A WORKSHOP ON PREDICTIVE MODELING &

CULTURAL RESOURCE MANAGEMENT ON MILITARY INSTALLATIONS

by
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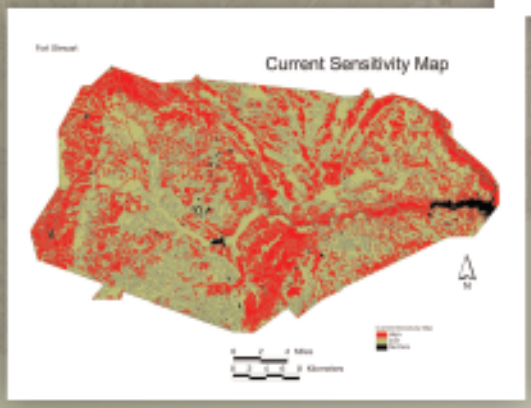

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The SRI Foundation and Statistical Research, Inc., under a Legacy Resource Management Program grant, convened a workshop of national experts to examine the use of predictive modeling by military installations. The workshop was held in Santa Fe, New Mexico on November 15-16, 2004. Workshop attendees included participants with a variety of expertise in modeling, managing cultural resources on military installations, and compliance with environmental and historic preservation laws. Workshop participants examined key issues associated with model development and use, discussed successful approaches to improving modeling efforts nationwide, and created some initial guidance for installations planning to use modeling for the first time or hoping to improve or revitalize their use of modeling. Spatial modeling for Department of Defense (DoD) agencies has traditionally focused on predicting site locations; however, modeling experts and managers attending the workshop agreed that models must now address more pressing issues of evaluating site significance and historic property treatment. In addition, predictive modeling should no longer be a stand-alone program within DoD with no link to the mission and stewardship requirements of installations. Modeling needs to be incorporated into the fabric of compliance with historic preservation laws, procedures, and regulations.

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A WORKSHOP ON PREDICTIVE MODELING AND CULTURAL RESOURCE MANAGEMENT ON MILITARY INSTALLATIONS

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Legacy Resource Management Program, Project #03-167

By

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The Department of Defense (DoD) Legacy Resource Management Program provides a mechanism to develop creative and innovative approaches to the study and management of cultural and natural resources. We feel particularly fortunate to have been awarded two Legacy grants (Projects #01-167 and #03-167). One examined and assessed the use of models for predicting archaeological site locations on military lands. The second evaluated the potential for modeling to enhance our ability to understand the past and manage the archaeological record within DoD installations. In particular, we want to thank the personnel and managers of the Legacy program for administering these grants (DACA63-00-D-0006, Order Nos. 0012 and 0023). We also want to acknowledge Marty Tagg of Headquarters Air Force Materiel Command for not only sponsoring the grants, but also providing insight into the issues associated with cultural resource compliance within DoD. Dr. Jay Newman of the U.S. Army Corps of Engineers, Fort Worth District and, Karen Gardner of Prewitt and Associates, Inc., provided contractual support. Finally, we wish to thank all the workshop participants who gave their time, energy, and considerable expertise to this project. Their efforts will help to ensure that those components of the cultural heritage of our nation that lie on DoD lands are managed for the benefit of our generation and those to come.

EXECUTIVE SUMMARY

In 2003, Statistical Research, Inc. (SRI) and the SRI Foundation, funded by a Department of Defense (DoD) Legacy Resource Management Program grant (#01-167), evaluated the use of archaeological predictive models on military installations. The project team first sent a questionnaire to installations representing all branches of the service, to determine how often military installations develop predictive models and whether or not model predictions are incorporated into the management of cultural resources. The second step was to choose models from four of the responding installations for an in-depth evaluation of their technical quality, accuracy, and general utility as a cultural resource management tool. This evaluation included suggestions about ways to improve the utility of each model. The final step in the project was to take the results of the evaluation and design a follow-up program that could directly contribute to more effective use of predictive modeling by military installations.

SRI and SRI Foundation proposed that the follow-up program should be a workshop where installation archaeologists and cultural resource managers could share their collective knowledge and outline a strategy on how the military can more fully incorporate predictive modeling into cultural resource management programs. The workshop would address four topics: database issues, modeling techniques, modeling and compliance, and the role of spatial analysis.

The SRI Foundation, under a second Legacy Program grant (#03-167), held the workshop in Santa Fe, New Mexico on November 15-16, 2004. Workshop attendees included participants with a variety of expertise in modeling, managing cultural resources on military installations, and compliance with environmental and historic preservation laws. Workshop participants examined key issues associated with model development and use, discussed successful approaches to improving modeling efforts nationwide, and created some initial guidance for installations planning to use modeling for the first time or hoping to improve or revitalize their use of modeling. Spatial modeling for DoD as well as for most federal land managing agencies has traditionally focused on predicting site locations; however, modeling experts and managers attending the workshop agreed that models must now address more pressing issues of evaluating site significance and historic property treatment.

Over the past several decades, DoD installations have identified tens of thousands of archaeological sites. Installations have used predictive models of archaeological site locations to assist in determining where sites will be and understanding the distribution of sites within installations. The National Register eligibility of most of these sites, however, remains unevaluated because on most installations, archaeological sites could be found and then avoided during military activities. As a result, there was no need to expend time or money to evaluate their National Register eligibility. The large numbers of unevaluated archaeological sites within installations have now begun to impose a constraint on military missions, however.

With the shift in military training toward joint actions, areas previously left undisturbed will now be subject to land disturbing activities. It is quite possible that large numbers of archaeological sites will have to be evaluated in the near future, which will be both costly and time consuming. Furthermore, base realignments and closures (BRAC) also require large investments of time and money in the evaluation of cultural resources with little military payoff (i.e., the land once cleared is not available for use by military activities). Finally, pressure from a variety of stakeholders, particularly tribes, has put renewed emphasis on DoD's stewardship responsibilities under Section 110 of the National Historic Preservation Act and Executive Order 13287.

To address this situation, it will be necessary to alter the current practice of evaluating and, potentially resolving, adverse effects on every eligible site affected by military activities. Installations need a program through which dollars and effort are focused on the most important sites. Such a program would save money and time while meeting the DoD's compliance and stewardship responsibilities. Installations should use modeling as a tool for decision-making, focusing their efforts on fewer, more important, archaeological sites. Modeling, as it is practiced on military installations, needs to be broadened so it can become a tool for site evaluations and resolving adverse effects, in addition to its traditional use for predicting site locations.

By broadening the focus to include site evaluation and treatment and incorporating modeling into existing military environmental programs, it will be possible to achieve significant savings. Figure 1 illustrates how these savings can be measured. In Figure 1, the solid line represents the trend of actual cumulative expenditures. Costs have increased at more-or-less a fixed rate. With no change to existing programs, costs will continue to increase at this rate or at an even higher rate as site avoidance becomes increasingly impossible. Alternatively, by incorporating modeling techniques into installation programs, costs could be lower substantially. In the short term, costs will rise to accommodate data requirements and analytical procedures associated with modeling, but in the long run, costs would drop dramatically below the current trend line as the number of sites evaluated and treated is substantially reduced.

Predictive modeling should no longer be a standalone program within DoD with no link to the mission and stewardship requirements of installations. Modeling needs to be incorporated into the fabric of

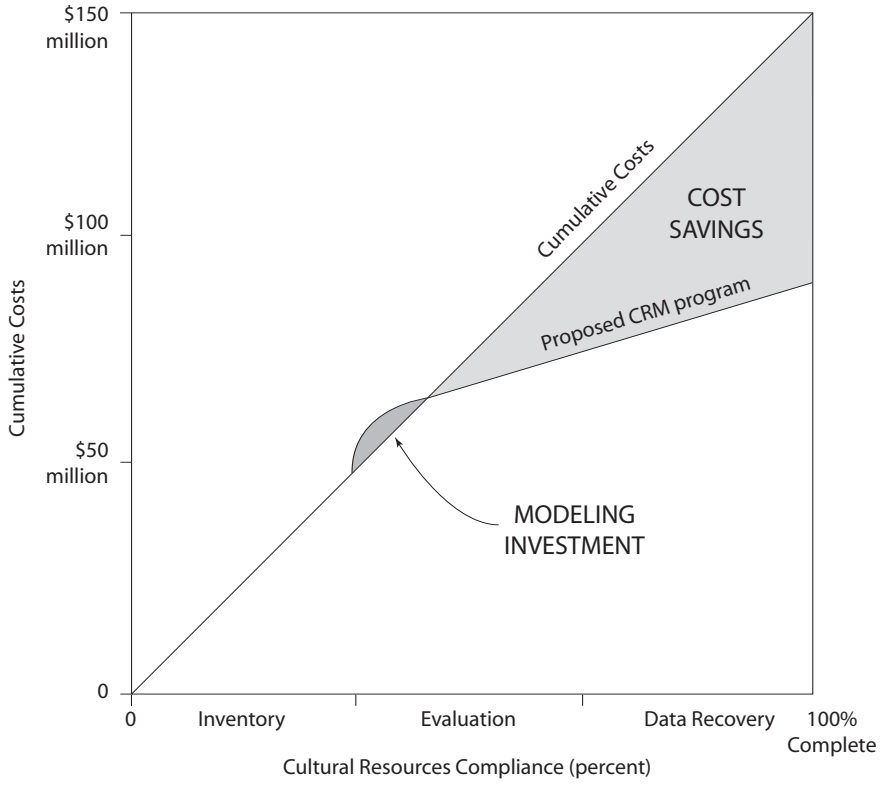

Figure 1. Cost Savings from Shifting Modeling Focus to Site Evaluation and Treatment.

compliance with historic preservation laws, procedures, and regulations.

The constraints on the military mission created by the presence of large numbers of identified but unevaluated archaeological sites on DoD lands and the potential cost of continuing with current approaches to evaluation and mitigation are approaching crisis proportions. The SRI Foundation, with assistance from the workshop attendees, will provide information to senior DoD management about this impending crisis and about ways to effectively address it. This will be accomplished by distributing this report; presenting the results of the workshop at various DoD conference and meeting venues; and, creating a *PowerPoint* presentation on the results of the workshop to show to senior DoD management. We will also document current efforts within installations that have shifted to using models as a site evaluation tool, and present the results of these efforts to DoD management as well.

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BACKGROUND

Results of the First Predictive Modeling Study

In 2003, Statistical Research, Inc. (SRI) and the SRI Foundation evaluated the use of archaeological predictive models on military installations.[1] Although varying widely in composition, archaeological predictive models generally manipulate a number of independent variables, in a replicable and logical manner, to yield a relative measure of the likelihood that a specified geographic area will or will not contain an archaeological sites. Natural environmental features are most often used as the independent variables in these models. Since the late 1970s and early 1980s, many military installations have developed archaeological predictive models on the assumption that these models will assist in the identification and management of cultural resources. Prior to 2003, there had been no comprehensive military-wide evaluation of the success of these models in either predicting sites or in managing resources.

The SRI and SRI Foundation evaluation effort, funded by a Department of Defense (DoD) Legacy Resource Management Program grant, was designed to answer four questions:

- Do predictive models created for military installations work?
- Can they be refined to work better?
- Are they sufficiently accurate so that land managers and State Historic Preservation Officers (SHPOs) can use them in evaluating management decisions about installation resources?
- Can a predictive model be integrated into a more dynamic operational model that would be useful across the DoD to increase cost efficiency of cultural resource management at large installations?

To address these questions the project team first tried to determine, through a questionnaire sent to military installations representing all branches of the service, how often installations develop predictive models, and whether installations incorporate them in the management of cultural resources. Although not intended to be a complete canvassing of the military use of predictive models, the objective of the questionnaire was to achieve a reasonable sample from which inferences could be drawn. The second step was to choose models from four of the responding installations for an in-depth evaluation of their technical quality, accuracy, and general utility as a cultural resource management tool. The four selected installations were Fort Bliss in Texas/New Mexico, Fort Drum in New York, Eglin Air Force Base in Florida, and Fort Stewart in Georgia.

Several important realizations about DoD use of predictive modeling came out of this study:

1. Despite all the interest in predictive modeling in the military, there is no centralized instruction. Each installation is left to surmount the difficulties associated with site recording, Geographic Information System (GIS) development, and predictive modeling on its own. This approach has encouraged innovation and led to the development of a wide variety of models. The poten-

tial of many of these models, however, is restricted because of decisions made early in the model creation process. All surveyed installations agreed that they could have profited greatly from one another's miscalculations and successes.

2. Most models are rudimentary in nature. In many respects, predictive modeling has witnessed a loss of sophistication in the models developed in recent years. Most models are simple intersection models or simple correlation models. Few models are based on multivariate statistical techniques or theoretically based constructs, such as optimal foraging. Because of the simplistic nature of the models, some installations have added judgmental criteria into their models to increase their accuracy, even though by doing so they reduce their systematic and objective character of the models.
3. Models tend to be restricted to predicting sites that exhibit surface manifestations. Despite the importance and predictability of buried sites, geomorphology is not a component of most modeling efforts, and neither are remote sensing techniques. The rare use of satellite imagery is particularly noticeable. Such imagery can be a useful proxy for ground cover and land surfaces. The imagery exists in digital form that can easily be included as a separate theme in an installation's GIS. Importantly, much of this imagery is available to the military at little or no cost.
4. In most cases, models are not integral to the cultural resources management compliance process. In part, this results from a tendency to view models as end products rather than as a process requiring ongoing commitment. Consequently, many models go out of date. This is unfortunate because so much effort goes into creating models, and relatively little effort is required to refine and improve them. But even for models that have been refined and kept current, decisions regarding level of archaeological inventory, determinations of National Register eligibility, and resolution of adverse effects rarely include model predictions. Yet, this does not have to be the case. How many acres should we survey? Where should survey areas be placed? How should we identify sites (e.g., shovel tests or pedestrian survey)? These are questions that predictive models can assist in answering. Determinations of eligibility require archaeologists to state why a site is significant, and what we may learn from it. Models could be used to highlight why a particular site's location is unusual or typical of a class of behaviors. Data recovery plans could incorporate model predictions about the type of site and the resources available to its residents as testable hypotheses.

The initial SRI/SRI Foundation study concluded as follows:

> Twenty years after the advent of predictive models, we believe it is time for the military to reach a consensus on how predictive modeling will be used to comply with cultural resource laws and regulations. We are not suggesting a top-down approach in which the Department of Defense in Washington issues another set of regulations. Indeed, in the case of predictive modeling, the expertise lies with the individual installations that have been struggling to realize the potential of this technique for the last several decades. In the course of this study, we have been profoundly impressed by the knowledge and creativity exhibited at the installation level. The absence of a mechanism for sharing this expertise beyond the installation is unfortunate.
>
> Our suggestion for a follow-up to the current study involves creating a mechanism to capitalize on this expertise. We propose to work with the military to convene a workshop in which installation archaeologists and cultural resource managers share their collective knowledge and come to a consensus on how the military can more fully incorporate predictive modeling into cultural resource management programs. Four topics would need to be addressed at this workshop: database issues, modeling techniques, modeling and compliance, and the role of spatial analysis:
>
> *Database issues*: We have found that many predictive models fail before they start.

Decisions about how sites will be represented in the installation's GIS, how the environment will be characterized, and what cultural attributes will be coded greatly affect the type and usefulness of a predictive model. Many installations delegate these decisions to GIS specialists, with the result often being that sites of all types are lumped together and that the environment is too crudely represented to be of much use as a predictor. And sometimes even these data-structure decisions can be too late in the process to ensure a successful model. Failure to impose quality assurance standards on the collection of field data often results in site locations being incorrectly plotted, features and artifacts being misidentified, and sites being assigned to incorrect types or periods. Each installation has a history of addressing these problems, which can be of great benefit to others.

Modeling Techniques: The intersection method, in which the greatest number of sites is placed in the smallest area by overlapping polygons of environmental variables, is currently the modeling technique of choice among military installations. This development is not necessarily a welcome one. The intersection method is easy and generally accurate. It does not, however, tell us much more than we already know. Intersection models have not been usefully integrated into compliance with historic preservation laws, largely because managers and SHPOs do not have enough confidence in the accuracy and reliability of the results. In part, this lack of confidence stems from the fact that intersection models are not based on principles of human behavior. They simply reflect the correlation of environmental features with archaeological sites. As such, managers are forced to develop ad hoc explanations of site locations, which heretofore have failed to convince SHPOs, tribes, and other parties involved in the historic preservation compliance process, leaving the installation no choice but to continue inventorying their lands. To move beyond survey, we need a thorough discussion of the range of modeling techniques available to installations, along with guidelines about the level of expertise needed to put them into operation.

Modeling and Compliance: The goal of the whole modeling process is not to create predictive models, but to provide a useful tool to assist installations to comply with laws and regulations more efficiently and more effectively. The emphasis should not be on models as end products, but on modeling as a process that assists with compliance. Although most installations have a long history of developing models, few have integrated the modeling process effectively into their CRM [Cultural Resource Management] programs. We need to explore why this has been the case and how the military can better use predictive modeling in decisions regarding inventory, evaluations of eligibility, and resolution of adverse effects.

Spatial Analysis: At the risk of having installation commander's resort to Ronald Reagan's admonition, "There you go again," we raise the need for predictive models to be useful in understanding the past. Correlation is not explanation. Knowing that archaeological sites can be predicted by a set of environmental features is not the same as knowing why humans chose those areas. Until military installations are able to demonstrate that they have programs focused less on identifying and avoiding and more on predicting and understanding, the military will continue to meet resistance when they propose not to survey every acre or test every site. Finding the appropriate approach to integrating research with compliance continues to haunt each installation. Answers will undoubtedly differ depending on the region and the nature of the resources, but common ground may be found that will enable all installations to develop strategies for integrating management and research.[1]

As noted above, the SRI and SRI Foundation researchers recommended that installation archaeologists and cultural resource managers attend a workshop at which they could share their experiences and identify strategies to more fully integrate modeling into DoD cultural resource management programs. The four topics listed above (database issues, modeling techniques, modeling and compliance, and the role of spatial analysis) were suggested as the framework for this workshop.

The SRI Foundation, under a second Legacy Resource Management Program grant (#03-167), organized a workshop in Santa Fe, New Mexico on November 15-16, 2004. Workshop attendees included participants with expertise in modeling, managing cultural resources on military installations, and compliance with environmental and historic preservation laws. A list of participants is provided in Appendix A. The remainder of this report presents the results and recommendations of the Santa Fe workshop.

2

WORKSHOP OBJECTIVES AND FORMAT

The first Legacy study found that, despite considerable interest in predictive modeling as part of archaeological resource management in the military, there is no centralized instruction on how to develop models and use modeling effectively. There is also no collective body of knowledge about previous efforts to develop and use models. The purpose of the Santa Fe workshop was to identify and possibly create products or tools that would assist installations in developing models, improving existing models, or using models to more effectively do the following three things:

- Manage resources,
- Improve stewardship, and
- Facilitate compliance with environmental and historic preservation laws.

The workshop products would be a manual, web-based tutorial, or other products that present various approaches to creating and using models more effectively. These products would also describe sources that installations can consult for help and guidance. The workshop products would not serve as a cookbook or text on predictive modeling. The great strength of current modeling efforts is their diversity. Archaeologists and managers have struggled with problems and crafted solutions that are peculiar to their installation. Any workshop products must recognize this diversity and the need for each installation to tailor predictive modeling to its own situation.

To facilitate the identification and creation of appropriate products and tools, workshop participants were divided into three breakout groups. One group was tasked to identify ways to **build better models**. This group considered several topics:

- Appropriate use of technology
- Database design
- Data quality
- Incorporation of remote sensing, geomorphology, and subsurface data into model development
- Modeling techniques
- Modeling as a process not a product

A second group looked at **modeling and resource management**, focusing on:

Planning – using models to develop Integrated Cultural Resource Management Plans (ICRMPs) and other DoD management documents

Compliance – linking models to National Environmental Policy Act (NEPA) and Section 106 of the National Historic Preservation Act compliance

Tribal consultation – addressing tribal concerns during model development and implementation

Supporting the mission – implementing strategies that balance cultural resource management and installation mission activities

The third group discussed **modeling, archaeology, and stewardship**. This group examined:

- The role of archaeological research in resource management
- Synthesizing existing information and using it to inform management decisions
- Focusing preservation activities on the "important" sites and/or a representative sample of sites
- The public benefits of taxpayer-funded archaeology

Based on the knowledge and experience of the break-out group members, with input from the rest of the workshop participants, each group identified:

- key issues
- successful approaches
- available guidance and assistance
- other information that would be helpful to installations planning to use modeling for the first time or hoping to improve or revitalize their use of modeling.

The groups also identified appropriate mechanisms for conveying this information to potential DoD users.

3

WORKSHOP RESULTS

The Building Better Models breakout group recommended the creation of web-based guidance. This guidance would provide suggestions for creating models and for writing scopes of work for model development. This guidance would also address areas critical to improving the modeling process:

- Defining the purpose of modeling
- Implementing model development
- Maintaining and upgrading models

The Modeling and Resource Management group identified three objectives for improving the balance between resource stewardship and an installation's military mission:

- Streamline compliance to make it better, faster, and cheaper
- Achieve better stewardship by focusing time and money on the most important resources
- Balance resource management and military mission by integrating archaeological models into DoD planning and management processes

The Modeling, Archaeology, and Stewardship breakout group discussed the utility of different model types. The appropriateness of each type is dependent on existing baseline archaeological data. Common sense models, for example, can be developed using minimal archaeological inventory data, whereas models that explain why humans settle specific locales require fairly complete installation inventory or a reliable and valid understanding of the causes of human settlement.

The model types defined by the third breakout group include:

- Experiential (judgmental, common sense, qualitative)
- Formal (trait list, intersection, Boolean)
- Correlative (weighted, regression)
- Explanatory (optimal foraging, cultural ecology, risk management, etc.)

This group stressed that modeling needs to be used to identify those archaeological resources that are worthy of preservation, moving beyond simply predicting site locations. Modeling should be used as a tool for determining which sites are truly significant (i.e., National Register eligible). Causal and explanatory models are needed to define the most important archaeological resources. The creation of such models requires syntheses of existing archaeological data and studies.

Using the results of the first Legacy study as a framework, and incorporating the key issues identified by the breakout groups at this follow-up conference, workshop participants:

- identified helpful guidance for those planning to develop models or improve existing models;
- made recommendations as to how to use existing best practices to assist installations in model

development, implementation, and maintenance; and

- identified mechanisms to disseminate guidance and recommendations to installations.

The following are the guidance and recommendations developed by workshop attendees. Mechanisms for sharing this information with installations are discussed later in this report.

Guidance on Model Development and Improvement

- The process for model development includes the following components: defining a model's function, particularly as it relates to an installation's mission and strategic plan; compiling and assessing data needs for model development and, if necessary, acquiring additional data; developing and implementing the model; and evaluating the model in terms of how well it assists management decisions about identifying and treating archaeological sites. Figure 2 provides a recommended approach to model development, linking development with an installation's mission.
- The type of model developed (experiential, formal, correlative, and explanatory) depends on the purpose of the modeling effort and the nature of available archaeological data sets.
- Model development may require the use of data from multiple study areas, some of which may extend beyond the boundaries of an installation. For example, a variable such as "level of disturbance" will be restricted to an installation, while a variable such as "rarity of site type" may require research beyond an installation's boundaries in order to encompass the cultural and natural region in which this site type is known to occur.
- Existing two-dimensional locational models should be supplemented with geomorphology models that show the history of landform evolution. Geomorphological models should be used to project areas subject to natural erosion and deposition, providing insight on likely locations of the most intact sites as well as buried sites.
- As part of all model development, one must include an explicit discussion of the factors that may limit a model's utility as a basis for compliance decisions (e.g., potential for buried sites, historical period changes in vegetation, lumping of sites from very different adaptive systems into a single model, etc.).
- For existing models, it is important to identify and make explicit the models' limitations as supporting evidence for compliance/management decisions.
- Use local and traditional knowledge to supplement models where needed, but do this in documented and consistent ways. For example, develop a matrix for determining the level of inventory needed: "The area of potential effect (APE) for an undertaking is in a location identified by the model as having a low probability of containing archaeological sites. In addition, the following factors make sites even less likely to be found: extensive disturbance, high level of erosion, distance from water, and particular landforms. Therefore, survey will be limited to A, B, and C." Or, "The APE is in a low probability zone but evidence from oral traditions indicates high potential for sites, therefore survey intensity will be increased beyond what is the norm for low probability areas."
- Sites found in areas predicted to have few or no sites tend to have great research potential, as they point to human behaviors that are relatively infrequent or rarely preserved in the archaeological record.
- To build partner and stakeholder confidence and trust in the use of models:
  - Establish early coordination with other agencies, State Historic Preservation Offices (SHPO), and the Advisory Council on Historic Preservation (ACHP)
  - Involve partners and stakeholders in selecting variables, model design, etc.
  - Provide examples of best practices and successful applications of modeling

- Use a written protocol (Section 106 programmatic agreement [PA]) or other mechanism) covering how and when modeling will be used and how consultation will continue
- Build in feedback to partners and stakeholders on the results of model development and use
- Disseminate results of the modeling effort to the public as appropriate

- To address tribal concerns when using models:
  - Establish formal consultation early in the process
  - Provide clear explanations about what is being done and why
  - Use a written protocol (PA or other mechanism) for how and when modeling will be used and how consultation will continue
  - Develop mechanisms for incorporating tribal values associated with archaeological sites into modeling and model-based decisions
  - Develop mechanisms for incorporating traditional knowledge into models
  - Identify funding sources for tribal consultants (that is, for those providing expert knowledge)
  - Identify tribes that have experience with modeling projects to serve as a resource for tribes to whom this is a new issue
  - Build in feedback to the tribe about the modeling results
- To ensure that the modeling process is an integral part of resource management at an installation, independent of personnel changes,
  - Write the modeling process into some form of planning or management document that continues to operate over the long term
  - Define a clear purpose and use for any new or revised model; communicate this to management
  - Ensure that maintenance and use of the model is included in position descriptions, written guidance, or job requirements for installation cultural resource managers
  - Use policy letters to ensure continuity of model use and maintenance
  - Make the model so useful for resource management that cultural resource staff and middle management will ensure that the model continues to be used and refined

One way for modeling to become an integral part of installation operations is to incorporate archaeological resource management programs into modeling efforts. One example program is Fort Irwin's Automated Tool for Monitoring Archaeological sites (ATMAS). This program prioritizes sites using three factors: information potential (as specified in the installation's Integrated Cultural Resource Management Plan), observed risk of future impacts (assumes evidence for past impacts is a good predictor for similar impacts in the future), and predicted risk for impacts (based on planned changes in training activities, construction or other actions that might affect sites).[2] By incorporating components like ATMAS, modeling efforts will include explicit management outcomes.

It was also recommended that installations assemble the right team for model formation and synthesis of data. The team should include archaeologists with management expertise, and team member roles and duties need to be clearly defined. It would also be beneficial to solicit assistance from others (military, academic, civilian contractors, state preservation agency representatives, tribes, etc.) or create a steering group to guide model development.

Guidance on Using Non-Archaeological Data in Model Development

- Recognize that most of these datasets are themselves models, with the attendant issues of scale, accuracy, quality, generalization, and automation. One must know the map scale at which data can be considered reliable.

- Dataset sources vary in quality and nature.
- Most datasets require some form of categorization. One should consider the categorization needs and whether the quality of a given dataset will support the sorts of categories desired. Some categories of a particular dataset may have special importance and be worthy of becoming their own datasets. For example, a surficial geology category of "clay" polygon(s) might need to be moved into its own "clay sources" dataset.
- Common data for modeling and landscape characterization include:

  DEM (Digital Elevation Models)

  - Most installations have data that are more accurate and more precise than USGS DEMs
  - DEMs may need manipulation to be incorporated into modeling efforts
  - Derived layers from DEM include: Slope, aspect, local relief, visibility, drainage, ridge/aspect, landform

  Surface (or accessible) water

  - One may need to distinguish man-made and natural surface waters.
  - Consider carefully the best way to obtain surface water information. In desert environments it may be soil moisture, in other areas it may be soil taxon. Other areas may be able to utilize USGS mapping directly or National Wetland Inventory (NWI) information.

  Geomorphology

  - Geomorphic data may be useful for defining potential buried sites, but they may need to be adapted from the geological uses for which they were created in order to meet archaeological needs
  - These data may be used to define site types (e.g., quarries)
  - Geomorphic data may allow one to forecast ages of surface and buried materials

  Soils

  - Soils are the outcome of time, climate, geology, geomorphology, and vegetation history, that is, many of the landscape factors of interest to archaeologists.
  - Soils are a "model" within a given area. They are observed in a few places and generalized to a map.
  - Soil datasets are generated at different levels of spatial accuracy (called "orders" in soil surveys)
  - Natural Resource Conservation Service soils are map units plus a suite of associated tables. They can be complicated to navigate and join correctly.

  Vegetation

  - Investigators should first examine existing installation databases. Many installations have some baseline vegetation mapping. Check the installation Integrated Natural Resource Management Plan (INRMP).
  - Today's vegetation may not be a good proxy for prehistoric vegetation. Check historic photographs to determine changes in vegetation.
  - Many vegetation datasets have limited accuracy on the ground. Boundaries are particularly problematic as is distinguishing small patches of a particular vegetation class.

  Bedrock geology

  Surficial geology

  Biomass

  Wetlands inventories

  - The National Wetland Inventory is the nationwide inventory; however, it is based on photography, so modern reservoirs appear as wetlands/waters and drained (historic) wetlands may not be shown.

Past land use (roads, trails, aboriginal pathways, portages, travel routes, mining claims, mining districts, farmsteads, etc.) is often documented in the historical record. Information sources include:

- Ethnographic studies, oral histories, traditional land uses
- Government Land Office records (GLOs)

Fauna

- Migration routes, wintering grounds

Paleoenvironments

- Landforms
- Shorelines
- Paleovegetation

Remote sensing

- Orthophotography, satellite imagery (very useful for geomorphological identification and for detecting change)

Guidance on Using Archaeological Data in Model Development

- Reliable spatial information has many uses aside from modeling. Installations need to know precisely how many sites are under their control, how many acres have been inventoried, how many sites have been identified, and how many unevaluated sites have been identified. It is usually cost-effective, though expensive, to automate this information.
- Quality assurance is essential but costly. If possible, "cleaning" the database should involve not only a check on accuracy, but also a review for consistency. For example, do the artifacts recorded fit with the site function, site type, or site age?

Modeling and data management are linked benefits. Data management, however, precedes model formation.

Additional Guidance and Considerations in Model Development

Surveys / Field Investigations

- Knowing which areas do not contain sites is as important as knowing which areas do with respect to modeling
- It is important to have criteria that define what are adequate inventories and surveys. Adequacy is usually defined by whether or not resources and attributes of interest were identified appropriately.
    - For the western U.S., information on transect interval and systematic coverage are important to define adequacy
    - For the eastern and central U.S., one may need to know shovel test intervals, screening protocols, etc.
- Spatial Representation
    - Polygons should be used for spatial representation. Small investigation areas could be buffered to create appropriately sized polygons

Sites

"Sites" recorded in an inventory are not necessarily the same "sites" that one uses in creating a model. For example, isolated finds may have been recorded as "sites" in an inventory, but may be of no interest in model formation. Alternatively, rastor-based GIS models may divide site areas into many "site" cells. It is important not to confuse what is in a database with what is needed in model development. Also, it is necessary to consider how to handle multiple recordings of sites. Model developers need to consider whether a site recorded multiple times should be treated as one site or as more than one site. Finally, relational databases may require complex queries to draw out model data.

The following are issues that need to be considered in terms of site representation and site attributes for model development:

- Spatial Representation of Sites
  - How sites are represented in a GIS may affect the kinds of modeling one can do. This is also the case for the unit of analysis (e.g., points, polygons, cells).
- Important Site Attributes for Model Development
  - Site functions
  - Site classes (descriptive)
  - Cultural/temporal context
  - Multi-functionality
  - Site depth
  - Site size
- Key Site Management Attributes
  - National Register status
  - Level of investigation
  - Date of last investigation
  - Condition
  - Impacts
  - Information potential

[See Appendix B for one example of a site attribute database. This database is from Fort Irwin, California]

Recommendations on Using Best Practices to Improve Model Development and Use

- Identify installations where existing models are being used effectively for National Environmental Policy Act (NEPA) compliance. Can these installations provide information on cost and time savings? Can they serve as models for other installations?
- Collect and make available examples of existing programmatic approaches (PAs, standard treatments, exempted categories of undertakings, etc.) that are based at least in part on information from models
- Identify an installation that is using modeling effectively to assist in site evaluation and find out the procedures and pitfalls involved in developing the model.
- For installations that do not have an existing model, develop a deductive model, based in part on a completed historic context. Use this model to guide all phases of archaeological work for a large project, determining how identification will be carried out, evaluating the sites that are identified, and guiding testing and excavation decisions and research design development.

4

WORKSHOP RECOMMENDATIONS NEXT STEPS

Workshop participants recommended the development of a web site (or sites) with information and guidance on modeling. This web site(s) would also provide information on how to develop scopes of work for creating models for installations. Information contained within the web site might also include guidance and best practices from individuals and organizations outside of DoD. The site(s) would need to be geared to several level of expertise in order to address the needs of new CRM staff and non-CRM specialists, particularly decision-makers and managers at installations. Web site(s) components might include:

- Introduction to DoD CRM predictive models
- Benefits of models for managers/decision-makers and for fulfilling installation missions
- Model building for CRM professionals (step-by-step guidance)
- Lessons learned from the development and use of existing models (e.g., best practices)
- Links to other sources of information
- A host for the web site would need to be identified, in addition to funding sources for creating and maintaining the web site.

All workshop participants agreed that installations need additional guidance and materials (beyond the guidance developed during the workshop) in order to improve their modeling efforts. These include:

- Guidance and examples for Army installations on how models can be incorporated in Historic Properties Components (HPCs) of ICRMPs, pursuant to the Army's Alternate Procedures, and to develop standard operating procedures (SOPs) that are required as part of HPCs.
- Example proposals for program alternatives (e.g., programmatic agreements, exempted categories of undertakings, approaches to inventory intensity decisions, etc.) that are based on information from modeling and can be adapted by interested installations.
- Guidance on how to incorporate historic contexts into the selection of variables for model development.
- Guidance on how to appropriately combine morphological characteristics of sites, information from historic contexts, and environmental variables to create a rational process for evaluating National Register eligibility.

These materials and guidance would be included in the proposed web site. Funding sources to create this additional guidance need to be identified and pursued. Development of this guidance, and possibly the web site, might be accomplished under future Legacy grants.

Workshop attendees also noted that modeling needs to become an integral part of installation operations. To accomplish this, workshop participants recommend that

- Models become part of ICRMP mandates. In addition, ICRMPs should incorporate reviews

of the cultural and environmental components of models. For example, if a new, more accurate DEM has been created for an installation, it should be addressed in the ICRMP, review and the new DEM's effects on the model will need to be assessed.

- Model use and updates should be stipulated within installation Section 106 programmatic agreements (see Appendix C for example from Camp Ripley, Minnesota).
- Research designs for archaeological data recovery should incorporate model predictions about the type of site under investigation. These research designs could also be used, in part, to test and validate models.

Again, the Legacy program may be an appropriate funding mechanism to create guidance on how installations can integrate modeling into their planning efforts and to insure that modeling remains an ongoing component of strategic planning.

The workshop attendees also suggested other funding sources and expertise for advancing individual installations' modeling efforts:

- Use changes in mission and major construction and training projects within installations as a justification for funding model development or updating.
- Use legislative Environmental Impact Statement requirements for withdrawals and other Congressional actions to get funds for model development or updating.

One of the workshop's primary recommendations was for DoD to shift modeling efforts away from an exclusive focus on predicting site locations. For several decades, DoD installations have been identifying tens of thousands of archaeological sites. Installations have used predictive models of archaeological site locations to assist in identifying where sites are and understanding their distribution within installations. The National Register eligibility of most of these sites, however, remains unevaluated because, until recently, archaeological sites could simply be found and then avoided during military activities. As a result, there was no need to expend the time or money to evaluate National Register eligibility of the sites. The large number of unevaluated archaeological sites within installations has now begun to impose a constraint on military missions. With changes in military training toward joint actions, areas previously left undisturbed will now be subject to land disturbing activities. Similarly, BRAC actions or consolidation of missions will require the evaluation and possibly the treatment of a large numbers of archaeological sites in the near future, which will be both costly and time consuming.

To address this situation, it will be necessary to alter the current practice whereby every site affected by military activities is evaluated and adverse effects are individually resolved. Installations need a program through which dollars and effort can be focused on the most important sites. Such a program would not only save money and time, but would also meet the DoD's compliance and stewardship responsibilities. Installations should use modeling as a tool for decision-making, focusing their efforts on fewer, more important, archaeological sites. Modeling, as it is practiced on military installations, needs to broaden its focus beyond just predicting site locations. Modeling should also serve as a tool for cost effective site evaluations and resolution of adverse effects.

By broadening the focus to include site evaluation and treatment, and by incorporating modeling more effectively into existing military environmental programs, it will be possible to achieve significant savings. Figure 1, in the Executive Summary, illustrates how these savings can be measured. With no change to existing programs, costs will continue to increase as site avoidance becomes increasingly impossible. Alternatively, by incorporating modeling techniques into installation programs, costs can be lowered substantially. In the short term, costs would rise to accommodate data requirements and analytical procedures associated with modeling, but costs would then drop dramatically as the number of sites evaluated and treated was substantially reduced.

SRI Foundation, with assistance from workshop attendees, will inform senior DoD management

about the impending crisis stemming from unevaluated sites on DoD lands and suggest mechanisms to effectively address this crisis. The distribution of this report (with the executive summary) will serve as an initial means to inform senior DoD management. Subsequent efforts might include

- a PowerPoint presentation on the results of the workshop, be shown to senior DoD management staff during face-to-face meetings;
- presentations at DoD environmental conferences and other DoD venues; and
- documentation of current efforts within installations that have shifted to using models as a site evaluation tool, and presentation of the results of these efforts to DoD management.

In addition to informing DoD senior personnel, SRI Foundation and workshop participants will make sure that the results of the workshop are shared with non-DoD personnel. The SHPO representatives who attended the workshop will present the workshop results and recommendations to the National Conference of State Historic Preservation Officers at their next annual meeting. Workshop results will also be sent to the Advisory Council on Historic Preservation and presented at various venues across the country, especially at meetings of other federal agencies that use archaeological modeling as a tool for historic preservation compliance.

Subsequent to the 2004 workshop in Santa Fe, some of the workshop participants met during the Society for American Archaeology's (SAA) 2005 annual meeting in Salt Lake City. The meeting provided an opportunity to fine-tune the 2004 workshop recommendations and develop specific strategies for advancing these recommendations. The results of this meeting are presented in Appendix D.

REFERENCES

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2 Meyer, William D., and Michael Hargrave, ATMAS 2.0 Instruction Manual. Prepared for Directorate of Public Works, Cultural Resources, National Training Center, Fort Irwin, California, December 2003.

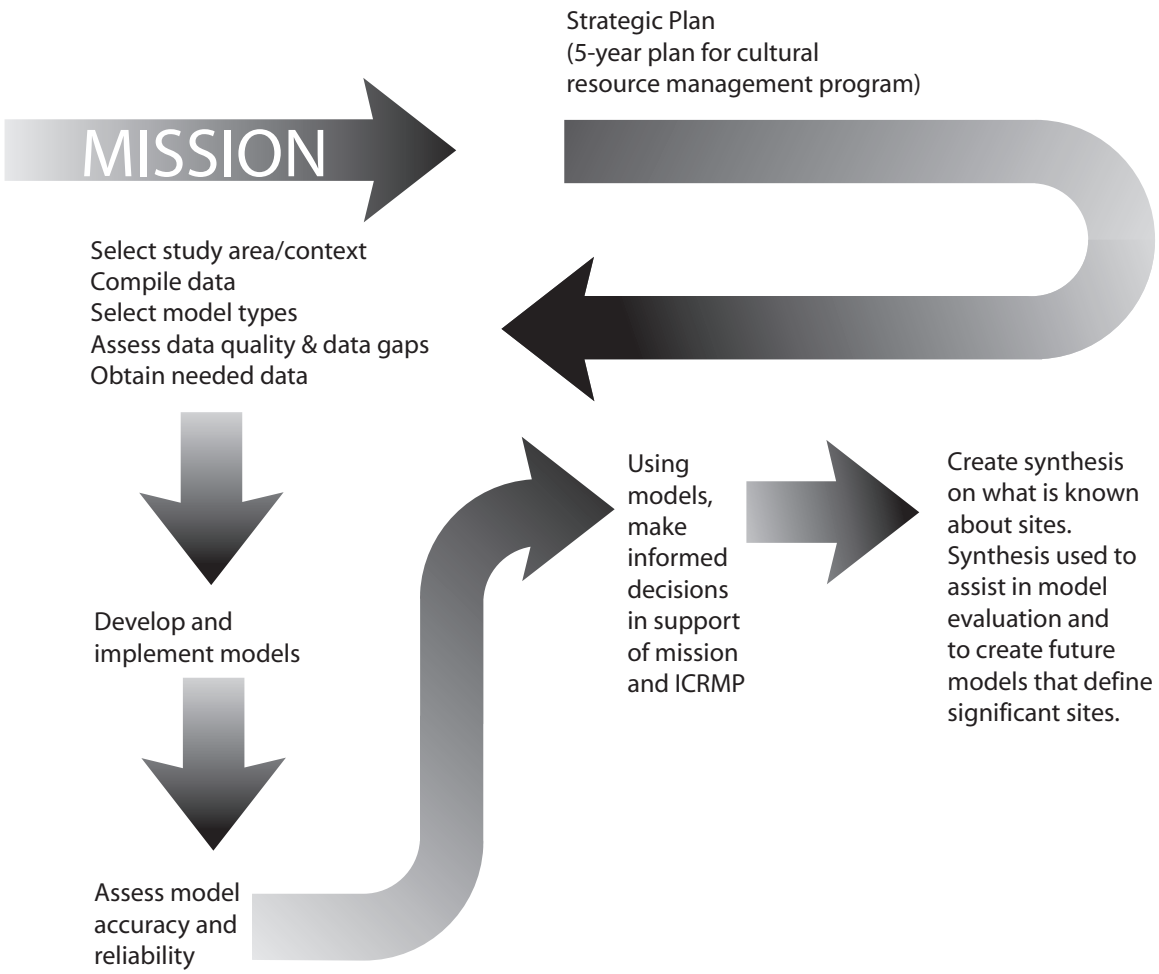

Figure 2.
Recommended Process
for Model Development

APPENDIX A
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APPENDIX B

FORT IRWIN CULTURAL RESOURCE DATABASE

Field Name	Description	Attributes	Attribute description
Site_No	Site number reflecting either the state	text field	
MGMT	NTC CR management area name	AM	Avawatz Mountain Area
		BLB	Bicycle Lake Basin
		BWW	Bow Willow Wash
		CLB	Coyote Lake Basin
		DB	Drinkwater Basin
		ELF	East Lucky Fire Area
		GDSCC	Goldstone Deep Space Communication Complex
		LLGR	Leach Lake Gunnery Range
		LLU	Leach Lake Uplands
		LW	Langford Well
		MULT	Multiple management areas
		NLU	Nelson Lake Uplands
		NMB	Nelson / McLean Basin
		NNB	No Name Basin
		NW	Nelson Wash
		RPL	Red Pass Lake Area
		TB	Tiefort Basin
FIELD	The year the field work took place	2004 or 2005	
Reference	Title of report describing the site	text field	
Area_m2	Size of site in square meters	Integer	Size to nearest meter
Type_1	Primary site type	BS, C, CNP, etc	See ICRMP document table D-2 for codes and descriptions
Type_2	Secondary site type for multi-component	BS, C, CNP, etc	See ICRMP document table D-2 for codes and descriptions
Type_3	IBID	BS, C, CNP, etc	See ICRMP document table D-2 for codes and descriptions
Type_4	IBID	BS, C, CNP, etc	See ICRMP document table D-2 for codes and descriptions
Type_5	IBID	BS, C, CNP, etc	See ICRMP document table D-2 for codes and descriptions
LM	Lake Mohave - 12,000 - 7000 B.P.	X	Indicate evidence of occupation during this period, otherwise blank
Pinto	Pinto - 7000 - 4000 B.P.	X	Indicate evidence of occupation during this period, otherwise blank
Gypsum	4000 - 1500 B.P.	X	Indicate evidence of occupation during this period, otherwise blank
Sara	Saratoga Springs - 1500 - 700 B.P.	X	Indicate evidence of occupation during this period, otherwise blank
Shos	Shoshonean - 700 - 100 B.P.	X	Indicate evidence of occupation during this period, otherwise blank
Proto	Protohistoric 100 B.P. - present	X	Indicate evidence of occupation during this period, otherwise blank
Unknown_Period	Date of site occupation not known	X	Indicate evidence of occupation during this period, otherwise blank
Historic_Period	Appoximately AD 1700 - present	X	Indicate evidence of occupation during this period, otherwise blank
C14	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Raw	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Ceram	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8

Field Name	Description	Attributes	Attribute description
Ceram	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Bead	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
ProjP	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
ArtA	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Obsid	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Historic_Art	Basis for Site Age	X	X or blank. See Evidence for site age in ICRMP Appendix D, page D-8
Unknown_Depth	Deposit structure	X	X or blank. See Deposit structure in ICRMP Appendix D, pages D-8 - D-9
Surf	Deposit structure	X	X or blank. See Deposit structure in ICRMP Appendix D, pages D-8 - D-9
Subsurf	Deposit structure	X	X or blank. See Deposit structure in ICRMP Appendix D, pages D-8 - D-9
Depth_of_Depos	Deposit structure	X	X or blank. See Deposit structure in ICRMP Appendix D, pages D-8 - D-9
Disturb_Unknow	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
Eros	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
Mil	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
Unautho_Collecti	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
No_Disturb	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
Percent_Disturb	Exent and cause of site disturbance	X	X or blank. See Extent of site disturbance and its causes in ICRMP Appendix D,
No_Protection	Existing Site protection Measures	X	X or blank. See Existing site protection measures in ICRMP Appendix D, page D-
Sign	Existing Site protection Measures	X	X or blank. See Existing site protection measures in ICRMP Appendix D, page D-
Fence	Existing Site protection Measures	X	X or blank. See Existing site protection measures in ICRMP Appendix D, page D-
Protection_Unkn	Existing Site protection Measures	X	X or blank. See Existing site protection measures in ICRMP Appendix D, page D-
Last_Monitored	Last date monitored	dd/mm/yyyy	Last date of site visit and site information updated
Survey	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
Surface_Collect	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
Testing	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
Data_Rec	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
Coll_Syst	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
Coll_Unsyst	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
100%_Coll	Data collection history	X	See Data collection history in ICRMP Appendix D, pages D-9 - D-10
STP	Excavation Unit Types	Number of excavation units per	Number or blank. See ICRMP Table D-4 and Appendix D, pages D-9 - D-10
1/2x1	Excavation Unit Types	Number of excavation units per	
1x1	Excavation Unit Types	Number of excavation units per	
1x2	Excavation Unit Types	Number of excavation units per	
2x2	Excavation Unit Types	Number of excavation units per	
Scrape	Excavation Unit Types	Number of excavation units per	
Other	Excavation Unit Types	Number of excavation units per	
%_Excav	Percentage of total site excavated	percentage	
Area_Excav_m2	Area excavated in meters squared	square meters	
NRHP	NRHP status	NE, CEI, etc	ICRMP table D-5 describes the fields
POT_AREA	Size of site criteria	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
POT_SITE	Site type critera	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
POT_INTG	Site integrity critera	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
POT_DATE	Site age critera	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
POT_DPTH	Site depth critera	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
POT_TOT	Sum of all scores	Integer	See document: Criteria for Scoring Information Potential - section 4.44 in
INFO_POT	Text label for sum value	label	See document: Criteria for Scoring Information Potential - section 4.44 in
Research _Hist	Stage of investigation completed at site	open text	See FICRD for examples
Risk	Potential risk of disturbance at site	LOW, MEDIUM, HIGH	See ICRMP section 4.7.1 for Criteria for Rating Risk (page 4-24)
Treat	treatment complete or not	COMP, INCOMP	Contractor shall develop criteria
LOSS_POT	Combination of Info potential	LL, LM, LH, ML, etc	First character is INFO_POT and second is Risk. See Appendix F of ICRMP for
Grid	Military grid	Integer	four digit military grid location of site
X_NAD83	East-west coordinate value	integer	Easting - UTM coordinate in NAD83
Y_NAD83	North-south coordinate value	integer	Northing - UTM coordiante in NAD83

APPENDIX C

PROGRAMMATIC AGREEMENT FROM CAMP RIPLEY, MINNESOTA

Programmatic Agreement Among The Minnesota Army National Guard, the Minnesota State Historic Preservation Officer, the Minnesota State Archeologist, and the Advisory Council on Historic Preservation Regarding Use of an Archeological Sensitivity and Settlement Model at Camp Ripley Training Site, Morrison County, Minnesota

Whereas, the Minnesota Army National Guard (MNARNG) uses Camp Ripley Training Site for training; and

Whereas, historic properties at Camp Ripley Training Site, although owned by the State of Minnesota, may be affected by those MNARNG activities that are Federal undertakings as defined in 36 CFR Part 800.16(y); and

Whereas, the National Guard Bureau, as the source of Federal funding to MNARNG, delegates certain National Historic Preservation Act (NHPA) Section 106 responsibilities to MNARNG; and

Whereas, the Minnesota State Historic Preservation Officer (Minnesota SHPO) and the Minnesota State Archeologist concur that the archeological sensitivity model adequately identifies "low sensitivity" areas within Camp Ripley Training Site, where prehistoric (pre-contact) and early historic (protohistoric) archeological sites are not likely to occur; and

Whereas, the Minnesota SHPO and the Minnesota State Archeologist concur that geographic information system (GIS) database prepared in 1999 of post-contact archeological resources adequately identifies locations associated with post-1837 activity;

Now, Therefore, MNARNG, the Minnesota SHPO, the Minnesota State Archeologist, and the Advisory Council on Historic Preservation (Advisory Council) agree that archeological investigations shall be implemented in accordance with the following stipulations in order to satisfy MNARNG's Section 106 responsibility.

Stipulations

I. The Model and Its Applicability

A. MNARNG shall implement an archeological sensitivity model (Model) comprised of *An Archaeological Sensitivity Model of Prehistoric and Contact Period Settlement at Camp Ripley,*

Morrison County, Minnesota prepared by IMA Consulting (1997) and *A Geographic Information System (GIS) Database of Post-Contact Period Cultural Resources at Camp Ripley, Morrison County, Minnesota* prepared by BRW (1999).

B. Use of the alternative procedures of this Programmatic Agreement (PA) shall be restricted to undertakings whose area of potential effects (APE) occurs entirely in low archeological sensitivity areas as identified by the Model.

C. With the exception of 36 CFR Part 800, as described in Paragraph B, the alternative procedures in this PA shall not replace any other required cultural resources procedures, such as those that address the Native American Graves Repatriation and Protection Act, the American Indian Religious Freedom Act, Executive Order 13007, or Executive Order 13175.

II. Alternative Procedures

A. Upon initiating review of a proposed MNARNG undertaking, the Environmental Supervisor at Camp Ripley Training Site shall:

1. Determine if there are any known historic properties or traditional cultural properties in the undertaking's APE;

2. Refer to the Model to determine if the undertaking's APE is within low sensitivity areas and if there are any historic site leads from the post-1837 GIS database; and

3. Determine whether the APE occurs within areas of Camp Ripley Training Site for which Native American Tribes have expressed interest or concern through consultation.

B. If the APE is entirely within areas for which there are no known historic properties/ traditional cultural properties, there is low archeological sensitivity, there are no post-1837 site leads, and there are no Native American concerns identified through consultation, then MNARNG may proceed without seeking Minnesota SHPO or Minnesota State Archeologist comments.

C. If the APE includes known historic properties/traditional cultural properties, locations of moderate or high archeological sensitivity, post-1837 site leads, or area of concern to Native American Tribes, then MNARNG shall proceed in accordance with 36 CFR Part 800.

III. Burials, Cemeteries, and Inadvertent Discovery

A. Ground disturbing activities or construction at Camp Ripley Training Site shall avoid all known burials, cemeteries, and archeological site 21MO22 within 100 meters.

B. If there is an inadvertent discovery of a burial, MNARNG shall proceed in accordance with 36 CFR Part 800, the Native American Graves Protection and Repatriation Act (43 U.S.C. 3001 *et seq*.), and Minnesota State Statute 307.08.

IV. Dispute Resolution

A. Any party to this PA or any Native American Tribe that objects to the interpretation or application of this PA should contact the Environmental Supervisor in writing. MNRNG shall attempt to resolve the matter by consulting with the objecting party and other signatories.

B. If MNARNG decides that the objection cannot be easily resolved, MNARNG shall proceed with dispute resolution in accordance with 36 CFR Part 800.

V. Amendment

Any party to this PA may propose to the other parties that it be amended, whereupon the parties

will consult in accordance with 36 CFR Part 800.6(c)(7) to consider such an amendment.

VI. Termination

A. Any party to this PA may terminate it by providing thirty (30) days' notice to the other parties, provided that the parties will consult during the period prior to termination to seek agreement or amendments or other actions that will avoid termination.

B. In the event of termination of this PA, MNARNG will proceed in accordance with 36 CFR Part 800, Army and National Guard Bureau policy, and other applicable plans, policy, or statutes.

VII. Sunset Clause

This PA will continue in full force and effect until November 30, 2006, at which time it may be renewed for an additional 5 years by a letter-based agreement among all the signatories.

Minnesota Army National Guard

_____ Date: _____
Eugene R. Andreotti
Major General, MNARNG
The Adjutant General, State of Minnesota

Minnesota State Historic Preservation Officer

_____ Date: _____
Britta Bloomberg
Deputy State Historic Preservation Officer
Minnesota Historical Society

Minnesota State Archeologist

_____ Date: _____
Mark J. Dudzik
State Archeologist
Office of the State Archeologist

Advisory Council on Historic Preservation

_____ Date: _____
Lee Keatinge
Advisory Council on Historic Preservation

APPENDIX D

Meeting of Workshop Participants during the 2005 Annual Meeting of the Society for American Archaeology, Salt Lake City, Utah

Subsequent to the 2004 workshop in Santa Fe, New Mexico, some of the workshop participants met during the Society for American Archaeology's (SAA) 2005 annual meeting in Salt Lake City, Utah. The meeting provided an opportunity to fine-tune the 2004 workshop recommendations and develop specific strategies for advancing these recommendations.

Workshop attendees who met during the SAA meeting included Jeffrey Altschul (Statistical Research, Inc.), Thomas Foster (BHE Environmental, Inc.), Carol Heathington (Luke Air Force Base, Arizona), Eric Ingbar (Gnomon, Inc.), Duane Peter (Geo-Marine, Inc.), Adrianne G. Rankin (Luke Air Force Base, Arizona), Laurie Rush (Ft. Drum, New York) Lynne Sebastian (SRI Foundation), and Marty Tagg (HQ AFMC/MSEVQ, Wright-Patterson Air Force Base, Ohio).

The meeting participants discussed the development of a web site, guidance, approaches for integrating models with installation management efforts, and advancing a third Legacy Resource Management Program project on modeling.

Web Site Content

- Introduction to predictive models and DoD Cultural Resource Management (CRM) programs
- Benefits of modeling for management decisions and missions
- Step-by-step guidance on model-building
- Best practices and lessons learned
- Links to sources of information on modeling

Guidance (made available on the web site)

- Using models in Historic Properties Components (HPC) of the Army's Integrated Cultural Resource Management Plans (ICRMP)
- Using Section 106 program alternatives, based on modeling, to streamline compliance
- Using historic contexts to guide variable selection for models
- Combining site morphology, environmental variables, and historic context information in order to make rational determinations of National Register eligibility

Integrating Models into Installation Management Programs

- Integrate models into ICRMPs, requiring model use and updating
- Integrate models into Section 106 programmatic agreements (PAs)
- Integrate models into research designs for data recovery projects

- Use models to evaluate the larger number of unevaluated sites

Third Legacy Resource Management Program Project

- Pick two (2) installations, and take existing models and enhance them so they can be used for site evaluations as well as for predicting site locations
- Apply for Legacy program grant funding
- Include development of web site and guidance in third Legacy program grant

Also, all agreed it was important to carry out, as soon as possible, the following tasks:

- Determine the appropriate military host for the web site. Work with the host, during the summer of 2005, to outline the elements of the web site so that costs and a schedule can be provided in the third Legacy Program grant.
- Write a letter transmitting the 2004 Santa Fe workshop report to appropriate individuals within DoD, including managers in Washington, D.C. Individuals to target include Maureen Sullivan (Federal Preservation Officer, ODUSD(I&E)/ESOH), Jim Cobb and Chris McDade (Regional Army Cultural Resource Managers), Jim Wilde (US Air Force, HQ AFCEE/TDI) and a program manager within the US Navy. The letter will focus on the workshop's primary recommendations and how they will result in cost savings DoD-wide. The letter will ask DoD managers if they find value in the workshop's findings and recommendations, and if they want to participate in implementing the recommendations.
- Take a joint service team to meet and talk to policy level staff within DoD in order to obtain support for implementing the workshop's recommendations.

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