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Archaeological Collection Sampling and Discard Protocols

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ABSTRACT

The intent of this project is to develop guidance on how to slow the growth in volume of materials requiring long-term curation and allow for future efficient management of collections of undetermined, little or no research potential. Guidance is given to relate collection management plans to associated project research designs. These guidelines are intended to be distributed to DoD cultural resources subject matter experts and cultural resources managers for discussion and implementation. The best practices presented would be implemented at the time of collection by the archaeologists who conducted the fieldwork. This will help reduce collection size in a well-documented fashion, and help make future de-accessioning more efficient. This report reviews SHPO collection, major repository curation standards, DoD, Army, Air Force, Navy, and Marine Corps instructions and guidelines, and the existing literature on sampling and discard practices. It discusses categories of artifacts most likely to warrant sampling and discard, and presents the results of a survey of cultural resources management firms about current actual practice. Procedures for and issues associated with destruction, de-accessioning for educational purposes, on-site burial, discard in landfill, or other alternatives for final disposition in keeping with the intentions of the regulatory revisions are explored. The report concludes with best practices for in-field artifact sampling, pre-accession discard, and future potential post-accession discard.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 BACKGROUND

1.1 Curation Crisis

The logistics of long-term curation of the large quantities of material collected from archaeological sites in the United States has become a critical problem for many agencies. The volume of curated materials is such that some repositories are no longer able to accept collections, or have been forced to raise curation fees and adopt restrictions on what materials they can accept (Childs et al. 2010). American archaeologists have been writing about the crisis in collections management for many years, and the problem is now well documented (Childs 2004, Praetzellis and Costello 2002, Wilson and Maples 1998, Campbell 2011, Lyons et al. 2006). The issue is not confined to the United States, but is felt keenly abroad as well (Ottaway 2010, Kersel 2015, Kletter 2015, Silberman 2015, Jamieson 2015). There is already a very large volume of archaeological material currently housed in curation facilities in varying states of condition, a continuous inflow of new material, and inadequate space, staffing, and other resources to manage these in perpetuity (Childs 2002). Various studies have been prepared that discuss aspects of the issue and propose adjustments to practice to alleviate the problem, including Legacy projects 06-319 and 00-107 (Sagebiel et al. 2010, USACE 2005).

Such practices include adopting no-collection strategies in the field where appropriate, field sampling, and pre-accession discard of redundant materials in the lab. These practices have become common, and current Department of Defense (DoD) practice generally encourages contractors to reduce collection sizes consistent with identified research needs. Air Force cultural resources instructions at AFI 32-7065, for example, encourages contractors to limit what is collected from the field, and what is retained in the lab consistent with Contracting Officer approved pre-fieldwork work plans. Beyond reducing the volume of what is accessioned for permanent curation, efforts to allow for post-accession discard are under way. Proposed revisions to 36 CFR 79, Curation of Federally Owned Archaeological Collections, designed to allow for de-accessioning extant collections have been published twice in the Federal Register, once in 1990 (55 FR 37670, September 12, 1990) but never finalized, and then again in 2014 (79 FR 68640, November 18, 2014).

These evolving practices will help reduce the volume of curated material, and may help make those important collections retained easier to access. However, there are a number of concerns related to no-collection field work, pre-accession discard, and post-accession discard that merit further examination. These include whether no- or limited-collection field studies are reliable and produce information adequate for decision making. Likewise, the practice of pre-accession discard raises questions about the research validity of resulting samples, and whether non-research heritage concerns have been adequately addressed. Lastly, there has been relatively little examination of how materials discarded from archaeological labs or curation facilities should be disposed.

1.2 Federal Guidelines

Policies and regulations concerning the collection and curation of artifacts during archaeological investigations exist at both the state and federal levels, including the Secretary of the Interior's Standards and the policies of individual federal agencies. The Secretary of the Interior's Standards for the Treatment of Historic Properties states that: "archeological resources will be protected and preserved in place," providing grounds to support limited collection and thus avoid site disturbance. However, *Secretary of the Interior Standards for Archeology and Historic Preservation, Standard I. Identification of Historic Properties Is Undertaken to the Degree Required to Make Decisions* says: "Identification activities should use a search procedure consistent with the management needs for information and the character of the area to be investigated. Careful selection of methods, techniques and level of detail is necessary so that the gathered information will provide a sound basis for making decisions." That means that limited collection methods are preferable only so long as the investigation is able to yield reliable information detailed enough to appropriately manage the resource.

Once collected, 36 CFR 79 requires that federal agencies curate federally owned artifacts and associated documentation. It applies to objects collected during the course of archaeological investigations "under the authority of the Antiquities Act (16 U.S.C. 431-433), the Reservoir Salvage Act (16 U.S.C. 469-469c), section 110 of the National Historic Preservation Act (16 U.S.C. 470h-2) or the Archeological Resources Protection Act (16 U.S.C. 470aa-mm)." The Secretary of the Interior Standards also have a bearing on curation and limited collection strategies, sampling, and pre-accession discard. Perhaps the most directly applicable is the Secretary of the Interior's Standards for Archeological Documentation:

> Archeological specimens and records that should be curated are those that embody the information important to history and prehistory. They include artifacts and their associated documents, photographs, maps, and field notes; materials of an environmental nature such as bones, shells, soil and sediment samples, wood, seeds, pollen, and their associated records; and the products and associated records of laboratory procedures such as thin sections, and sediment fractions that result from the analysis of archeological data. 48 FR 44734-37.

Of note is that the Standards cite objects that "embody the information *important* to history and prehistory" [emphasis added]. In practice, it seems that many archaeologists interpret the existing regulations and guidelines to apply to collections that have been formally accessioned. For example:

> In the National Capital area of the Park Service, we have been experimenting with what we euphemistically refer to as "pre-accession deaccessioning." All material recovered in the field is returned to the lab, where it is processed and inventoried. It is at this time that the project archeologist makes the determination to keep or reject artifacts or groups of artifacts for permanent accessioning (Sonderman 1996).

But the actual wording of 36 CFR 79 appears to be stricter. It isn't clear that the Secretary's Standards for Documentation supersede the language in 36 CFR 79. Neither the existing regulation nor the proposed revision makes a distinction between pre-accession or post-accession collections. A collection is defined as anything excavated or removed. Griset and Kodack say that reburial on site after cataloging meets the letter of the law, but is that strictly true if the material has been brought to the surface through excavation, or transported off-site to a laboratory? This raises the question of whether pre-accession discard, either in the field or in the lab is in a kind of legal limbo. The draft revised regulations (79 FR 68640, November 18, 2014) do not appear to allow either disposal in land fill or reburial. Transfer to another institution or destruction are the only options.

The Secretary's Standards and 36 CFR 79 lay the groundwork for archaeological material to be collected, analyzed and curated. However, despite an identified need to be able to reduce the overall volume of archaeological collections in federal ownership, there is currently no provision for doing so. Griset and Kodack (1999) state the following: "Currently there is no legal means for disposing of archaeological materials that are determined to be excess or redundant, once they have been collected from federal lands." Later on the same page they write "Once the materials have been accessioned into a federal collection, the only current legal means of disposing archaeological materials is through consumptive analysis or repatriation of items specified in the Native American Graves Protection and Repatriation Act."

Beyond the Secretary Standards and 36 CFR 79, DoD Service instructions provide service-specific guidelines for implementing federal historic preservation laws and regulations. These generally encourage minimizing the amount of collected material. AR 200-1 (USDA 2007) states that the Army should "minimize the amount of archeological material remains permanently curated by reserving such treatment for diagnostic artifacts and other significant and environmentally sensitive material that will add important information to site interpretation."

SECNAVINST 4000.35A (2001) states "Archeological sites under the control of DON should be excavated only to the extent required for evaluation and identification, unless scientific or programmatic considerations (including other planned uses of a site), or concerns about the integrity or security of a site, make more extensive excavation necessary or advisable. The use of noninvasive or minimally invasive identification and evaluation techniques is encouraged when practical." Air Force Instruction 32-7065 (2014) says to

> Process and maintain all final collections of archaeological artifacts and records IAW 36 C.F.R. § 79, Curation of Federally-Owned and Administered Archaeological Collections. NOTE: Final collections are those forwarded by contractors or permitted researchers to approved curation facilities. Contractors/researchers are expected to reduce collection sizes/curation burdens by sampling large collections of common redundant artifacts, analyzing bulk samples, culling non-artifacts and unanalyzed bulk samples, and disposing of unwanted portions of collections IAW with Contracting Officer (CO) approved pre-fieldwork work plans (aka research designs, sampling plans, curation plans, etc.), required by each Statement of Work(SOW).

The wording of the AFI appears to interpret the requirements of 36 CFR 79 as applying only after a collection is submitted to a repository as a final collection.

1.3 State Standards and Guidelines

1.3.1 Fieldwork

State standards and guidelines for archaeological investigations and collections curation were reviewed for this project in order to delineate the extent of practice recommended by state review agencies. Relevant quotes and brief summaries are presented in Appendix A. There is a range of practice recommended in existing state standards and guidelines for archaeological investigations. Most states allow in-field sampling at least implicitly. Some, like New Mexico and Oregon, actively encourage no-collection strategies, while others, like Georgia, appear to discourage the practice. "Typically, all artifacts are collected. However, any material not collected such as brick, mortar, shell, or fire-cracked rock—may be counted, measured (when appropriate), weighed, sampled by provenience, and discarded in the field" (Georgia Council of Professional Archaeologists 2014). Pennsylvania guidelines state "In general, all observed artifacts should be collected during a Phase I survey; however, for certain artifact types a sample can be collected (i.e. brick, window glass, plaster, etc.). Consult with the SHPO regional reviewer before instituting a sampling strategy (PA SHPO 2016)." Maryland's standards state that all non-recent artifacts should be retained:

> While sampling of the area of potential effects is generally necessary, surveyors should retain all of the prehistoric and historic artifacts recovered from the sampled land for analysis and curation. (Recall that this document's definition of artifact includes only those cultural items which are at least 50 years old. Therefore, an archeologist need not collect clearly modern objects like styrofoam cups or aluminum pull-tabs. It may be useful, however, to save a modern cultural object if it is critical for the interpretation of an archeological property's stratigraphy and integrity.) (Maryland Historical Trust 1994)

Several states allow in-field sampling, but require that some artifacts be collected (e.g. Arkansas, Indiana, Kansas, Louisiana, Minnesota, Mississippi, and Missouri). What this means in practice varies from state to state. Arkansas guidelines read "sampling is acceptable, but some artifacts must be collected and curated (Arkansas Archaeological Survey 2010)." Mississippi elaborates on this theme: "Representative artifact collections (i.e. all artifact forms, not just diagnostics) must be made from archaeological sites identified within the project area for the purposes of determining the site's temporal and cultural affiliations, as well as the functional and technological aspects of the assemblage (Simms 2001)." Kansas asks that all diagnostic surface artifacts, and all subsurface artifacts, except bulk classes such as fire-cracked rock, be collected (Kansas State Historical Society 2010). Indiana draws a distinction between practice for prehistoric and historic period sites.

> On prehistoric sites, all diagnostic artifacts and all artifacts found within individual transects (1 meter to either side of transect centerline) will be collected, with the exception of fire-cracked rock (FCR). Concentrations and relative densities of all artifacts, including FCR, must be recorded. Counts, densities, and/or weights of FCR, must be recorded.
>
> …
>
> On historic sites, if the Field Supervisor (or Principal Investigator) meets the state qualification standards in Midwestern historic archaeology and is thoroughly familiar with the ages and functions of historic artifacts, then thorough collections of artifacts of recent origin (less than 50 years old) need not be made. If there is any doubt as to the age, function, or information potential of artifacts, collections should be made for identification purposes. A decision not to collect all of the artifacts found within individual transects (1 meter to either side of transect centerline) must be justified and approved by DHPA prior to the initiation of fieldwork or at a point during the fieldwork when a situation arises that forces such a revision. The exception to this is in the category of large amounts of architectural/construction items. Artifacts such as bricks, concrete blocks, and other construction debris do not need to be collected (although they must be noted and described, and densities estimated, counted, and/or weighed), unless there is something diagnostic (e.g., manufacturer's mark, name or place stamped on an artifact, artifact has relevant functional information, etc.) about them or if the research design delineates such methodology for a specific study (e.g., early 19th century brick manufacturing).
>
> …
>
> "All artifacts encountered during the subsurface investigation need to be collected and bagged by provenience (trench, depth, features, etc.). Intermediate trenches/augering may be required for accurate definition of site boundaries (Indiana Division of Historic Preservation and Archaeology 2008).

The implication of this is that there is no single approach that federal agencies can adopt that will be applicable in all situations. Consequently, agencies should prepare field strategies in consultation with the applicable State Historic Preservation Officers (SHPOs) and Tribal Historic Preservation Officers (THPOs) that fit the historical and environmental setting of the proposed work and will be effective in identifying and evaluating archaeological sites anticipated to be encountered. This is in keeping with the spirit of*, Standard I. Identification of Historic Properties Is Undertaken to the Degree Required to Make Decisions.* A broad range of survey techniques are potentially compatible with this requirement; however, inaccuracies in artifact identification are an issue for National Park Service (NPS) standards insofar as they potentially undermine correct identification and evaluation of archaeological sites. Agencies should understand that investigations carried out in different parts of the country may require substantially different levels of effort to complete effectively.

The Secretary's Standards for Treatment express a preference for preserving archaeological sites in place (The Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995, Standard 8). This would appear to favor no-collection strategies where appropriate. This might arguably be most true for sites that are in protected locations, and not vulnerable to loss from erosion or human activity. However, this ethic also may suggest that disposing of artifacts once collected from a site is potentially problematic since that could undermine the future preservation of the site, especially if material considered redundant or unimportant proves to be of greater interest to future generations.

1.3.2 Curation

An internet search was made to locate state standards for the curation of archaeological collections. Not all states have explicit state-level standards or guidelines for curation; this is sometimes left to individual repositories. Many states do explicitly address pre-accession discard: 23 have statements in their guidelines that address the issue one way or another, including 18 that appear to encourage culling, or at least allow it under certain circumstances. None explicitly elaborate on how materials that are not to be curated are to be disposed.

Where state guidelines have addressed the issue, there is a diversity of views. Some states, like California, Georgia, and Florida appear to allow the practice of culling for some material given proper consultation. Example text from similar state curation guidelines include the following:

> After careful consideration is given to retaining representative samples, some materials may be discarded prior to submitting collections for curation. Record materials being discarded in a separate catalog record. The OSA catalog database employs a yes/no field to record discarded material. Currently, the OSA lists the following materials that may be discarded:
>
> 1. Fire-cracked rock;
>
> 2. Noncultural or unmodified rock;
>
> 3. Masonry materials including brick, cement, mortar, limestone;
>
> 5. Slag, cinders, and coal; and
>
> 6. Other bulky, redundant, or non-diagnostic materials lacking either secure archaeological context or research applications.
>
> (Association of Iowa Archaeologists 1999)

> Certain types of material may have questionable long-term research value and thus may not warrant permanent curation with the collection. These materials may include: brick, mortar, slag, coal, shell, and recent 20th/21st century debris (i.e., less than 50 years old). It may be more prudent to discard these items following analyses, rather than to permanently curate the materials with the collection. The collection's catalog must specify the types and quantities of discarded materials, along with a justification for the selected discard, including means and location,

and a note in the catalog that the items were discarded. The discard of bulk artifacts such as fire-cracked rock, window glass, shell, and other materials is a topic of ongoing national discussion. As curation storage space is filled and curation box fees rise, archaeologists and institutions curating archaeological artifacts are discussing the need for rigorous discard policies that minimize the loss of important archaeological information.

(Maryland Historical Trust 2005)

Because of the large number of artifacts associated with some types of Native American and many historic sites, the principal investigator in conference with the NHDHR and the NHDOT may need to address which portions of the assemblage are retain. Retention includes collection sufficient to permit its reanalysis to examine the research questions of the data recovery project from a different perspective and pursue other questions and types analyses at a later date. The method of and reasons for the artifact selection and the discussions about it with the State Archaeologist are documented in the Phase III report.

(New Hampshire Department of Transportation 2004)

Some categories of artifacts may be discarded after they have been identified and recorded. This includes modern objects and bulk items which have no diagnostic value beyond their presence (e.g., coal and coal waste; and construction materials such as mortar, brick fragments, and cut stone fragments). Representative specimens of these latter items should be retained. Artifacts of all categories should be recorded quantitatively.

(New Jersey Historic Preservation Office 2004)

For artifacts such as fire cracked rock, unmodified chert cobbles, limestone fragments, or brick, retain a sample, then weigh, record and discard the remainder. Tabulate, describe and discard late 20th century materials, such as aluminum cans or bottle glass, that have no bearing on site interpretation. Do not include unprocessed soil samples.

(Tennessee SHPO 2009)

Certain types of bulk artifacts and artifacts with limited context or no context have questionable long-term research and exhibit value and thus may not warrant permanent management with the collection. These materials may include: fire-cracked rock, flakes, brick fragments, mortar, slag, coal, shell, artifacts designated as ‘locations,’ and 20th /21st century debris, especially artifacts less than 50 years old. In certain types of field recovery approaches, like controlled surface collecting, many of these items may be noted, counted, weighed, and left in the field. Recovered items that are slated for selective discard must be cataloged and analyzed. The collection's catalog must clearly identify and quantify the discarded

> materials. A project's principal investigator, in consultation with the Chief Curator, should employ the best professional judgment to decide what to discard. Factors to consider in reaching the decision to selectively discard materials include: archaeological context, the redundancy of the materials, and the item's research, education, or exhibit potential.
>
> (Virginia Department of Historic Resources 2011)

> For some artifact categories, permanent curation of every item might not be viewed as warranted or economically feasible, and curation facilities must make decisions regarding such items' disposition. Some items might be assessed as having questionable long-term research value, while others pose problems for permanent curation because of bulk, weight, or instability. Some common examples are unmodified rock or fire-cracked rock from prehistoric sites, or plate-glass fragments, nails, or other building debris from historic sites.
>
> Factors to consider in deciding to dispose of some materials include archeological context, research potential, amount and manageability of the materials, stability, and available curation and conservation resources. Archeologists should employ the best professional knowledge and judgment to decide how to deal with these materials, and should consider the items' potential future research value. Depending on their size and stability, these materials might be either analyzed and left in the field or returned to the lab for analysis but discarded before final curation.
>
> As noted previously, implementation of artifact sampling strategies must be negotiated with WHS/SHPO and any agencies on whose behalf the research is undertaken in advance of field research or other investigations."
>
> (Wisconsin Archaeological Survey 2012)

Some states make stronger statements encouraging sampling:

> As a rule, unanalyzed bulk samples of soil or materials such as fire-cracked rock will not be accepted for curation. Exceptions may be made, in writing, at the discretion of the State Archeologist.
>
> (Kansas State Historical Society nd)

> Only an adequate representative sample of certain artifact classes (e.g., brick, fire cracked rock, window glass, etc.) will be accepted for curation. In general, bulk amounts of these classes of artifacts should be quantified, weighed, measured and recorded in the field. However, prior approval can be given on a case-by-case basis. Exceptions will not be made without prior consultation with the ACF curators.
>
> (Archaeological Collections Facility of West Virginia 2002)

Other states appear to be more restrictive.

> Every artifact must be cleaned, labeled with permanent provenience designation (either by writing directly on the artifact or by placing artifacts in appropriate labeled containers), and listed in an inventory organized by provenience. Type identifications should correspond to local and regional descriptive and classificatory systems, unless a rationale for new types is in the project report. Artifacts requiring stabilization by a professional conservator shall receive prompt treatment. All survey collections (including artifacts, field records, laboratory records, and a copy of the final report) must be placed in an archaeological repository for permanent curation approved by the Alabama Historical Commission. Such repositories must meet Department of the Interior 36 CFR 79 guidelines for ""professional, systematic and accountable curatorial services on a long-term basis"". These services include storing and maintaining collections in clean, physically secure conditions with appropriate environmental controls, and providing access and facilities for study of the collections.
>
> (Alabama Historical Commission 2006)

> Archaeological projects may not unilaterally discard or otherwise dispose of survey or excavated collections from State lands. Collections from Other Lands in Arizona It is the responsibility of all parties using ASM as a repository to comply with the policies and guidelines of the agency owning, sponsoring, or authorizing the project. This is particularly critical for the disposal of material. Complete records of any such disposal must be provided to ASM as an essential part of the project documentation."
>
> (Arizona State Museum 2004)

> All artifacts not returned to the landowner, copies of field and laboratory records and documentation, maps, photographs, samples recovered or taken, notes, site forms, site and project report(s), other relevant records, documentation, etc. must be curated at a qualified curational facility.
>
> (Indiana Division of Historic Preservation and Archaeology 2008)

> 1. The classes of material remains which should be curated can be determined from the research problems contained in pertinent research designs or historic contexts for archaeological resources.
>
> 2. At least a representative sample of each class of material remains and all associated records should be curated. The disposition of non-curated material remains from archaeological investigations should be documented in accordance with standards and guidelines such as those adopted by the American Association of Museums.
>
> (Ohio Historic Preservation Office 1994)

Still other states guidelines lack a direct statement on the issue.

> Submitters are reminded that they must comply with all relevant Federal, State, or Tribal guidelines concerning the disposal of portions of collections prior to submission for curation. Although the Curator, ARC, strongly encourages archaeologists to consult with the state or federal agency supervising their investigations regarding the need to curate all materials collected during the investigation, the Museum of New Mexico accepts no responsibility for the selection of collections for disposal prior to their submission to ARC. Furthermore, the ARC staff cannot dispose of any artifacts or samples once a collection is submitted for curation.
>
> (Museum of New Mexico 2002)

> Specific artifact and sample collection policies are determined by the responsible lead agency. Check with the lead agency to determine collection policies prior to fieldwork.
>
> (University of Wyoming Archaeological Repository 2013)

Generally speaking, most of the advice given by states remains relatively broad irrespective of their overall leanings. In contrast, Pennsylvania gives fairly specific guidance:

> Some artifact types found on archaeological sites are not worthy of long-term curation due to their ubiquity, discovery context, physical condition, or a combination of several or all of these factors. Discards, however, must be appropriately analyzed, cataloged, and noted as such on artifact inventory sheets. Retention of a 5% minimum randomly selected sample of identifiable iron nails and fire-cracked rock is recommended from each distinct provenience/catalog unit within a site. The following artifact types may be discarded without sample retention, so long as they satisfy stated contextual criteria.
>
> - All surface-collected roadside debris. [Careful distinction between roadside and household debris must be made where historic sites exist next to roadways.]
> - Severely corroded unidentifiable metal from all contexts.
> - Brick and mortar fragments from surface or plow zone contexts.
> - Window glass pieces from surface or plow zone contexts.
> - Asphalt and concrete from surface, plow zone, and fill layer contexts.
>
> (Pennsylvania Historical and Museum Commission 2006)

Similar to Pennsylvania, Vermont also gives fairly specific guidance, and notably stresses the importance of retaining materials from pre-contact sites collected at a Phase I level, since the significance of given artifact classes may not be apparent at that stage:

> Archeologists must carefully weigh decisions about which artifacts or data sets to keep since caring and managing for collections in perpetuity involves significant costs, commitments, and efforts. The National Park Service offers excellent guidance and information for dealing with many of the complex topics associated with care and management of collections at their web site http://www.cr.nps.gov/aad/curation.htm.
>
> Generally, all cultural materials recovered from a pre-contact site are considered important and worthy of care and management in perpetuity. However, data classes such as fire cracked rock from fire pits, hearth or other feature fill, soil samples, and some other kinds of data should be judiciously evaluated to assess whether it is necessary to keep all or part of it after analysis. The type of site involved will affect these considerations. Retaining collections from pre-contact site contexts is especially important when an investigation ends after Phase I since it may not be possible to know what the collected set of data represents. Artifacts and other data classes from historic period archeological sites require more deliberation and decision-making about what to keep after analysis. Generally, the earlier, or rarer, or otherwise more special the historic archeological site, the more materials should be retained if they pertain to the site's period of significance. Even for early historic sites, disposition of large quantities of brick, glass, rock, and other construction materials needs to be carefully considered; only appropriate samples should be maintained. For more common types of historic period archeological sites, the most important parts of the collection are those data sets that addressed the research questions. Twentieth century artifacts such as tin cans, bottles, bottle caps, and so forth, in 19th century contexts should not be retained although documenting their archeological context may be necessary or even important. Occasionally, however, it is crucial to retain an out-of-context artifact as confirmation of site disturbance or site age or because it offers another important piece of information.
> (Basque et al. 2017)

As with the practice of no- or limited-collection field survey, there is a broad range of recommended practice across the United States. Thus, as with fieldwork, agencies in crafting scopes of work and working with contractors will need to consider the specific standards and guidelines in place for the state in which work is anticipated along with the nature of anticipated resources and artifacts likely to be encountered. Consultation with the SHPO/THPO and anticipated artifact repository are advisable as a component of project planning prior to the initiation of fieldwork, collection, and artifact processing.

2.0 NO COLLECTION, LIMITED COLLECTION, AND ARTIFACT SAMPLING

2.1 Issues with In-Field Artifact Identification

No-collection field strategies have been adopted in an effort to preserve sites in situ, to help curb survey costs, and to limit the amount of material flowing into a system of arguably overburdened curation facilities. One could argue that a no-collection strategy where viable better complies with the spirit of *preservation in place* than collection strategies. However, not collecting material from identified sites may also expose sites to loss from unauthorized collection or erosion.

Critiques of no-collection strategies include concern that the site is left vulnerable to subsequent loss if no sample is taken. The absence of a curated collection or sample precludes restudy of the objects in the light of new research questions or methodologies while also leaving the results of the original archaeological field study unverifiable (Butler 1979). Thus an effective no-collection survey is predicated on accurate and complete identification of artifacts by field personnel.

However, there is evidence that in recent years has questioned the accuracy and replicability of these efforts. One study (Heilen 2013) has suggested that in-field identification may not be as reliable as hoped. Legacy Project No. 11-157), compared the results of in-field artifact analysis with laboratory analysis using artifacts from two prehistoric archaeological sites in southeastern Arizona and south-central New Mexico. In-field artifact analysis was conducted by two different field technicians. The objects were then collected. Trained laboratory personnel then either identified the physical object, or a digital photograph of the artifact. The project authors concluded that:

> In general, the results of these assessments showed that both the in-field and the digital-photograph analyses were of low accuracy and were often inadequate for site interpretation. Rare and important artifact types were often misclassified, and evidence for both random error and systematic bias in artifact identification was common. Digital-photograph analysis tended to be more precise than in-field analysis, but digital photograph analysis also tended to identify rare types incorrectly, resulting in more-precise but inaccurate inferences about the temporal and cultural affiliations of a site (Heilen 2013).

The results of this study raise the possibility that in-field analysis, or even artifact analysis based on laboratory review of digital photographs may potentially misidentify key objects, leading to potential mischaracterizations of site temporal and cultural affiliations. This could, in turn, result in mischaracterization of site significance, undermining the study's responsiveness to the Secretary's Standards requiring that investigations be carried out to the level necessary to yield reliable identifications and determinations. In response to these identified limitations, the Legacy Project authors recommend consulting with project stakeholders about the information needs of a survey before initiating a no- or limited-collection survey. They also recommend that practices be adopted to improve in-field identification, including training, developing field guides, and improving the implementation of digital field recordation practices (Heilen 2013).

However, having all field crew versed in detailed artifact identification may be impractical, and in some cases, artifacts may need to be cleaned and examined carefully under good light or magnification for proper identification. Having an in-field laboratory may be a possibility for large projects with schedules spanning a significant amount of time, but is not practical for many small, or short-duration cultural resources management (CRM) survey and evaluation projects. The use of detailed field guides in conjunction with digital recordation of objects in the field may help improve results. No collection field strategies can also be supplemented with limited collection of certain classes of artifacts that either require additional laboratory analysis, or are prone to misidentification. Additional projects like Legacy Project 11-157 carried out in other regions of the country will also help in understanding the extent and nature of the problem. Because anticipated material culture, state survey standards, and curation repository expectations differ substantially from one part of the country to another, agency staff and field archaeologists are advised to consult with the SHPO/THPO and anticipated repository in developing a collection strategy.

It may be worth noting that the location and size of recorded archaeological sites will not be affected by collection strategies. However, National Register of Historic Places (NRHP) evaluation requires accurate temporal, cultural, and functional characterization. Installation cultural resource managers evaluating the reliability of archaeological field results related to NRHP eligibility should consider what measures were in place to check the reliability of artifact identifications. Where material was not collected, photographs and/or a sample to allow for subsequent verification of identifications will improve the reliability of eligibility determinations.

2.2 Issues with Pre-Accession Discard

There are many reasons why archaeologists may not wish to curate all the material brought back from a field project. Most obvious are those instances where collected material proves on closer examination to be non-cultural. But there are also valid reasons for collecting artifacts, floral and faunal material and bringing these to a laboratory for analysis, but not curating all of them, especially if they are extremely numerous and of very limited information potential. It may make sense to be able to measure and weigh lithic debitage, fire-cracked rock, brick fragments and window glass for example. Oyster shell might be classed by size and species. But once these data have been recorded, it may be unlikely that these materials will have any future additional research value that requires the original object to be present for inspection, especially if analysis shows the site the material came from is not archaeologically significant owing to heavy disturbance or other issues. In such cases, a good argument can be made that further resources should not be expended to curate this material.

Pre-accession discard differs from field sampling in an important respect. Rather than leaving some material in the field in original, or near original physical context, materials have been removed from a site and transported to a laboratory for analysis. This difference raises many important issues, including whether the resulting sample will have any statistical validity for

analytical purposes, whether the practice of pre-accession discard is consistent with regulatory requirements and professional archaeological ethics, and whether the methods of discard risk creating a false archaeological site.

What is brought back from the field is already a sample. To retain some is a sample of a sample, thus its statistical value may be compromised or unclear, especially if the second sampling methodology is not systematic or is unclearly documented. The basis for sampling must consider how the significance or redundancy of artifacts and artifact classes is determined, and how this relates to any potential research questions that might be addressed to data from the site.

Another issue, particularly in a Section 106 context where the site will be destroyed, and the collection will be all that remains, is whether pre-accession discard reflects the professional ethics of archaeology as a discipline. Certain discard methods may also risk creating secondary, artificial sites. Disposal of site material anywhere other than on the site would appear to violate the standard of preservation in place, unless the material is recent and unrelated to the site's significance, or the site has been, or will be destroyed, and data recovery has been implemented to mitigate the adverse effects of loss.

The formal ethical statements prepared by the Society for American Archaeology (SAA), the Society for Historical Archaeology (SHA), and the Register of Professional Archaeologists (RPA) were reviewed for statements that have a bearing on archaeological discard. While not having the weight of federal law or regulation, they do represent important statements on best practice developed by archaeology as a discipline. Several of the SAA's principals (SAA 1996) relate to issues arising from artifact disposal, including Principles 1, 2, 3, 4, and 7.

> Principle No. 1: Stewardship
>
> The archaeological record, that is, in situ archaeological material and sites, archaeological collections, records and reports, is irreplaceable. It is the responsibility of all archaeologists to work for the long-term conservation and protection of the archaeological record by practicing and promoting stewardship of the archaeological record. Stewards are both caretakers of and advocates for the archaeological record for the benefit of all people; as they investigate and interpret the record, they should use the specialized knowledge they gain to promote public understanding and support for its long-term preservation.
>
> Principle No. 2: Accountability
>
> Responsible archaeological research, including all levels of professional activity, requires an acknowledgment of public accountability and a commitment to make every reasonable effort, in good faith, to consult actively with affected group(s), with the goal of establishing a working relationship that can be beneficial to all parties involved.
>
> Principle No. 3: Commercialization

> The Society for American Archaeology has long recognized that the buying and selling of objects out of archaeological context is contributing to the destruction of the archaeological record on the American continents and around the world. The commercialization of archaeological objects - their use as commodities to be exploited for personal enjoyment or profit - results in the destruction of archaeological sites and of contextual information that is essential to understanding the archaeological record. Archaeologists should therefore carefully weigh the benefits to scholarship of a project against the costs of potentially enhancing the commercial value of archaeological objects. Whenever possible they should discourage, and should themselves avoid, activities that enhance the commercial value of archaeological objects, especially objects that are not curated in public institutions, or readily available for scientific study, public interpretation, and display.
>
> Principle No. 4: Public Education and Outreach
>
> Archaeologists should reach out to, and participate in cooperative efforts with others interested in the archaeological record with the aim of improving the preservation, protection, and interpretation of the record. In particular, archaeologists should undertake to: 1) enlist public support for the stewardship of the archaeological record; 2) explain and promote the use of archaeological methods and techniques in understanding human behavior and culture; and 3) communicate archaeological interpretations of the past. Many publics exist for archaeology including students and teachers; Native Americans and other ethnic, religious, and cultural groups who find in the archaeological record important aspects of their cultural heritage; lawmakers and government officials; reporters, journalists, and others involved in the media; and the general public. Archaeologists who are unable to undertake public education and outreach directly should encourage and support the efforts of others in these activities.
>
> Principle No. 7: Records and Preservation
>
> Archaeologists should work actively for the preservation of, and long term access to, archaeological collections, records, and reports. To this end, they should encourage colleagues, students, and others to make responsible use of collections, records, and reports in their research as one means of preserving the in situ archaeological record, and of increasing the care and attention given to that portion of the archaeological record which has been removed and incorporated into archaeological collections, records, and reports.

The implication of Principle 1, Stewardship, is that culling should not be done in a manner that undermines the integrity of the archaeological record. This might argue for a conservative approach, not culling materials unless necessary. This would be counterbalanced by the idea that curating all materials collected from a site might undermine the long-term viability of more crucial collections, or crucial parts of collections. Care must be exercised in finding this balance,

particularly in the justification for any culling, and in the preparation of a sampling strategy and associated research design. Without a rigorous research design, it would be difficult to practice culling in a manner consistent with this principle.

Principle 2, Accountability, underscores the importance of consulting with applicable agencies and other stakeholders about decisions made regarding sampling and culling. This would arguably include preparation of a research design responsive to a broad range of potential interests in a site. The identification of categories of potentially redundant materials, the development of a sampling strategy, and implementation of a disposal plan. Consultation would ideally give a range of stakeholders an opportunity to express their concerns, including involved agencies, SHPO/THPOs, other archaeologists and potentially members of the interested public.

Principle 3, Commercialization, makes it clear that artifacts selected for culling must not be sold or traded in any way. Principle 4, Public Education and Outreach, would support finding ways for artifacts not needed for curation to be of use for the public. Principles 5 and 6 do not clearly relate to artifact discard, but Principle 7, Records and Preservation, underscores the importance of clearly documenting the rationale for culling, the method used to derive a sample, and a catalog of any discarded materials.

RPA's Codes and Standards of Research Performance Section III, Procedures for Field Survey or Excavation are relevant here (RPA 2017).

> 3.1 - If specimens are collected, a system for identifying and recording their provenience must be maintained.
>
> 3.2 - Uncollected entities such as environmental or cultural features, depositional strata, and the like, must be fully and accurately recorded by appropriate means, and their location recorded.
>
> 3.5 - Insofar as possible, the interests of other researchers should be considered. For example, upper levels of a site should be scientifically excavated and recorded whenever feasible, even if the focus of the project is on underlying levels.
>
> - During accessioning, analysis, and storage of specimens and records in the laboratory, the archaeologist must take precautions to ensure that correlations between the specimens and the field records are maintained, so that provenience contextual relationships and the like are not confused or obscured.
> - Specimens and research records resulting from a project must be deposited at an institution with permanent curatorial facilities, unless otherwise required by law.
> - The archaeologist has responsibility for appropriate dissemination of the results of her/his research to the appropriate constituencies with reasonable dispatch.

The SHA's statement on ethical principles, Principle 4 is useful in this context (SHA 2015).

> Principle 4. Archaeology is like doing detective work where you can only interview suspects one time. Once you excavate a unit or feature, you have destroyed the information it contains. Take detailed notes and records for the benefit of future researchers. You also have a responsibility to make certain the collections are properly analyzed and curated so they are available to other researchers.

One overall implication of these ethical principles is that artifacts should not be discarded merely out of convenience or as a cost saving effort, but should be carried out in a manner that does not significantly compromise the principles of stewardship. In considering discard, one must ensure that critical materials and information are not lost. Where artifacts can be properly discarded, they should not be discarded prematurely. Kentucky has specific guidelines for pre-accession discard, and specifies that nothing should be discarded until a final evaluation of eligibility is made, and that if further work is recommended, all material should be kept until that work is accomplished (Kentucky Heritage Council nd).

Another implication is that if material is discarded, it must not be for commercial gain. This means that if artifacts are to be transferred to another entity, they may not pay for it. By extension, the instrument of such transfer would probably need to contain language that restricts the sale of transferred artifacts by the new and any subsequent owner.

One final ethical issue concerns the danger of disposing of archaeological material in such a way that it might create what might later be incorrectly interpreted as an archaeological site. While not explicitly stated in any professional ethical standards, it is implied within the ethical obligation to act as stewards of the archaeological record, which would be undermined by the creation of false sites. It is also among the concerns raised among the comments to the proposed revisions to 36 CFR 79 (Ewen 2015).

To explore these concerns, it is necessary to discuss in turn how significance or redundancy of artifacts might be framed, how consultation with project stakeholders can inform decisions about significance, and how sampling strategies and methods might be designed and implemented.

2.3 Determining Artifact Research Value

In order to generate a sampling strategy either for limited field collection or pre-accession discard, it will be necessary to assess the relative information potential of the kinds of artifacts anticipated, and identify for which of these large samples will likely prove redundant. As observed in the introduction to the 2014 revisions to 36 CFR 79; comments to the proposed 1990 revisions identified the: “need for procedures to determine a “representative” sample of bulky, non-diagnostic objects to be retained for future research from material remains to be discarded (NPS 2014).” Such an assessment requires an understanding of the different kinds of value that an artifact might have.

What is an artifact of limited research value? When does an artifact become redundant? Most sources that discuss this question approach it from a research value perspective (e.g. Griset and Kodack 1999), but it is also important to recognize that symbolic cultural values need to be considered as well. This most obvious for any objects potentially associated with human burials as the requirements of the Native American Graves Protection and Repatriation Act (NAGPRA) make clear. But other communities may attach value to grave materials not covered by NAGPRA. Some materials common on historic period burial sites like nails and window glass might, by themselves, fall into classes of artifacts that in other contexts might be regarded as potentially redundant. Yet descendants of those buried would likely want all material saved and treated with respect. Similarly, some of the comments from tribes to the proposed revisions of 36 CFR 79 state that to some, any material associated with their ancestors has some heritage value that should be respected. As Praetzellis and Costello (2002) point out, heritage value could also involve materials of low information value from a research perspective, but nevertheless valuable from a heritage perspective for being useful for exhibits, photographs, or teaching even if they might otherwise be considered redundant. Objects with heritage value might also include any material with symbolic, religious, or emotional significance, independent of whatever its information potential might be.

Those sources that discuss sampling and discard methods from a research perspective often use the terms "diagnostic" and non-diagnostic" to describe information value. While the term "diagnostic" is often used, it isn't often defined. Table 1 provides some examples of definitions from the archaeological literature. The uncritical use of the term "diagnostic" in archaeology runs the risk of circular reasoning. It can be a little like saying something is useful because you can use it. It could be argued that any object identified as an artifact is at least minimally diagnostic of some human activity, if only in a very limited way. However, clearly the attributes of some objects include more potential information about time, culture, and use than others, and it is objects that have a lot of information specific to a particular time, place or culture that archaeologists term "diagnostic." But what density of information potential or degree of specificity needs to be met before an artifact or eco-fact can be termed "diagnostic" or "significant"? The potential significance of any diagnostic attribute will depend on the context, and the questions raised in an applicable research design. On historical archaeology sites, objects with maker's marks are often termed diagnostic because the text of the mark may give a very specific manufacture date and location. Common objects with long production periods, such as wrought nails, might be considered redundant in many contexts. Yet on a contact period site, where such objects might be very rare, any object made with European technology, no matter how simple, could be of great significance.

Table 1: Definitions of Diagnostic

Definition	**Source**
an item that is indicative of a particular time period and/or cultural group.	http://www.wvculture.org/shpo/glossary.html
indicative of a particular time and/or	http://mvac.uwlax.edu/glossary/diagnostic-artifact/

cultural group	
artifacts that mark specific time periods in archeology	https://www.nps.gov/archeology/afori/howfig_mar1.htm
an item that was only made or used for a limited period, and thus indicates use during a particular period or by a certain group who made or used it; there can also be diagnostic assemblages	http://thesga.org/2001/01/diagnostic-artifact/

The emphasis in the definitions shown in Table 1 is on chronology, though cultural group is also sometimes mentioned. Certain attributes of an artifact can also relate to a specific function. Unmodified faunal or floral remains, or eco-facts, can also have attributes that reflect species, age, and environmental conditions. Categories of artifacts typically found to be non-diagnostic, or redundant, are ones with relatively low information density, or where associated temporal or cultural categories are unhelpfully vague or broad. Thus artifacts can be diagnostic, or significant, in a variety of different ways. It might help discussions of significance and artifact categories to break these out. To give an example in table form, one can include columns for the categories of information to which an artifact type might contribute information as well as an assessment of how precise its information potential is. Table 2 compares shell (often considered to have low information potential) versus a more information rich decorated ceramic.

Table 2: Understanding Information Potential

Artifact Type	**Temporal**	**Cultural**	**Functional**	**Environmental**	**Public/Heritage**
Oyster Shell	Variable	Low	Low	Variable	Low
Decorated Ceramic	High/specific	High/specific	High/specific	Low	High

Note that for most categories the ceramic has more information potential than the shell. But oyster shells that are complete enough to show size and species may have information about environmental conditions at a particular place and time not available elsewhere. Significance is always dependent on context and research goals.

2.4 Selecting Materials for Sampling

The state-specific guidelines referenced in Section 1.3, and included in Appendix A, include a lot of advice on how to approach sampling and culling. For example, the Maryland Historic Trust offers the following:

> Certain types of material may have questionable long term research value: and thus may not warrant permanent curation with the collection. These materials may include: brick, mortar, slag, coal, shell, and recent 20th-century debris (i.e., less than 50 years old) ... Factors to consider in reaching the decision to selectively discard materials include: the archaeological context of discovery, the items' research potential, [and] the amount and manageability of the materials (Maryland Historic Trust 1994).]

The list of potentially disposable materials is fairly common. However, as the Maryland Historical Trust (MHT) points out above, such guidelines need to be taken with care, and strategies adjusted according to site type and research needs. For example, very small artifact fragments (glass, ceramic) may be indicative of field scatter, and thus of using night soil as fertilizer. If so, then size, type and distribution might be noted, but the artifacts themselves may have no value beyond such recordation. Also, MHT's advice above about slag might solicit objections from those interested in what slag might say about industrial processes at the site where it was found.

The importance of context sensitivity is repeated by authors who have elaborated beyond state-specific guidelines on sampling guidelines for specific classes of archaeological material. Among the more comprehensive of these efforts is included as Table 6 in Guidelines for the Field Collection of Archaeological Materials and Standard Operating Procedures for Curation Department of Defense Archaeological Collections (Griset and Kodack 1999). Griset and Kodack's table provides a fairly comprehensive list of potentially redundant materials along with specific advice about ways by which they may be productively sampled.

Praetzellis and Costello (2002) take a different approach from Griset and Kodack by recommending some broad categories of collected materials as particularly appropriate for disposal:

> • construction materials such as brick, lumber, and concrete. While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants.
>
> • non-cultural items such as rocks, stones, and tree parts.
>
> • amorphous lumps of metal not potentially identifiable.
>
> • non-diagnostic tin-can parts (seams, openings, and other identifying portions were collected, portions sufficient to analyze types and quantities)

• artifact fragments smaller than a dime.

For most sites these recommendations are sound. Of course in certain contexts, such as a contact period site, even a small amount of unidentifiable metal might be very important, and what is unrecognizable to the eye might be identifiable in an x-ray. Presumably Praetzellis and Costello don't mean for their advice about artifacts smaller than a dime to refer to artifacts such as buttons, pins, or other information rich "small finds." Yet other very small artifact fragments can suggest whether the items were found in original context, or are very small because they have been redeposited, as with materials in night soil used as fertilizer. Even so, they may have little use after they are counted and cataloged.

Praetzellis and Costello (2002) also point out that research interests are not the only value that should be considered. Collection managers also need to consider teaching, display or heritage values that archaeological materials may have. There may be objects that aren't useful for analysis but that would work for display, teaching, or that site stakeholders or descendants would consider important or valuable.

Oyster shell, found in prodigious quantities on some sites, is often recommended for sampling and discard. However, Peacock (2015) in his comments to the most recently published proposed revisions to 36 CFR 79 notes the potential environmental history applications of shell:

> I basically agree with both the intent and the specifics of this proposed rule. My comments involve the thorniest part, retaining a "representative sample" of materials followed by disposal of the remainder. I wish in particular to point out the vagaries of "representative sample" where biotic remains, specifically shellfish remains, are concerned. Shell middens build up laterally at the same time they build up vertically. Because of this, any samples retained must be spatially extensive, not just tied to numbers or percentages of shells recovered. I have done work (e.g., Peacock 2000) to show that this is the case. In addition, such remains have import for "applied zooarchaeology"; that is, they can be used to establish species ranges and population structures as they existed prior to modern environmental impacts. To achieve this, large numbers are needed in addition to spatially extensive samples (see Mitchell reference below). Redundancy can be demonstrated in a number of ways such as rarefaction curves. Before any shell is disposed of, such redundancy should be demonstrated. I think it is perfectly acceptable to just retain identifiable valves while disposing of the platy fragments that are unidentifiable to species. While these comment are specific to shells (and apply equally to fresh-, brackish, and salt-water species), the same qualifications also apply to other faunal remains. Many thanks for the opportunity to comment. Relevant publications are listed below (Peacock 2015).

In considering whether objects can be culled, it is also useful to consider what analyses require the original artifact. Such analyses may include materials analysis, micro-wear, refitting, and cross-mending. Also, instances where identification may be problematic or in doubt. Where identification is straight forward, and there are not significant avenues of inquiry requiring the

original object, a detailed catalog may be sufficient for a wide range of research questions. For example, mass-produced objects are likely to be less intrinsically valuable than locally hand-made items apart from cross-mending, assuming they are thoroughly and accurately cataloged.

Table 3 below summarizes Griset and Kodack's recommendations along with notes and caveats derived from other authors (Praetzellis and Costello (2002); Williams (2011); Peacock (2015)) that provide some potentially useful modifications and caveats to the various classes. Within the categories discussed below, it is important to bear in mind that which specific materials will warrant sampling will vary by site and the research questions identified. Context is significant in understanding what is potentially redundant. In the case of the John Wesley Cemetery site (Versar 2013), selecting artifacts for sampling and discard focused on discerning the likely difference between material associated with the site's significance as a cemetery, church and school site, from material deposited subsequent to the site's abandonment and associated with roadside refuse disposal. The large majority of objects related to the latter context, which helped substantially reduce the quantity of material curated. It is also worth noting that for the specific project extensive consultation was carried out with the Delaware SHPO about culling decisions.

Overall, there are a number of potentially useful guidelines in the literature about what materials can be culled, some of which are summarized in Appendix B. With all of these guidelines, context is everything, and depending on the research questions relevant to a given site and project, these suggestions may or may not be applicable.

2.5 Sampling Strategy

Once the decision is made to cull selected objects from material collected in the field, a method to select some of what was collected needs to be chosen. Before this is done, there needs to be a full catalog of all of the material recovered, including separating, counting and weighing (as needed) by type so that the full range of variation can be understood (Sagebiel et al. 2010; Childs and Corcoran 2000). Decisions about culling should be based on:

- evaluation of the relative quantities of objects in each artifact class and how they are distributed over the project area;
- the range of variation within a class;
- the scientific methods that could be used to study the objects (and the number and variety of objects needed for those scientific methods); and
- the potential of future research by other specialists and colleagues (although this can never be fully anticipated).
  Childs and Corcoran (2000)

In addition to a complete catalog of materials in the collection, there needs to be a clear understanding of the universe of uses, both scientific and heritage-related, that material in the collection possesses. This will naturally require a clear research design for the project as well as consultation with potentially associated stakeholders so that responsible collections managers understand the range of values that others may attach to material in the collection.

Once the overall parameters of the collection are well understood, a method of sampling needs to be chosen. Some objects collected from the field, such as items found not to be cultural, or surface objects so recent as to have no bearing on any potential period of significance for the site, may not need to be sampled at all, but can simply be discarded. But the consensus seems to be that for many classes of archaeological material, the best practice is to retain some portion of the items collected from the field. There are a number of potential strategies that might be adopted. The following are based on sampling strategies frequently adopted for guiding the locations of excavations during fieldwork, but would be applicable to sampling within a collection as well (e.g. Redman 1987, Hole 1980).

Non-probabilistic sample (judgmental) – material selected by the principal investigator according to the researcher's determination of what is significant. Open to the charge of being hap hazard or distorted by undocumented bias.

Simple random sample – A random sample from across the whole collection. This might be accomplished by random computer selection from an inventory. This may leave key artifact types unrepresented.

Stratified random sample – A random selection made within certain parameters, such as a specified percentage of certain classes of objects, or from across proveniences. This may be more

satisfactory than a simple random sample. It is unclear what guidance may exist for selecting a particular percentage.

Systematic sample – In archeological fieldwork, this refers to fixed interval testing across the whole study area. For a collection, this might mean selecting the first sample or first *n* samples from across a collection. This is not clearly a useful approach.

Stratified systematic sample - In contrast to a plain systematic sample, a stratified systematic sample might take the first (or last, or middle) *n* artifacts per material type and/or provenience. It is not at all clear that this would have an advantage or a stratified random sample.

According to an existing sampling strategy - Selecting materials according to a particular research design or plan. This would have the flexibility to vary sampling strategy by material and/or provenience based on the likely research questions that material could be used to address, and the quantity of material that research question's applicable methodology would require to be successful. In some ways, this might actually resemble a judgmental sampling strategy, except that it is documented with a specific rationale.

Hybrid Strategy – There may be reasons to combine two or more of the strategies above. For example, one might make multiple samples: one sample based on a sampling strategy to support specific anticipated research questions; a second according to a stratified random sample to support potentially unanticipated research questions, and a third judgmental selection to preserve any remaining objects that may have heritage, display or interpretive value.

As stated above, a good sampling strategy will need to take the extent of variability within given classes, and the relationship of that variability in attributes that matter for given research questions in order to derive an appropriate sample. Childs and Corcoran (2000) recommend a sampling strategy that is stratified by material, noting that "sample sizes may differ for each artifact class." They advise that "important diagnostic artifacts should be retained (sampled at 100%), while more common, highly redundant artifacts may be sampled at 10, 25, or 50%."

2.6 Consultation and Documentation

Because of the contingent nature of artifact significance, designing an artifact sampling strategy will benefit from consultation with interested stakeholders. The results of the survey discussed below in Section 5 suggests that common practice is for CRM firms to perform consultation primarily with the lead agency for a given project, and the corresponding SHPO/THPO (80-90% of survey respondents). Only approximately 30% of the survey respondents reported conducting consultation with additional project stakeholders. While consultation beyond those parties specified in 36 CFR 800 may not be required for Section 106 projects, the advantage of a broader range of consultation is that a wider range of potential heritage values for portions of a collection may come into clearer focus. There may also be an opportunity to identify potential partners for the donation of items not considered appropriate candidates for permanent curation.

There is also much value to be had in documenting the consultation and decision making process behind pre-accession sampling and disposal. At Dover Air Force Base (AFB), Versar proposed an artifact sampling plan and then consulted with Dover AFB and the Delaware SHPO to select artifacts for discard. This led to a formal agreement. This is slower, but less liable to misunderstandings (Versar 2013). Clear documentation about the decisions guiding initial field collection, and subsequent laboratory processing, sampling and culling should then accompany a collection to a curation facility. This documentation will help future researchers understand the nature of the final curated collection, and its relationship to the full catalog of materials originally identified in the field and lab. This understanding is critical to assessing the potential limitations of future analyses of the collection and its fitness for particular lines of inquiry.

A catalog of the objects culled from the collection is an essential part of the documentation that should be prepared. This catalog should be sufficient to make clear how the discarded material relates to the portion of the collection that will be curated. It should also be sufficiently detailed to address research questions that might likely arise concerning the discarded material. Just what attributes might comprise such sufficient documentation is not entirely clear however. It is also advisable to photograph all of the artifacts while they are on the drying racks (with the provenience tag visible with them). This serves as a pre-culling record of the entire collection.

There are broad differences in how archaeologists catalog artifacts, and a lack of related data standards. Griset and Kodack surveyed federal and state agencies as well as Cultural Resources Management Firms and Universities. They found that 57% of the survey respondents had written artifact catalog standards. This leaves open the question of how standardized conventional practice may be. One would expect some variation in attributes recorded in order to tailor artifact catalogs to the needs of regionally and temporally appropriate research designs. But should explicit minimums be explored for common categories of bulk artifacts such as shell or lithic debitage? Griset and Kodack's Table 6 (Griset and Kodack 1999, pg. 37) lists very limited minimums. For debitage it says "Count and weigh all specimens; retain all formed tools and a predetermined sample of chipped stone artifacts (also debitage) for analysis." That would appear to leave out material, morphology and size grade, which some would include as part of a minimum. Of course, one could argue that retaining a predetermined sample would allow for subsequent finer cataloging, but how that sample is determined is the catch. For shell Griset and Kodack's Table 6 reads: "Retain all modified shell, sort by species, and weigh all identified and unidentified shell, then discard all unmodified shell." This may not be adequate for addressing biological and environmental questions, for which it would be better to retain a large sample of identifiable valves, but not the species non-diagnostic platy fragments.

There may be other scenarios where additional minimums for collections are necessary. This serves to underscore the need to base fieldwork on research designs that explicitly address the reasoning for collection strategies. It may also be useful to survey the breadth of artifact cataloging practice in the United States. Likewise, it may be worth studying the consistency with which artifacts are identified and described in laboratory settings in a manner similar to what Heilen (2013) did for field analysis. There are examples of this for measuring the reliability of lithic debitage typologies (e.g. Prentiss 1998). But Prentiss's work was aimed at understanding the reliability of a particular lithic typology, not potential discrepancies between different catalogers. Unfortunately, there are no simple solutions to these problems for cultural resource

managers or their archaeological consultants to adopt. Archaeological investigations should begin with a review of the existing literature for the region, applicable state and regional standards and guidelines, and preparation of a research design. Field and laboratory sampling strategies and cataloguing choices should flow from that research design and be detailed in project documentation.

Potential items to include with the documentation of sampling and discard for an archaeological collection could include the following:

As part of the final report:

- Field Collection Strategy (including sampling rationale and method of discard)
- Full catalog of all material encountered in the field and laboratory analysis including all discarded material with indication of what was not retained
- Rationale for sampling in the lab
- Sampling method
- Method of discard, or place of final disposition

As part of curation folder or included as appendix in final report:

- Photographs of discarded material (or photographs of all material before culling)
- Consultation Agreement
- Consultation correspondence

3.0 POST-ACCESSION DISPOSAL

3.1 Circumstances when pre-accession disposal is not possible

Post-accession disposal is similar to pre-accession discard in motivation (the desire to limit the volume of material placed in facilities for perpetual curation) and method (material for discard is selected for discard according to the same parameters as in pre-accession discard). What differs is the regulatory framework within which the de-accession takes place. While there may be some conveniently exploited regulatory ambiguity about whether material brought to a laboratory, but not yet formally accessioned in a museum, constitutes a "collection" for purposes of 36 CFR 79, there is no such ambiguity for formally accessioned materials. Presently, there is no provision in federal regulation for such de-accession. The revisions proposed to 36 CFR 79 in 1990 and 2014 were intended to address this problem. If adopted, the revisions would allow de-accession under certain limited circumstances, and create some specific requirements for consultation and documentation that will be discussed here.

In what some would call an ideal world where likely redundant materials aren't curated in the first place, post-accession discard would only apply in limited situations. But there may be circumstances where potentially redundant materials may need to be kept pending the result of

subsequent phases of investigation and consultation. One example might include an initial phase of archaeological site identification pending NRHP evaluation, concurrence or subsequent data recovery for NRHP eligible sites that will be adversely effected by an undertaking.

One of the key findings of exploring sampling strategies and rationales is the importance of a research design to understanding object significance. What classes of materials and associated attributes are or are not diagnostic or are redundant depends on the kinds of research questions a given site is thought to have potential to address. Therefore, it may not be possible to fully identify what is surplus until such a research design is formed. One potential caveat to this is that while permanent disposal (such as destruction or disposal in landfill) will prevent subsequent re-evaluation and study of discarded objects, other reversible disposal strategies such as reburial in a documented location may allow this.

In circumstances where a collection cannot be culled prior to accession because of incomplete evaluation, it may be possible to identify classes of bulk materials commonly identified as potentially redundant but that would have an analytical value on a National Register eligible site, but not on an ineligible site. These materials would have potential value relative to specific research questions. If subsequent evaluation of the site shows that these questions can't be effectively addressed at that site, then those materials would be rendered superfluous, at least with respect to that question, and might be disposed of.

3.2 Consultation

Future discard of accessioned federally owned archaeological material will be governed by any completed revision to 36 CFR 79, along with the de-accession protocols of the repository in which the material is kept. Likely potential parties to such consultation include the owning agency, repository staff, SHPOs/THPOs, experts on the materials proposed for discard, and other consulting and interested parties. Interested parties could include potential recipients of donated archaeological collections for teaching purposes. The proposed revisions to 36 CFR 79 have specific procedures in view including publication in the federal register. There is also the question of when consultation would be appropriate. If potentially redundant materials have been retained pending resolution of NRHP eligibility and development of an associated research design, then consultation might begin once a determination of the site's research potential has been made, and by extension, the research value of the collection clarified. Consultation would need to review:

- the site and collection significance
- rationale for proposed classes of redundant material
- sampling strategy
- proposed disposition

Sampling strategy is reviewed above in Section 2.5, but there are additional issues to consider in selecting materials from an accessioned collection for disposal. Generally, that collection will already have been sampled at least once in the field, and possibly a second time in the lab through pre-accession culling. The currently proposed revised text of 36 CFR 79.12(e)iii states

that a representative sample of materials deemed overly redundant must be retained. If adopted, that would mean that archaeologists assessing an accessioned collection for further culling would need to consider how previous sampling will have affected the representativeness of any final sample retained.

3.3 Documentation

Section 2.6 discusses documentation issues for discarded material. Many of the same issues would apply to post-accession discard. That would include documentation regarding the rationale for discard, the consultation surrounding the discard, and a sufficiently detailed catalog of discarded material. A key part of additional documentation will be to specify the applicable research design for which the artifacts were curated, and the circumstances upon which that research value would prove moot. For example, some artifacts, like body glass or ceramics without any diagnostic information might be kept if completing cross mends or minimum vessel counts might later prove useful. Documentation should include an original catalog of all material accessioned and a detailed catalog of any materials removed for disposal, and the means by which they were disposed. In the case of soil samples, collected material may be bulky, and have increasingly limited value as time goes by. It is important that any soil samples retained for future study be thoroughly dried and properly packaged and labeled (Sagebiel et al. 2010). Depending on the relevant research questions, soil samples may not last indefinitely. Thus, in addition to the research questions for which the sample was kept, documentation for soil samples culled or retained should include the methods by which the sample was processed, and any applicable time or condition limitations on its ability to be useful in future analyses.

3.4 Packaging

There is already substantial guidance available for packaging collections for curation (e.g. Sagebiel et al. 2010). In some cases, it may not be possible to complete a culling process pending completion of certain studies. For example, material collected during an identification survey may all need to be kept until a site's significance and associated research questions are understood. Likewise, material collected during an evaluation stage may need to be kept in certain cases until an anticipated data recovery plan is finalized or executed. In such cases, it may be advantageous to package curated materials in such a way that they can be subsequently culled following the completion of analyses and associated consultation. Such packaging and associated documentation would show what materials are redundant and which are not. Ideally, this would happen prior to accession, but in some cases this may not be possible. For example, it may be possible to anticipate future discard while the collection is being prepared for curation in a consulting archaeologists lab provided that an applicable sampling strategy has been developed.

4.0 METHODS FOR DISPOSAL

There are a number of different means by which archaeological materials may be disposed. Sagebiel et al. 2010 give the following list:

1. Repatriate objects to the appropriate tribe, cultural group, or nation of origin. Consult with them first about any sensitive issues or handling. Note that NAGPRA requires that repositories keep unaffiliated human remains until final regulations are promulgated or unless legally required to do otherwise.
2. Return the materials to their rightful owner.
3. Transfer the materials to another research or educational institution.
4. Exchange the materials with another research or educational institution for a more relevant collection.
5. Sell the materials (strongly discouraged in the case of archaeological material).
6. Bury the materials.
7. Destroy the material. This is usually reserved for hazardous, severely deteriorated, or counterfeit items. Destruction should be permanent, irreversible, and well documented. Sagebiel et al. 2010, pg. 58.

Partial loss through destructive analysis might also be added to this list. The current regulatory framework only allows for the first 2. The most recently proposed revisions to 36 CFR 79 expand this only a little to allow numbers 3 and 7, and expressly prohibits 5. The background material provided with the 2014 publication of proposed revisions to 36 CFR 79 in the Federal Register mentions comments to the 1990 proposed revisions concerning disposal. Those comments included a desire for more detail about methods of disposal, and the need to provide against the creation of false sites. "Prehistoric or historic material remains improperly disposed of could later be rediscovered and misinterpreted by unwitting archeologists or others as evidence of activity in the distant past, so it is important to delineate appropriate methods of disposal (NPS 2014)." However, the 2014 revisions only provide for two broad classes of deaccession and disposal: the donation of a collection to another entity, or destruction. Other methods of disposal, such as reburial, or discard in landfill, are not allowed under the proposed revisions. Some comments, such as from the Society for Historical Archaeology, repeated the concern about potentially creating "false archaeological sites (SHA 2015)." The Hopi Tribe objected to all methods of disposal "We also stated that all of the methods of disposition of collected artifacts were unacceptable, and that we objected to the collection of artifacts, and once collected we object to their disposition or destruction." (Arthur Arguedas to Stanley Bond February 17, 2015).

The narrowness of the available options may restrict the practical utility of the proposed revision. Further options, particularly reburial may merit serious consideration. This section will discuss the avenues of discard/deaccession provided for in the revision (donation and destruction) as well as reburial and discard in landfill.

4.1 Donation

The proposed revisions to 36 CFR 79 would allow for federal agencies to donate archaeological

materials deemed surplus to other entities under certain circumstances. If the material in question was excavated from Indian Lands, then the objects are the property of the tribe, and a change in their disposition requires the consent of the tribe. The agency may return such material to the tribe. If the tribe does not want the objects, the agency may, with the permission of the tribe with ownership rights, give them to:

- another agency,
- a suitable public or scientific entity,
- another federally recognized tribe if the lands from which they were removed had religious or cultural importance to that tribe, or
- a federally recognized tribe from whose historically aboriginal lands the material was removed.

For material or objects not belonging to a tribe or having any association with Native American groups, only the first two options would be applicable. The trouble with donating artifacts considered redundant is that they are unlikely to be of interest to other parties, even as a teaching collection. A sample of some redundant materials would be useful in a teaching collection or even in a display, but a large volume of these materials might seldom if ever be useful. A useful teaching collection would need a diverse sample of many different kinds of objects, including ones that might frequently be considered diagnostic. Educators interested in obtaining teaching collections likely have better resources available than collections slated for discard. The SAA has a website with resources for generating teaching and outreach collections, which list sources for obtaining reproductions, not original artifacts (SAA 2011). Selling artifact teaching collections might be considered unethical since it could contribute to the commercial value of archaeological material, putting unexcavated sites at risk (Society for American Archaeology 1996, Society for Historical Archaeology 2015, Register of Professional Archaeologists 2017). Because of these limitations, it may be that donation is not really a viable method of disposal in practice for archaeological objects of little research value.

Another difficulty is that objects given to a non-tribal entity under the proposed revisions to 36 CFR 79 could only be given to an entity meeting the definition of repository under the current regulations at 79.4(j): "a facility such as a museum, archeological center, laboratory or storage facility managed by a university, college, museum, other educational or scientific institution, a Federal, State or local Government agency or Indian tribe that can provide professional, systematic and accountable curatorial services on a long-term basis." However, the notion of pre-accession discard as practiced is that the objects do not yet fall under the provisions of 36 CFR 79, so would not be subject to this narrow restriction, but would be subject to the broader ethics of the professional discipline. Those ethics would preclude the sale of artifacts (Society for American Archaeology 1996, Society for Historical Archaeology 2015, Register of Professional Archaeologists 2017).

A further issue is that some Native American tribes have expressed a concern that artifacts of broad heritage interest to them have been removed from their original context, and there may not be documentation with the collection about potential tribal affiliation (Teara Farrow Ferman to Stanley Bond 2/17/15). Further, some tribes may not have the resources to take unwanted collections, but may object to these collections being discarded in landfill or destroyed.

> The proposed rule appears to endorse unfunded transfer or "gifting" of certain de-accessioned ancestral material deemed insignificant by agency experts, to lndian tribes. We can certainly expect to see (and the Muckleshoot Tribe has experienced) existing collection holders or established federally certified facilities apply to unload unfunded or underfunded federal collections to make space for recent better endowed or perhaps more glamorous collections (Jeremy James to Stanley Bond 3/24/15).

4.2 Destruction

The only other method of disposal for formally accessioned federally owned archaeological material other than donation under the proposed revisions to 36 CFR 79 is destruction; considered a last resort when other alternatives have been exhausted. Destruction, other than as part of scientific analysis, means disposing of an artifact in a way that does not risk creating a false archaeological site, as could conceivably happen with archaeological material simply thrown in the trash. Destruction, such as by reducing material to a fine powder, would render an object unrecognizable.

This is not commonly done at present, and the practical realities have not been explored. Materials likely to be considered redundant may not be easily destroyed, and the options for total destruction do not seem to have been explored in the current literature. Potential means might include melting or pulverizing. Of these, perhaps the most practical option would appear to be grinding material to a powder using industrial equipment. There are businesses who will reduce waste objects to a powder. There are also machines that can be purchased, but that is not likely to be an economical solution for repositories or CRM firms. Companies in business to grind industrial waste are geared towards clients with large quantities of materials, such as from building demolition, it isn't clear what the costs or viability would be for repositories or CRM firms who seek to have relatively small amounts of material pulverized.

Destruction would help address the issue of unintentionally creating secondary archaeological sites with discarded materials. However, this is not reversible should subsequent research show the materials may have value. Moreover, even if practical and cost effective methods of destruction are identified, there may be objections raised about destroying materials from heritage sites because they do not presently demonstrate value based on current archaeological thinking. Based on some of the public comments to the proposed revisions of the regulation, it would appear that some tribes may object to artifact destruction because sites related to their heritage have been destroyed in excavation, and now some of the surviving material is to be pulverized to save money and space.

4.3 Reburial

Some of the shortcomings and issues raised by donation may potentially be allayed by on-site reburial of pre-accessioned objects. This option is not permissible for federally owned collections under 36 CFR 79, nor do any of the proposed revisions include it. The advantages of reburial are that it would help alleviate overcrowding in repositories, and with proper documentation, it is potentially reversible. Material thought to be redundant would be preserved. Potential shortcomings are that without good packaging and clear documentation, one could create false archaeological features, or, in reburial on or near a site, disturb the original site or other archaeological resources. Also, while many archaeological materials are stable, reburial in a soil matrix different from which they were removed creates the possibility of long-term chemical change and degradation. Lastly, reburial on or near a site from which materials were initially collected may not be practical in many instances where a site is to be impacted by construction.

There are some examples where reburial of artifacts as a means of long-term curation have been tried. Colonial Williamsburg experimented with the reburial of architectural materials excavated between 1930 and 1950 within an historic period cellar (Williams 2011). The authors describe the rationale for the need, the sampling strategy adopted, and the method of packaging and burial. No monitoring of condition has yet been published. In Europe, there has been a series of international conferences entitled International Conference on Preserving Archaeological Remains in Situ (PARIS). PARIS5 papers gave some thought to monitoring and quantifying degradation as well as to ways of mitigating that loss (Leuzinger et al. 2016).

A number of issues concerning the alterations to objects and packaging from reburial will need to be considered. Long-term, reversible reburial may have particular soil requirements for example. Soils may need to be selected based on both drainage and chemical properties. It may be desirable for example to use sand or gravel to facilitate drainage and to reduce chemical alteration of artifacts or packaging and labeling. There are resources available to help assess the potential impacts of certain soil chemical matrices on archaeological materials. See for example Table 3 adapted from Sease (1994) by Childs and Corcoran (2000).

Table 3: Soil Characteristics and Preservation
adapted from Sease 1994 by Childs and Corcoran (2000)
Soil Type

	Acidic	**Alkaline**	**Saline**	**Water-logged Acidic**	**Water-logged Alkaline**	**Desert**	**Arctic**
Ceramics	R-calcareous fillers dissolve	P-basic structure affected	P	R	P	G-wind erosion possible	G

Table 3: Soil Characteristics and Preservation
adapted from Sease 1994 by Childs and Corcoran (2000)

Soil Type	**Acidic**	**Alkaline**	**Saline**	**Water-logged Acidic**	**Water-logged Alkaline**	**Desert**	**Arctic**
Lithics	G	G	P-soluble salts	P	P-insoluble salt encrustation	G-wind erosion possible	G
Glass & Glazes	R-alkali leaching	P-basic structure affected	P	R	P	G-wind erosion possible	G
Wall Plaster	P	G	P	P	P	G	G
Shell	P	G	P-soluble salts	P	P	G	G
Metals							
Iron	P-corrosion	G	P-corrosion	G	G	G	G
Copper Alloys	P-corrosion	G	P-corrosion	G	G	G	G
Lead	P	P	R	G	G	G	G
Silver	P	G	G-slight saline P-high saline	G	G	G	G
Organics							
Bone, Ivory, Antler	P	G	P-soluble salts	P	P	G	G
Wool, Leather, Hair	deterioration of protein	P	R-dehydration	G	G	G	G
Wood, Cotton, Linen	P	P	R-dehydration	G	G	G	G
G=good preservation							
R=reasonable preservation							
P=poor preservation							

Just as important as issues surrounding artifact preservation are questions concerning the durability of accompanying packaging and labeling that clearly designates materials as intentionally redeposited. In cases where artifacts are reburied on-site, care will need to be taken

to mark the reburial so it is not misinterpreted in the future, and include an accurate map of the location with the permanent site record. Some thought and research will need to address packaging materials and known preservation issues. Griset and Kodack (1999) discuss using a polyvinyl chloride (PVC) pipe at the corner of an exaction unit as a means of reburial of redundant materials on site while still in the field. But how long does PVC last in the ground? PVC loses impact resistance strength after prolonged exposure to sunlight (JM Eagle 2009). Are there better materials to choose from? Will some plastics leach chemicals into the ground or into artifacts?

There is an ongoing project in Sweden that has explored the preservation of both artifacts and associated packaging and labeling. The Reburial and Analyses of Archaeological Remains (RAAR) Project is a long-term study being carried out to assess reburial as a method of long-term storage for water-logged archaeological materials. The primary focus has been on the stability and deterioration of materials commonly found on archaeological sites, as well as the effect of underwater burial on packaging and labeling (Godfrey et al. 2012). The authors suggest that in developing protocols for reburial, a distinction needs to be made between in situ vs ex situ reburial, depending on whether material is buried in the original site, or in another location. The reburial for the RAAR project was ex situ, that is, located away from the source site for the artifacts. The project tracked materials degradation for five different classes of materials: silicates (glass and ceramics); metals, wood, other organic material; and packaging material (Bergstrand et al. 2005). These materials were buried in marine sediment, and their condition was assessed after 1, 2, 3, 6 and 12 years (Williams 2011). While some results were inconclusive, the authors were able to make some preliminary observations about the potential long-term effects of burial in anaerobic marine sediments (Nyström-Godfrey et al. 2011). Differences were observed both in curated objects and in packaging and labeling. The specific observations would only be applicable to other projects intending to rebury objects from a marine site in a like environment, probably an uncommon occurrence relative to terrestrial archaeology. But there are some conceptual similarities.

Avoiding the creation of a "false" site is also important. Comments from the SAA and SHA to the latest proposed revisions to 36 CFR 79 raised concerns about this issue. "The disposal of artifacts should not result in the inadvertent creation of false archaeological sites" (Ewen 2015).

> It has been an enduring concern of the SAA and other organizations, including tribes, that reburial of deaccessioned material should be undertaken in such a way that it would not generate new "artificial" sites. We remain concerned that, although reburial is not an option available to the FAO for disposal of deaccessioned materials, the reburial of deaccessioned material remains may be considered an appropriate method of disposal by tribal organizations. In these circumstances, we recommend that the Department provide guidance to the recipients of deaccessioned materials regarding how to rebury these objects, or portions of collections, in ways that will be clearly recognizable as the contemporary reburial or discard of older archaeological materials. (Altschul 2015).

Comments from the Hopi Tribe echo these concerns:

> "the revised updated draft regulation does not address return of artifacts collected by the NPS to the places from which they were collected in a way that would not create an artificial archaeological site." And "Therefore, we request a provision in this regulation that specifically states that the NPS will authorize return of artifacts collected from NPS lands to NPS lands in such a manner that would not create an artificial archaeological site, in the same way NAGPRA remains and objects collected from NPS lands are permitted to be repatriated and reburied on NPS land. Repatriation to place rather than disposition, from place." (Kuwanwisiwma 2015)

Some of the practical concerns for reburial without creating a false site are addressed by Perez-Mejia in a University of South Carolina dissertation. Perez-Mejia applies an engineering perspective to designed reburial that includes among other things, measures for making sure reburied artifacts don't migrate away from the reburial context. Among the considerations examined is protecting reburied material from root damage and rodent displacement. Geotextiles, geomembranes, gravels, fills etc. are discussed in this context. Perez-Mejia also points out that burial contexts conducive to preserving some materials may not work as well for others. "As archaeological materials in an assemblage are affected by environmental conditions in different ways, a reburial environment can delay the degradation of one type of material, while accelerating the decay of another." (Perez-Mejia 2015).

Reburial on-site may not be practical in many CRM situations, either because of construction needs, or if the artifacts have been removed some distance for analysis. If artifacts are to be reburied on site, provision needs to be made to make sure that no new disturbance to the site is created, and that the material is reburied in a manner that makes it clear they are redeposited artifacts. Artifacts buried ex-situ will need to be placed in a location where there is some guarantee of long-term protection from erosion, vandalism or sale and construction. Reburied surplus materials should be recoverable, buried with durable provenience packaging, in mapped relation to a long-term durable datum. As with materials buried in-situ, clear mapping will need to accompany the collection documentation that is permanently curated.

4.4 Landfill

The simplest method of disposing of excess archaeological materials prior to accessioning may in the trash. As with controlled reburial, there is no provision for disposing of accessioned materials in landfill. There are, however, a number of issues surrounding disposal of archaeological material in a landfill. As with intentional burial in- or ex-situ discussed above, one objection against discard of artifacts in refuse is that this risks creating a false site. There is some historical precedent for this concern. In the 19th century, artifacts discarded in latrines and privies sometimes got redeposited on rural agricultural fields where night soil was used as a

fertilizer (Crane 2000; Geismar 1993; Roberts 1984). These field scatters have sometimes been misinterpreted as archaeological sites.

However, if the ultimate context of disposal is a modern, large, urban landfill, discarded material an archaeological site will be completely overwhelmed in volume by contemporary refuse. Should future archaeologists studying the landfill find the disposed archaeological material, there is no likelihood that they would interpret the material as being a "false site" somehow separate from the landfill. Nevertheless, once consigned to waste management systems, archaeologists have no control over or knowledge of the artifacts ultimate disposition, and it is possible that some materials might not make it to the landfill. Garbage cans can get overset by accident or by rodents, and their contents dispersed for example. Where this is done prior to accessioning, measures should be taken to make sure that disposed materials are packaged and placed in durable receptacles to ensure that they aren't accidently dispersed before arrival at a landfill.

Another issue with disposal in landfill is that, unlike controlled reburial, it is not reversible. If subsequent research identifies a potential research value for the disposed materials, there is no recourse for their recovery. Furthermore, disposal in waste landfill may be objectionable to tribes or others with a heritage connection to the collection. Such objections may be less likely for relatively recent industrial mass-produced materials.

One way to mitigate objections to disposal of artifacts in landfill might be to advertise that the collection exists but is considered unsuitable for curation. If no one takes it or expresses an objection, then simple disposal in landfill could be done. Agency and SHPO consultation alone may not be sufficient. Some public involvement would seem to be necessary, though not clearly required by regulation.

5.0 CURRENT PRACTICE

5.1 Survey Design and Questions

While there is a substantial literature providing guidance on archaeological collection, processing, and curation, there is very little information available about actual current practice within CRM in the United States. In order to gather some basic information about what CRM practitioners commonly do, a simple survey was prepared. The survey focus was intended to assess the current state of practice within the CRM industry with regard to infield sampling and pre-accession discard of certain classes of artifacts. The survey was designed with input from the Archaeological Curation Consortium and the American Cultural Resources Association (ACRA), and kept relatively simple in order to maximize participation. The online survey form, generated on surveygizmo.com, was distributed to ACRA member CRM firms on March 28, 2017. The survey questions are included in Appendix C.

5.2 Survey Results

The survey was distributed via email to ACRA member firms March 28, 2017. "ACRA is the national trade association supporting and promoting the common interests of CRM firms of all sizes, types and specialties. Today, our member firms undertake much of the legally mandated CRM studies and investigations in the United States" (ACRA 2017) ACRA includes 186 member firms across the United States and ranging in size from small to large companies. A total of 64 responses were received by the end of April 2017. The survey responses were anonymous, but the response data included limited information about the location of the computer completing the survey. Responses were entered in 28 states.

5.3 Survey Analysis

The results show that a majority of respondents conduct some kind of limited or no-collection fieldwork (84.4%). Of these, the most common experience was with no-collection surface surveys (75.9%), followed by diagnostic only surface collection (66.7%). Limited or no-collection strategies were less common in subsurface surveys: no-collection subsurface (44.4%) and diagnostic only subsurface (33.3%). There were 9 write-in responses (16.7%) where the respondents did not feel that the other four choices adequately described their experience, and mostly related to sampling strategies for certain bulk items, or specified in-field analysis. The overwhelming majority of responses (92.2%) had performed some kind of in-field sampling.

Table 4: Question 3	**Percent**	**Responses**
No-collection surface study	75.90%	41
No-collection subsurface study	44.40%	24
Diagnostic only surface collection	66.70%	36
Diagnostic only subsurface collection	33.30%	18
Other - Write In (click to view)	16.70%	9

In general, no-collection strategies were most common in reconnaissance and intensive pedestrian surveys. A similar pattern holds for diagnostic only collection strategies. Some form of in-field sampling appears to be common across study types, with the exception of site evaluation without excavation. No-collection, or diagnostic-only sampling strategies are uncommon on data recovery projects.

Table 5: Question 4	**No Collection**	**Diagnostic Only**	**In-Field Sampling**
Reconnaissance survey	38	27	27
Intensive pedestrian survey	37	32	31
Shovel test survey	23	27	33
Site evaluation without excavation	19	14	7
Site evaluation with unit excavation	6	10	24

Table 5: Question 4	**No Collection**	**Diagnostic Only**	**In-Field Sampling**
Data recovery	2	5	25

Responses to Question 5 show that there are some regional differences in how survey strategies are adopted. No-collection or diagnostic-only collection strategies are adopted more often in the West than in the East, while in the East in-field sampling is more common. There are more contexts in the West where ground visibility is high, allowing for effective pedestrian survey, while in the Eastern US, shovel test surveys are more common, and archaeologists appear to be reluctant to adopt no-collection strategies for excavated material.

Table 6: Question 5	**No collection**	**Row %**	**Diagnostic Only**	**Row %**	**In-Field Sampling**	**Row %**
Northeast	5	20%	5	20%	15	60%
Mid Atlantic	7	28%	6	24%	12	48%
Southeast	11	28%	12	31%	16	41%
Great Lakes	3	21%	5	36%	6	43%
Midwest	8	29%	8	29%	12	43%
Gulf States	4	27%	4	27%	7	47%
Plains	9	41%	8	36%	5	23%
Rocky Mountains	10	45%	7	32%	5	23%
Great Basin	8	44%	6	33%	4	22%
Southwest	7	28%	9	36%	9	36%
Northwest	7	35%	7	35%	6	30%
California	10	33%	10	33%	10	33%
Alaska	4	44%	3	33%	2	22%

The responses to Question 6 suggest that there is not a meaningful difference in the temporal types of sites and sampling strategy. The only notable pattern in survey strategy with respect to land-owner involved land owned by Native American Tribes, where no-collection survey strategies were more common than for other land owners.

Most respondents reported consultation with a land-owning agency and with the SHPO/THPO, though only a little over half prepared written documentation of a research design and collection strategy for formal review (Figure 1). Only about 1/3 of respondents conducted consultation with other stakeholders (such as a repository, or a landowner).

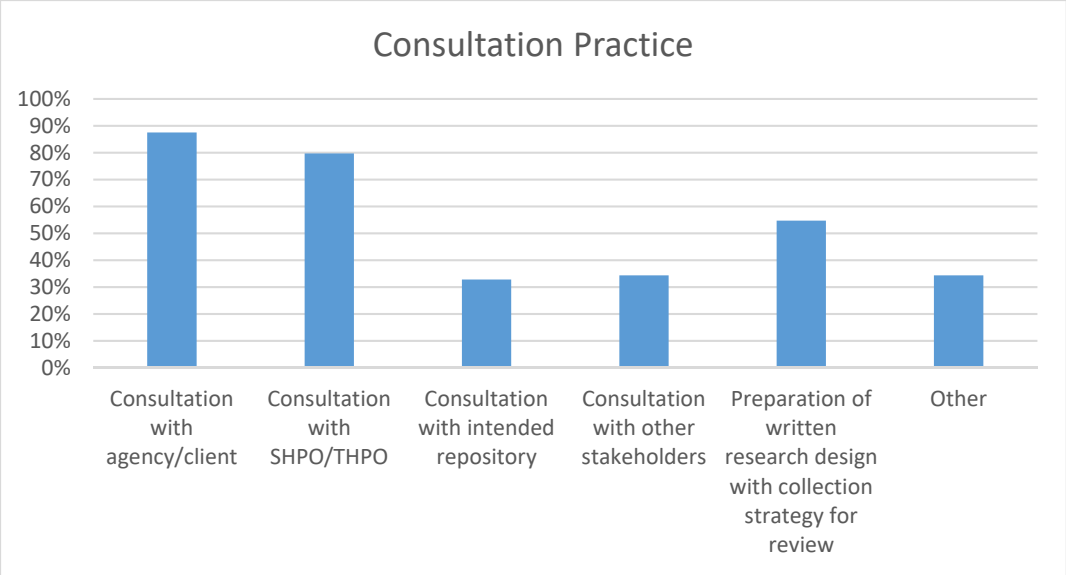

Figure 1: Consultation Practice

Most respondents reported that they used field personnel either with extensive applicable experience, or were trained as appropriate prior to fieldwork. Most also reported using Global Positioning System (GPS) and photography to record material in the field. Write-in responses included weighing some classes of material in the field (like brick) and doing artifact sketches.

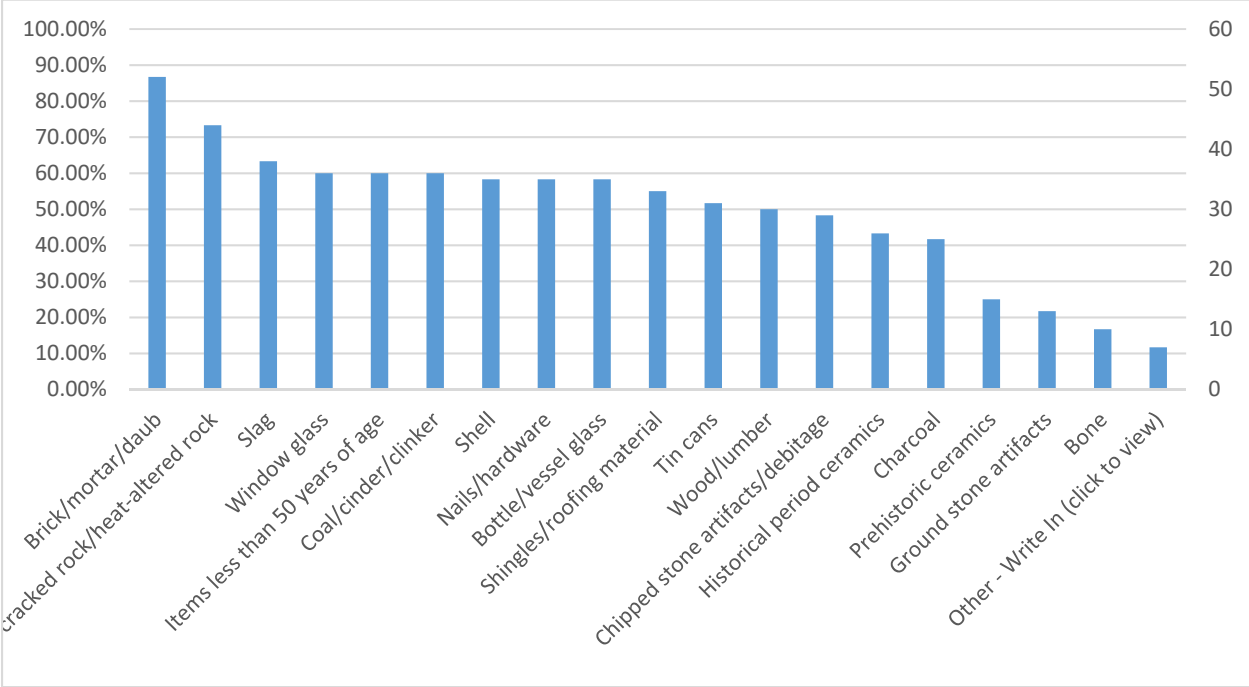

Figure 2: Commonly Sampled Materials

Figure 2 shows the classes of material most frequently sampled in the field. The most commonly sampled materials include brick/mortar/daub from historic sites, and fire-cracked rock from prehistoric sites. Half or more of the respondents reported sampling most of the artifact classes in the pick list. Prehistoric ceramics, ground-stone artifacts and bone were much less frequently sampled. The answers suggest that some saw this as what was left in the field (not all taken) while others, doing no-collection surveys, perhaps saw it was what was taken. One write-in was "all artifacts, period". Unfortunately, this ambiguity makes the results for this question difficult to interpret.

The use of field laboratories appears to be common, though not universal; 57% of respondents report using one for certain projects. However, the range of minimum length of project for which a field laboratory was used varied widely. The smallest minimum cited was 1 day, the longest was 180 days. The average was 40 days (or around 6 weeks), and the mode was 14 days (7 out of 31 responses). The question didn't ask respondents to specify how elaborate these field laboratories were. In general, it seems that some level of artifact processing is common, even on relatively short duration projects.

Post processing, but pre-accession discard of at least some materials appears to be overwhelmingly common, with over 85% of respondents saying they engage in the practice. Table 7 lists the cited reasons by frequency.

Table 7: Reason for Discard	**Percent**	**Responses**
Excessive quantity of artifacts	72.20%	39
Lack of long-term research value	70.40%	38
Manageability problems (e.g. size, nature of materials)	57.40%	31
Whether artifacts were temporally or functionally diagnostic	51.90%	28
Curation Costs	44.40%	24
Poor archaeological or historical context	40.70%	22
Lack of public educational or interpretive value	37.00%	20
Poor condition	35.20%	19
Whether artifacts were necessary for analysis	33.30%	18
Health and safety risks	27.80%	15
Other	22.20%	12
Lack of symbolic or heritage value to a particular culture	14.80%	8

The most commonly cited reasons concerned excessive quantity (e.g. bulk materials) and low research value. Five of the "other" write-in responses cited policy or restrictions related to the repository. Three mentioned discarding material that proved not to be artifacts.

Table 8 shows the methods employed for selecting a sample of material for pre-accession discard. Non-probabilistic (judgmental) sampling was the most common choice (66%), with the next most common strategy being the use of an existing sampling strategy (30.4%). The popularity of judgmental sampling might seem to be a potential problem in terms of how representative the curated collection may be. But on the other hand, there are reasons for selecting objects for curation other than statistical validity, such as suitability for display, public outreach or other heritage purposes. The answers to Question 16 (Table 9) also show that most respondents preserve a catalog of discarded items as well as a rationale for selection. Less common is preparation of a curation agreement, or preservation of consultation correspondence with a collection.

Table 8: Sampling Methods	**Percent**	**Responses**
Non-probabilistic sample (judgmental)	66.10%	37
According to an existing sampling strategy	30.40%	17
Systematic sample	23.20%	13
Other	17.90%	10
Simple random sample	12.50%	7
Stratified systematic sample	8.90%	5
Stratified random sample	7.10%	4

Table 9: Documentation	**Percent**	**Responses**
Catalog of discarded material	82.10%	46
Rationale for sampling	75.00%	42
Sampling method	71.40%	40
Collection Strategy (including sampling rationale and method of discard)	71.40%	40
Method of discard	44.60%	25
Consultation Agreement	41.10%	23
Consultation correspondence	37.50%	21
Other	10.70%	6

As Table 9 shows, most respondents (82%) include a catalog of discarded materials with material that is curated. Table 10 shows what attributes were typically recorded for discarded

material. Most respondents record material, provenience, description and a count. Weight and size are also often, if not universally, recorded. Other attributes recorded included maker's marks, other diagnostic features, and sometimes analytical comments.

Table 10: Attributes Recorded		
Value	**Percent**	**Responses**
Material	96.30%	52
Provenience	94.40%	51
Description	90.70%	49
Count	90.70%	49
Weight	77.80%	42
Size	53.70%	29
Other	14.90%	8

Table 11 shows that the most common method of disposal is in landfill. Reburial or destruction are much less common. There are some concerns (Ewen 2015, Altschul 2015) about whether this has the potential to produce false sites. However, the nature of modern landfill practices may make this unlikely, as sanitary landfills are large, managed sites, with an overwhelming quantity of contemporary material that would make misidentification of a landfill deposit very unlikely. The caveat, as discussed in Section 4.4, is that there is a potential for material to be lost and dispersed between the site of disposal (the archaeologist's lab) and the landfill site.

Table 11: Method of Discard		
Value	**Percent**	**Responses**
Trash/Landfill	78.60%	44
Reburial	35.70%	20
Other	23.20%	13
Destruction	1.80%	1

A number of respondents chose "other" and wrote in the following dispositions:

- Dumped into the ocean.
- FMR returned to project site
- HAZMAT disposal under EPA guidelines
- On site
- Recycled metals and glass
- Repatriation to tribe
- Returned to original site surface along with backdirt

- Disposed in staff's yards
- Educational collection for simulations
- Landscaping and teaching collections
- Reference collection

6.0 CONCLUSIONS: PROTOCOLS AND BEST PRACTICES

6.1 Overview

Broadly speaking there are three potential stages during which archaeological material identified in the field might be sampled or discarded. During field work archaeologists might collect all of the artifacts they encounter, none of what they find, or a sample of them. Once collected and brought to a laboratory setting for cataloging and analysis, certain classes of artifacts may be sampled again if there is reason to believe that curating all of that class of material is redundant or counterproductive. Lastly, formally accessioned collections can be culled to reduce their size to allow for more efficient use of space and resources. The latter is not currently permissible for federally owned archaeological collections, but is under consideration in proposed revisions to 36 CFR 79. Sampling of artifacts in the field and/or culling in the laboratory are widely practiced, and frequently encouraged by federal and state agencies. The following suggested best practices will address each in turn.

6.2 In-Field Sampling:

In-field sampling has the virtue of helping to reduce the size of archaeological collections, while meeting the standard of preserving archaeological sites in place. Potential drawbacks are that material left in the field may be at risk from unauthorized collecting, vandalism, decomposition, erosion or other disturbance. There is also the risk that in-field artifact identification may not be as reliable as identification made in a laboratory setting. To address these issues, installations and CRM contractors may wish to consider the following recommendations:

- Consult with agency and SHPO and tribes and other stakeholders if applicable.
- Develop a clear research design that ties explicit research questions to specific categories of artifacts. Specify what potential contributions different kinds of artifacts may make. This is crucial for identifying potentially surplus artifacts as well as the means for identifying an applicable sampling strategy.
- Develop a survey and sampling strategy responsive to the goals of the research design. The research design should not presuppose the significance of all material that may be encountered in the field and be flexible to accommodate unanticipated finds research questions that arise during the project.
- Document what was done and why.
- Include personnel with training and experience in the identification of material culture anticipated in the project area.

- Consider collecting difficult to identify objects or artifacts potentially at risk from future loss.
- Consider collecting a random sample of identified artifacts to allow for laboratory verification of in-field identification.
- Photograph potentially diagnostic or difficult to identify materials left in the field.

6.3 Laboratory Culling

Laboratory sampling also has the virtue of helping to reduce the size of archaeological collections, while addressing concerns about accuracy of identification with in-field sampling. Potential drawbacks are that what is brought to the lab is already a sample, and careful thought will need to be given towards creating a valid sub-sample for curation and further study. Other objections are that material currently considered of low research or heritage value may be seen differently in future years. Also, while laboratory identification is likely more reliable than field identification, it may still be inconsistent between different catalogers. This is most critical for sites destroyed by project development and for which the curated collection is all that is left of the site. Finally, careful consideration needs to be given to the methods of disposal that are either reversible (such as reburial) or that do not risk creation of false sites (landfill disposal). To address these issues, installations and CRM contractors may wish to consider the following recommendations:

- Consult with agency and SHPO and tribes and other stakeholders if applicable.
- Develop a clear research design that ties explicit research questions to specific categories of artifacts. Specify what potential contribution different kinds of artifacts can make. This is crucial for identifying potentially surplus artifacts as well as the means for identifying an applicable sampling strategy.
- Record artifact attributes that flow from and support the research design.
- Document what was done.
- Consider whether donation, reburial, land-fill discard, or destruction would be the most appropriate method of disposal of culled material

Recommendations Related to Donation:

- The 2014 proposed revisions to 36 CFR 79 include procedures for consulting with potentially affiliated federally recognized tribes that may be interested in receiving materials.
- If there are no tribes interested in the objects, consider other repositories, museums, or educational institutions that may have an interest in the material.
- Objects must not be sold.

Recommendations Related to Destruction:

- Material to be discarded must be rendered unidentifiable.
- For most classes of artifacts, grinding to a powder is likely to be the most practical.

Recommendations Related to Disposal in Landfill:

- Material to be securely packaged to ensure that objects are not accidentally dispersed between the disposal location and the destination sanitary landfill.

Recommendations Related to Reburial:

- Rebury on-site in an area documented to be free of significant features.
- When on-site reburial is not feasible, rebury close to the site in a location free of significant features.
- Where on- or near-site reburial is not feasible, chose a location with similar soil properties, and secure from vandalism or future development loss.
- Package reburied objects with durable packaging and labeling that make it clear the collection is reburied. Consider the effects of soil chemistry and drainage on both archaeological material and its associated packaging and labeling. Also consider potential impacts of animal and plant disturbance and redistribution of reburied artifacts.
- Include detailed locational information with curated project documentation.
- Consider applicability of long-term monitoring to periodically check condition of reburied items, packaging and labeling.

6.4 De-accession and Discard

Post-accession discard is not currently allowed for federally owned collections under 36 CFR 79. The most recent proposed revisions to those regulations envision only two means by which artifacts might be disposed: donation to another entity or, as a last resort, destruction. Inclusion of reburial, and landfill discard where appropriate as potential options might enhance future proposed revisions of the regulation. However, there may be instances where installations will curate some materials during early identification and evaluation phases of site study that might subsequently be proven redundant by later stages of investigation. With this in mind, it may be prudent to consider packaging and documenting such material in a way that will facilitate future culling if applicable and permissible. Recommended procedures would include:

- Consult with agency and SHPO and tribes and other stakeholders if applicable.
- Develop a clear research design that ties explicit research questions to specific categories of artifacts. Specify what potential contribution different kinds of artifacts can make. This is crucial for identifying potentially surplus artifacts as well as the means for identifying an applicable sampling strategy.
- Record artifact attributes that flow from and support the research design
- Package materials most likely to be eligible for culling separately to facilitate culling once all necessary site studies are completed, and 36 CFR 79 has been revised to allow for de-accessioning and disposal.

- Include documentation with the collection that identifies which materials are potentially redundant and the rationale for this.
- Where accessioned collections contain soil samples, verify that the sample is adequate in size but not too large by current standards for soil analysis. Dry the sample. Include documentation of how the soil sample relates to the research design, and include an expiration date for the sample if applicable.
- Once culling has occurred, thoroughly document what materials were discarded, the rationale for selection, parties consulted during culling, and the method of disposal.

These best practices would be implemented at the time of collection by the archaeologists who conducted the fieldwork. The intent is for these recommended procedures to help slow the growth in volume of materials requiring long-term curation and allow for future efficient management of collections of undetermined, little or no research potential while at the same time assuring that archaeological surveys, evaluations and associated collections are scientifically valid and support cultural resources management needs. These guidelines should be distributed to DoD cultural resources subject matter experts and cultural resources managers for further discussion and implementation.

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APPENDIX A: STATE STANDARDS AND GUIDELINES FOR IN-FIELD SAMPLING AND PRE-ACCESSION DISCARD

State		Relevant Text	Title	Date	URL	Notes
Alabama	**In Field Sampling**	"Every archaeological survey must include a pedestrian walkover, a visual inspection of the survey tract, and the systematic collection of significant artifacts from the ground surface. "During surveys and testing projects, artifacts should be collected according to a defined sampling strategy. For instance, if modern artifacts (less than 50 years old) are not collected, the strategy needs to be explained and applied consistently. Even so, the presence of modern artifacts shall be recorded in field records. Certain kinds of sites (such as shell midden and lithic quarries) can yield massive quantities of similar artifacts that are best dealt with by sampling, rather than by total recovery. In those cases, the samples shall be representative of the assemblage from which they are drawn, and the samples shall be selected from meaningful stratigraphic units. Systematic surface collection of surface artifacts is not recommended, since this could preclude future relocation of the site.	Alabama Historical Commission Administrative Code Chapter 460-X-9 Archaeological Investigations	6/30/06	http://www.alabamaadministrativecode.state.al.us/docs/hist/460-X-9.pdf	

State		Relevant Text	Title	Date	URL	Notes
	Pre-accession Discard	"Every artifact must be cleaned, labeled with permanent provenience designation (either by writing directly on the artifact or by placing artifacts in appropriate labeled containers), and listed in an inventory organized by provenience. Type identifications should correspond to local and regional descriptive and classificatory systems, unless a rationale for new types is in the project report. Artifacts requiring stabilization by a professional conservator shall receive prompt treatment. All survey collections (including artifacts, field records, laboratory records, and a copy of the final report) must be placed in an archaeological repository for permanent curation approved by the Alabama Historical Commission. Such repositories must meet Department of the Interior 36 CFR 79 guidelines for "professional, systematic and accountable curatorial services on a long-term basis". These services include storing and maintaining collections in clean, physically secure conditions with appropriate environmental controls, and providing access and facilities for study of the collections.				
Alaska	**In Field Sampling**		University of Alaska, Museum of the North, Curation Guidelines	2016	http://www.uaf.edu/museum/collections/archaeo/pdfs/Curation-Guidelines_2016.pdf	
	Pre-accession Discard					

State		Relevant Text	Title	Date	URL	Notes
Arizona	**In Field Sampling**		Standards for Inventory Documents Submitted for SHPO Review	2016	http://www.statemuseum.arizona.edu/media/statemuseum/_file/SHPO_Survey_Report_Standards.pdf	
	Pre-accession Discard	Archaeological projects may not unilaterally discard or otherwise dispose of survey or excavated collections from State lands. Collections from Other Lands in Arizona It is the responsibility of all parties using ASM as a repository to comply with the policies and guidelines of the agency owning, sponsoring, or authorizing the project. This is particularly critical for the disposal of material. Complete records of any such disposal must be provided to ASM as an essential part of the project documentation.	Requirements for the Preparation of Archaeological Project Collections for Submission to the Arizona State Museum	2004	http://www.statemuseum.arizona.edu/media/statemuseum/_file/repository_manual.pdf	
Arkansas	**In Field Sampling**	2. Collection of artifacts from the surface of each site is required (except tombstones from a cemetery!). This stipulation is contingent on having landowner permission or a federal Archeological Resources Protection Act (ARPA) permit. The collection strategy and the kinds and numbers of artifacts collected will depend upon the size of the site, the number and diversity of artifacts, the research goals, and the time frame of the project. Some level of spatial control is recommended for all surface collecting. The methods used must be consistent with project goals and must be described and illustrated in the report. The artifacts should be curated in a state approved curation facility in Arkansas (see page 2 curation). 3. Observation and recording of artifacts without collecting is not an acceptable	Appendix B of the Arkansas State Plan Guidelines for Archeological Fieldwork and Report Writing In Arkansas	2010	http://archeology.uark.edu/wp-content/uploads/2014/12/Guidelines-for-Cultural-Resources-Fieldwork-Report-Writing-In-AR-Appenices-B-and-C-from-the-State-Plan.pdf	

State		Relevant Text	Title	Date	URL	Notes
		practice. Much of the interpretation about a site is dependent upon a study of the artifacts. If no collection is made, no confirmation of identification is possible, and the required illustration and analysis in a report would be much less complete. It is highly likely that the artifacts not collected by an archeologist will be collected by someone else and will not be available for future study. This applies equally to historic and to prehistoric sites. 4. Collections of material from sites known to be less than 50 years old need not be made, although the nature of the artifacts observed should be recorded. If an archeologist is not thoroughly familiar with historic artifacts (i.e., cannot tell what is 50 years old or older), collections must be made on all historic sites so that proper identification may be made through consultation with a trained historic archeologist.				
	Pre-accession Discard		in Compliance with Historic Preservation Laws	1999	http://archeology.uark.edu/wp-content/uploads/2014/12/Standards-for-Long-Term-Curation-of-Archeological-Materials.pdf	
California	**In Field Sampling**		California BLM Guidelines for a Cultural Resources Inventory	nd	https://www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-010ATT1.pdf	

State		Relevant Text	Title	Date	URL	Notes
	Pre-accession Discard	When cultural materials are encountered as the result of a prehistoric or historic resource survey, excavation, or other study, archival procedures must be followed and decisions must be made by qualified archeologists as to what must be recorded, discarded, or saved for a permanent collection. Decisions to eliminate material may have to consider hazards to health and safety, deterioration of material beyond its ability to be preserved, importance for scientific research, heritage appreciation, or educational value, or its age being too recent to qualify as historical. Such decisions also must consider practical factors, such as weighing the costs of curation against the present and potential heritage and research values of the materials. As it is extremely difficult to predict future values, a conservative approach is recommended	Guidelines for the Curation of Archeological Collections	1993	http://ohp.parks.ca.gov/pages/1054/files/guide93.pdf	
Colorado	**In Field Sampling**	"Artifact collection strategies vary according to the research design, the scope of the project, and the scale of the resource."	Colorado Cultural Resource Survey Manual Guidelines for Identification: History and Archaeology	2007	http://www.historycolorado.org/oahp/survey-manual	
	Pre-accession Discard		Submission Guidelines for State-Owned Archaeological Collections	2012	http://www.historycolorado.org/sites/default/files/files/OAHP/crforms_edumat/pdfs/1636.pdf	
Connecticut	**In Field Sampling**		Archaeological Permits	nd	http://www.sots.ct.gov/sots/lib/sots/regulations/title_10	

State		Relevant Text	Title	Date	URL	Notes
					/386.pdf	
	Pre-accession Discard		Introduction to the Revised Environmental Review Primer for Connecticut's Historic Properties	2012	http://www.cac.uconn.edu/Images/OSA%20Downloads/CT%20SHPO%20-%20Intro%20to%20the%20Revised%20Primer%20March%202012.pdf	
Delaware	**In Field Sampling**		Archaeological Survey in Delaware	2012	http://history.delaware.gov/pdfs/archaeologicalSurveyGuide2012.pdf	
	Pre-accession Discard		Collections Management Policy	2015	http://history.delaware.gov/pdfs/HCA_Collections_Management_Policy_2015_09_10.pdf	
Florida	**In Field Sampling**	We strongly encourage discussion of collection and curation strategies with BAR staff before beginning a 1A-32 project. Please be aware that not all items collected during 1A-32 permit investigations may be curated by the BAR.	1A-32 Permit, Collection and Curation Guidelines	2017	http://dos.myflorida.com/media/698013/dhr_-curation-guidelines-2017.pdf	
	Pre-accession Discard	IV) Handling Material Not Curated Materials or items exempt from curation are excluded from selling or personal use. The material must be dealt with in a professional and ethical manner. Note the following: Material not selected for curation and considered to lack research potential (e.g., modern plastic, cigarette filters, unmodified matrix pebbles, charcoal unsuitable for radiocarbon or other analysis, etc.) may be discarded in land-fill	General Guidelines for Determining the Collection and Curation of Archaeological Materials Made under 1A-32 Permitting	2017	http://flheritage.com/archaeology/education/permit.cfm	

State		Relevant Text	Title	Date	URL	Notes
		trash or buried on site (the latter, per consultation with BAR and land managing agency). · Toxic items (e.g., asbestos) need to be disposed of properly and not simply added to normal trash. · Unselected metal oxides and unrecognizable decomposed materials can be treated as trash.				
Georgia	**In Field Sampling**	"Typically, all artifacts are collected. However, any material not collected such as brick, mortar, shell, or fire-cracked rock—may be counted, measured (when appropriate), weighed, sampled by provenience, and discarded in the field. "	Georgia Standards and Guidelines For Archaeological Surveys	2014	http://georgia-archaeology.org/GCPA/standards_for_survey/	
	Pre-accession Discard		Laboratory of Archaeology University of Georgia Collections Management Policy	2015	https://archaeology.uga.edu/archlab/sites/default/files/misc/2015_collections_management_policies_uga.pdf	
Hawaii	**In Field Sampling**	The SHPD does not require the collection of surface artifacts from archaeological sites during surveys, and recommends that they remain on site unless they are in danger of being disturbed, destroyed, or stolen. Unique or diagnostic surface artifacts should be photographed on site with a suitable scale, especially when their presence is an important to the interpretation of site age or function. If such artifacts are moved to safer locations on the site after documentation, the original and	Procedures and Guidelines for Archaeological Survey and Inventory in Hawai‘i	nd	http://hawaiianarchaeology.org/publication/view/draft-survey-and-inventory-sop/	

State		Relevant Text	Title	Date	URL	Notes
		new locational information should be documented.				
	Pre-accession Discard					
Idaho	**In Field Sampling**		Guidelines for Documenting Archaeological and Historical Surveys	nd	https://history.idaho.gov/forms-guidelines-and-templates	Guidelines focus on report contents. Collection methods are not addressed.
	Pre-accession Discard					
Illinois	**In Field Sampling**		Illinois State Historic Preservation Office Guidelines for Archaeological Reconnaissance Surveys/Reports	nd	https://www2.illinois.gov/dnrhistoric/preserve/siteassets/pages/archaeology/archaeological%20guidelines.pdf	Guidelines focus on report contents. Collection methods are not addressed.
	Pre-accession Discard					

State		Relevant Text	Title	Date	URL	Notes
Indiana	**In Field Sampling**	"On prehistoric sites, all diagnostic artifacts and all artifacts found within individual transects (1 meter to either side of transect centerline) will be collected, with the exception of fire-cracked rock (FCR). Concentrations and relative densities of all artifacts, including FCR, must be recorded. Counts, densities, and/or weights of FCR, must be recorded. On historic sites, if the Field Supervisor (or Principal Investigator) meets the state qualification standards in Midwestern historic archaeology and is thoroughly familiar with the ages and functions of historic artifacts, then thorough collections of artifacts of recent origin (less than 50 years old) need not be made. If there is any doubt as to the age, function, or information potential of artifacts, collections should be made for identification purposes. A decision not to collect all of the artifacts found within individual transects (1 meter to either side of transect centerline) must be justified and approved by DHPA prior to the initiation of fieldwork or at a point during the fieldwork when a situation arises that forces such a revision. The exception to this is in the category of large amounts of architectural/construction items. Artifacts such as bricks, concrete blocks, and other construction debris do not need to be collected (although they must be noted and described, and densities estimated, counted, and/or weighed), unless there is something diagnostic (e.g., manufacturer's mark, name or place stamped on an artifact, artifact has relevant functional information, etc.) about them or if the research design delineates such methodology for a specific study (e.g., early 19th century brick manufacturing)."	Guidebook for Indiana Historic Sites and Structures Inventory – Archaeological Sites as partially revised by the Division of Historic Preservation and Archaeology in consultation with the Guidebook Committee of the Indiana Archaeology Council in 2008	2008	https://www.in.gov/dnr/historic/files/hp-ArchaeologyDraftGuidebook.pdf	

State		Relevant Text	Title	Date	URL	Notes
		"All artifacts encountered during the subsurface investigation need to be collected and bagged by provenience (trench, depth, features, etc.). Intermediate trenches/augering may be required for accurate definition of site boundaries."				
	Pre-accession Discard	All artifacts not returned to the landowner, copies of field and laboratory records and documentation, maps, photographs, samples recovered or taken, notes, site forms, site and project report(s), other relevant records, documentation, etc. must be curated at a qualified curational facility.				

State		Relevant Text	Title	Date	URL	Notes
Iowa	**In Field Sampling**	"Archaeologists should routinely collect artifacts that are observed during survey. It is rarely appropriate to discard artifacts found in subsurface contexts, although this procedure may sometimes be necessary when large amounts of non-diagnostic cultural material are encountered. In every case, a representative sample of materials should be collected, and the decision to not collect all archaeological materials should be fully explained and justified." "Collection of artifacts and curation of specimens during Phase II investigations should include all considerations discussed for Phase I survey report guidelines that are applicable to Phase II investigations (Section 3, Chapter 5 "Collection and Curation of Artifacts"). All artifacts, including fire-cracked rock, should be collected during controlled surface collections and test excavations. If possible all artifacts or specimens, diagnostic and undiagnostic, should be collected and curated. However, the Principal Investigator should determine if collection and curation of all artifacts is necessary. A situation may dictate the collection and curation of only a representative sample of undiagnostic artifacts such as fire-cracked rock. Stratigraphic and horizontal control should be implemented and maintained during collection of materials recovered from Phase II investigations." "Collection of artifacts and curation of specimens during Phase III data recovery should include all considerations previously discussed for Intensive Phase I survey guidelines. The Secretary of the Interior's	Guidelines for Archaeological Investigations in Iowa	1999	http://aiarchaeologist.org/archaeo_guidelines_section0.pdf	

State		Relevant Text	Title	Date	URL	Notes
		Standards and 36 CFR 79 should be consulted concerning the collection and curation of specimens. All artifacts, including fire-cracked rock, should be collected during data recovery. If possible all artifacts or specimens, diagnostic and non-diagnostic, should be collected and curated. However, the Principal Investigator should determine if collection and curation of all artifacts is plausible. A situation may dictate the collection and curation of only a representative sample of undiagnostic artifacts such as fire-cracked rock. Stratigraphic and horizontal control of collected materials should be implemented and maintained during Phase III data recovery."				
	Pre-accession Discard	"After careful consideration is given to retaining representative samples, some materials may be discarded prior to submitting collections for curation. Record materials being discarded in a separate catalog record. The OSA catalog database employs a yes/no field to record discarded material. Currently, the OSA lists the following materials that may be discarded: 1. Fire-cracked rock; 2. Noncultural or unmodified rock; 3. Masonry materials including brick, cement, mortar, limestone; 5. Slag, cinders, and coal; and 6. Other bulky, redundant, or non-diagnostic materials lacking either secure archaeological context or research applications."	Curation Services Guidelines Office of the State Archaeologist The University of Iowa	nd	https://archaeology.uiowa.edu/curation-services	

State		Relevant Text	Title	Date	URL	Notes
Kansas	**In Field Sampling**	"All diagnostic surface artifacts should be collected, concentrations of artifacts should be noted and a controlled sample of surface artifacts collected. A number of 1x1 meter test units should be excavated, with test units strategically placed to investigate artifact concentrations and features, and to establish the subsurface of the site." "All subsurface artifacts, except bulk classes such as fire-cracked rock, should be collected, along with all surface diagnostics and a controlled sample of surface artifacts. Bulk artifact classes should be tallied or weighed in the field and an adequate sample collected."	Kansas SHPO's Guide to Archeological Survey, Assessment, and Reports	nd	https://www.kshs.org/preserve/pdfs/shpos_guide_archeology.pdf	
	Pre-accession Discard	"As a rule, unanalyzed bulk samples of soil or materials such as fire-cracked rock will not be accepted for curation. Exceptions may be made, in writing, at the discretion of the State Archeologist."				
Kentucky	**In Field Sampling**	"Survey methodologies incorporating non-collection of surface artifacts are not acceptable to the SHPO except for very unusual circumstances and require prior approval."	Specifications for Conducting Fieldwork and Preparing Cultural Resource Assessment Reports	2006	http://heritage.ky.gov/NR/rdonlyres/5757C6A1-E8E0-4B5E-BE0F-7AF5B78C6BF1/0/2006FieldworkCRspecs.pdf	
	Pre-accession Discard	Historic archaeological excavations often generate archaeological collections of tremendous size. These collections take up increasingly limited space in museums and federal repositories. Through meetings and discussions with various firms and agencies, it has become apparent that a statewide policy and procedure for discarding historic materials is needed. With this in mind, the Heritage Council	Discarding Historic Artifacts: Guidance for Consultants	nd	https://anthropology.as.uky.edu/sites/default/files/Historic%20Artifact%20Discard%20Policy.pdf	Culling is encouraged; specific guidelines available. But all material must be retained pending a final determination

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		staff prepared the following guidelines.				of site eligibility.
Louisiana	**In Field Sampling**	" The Division encourages, but does not require, the curation of diagnostic artifacts recovered from Isolated Finds as a result of Phase I investigations. Investigators may return materials from Isolated Finds to property owners or discard them. Investigators must retain all non-bulk cultural material recovered during a Phase I investigation of an archaeological site. Investigators must separate all archaeological materials by their provenience for curation. Investigators can count or weigh bulk materials such as brick, mortar, plaster, shell, and gravel in the field or lab with only a representative 10% sample retained for curation. Bulk material samples submitted for curation may not exceed 250 grams (10.5 oz.) each without prior approval by the Division of Archaeology."	Field Standards for Terrestrial Phase I Cultural Resources Surveys	nd	http://www.crt.state.la.us/cultural-development/archaeology/section-106/field-standards/phase-i-surveys/index	
	Pre-accession Discard					
Maine	**In Field Sampling**		Archaeological Survey Guidelines	2002	http://www.maine.gov/mhpc/project_review/archaeological_survey_guid	

State		Relevant Text	Title	Date	URL	Notes
					elines.html	
	Pre-accession Discard					
Maryland	**In Field Sampling**	"surveyors should retain all of the prehistoric and historic artifacts recovered from the sampled land for analysis and curation. (Recall that this document's definition of artifact includes only those cultural items which are at least 50 years old. Therefore, an archeologist need not collect clearly modern objects like styrofoam cups or aluminum pull-tabs. It may be useful, however, to save a modern cultural object if it is critical for the interpretation of an archeological property's stratigraphy and integrity.)"	Standards & Guidelines for Archeological Investigations in Maryland	1994	https://mht.maryland.gov/documents/PDF/archeology/Archeology_standards_investigations.pdf	

State		Relevant Text	Title	Date	URL	Notes
	Pre-accession Discard	"Certain types of material may have questionable long term research value and thus may not warrant permanent curation with the collection. These materials may include: brick, mortar, slag, coal, shell, and recent 20th century debris (i.e., less than 50 years old). It may be more prudent to discard these items following analyses, rather than to permanently curate the materials with the collection. A project's principal investigator, in consultation with the Trust, should employ the best professional knowledge and judgement to decide the most appropriate disposition of these materials. Factors to consider in reaching the decision to selectively discard materials include: the archeological context of recovery, the items' research potential, the amount and manageability of the materials. The principal investigator should carefully consider the potential future research value of the items. Depending upon the situation, the selective discard may encompass all, none, or a portion of the materials. It may be prudent to retain a sample of the materials slated for discard for future study and analyses. Items slated for selective discard must still be analyzed and cataloged. The collection's catalog must specify the types and quantities of discarded materials, along with a justification for the selected disposition, and note that the items were discarded."	Standards and Guidelines Update 1: Archeology, Standards for Curation	2005	https://mht.maryland.gov/documents/PDF/archeology/Archeology_standards_curation.pdf	
Massachusetts	**In Field Sampling**					
	Pre-accession Discard					
Michigan	**In Field Sampling**					

State		Relevant Text	Title	Date	URL	Notes
	Pre-accession Discard					
Minnesota	**In Field Sampling**	When sites are encountered by surface reconnaissance, the amount of material collected and saved for laboratory analysis will be dependent on the artifact density and artifact variety. All obviously diagnostic artifacts (e.g., rim sherds, projectile points) and formed tools must be collected and saved as well as representative samples of lithic debitage, body sherds, bone, and other kinds of artifacts. Piece plotting of individual artifacts is not necessary in a Phase I survey unless specified in the research design, although areas of artifact concentration or artifact differentiation should be noted. Important surface features need to be mapped." "All artifacts recovered by shovel testing must be saved for analysis and curation so horizontal provenience needs to be carefully maintained." "Recovered materials that are not being addressed by project research questions should not be discarded without careful consideration of their future research value." "A discard protocol should also be developed for items like fire-cracked rock." "Fire-cracked rock (FCR) may be discarded in the field, but its location and raw material type should be carefully recorded; weighing prior to discarding is recommended. Some FCR can be used as expedient tools, a fact which may escape casual field inspection so the retention	SHPO Manual for Archaeological Projects in Minnesota	2005	http://www.mnhs.org/shpo/survey/archsurvey.pdf	

State		Relevant Text	Title	Date	URL	Notes
		of some sample of the FCR is advised. Reasons should be presented why rock is assumed to be fire-cracked."				
	Pre-accession Discard	"Archaeological materials collected from public sites should not be discarded without the approval of the land management agency."	Curation of Archaeology Collections Under Repository Agreements	nd	http://www.mnhs.org/collections/archaeology/curation.php	
Mississippi	**In Field Sampling**	"Representative artifact collections (i.e. all artifact forms, not just diagnostics) must be made from archaeological sites identified within the project area for the purposes of determining the site's temporal and cultural affiliations, as well as the functional and technological aspects of the assemblage."	Guidelines for Archaeological Investigations and Reports in Mississippi	2001	http://www.mdah.ms.gov/new/wp-content/uploads/2013/06/archguidelines8-13-2012.pdf	
	Pre-accession Discard		Curation	nd	http://www.mdah.ms.gov/new/preserve/archaeology/curation/	
Missouri	**In Field Sampling**	"At a minimum, samples of artifacts observed during Phase I survey should be collected and curated."	Guidelines for Phase I Archaeological Surveys and Reports	nd	https://dnr.mo.gov/shpo/docs/MO_phase1_guide.pdf	
	Pre-accession Discard		Guidelines for Archaeological Curation	2011	https://anthromuseum.missouri.edu/pdfs/aad_curation_standards_2011.pdf	

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Montana	**In Field Sampling**		Consulting with the Montana SHPO Guidelines and Procedures; Step 2: Identify Archaeological Properties	nd	https://mhs.mt.gov/Portals/11/shpo/docs/ConsultingWith/STEP_2a_ConsultingWithMTSHPO.pdf	
	Pre-accession Discard		University of Montana Anthropological Curation Facility Policy and Procedure Manual	nd	http://hs.umt.edu/anthropology/umacf/documents/umacf-policy-2014.pdf	
Nebraska	**In Field Sampling**		Nebraska State Historic Preservation Office National Historic Preservation Act Archeological Properties Section 106 Guidelines	2006	http://www.nebraskahistory.org/histpres/publications/Sec-106-Guidelines.pdf	site form has provisions for material observed but not collected
	Pre-accession Discard		Burke Museum: Guidelines for Preparing Archaeological Collections for Curation at the Burke	2015	http://www.burkemuseum.org/sites/default/files/burke-curation-guidelines.pdf	
Nevada	**In Field Sampling**	"Research, testing plans or treatment plans that include limited testing, artifact collection, excavation, or removal of artifacts will require additional information from the BLM District or Field office in which the work is going to occur prior to the NSO issuing Limited Testing and/ or Collection Permits or Excavation and/or Removal Permits"	Bureau of Land Management Nevada State Office Guidelines and Standards for Archaeological Inventory	2012	https://www.blm.gov/sites/blm.gov/files/documents/files/NV%20Guidelines%20and%20Standards%20for%20Archaeological%20Inventory%202012.pdf	From BLM
	Pre-					

State		Relevant Text	Title	Date	URL	Notes
	accession Discard					
New Hampshire	**In Field Sampling**	"If historic artifacts are not retained, then state the reason for their disposal in the report. For example, they compose field scatter." "All artifacts returned to the laboratory are cataloged, and the catalogue is placed in the report's appendix."	Archaeological Standards and Guidelines.	2004	https://www.nh.gov/nhdhr/review/archaeology.htm	
	Pre-accession Discard	"Because of the large number of artifacts associated with some types of Native American and many historic sites, the principal investigator in conference with the NHDHR and the NHDOT may need to address which portions of the assemblage are retain. Retention includes collection sufficient to permit its reanalysis to examine the research questions of the data recovery project from a different perspective and pursue other questions and types analyses at a later date. The method of and reasons for the artifact selection and the discussions about it with the State Archaeologist are documented in the Phase III report."				
New Jersey	**In Field Sampling**	"Some sorts of artifacts can be discarded in the field, provided their data value is fully documented and possible subsequent phases of investigation are not compromised by the discard of these specimens. Other specimens should be retained for laboratory examination."	Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources.	2004	http://www.nj.gov/dep/hpo/1identify/arkeoguide1.htm	

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	Pre-accession Discard	"Some categories of artifacts may be discarded after they have been identified and recorded. This includes modern objects and bulk items which have no diagnostic value beyond their presence (e.g., coal and coal waste; and construction materials such as mortar, brick fragments, and cut stone fragments). Representative specimens of these latter items should be retained. Artifacts of all categories should be recorded quantitatively."				
New Mexico	**In Field Sampling**	" G. In-field artifact analysis. Perform in-field analysis on all or a sample of all classes of surface-visible artifacts including but not limited to lithics, ceramics and historic artifacts. The size of the sample shall be sufficient to document the full variety of types of artifacts represented at the site and to delineate intrasite activity areas. Formal, bounded sample units are recommended. Required information may be documented in a table, on a form developed by the individual or firm performing the survey or on a form required by the state agency. Required information includes class of artifact, make, type or series and other attributes that relate to interpretation of chronology, form and function. If measurements will aid in the identification or classification, measure artifacts with a ruler, tape or calipers. Measurement shall be taken in metric units unless the artifact is historic and English measurements are more appropriate. Illustrations or photographs of diagnostic artifacts are encouraged. Attach copies of the in-field analysis forms, narrative descriptions and illustrations to the LA archaeological site record." "A. Collection of artifacts. Collection of artifacts from archaeological sites and isolates	New Mexico Register / Volume XVI, Number 15 / August 15, 2005. Title 4 Cultural Resources; Chapter 10 Cultural Properties and Historic Preservation; Part 15 Standards for Survey and Inventory	2005	http://www.nmhistoricpreservation.org/assets/files/permits/standards.for.survey.pdf	

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		is strongly discouraged. Collection of artifacts from state trust lands shall be allowed only with the written permission of the Commissioner. In all other cases, collections are permitted if the items are likely to be lost through illegal collection, are required to address specific predefined research issues that necessitate laboratory analysis or are necessary for accurate classification. Collections shall be analyzed in the laboratory, reported upon in the survey report and curated at an acceptable repository pursuant to 4.10.8 NMAC."				
	Pre-accession Discard	"Submitters are reminded that they must comply with all relevant Federal, State, or Tribal guidelines concerning the disposal of portions of collections prior to submission for curation. Although the Curator, ARC, strongly encourages archaeologists to consult with the state or federal agency supervising their investigations regarding the need to curate all materials collected during the investigation, the Museum of New Mexico accepts no responsibility for the selection of collections for disposal prior to their submission to ARC. Furthermore, the ARC staff cannot dispose of any artifacts or samples once a collection is submitted for curation."	Procedures Manual for Submission of Archaeological Artifact and Records Collections	2002	http://miaclab.org/assets/files/submission.pdf	
New York	**In Field Sampling**		Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State	1994	https://toh.li/files/pdfs/th_lighthouse/31_s3.61_06_BasicFreeway.pdf	
	Pre-accession Discard					

State		Relevant Text	Title	Date	URL	Notes
North Carolina	**In Field Sampling**	"Collection of artifacts is discretionary; however, any materials removed from their original setting should be fully documented and retained, rather than being discarded."	Archaeological Investigation Standards and Guidelines	2017	https://files.nc.gov/dncr-arch/OSA_Guidelines_May2017.pdf	
	Pre-accession Discard	All materials – including artifacts, floral and faunal remains, and sediment samples, along with related documentation such as original field notes, maps, photographs, artifact inventory lists, and analysis forms – recovered and created for purposes of compliance with state and federal regulations shall be permanently curated in an approved archaeological repository, preferably in the state of North Carolina.				
North Dakota	**In Field Sampling**					
	Pre-accession Discard					
Ohio	**In Field Sampling**	"Phase II investigation should aim for the recovery of chronologically diagnostic artifacts, the recovery of datable radiocarbon samples, and the recording of geomorphological data which may provide approximate chronological limits to the occupation of the site."	Archaeology Guidelines	1994	https://www.ohiohistory.org/OHC/media/OHC-Media/Documents/Archaeology-Guidelines-PDF-FILEminimizer.pdf	
	Pre-accession Discard	"1. The classes of material remains which should be curated can be determined from the research problems contained in pertinent research designs or historic contexts for archaeological resources. 2. At least a representative sample of each class of material remains and all associated records should be curated. The disposition of non-curated material remains from archaeological investigations should be				

State		Relevant Text	Title	Date	URL	Notes
		documented in accordance with standards and guidelines such as those adopted by the American Association of Museums."				
Oklahoma	**In Field Sampling**					
	Pre-accession Discard					
Oregon	**In Field Sampling**	"Oregon SHPO recommends that collecting should in principle be avoided at the survey level." "If artifacts are not going to be collected during subsurface reconnaissance work on nonfederal public land, this must be stipulated in the archaeological l permit and approved by the Oregon State Museum of Anthropology (OSMA). State law (ORS 390.235) links curation decisions to OSMA who reviews all permit applications." "If reburial of artifacts is approved, all artifacts should be thoroughly recorded and documented prior to reburial. Some method should be used to clearly indicate that they have been previously discovered – i.e. placed in plastic bags in the bottom of the unit." "When work is being done under a State of Oregon Archaeological Excavation Permit, everything from excavation units	Guidelines for Conducting Field Archaeology in Oregon	2007	http://www.oregon.gov/oprd/HCD/ARCH/docs/draft_field_guidelines.pdf	

State		Relevant Text	Title	Date	URL	Notes
		should be collected in the field and taken back to the laboratory. All artifacts should be curated following analysis. Modern items may be discarded in the laboratory. State law (ORS 390.235, sub-section 3) requires that everything of archaeological significance, 75 years and older, collected under an excavation permit must be curated. "In some circumstances culling of historic material may be acceptable but this should happen in the laboratory and only after consultation with the repository that will be curating the collection. In Oregon this is generally OSMA for precontact collections, OSU for historic materials, or an alternate facility agreed upon by OSMA."				
	Pre-accession Discard		Guidelines for the Preparation of Archaeological Collections to be Curated by the University of Oregon Museum of Natural and Cultural History and State Museum of Anthropology	2010	http://natural-history.uoregon.edu/sites/default/files/mnch/FinalGuidelines%20for%20Preparation%20of%20Collections_Jan_2017.pdf	
Pennsylvania	**In Field Sampling**	"In general, all observed artifacts should be collected during a Phase I survey; however, for certain artifact types a sample can be collected (i.e. brick, window glass, plaster, etc...). Consult with the SHPO regional reviewer before instituting a sampling strategy."	Guidelines for Archaeological Investigations in Pennsylvania	2016	http://www.phmc.pa.gov/Preservation/About/Documents/SHPO-Guidelines-Archaeological-Investigation.pdf	
	Pre-accession Discard	Some artifact types found on archaeological sites are not worthy of long-term curation due to their ubiquity, discovery context, physical condition, or a combination of several or all of these factors. Discards, however, must be	Revised Curation Guidelines	2006	http://www.phmc.pa.gov/Preservation/About/Documents/State-Museum-	

State		Relevant Text	Title	Date	URL	Notes
		appropriately analyzed, cataloged, and noted as such on artifact inventory sheets. Retention of a 5% minimum randomly selected sample of identifiable iron nails and fire-cracked rock is recommended from each distinct provenience/catalog unit within a site. The following artifact types may be discarded without sample retention, so long as they satisfy stated contextual criteria. • All surface-collected roadside debris. [Careful distinction between roadside and household debris must be made where historic sites exist next to roadways.] • Severely corroded unidentifiable metal from all contexts. • Brick and mortar fragments from surface or plow zone contexts. • Window glass pieces from surface or plow zone contexts. • Asphalt and concrete from surface, plow zone, and fill layer contexts.			Curation-Guidelines-2006.pdf	
Rhode Island	**In Field Sampling**					
	Pre-accession Discard					
South Carolina	**In Field Sampling**		South Carolina Standards and Guidelines for Archaeological Investigations	2013	http://shpo.sc.gov/programs/Documents/Standards_Guidelines2005-13.pdf	
	Pre-accession Discard	"Typically, all artifacts are collected. However, any material not collected -such as brick, mortar, shell, or fire-cracked rock - should be sampled by provenience, and then counted, measured (when appropriate), or weighed, and discarded in the field. "				

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South Dakota	**In Field Sampling**					
	Pre-accession Discard					
Tennessee	**In Field Sampling**	Reports should include "Detailed summation and evaluation of field techniques used, including sampling and recording techniques (If the complete range of artifact types was not collected, a rationale should be given for differential recovery methods.);	Tennessee SHPO Standards and Guidelines for Archaeological Resource Management	2009	https://www.tn.gov/assets/entities/environment/attachments/arch_shpo_sg.pdf	
	Pre-accession Discard	"For artifacts such as fire cracked rock, unmodified chert cobbles, limestone fragments, or brick, retain a sample, then weigh, record and discard the remainder. Tabulate, describe and discard late 20th century materials, such as aluminum cans or bottle glass, that have no bearing on site interpretation. Do not include unprocessed soil samples."				
Texas	**In Field Sampling**	Council of Texas Archaeologists: 2.2.5.1 Collection of artifacts in the field. The basis of the decision as to whether or not artifacts will be collected should be specified, and the disposition of artifacts that are collected and their documenting records should be indicated. 4.2.3.5 Collection of artifacts must be made in a systematic manner with minimal attrition to the site. The methods used must be documented in the field notes. 4.2.3.6 If artifacts are not collected, there must be descriptions, drawings, and photographs that fully convey the range of variation and relative frequencies of observed specimens. Whenever possible, a scale or an object that conveys a scale should be included. Any	Council of Texas Archaeologists Guidelines for Professional Performance	nd	http://counciloftexasarcheologists.org/wordpress/wp-content/uploads/Performance-Guidelines.pdf	

State		Relevant Text	Title	Date	URL	Notes
		selectivity exercised in recording artifacts must be noted and justified. 4.3.4 Whenever possible, controlled surface collections should be made and should be related to the provenience system used in the subsurface investigations.				
	Pre-accession Discard	When eliminating material, archeologists may have to consider hazards to health and safety, deterioration of material beyond its ability to be preserved, importance for scientific research, heritage appreciation, educational value, or its age being too recent to qualify as historical. ... Such decisions also must consider practical factors, such as weighing the costs of curation against the present and potential heritage and research values of the collections. As it is extremely difficult to predict the potential for research, a conservative approach is recommended.	Council of Texas Archaeologists Guidelines and Standards for Curation	2011	http://counciloftexasarcheologists.org/wordpress/wp-content/uploads/CTA-CurationGuidelines-2011-03-03-NL.pdf	
Utah	**In Field Sampling**					
	Pre-accession Discard					
Vermont	**In Field Sampling**		Guidelines for Conducting Archeology in Vermont	2017	http://accd.vermont.gov/sites/accdnew/files/documents/HP/ARCHEO%20GUIDELINES%20Final.pdf	

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	Pre-accession Discard	"Archeologists must carefully weigh decisions about which artifacts or data sets to keep since caring and managing for collections in perpetuity involves significant costs, commitments, and efforts. The National Park Service offers excellent guidance and information for dealing with many of the complex topics associated with care and management of collections at their web site http://www.cr.nps.gov/aad/curation.htm. Generally, all cultural materials recovered from a precontact site are considered important and worthy of care and management in perpetuity. However, data classes such as fire cracked rock from fire pits, hearth or other feature fill, soil samples, and some other kinds of data should be judiciously evaluated to assess whether it is necessary to keep all or part of it after analysis. The type of site involved will affect these considerations. Retaining collections from precontact site contexts is especially important when an investigation ends after Phase I since it may not be possible to know what the collected set of data represents. Artifacts and other data classes from historic period archeological sites require more deliberation and decision-making about what to keep after analysis. Generally, the earlier, or rarer, or otherwise more special the historic archeological site, the more materials should be retained if they pertain to the site's period of significance. Even for early historic sites, disposition of large quantities of brick, glass, rock, and other construction materials needs to be carefully considered; only appropriate samples should be maintained. For more common types of historic period archeological sites, the most important parts of the collection are those data				

State		Relevant Text	Title	Date	URL	Notes
		sets that addressed the research questions. Twentieth century artifacts such as tin cans, bottles, bottle caps, and so forth, in 19th century contexts should not be retained although documenting their archeological context may be necessary or even important. Occasionally, however, it is crucial to retain an out-of-context artifact as confirmation of site disturbance or site age or because it offers another important piece of information.				
Virginia	**In Field Sampling**	Certain types of bulk artifacts and artifacts with limited context or no context have questionable long-term research and exhibit value and thus may not warrant permanent management with the collection. These materials may include: fire-cracked rock, flakes, brick fragments, mortar, slag, coal, shell, artifacts designated as 'locations,' and 20th /21st century debris, especially artifacts less than 50 years old. In certain types of field recovery approaches, like controlled surface collecting, many of these items may be noted, counted, weighed, and left in the field. Recovered items that are slated for selective discard must be cataloged and analyzed. The collection's catalog must clearly identify and quantify the discarded materials. A project's principal investigator, in consultation with the Chief Curator, should employ the best professional judgment to decide what to discard. Factors to consider in reaching the decision to selectively discard materials include: archaeological context, the redundancy of the materials, and the item's research, education, or exhibit potential.	Guidelines for Conducting Historic Resources Survey in Virginia	2011	http://www.dhr.virginia.gov/pdf_files/Survey%20Manual-RevOct.2011Final.pdf	

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	Pre-accession Discard	Certain types of bulk artifacts and artifacts with limited context or no context have questionable long-term research and exhibit value and thus may not warrant permanent management with the collection. These materials may include: fire-cracked rock, flakes, brick fragments, mortar, slag, coal, shell, artifacts designated as 'locations,' and 20th /21st century debris, especially artifacts less than 50 years old. In certain types of field recovery approaches, like controlled surface collecting, many of these items may be noted, counted, weighed, and left in the field. Recovered items that are slated for selective discard must be cataloged and analyzed. The collection's catalog must clearly identify and quantify the discarded materials. A project's principal investigator, in consultation with the Chief Curator, should employ the best professional judgment to decide what to discard. Factors to consider in reaching the decision to selectively discard materials include: archaeological context, the redundancy of the materials, and the item's research, education, or exhibit potential.				
Washington	**In Field Sampling**					
	Pre-accession Discard					
West Virginia	**In Field Sampling**					

State		Relevant Text	Title	Date	URL	Notes
	Pre-accession Discard	"Only an adequate representative sample of certain artifact classes (e.g., brick, fire cracked rock, window glass, etc.) will be accepted for curation. In general, bulk amounts of these classes of artifacts should be quantified, weighed, measured and recorded in the field. However, prior approval can be given on a case-by-case basis. Exceptions will not be made without prior consultation with the ACF curators."	Guidelines for submitting a collection to the Archaeological Collections Facility of West Virginia	2002	http://www.wvculture.org/museum/curationguide/index.html	
Wisconsin	**In Field Sampling**					
	Pre-accession Discard	For some artifact categories, permanent curation of every item might not be viewed as warranted or economically feasible, and curation facilities must make decisions regarding such items' disposition. Some items might be assessed as having questionable long-term research value, while others pose problems for permanent curation because of bulk, weight, or instability. Some common examples are unmodified rock or fire-cracked rock from prehistoric sites, or plate-glass fragments, nails, or other building debris from historic sites. Factors to consider in deciding to dispose of some materials include archeological context, research potential, amount and manageability of the materials, stability, and available curation and conservation resources. Archeologists should employ the best professional knowledge and judgment to decide how to deal with these materials, and should consider the items' potential future research value. Depending on their size and stability, these materials might be either analyzed and left in the field or returned to the lab for analysis but discarded before final curation.	Guide for Public Archeology in Wisconsin	2012	http://wisarchsurvey.org/wp/wp-content/uploads/2013/04/WAS-Guide-final-8-27-2012.pdf	

State		Relevant Text	Title	Date	URL	Notes
		As noted previously, implementation of artifact sampling strategies must be negotiated with WHS/SHPO and any agencies on whose behalf the research is undertaken in advance of field research or other investigations.				
Wyoming	**In Field Sampling**	If applicable, describe the collection strategy. Specific artifact and sample collection policies are determined by the responsible lead agency. Check with the lead agency to determine collection policies prior to fieldwork.	Wyoming State Historic Preservation Office Format, Guidelines, and STANDARDS for Class II and III Reports	2012	http://wyoshpo.state.wy.us/pdf/ClassIIIReportStandards.pdf	
	Pre-accession Discard	"Unprocessed carbon samples must be kept to a minimum because of limited available space in the repository." "No soil samples will be accepted without the prior approval of the Collections Manager or Repository Supervisor." "Fire cracked rock as such will not be accepted under any circumstances."	The University of Wyoming Archaeological Repository Guidelines and Standards	2013	http://wyoarchaeo.state.wy.us/pdf/repository_guidelines.pdf	

APPENDIX B: MATERIAL SAMPLING STATEGIES

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
Bone, Antler, Ivory (prehistoric)	Count, measure, and weigh all artifacts; retain all formed tools, ornaments, or diagnostic fragments.				
Botanical	Retain all diagnostic specimens.				
Botanicals (prehistoric textiles, wood)	Retain all artifacts. Weigh and measure all formed tools.				
Brick	Weigh all; note reconstructable dimensions; retain all with maker's marks and a representative sample of those without maker's marks.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."	Selected severely broken and crumbled brick for burial. "Samples of even the most ordinary broken brick, stone and mortar were retained for testing, comparison with other examples in the archaeological collection, and a general understanding of all materials represented from the different groupings. This included brick fired at different temperatures or made of different clays, all types of mortar, and a representational sample of all types of stone present from 18th century to modern marble. Whole brick, shaped brick, stone with any markings,	Chemical analysis has the potential to reveal clay source and location of manufacture. Rehydroxylation (RHX) dating may also be possible.

Table B1: Material Sampling Strategies					
Material Class	**Griset and Kodack (1999)**	**Peacock (2015)**	**Praetzellis and Costello (2002)**	**Williams (2011)**	**Notes**
				attachments, finished edges, wear marks or other use and construction evidence were all retained."	
					In addition to speaking to the physical nature of buildings, construction materials also have the potential to illuminate the timing of construction episodes, which in turn relates to the life and ownership cycles of the occupants.
Ceramics	Count and weigh all; retain all diagnostic specimens and a predetermined sample of redundant materials as specified in the research design.				Hand-made or locally produced ceramics may have more information potential the analysis of which would require the original object compared to mass-produced ceramics.
Charcoal	Retain all samples having provenience data for prehistoric sites; discard any lacking provenience or compromised by contaminants. Note for historic period sites, but do not collect.				C14 dating is not useful on recent samples of charcoal. However, where the species of plant can be discerned, retainage may be valuable for environmental reconstruction.
Chipped Stone	Count and weigh all specimens; retain all formed tools and a predetermined sample of				If refitting studies are planned, a representative sample won't be sufficient.

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
	chipped stone artifacts (also debitage) for analysis.				
Coal	Weigh all; retain predetermined sample.				
Daub	Weigh all; retain any with impressions significant to interpretation.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		In addition to speaking to the physical nature of buildings, construction materials also have the potential to illuminate the timing of construction episodes, which in turn relates to the life and ownership cycles of the occupants.
Faunal (Prehistoric)	After analysis, retain representative sample of all identified fauna present, any modified bone, and a predetermined sample (e.g., selected column sample) of unanalyzed faunal remains.				Small fragments, unidentifiable to species, or butchering technique have little further value beyond count, weight, and identification of whether mammalian or not. However, those from prehistoric sites may yield radiocarbon dates.
Faunal (Historic)	Weigh all; retain a predetermined sample for analysis and an example (e.g., selected column sample) of unanalyzed faunal remains.				Small fragments, unidentifiable to species, or butchering technique have little further value beyond count, weight, and identification of whether mammalian or not.

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
Fire-Cracked Rock	Weigh all; retain representative sample of rock material types.				If refitting studies are planned, a representative sample won't be sufficient. Can also be used for thermoluminescence dating.
Groundstone	Count and weigh all specimens; retain all complete specimens and those with reconstructable dimensions, residues, or other significant features; retain a representative sample of each rock material type.				
Lumber	Identify and record sizes present; retain unique or diagnostic specimens.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		
Mass Produced Products	Retain significant specimens as identified by research design (e.g., diagnostic parts of tin cans, leather, glassware, metal). Discard all non-diagnostic fragments.				Focus on retaining only those items for which the original artifact is needed for further analysis.

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
Metal (Architectural)	Retain any with diagnostic features; do not collect non-diagnostic fragments.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		
Mortar	Retain any specimens with diagnostic features.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		Distinct mortar types can help to date construction episodes.
Nails	Identify type and number of each type; retain a representative sample; discard remainder.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		
Shell	Retain all modified shell, sort by species, and weigh all identified	Sample must be spatially broad (when from a midden); retain			

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
	and unidentified shell, then discard all unmodified shell. Or, retain a predetermined sample for analysis	identifiable valves			
Shingle/Roofing Materials	Weigh all; retain representative sample of material types.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		
Soil	Retain all floated samples and a representative sample of unprocessed soil.				Reference DoD guidelines for the curation of soil samples (DoD nd); long-term storage may not be viable for preserving information. Needs to be dried to prevent mold growth
Window Glass	Measure thickness of all window glass; retain representative sample of types.		"While construction materials are useful in determining the nature of historic buildings and structures, the focus of most urban projects is recovery of primary deposits related to domestic and commercial use by the buildings' occupants."		Window glass from coffin viewing panes may have heritage value beyond its information potential.

Table B1: Material Sampling Strategies

Material Class	Griset and Kodack (1999)	Peacock (2015)	Praetzellis and Costello (2002)	Williams (2011)	Notes
Wood	Retain a representative sample of wood types.				
Non-identifiable Metal, non-diagnostic tin-can pieces			Do not retain		As a counter to discarding unidentifiable metal, see Sarah Cofield's blog on the potential for x-ray analysis: https://sha.org/blog/2015/03/my-artifact-obsession-colonial-metals/
Artifacts smaller than a dime			Do not retain		This should not apply to small objects often classed as "small finds" such as pins, buttons, and beads. Likewise, small animal bones and seeds can be species diagnostic. The overall size grade of material collected during excavation is typically determined by the sifting screen gauge.
architectural stone				Retain discernible wear marks, shadowing, finished edges, holes, markings, attachments, construction evidence, or other characteristics	

APPENDIX C: SURVEY QUESTIONS

The survey asked the following questions.

1. Has your organization conducted limited or no-collection archaeological fieldwork?

- Yes
- No

2. If you checked "yes" above, please check all that apply:

- No-collection surface study
- No-collection subsurface study
- Diagnostic only surface collection
- Diagnostic only subsurface collection
- Other - Write In: Please enter an 'other' value for this selection.

3. Has your organization conducted in-field sampling of observed artifacts (i.e., not collecting all specimens of certain artifact types, particularly bulk items such as shell or brick fragments)?

- Yes
- No
- Other - Write In: Please enter an 'other' value for this selection.

4. If your organization has conducted no-collection fieldwork or in-field sampling, on what phases of investigation was this done? Check all that apply.

	No Collection	Diagnostic Only	In-Field Sampling
Reconnaissance survey	☐	☐	☐
Intensive pedestrian survey	☐	☐	☐
Shovel test survey	☐	☐	☐
Site evaluation without excavation	☐	☐	☐
Site evaluation with unit excavation	☐	☐	☐
Data recovery	☐	☐	☐

5. If your organization has conducted no-collection fieldwork or in-field sampling, in what region was the work done? Check all that apply.

	No collection	Diagnostic Only	In-Field Sampling
Northeast	☐	☐	☐
Mid Atlantic	☐	☐	☐
Southeast	☐	☐	☐

	No collection	Diagnostic Only	In-Field Sampling
Great Lakes	☐	☐	☐
Midwest	☐	☐	☐
Gulf States	☐	☐	☐
Plains	☐	☐	☐
Rocky Mountains	☐	☐	☐
Great Basin	☐	☐	☐
Southwest	☐	☐	☐
Northwest	☐	☐	☐
California	☐	☐	☐
Alaska	☐	☐	☐
Hawaii	☐	☐	☐
	☐	☐	☐

6. If Your organization has conducted no-collection, diagnostic-only, or in-field sampling strategies, on what types of sites was this done? Check all that apply.

	No Collection	Diagnostic Only	In-Field Sampling
Historical period sites	☐	☐	☐
Prehistoric sites	☐	☐	☐
Multi-component sites	☐	☐	☐
Other (Write-in)	☐	☐	☐
Other (Write-in)	☐	☐	☐

7. If your organization has conducted no-collection fieldwork, diagnostic-only, or in-field sampling, who owned the land? Check all that apply.

	No Collection	Diagnostic Only	In-Field Sampling
Federal agency	☐	☐	☐
Tribal government	☐	☐	☐
State or municipal government	☐	☐	☐
Private individual or organization	☐	☐	☐
Multiple owners	☐	☐	☐

8. If your organization has conducted no-collection fieldwork, diagnostic-only, or in-field sampling, what consultation protocols did you adopt? Check all that apply.

- Consultation with agency/client
- Consultation with SHPO/THPO
- Consultation with intended repository
- Consultation with other stakeholders
- Preparation of written research design with collection strategy for review
- Other - Write In Please enter an 'other' value for this selection.

9. If your organization has conducted no-collection fieldwork, diagnostic-only, or in-field sampling, what fieldwork methods did you adopt for documenting uncollected material? Check all that apply.

	Seldom	Sometimes	Frequently	Always
Use of field personnel with extensive region/time period appropriate artifact identification experience	☐	☐	☐	☐
Use of field personnel who were trained in region/time period appropriate artifact identification before the project started	☐	☐	☐	☐
Artifact Mapping with GPS	☐	☐	☐	☐
Artifact Photography	☐	☐	☐	☐
Other (Write In)	☐	☐	☐	☐

10. What artifact types were sampled? Check all that apply.

- Bone
- Shell
- Fire-cracked rock/heat-altered rock
- Ground stone artifacts
- Chipped stone artifacts/debitage
- Prehistoric ceramics
- Historical period ceramics
- Bottle/vessel glass
- Window glass
- Brick/mortar/daub
- Shingles/roofing material
- Wood/lumber
- Nails/hardware
- Tin cans
- Slag
- Coal/cinder/clinker
- Charcoal
- Items less than 50 years of age
- Other - Write In Please enter an 'other' value for this selection.

11. Has your organization used a temporary field lab for processing and cataloging artifacts on site?

- Yes
- No
- Other - Write In: Please enter an 'other' value for this selection.

12. If yes, what was the shortest field project for which you set up a temporary lab?

13. Where artifacts were transported to a permanent lab for processing, were any items discarded after identification/cataloging but before accessioning?

- Yes
- No
- Other - Write In: Please enter an 'other' value for this selection.

14. If yes, what factors influenced the decision? Check all that apply.

- Lack of long-term research value
- Poor archaeological or historical context
- Whether artifacts were necessary for analysis
- Whether artifacts were temporally or functionally diagnostic
- Excessive quantity of artifacts
- Manageability problems (e.g. size, nature of materials)
- Curation Costs
- Poor condition
- Health and safety risks
- Lack of public educational or interpretive value
- Lack of symbolic or heritage value to a particular culture
- Other - Write In: Please enter an 'other' value for this selection.

15. If applicable, how was material selected for discard? Check all that apply.

- Non-probabilistic sample (judgmental)
- Simple random sample
- Stratified random sample
- Systematic sample
- Stratified systematic sample
- According to an existing sampling strategy, such as: Griset and Kodack (1999).
- Other - Write In: Please enter an 'other' value for this selection.

16. Which of the following was included in associated documentation prepared for the collection? Check all that apply.

- Consultation correspondence
- Consultation Agreement

- Rationale for sampling
- Sampling method
- Catalog of discarded material
- Method of discard
- Collection Strategy (including sampling rationale and method of discard)
- Other - Write In: Please enter an 'other' value for this selection

17. If discarded material was recorded, what attributes were included? Check all that apply.

- Provenience
- Material
- Description
- Count
- Weight
- Size
- Other - Write In: Please enter an 'other' value for this selection.

18. How was material discarded? Check all that apply.

- Reburial
- Trash/Landfill
- Destruction
- Other - Write In: Please enter an 'other' value for this selection

19. If collected material was destroyed, how was destruction accomplished? Check all that apply.

- Consumed in scientific analysis
- Ground to powder
- Melted
- Other - Write In: Please enter an 'other' value for this selection.

20. Please provide any additional input you feel would be helpful to the goal of this survey.