

Cultural Resources Priority Area Planning in Sub-Mogollon Arizona and New Mexico¹

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ABSTRACT

Regional planning is an essential element of comprehensive archaeological management programs. Most regional planning efforts in archaeology focus on predictive modeling to distinguish areas based on the likelihood of encountering archaeological resources. We discuss a complementary approach that uses known sites and expert opinion to identify spatially explicit cultural resource preservation priorities. Loosely analogous to biodiversity conservation planning, priority cultural resource assessments provide an evolving vision of an archaeological reserve network which, if managed appropriately, could protect a significant part of our cultural heritage. We outline an efficient approach to identifying spatially explicit Priority Areas within portions of Arizona and New Mexico. This information complements assessments of individual site eligibility for purposes of listing on the National Register of Historic Places by providing an added layer of regionally contextualized information at larger geographic scales. By establishing priorities, this information can also enhance cultural resource considerations in local, state, and federal land use planning. While our consideration of significance is based on the potential information content of the resource, we argue that this planning process can easily incorporate other cultural resource values and help to address preservation actions in support of this broader set of values.

La planeación regional es un elemento esencial de cualquier programa de manejo integral de sitios arqueológicos. Hasta ahora, la mayor parte de los esfuerzos en torno a la planeación regional en la arqueología han utilizado el modelo predictivo para distinguir áreas potenciales con recursos arqueológicos. Aunque no precisamente análoga a la conservación de la biodiversidad, la prioridad de los recursos culturales durante la planeación es similar al establecimiento de una red de reservas arqueológicas en constante evolución, que de ser manejadas apropiadamente, podrían proteger una parte significativa de nuestro patrimonio cultural por generaciones. Nosotros esbozamos un método directo y de bajo costo para identificar áreas prioritarias, especialmente explícitas, en una gran parte del sureste de Arizona y el suroeste de Nuevo México. Inicialmente destinado como una herramienta de manejo para guiar los esfuerzos privados y públicos de protección de los recursos, la información generada tiene una aplicación más amplia. En lo particular, la planeación prioritaria va más allá de las evaluaciones de elegibilidad y del significado individual del sitio con el propósito de enlistarlo en el Registro Nacional de Lugares Históricos, al proporcionar una capa adicional de información regional contextualizada para escalas geográficas más grandes. Nosotros argumentamos que dicho proceso de planeación puede ayudarnos a abordar con mayor eficacia un rango más amplio de valores de los recursos culturales y afrontar las oportunidades de preservación.

Cultural resources² will not persist unless we dedicate time, effort, and money toward their long-term preservation. The sheer number of cultural resources at risk will always outstrip our ability to meet the needs of preservation. This mismatch requires archaeologists and other heritage management professionals to engage in a process of *priority setting*—deciding how to spend limited resources to protect rare and

irreplaceable archaeological and historical remains. In this article, we provide an example of, and the reasoning behind, a series of systematic and comprehensive regional-scale cultural resource priority setting exercises recently conducted by Archaeology Southwest and partners in a portion of the U.S. Southwest. We argue that cultural resource priority setting should be an essential element of archaeological resource management.

Strategies providing for the in situ conservation of sites or areas (i.e., site protection³) are a key aspect of comprehensive cultural resource management (Lipe 1974). In Arizona and New Mexico, there are over 250,000 documented cultural properties of record. A large proportion of these are listed or considered eligible for listing on the National Register of Historic Places. Given the large number of listed or eligible sites and their geographic extent, regional priority setting is necessary to effectively focus site protection efforts. As a first step in directing and allocating limited resources, we describe an efficient and straightforward approach to cultural resource priority setting and provide an example focusing on the precontact and proto-historic record across much of sub-Mogollon Arizona and New Mexico. While this work was initiated to direct our own archaeological site protection activities, we see this as an initial step towards a broader discussion regarding cultural resource priority setting in relation to other preservation goals and activities. Our work is inspired, in large part, by the science of priority setting within the field of conservation biology (Game et al. 2013; Myers et al. 2000) and grew from an early priority cultural resources planning effort conducted in Pima County, Arizona, as part of a countywide comprehensive land use planning effort known as the Sonoran Desert Conservation Plan (Cushman 2002).

Given the inevitable demands placed on our natural world by a burgeoning population, difficult decisions are required to allocate finite resources to protect species, communities, and ecosystems over the long-term. In response to this challenge, the discipline of conservation biology developed an approach that seeks to understand the status and nature of Earth's biodiversity and to protect it from excessive rates of extinction brought on by human activities (Soulé and Wilcox 1980). At its core is the idea that biodiversity conservation can be accomplished through the establishment of a regional network of conservation reserves (Sarkar 2009). In developing an overall plan for biodiversity conservation in a region, "targets" (i.e., particular species, communities, and ecosystems) are identified for which quantitative goals are developed. Areas are identified that "capture" the targets and these specific places collectively form a network (i.e., conservation reserve system) that, if protected over the long-term, can help to meet the quantitative goals established for the identified targets (Van Dyke 2008). These specific places are intended to receive priority attention when directing conservation actions that reduce, if not eliminate, threats to the targets directly and/or promote the natural processes that sustain those targets. Targets are viewed as surrogates whose long-term protection serves to maintain the full complement of species, communities, and ecosystems in a region (Pressey 2004).

Although the loss of our cultural heritage is an ongoing concern (Elia 1997), little attention has been given to the reserve concept as a vehicle for the long-term protection of cultural heritage sites in the United States (with the exception of highly visible cultural resources evaluated for World Heritage designations [Bandarin 2007]). There have been a few efforts focused on systematically identifying protection priorities, usually in relation to specific cultural themes and time horizons (DOI 1985, 1989). Most recently, National Heritage Areas have conducted assessments at regional scales to develop more coordinated planning around significant cultural and natural resources (NPS 2013). The selection of National Heritage Areas is a bottom-up process and requires Congressional designation, adding a lens of politics

regarding their selection. We are unaware of any broader efforts that speak to the systematic and comprehensive identification, assessment, and protection of places of cultural significance at regional scales. This is surprising in light of the early intellectual capital regarding this concept developed by researchers such as Edgar Lee Hewett (1905) and his successful efforts to establish a number of federal archaeological preserves. This may be a reflection of the fact that the National Register of Historic Places has become the arbiter of significance with regard to cultural resources (Sebastian 2009) and Cultural Resource Management, as implemented through the Section 106 process, has come to define preservation in the United States as it pertains to the archaeological record.

At a conceptual level there is recognition that proactive, regional planning is an integral element of a comprehensive cultural resource management program (Lipe 1974, 2009). Barker (2009) argues that such proactive planning provides the best opportunity to protect archaeological resources in advance of site specific undertakings and to eliminate in advance sources of conflict in places where significant resources are likely to exist. To date, most regional planning efforts have relied on predictive location modeling to identify cultural resource sensitivity zones (Sebastian and Judge 1988; Wescott and Brandon 2000). Specifically, researchers examine the archaeological record across large-scale geographic areas to develop mathematical relationships between physical landforms or other environmental variables and occurrences of cultural remains. Such predictive models provide the basis for determining which areas are likely to be richer in cultural remains than others (Figure 1; Hill et al. 2009). Cultural resource sensitivity analyses have led to more efficient allocation of survey efforts and the identification of avoidance zones at the initial stages of planning for resource development (Ingbar et al. 2005). While the value of these predictive modeling exercises as regional planning tools cannot be overstated, we argue that we are currently lacking efforts directed toward identifying priority cultural resource preservation areas (analogous to biodiversity conservation targets or reserves) based on the known record of cultural resources, the use of geospatial tools, and our collective awareness of their significance.

We describe below a set of recent planning efforts designed to identify areas that adequately capture preservation targets based on geospatial archaeological data and expert opinion. The resulting spatially explicit map of the identified areas ("Priority Areas") can be viewed as an evolving vision of a regional archaeological reserve network and a necessary complement to sensitivity analyses like those described above. In addition to its value in directing site protection activities, the efficient and cost-effective method described here can help us more effectively integrate cultural resource considerations into local, state, and federal land use planning. These efforts are not intended to replace other heritage management laws or processes, such as the National Historic Preservation Act and the National Environmental Protection Act, but to supplement them.

METHODS

We have completed, or are in the process of completing, multiple regional Priority Area planning efforts throughout sub-Mogollon Arizona and New Mexico. The planning units (Figure

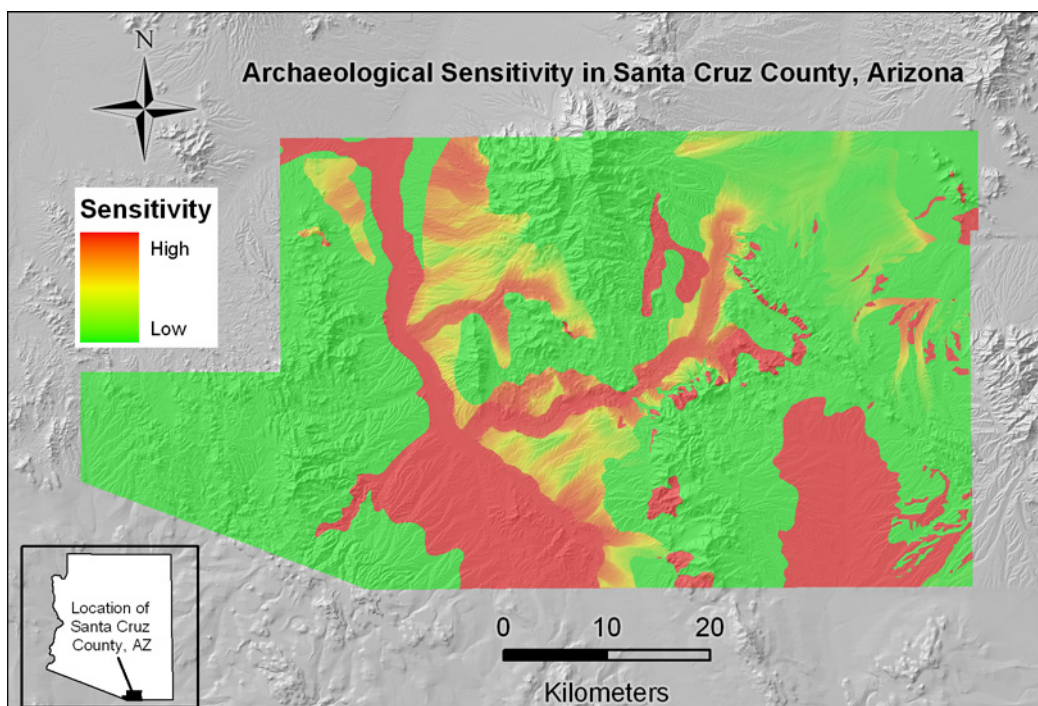


FIGURE 1. An example of an archaeological site sensitivity model for Santa Cruz County, Arizona (from Hill et. al 2009).

2) include Pima County, Arizona (conducted by the Pima County Cultural Resource Office); Pinal County, Arizona; the San Pedro River basin; Safford Basin; southeast Arizona (Sulphur Springs, San Simon, and the Upper San Bernardino Valleys); and the Upper Gila Valley, Mimbres Valley, and eastern Black Range in New Mexico west of the Rio Grande. We have also conducted a broader effort, the Salado Preservation Initiative, focused on sites important for understanding the origins, spread, and diversity of late precontact social developments in the Southwest marked by the presence of a widespread ceramic ware known as Salado polychrome, along with other associated material and social changes (see Clark et al. 2012; Crown 1994). The Salado Preservation Initiative Priority Area planning was restricted to a shorter temporal period (A.D.1250–1450) and the boundaries of the planning area were defined primarily by the spatial extent of sites with relatively high frequencies of Salado polychrome and related ceramic types (> 25 percent) in their decorated ceramic assemblages. All of these planning efforts employed a similar methodology to identify and delineate Priority Areas and their boundaries by integrating five elements: geospatial data organization within a defined area (typically watersheds), expert opinion, field assessments, more detailed site survey information (when available), and land ownership records review. However, each planning effort was undertaken with slightly different goals in mind and differed accordingly, as outlined below.

In general, each planning effort considered the known archaeological record, beginning with the Paleoindian period (ca. 11,500 B.C.) and continuing through the protohistoric period (A.D.1700), although Pima County planning did include buildings and structures that post-date A.D.1700. To date, our planning has excluded consideration of traditional cultural properties or other places of religious or spiritual significance

to descendant communities. We believe that the process we describe can apply to priority setting efforts that include this broader suite of cultural resources (see below).

Geospatial Data Organization

Archaeology Southwest maintains a large integrated geospatial database, the Heritage Southwest (HSW) Database, containing information on over 10,000 prehistoric and historic archaeological sites in the U.S. Southwest and the Mexican Northwest. This database is divided into a number of smaller sub-databases, each developed for specific preservation objectives, which contain information on specific periods, areas, or types of sites. The core of the HSW database is what we call the Coalescent Communities Database (CCD). The CCD consists of site size and location information for a large proportion of previously recorded archaeological sites of greater than 12 rooms from the U.S. Southwest and the Mexican Northwest dating between A.D. 1200 and 1700 (Hill et al. 2004, 2012; Wilcox et al. 2003). Over the last eight years, Archaeology Southwest has maintained, updated, and improved this original database.

The HSW Database also contains a large database of Paleoindian and Archaic period sites throughout the state of Arizona (Mabry 1998); petroglyph and pictograph sites in Arizona (Thiel 1995); architectural and occupation period information on all known Chacoan style great houses and great kivas (ca. A.D. 875–1250); public architectural elements of the Hohokam sequence in central and southern Arizona (ca. A.D. 750–1450; Doelle 1995, 2000); and a detailed database of previously recorded architectural sites (ca. A.D. 700–1450) in a large portion of the Mimbres region of southwestern New Mexico, including the Mimbres Valley, Upper Gila, and Black Range areas (see Hegmon et al. 2008).

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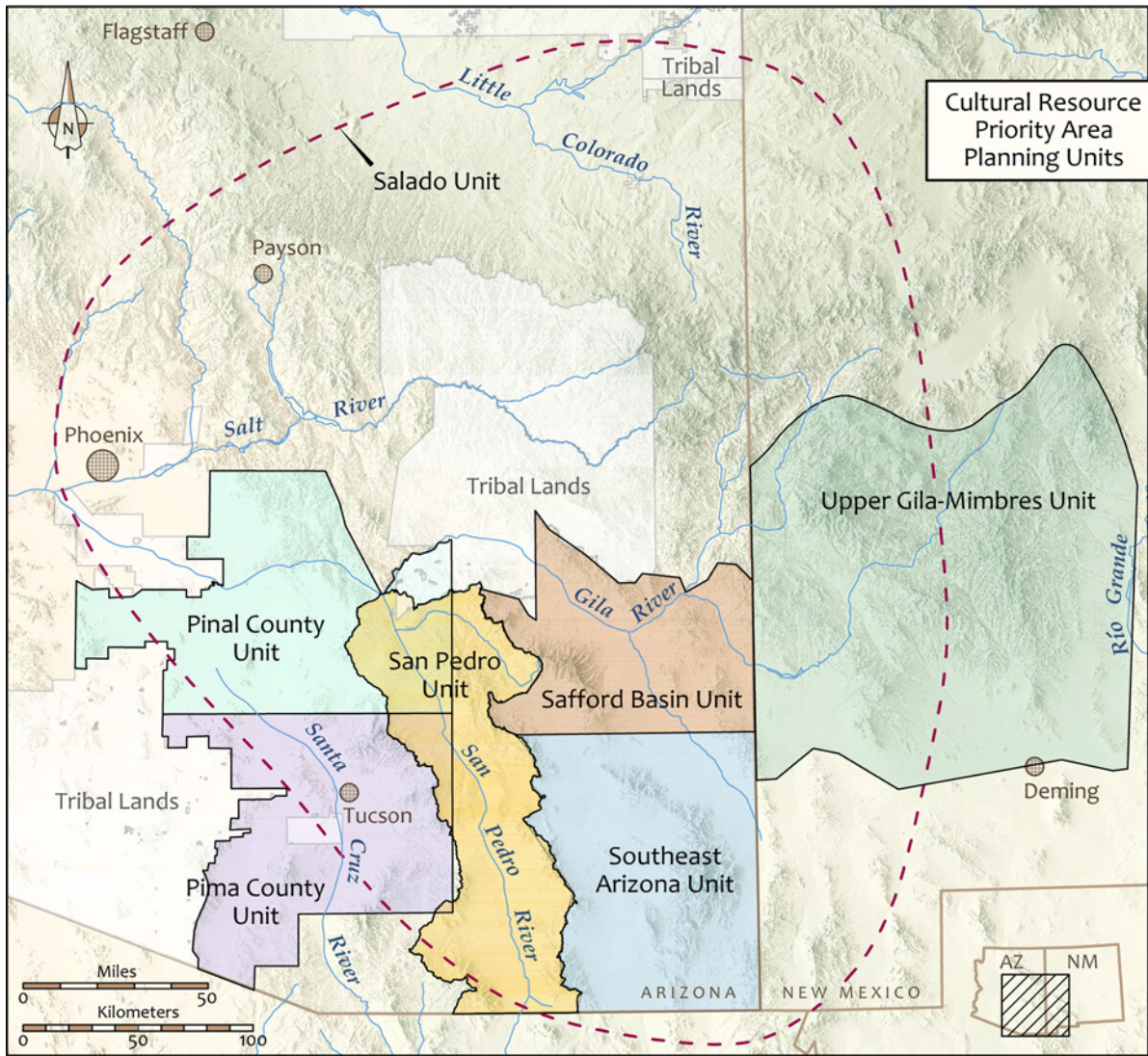


FIGURE 2. Priority Area planning unit boundaries in Arizona and New Mexico.

The latest addition to the HSW Database, the Southwest Social Networks (SWSN) Project (Mills et al. 2013), added information to a number of sites in the HSW, dating between A.D. 1200–1500, west of the Continental Divide. This included systematic tabulations of painted and plain ceramic types and wares for over 700 sites and sourced obsidian objects for nearly 150 sites. Altogether, the SWSN database currently contains information on more than 4.3 million typed ceramics and over 6,000 chemically characterized obsidian objects representing the results of over a century of archaeological research in the region. The combined resources within the HSW database allow us to explore patterns of regional interaction and demographic change across the region at scales not previously possible.

Because the geographic coverage among the various HSW sub-databases varies and some have not been consistently updated with new data, we also obtained site records within each planning unit from state archaeological data repositories, including Arizona Archaeological Site and Survey Database (AZSITE)⁴ and New Mexico Cultural Resources Information

System (NMCRIS),⁵ excluding records for sites located on tribal lands (see below). The Pima County planning effort relied on the entire AZSITE records database for Pima County, whereas all Archaeology Southwest planning efforts requested a subset of the available records based on the presence of particular feature types. In general, we restricted data requests to a subset of the larger data set based on the presence of certain features types: major habitations, important architectural features such as ball courts, platform mounds, large hilltop features, pithouse villages, great kivas, roomblocks of 10 rooms or greater, unusual rock alignments, rock shelters and caves with cultural remains, and pictograph or petroglyph sites. In Arizona, United States Forest Service site records are not fully incorporated into the AZSITE system, necessitating efforts to obtain site records from individual National Forests. All listed National Register sites or districts were identified and included. All the information described above was reviewed to eliminate duplicates and organized into a master geodatabase for each regional planning area. In aggregate, these became data points for what we term “focal sites,” which functioned as preservation targets (Table

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TABLE 1. Preservation Targets Mapped to Focus Expert Discussions in Workshops and Consultations.

Habitation	Pithouse Villages (> 10 houses) Masonry/Adobe Room blocks (> 12 rooms)
Public Architecture	Ball court Great Kiva Platform Mound Reservoir
Hilltop Structures	Masonry Structures, including rock terraces
Cave/Rock Shelter	Cultural Deposits
Petroglyphs	Sites (> 6 panels and/or > 20 elements)
Pictographs	> 10 elements
Ceramics	Salado polychromes and related wares
Specific Rare Site Types	Paleoindian cultural remains other than isolated projectile points Early agriculture Pictograph sites in central and southern Arizona regardless of size Western archaic style petroglyph location in Arizona regardless of size Apache pictographs Protohistoric habitation areas
Landforms	Early Holocene floodplain deposits "Black mat" stratigraphy

1) and, in conjunction with expert opinion, were the basis for delineating Priority Areas.

A priori decisions about which sites merited consideration as preservation targets evolved from internal conversations and advance consultation with some of the experts. For example, isolated occurrences of Clovis or Folsom points were not considered preservation targets. These ad hoc, a priori decisions are contextual and should be discussed early in the planning process. The Pima County planning effort differed in that it began with a list of significant sites developed internally by County staff and through iterative outreach with experts. The master list of sites was then reviewed by everyone in a workshop setting to make additions or deletions. In many ways this initial approach, as well as later planning efforts, were grounded in what is largely an intuitive sense by most archaeologists as to what are the important places. The specific criteria used to set priorities will always be regionally specific due to differences in the nature of the archaeological record, but this general approach is transferable to other locations through the involvement of local experts and stakeholders.

As mentioned briefly above, detailed site data from tribal lands is not currently included in our planning. Considerations of archaeological data on tribal lands involve additional concerns including questions of who can control and access these proprietary data and where and how data should be man-

aged, presented, or duplicated. As our initial efforts described here were designed to identify preservation priorities to direct site protection efforts on public and private lands, we did not request detailed data from sovereign tribal lands. However, local tribal representatives and land managers were invited and many did attend the expert workshops or provide comments on these efforts. In a few cases, Priority Areas or additional locations for investigation were identified for well-known archaeological resources on tribal lands (e.g., Kinishba Ruins National Historic Landmark on the Fort Apache Indian Reservation). In future planning efforts, we hope to expand this exercise to further include tribal lands and tribal perspectives on cultural resource values, including other kinds of traditional cultural properties through more in-depth collaborations and partnerships.

Expert Workshops and Individual Expert Consultations

Expert opinion (i.e., feedback provided by professional archaeologists, tribal members, and other heritage management specialists) solicited in workshop settings or one-on-one consultations provided the foundation for Priority Area identification. Experts were asked to draw, in real time, polygons around important individual sites or areas based on mapped geospatial information on targets and their knowledge of the resources on the ground.⁶ We requested that particular attention be given to geographic areas with precontact cultural remains that have considerable time depth or that include groups of sites that are functionally, temporally, or spatially related. Based in part on Pima County's experience, experts agreed that priority should be given to site complexes or settlement clusters that served as cultural resource "hotspots" offering the greatest opportunities to learn about the past. However, in certain places where land development and natural changes like erosion caused a great deal of fragmentation of the original cultural setting, many of the Priority Areas included single sites as preservation targets. While experts were asked to consider site significance, integrity, representativeness, and uniqueness based on their direct knowledge of specific sites or areas, deference was given to all expert input.⁷ Importantly, our geodatabase links expert opinion to independent evidence for the nature and distributions of archaeological resources.

Detailed Survey and Land Ownership Information Review

Following expert workshops, additional information obtained from the site file, including computerized site records, was reviewed to identify all sites within and in close proximity to Priority Areas. This more detailed spatial information, when available, provided for fine-grained boundary delineation based upon the presence of sites that could be reasonably related spatially, temporally, and/or culturally to the preservation targets "captured" in the expert-defined polygons. It is within these larger contexts that smaller and more common sites that are specifically excluded from initial target list are included and given greater value. In some instances, areas originally defined as distinct in the experts' discussions were combined into one Priority Area.

Land ownership within expert-defined polygons was then reviewed and boundaries were adjusted to conform more effi-



FIGURE 3. A member of a volunteer field crew, Cherie Freeman, assessing an early Classic period Hohokam settlement site in Picacho Mountains Priority Area within Pinal County, Arizona.

ciently to ownership interests. In general, we sought to minimize the inclusion of private property where preservation targets were not located on private holdings. Private property rights are a sensitive issue and merit careful consideration in the priority setting process.

Site Condition Assessments

For most expert-defined polygons, recent information on site content and condition was not readily available. Therefore, excepting Pima County, a volunteer crew with significant field experience and/or Archaeology Southwest staff relocated and evaluated site conditions for preservation targets within recommended Priority Areas (Figure 3).⁸ The intent of these surveys was not to collect new information, but to evaluate the current condition of previously known sites. In a few instances, land development had destroyed targets, and thus they were eliminated from further consideration. In other instances, the location information for the preservation target was inaccurate and the site(s) could not be located. There were also occasions when private landowners did not grant permission to visit some locations. If the available information on the preservation target was greater than 20 years old, it was excluded from the final set of recommendations until more recent information becomes available. In addition to these on-the-ground efforts, we also used readily available aerial imagery (e.g., Google Earth, United States Geological Survey) as another source of information to supplement site condition assessments.

RESULTS AND DISCUSSION

Geospatial data organization and expert consultation is complete for most of the planning units described above. To date, over 40 experts, land managers, tribal representatives, and other stakeholders have participated in either formal workshops or one-on-one individual consultations (Appendix). As a result, 315 Priority Areas have been identified across sub-Mogollon Arizona and New Mexico (Figure 4). In addition to the Priority Areas described above, Priority Investigation Areas (Figure 5) were identified by experts in areas for which there was little survey information available if there was a sense that significant cultural resources were present and in areas unfamiliar to the experts if there was data to suggest the presence of significant resources.

Planning efforts in Pima and Pinal County, Arizona, resulted in final reports and maps (Cushman 2002; Laurenzi 2012) and as such provide specific examples for much of the discussion in this section. The remaining planning units are a work in progress, and the information exists in the form of internal planning documents (geographic information data files, site/area descriptions, site condition assessment notes, land ownership maps, etc.). Expert consultations, Priority Area boundary delineations, and site condition assessments are ongoing.

The Pinal County planning effort was conducted in partnership with the Planning and Development Services Department of Pinal County as an outgrowth of their 2010 County Comprehen-

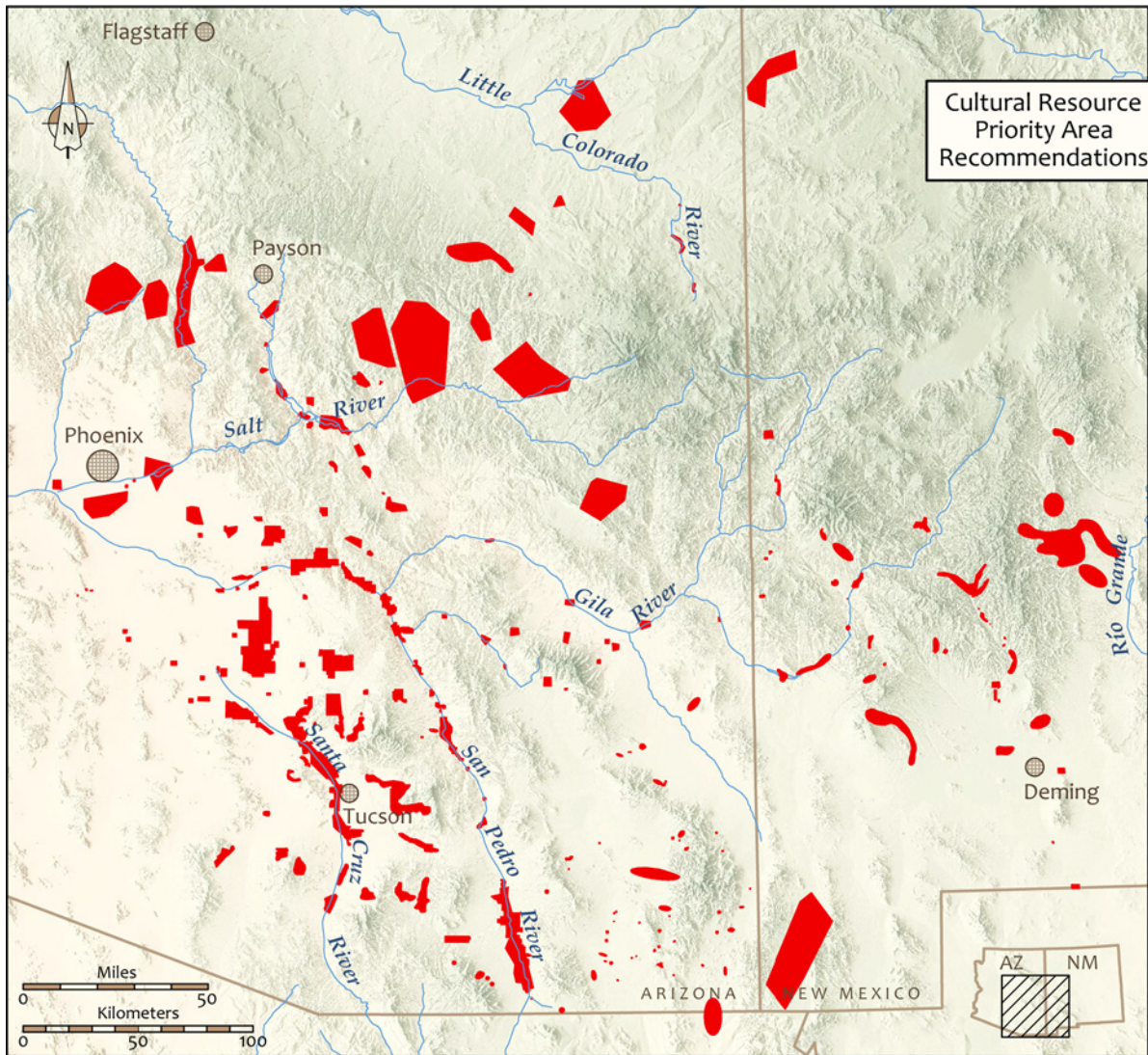


FIGURE 4. Cultural Resource Priority Areas for the current planning units within Arizona and New Mexico, based on expert meetings and site data from the Heritage Southwest databases.

sive Land Use Plan. Federal lands managed by the Bureau of Land Management and the United States Forest Service, as well as tribal lands, were excluded from consideration as these lands lie outside the jurisdiction of Pinal County. Through the initial expert workshop, a total of 28 expert-defined polygons were mapped. Eleven areas unfamiliar to the experts were also recommended for further consideration conditioned on additional site research and field investigations by Archaeology Southwest based on the mapped preservation targets.

Following the workshop, Archaeology Southwest conducted site/area visits and archival research to evaluate most of the proposed Priority Areas and areas recommended for further consideration. Ten Priority Areas were removed from consideration, as these areas had been either destroyed or severely degraded by development. An additional five Priority Areas were removed because they could not be assessed due to access restrictions and out-of-date site condition information. In several instances, expert-defined polygons were broken into separate Priority

Areas due to land fragmentation or the lack of survey data. Figure 6 illustrates how initial polygons drawn by experts were revised based on post-workshop considerations.

A significant portion (35 percent) of Pinal County land area is Arizona State Trust land, which occurs predominantly in large continuous blocks throughout the County. While all of this land is managed for highest and best use by the Arizona State Land Department, much of it has been and continues to be used for livestock grazing. In general, this use has not significantly impacted archaeological remains. State law requires consideration of historic resources for any lease or sale which has resulted in numerous small clearance surveys, and in the south-central part of the County, the University of Arizona and Pima Community College have undertaken extensive surveys on state trust land (Fish et al. 1993; Hewitt and Johnson 1979). The significant amount of detailed survey information, the extent of state trust land with extensive archaeological remains, and the relatively intact physical environment allow for several

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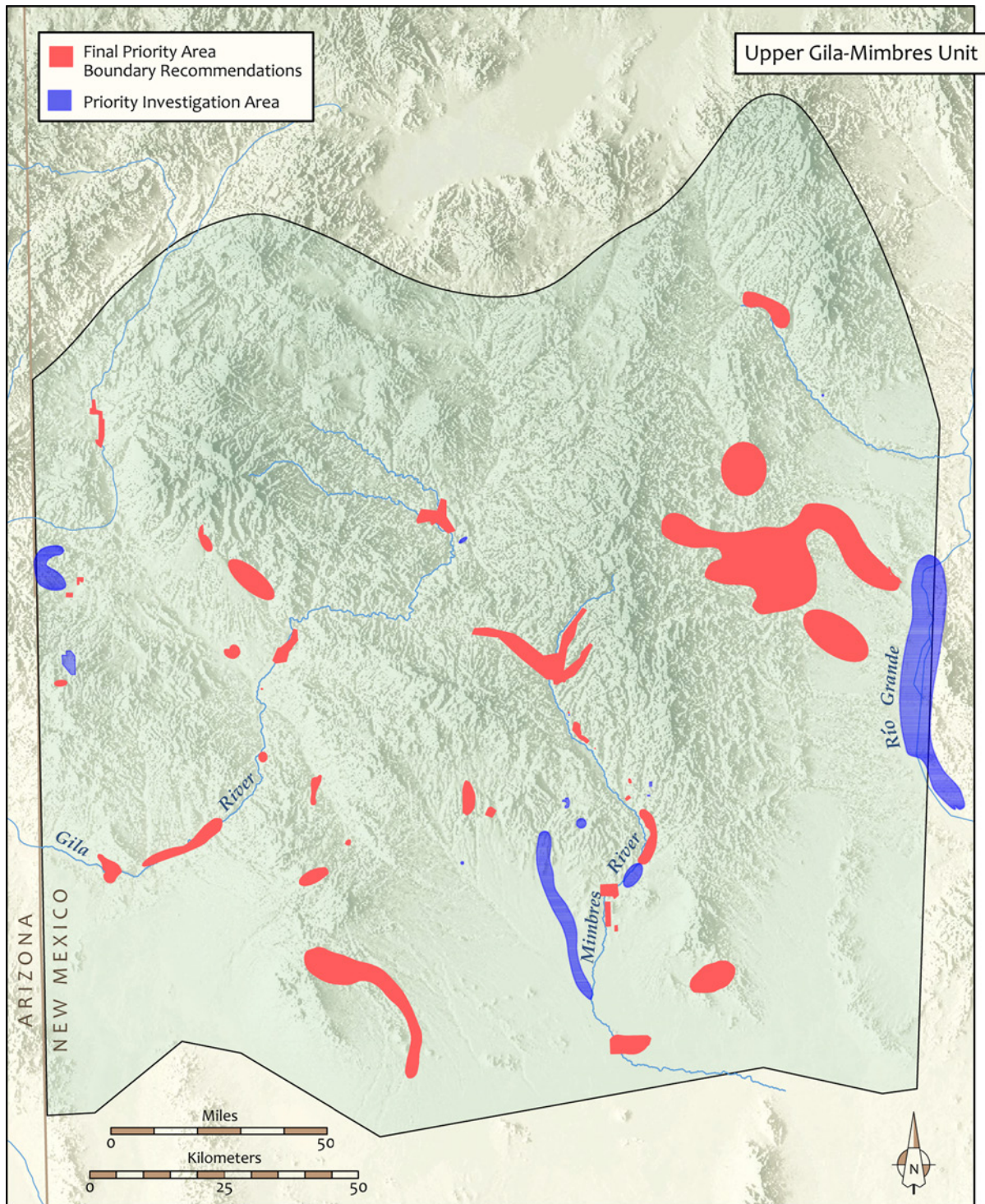


FIGURE 5. Expert-defined Priority Investigation Areas in the Upper Gila and Mimbres River Valleys.

landscape-scale preservation opportunities that include most of an entire mountain range or long continuous segments of river corridors. In these instances, the richness of the known archaeological record, including less visible sites such as lithic scatters and small petroglyph sites, along with the potential for undiscovered subsurface remains, provide even greater preservation opportunities.

Similarly, in the Upper Gila, Mimbres Valley, and eastern Black Range of New Mexico there has been good survey coverage due in part to the work of the Mimbres Foundation in the 1970s and other researchers working in academic settings (e.g., Blake et al. 1986; Fitting 1972; Lekson 1978, 1989; Nelson 1984, 1999). A number of large-scale cultural resource management activities associated with water development projects were proposed in

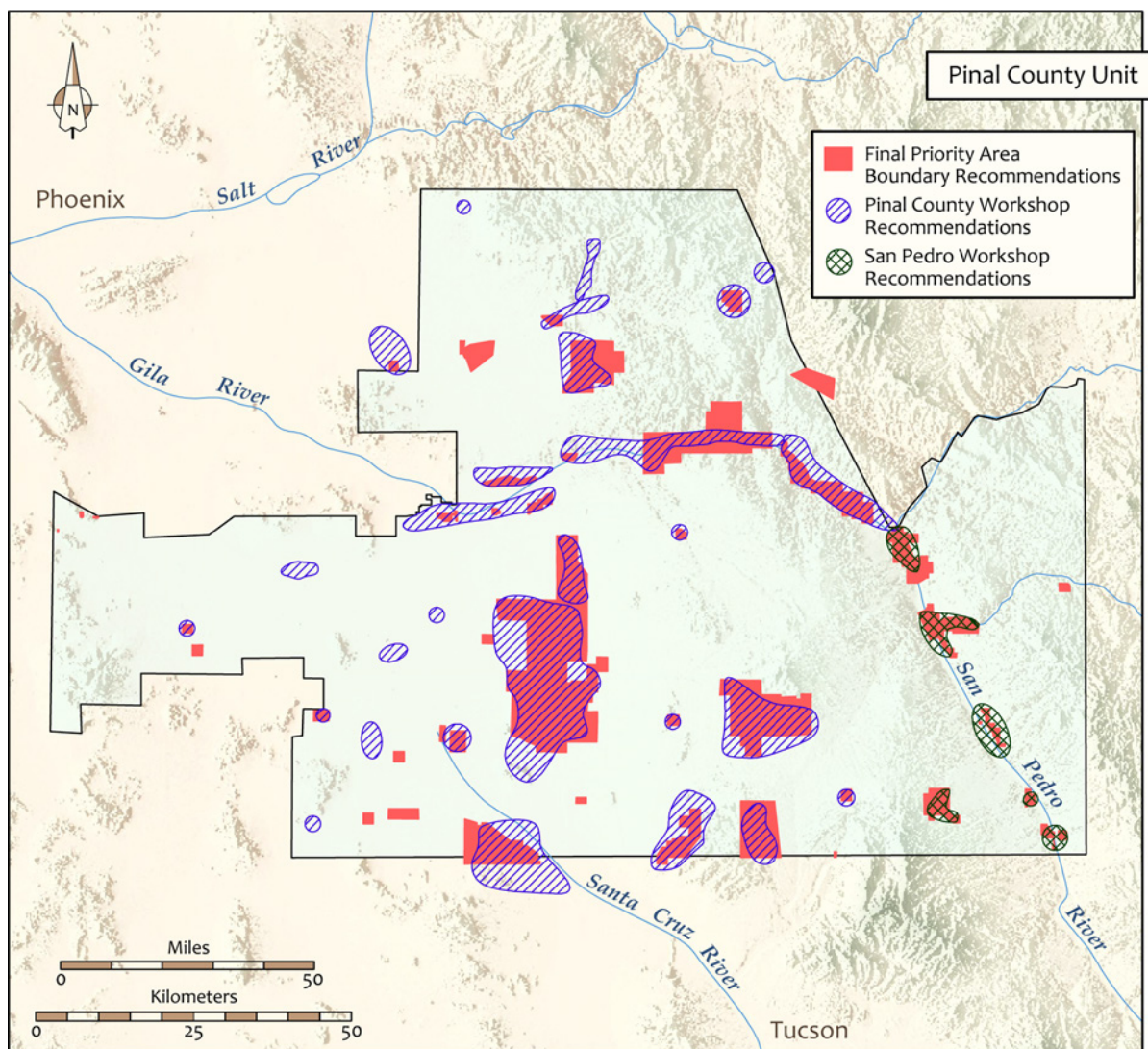


FIGURE 6. Expert-defined polygons and final Priority Area boundary recommendations following a review of available area survey information and site visits for Pinal County, Arizona.

the 1980s, and a significant amount of inventory survey was conducted on state and federal lands (e.g., Chapman et al. 1985; Laumbach and Kirkpatrick 1983). A number of landscape-scale Priority Areas have been identified in this area as well.

The amount of available data described above stands in contrast to other parts of southeast Arizona and extreme southwest New Mexico, where private land is extensive and fewer large surveys have occurred. As a result, very little detailed information exists. In these areas, many of the Priority Areas are defined by individual preservation targets and information is insufficient to identify site complexes, let alone landscape-scale preservation opportunities.

In some instances, Priority Areas were based not on the documented presence of particular kinds of sites, but rather on the presence of landforms or features that suggest where important sites are likely to be found in the future. For example, across much of the sub-Mogollon region, Paleoindian sites are

primarily restricted to isolated occurrences of Clovis or Folsom points (Mabry 1998), which, in the absence of other cultural remains, do not merit inclusion as Priority Areas. However, one notable exception to this pattern is the Upper San Pedro River basin, where a number of Paleoindian sites with intact remains have been documented (e.g., Murray Springs National Historic Landmark [Haynes and Huckell 2007] and Lehner Mammoth Kill Site National Historic Landmark [Haurly 1959]). Many Clovis period sites are associated with a specific and widespread geological stratum characteristic of the late Pleistocene known as the "black mat." Thus, in the San Pedro watershed planning unit, Priority Areas were defined based both on the known areas containing intact Paleoindian remains and on occurrences of the "black mat" as areas of high potential for encountering important sites through future investigations (Haynes 2008). Similarly, a number of Priority Area boundaries were drawn to include portions of the Holocene floodplain that research has shown to include a long association with sites likely to contain Early Agricultural components (ca. 2100 B.C.–A.D. 50) beneath

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younger remains (Nials et al. 2011). In New Mexico, much less is known about the extent of Early Agricultural remains, and our expert panel suggested that we target undated aceramic pit-house sites located in the Cliff-Gila Valley as likely Early Agricultural sites. These kinds of decisions can be tailored to a specific region based on local expert knowledge and call attention to the importance of contextualizing information regionally based on expert input. Expert opinion at the early stages of planning is critical in determining the local criteria for defining focal sites. This element of the planning process may be more critical in places where the archaeological record is more ephemeral, less visible, and survey coverage less extensive.

OBSERVATIONS

Collectively, our experience has been that the Priority Area planning process was well received by the experts who participated, and, somewhat surprisingly, consensus was relatively easy to achieve. The people most familiar with a region know the important sites and, despite the lack of well-defined criteria, with potential preservation targets plotted, they were able to easily draw polygons on a map. Even in situations where these resources are not obvious to non-regional specialists, agreement on the important places was, in most cases, easily attained. The universe of Priority Areas is finite and getting to that known universe once the data is organized can be a rapid process, particularly if expert consultation is undertaken in a workshop setting. While most archaeologists continue to focus at the site level, it was not difficult for experts to conceptualize at larger geographic scales for purposes of defining Priority Areas. Further, the buy-in of experts in the planning processes contributed significantly to building relationships among the expert community.

While there are certainly new discoveries every day in the field, sites of the types used as preservation targets here are less frequently encountered as a result of cultural resource management, academic, or agency inventories. New information, however, will continue to drive the need to consider additional Priority Areas (research on Early Agricultural sites comes readily to mind), and like any planning process it is intended to be dynamic to capture new information as it evolves. The important consideration is that once an initial planning foundation is developed, future changes are unlikely to be extensive. Thus, an exciting element of this kind of planning is the degree to which we can successfully define the nature of that finite universe based on current information.

The significance of expert opinion cannot be overstated. It is the key to connecting the dots, so to speak—the highly visible sites that enable the initial expert-defined polygons to have meaning in a cultural sense. The information is often “fragile,” as the knowledge resides solely with the expert, a significant amount of which is not formally recorded. Not unlike cultural resources, once this information is gone, it may be gone forever. Thus, another important dimension of these planning exercises is the documentation of knowledge. We have also found that the expert workshops organized for priority planning efforts have created productive environments for land managers and researchers to share ideas and improve communication regarding the value and state of knowledge on specific resources or

kinds of resources. In the future, we hope to develop a standing committee of land managers and archaeologists for each planning unit to coordinate and achieve management goals throughout that planning area, as well as to continually update Priority Area designations.

Another key element of the planning efforts was geospatial data compiled by Archaeology Southwest or other experts (Doelle 1995, 2000; Hegmon et al. 2008; Hill et al. 2012; Mabry 1998; Thiel 1995). While NMCRIS and AZSITE computerized databases perform valuable roles, the uneven quality of the source data and the lack of consistent recording of key site attributes are limiting. For example, it is not currently possible to reliably select records based on criteria related to specific site features such as room counts, numbers of petroglyphs, or even public architecture. The HSW databases are research tools designed specifically to account for features of academic interest and to systematically record the presence of these and other specific kinds of site features or characteristics. The existence of these research databases serves to significantly reduce what would otherwise be exhaustive data processing requirements. As such, we were able to use NMCRIS and AZSITE data to supplement the HSW databases with recently recorded information or, in some instances, sites that were overlooked, or to more fully populate expert-defined polygons and surrounding areas with all known information enabling us to better define site complexes/settlement clusters. At least half of the Priority Areas in a Planning Unit are site complexes/settlement clusters.

The planning work we describe here was undertaken initially with a specific goal in mind to define important places to target private and public site protection activities. To that end, it serves us well by identifying spatially explicit areas that in general guide our day-to-day protection activities. In the San Pedro river valley in Pinal County, we identified nine Priority Areas that included 186 individual land parcels. Twenty of these 186 parcels contained preservation targets. A further analysis of the landowner status of these 20 individual land parcels revealed that six parcels were in public ownership (i.e., tribal lands, federal lands, and lands managed by the state of Arizona), which provided cultural resources with protection under federal and state preservation laws. Six of the remaining 14 parcels were owned by private entities for land conservation purposes (i.e., The Nature Conservancy, local land trusts) or were held as mitigation lands and managed by the private land owner expressly for conservation purposes. The remaining eight private parcels (owned by individuals, family ranch corporations, and mining interests) were the cultural resources most vulnerable to loss. From an initial list of 186 parcels, eight distinct parcels owned by six landowners are the focus of our site protection activity in this area. In 2011, we acquired one of the eight target parcels (Figure 7). Given our limited resources, this is the essence of priority setting.

Importantly, it has become clear that the utility of identifying spatially explicit Priority Areas extends into other spheres. In addition to our own internal protection efforts and those of other cultural resource preservation organizations, many local governments engage in the systematic identification of natural open spaces for preservation purposes, and this information can inform these kinds of planning efforts, providing synergy in conservation investments by local governments and land trusts (Figure 8). Similarly this information can be used to help build



FIGURE 7. An aerial view of the eight-acre Redington ball court site located within the Redington Cultural Resource Priority Area, Pima County, Arizona. This site was acquired in 2011 by Archaeology Southwest.

a stronger case for federal land acquisition in certain areas or to provide a stronger justification for new preservation designations, such as National Monuments, National Conservation Areas, or administrative designations such as BLM's Areas of Critical Environmental Concern. Of particular note within the context of open space conservation is that Priority Area planning moves beyond site-level considerations and begins to elucidate landscape-level perspectives on cultural resources. The trend in land conservation is towards understanding and conserving biological resources within a landscape context (Mörtberg et al. 2007). Priority Area planning enables cultural resource preservation interests to engage more fully in these initiatives.

As an additional example, Pima County's Sonoran Desert Conservation Plan achieves cultural resource protection of individual sites as well as larger landscapes. The planning process began in 1998, and the plan was adopted as county policy in 2001. Using voter-approved Historic Preservation bond funds, Pima County was able to purchase all or portions of four Hohokam ball court villages within the Tucson metropolitan area. Five other major historic properties and several smaller ones have also been

purchased. In one case in which a key historic ranch complex in a Tucson suburb was threatened by development, the fact that the property had been designated as a Priority Area played a critical role in moving both citizens and the local government to support, and ultimately achieve, protection.

The Priority Area planning process provides a blueprint to engage proactively in preservation. As beneficial as the Section 106 process has been in archaeological resource preservation, the process is project driven and, as such, largely reactive. By law, its principal focus is on preserving the information content of individual archaeological sites. The importance of individual archaeological sites in the United States is typically defined by the application of National Register of Historic Places eligibility Criterion D. As Sebastian (2009:99) notes, although such considerations offer a perspective on the value of a site or the kinds of information it may provide, none of these criteria lend themselves to an easy "pass-fail" of the eligibility test. In practice, such a binary eligibility assessment process leads to the current situation in which archaeologists tend to define the vast majority of sites as eligible. When almost every site is defined

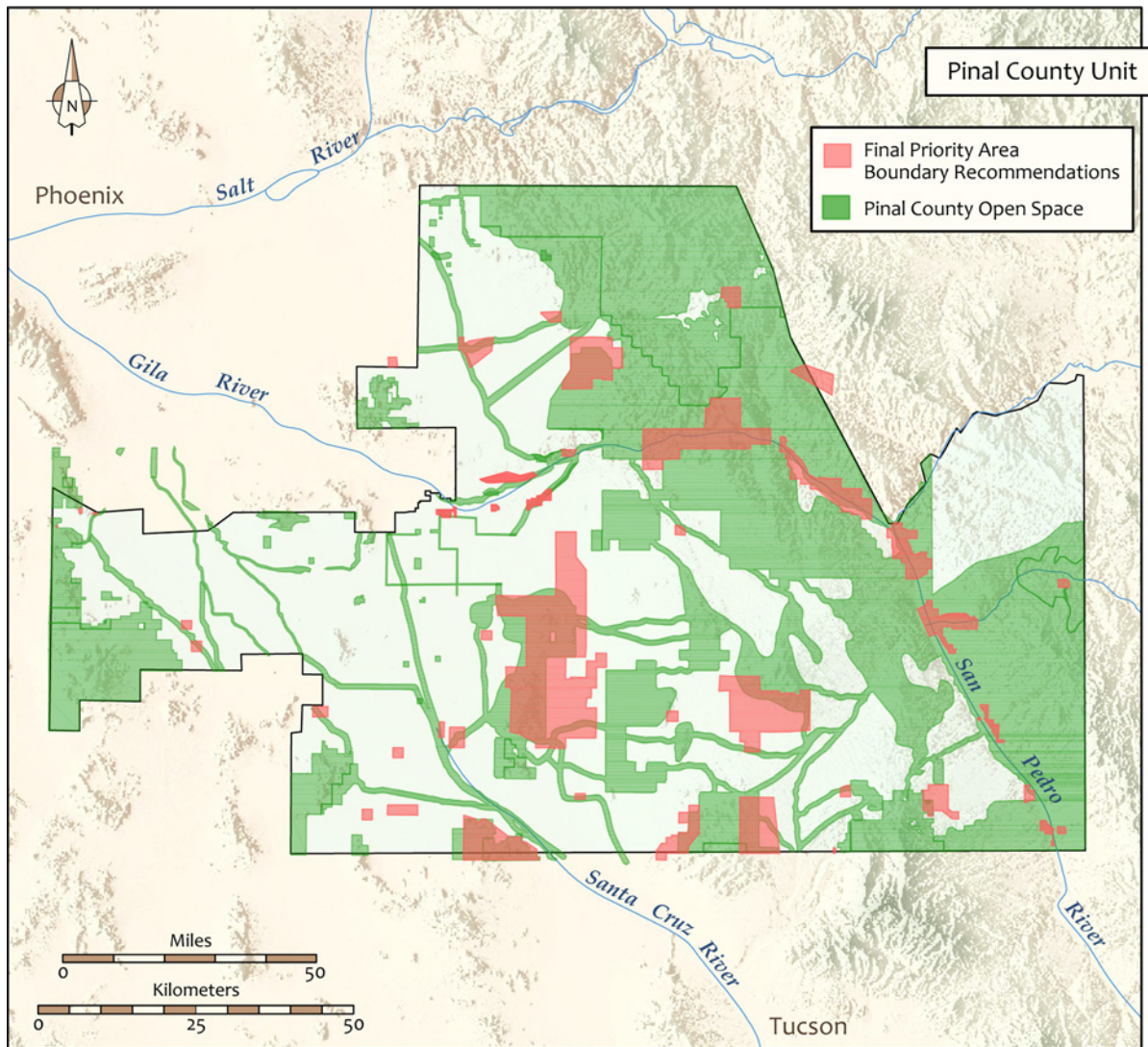


FIGURE 8. A comparison of final Pinal County Natural Open Space recommendations and Cultural Resource Priority Areas for Pinal County, Arizona.

as eligible and significant without any further classification (see Sebastian 2009), we are left with very little guidance for how best to allocate limited money and resources in an effort to address preservation more broadly.

The priority planning process described here is not meant to replace assessments of site eligibility and significance, or the requisite Class II or Class III field inventories, but instead to provide an added layer of regionally contextualized, spatially explicit information to assist decision-makers, tribal interests, and other preservation advocates. Through the workshops and interviews described above, we ask experts to make determinations on important places, which they do using similar criteria to those mandated by law: scientific value, integrity, representativeness, and rarity. In addition, and more importantly, we ask them to think beyond single sites (regardless of their significance) to consider larger zones that include a broad array of site types related in terms of space, time period, and function. In some areas, due to the level of survey information available and land ownership, large unfragmented natural landscapes can support

a rich array of cultural resources and represent landscape-scale preservation opportunities beyond that of the site or site complex. Thus, Priority Area identification helps us to contextualize the record of a given area as a whole, based on current knowledge at a scale not typically possible through independent site-level assessments.

This broader perspective has significant value for informing the early planning phases of large-scale projects, most notably linear facilities (e.g. energy transmission corridors, highways, pipelines, etc.), as well as large-scale energy development projects on public lands, such as solar arrays, wind farms, and oil and gas drilling. This is not unlike the kinds of information on natural resources (e.g., locations of wetlands, endangered species habitat, etc.) already used in the early stages of project development by planners at the state and federal levels. In many instances, cultural resource information is not fully integrated in these early planning phases of the projects. As an example, Figure 9 displays the various alternative transmission corridor alignments of the proposed Sunzia Southwest Transmission Line Project (BLM

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2013), including the preferred transmission corridor alignment, in relation to Priority Areas we have identified. While the Draft Environmental Statement is unclear on how the information was used in decision-making, Figure 9 illustrates how route design and selection can be better informed at low cost by supplementing the typical cataloguing of listed or potentially eligible National Register sites within some threshold distance of the alignment. Because many of the Priority Areas function as cultural resource hotspots, in some instances they can help inform the selection of Class II survey areas that help guide detailed project planning. Again, cultural resource Priority Area planning allows us to develop a perspective on the cultural landscape that moves away from site-level assessments made after impact areas are determined, which tend to reduce opportunities for in situ preservation and often lead to gerrymandering a project to avoid sites without reference to any larger context (Barker 2009). These benefits are further enhanced when used in conjunction with regional-scale, predictive location models.

Priority Area planning can have the added benefit of widening the discussion on resource management to meet a broader range of values. A number of professionals (Sebastian and Lipe 2009) have consistently raised the point that the work of archaeologists should be to serve the public interest, which includes preservation of resources in support of a broad range of values beyond the value of information content ascribed by archaeologists. While our work was similarly focused on information content as the principal criterion delineating Priority Areas, many of the areas are also traditional cultural properties and provide physical validation/verification of tribal histories that provide meaning and a strong emotional relationship between the Native people and their cultural landscapes. We argue that the process described here with, appropriate engagement and support of descendant communities, can easily include Priority Area selection criteria that accommodate these broader ranges of values.

The American Southwest is notable for the quantity and quality of the archaeological record due in large part to the permanence of architectural features and other cultural remains, the arid environment, and extensive amount of non-private land. The question that most readily comes to mind is why is priority planning not a well-accepted preservation planning tool? Given the availability of information, the extent of our knowledge about the past, and the availability of data processing tools, it has become clear that, with a modicum of effort and resources, many important places, archaeologically speaking, can be made spatially explicit. More work needs to be done informing the process and debating the approach taken, but ideally priority planning can be extended to the entire Southwest and other areas across the U.S. and perhaps beyond through the inclusion of expert opinion and the involvement of a broad range of stakeholders in defining and contextualizing importance. Our hope is that these planning exercises can bring more focused thinking to bear on the larger-scale questions of in situ site protection and preservation. Although management efforts are often focused on individual sites, the archaeological record needs to be understood in a regional context. We rarely have the opportunity to explicitly assess the long-term, cumulative effects of multiple development actions on the archaeological record of an entire region through time. Synthesizing and organizing data and expert opinion at regional scales provides an opportunity for us to talk with stakeholders and policy makers

about the challenges of managing and protecting archaeological landscapes. The Priority Area planning approach is only one tool in the preservation toolbox, but we argue that it is certainly time to put it to use.

Acknowledgments

We would like to thank the expert consultants (see appendix) who dedicated their time and mental energy toward the Priority Planning exercises described here. We would not have been able to do this without them. We would also like to thank David Cushman with the SRI Foundation for reviewing the manuscript and providing early intellectual capital on Priority Cultural Resources. Catherine Gilman prepared the maps presented here, and John Hooper translated the Spanish abstract.

Data Availability Statement

All Priority Area and Priority Investigation Area shapefiles for Geographic Information Systems are available from Archaeology Southwest upon request. Please submit your requests to andy@archaeologysouthwest.org. The site data in the Heritage Southwest Database are available from Archaeology Southwest through a formal user agreement available online (<http://www.archaeologysouthwest.org/hswdb>). This user agreement asks users to agree to keep locational information confidential and also asks that they collaborate with or cite researchers responsible for any specific datasets they choose to use. Qualified users will include academic researchers, archaeologists within contract firms, and independent researchers with access to databases such as AZSITE (Arizona database for site information) and/or ARMS (New Mexico database for site information), which also contain sensitive site locational information.

APPENDIX: CULTURAL RESOURCES PRIORITY AREA PLANNING EXPERT CONSULTANTS

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Larry Benallie, Gila River Indian Community
Jacob Butler, Salt River Pima Maricopa Indian Community
Roberta Carlos, Salt River Pima Maricopa Indian Community
Jeff Clark, Archaeology Southwest
Doug Craig, Northland Research
Darrell Creel, University of Texas
William Doelle, Archaeology Southwest
Mark Elson, Desert Archaeology, Inc.
Paul Fish, University of Arizona
Suzanne Fish, University of Arizona
Michelle Hegmon, Arizona State University
Kathy Henderson, Desert Archaeology, Inc.
Angela Garcia Lewis, Salt River Pima Maricopa Indian Community
Patricia Gilman, University of Oklahoma
Carol Griffith, Arizona State Parks, State Historic Preservation Office
Karen Gust Schollmeyer, Arizona State University
Joseph Joaquin, Tohono O'Odham Nation
Karl Laumbach, Human Systems Research

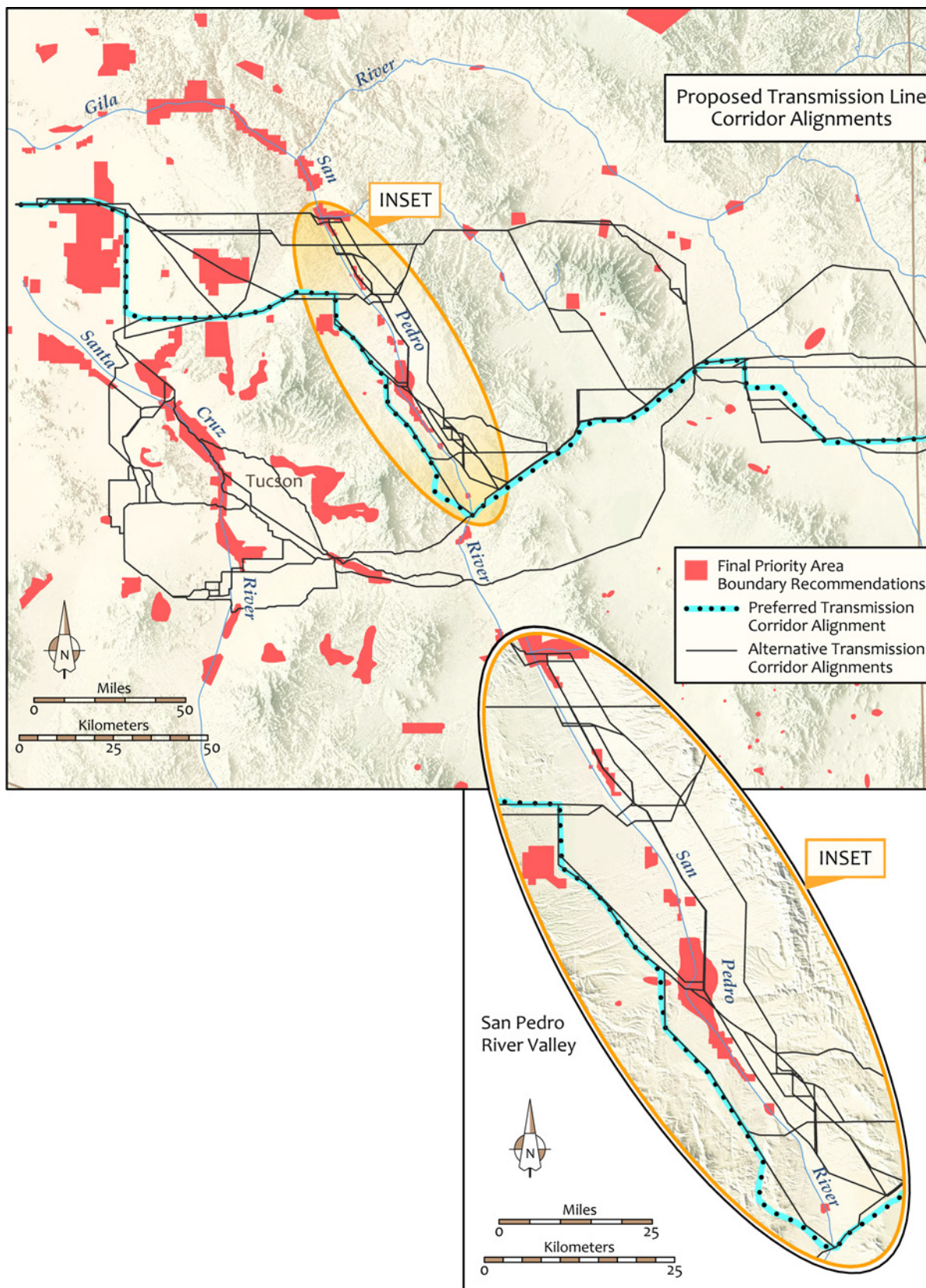


FIGURE 9. Cultural Resource Priority Areas and Sunzia Southwest Transmission Line Project Proposed Alignment Corridors.

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Steve Lekson, University of Colorado Boulder
 Barnaby Lewis, Gila River Indian Community
 Patrick Lyons, Arizona State Museum
 Margaret Nelson, Arizona State University
 Anna Neuzil, Eco Plan Associates, Inc.
 Glen Rice, Rio Salado Archaeology
 John Roney, Colinas Cultural Resources Consulting
 Steve Ross, Arizona State Land Department
 Jerrod Stabley, Pinal County
 Amy Sobeich, Bureau of Land Management
 Peter Steere, Tohono O'Odham Nation
 Matthew Taliaferro, Gila National Forest
 Kent Taylor, Pinal County
 Semana Thompson, Gila River Indian Community
 Elizabeth Toney, Gila National Forest
 Chris Turnbow, New Mexico Gas Company
 William Walker, New Mexico State University
 Henry Wallace, Desert Archeology, Inc.
 David Wilcox, Museum of Northern Arizona
 Scott Wood, Tonto National Forest
 Tom Wright, Salt River Pima Maricopa Indian Community

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Notes

1. Sub-Mogollon Arizona includes those portions of Arizona and New Mexico that lie south of the Mogollon Rim, an escarpment defining the southern edge of the Colorado Plateau.
2. Cultural resources are defined here as any location of human activity, occupation, or use identifiable through field inventory, historical documentation, or oral evidence that is older than 50 years. The term includes archaeological, historic, or architectural sites, landscapes, buildings, structures, objects, and places that possess historical and/or cultural significance, as well as places with important public and scientific uses, and may include definite locations of traditional cultural or religious importance to specific cultural groups.
3. We use the term “site protection” to describe actions that provide long-term, in situ conservation of sites or areas. “Preservation” is intended to include a broad array of activities related to research, education and outreach, materials curation, and in situ conservation of sites and areas.
4. AZSITE serves as a consolidated geospatial database of recorded cultural resources, including prehistoric and historic sites and properties and projects within the state of Arizona and a 40-mile buffer around the state that is maintained by the Arizona State Museum.
5. New Mexico planning efforts have relied on NMCRIIS, which provides tabular and geospatial information to qualified users regarding cultural resources investigations, archaeological sites, historic structures, and state and national register properties within the state of New Mexico and is maintained by the Archaeological Records Management System for the State of New Mexico.
6. Remote interviews were conducted using web-based platforms to display spatial information.
7. Pima County employed a quantitative ranking process as means to determine relative importance among sites. However, upon reflection, many of the ranks assigned were quite subjective and, in some instances, arbitrary and this technique was not employed in subsequent planning efforts.
8. Sites included within the Arizona or New Mexico Regional Site Steward Monitoring network were not revisited to assess current condition. Our assumptions were that if the site merited inclusion within the monitoring network, it was present and at least in fair condition. Some of the experts also had recent firsthand knowledge of the high visibility sites in the Priority Area, negating the need for us to arrange for site condition assessment.

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