

**Bureau of Land Management**  
**Cultural Resources Data Sharing**  
**2005 Progress Report**

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### **Executive Summary**

In 1998, the Bureau of Land Management began a program of information development in partnership with the State Historic Preservation Offices (SHPOs) in 13 western states (Alaska, Oregon, California, Nevada, Arizona, New Mexico, Colorado, Utah, Idaho, Wyoming, Montana, North Dakota, South Dakota, and Washington). The Cultural Resources Data Sharing Project has become an important part of the overall relationship between BLM and the SHPOs in the states where BLM has significant presence and activities. This report summarizes the activities performed by BLM and its SHPO partners since 1998. The report is also a prospectus on where future effort must be made to meet foreseeable and current needs for information, planning, and streamlining of work flow.

### **History and Background**

The Bureau of Land Management Cultural Resources Data Sharing Program (henceforward simply "CRDSP") was begun formally in 1998 from many antecedents. The CRDSP drew together much ongoing work at the time. Several of the states in which BLM has significant presence had long-running programs of data automation and most of the other states of interest to the agency were contemplating the use of automated information in some form. BLM itself had used, and was using, a variety of databases and some geographic information systems. The National Park Service and the U.S. Forest Service were preparing data system designs for enterprise-wide retention of all sorts of biological, cultural, and facilities information. The cost of computing was dropping sharply, with personal computers ubiquitous and wide area networking ever more common. Geographic information systems (GIS), formerly the province of GIS technical experts alone due to their complexity and cost, were less costly and much easier to use for the average professional. An especially significant development was that the record managers in the western State Historic Preservation Offices (SHPOs), states where BLM has a major presence Section 106 actions were (and are) common, had been meeting semi-formally for about ten years to discuss shared technical and procedural issues.

The term “cultural resources” has many potential meanings, ranging from an opera house to an artifact. Archaeological information comprises the bulk of BLM’s cultural resources information management, and the term “cultural resources” is used throughout the CRDSP as a shorthand label for archaeology, with the understanding that there are also historic buildings and structures, landscapes, and traditional cultural properties. In general, the term “cultural resources” accords to the sorts of things defined in the National Register Bulletin Number 15 as types of properties. It is useful to remember though, that the management of cultural resources involves not just these resources, but also the arranging and review of fieldwork, decisions about legal significance and treatment, cost-benefit decisions, and budgets. Thus, information about cultural resources is not just information about places, things, and landscapes; it also comprises knowledge of management, context, and procedures. Cultural resources information systems, considered broadly, must retain and convey appropriate values about all of these things.

BLM’s cultural resources are dominated by archaeological sites, both historic and prehistoric in age. Archaeological site information has been systematically collected and accumulated since long before the National Historic Preservation Act of 1966 mandated the creation of inventories. Archaeologists began cataloguing and systematically mapping information about sites in the Southwest over a hundred years ago. In the 1920’s, Frank Mera established a system of mapping and keeping notes on *all* archaeological sites in New Mexico at the Laboratory of Anthropology. The Smithsonian River Basin Surveys of the 1930’s covered thousands of square miles throughout the country, recorded tens of thousands of archaeological sites, and created the foundation for archaeological information archives in most of the United States. The River Basin Surveys explicitly utilized a state-based numbering system for archaeological sites (despite the fact that the investigations were defined by drainage basins that frequently encompassed many states). The resulting trinomial system consists of a state number, a county letter code, and then a sequential number within each county. The enumeration of sites by number was necessary to catalog the huge number of finds in to museum collections where designations like “White’s Point Mound 12A” would have been unwieldy.

### **The Growth of the Archaeological Survey and Standard Recording Formats**

In more recent times, archaeology on the public lands or through public projects that fell under the Section 106 process have been of such importance to anthropological research that systematic electronic data collection has been an explicit approach in archaeology as a whole. For instance, in the mid-1970’s the Southwest Anthropological Research Group (a coalition of researchers) created an explicitly computerized format for the SARG Database: a systematic set of observations to be made on every archaeological site. The database (which was intended for use only by SARG participants) was intended to answer the seemingly simple question of why sites are located in the places they are found.

In the late 1970’s, regional recording formats for archaeological sites and rock art grew out of this broader interest in site distribution and contents. The Intermountain Antiquities Computer System (IMACS) recording form was devised to be entered into a database. BLM and the other major federal agencies, along with the western State Historic Preservation Offices IMACS use encompassed many of the states in which BLM has significant management interests (Idaho, Nevada, Utah, Wyoming, Montana, Colorado), and many states still use the same format (Wyoming, Colorado, and Montana have changed formats and Idaho has modified the format slightly). One goal of IMACS, and similar efforts within states (notably New Mexico, which began archive automation) was similar to the goal of SARG. Another goal of IMACS was the standardization of field techniques, observations, and site form creation. State boundaries did not exist in the past; their reification through different site recording techniques in each state hindered effective fieldwork and study.

Although the logic of consistent recording of archaeology regardless of state boundaries was in itself sufficient to gain favor in the professional scientific community, energy exploration and development throughout the west (kicked off by the energy crisis of the early 1970’s) combined with the Federal Land

Policy Management Act, created a huge boom in archaeological field surveys of public lands in the western U.S. A new industry “cultural resources management” was born: firms that specialized in archaeological work required by the growing use of public lands (mostly BLM-managed) by various undertakings. The volume of site records generated by cultural resources management necessitated a more rapid means of site recording. Standardized recording formats helped to speed the field process.

Thus, two factors created the first round of automation of cultural records in the “BLM states” and regions. First, the anthropological interest in site distribution. Second, huge acreages of new fieldwork finding thousands and thousands of sites. This forced many State Historic Preservation Offices (SHPOs), mandated to keep an inventory under Section 106 of the NHPA, to create some form of electronic site ledger. Typically, this was on a mainframe computer, heavily encoded to save storage space, and limited to a few attributes of each site. Also typical of these systems was that they contained only archaeological site information (sometimes only prehistoric sites). Other kinds of cultural resources information, notably, the management status of the archaeological sites or other parts of cultural resources information were not automated in to data systems.

### **Recognition of the Archive Problem**

The fieldwork boom of the 1970’s and 1980’s flooded the archives of most SHPOs with new records. Some states created new staff positions of archive managers (sometimes combined with other job duties), others already had them. New and old archive managers faced problems of reviewing records for adequacy, physical filing, allowing appropriate access (for pre-field reviews and for undertaking reviews), staff, operating space, and funding. Archive managers in the IMACS states and several nearby (New Mexico, the western Great Plains) started meeting informally at the annual Plains Conference. This group, which informally adopted the moniker of Cultural Resource Information Managers Exchange (CRIME) realized that each archive faced similar problems. So, while each (paper) tower seemed a castle unto itself, solutions found in one place were useful in other places too. By the late 1980’s most of the CRIME members were looking toward computerization of records, and many were contemplating the use of GIS to maintain map information on where sites were located and where inventories had been made. In 1993, Ebert and Associates – a consulting firm – investigated the automation of archives nationally under a grant from the National Science Foundation. The Ebert and Associates study confirmed that most archives in the western U.S. would move toward database management and GIS within the next decade.

The Ebert and Associates study identified GIS as the key technology that would bring site record archives into electronic data systems. GIS brings together most of the common business needs that users of site record archives have: assessment of prior areas of investigation, inclusion of attributes in simple tables (i.e., not implementing one to many relationships in the GIS, but information in tables beyond just map attributes), ready distribution as electronic files, and the ability to phrase queries and return results either geographically or by selecting attributes in a table. In 1993, of the 13 states in which BLM has significant lands under its management, only New Mexico was actively building GIS data.

Modeling the occurrence of archaeological sites was another factor that drove the increasing demands for effective records management in cultural resources as a whole. Public land managers realized very quickly that the demand for access to public lands for project staging would outstrip the agency’s ability to perform new, intensive, fieldwork. Model-building to predict where archaeological sites would occur and (to some extent) their characteristics, became an important focus. Unlike the earlier SARG initiative, management of the resources was part of the rationale for modeling. Anthropological understanding of site location – essentially understanding “why” sites are where they are – was one line of model-building during the 1980’s but there were also suites of models built that sought to find the pattern of site occurrence without reference to why such a pattern might occur.

The BLM published a comprehensive edited volume on model-building approaches in archaeology in 1988. This volume remains a benchmark. At the time of its publication, many authors commented on how

the expansion of GIS usage would impact model-building and management. The CRIME group, mentioned above, actively turned toward GIS as a topic of informal study. New Mexico, Wyoming, Arizona, and staff at Gnomon, Inc., began researching GIS technologies as a team of interested parties.

### **Spatial Data Falls In To Place**

In the mid-1990's, the National Spatial Data Infrastructure was established by executive order. The NSDI as it is known creates a framework for the creation and retention of all geospatial data by federal agencies. The NSDI called for standard methods, values, and documentation of all geographically referenced data. The U.S. Geological Survey (USGS) was given lead responsibility for implementing the program, which it does through the Federal Geographic Data Committee (FGDC). One of the first actions of the FGDC was to establish a data standards creation and review process. Standards established by the FGDC are requirements that federal agencies must meet when creating geospatial data.

The FGDC's first product was a general standard for describing spatial data. The "Content Standard for Digital Geospatial Metadata" mandated particular categories of descriptive information for every federal geospatial dataset. The standard did not say how accurate data had to be, or specify sources or formats of data itself (metadata is information *about* data and this was a standard for how to describe data, hence a *metadata standard*). The FGDC next turned to standards creation for the *content* of spatial datasets.

Wyoming, New Mexico, and Gnomon, Inc. jointly applied for an FGDC grant to create an addition to the metadata standard – a tailoring of the specification – to fit the large datasets that were being (or soon would be) created in automating the Section 106-populated archives in the western U.S. The project involved multiple federal agencies, SHPOs, consultants, and state agencies. BLM, recognizing that it would soon be faced with implementing FGDC standards in some fashion, became one of the project sponsors. The grant had two significant outcomes. First, it met the goal of creating an extension to the FGDC spatial metadata standard that was more appropriate for the kinds of information prevalent in the western states. Second, it showed several things about the situation in the western states: (1) federal agencies use state-determined record formats because of the need to collaborate with SHPOs in each state (2) there is considerable variation between states (except for IMACS states) in site recording standards and report standards; (3) the work process itself was generally common from one state to the next ; (4) notwithstanding state-level variation, there is a high-level set of attributes that all participants in the work process agreed are either mandatory, mandatory if present, or strongly recommended.

### **The Genesis of CRDSP**

Item (4) above is worthy of some further explanation, for it forms the core of the CRDSP concept. An example makes the idea clear, we think. All participants in the standards process agreed that a key piece of information about an archaeological site (or a cultural resource generally) is its age. However, the way in which age is assessed or described varies from one region to another (even within the same state). For instance, an early historic site in New Mexico may be much older in years than an early historic site in Nevada. At some level, we can all agree that both sites are historic in age, but the terms appropriate for additional description are best considered local or regional. The reason for this is two-fold. First, there truly are different historical sequences represented in the archaeological record of different parts of the western states. Second, the history of archaeological inquiry has varied from one state or region to the next – creating inconsistent descriptions across recording format boundaries. On the other hand, the consistency of the Section 106 work process elucidated in the FGDC study makes a high degree of standardization possible in describing the work process itself, as opposed to the archaeology that is the subject of the work.

At the same time as the technical options were becoming clear, BLM was formulating a national programmatic agreement for how Section 106 would be conducted. All of the participants recognized that timely, correct, information was very valuable in meeting the requirements of Section 106 efficiently.

Data development was acknowledged as an important, shared, responsibility of both the SHPOs and the BLM in the national agreement. Agreements formulated in each state used similar language about data development and sharing, but tailored to meet the situation of each SHPO.

BLM examined these outcomes in great detail and evaluated whether the agency was best served by creating its own data system or by forming partnerships with the SHPOs in the western states – most of whom were heading into the creation of sharable electronic datasets themselves. Because the review and agreement process – consultation – occurs at the state level the BLM concluded that it was more effective to collaborate at the state level rather than to create a single comprehensive national data system. By way of contrast, the U.S. Forest Service followed the latter course as part of its entire data management system, INFRA. Similarly, the National Park Service has a single data model for the National Parks called ASMIS. The USFS was able to fold the creation of INFRA Heritage in to INFRA development generally, which had a funding priority as the “do-everything” business system for the Forest Service. The National Park Service manages a very small part of the western landscape at a more measured pace than the public lands for which BLM is responsible – NPS staff have more opportunity to create database entries and work with fitting additional descriptive information in to a national framework.

BLM also had its own information systems in place or being built on a piecemeal basis. Some field offices (then known as Districts and Resource Areas) had GIS digitizing or database population (or both) underway. Each used its own unique format that fit its local preferences.

The problem of piecemeal information systems development is sometimes called “stove piping”, because it is like having a house in which each stove has its own chimney. The CRDSP is based on the premise that the common “chimney” for *detailed information about a resource* is at the state (SHPO) level, not at the national level. The different state “chimneys” then can be merged into a more general national “chimney”. A key idea here is that the state-level systems be intentionally designed to provide information at the level of abstraction required nationally. Data sharing agreements, often tied to the state-level programmatic agreements between BLM and SHPOs, provide a framework for appropriate interaction.

In formulating the CRDSP, the cultural resources staff in the Washington D.C. office (WO240) saw that BLM could partner with the SHPOs to achieve a common goal. As well, other agencies and parties in the process (including industry) could be useful partners too. The CRDSP began a period of several years of coalition building at the state and national levels. One major success was with the Department of Energy, which immediately saw the wisdom of better decision-making support with improved information and funded several projects in the western states that created and enhanced datasets themselves and created new ways to deliver and analyze the data. Another major data-creation and sharing effort has been the Mohave Desert Ecosystem Project, a shared venture with Department of Defense, the National Park Service, and the BLM. This project created digital data for much of southeastern California.

Part of the coalition building was a series of presentations throughout the western states, many made with SHPO partners, to other agencies. BLM has created a “Data User Group” (DUG) that incorporates agency and SHPO partners explicitly and is open to other participants too. The core members of the DUG consist of BLM Field office staff (one per state) and SHPO data managers (also one per state), WO240 staff, and any appropriate contractors. The DUG has held annual meetings or, more recently, teleconferences. Like the CRIME group of years past, the DUG is intended to share successes and alert others to failures) in order to make the arduous process of data system development and maintenance more efficient. In addition to the national DUG, some states have discussion groups either run by the SHPO or by the BLM. These coalitions address issues and needs within each state.

The BLM has provided funding and technical assistance in each of the CRDSP states. Following the model that local relationships work most effectively, BLM has gained greatest benefit by allowing each state office to determine how best to distribute the funding provided for the CRDSP within that state. So, in one state funding may have gone toward an area in which fuels management and response demanded

better data for planning, while in another state funds went toward SHPO developing web-based GIS services so that cultural resources professionals could work more swiftly on day to day Section 106 projects.

## **Current Status**

The CRDSP is a complex project, so its current status has several facets to it. This section examines the status of the CRDSP through several measures. One measure is the percentage of known cultural resource phenomena that are populated in the CRDSP federation datasets. A second important measure is how data sharing affects overall job accomplishment. A third measure is whether the process of data sharing itself is assisting BLM in managing work with its other partners (including SHPOs) and in long-term resource management. Obviously, there are dependencies between these different measures that affect the status of the CRDSP within any given state. For example, one area in a state may not be in the dataset at all, but if BLM manages no ground or projects there, it does not impair the agency's work.

At a basic level, there is the fundamental measure of how much information is *readily* available to BLM in digital formats. Too, there is the question of how current the information in shared systems might be, and whether it is being updated actively, episodically, or not at all. These are some of the simplest measures for they can be quantified in some simple ways. The FGDC standards effort discussed in the Background section of this report found the need for two basic forms of spatial data and associated attributes: the locations and extent of cultural resources themselves (overwhelmingly archaeological sites on BLM-managed lands) and the locations and extents of systematic investigations to find cultural resources. The latter, (commonly called "surveys" by archaeologists) are typically of high management value but were overlooked in many digitization efforts according to the Ebert and Associates study of 1993. In any case, any assessment of current status needs to consider information about both of these fundamental entities. Table 1 summarizes the status of information availability.

## **Data Creation and Use**

Tables 1a through 1k display summary information on the progress made within each state between 2001/2002 and the end of 2004. As the tables show, there have been very large increases in the population of data in the databases and GIS within most states. Half of the listed states were interviewed by telephone. Most (5 of the 6) interviewed states said that the increase in digital data was directly due to the CRDSP. The CRDSP did not fund all, or even most, of the creation of GIS data in these states (according to the archive managers). Instead, CRDSP funds started the process, which then drew in other participants. CRDSP created a framework in which other funds became more effective.

The archive manager for Wyoming made a particularly interesting point. She stated that with each investment in technology and data management process, the cost to create and maintain digital data had dropped. So, when the Wyoming SHPO automated records in the Moxa Arch oil and gas area for BLM, the average per-resource cost was about \$25 to digitize, enter, verify, etc., a site record (and associated report documents). The DOE Pump III project just being concluded in the Wyoming SHPO's office has a cost of around \$11 per record – less than half what it used to cost. (Please note that the per record cost is actually much lower when one considers *only* data entry and verification – the \$11 or \$25 includes custom programming costs, computer support, and so forth).

## **Data Usage (Query, Export)**

The tables by state also show whether BLM and other professionals can gain access to the data by query (in other words, by posing a question to the data system) and by directly getting a full or partial copy of the data. Most states have put in place some sorts of query systems or have enhanced their existing ones

in the past two to three years, using both CRDSP funds and other funding sources (the regional electrical company in New Mexico funded an interface improvement so that its consultants could help it plan better, for instance).

Of course, having an interface to information does not mean it will be used. The functional assessment of current status is more difficult question, for one must ask whether data development, sharing, and information systems in general are assisting BLM staff in accomplishing work. For daily work, one can ask about the frequency of information usage. For longer term goals, e.g., impact of data management on resource management plan revisions, we relied upon anecdotal evidence.

We assessed each state's CRDSP activities. Necessarily, our answers to all but the tallying questions, discussed above, are subjective. Our general impression is that map-based query interfaces (usually provided through browser-based internet GIS applications have the highest (or perhaps just the most visible) use of CRDSP products and processes. Currently, Arizona, Nevada, New Mexico, Wyoming, and (recently) Utah offer this service to BLM cultural resource specialists. California is developing this interface for the Mohave Desert project area. The Oregon BLM-USFS central Oregon data system (OHIMS) is also developing a map interface. Tabular on-line queries (having no map interface) are less of a draw in popularity but are still heavily used. Wyoming, for example, has measured an 800% increase over three years in queries against its database since implementing a map-based service.

The “enter and ship” model of data distribution and use has had less clearly successful results. In this model, the SHPO or archive sends BLM field offices a cut of the data on a periodic basis (either by physical or electronic transfer). How useful this information may be is difficult to judge, for the interaction is basically one-way. Idaho has had pretty good success with this approach from the BLM’s perspective as has Colorado. On the other hand, from the archive perspective, it is all too easy for this to become a one-way conduit. In Colorado, for instance, by the start of 2005, only a single field office was sending back corrections and additions to the information that the SHPO records section sent out.

### **Born Digital and CRMTracker**

In 2001, Gnomon, Inc. convened a small meeting to propose the development of a web-based workflow application to collect information from participants in the cultural resource management process as their actions took place in the process. So, a fieldwork organization would enter information about its fieldwork as part of the pre-field permit process; a reviewer of the subsequent report would enter the review as they made it, and so on. The application was intended to be easy to use and not to require more than the bare minimum of data entry. The common Section 106 steps would thus give digital birth to basic information on cultural resources and investigations. This information could then be built upon in specific information systems. By design, the intent was *not* to create information specific to any single state, but to create a general, more abstract, set of data categories that still met the needs of cultural resource management business information.

Wyoming SHPO, using CRDSP and internal funds, began development of this application with Gnomon. Gnomon, Inc. also contributed its own funding to the project development and then sought support through a Department of Energy grant as well. The resulting application is called CRMTracker. Selected field offices in Wyoming used CRMTracker throughout FY 2004 and FY 2005. Consultants entered many of the investigation records within the system: over 1500 in FY2004 and 2500 records in FY2005.

FY 2004 and 2005 reporting was done using CRMTracker for the Worland Field Office, which entered all of its projects into CRMTracker. Because Worland had done tens of thousands of grazing allotment renewals, these literature-reviews were entered as a single acre tally. In any case, the resulting report was presented to the SHPO as part of the required reporting under the statewide programmatic agreement. Two of the twenty questions in the report were answered with CRMTracker queries. As well, the tallies answer most of the Secretary of the Interior report compiled by WO240.

CRMTracker is, it appears, a little too generic for adoption in most states. Consequently, the current development effort is to add state-specific profiles to CRMTracker, so that it can better communicate with state-level information systems. One of the flaws of CRMTracker is that it is only truly useful if everyone uses it. Otherwise reporting will still require going through other kinds of records. One archive manager stated an opinion that mandated use of CRMTracker by BLM and all consultants working on BLM lands would save the SHPO office a staff person equivalent per year in data entry, and would probably save BLM a similar amount of effort in digitizing site locations (because they can be posted from CRMTracker as centroids for later elaboration at the SHPO).

CRMTracker is one example of “born digital”. Others that are state-based, and thus different in scope. For example, the AZSITE information system in Arizona distributes a free database/desktop GIS tool for creating AZSITE site and project records, including GIS data. The user then ships the bundled data to AZSITE for verification and inclusion. BLM is a partner in the development of this data entry tool. Idaho distributes a Microsoft Access version of its site record, which can also be shipped back to the SHPO for database inclusion. Utah anticipates a completely on-line systems by the end of FY 2006, which will include full data entry and digitizing. Similar efforts are under way in California, Nevada, and Oregon. In Wyoming, the BLM field offices create GIS and simple attribute information and return it to the SHPO archive for verification and inclusion in the central data repository. California BLM will put in place a digitizing toolbar inside of ArcGIS during FY 2006 that all field offices will use to create basic cultural resources GIS entries. Building records directly in electronic formats saves BLM time and money, especially because it is often consultants who will do the actual entry in to these applications. It also shortens the time needed to get information in to one or more data systems. Toward this end, the CRDSP has also created a metadata and minimum content standard guideline for conveying GIS datasets to and from BLM.

### **Integration With Other BLM Activities**

The CRDSP was begun on the notion that shared data benefits many. For BLM, the notion of “many” is all of the programs that cultural resource specialists must help support or serve. While the focus has been different from one state or area within a state to another, beneficiaries and co-developers of information in the CRDSP have included:

- Fuels and fire
- Range
- Land Use Planning
- Recreation
- Mining
- Fluid Minerals

Each of these programs has benefited from the CRDSP, although certainly not in every state. As well, the programs in which there have been some involvement by BLM usually have drawn in other partners. For example, the original Railroad Valley digitization and modeling effort (funded with BLM-DOE cooperative funds), drew DOE in as the direct (and sole) supporter of a similar project in Pine Valley, Nevada. This in turn led to the Pump III project, which accomplished huge automation efforts, analyses, and further studies in New Mexico and Wyoming. In this case, BLM’s initial investment yielded a return in effort five or six times bigger than the original. Too, in fuels and fire, model-building efforts have drawn forward other program areas to enhance datasets or build more useful interfaces.

There are challenges in the dissemination of archaeological data to these other programs. One of the most vexing is the reluctance of cultural resource specialists to reveal site locations. This is a problem that

could be addressed by putting field office staff in charge of educating their colleagues in confidentiality under the National Historic Preservation Act. Because the cost of information is offset by its use, it would lower the “cost” of cultural resource information management by having it be used more. Two states (Wyoming, Nevada) provide generalized map versions of their data, so that only gross location or counts per square mile are available. This may ease some concerns – and may be sufficient for planning sorts of use. Yet, generalized data cannot be used for specific project footprint evaluations or to route a fireline around an archaeological site. The problem is discussed further below.

## **Issues and Opportunities**

The CRDSP is not without issues and problems. Some are inherent to the process of automation, others are structural within the agency or its partners, and still others are simply matters of semantics and communication. All are worthy of some consideration, either to seek resolution or to decide not to do so.

### **Security**

A common concern is data security and access. This was touched upon above. Even within the agency’s own doors, cultural resource specialists are reluctant to share specific site location information. We assessed whether states were ready to prevent unauthorized use of their data in two ways. First, did they have an acceptable use policy for authorized information system users. Second, did they have standard security measures such as passwords, URL obfuscation, logging and log reviews for protecting on-line data. Every state that has digital data has developed a statement about acceptable use of information. Every state that has digital data accessible through an internet connection has some forms of security placed upon access. Few states encrypted information transmissions. Our own visits to archives have shown that *paper security* is relatively lax and may present more of an opportunity for the determined site location scavenger than the digital representation of the same information

Information security has many aspects to it. Overall, there *is* security surrounding cultural resource information systems, whether they are on paper or in digital form. That is, everyone recognizes a need to hold confidential some sorts of knowledge. However, each office seems to adopt its own standard as to who can be included in a circle of trust that has access to this knowledge.

A best practice document concerning cultural resource information security would be useful. Such a document needs to first define the threats that must be averted by security practices, for “security issues” is too vague and one cannot make useful recommendations at that level of generality. After the threats are identified, some assessment of their likelihood needs to be made, and these probabilities determine the necessary research to define a best practice for confidentiality and security.

### **Backlogs**

Most archives were flooded with records in the early 1980’s and have never recovered fully from the experience. Strategies for coping with these records vary. For example, Colorado has approximately a two year lag in records being entered fully into their system. New Mexico requires registration through an on-line entry format that puts a placeholder partial record in its system immediately. Years later, New Mexico SHPO staff will see the actual record and correct any errors in it.

Information in automated systems has to be complete to be most useful. Elimination of backlog and pockets of “missing” data should be a high priority for all of the CRDSP participants. There are two elements in this process: (a) entering “old” records and (b) devising a system that prevents the creation of a backlog in the future. The latter is especially important – the Utah archivist uses the term “day forward”

(as in “from this day forward there will be no backlog”) to describe this philosophy. Because of the competing demands upon cultural resource specialists, data entry and verification inevitably fall toward the bottom of job priorities. So, it seems most effective to follow a “born digital” strategy like CRMTracker or AZSITE standalone entry to eliminate the data entry step by merging it with the creation of project and site reports that are part of the “important” business that gets a higher work priority.

Coping with the former – the existing records that are not in the system – may require letting go of full entry of these records in the same detail that one would use on new records. In the interest of efficiency, perhaps older records could be entered in a very abbreviated form that captures only their most general, reliable, attributes. By holding a flag on them that indicates the entry profile is “quick” one could always return in a later effort to glean more data from them. Some SHPO archives do not like this approach, in our experience. Nevertheless, for the CRDSP to produce useful results, it may be necessary to force them to utilize it – at least in the near-term.

A significant source of “missing” data is the presence in field offices of project reports and site records for actions that never went to consultation with SHPO. Often, these records were retained at the agency since no discussion with another reviewer was needed. The field office backlog can be quite a significant amount of work. For example, in the Ely Field Office, Gnomon, Inc. found that there were approximately 20% more sites in the field office records than in those at the state archive. As is the case with backlog generally, one must separate the strategies for getting these existing records into a system from the strategies to prevent the discordance ever occurring again. This is a matter for state-level conventions and agreements.

### **Records and Information Pockets**

One of the initial barriers to data sharing was the presence of pockets of records and even automated information in various field offices. Some of the field office pockets of records and automated data have been created at great effort by agency staff with a great sense of dedication. Letting go of these records and datasets can be difficult.

This causes partial use of the CRDSP, which slows progress toward comprehensive deployment. For instance, if one must check the on-line data and also drive three hours to the field office to “see if there is anything else that we don’t send to SHPO”, one will ultimately decide that since you have to drive the three hours anyway, why invest in the on-line system? Again, state-level conventions and agreements can be used to treat the syndrome by specifying that review *will* utilize the on-line system solely, once it is certified as fully populated (this can also provide a deadline for those who would like to sit on a backlog of records).

### **Software Is Hard to Use**

Although software has become easier to use over the years, it is still daunting to the average archaeologist. Many of the software tools that appear on BLM desktops really are too complicated to be useful on an occasional basis. This is why some of the most successful CRDSP aspects use some of the most familiar tools like map interfaces.

An important need is to identify the *key* business uses that the software tools must meet. These are a much smaller set than the *desired* uses expressed by cultural resources specialists. For example, an archaeologist may like the idea of having a software tool (like ArcGIS Spatial Analyst) with which they can calculate spatial statistics for randomness of site distribution. In fact, they will utilize this function only once every two years (and each time will require hours of reading a manual to remember how to do it). On the other hand, three times a day they will need a report that lists all sites within a given arbitrary polygon that they draw on an electronic map. Effective software should provide only this second function.

This will also make training much easier and faster. Making tools easier to use means defining the job at hand, as in the example above. This is the truly difficult part. We discuss it further below.

### **Core Data and Generalizing from the State Partners**

Up to this point, the CRDSP has not drawn much upon the state partners to produce consistent, more abstract, levels of information. A single map creation effort in 1999 showed that it is possible and useful to do so by making a map showing the western states by county and displaying site density, percentage of sites considered eligible to the National Register, acres of inventory, and so forth. Since that time, we have not attempted a similar compilation.

The state-based summaries show that overall good progress is being made in creating data at the state level. The states are all creating information that should generalize upward appropriately. We think it is time to design the national-level mandatory fields that every CRDSP partner populates in some way (perhaps by using state-based values that translate to the national value set). Further, we suspect that the list of mandatory, business-required, information fields is fairly short. This should be a high priority goal for the agency because it focuses on the goals of having shared information systems in the first place. It also gains support and sustainability for the CRDSP by tying it into the BLM/DOI information system framework. First steps to achieving this goal are to decide upon the needed values at a national level, and then examine the state cultural resource recording formats to ensure all contain them (see Table 2 for web links to all state site records).

### **Opportunities**

BLM, through the CRDSP, is poised to reap the fruit of its labors. During the next two years, the CRDSP should:

- Define a standard national set of attributes and require CRDSP partners to populate them
- Define a standard application set (perhaps along the lines of CRMTracker) that eliminates double entry and makes backlog accumulation difficult
- Set benchmarks for system use, rather than system population. Population will follow use, rather than vice versa.
- Continue to promote multi-agency coalitions for data sharing to distribute cost and increase the cost-benefit of information creation and maintenance.

The first recommendation is for a standard national set of attributes and values for those attributes are important for many reasons. The business processes which BLM follows are national in scope, and the data from the different states should be useful by them without regard to state boundaries. For example, the basic legal status information needed for cultural resources management (National Register status, applicable criteria, actual listing on the Register) are national-level values. The CRDSP partners should be encouraged to translate existing terms in the state data systems to a single, national, set of values for legal status of resources. CRDSP partners that do not track legal status should either be encouraged to do so, or given a standardized system (similar to CRMTracker, perhaps) in which legal status would be tracked.

Initially, the national set of attributes might focus on the characteristics of cultural resources and fieldwork that are specific to the National Register and the 8100 series manuals: type of resource (or property type in National Register terms), general age, simple condition (extant, destroyed, data recovered and extant, data recovered and destroyed, unknown), BLM-specific attributes (e.g., use category). Inventory or survey areas need some basic information too: fieldwork year(s), ground coverage level (Class III, Class II, with appropriate metadata about each state's Class III/II standards for fieldwork at the time of the fieldwork).

The standard attributes could be populated explicitly through an application (see below) or by building export processes from state-based systems. The latter requires building tables of equivalences between state-based terminology and the national values.

Standard national attributes should be available through one or more common applications that are available service-wide. At a minimum, these will allow query of the standard, national attributes. For example, one might query a web-based interface for a count and list of resources within Nevada that are eligible or potentially eligible to the National Register and known to still be extant.

Several benchmarks would be easy to obtain. One benchmark is whether all staff know how to use appropriate state and national level information technology. A second benchmark is that all BLM cultural resources staff receive formal training in using appropriate data systems, just as they do in the 8100 series manuals. A third benchmark is that each field office conveys records to the data system appropriately and in a timely manner. A fourth benchmark is that each field office actually utilize the data system or the data provided by the SHPO partner.

Data-sharing, system development, and system use have been great opportunities for BLM and the other partners. Collaborations within each state need to continue and intensified, where possible. There are several tangible ways in which this can occur. Technology transfer is one collaboration opportunity: as BLM and its partners develop applications they become attractions for new partners – who may also provide new data and perhaps some other technology component that enhances the CRDSP. BLM should not be shy about requesting an invitation to data development meetings or opportunities that the SHPO partners are hosting or seeking. As mentioned above, BLM's presence in these sorts of collaboration opportunities often draws in a new partner, increasing the value of the CRDSP as a whole.

Table 1a. Summary for Alaska. Comparable estimated figures for 2001 are provided in brackets. Italicized answers indicate 2005 updates.

Percentage of (known) BLM-managed sites in database	100% [100%] – all in old format. Being converted to new formats
Percentage of known BLM-managed sites in GIS	50%
Percentage of investigations on BLM-managed land in database	<i>Most – through reports database. Alaska SHPO has created a citations database that includes scanned documents. Unknown how many may not have gone to SHPO from field offices</i>
Percentage of investigations on BLM-managed land in GIS	Hard to tell because of nature of investigations in Alaskan terrain (does not necessarily follow “block survey” model of other states)
Electronic data queries available to qualified cultural resource professionals	In office, or by qualified state employees via the state network. for GIS, for site records, and for reports (citations).
Electronic data queries available to other professionals and qualified interested parties	Not outside of office except for state employees with access to state network
Mechanism to keep GIS and database on-going	Maintained by SHPO. Electronic (web-based) site card prototype is being refined for general use
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes through data sharing
GIS available to external qualified professionals?	Yes, to those who sign an agreement.
Database available to external BLM users?	Yes
Database available to external qualified professionals?	Yes
Site and/or investigation record “born digital”?	See above
Site or report images in digital format?	Scanning project is under way as part of data re-population in to new systems
Opportunities for improvement	Consistent standards for data entry and digitization will allow field offices to provide information appropriately to SHPO. <i>The SHPO is working on this relationship. SHPO is building a comprehensive management data system for all aspects of cultural resources.</i>
Legacy data issues	Being worked on as data system is revised and improved.
Highlights/Lowpoints	SHPO archive is working hard to build a user-friendly contemporary system that will benefit BLM and many other agencies
Major funding partners	Alaska Dept. of Transportation, BLM, U.S. Forest

	Service, SHPO internal funding
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Table 1b. Summary for Arizona. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	80% [60%] – estimated
Percentage of known BLM-managed sites in GIS	70% [40%] – estimated
Percentage of investigations on BLM-managed land in database	100% for major reports [60%]
Percentage of investigations on BLM-managed land in GIS	60% for major reports [40%]
Electronic data queries available to qualified cultural resource professionals	Yes
Electronic data queries available to other professionals and qualified interested parties	Yes
Mechanism to keep GIS and database on-going	AZSITE standalone data entry module fully populates data tables and allows export of data to AZSITE
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes
GIS available to external qualified professionals?	Yes
Database available to external BLM users?	Yes, by arrangement
Database available to external qualified professionals?	Yes, by arrangement
Site and/or investigation record “born digital”?	Available through MS-Access tool for creating records including GIS
Site or report images in digital format?	No
Opportunities for improvement	Clean up legacy data issues in field offices; involve more agencies, stabilize funding situation with other contributors; integration with SHPO legal status database
Legacy data issues	Some field offices for BLM
Highlights/Lowpoints	The coalition that created AZSITE is succeeding. Some potential coalition members – notably the DOT – have not come in to the partnership due to perceived data quality issues. This might be addressed in the future and would strengthen AZSITE.
Major funding partners	BLM, USFS, FGDC, Arizona State Museum, SHPO

Notes: AZSITE is not a SHPO database per se, but is managed and run by the Arizona State Museum in collaboration with the SHPO. *Since the figures above were compiled, AZSITE has been made the official repository of site information by the SHPO (in late 2005).*

Table 1c. Summary for California. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	60% In SHPO management database; variable in terms of information centers (some have no database)
Percentage of known BLM-managed sites in GIS	80% - includes Mohave Desert GIS and NE California GIS. [40%]
Percentage of investigations on BLM-managed land in database	Unknown
Percentage of investigations on BLM-managed land in GIS	50% (Mohave Desert only)
Electronic data queries available to qualified cultural resource professionals	No
Electronic data queries available to other professionals and qualified interested parties	No
Mechanism to keep GIS and database on-going	Being created
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes through direct data distribution
GIS available to external qualified professionals?	Only by special arrangement
Database available to external BLM users?	Only by special arrangement
Database available to external qualified professionals?	Only by special arrangement
Site and/or investigation record “born digital”?	Not currently
Site or report images in digital format?	Yes for Mohave Desert Ecosystem Project (50,000 records)
Opportunities for improvement	Integration, define mechanisms for BLM to become a data creator and consumer of its own data creation while still creating compatible information for the shared statewide system that will ultimately appear.
Legacy data issues	Many and quite large – field offices that are not digital, have not submitted all records to information centers, etc.
Highlights/Lowpoints	Relationship with SHPO data management (called CHRIS) has been confusing and often unproductive. <i>Improving through discussions of Mohave data.</i>
Major funding partners	BLM, DOD, CALTRANS, FEMA, municipal government coalitions

*BLM California has embarked upon a program of consistent GIS creation within all field offices, aided by a purpose-built ArcGIS toolset for cultural resources digitizing and attributes, and through the use of a centralized GIS network deployment (via the State Office Citrix server).*

Table 1d. Summary for Colorado. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	95% [95%] – there is an approximate two year backlog (lag in data entry)
Percentage of known BLM-managed sites in GIS	95% [10%] - represented as centroids and extents; actual boundaries are done for sites >10 acres on existing records and >5 acres for new records
Percentage of investigations on BLM-managed land in database	100% [100%]
Percentage of investigations on BLM-managed land in GIS	65% [5%]
Electronic data queries available to qualified cultural resource professionals	Yes through the COMPASS system, which does not provide GIS on the web. Custom queries and datasets created on an as-needed basis.
Electronic data queries available to other professionals and qualified interested parties	Only some categories of resource information.
Mechanism to keep GIS and database on-going	Archive maintains data and accepts field office digitization from one BLM office and routinely from USFS Ranger Districts. <i>On-going digitizing with BLM field offices in northwest Colorado.</i>
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes – data are sent to the BLM as requested for use in BLM systems
GIS available to external qualified professionals?	Yes – as requested
Database available to external BLM users?	Yes – as above
Database available to external qualified professionals?	Yes – as above
Site and/or investigation record “born digital”?	No
Site or report images in digital format?	Pilot project completed, but is not being done except for photographs (which are accepted digitally and linked in the on-line system)
Opportunities for improvement	Scanned site records have a high priority for scanning. ArcIMS and COMPASS linkage to integrate tabular and GIS data. <i>An ArcIMS web-GIS tool is planned.</i>
Legacy data issues	Surveys are a legacy data issue at present. Funding is being sought (a grant has already been prepared) to deal with this. <i>Moving forward as of 2005 with on-going digitizing.</i>
Highlights/Lowpoints	Scanning would add value. BLM is not making as much use of the data as they could, and with the exception of one field office, updates are rarely sought by the field office staff. Better integration of the whole

	process (field office to archive) would be desirable
Major funding partners	BLM, Colorado DOT, US Forest Service, Bureau of Reclamation, State Historical Fund (major supporter)

Table 1e. Summary for Idaho. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	100%
Percentage of known BLM-managed sites in GIS	100% posted from UTM coordinates in database
Percentage of investigations on BLM-managed land in database	100% of received reports
Percentage of investigations on BLM-managed land in GIS	0% as of 2004. <i>Approaching 100% as of end of FY2006 through project done at BLM State Office in collaboration with SHPO (begun in 2004)</i>
Electronic data queries available to qualified cultural resource professionals	Only through use of the electronic site record for self-authored records. Query of main data done by arrangement with SHPO.
Electronic data queries available to other professionals and qualified interested parties	No
Mechanism to keep GIS and database on-going	BLM is beginning to be a “data creator” that shares information with SHPO. Otherwise SHPO does all database maintenance.
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes – datasets shipped on CD-ROM
GIS available to external qualified professionals?	By special arrangement only and with permission of all parties
Database available to external BLM users?	Yes, to cultural resource professionals only
Database available to external qualified professionals?	By special arrangement only and with permission of all parties
Site and/or investigation record “born digital”?	Available through MS-Access tool for creating site record (print text only)
Site or report images in digital format?	Yes, site records are all in scanned format
Opportunities for improvement	Better integration of field offices and SHPO if the need is felt. Otherwise, digitization of inventoried ground is probably the biggest need
Legacy data issues	Inventories, large sites any information in field offices not filed with the SHPO archive is not in the database or GIS.
Highlights/Lowpoints	Native American concerns with data sharing and dissemination for planning and more general professional uses.
Major funding partners	BLM, Idaho Dept. of Transportation, internal SHPO funds, Bureau of Reclamation, Idaho Power

Table 1f. Summary for Montana. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	100%
Percentage of known BLM-managed sites in GIS	None (no GIS). Can be posted by using coordinates in some (but not all) site records
Percentage of investigations on BLM-managed land in database	100% of SHPO-reviewed projects
Percentage of investigations on BLM-managed land in GIS	None (no GIS)
Electronic data queries available to qualified cultural resource professionals	Yes
Electronic data queries available to other professionals and qualified interested parties	Bibliography and review projects only
Mechanism to keep GIS and database on-going	Maintained by SHPO and by U of Montana
GIS used internally by SHPO?	Unknown
GIS available to external BLM users?	No
GIS available to external qualified professionals?	No
Database available to external BLM users?	Yes
Database available to external qualified professionals?	Yes
Site and/or investigation record “born digital”?	No
Site or report images in digital format?	Yes – available to BLM staff through specialized interface
Opportunities for improvement	Unclear whether improvement is needed. Inventoried space and basic GIS of resource locations would be useful to some field offices (e.g., Miles City) where decision-making and 106-driven actions are key.
Legacy data issues	Unknown
Highlights/Lowpoints	
Major funding partners	BLM, MT SHPO

Montana has had a long-running tabular system that comprises three basic databases: sites, reports, and reviews of projects for eligibility and effect. GIS has not been identified as a needed service within Montana – at least by the SHPO.

Table 1g. Summary for Nevada. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	85% [30%] 90%
Percentage of known BLM-managed sites in GIS	85% [30%] 90
Percentage of investigations on BLM-managed land in database	85% [30%] 90%
Percentage of investigations on BLM-managed land in GIS	85% [30%] 90%
Electronic data queries available to qualified cultural resource professionals	Yes. <i>SHPO, BLM, and USFS have created an access committee and SHPO has defined control mechanisms.</i>
Electronic data queries available to other professionals and qualified interested parties	Yes, through generalized results only.
Mechanism to keep GIS and database on-going	Digital encoding format in MS-Access, shapefile format, CRMTracker
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes
GIS available to external qualified professionals?	Yes
Database available to external BLM users?	Yes
Database available to external qualified professionals?	By arrangement only. <i>Answer is now yes. Data sharing partnership has created external professional access.</i>
Site and/or investigation record “born digital”?	Available through MS-Access tool for creating site record (print text only); CRMTracker use is proposed for 2005/06.
Site or report images in digital format?	Yes – most site records in the two archives have been scanned to PDF format
Opportunities for improvement	Backlog clean-up – getting data from field offices that never made it to archives is important and is underway in several BLM field offices; ensuring that new site records and reports go in is the key to maintainability. SHPO is seeking state funding for a full-time data manager to ensure the system (NVCRIS) is a success. <i>Achieved as of early 2006 with hiring to follow.</i>
Legacy data issues	Variable, but can represent up to 20% of known sites within a field office.
Highlights/Lowpoints	Great working relationship between SHPO and most BLM offices is very helpful. SHPO is very open to building coalitions and has been an active former of partnerships with other agencies.
Major funding partners	Nevada Dept. of Transportation (single largest funding

	source). BLM, Department of Energy
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Table 1h. Summary for New Mexico. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	100% [100%]
Percentage of known BLM-managed sites in GIS	100% posted by centroid and buffered boundary. Actual boundaries larger than 100m across are digitized but percentage of BLM-managed sites is not known.
Percentage of investigations on BLM-managed land in database	100% [100%]
Percentage of investigations on BLM-managed land in GIS	25% [10%]
Electronic data queries available to qualified cultural resource professionals	Yes
Electronic data queries available to other professionals and qualified interested parties	Yes, by arrangement
Mechanism to keep GIS and database on-going	On-line site and project registration to get required site and project numbers
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes
GIS available to external qualified professionals?	Yes
Database available to external BLM users?	Yes (copied to BLM periodically)
Database available to external qualified professionals?	By arrangement
Site and/or investigation record “born digital”?	Yes, through project and site registration process
Site or report images in digital format?	No
Opportunities for improvement	Enhanced creation of digital record
Legacy data issues	More investigations to digitize. Unknown backlog within field offices.
Highlights/Lowpoints	Long-term, stable program with many partners and beneficiaries
Major funding partners	New Mexico Dept. of Transportation, BLM, US Forest Service, major internal SHPO funds are devoted to maintaining the archive. Dept. of Energy (Pump III)

Table 1j. Summary for Oregon. Comparable estimated figures for 2001 are provided in brackets. OHIMS (Oregon Heritage Information Management System) is a joint USFS and BLM database that includes most of the central Oregon administrative units for these agencies and partially articulates with the SHPO database.

Percentage of (known) BLM-managed sites in database	SHPO database – 80% [25%] from older reports and records in REPORTS database; OHIMS, 90% within participating units. [75%]
Percentage of known BLM-managed sites in GIS	SHPO – 100% [10%] from older maps but quality is unknown; OHIMS 90%
Percentage of investigations on BLM-managed land in database	SHPO – 80% from old reports on file at SHPO. OHIMS 90% for participating units
Percentage of investigations on BLM-managed land in GIS	SHPO – 70%?? Estimated from age of reports at SHPO; OHIMS 90% for participating units
Electronic data queries available to qualified cultural resource professionals	SHPO – no; OHIMS agency staff only (OHIMS)No
Electronic data queries available to other professionals and qualified interested parties	No
Mechanism to keep GIS and database on-going	OHIMS – continuous population; SHPO stand-alone site record application
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	SHPO data – no; OHIMS – yes
GIS available to external qualified professionals?	No
Database available to external BLM users?	SHPO database - no (as of 9/2004); OHIMS, yes
Database available to external qualified professionals?	No (as of 9/2004)
Site and/or investigation record “born digital”?	OHIMS – yes; SHPO – site record yes
Site or report images in digital format?	No
Opportunities for improvement	SHPO format and OHIMS format differ and could be merged or SHPO could agree to accept the more comprehensive OHIMS site record format
Legacy data issues	Many. Old map digitization (from SHPO reference maps) are of unknown quality and this data needs to be cleaned to have value for contemporary management.
Highlights/Lowpoints	Relationship between SHPO and BLM/USFS has sometimes been at cross-purposes regarding information exchange
Major funding partners	Oregon Dept. of Transportation, BLM, US Forest Service, central Oregon field offices and ranger districts



Table 1k. Summary for Utah. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	90% [70%]
Percentage of known BLM-managed sites in GIS	70% [50%]
Percentage of investigations on BLM-managed land in database	90%
Percentage of investigations on BLM-managed land in GIS	70% [40%]
Electronic data queries available to qualified cultural resource professionals	Yes, in-office only
Electronic data queries available to other professionals and qualified interested parties	No
Mechanism to keep GIS and database on-going	SHPO maintains data
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes
GIS available to external qualified professionals?	No
Database available to external BLM users?	Only by special arrangement
Database available to external qualified professionals?	No
Site and/or investigation record "born digital"?	IMACS tool to create site record (MS-ACCESS)
Site or report images in digital format?	No
Opportunities for improvement	Get more BLM users employing on-line map system and data maintenance/update will improve because folks will cease hoarding reports in their offices
Legacy data issues	Significant in several field offices (suspected to be so)
Highlights/Lowpoints	Utah SHPO funding has been variable.
Major funding partners	BLM, NPS, Bureau of Reclamation, Utah SHPO internal funding

*By the end of 2006, Utah anticipates having a fully on-line system that allows consultants and BLM to enter site records to a centralized database and to digitize records to a centralized database.*

Table 11. Summary for Washington. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	Unknown – presumed to be all in WA SHPO internal database
Percentage of known BLM-managed sites in GIS	
Percentage of investigations on BLM-managed land in database	Unknown – presumed to be all in WA SHPO internal database
Percentage of investigations on BLM-managed land in GIS	Unknown
Electronic data queries available to qualified cultural resource professionals	No
Electronic data queries available to other professionals and qualified interested parties	No
Mechanism to keep GIS and database on-going	Unknown
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	No
GIS available to external qualified professionals?	No
Database available to external BLM users?	No (as of 9/2004)
Database available to external qualified professionals?	No (as of 9/2004)
Site and/or investigation record “born digital”?	Available through MS-Access tool for creating site record (print text only)
Site or report images in digital format?	No
Opportunities for improvement	Unclear whether improvement is needed – BLM manages small acreage in this state. BLM may be able to tier off highway-related information development.
Legacy data issues	Unknown
Highlights/Lowpoints	Little appetite at SHPO to serve data to BLM because of small area in which BLM has interests.
Major funding partners	

Notes: The only field office in Washington state interacts directly with SHPO on most database issues. SHPO has not made its internal GIS and database data available to external agencies.

Table 1m. Summary for Wyoming. Comparable estimated figures for 2001 are provided in brackets

Percentage of (known) BLM-managed sites in database	100% [100%]; 100% in old, abbreviated, form, approximately 30% in contemporary, richer format
Percentage of known BLM-managed sites in GIS	50% [5%]
Percentage of investigations on BLM-managed land in database	100% [80%]; 100% in old, abbreviated, form and roughly 30% in contemporary, richer format
Percentage of investigations on BLM-managed land in GIS	40% [5%]
Electronic data queries available to qualified cultural resource professionals	Web-based map and tabular database query; internal file search reports are returned as map images and word-processing tables
Electronic data queries available to other professionals and qualified interested parties	Anonymized (no site location information) web-based tabular database query; through DOE Pump III project, web-based map and summary reporting (no site location information, only counts)
Mechanism to keep GIS and database on-going	BLM Field Offices digitize site and project boundaries and send to SHPO for quality control and inclusion. SHPO staff do primary data entry in to database. Beginning 2005, CRMTracker will become source for initial entry of investigations and sites in statewide database
GIS used internally by SHPO?	Yes
GIS available to external BLM users?	Yes – via WYSO
GIS available to external qualified professionals?	Yes, via view-only web-based map service
Database available to external BLM users?	Yes, via web query and as tables when needed
Database available to external qualified professionals?	Yes, via web query
Site and/or investigation record “born digital”?	Through CRMTracker, yes. Not all consultants or Field Offices utilize CRMTracker
Site or report images in digital format?	Yes, approximately 50% of BLM-managed sites
Opportunities for improvement	Post spatial data from CRMTracker. Give users a mechanism for digitizing over the web to eliminate moving files and quality control issues. Move toward single, enforced, standards
Legacy data issues	Yes. So far, work has concentrated on areas of active oil and gas development.
Highlights/Lowpoints	Highpoints: - cost to digitize a record has dropped from \$25 to

	<p>approximately \$11</p> <ul style="list-style-type: none"> <li>- huge user pool – 800% increase in queries posed to database and GIS since 2001</li> </ul>
Opportunities	<p>Archive opinion: full implementation of CRMTracker would further cut costs and save time. Having BLM staff digitize information is not as efficient as having SHPO staff do the work because of support framework costs and the fact that SHPO must still do the same QA/QC.</p>
Major funding partners	<p>Wyoming BLM, individual field offices have funded data development as part of specific project planning efforts (e.g., Moxa Arch field); Wyoming Dept. of Transportation, SHPO internal funds, Department of Energy (through PUMP III project). Wyoming SHPO actively seeks partnerships with agencies to populate spatial and tabular data.</p>

Notes: Wyoming has been one of the example states for data automation approaches in cultural resources. It has served as a test bed for approaches and technology development that have then been used in other states. *The PUMP III project was completed in 2005, with over one-third of the state's area being digitized as part of the project (north-central and northeastern Wyoming). CRMTracker has been utilized for two field seasons with over 4000 investigations entered into CRMTracker by the end of 2005.*

Table 2. URLs to state site records (as of June, 2006)

State	URL	Notes
Alaska	<a href="http://www.dnr.state.ak.us/parks/oha/ahrs/ahrsinst.htm">http://www.dnr.state.ak.us/parks/oha/ahrs/ahrsinst.htm</a>	
Arizona	<a href="http://www.statemuseum.arizona.edu/profsvcs/forms.shtml">http://www.statemuseum.arizona.edu/profsvcs/forms.shtml</a>	
California	<a href="http://ohp.parks.ca.gov/?page_id=1069">http://ohp.parks.ca.gov/?page_id=1069</a>	
Colorado	<a href="http://www.coloradohistory-oahp.org/crforms/crformsindex.htm">http://www.coloradohistory-oahp.org/crforms/crformsindex.htm</a>	
Idaho	<a href="http://www.idahohistory.net/shpo.html">http://www.idahohistory.net/shpo.html</a>	
Montana	<a href="http://www.his.state.mt.us/shpo/forms.asp">http://www.his.state.mt.us/shpo/forms.asp</a>	
Nevada	<a href="http://www.anthro.utah.edu/imacs.html">http://www.anthro.utah.edu/imacs.html</a>	
New Mexico	<a href="http://potsui.arms.state.nm.us/">http://potsui.arms.state.nm.us/</a>	Follow Resources link
Oregon	<a href="http://www.oregon.gov/OPRD/HCD/ARCH/arch_pubsandlinks.shtml">http://www.oregon.gov/OPRD/HCD/ARCH/arch_pubsandlinks.shtml</a>	
Utah	<a href="http://www.anthro.utah.edu/imacs.html">http://www.anthro.utah.edu/imacs.html</a>	
Washington	<a href="http://www.oahp.wa.gov/pages/Archaeology/Survey.htm">http://www.oahp.wa.gov/pages/Archaeology/Survey.htm</a>	
Wyoming	<a href="http://wyoshpo.state.wy.us/SHPOweb2002/2002webpages/cpforms.htm">http://wyoshpo.state.wy.us/SHPOweb2002/2002webpages/cpforms.htm</a>	