WILDLAND FIRE
CULTURAL RESOURCES MANAGEMENT PLAN
FOR ROCKY MOUNTAIN NATIONAL PARK

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Introduction

The following report presents initial efforts to develop a cultural resources component of the Rocky Mountain National Park (RMNP) Fire Management Plan. In late summer, 2009, Dr. Robert Brunswig, Director of the University of Northern Colorado's Center for Engaged Research & Civic Action (CERCA), was contracted to work with Park professional staff to plan and conduct a Fire Management Workshop with Park and non-Park experts in fire management and cultural resources from the Park, the National Park Service's Intermountain Agency regional office, other state and federal agencies and universities, Native American tribes, and private cultural resource management (CRM) contractors. That workshop, titled "Developing Strategies for Managing Fire Effects on Cultural Resources at RMNP", took place on November 18 and 19, 2009, at the Estes Park Stanley Hotel. Results of the workshop were reported to RMNP in a workshop summary document (Brunswig, Butler, and Diggs 2009) in December, 2009. Results from that workshop as well as input from this report's authors are integrated into the content of following sections.

The RMNP fire management plan project is driven by a National Park Service (NPS) mandate that cultural resource protection, preservation and research needs of national park and monument units must be identified as part of each unit's overall fire management plans. That mandate is clearly spelled out in the NPS Fire Management Reference Manual (NPS-18, 2008) (Chapter 18, Section 3 Research and Management Plans, page 2):

> "Fire management and natural and cultural resources staff must work together to ensure that fire research needs are clearly identified and included in park resource management and fire management plans. In particular, research identified in cultural and natural resource management plans that are needed to implement or refine the fire management program must be included in the fire management plan. The plan should also identify any research needed to implement fire management objectives that are not included in resource management plans. Key questions that these plans should address are:
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> • What fire-related information is lacking or the depth of knowledge is shallow that additional research will provide direction or support for management decisions?
>
> • How will the park staff integrate past and current research into its decision making process?
>
> • What do park staff and other experts think are the priority research needs relating to fire and what are the weighting factors that influence these priorities?
>
> • How do the priority research needs relate to current or past studies within either the park or the eco-region?

• How can the park staff leverage current and future research with adjacent and regional landowners and institutions to strengthen these studies?"

Outcomes of the Developing Strategies… Workshop

The "Developing Strategies for Managing Fire Effects on Cultural Resources at RMNP " workshop took place at the Stanley Hotel over two days, November 18 and 19. Participants were invited from Rocky Mountain National Park, the National Park Service Intermountain Region Office in Denver, the Arapahoe-Roosevelt National Forest (U.S. Forest Service), Bureau of Land Management field offices in Kremmling and Montrose, the National Trust, the Colorado State Historic Preservation Office (SHPO), RMC Consultants (a private cultural resource company under NPS contract), the Northern Ute Tribe, Colorado State University, and the University of Northern Colorado. Thirty-five experts in fire management, cultural resources, climate change, and Geographic Information Systems attended the workshop (see workshop attendees listing, Appendix A),

Prior to the conference, a packet of materials related to RMNP fire management policy, cultural resources, climate change, GIS Fire Management systems and software, and a working glossary of terms was mailed to each workshop participant. Three expected workshop attendees were unable to attend due to illness or family emergencies. The workshop began at 9 AM on Wednesday, November 18th, with background presentations on: 1) current fire management strategies and protocols in the park, 2) cultural resource information, processes, and recognition and classification of those resources, past, present, 3) anticipated (future) climate change parameters and their relationship to present and potential (future) fire ecology and fire risk conditions, and 4) current and evolving roles of Geographic Information Systems in NPS fire management decision-making protocols. From 2-5 PM on the 18th of November, workshop participants were divided into five work groups. Workgroup memberships were designed to represent a balance of varied professions and experience so that recommendations for cultural resource based-fire management Standard Operating Procedures (SOPs) could be considered from a multiple perspectives. A Cultural Resource Elements (CRE) protocols matrix for fire management from the National Park Service Southeast Region was provided to each work group as a guide for thinking systematically about variables associated with prospective SOPs for the park. In most cases, the groups utilized the matrix as an informational guide, not as a strict mechanism, for discussing interactive fire management-cultural elements and arriving at protocol recommendations. Work group talking points and recommendations were sketched out on tripod-mounted note pads and entered into notebook computers as discussions advanced.

On the second day, the workshop's five working groups organized their conclusions and recommendations and presented them in open session. The session included general discussion and question and answer (Q&A) periods after each group's presentation. The afternoon session consisted of a final open discussion of all workshop

participants in order to create a general summary of workshop recommendations by topic area. Those recommendations are summarized in Table 1 below.

Table 1. RMNP Fire Planning Workshop Topical Recommendations

Develop a Cross Training Video Tour on Fire Management and Cultural Resources	Establish Formal and Regular Cultural Resource Advisory Training for Fire Management Leaders and Staff at RMNP
Complete an RMNP Fire Plan Update for Cultural Resources in the Immediate Future and a Long-term Process for Annually Updating and Improving Cultural Resource Fire Protocols	Identify the Top 10/20 Sites for Future Fuel Reduction Actions
Establish Priorities for Fire/Cultural Resources Research Needs for Funding	Obtain Summer Cultural Resource Assistance in the Form of Seasonal Employees or Interns for RMNP Cultural Resource Coordinator
Develop Public Education Programming About CR/Fire Management Rationales	Formulate Clear and Simplified Protocols for Fire Management related to the Park's Cultural Resources
Develop the Action Matrix- Planned/Unplanned	Begin the Process of Updating and Reformatting RMNP GIS Data Layers, particularly the archeological/historical layer, to Provide Greater Efficiency and Detail Needed to Identify High Priority Cultural Resources within the Park
Coordinate GIS – Fire Managers	Prioritization, Threat, Sensitivity, Parameters
Develop Interpreter Materials and Training which Address the Interrelated Components of Fire Management and Protection and Stewardship of Cultural Resources	Connect RMNP Law Enforcement more closely with Cultural Resource Management and Provide Training on the Nature and Location of Important Park Cultural Resources
Add a Cultural Resources Section to Each RMNP End-of-Year Fire Review	Insure and Enhance Regular Native American Collaboration on Cultural Resources and RMNP Fire Policy and Actions
Maintain and Enhance Federal Land Management Inter-Agency Cooperation/Collaboration Related to RMNP Fire Management and Cultural Resources Policies and Procedures	Encourage and Develop CESU Inter-Agency and Academic Partner Institution Research Planning and Project Development to Support Cultural Resource/Fire Management/Climate/Ecosystem Change Effects into Future Planning and Actions-Get Ahead of the Curve

Subsequent sections of this report address the authors' recommendations for NPS procedures for protecting cultural resources during wild-land fires, recommendations based on feedback from the November workshop, consultation with RMNP professional staff, analysis of current programs and processes employed by NPS regions and units in the Rocky Mountain and elsewhere in the country, and the extensive professional background and experience of the authors in cultural resources, GIS, and RMNP in particular.

Current Status of the RMNP Fire Management Plan as Related to Park Cultural Resources

The present RMNP Fire Management Plan, posted on the park's web site (http://www.nps.gov/romo/parkmgmt/fire_mgmt_plan.htm ; RMNP 2004), succinctly and broadly describes classes and types of cultural resources which need to be protected during proactive (fuel reduction, prescribed burns, etc.) and reactive fire (fire-fighting) management activities and briefly goes into recommendations about what avoidance and mitigation measures should be taken:

> "The cultural resources that need to be protected and/or avoided (whether or not they have been previously recorded) in each FMU include wickiups, log cabin remains, standing structures, cairns and rock walls, rock shelters, culturally peeled trees, traditional cultural properties such as vision quests, or other cultural resources that may be affected by fire or mechanical treatment activities. Mechanical treatment includes fire camps, helicopter landing pads, fire lines, and staging areas. Because isolated finds are considered not eligible for inclusion on the National Register of Historic Places, they will not be protected during fire management project implementation, and none are listed below. No surveys have been conducted in Paradise Park (West Divide FMU), and several other areas have seen few and limited area surveys. The cultural resources as known in the fall of 2003 are listed below under each FMU. Although not subject to damage by fires, prehistoric sites can be impacted by mechanical treatments. Sites for specific avoidance are cairns, game drives, and vision quest structures in the tundra, which are not listed in this plan." (RMNP 2004: 10-11).

> "Prehistoric Archaeological Sites. Prehistoric and protohistoric cultural material found in the park includes flaked lithics, ceramics, hearths, rock walls/game drives/kill sites, butchering stations, camp sites and midden deposits, tipi rings, wickiups, culturally peeled trees, rock cairns, and battle sites (Butler 1997 *Rocky Mountain National Park Research Design for Archeology)*. Although it is generally believed that most prehistoric, and some protohistoric cultural material has been subjected to the effects of wildland fire in the past, certain cultural resources may be adversely affected by fire. These resources include fire hearths with datable (C14) charcoal, buried midden deposits with organic material, wood wickiups, and culturally peeled trees. Mitigation measures to protect these cultural resources include removing fuel from interior and site perimeters, and effectively removing these resources from proposed project areas by constructing hand line, wet line, or installing physical barriers such as fire shelters. These cultural resources should not be exposed to prescribed or wildland fire."

> Historic Archaeological Sites. The historic era in RMNP ranges from the later half of the 19th Century through the middle of the 20th Century.

> Historic-era cultural material found in the park is generally associated with mining, ranching, and tourism. American Indian sites from the historic-era are also present in the park. Historic-era cultural material found in the park includes wood and rock structural remains (both Euro-American and American Indian), travel ways including roads and trails, artifact scatters including metal, glass, brick, and ceramics, hearths and temporary camps, cabin platforms, blazed trees, fence materials, telephone lines, burials and memorials, and landscaped vegetation and rock work. Artifact types that may be adversely affected by fire include wood structural remains, features, and artifacts, hearths that may contain datable charcoal, blazed trees and fence material, burials, and landscaped or planted vegetation. Mitigation measures to protect these cultural resources include removing fuel from interior and site perimeters, and effectively removing these resources from proposed project areas by constructing hand line, wet line, or installing physical barriers such as fire shelters. These cultural resources should not be exposed to prescribed or wildland fire.
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> Traditional Cultural Properties. Traditional Cultural Properties (TCPs) are specific physical locations that have a history of use by an identified cultural group. In RMNP, TCPs are associated with American Indian tribes. TCPs are generally located to include an important viewshed or natural resources that are essential to a cultural or religious ceremony. TCPs are considered sensitive sites, and may be adversely affected by fire. Mitigation measures to protect these cultural resources include effectively removing these resources from proposed project areas by constructing hand line, wet line, or installing physical barriers such as fire shelters. These cultural resources should not be exposed to prescribed or wildland fire, except where requested by the users of the TCP to benefit resources (for example, burning to stimulate new growth of a specific plant species).
> Isolated finds. Isolated finds are defined as less than ten artifacts in a 100 square meter area suggesting a single function. Included are such items as certain hearths, cairns, and modern wickiups – all common finds in RMNP. By definition, isolated finds are not eligible for inclusion to the National Register of Historic Places. The park archaeologist may suggest that the park manage certain isolated finds for protection. Mitigation measures may include any of those suggested for historic or prehistoric cultural resources, above." (RMNP 2004: 134-135)

This report, based on current park and National Park System (NPS) fire policy and practices, valuable input from the November workshop, and drawing on past experience of the report's authors, the former park archeologist, a university archeologist who conducted the majority of archeological surveys and inventories in the park's history, and a Geographic Information System [GIS] professor with considerable park experience), substantially advances the knowledge base and rationales for enhancing the cultural resources component of the current RMNP fire management plan. The report

also proposes a long-term program of continued development and enhancement of protocols and research agendas for protecting and further identifying cultural resources in the park, subject to destruction or degradation due to wild-land fires and fire suppression activities.

Legal, Policy, and Practice Considerations Associated with a Cultural Resource Component of the RMNP Fire Management Plan

Hazardous fuel reduction programs are planned activities and cultural resource surveys which identify archeological sites conducted before any prescribed fire, per standard Cultural Resource Management (CRM) requirements. As a result, protocols for dealing with cultural resource in areas planned for fuel reduction are well-established in the National Park Service and other federal agencies. As such, they are not discussed further. A fundamental principle in wildland fire management is that there are no prehistoric sites or wooden structures worth risking human lives. It is a desirable outcome if a site or structure can be saved from a fire without endangerment to fire-fighters, but if not, they must be allowed to burn. This principle is succinctly stated in the NPS Fire Management Reference Manual NPS-18, page 2:

> "Protection priorities are first, human life, and second, property and natural and cultural resources. Once people have been committed to an incident, they become the highest value to protect. If it becomes necessary to prioritize between property and natural or cultural resources, the decision must be based on the relative values to be protected commensurate with fire management costs."

The 2009 fire management workshop resulted in several suggestions for assisting the park Fire Management Officer (FMO) in making decisions about the treatment of archeological resources, including simplified maps, open databases, databases edited for some content, etc. However, those recommendations are subject to a lack of legal mechanism or authority for *delegating cultural resource management or any such decision making authority to non-archaeologists* (see NHPA as amended; AHPA of 1974; ARPA as amended [2006]), Section 112 (a), Section 106, 36CFR800; and NPS 28). Giving the FMO such authority would abrogate ROMO CRM responsibilities and open the NPS up to law suits for failure to comply with federal legislation and policies. Also, it is inappropriate to place FMOs in the position of having to make decisions for which they are not qualified nor authorized to make.

Conditions, Resources, and Considerations Related to Cultural Resource Protection and Management and the RMNP Fire Management Plan

For the past several years, the park has been involved in an active hazardous fuel reduction program around all structures, along the park boundary (i.e., Wildland-Urban Interface or WUI) and elsewhere within the park. Most standing structures of historical relevance have been subjected to forest thinning and removal of ladder fuels in their immediate vicinities. Standing structures not subject to a park cultural resource fire

management plan would be those currently in use by the NPS. These include the park's Utility Area, Kawuneeche Entrance, Alpine Visitor Center, Mill Creek Ranger Station, Onahu/Green Mountain, Holzwarth, Betty Dick, Fall River Entrance, backcountry ranger camps, spike and ranger camps, and private in holder cabins, due to the fact they are not archeological resources but structures which have already had hazardous fuels removed and are near roads easily reached by fire trucks.

The most critical requirement for a fire management plan's cultural resources component is involvement of a qualified archeologist to review and assist in planning for surveys, condition assessments, logistic camps, fire lines, and other tasks. RMNP is fortunate to have been the focus of a five-year NPS funded Systemwide Archeological Inventory Program (SAIP), conducted between 1998 and 2002 (Brunswig 2005a; Butler 2005). As a result, large areas of the park have been surveyed for historic and prehistoric archeological resources and information on these sites are in the park's site files and in its ASMIS and Surveywork GIS databases. However, many areas remain archeologically unexplored. Unsurveyed areas, identified as having high probabilities for containing archeological sites by a site location predictive model accomplished during the SAIP project, should be surveyed as soon as possible (cf. Brunswig 2005a: 98-103; Butler 2004, in press; Rohe 2003a, 2003b, 2004; see discussion below).

Primary data on park cultural resources are stored in the ASMIS **(**Archeological Sites Management Information System) database, the National Park Service's database for registration and management of park prehistoric and historic archeological resources. ASMIS records provide information on site location, description, significance, condition, threats to, and management requirements for known park archeological sites. ASMIS is a tool for supporting improved archeological resources preservation, protection, planning, and decision-making by parks, support offices, and the National Center. It is used to help preserve significant scientific, archeological and historical data from all sites threatened with irreparable loss, damage or destruction, and protect all archeological sites from looting, vandalism or unauthorized excavation or removal of artifacts. Table 2 shows a Cultural Sites Inventory (CSI) form used to record archeological and historic site status, including the site's physical and cultural condition (known as a condition assessment or CA), its significance, and assessed vulnerability (threat) to natural or human disturbance.

Table 2

ROCKY MOUNTAIN REGION
ARCHEOLOGICAL SITE STATUS EVALUATION

SITE: DATE:
PARK: EVALUATED BY:
EVALUATION IN THE FIELD: ___ EVALUATION IN LABORATORY: ____

THIS FORM MUST BE COMPLETED USING THE STANDARDIZED CULTURAL SITES INVENTORY DEFINITIONS FOR ARCHAEOLOGICAL SITE STATUS EVALUATIONS. THIS IS COLUMN 5 IN THE ROCKY MOUNTAIN REGION COMPUTERIZED CSI DATABASE. THE DEFINITIONS THAT MUST BE USED ARE PROVIDED.

CONDITION: GOOD____ FAIR____ POOR____ DESTROYED____

REMARKS:
LEVEL OF IMPACT: SEVERE____ MODERATE____ LOW____ NONE____
REMARKS:

CAUSES OF IMPACT: (List all known impacts, examples of which are indicated on site status definition sheet)

STABILIZATION NEEDS: CRITICAL____ ESSENTIAL____ MODERATE____ NONE____
REMARKS:

LEVEL OF DOCUMENTATION: EXCELLENT____ GOOD____ FAIR____

REMARKS:

In addition to site status evaluations, archeological and historical sites are normally evaluated for eligibility for nomination to the National Register of Historic Places (NRHP). Almost all known sites in the park have been evaluated for the NRHP. The NRHP (1990) is an official listing of significant cultural resources related to "historic contexts" and is:

> "An organizing structure for interpreting history that groups information about historic properties that share a common theme, common geographical area, and a common time period. The development of historic contexts is a foundation for decisions about the planning, identification, evaluation, registration, and treatment of historic properties, based upon comparative historic significance." (NPS 1997 revised, National Register Bulletin 15:53).

Both prehistoric and historic cultural resources may be nominated to, and be listed on, the NRHP. National Register of Historic Places recommendations deal with the relative significance of prehistoric and historic cultural resources related known or potential contributions to knowledge of past patterns of historic (and prehistoric) change, an area's natural resource history and human utilization of those resources, and evolving human lifestyles; locally and regionally (NPS 1997). Three categories of recommendations reflect the relative, assessed level of significance of each site to cultural resource preservation and management objectives of the National Park Service. These are: **Not Eligible** for nomination to the National Registry of Historic Places (NRHP), **Eligible** (a site is of sufficient significance it may be nominated to the NRHP), or **Need Data** (a site should be further investigated through archeological testing, re-survey, and/or additional background research). The Needs Data category is typically accompanied by a short statement describing the form of investigation determined to be most appropriate, e.g. re-survey and testing, archival research, etc. Sites recommended for further investigation (**Need Data**) may, after sufficient re-investigation, be re-designated as Eligible or Not Eligible at a later date, depending on results of that research.

It is important to note that an evaluation of "needs testing" or "needs additional data" does not remove sites from eligibility on the NRHP. It only establishes that

insufficient information is available to currently make that assessment. In fact, in many cases, there is often evidence that sites are almost certainly eligible, but require further intensive survey or test excavations to determine the presence of artifacts concealed by surface vegetation, e.g. pine needle duff or thick grasses, or determine if suspected subsurface cultural deposits exist in order to make that determination conclusive. Such sites are to be avoided and considered eligible until proven otherwise by additional assessment activities.

Sites and structures which have been formally evaluated and definitively determined *not eligible* for the National Register of Historic Places do not need to be protected. However, there may be structures or sites that should be protected because they are integral to the park's interpretive programs or they represent potential for demonstrating an unusual or even unique prehistoric or historic activity or event in its past. In other words, just because an archeological site or structure is not on the NRHP does not necessarily mean it should not be protected.

Recommendation for Revising Condition Assessments and ASMIS Procedures

Condition assessments (CA), part of the above noted archeological site status evaluation form, are part of routine documentation procedures used in recording archeological sites and have been completed for most sites in RMNP. However, as pointed out during the November (2009) fire management workshop, the current CA portion of the site evaluation form does not include a provision for potential damage due to the direct or indirect (post-burn) effect of fires. It is recommended that condition assessment sections of NPS site evaluation forms should include a section for assessing the potential for fire damage for all archeological sites. In revising the CA section to account for fire threats, it is important the FMO should be consulted to help define what constitutes which kinds of treatment, i.e., types of fuel and proximity, should be applied to various types of cultural resources. Minimally, we would expect the form to include such fields as:

"Site is in woods or covered with brush that would burn – YES/NO and Describe"
"Fire on site would result in (1) no damage, (2) moderate damage, (3) complete destruction."
"Potential for erosion and site degradation after a fire is (1) low, (2) medium, (3) high. Comments:"

Once completed, the revised CA form should be used during NPS-required periodic site condition assessments and consideration should be given to increasing the number of sites to be revisited each year to update fire threat documentation.

The NPS primary database on cultural resources, ASMIS, contains several fields for threats and treatments for each site, but does not contain "fires" as one of the variables in the system. It is recommended the NPS Washington Support Office (WASO) be contacted to update the lookup table to include fire damage. If ASMIS does not have fire as a threat, then a separate GIS database will need to be constructed, and it is suggested it

contain all threats to sites; these data can be exported from ASMIS, and fields added for fire threats.

It should also be noted that most prehistoric sites have been surface collected and their artifacts placed in RMNP Museum storage. Just because nothing is found on the surface during a condition assessment does not mean that there are no buried components. Accordingly, notations such as "could not relocate site" or "site has been destroyed" should be made with caution.

Native American Consultation

From a perspective held by many Native Americans, traditional landscapes integrate both cultural resources and natural resource features, the latter including landforms, such as prominent geologic and geographic features (mountain peaks, rivers, lakes…) and vegetation. Vegetation landscape phenomenon significant to native peoples can consist of localized ecosystems which are home to plant species used by them for economic, medicinal, and ritual purposes. The loss of many of those plants in an area through human disturbance, e.g., fire-fighting tactics, would be a major concern. To native peoples, all fires are not the same, there is a difference between natural and planned fire events. For example, the Northern Ute Tribe is not concerned with the resources lost through natural fires, because its considered part of natural processes. In contrast, resources lost through a prescribed burn due to staging operations and constructing fire lines would be considered a major issue.

Many prehistoric and early historic sites in RMNP are associated with Native American religious practices and subject to protection under both ARPA, NAGPRA (the Native American Graves Protection and Repatriation Act 1990, 25 U.S.C. 3001 et seq. , http://www.nps.gov/nagpra/), AIRFA (the American Indians Religious Freedom Act, Public Law 95-341, 42 U.S.C. 1996 and 1996a, http://www.nps.gov/history/local-law/FHPL_IndianRelFreAct.pdf), and Executive Order 13007 on Indian Sacred Sites (1996) (http://www.nps.gov/history/local-law/eo13007.htm). The park is fortunate in having had many of its spiritual sites identified and investigated through NPS-funded research projects by the University of Northern Colorado (Brunswig 2003; Brunswig, Diggs, and Montgomery 2009; Brunswig, McBeth, and Elinoff 2009; Diggs and Brunswig 2006, 2009). It is also fortunate that the majority of those sites are located in high altitude areas less likely to be disturbed by wildfires or fire-fighting activities. However, care should be taken to avoid disturbance of such archeological features as rock walls, cairns, and other structures since many, documented or not, are potentially sacred sites or potential burials. In such cases, Native American consultation is necessary should avoidance prove to be difficult or impossible. Other direct evidence of a Historic Native American presence includes culturally peeled trees and wickiups (forked branch shelters) which still survive in the park, but are particularly vulnerable to fire since they are located in forested montane zones.

Recommendations on Native American Consultation

It is recommended that protocols be developed to deal with sensitive information involved in the process of fire management and fire-fighting, such as sites known to be sacred to the tribes. It must be determined how sufficient information on such sites can be provided to fire fighters without unduly revealing sensitive information.

It is important to maintain consultation with Native American tribes about the park's evolving fire plan's cultural resource component. The recent workshop advanced that process by having a representative of the Northern Ute Tribe participate, and having Southern Ute and Arapaho representatives who were not able to attend, invited as well.

Workshop participants suggested tribes with known and/or established associations with the park in the historic past should be invited to discuss issues related to fire protocols, becoming involved in development of cultural resource components of the overall fire plan. It was suggested by the Northern Ute tribal representative that the tribes would like to have a multiple-agency consultation meeting to discuss fire planning issues. This would be cost-effective and time-effective rather than an individual tribe by tribe basis, saving the tribes the chore of repeating the same information over and over again to the same agencies. Such a meeting should be sooner rather than later since last-minute calls to tribes, saying "we have a fire, what should we do about these sites". A multi-agency meeting would demonstrate to the tribes that the federal agencies are working together. While missions of land management agencies in the Southern Rocky Mountain region frequently result in different rules, protocols, there should still be an effort to coordinate consultation and multi-agency planning. At a minimum, it would be very helpful for the tribes to learn more about these varying protocols. A best-practices study from different agencies would be helpful. A major priority should be consultation with the tribes on the identification of tribal cultural landscapes – and their integral features – and appropriate techniques that should be used to preserve them. RMNP has made substantial progress in that direction with the SAIP project, various ethnographic consulting and Native American park visit programs, and the on-going Sacred Landscapes Project.

The Archeologist's Role in Park Fire Management

Workshop participants emphasized that a priority for all tasks and procedures related to fire management planning and field actions is to have an archeologist available to review and assist in planning for surveys, condition assessments, logistic camps, fire lines, and other tasks. As discussed above, archeological decisions related to cultural resources are required by legal mandate to be accomplished by a qualified archeologist (NHPA as amended; AHPA of 1974; ARPA as amended [2006]), Section 112 (a), Section 106, 36CFR800; and NPS 28).

Recommendations for Integration of Archeologists in Fire Activities

When a wildland fire is identified in the park, the CR manager should be informed immediately so as to arrange to get an archeologist on board as soon as possible: leaving a telephone message is unacceptable, and alternative contacts and procedures need to be established as soon as possible.

An archeologist with a Red Card should be made available for field work in a fire area once a fire begins; either in prescribed or uncontrolled burn situations. Requirements for red card qualifying technical specialists such as archeologists are outlined in the Wildland and Prescribed Fire Qualification System Guide: PMS 310 (National Wildfire Coordinating Group 2000; see also Hanson 2000 and NPS 2008: Chapter 7, page 13). Archeologists assisting with setting up a logistics camp, however, would not need to be red-carded since such camps are by definition located in areas not threatened by fire.

Although many wooden structures have been recorded in the park, the possibility exists for the discovery of unknown structures hidden in the deep woods as a fire progresses and fire containment strategies are being employed. A red-carded archeologist could record any new structures identified by fire crews during a fire. Field assessment for NRHP eligibility per the Emergency Discovery provisions of the AHPA of 1974 (the "Moss-Bennett Act") or protection requires an archeologist meeting 36CFR61 or ARPA professional requirements. The archeologist must document any on-site mitigation decisions and the State Historic Preservation Office (SHPO) must be informed of all field decisions.

If a private, i.e., non-Government, contractor is placed on call, then the contractor must familiarize himself or herself with park resources and NPS policies concerning fires and personnel procedures, i.e., red cards. The contractor must also meet 36CFR61 or ARPA professional requirements.

A red-carded archeologist will be needed when fire lines or special access roads have to be constructed during a fire. A list of red-carded archeologists employed by the USFS and BLM should be kept on file, with the understanding these individuals may be asked to assist the NPS with archeological matters during a fire – this should be a reciprocal (Interagency) agreement.

It is further recommended that a qualified archeologist from the NPS, USFS, CESU, or private contractor review all the RMNP GIS data on park cultural resources as soon as possible to understand what the databases mean, do not mean, their relative strengths and weaknesses, and how to use them effectively. Learning how to run the GIS and understand the CRM data after a fire has started is unacceptable. That individual, or a red-carded archeologist, should be placed on standby for when a fire starts so as efficiently work with the FMO for any conflicts between fire suppression or control and cultural resource damage. CRM decisions must be made by the qualified archeologist,

not a fire person. However, care should be taken such that archeologists do not tie the FMO's hands or vice versa.

Finally, the role of archeologists, red carded and otherwise, during a fire needs to be pre-determined and coordination activities and a chain of command planned and understood by all. However, archeologists will make all decisions concerning archeological sites during a wildland fire. It is important to emphasize that ASMIS and any and all CRM databases (especially ASMIS and Surveywork GIS) should not be modified or data extracted for other databases without evaluation by an archeologist. Site data should not be given to the FMO, except for the historic wooden structure database without oversight and consultation of appropriate and qualified CR specialists. In the case of wooden structures, all are well known throughout the park and surrounding community (see below).

Effects of Fire and Fire Management Actions on Cultural Resources

As noted in the "CRE Matrix for National Park Service Units in the Southeast Region" (NPS 2004), direct damage to artifacts due to direct fire effects, except for those made of organic materials, is nearly always "moderate", but the most severe damage comes from physical damage and disturbance related to fire fighting, e.g. the creation of fire lines, the movement of heavy vehicles across a site, use of fire-fighting chemicals, etc. In any case, it would be almost impossible to control surface temperatures during an out-of-control fire in order to reduce damage to artifacts.

Moreover, it is highly likely that all or most prehistoric sites have been burned over many times over hundreds and thousands of years, per fire-frequency data generated by Dr. Jim Doerner (UNC) and others, (cf., Doerner 2008; Johnson 2004; RMNP 2004: 124-126; Sibold and Veblen 2006; Sibold, Veblen, and Gonzalez 2006). The only exception might be very high altitude tundra sites which have never been forested and having not had sufficient fuels to feed and maintain wild-land fires in the past. In addition, archeologists analyze surface remains far differently than they do artifacts from excavations because surface materials are rarely, if ever, in their original contexts and are often the result of multiple occupations through time (multi-component), a condition referred to by archeologists as *palimpsests*. Whether a lithic tool is fire-crazed or not may be irrelevant and/or hard to distinguish from previous fires, use, or manufacturing. For example, a lithic tool with fire crazing or potlid fractures may have resulted from the manufacturing process or been burned in a prehistoric campfire and not from a surface natural fire. Likewise, blackening on a potsherd may have come from its being used over an open hearth, rather than from a forest fire. Protective measures, if any, should be designed with these facts in mind.

One possible disturbance of archeological sites is contamination of ancient charcoal in surface hearths with modern carbon. However, if the charcoal is exposed at or near the surface, such contamination may have already taken place. Among sources of post-use contamination are the existence of up-slope winds carrying charcoal to upper elevation sites and prehistoric through historic period fires. Atomic bomb contamination

from the 1950s is known to have biased dates from some shallowly buried surface hearths as was discovered from a radiocarbon date at the Horseshoe Park wickiup (cf. Brunswig 2000: 23-24). It is also important to note that the vast majority of documented surface hearths in ROMO are historic in age and most likely associated with non-Native American visitor campfires.

Workshop participants agreed that the most significant damage to archeological sites can occur from the creation of fire lines, access roads, etc. and that those same actions may also accelerate water and soil erosion after a fire. Although *most* archeological sites in the park are either confined to the modern surface or only shallowly buried, surface disturbance by vehicles or temporary access road construction can crush or break important artifacts (e.g., projectile points, lithic tools…) and dislocate and mix surface artifact assemblages. Construction of fire lines through sites can destroy their archeological integrity, including disturbance of buried cultural levels and features.

Use of chemical retardants in fire suppression would not significantly affect the majority of documented archeological sites in the park since those sites have largely been surface-collected and/or have been evaluated as ineligible for NRHP nomination. However, a USFS study (Reed, Timmons, and McIntyre 2007) showed that fire retardant chemicals cause thermal shock to fire-heated stone artifacts and features, coats flaked stone and ground stone tool artifacts with a chemical film that destroys organic residues and restricts tool manufacturing patterns analysis, introduces acids to archeological bone and leads to its rapid deterioration, and chemically alters and helps break down pottery. Retardant also kills or severely limits the growth of culturally-useful plants on or near a site useful for inferring local plant resource use for economic, medicinal, and religious purposes. Finally, chemical retardants have an adverse affect on historic wooden structures and artifacts staining the wood or leading to accelerated decomposition of older, more fragile wood.

Recommendations for Archeological Site Fire Procedures

Allowing fires to burn over prehistoric and historic archeological sites is normally an acceptable option. Direct disturbance of sites by heavy equipment or excavating fire lines during fire mitigation or wild-fire activities which are determined to be eligible for NRHP nomination, on the NRHP, or determined to require further research should be avoided wherever possible.

In developing a CR protection plan for fire management, potential locations of all temporary fire logistic support and tent camps should be assessed first. Camp and support locations not located in established campgrounds should be cleared by an archeologist before they are occupied. Clearance of potential sites is facilitated by the fact that substantial lower elevation sections of the park have been surveyed for sites and their locations well-known. Threatened and endangered species should be considered in the selection of sites and surface and vegetation rehabilitation of camp locations need to be anticipated after use.

No backcountry fire logistic camps are allowed at Lulu City, Gaskill, around the Shipler Cabins, along Hague Creek, and the Cache La Poudre. Paradise Park was once used as a fire camp, but the area needs to be surveyed before it can be used again.

Camps in the tundra should be avoided due to its fragile nature and the probable high frequency of archeological sites, a fact well-documented during SAIP surveys between 1998 and 2002. Use of the Alpine Visitor Center parking lot should be considered if a high altitude camp is needed in the western section of Trail Ridge. Although the Milner Pass Road Camp/Mess hall is potentially available for fire crew use, it has experienced hantavirus infestations and will require major clean up before it can be used.

On the western side of the park, in the Kawuneeche Valley, the area south of Fleshut cabin (Holzwarth parking lot) was the location of early resorts and the land has been highly disturbed and could be used as a logistic camp in the central to upper part of the valley. South of Granby, RMNP should consider establishing an agreement with the USFS for the use of the Flying A barn south of Shadow Mountain Reservoir for a logistics camp. Use of the USFS facility would keep the camp out of the park in the lower Kawuneeche Valley and avoid potential problems with wilderness, archeological sites, threatened and endangered species, and need for environmental restoration by the NPS if such a camp was in the park. The narrow nature of the Kawuneeche Valley suggests that the location of any logistic camps in the valley could prove dangerous if valley slopes are on fire. A camp outside the park for the Kawuneeche Valley is recommended if possible.

Probably the best location for a logistic camp on the east side of the park is in Hollowell Park. Hallowell's cultural resource integrity has been extensively damaged by two CCC camps and an NPS campground.

Funds and fund sources should be identified in the fire planning process for environmental restoration for any camp in the park not located in an established campground. It is important that all potential logistic camps be identified as soon as possible to insure that cultural resource concerns are addressed early, not when the fire starts.

Given the determination of the potential for erosion damage from such an erosion model (or from a review of site forms), consideration should be given to creating water diversion berms to re-direct run off after a fire to reduce erosion. Such berms can be created from earth and rock or even bundled hay bales often used for erosion protection in the park and elsewhere. Where it is determined that erosion-prevention berms would be useful in preventing post-burn erosion, it is recommended that they be put in place *before* any fires. This is expensive and may be difficult to implement in designated wilderness areas. In such cases, a reassessment of the level of documentation for these potentially effected sites should be undertaken, and additional work (including testing) should be considered. The placement of berms to protect sites from water erosion after a fire should be considered by archeologists with assistance from expertise in the trails

office. It should be noted that just because much of the park is classified as wilderness, it does not mean that all cultural resource laws and statutes do not apply, they do apply as shown in a clause in the Wilderness Act itself (NPS 1999, 2002; U.S. Government 1964). Identification of sites with the highest risk for post-fire erosion can be accomplished with the aid of the enhanced Condition Assessment form discussed above and research into the creation of a GIS-based Site erosion model, discussed in a following section.

It is recommended research be conducted on development of a site erosion model using GIS to analyze and model post-burn vulnerability to accelerated soil erosion based on contributing variables such as soil, elevation (slope, aspect…), local geology, ecology, and hydrology. Numerous examples of studies as well as GIS modeling research exist and would, along with already existing park GIS site predictive model databases and projects, provide an excellent basis for initiating site erosion model research (cf. Ebert and Singer 2004; Haines and Schofer 2008; Johnson 2004; Smith 2001; Warren and Asch 2000).

Another action which can be taken is to conduct assessment of how the USFS and other agencies control erosion on cultural sites after fires and, where applicable to the park environments, adopt (and adapt) their protocols to the park fire management plan.

As described above, the cutting of fire lines and access roads do the most damage to archeological sites, both during a fire and afterwards through increased susceptibility to water erosion. It is important that known site locations be assessed and their accessibility evaluated prior to a fire to help avoid site damage. As stated earlier, a red-carded archeologist should consult the ASMIS database and must conduct an in-field assessment before such fire-lines or access roads are constructed. No fire lines should be made or other ground disturbing actions taken on archeological sites without review and permission of a qualified archeologist and it is important that the involved decision process must be documented. It should be possible to identify many areas prior to fires that may serve for fire lines and cultural resource "clearances" should be obtained once those areas are identified. Strategies for identifying likely fire line areas might include the use of GIS modeling to help insure archeological sites can be avoided.

Finally, it is recommended that individuals from the park's trails program become more regularly involved in planning for the location of fire logistic camps and fire lines, and kept informed during a fire. Expertise offered from trails personnel will help determine the most efficient access to a fire area, as well as escape routes, etc. Their assistance may, in some cases, obviate the need to create new trails, roads or fire lines.

The Use of GIS in Cultural Resource Protection during Fire Management Activities and Planning

One of the objectives of this project was to produce a "Refined GIS layer showing cultural resource priorities and fire treatments" (Developing Strategies for Managing Cultural Resources at Risk from Fire and Climate Change in Rocky Mountain National Park Cooperative Agreement H1200090004). During the November workshop, it was

determined that producing such a GIS layer would entail effort and time far beyond that budgeted for the agreement and a follow-up, longer term effort to produce a usable tool for RMNP fire management is needed. However, based on current CR GIS data, existing park CR reports, and the aggregate experience of this report's authors on park cultural resources, a preliminary, prioritized listing of what were deemed the most significant and threatened archeological and historic sites was drawn up (see Appendix A). At the same time, a provisional GIS layer of those sites was created and, based on a workshop recommendation, experimental efforts were made to create "exclusion polygons" on GIS aerial overlays of several of the thirty most "endangered" sites subject to fire or fire-fighting impacts.

The polygons were digitized around a sample of 30 archeological and historic sites that are considered high priority areas to protect either from wildfire or the effects of fire management activities. A combination of site form descriptions, site form maps (not created in a GIS), and GIS background layers were used to create a polygon around each site in *ArcGIS*. GIS background layers used included trails, rivers, NAIP aerial photography, and the actual point layers of the sites. Problems, however, arose in digitizing the site polygons with a high degree of certainty that all polygons had a similar level of accuracy.

Two examples help to explain the varying levels of accuracy related to generating the GIS polygons. Figure 1 shows a comparison between a GIS map (A-- with digitized site polygon) and the original site map (B--non-GIS) of 5LR317 near Lawn Lake. A number of features clearly correspond on the two maps: including the old dam location, the spillway, the Lawn Lake Trail, and even the trees. The actual site (green cross) appears about right. We believe the digitized site polygon is accurate and appropriately describes the area that should be protected (with an extra buffer zone for safety). As also shown in the figure, it is also possible to link actual field photographs of a site with a GIS map for in-field perspectives of the site and its local natural landmarks, facilitating site identification in cases where surface evidence is minimal.

Figures 1 and 2 redacted

Figure 2. 5GA2197, Corduroy Road Vicinity, Upper Kawuneeche Valley.

Figure 2a shows an area of a number of archeological and historic sites in a limited area of the upper Kawauneeche Valley while Figure 2b shows the specific location of one of those sites, 5GA2197. Known as the "Corduroy Road", the site is a section of stagecoach trail (late 1800's) which ran up (north) the Kawuneeche Valley along the Colorado River, past Lulu City, and turning west, rose to cross the Continental Divide at Thunder Pass and follow the Michigan River into North Park. It consists of a number of pine logs laid side by side in the late 1800's to allow the stage to cross through a marshy area west of the river. Although in poor shape, mainly water-logged, and concealed in tall grass (not the photo at the bottom of figure 2), the logs represent a unique historical resource in the park and their scientific study, including dendrochronology and dendroclimatic analysis, would provide valuable information on the park's historic pioneer period. Location of the logs was dictated by narrowing of the Colorado River corridor by steep hill slopes, a situation which might encourage fire-fighting vehicles to drive through the site to gain upriver access. Creating a site polygon around 5GA2197, however, was problematic. The trail and river locations do not match either in terms of shape or scale (from other features). We believe that we identified the

pond location on the air photo, but with some uncertainty. The site description form locates the northern and southern ends of the 5GA2197 (see Figure 2b). Note, however, that the GIS point layer of historic features shows the 5GA2197 site outside of these north-south bounding coordinates. The air photo, while good at 1 meter cell resolution, isn't quite good enough to identify the road, intact logs, or small building foundations. The site was surveyed in 2002 and the site was GPS-logged using a small hand-held GPS unit not capable of sub-meter post-processing (see below). Thus, while we believe that the digitized site polygon 'probably' encompasses the site with an adequate amount of buffer, it is difficult to ascertain the exact level of accuracy with a high level of certainty without returning to the site and conducting a more accurate survey with a higher resolution instrument.

Error can be ascribed to a number of factors. GPS standards varied according to when the site data were collected. Some sites surveyed late in the SAIP project, 2001 and onward, had coordinate data that were post-processed to within a high degree of accuracy (~1-3 few meters). Prior to May 2000, GPS NavSat system satellite signals were degraded, a phenomenon known as selective availability (SA), resulting in standard deviation errors of as much as 50-100 meters. Even after 2000, site spatial coordinates, particularly in very remote high altitude survey areas, were largely collected with lower quality, hand-held GPS units since sub-meter, post-processing capable (survey-grade) GPS units were either not available or being employed on an experimental basis at the time. UNC's first use of sub-meter (survey grade) GPS technology for archeological survey took place in 1998 at Trail Ridge Game Drive (5LR15) and consisted of only experimental GPS mapping of that site (Brunswig 1999: 10-13, 19-22). Due to earlier limitations of that technology, including limited battery duration and portability of the early survey grade instrument being used, only a handful of park sites were subjected to sub-meter GPS logging through the end of the SAIP project in 2002. However, even early survey-grade GPS units used from 1998 through 2004 encountered accuracy issues when operated in forest environments, a problem now largely overcome by more advanced instruments from 2005 onward.

Accuracy levels of GIS background layers can also vary. For example, the trails layer for RMNP has varying levels of accuracy. Some trail segments are GPS'ed and accurate to within 2 to 5 meters. The trail section for Figure 2b is at a scale of 1:100,000 which mean the trail is within 166 feet of its actual location. NAIP orthorectified air photos accuracy is generally less than + or - 10 meters. Nevertheless, adding the various sources of error together can result in significant overall error. Furthermore, this total error will vary significant from site to site. An accuracy assessment almost needs to be done on an individual basis (which would be very time consuming). It is also important to note that site forms and hand-drawn maps were never really intended to precisely locate every tree, rock, trail, and river. Thus, it is not surprising that non-GIS site forms and hand-drawn maps do not always correspond closely to the GIS maps.

We believe that site polygons can generally be employed to encapsulate sites with an adequate buffer for realistically avoiding their damage during fire fighting actions such as fire-line construction, employment of heavy equipment, etc. However, we are

unable to state a specific accuracy level of the polygons (without considerable effort), nor the level of precise certainty of the general statement that site polygons 'probably' encapsulate the sites. We recommend that 10-20 of the more easily accessible sites be re-located with use of survey-grade or higher differential-processing capable GPS units in the very near future. A comparison could then be made between the digitized polygons and the on-ground polygons collected with precision GPS.

Recommendation on the Survey of Unsurveyed Park Areas
Subject to GIS Predicted High Probability of Archeological Site Occurrence

Many areas of the park have never been subject to ground survey even though large sections were subjected to intensive SAIP surveys between 1998 and 2002. Since 2002, smaller more focused surveys have concentrated on the location and identification of Native American-related spiritual (sacred) sites and features (Brunswig, Diggs, and Montgomery 2009; Brunswig, McBeth, and Elinoff 2009) and, most recently, include a research program designed to more intensively document one of the park's most heavily occupied local landscapes, Forest Canyon Pass (Brunswig et al. 2009). Surveys need to be conducted in unsurveyed areas whose potential for containing important cultural resources is considered high. Many such areas were identified during earlier described GIS predictive site modeling during the SAIP and in more localized sacred landscapes and Forest Canyon Pass GIS modeling since 2002. It is much easier and far more efficient to avoid sites once they are known rather than wait until a fire restricts access and when time becomes critical. Funds for continuing surveys and archeological assessment may be available from several FMO accounts for a proactive fire management program to investigate high site probability areas of the park in the immediate future. Figure 3 is a GIS map showing predicted high probability area locations where archeological sites may exist, but have not yet been documented. The map was prepared by modifying the original SAIP GIS predictive model produced by Rohe (2003a, 2003b, 2004), modifications including addition of more recently documented park sites and utilization of the weights-of-evidence statistical technique used successfully in the on-going sacred landscapes study cited above.

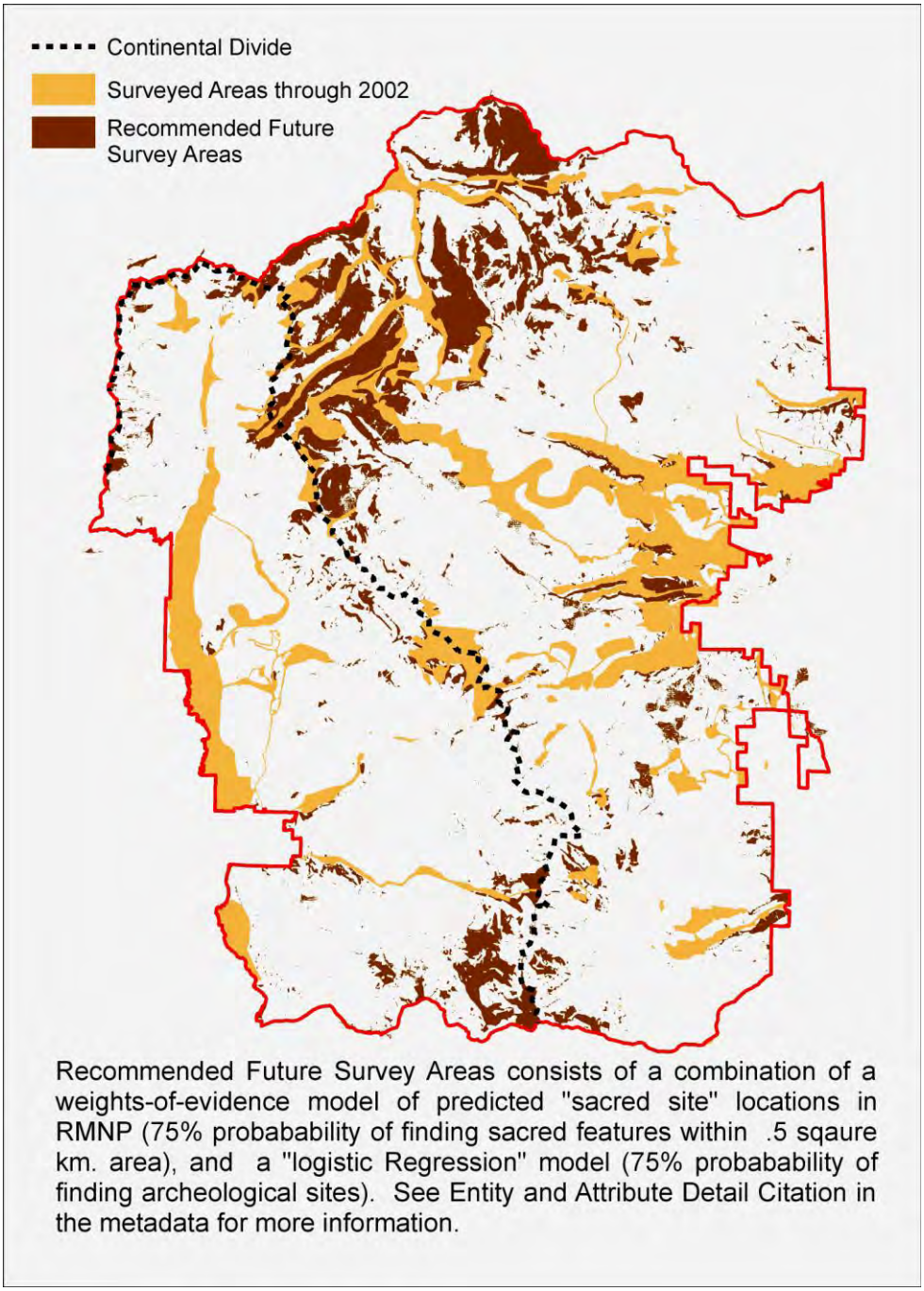

Figure 3. GIS Site Predictive Model Map of Higher Probability (~75%) Unsurveyed RMNP Areas Likely to Produce Archeological Sites.

GIS and Historic Structures

Databases, along with GIS maps showing the location of all known archeological historic period wooden structures, were prepared over the past several years and provided as a distinct GIS layer to the park's GIS office and to the FMO. Most wooden structures

in the park have been identified and recorded, although it is possible a handful of such structures may remain unidentified and undocumented in remote or heavily forested areas not yet subjected to formal surveys (cf. Butler 2005). Many are on the NRHP. Not included in the GIS database are structures in the Utility Area, Kawuneeche Visitor's Center (KVC), Alpine Visitor's Center (AVC), the Mill Creek areas, and most campgrounds, or spike/ranger camps. In holder cabins may require special agreements between the NPS and owners for preservation and protection. Many of historic wood building archeological remains have had magnetic nails placed in their corners so they can be relocated should the logs be destroyed by fire or after they have disintegrated from natural causes.

Recommendations for Use of the GIS Historic Structures Database

Historic structures maps and associated databases should be reproduced and given to all fire crews for assistance in making in-field decisions. Other databases exist for standing structures in use by the NPS. Data, including locations, should not be given to FMO personnel for unsupervised use as they lack the training to properly understand these data. The information should be reviewed by an archeologist before and during a fire.

Although condition assessments have been accomplished over the past several years, all of the structures considered significant (listed below) should be revisited by FMO with the goal of further removal of hazardous fuel trees or undergrowth, or selecting the location of fire lines or buffer zones.

Site forms and the previous park archeologist's (William Butler) field notebooks need to be reviewed to determine which sites have had the nails placed in them, and which need to have it done. Re-recording, condition assessment updates (required per NPS directive), and dendrochronological dating could be accomplished at the same time.

Many historic structures are undated except by historical records that lack precision, i.e., Shipler Cabins. Dendrochronological studies should be conducted on such structures. Since many sites are located in areas that make them difficult or even dangerous to try and protect (Sawmill Gulch Cabin, Dutchtown, Hitchens Cabins, Log Flume), they most likely will be lost during a wildland fire. It is recommended they be re-recorded, magnetic nails be placed in the corners of structures, dendrochronological studies accomplished, and even excavation be done.

On the west side of the park, specific historic resources should be subject to the following mitigation activities:

1) Remains of a cabin near the location of old Bowker Cabins (5GA2234) should be re-recorded and dendrochronology and dendroclimatic samples should be taken and analyzed for their historic data.

2) At the Sam Stone Cabin and Barn (5GA2086), Dutchtown (5GA807), Hitchins Cabins, and Shipler Cabins (5GA2202), plans should be made to protect the structures in event of a fire if there is no risk to firefighters and dendrochronology/dendroclimate studies undertaken.

3) A historic log flume in Sawmill Gulch off of Thunder Lake Trial (5GA2700) is a unique example of such construction in the park and should be re-recorded in greater detail and dendrochronology/dendroclimate studies undertaken.

4) At the Grand Ditch Construction Camp 3 (5GA301.3) Powder Magazine and Blasting Cap Magazine, heavy tree and shrub growth ladder fuels should be cleared from around the magazines should be cleared and a new roofs placed on the magazines to protect it from interior deterioration. Both are the only intact examples of their type in the park.

5) Consideration should be given to moving the carriage and husk of the Grand Lake Lodge Sawmill (5GA2132) to the maintenance area or to Betty Dicks for protection until it can be repaired and placed on display. It is the only portable sawmill in any National Park that can be restored and interpreted (cf. Butler 1999).

6) Gaskill Townsite (5GA2470) and Lulu City (5GA302) log structures should be marked with magnetic nails buried in the corners of each structure. Excavation should also be considered at both sites in and adjacent to their log structures. Both sites should be re-recorded in greater detail and their log remains subjected to dendrochronological and dendroclimatic studies. Gaskill is one of the sites that has been placed in the GIS site exclusion database for this report (noted earlier) for fire line construction and fire staging area avoidance due to its strong potential for buried historic archeological remains. However, nearly all the actual structures associated with Gaskill and Lulu City were either removed or burned down by the park service in earlier decades and otherwise can be left to burn during a fire.

On the east side of the park, specific historic resources should be subject to the following mitigation activities:

1) The Mt. Wuh Cabin needs to be recorded and dendrochronology/dendroclimate studies undertaken.

2) The Eugenia Mine Cabin (5LR8950) and Wild Basin Cabin should be protected if possible during fires and dendrochronology/dendroclimate studies undertaken.

3) The Hondius-Beaver Water Diversion Structure (5LR1959) in Beaver Meadows, easily accessible by road, should be protected from fire line construction and fire-fighting vehicle traffic if possible.

4) Wild Basin Trail sawmill (5BL9095) and its associated cabins and a standing structure to their west should be protected and dendrochronology/dendroclimate studies undertaken.

6) It is recommended that three Native American associated historic wood structures and features in the park, the Weinmeister Wickiup, the Horseshoe Park Wickiup (5LR4499) (included in the above GIS site buffer database), and Culturally Peeled Trees in Tuxedo Park, the latter directly accessible by road, should be protected during a fire if possible.

7) Finally, there are two examples of historic "rock art" for which protective measures, in the form of clearance of adjacent brush, should be undertaken. These are a now faded, painted commercial sign with "Drink Denver Sour" on a large boulder and early 20th Century USGS markings on the "Apache Fort" site (5LR327) rock outcrop at the west end of Beaver Meadows.

Fire Management Planning and Museum Collections Curation

The park's 2007 Collection Management Plan calls for developing structural fire plans for all facilities containing museum collections on exhibit or in storage. For life safety and NFPA codes, all buildings containing such collections are required to be inspected biannually.

Recommendations for Fire Protection of Curated Museum Collections

Each building with museum collections on display or in storage should have specific risk determinations, items removal priority lists, packing needs, staffing assignments, etc. Plans need to be drawn up to protect or move museum property in places such as Holzwarth or at Betty Dicks and elsewhere such as the Backcountry Patrol Cabins. Museum items should be identified in each structure. Boxes and all packing material should be prepared and placed on or near the site. At the same time, individuals should be identified that can/will be called upon to help remove objects when a decision is made. Employees need to be trained in the use of fire extinguishers and will not fight fires beyond the use of fire extinguishers (EOP 2003). It is important to emphasize that all curation-related issues should be established and directed by the park Curator.

Post-Fire Assessment for Archeological and Historic Structure Sites

Once a fire has burned through any area of the park, whether as a prescribed burn activity or a wildfire, a field assessment should be made of damage to, and the uncovering of previously unknown, cultural resources through a post-fire field survey. Funding for surveys may be available from Fire Pro and other fire-related programs to accomplish that task.

Recommendations for Post-Fire Assessment

A formal plan for post-fire assessment should be developed. This should include a research design specifying field activities and required levels of documentation. The fire and post-fire erosion component suggested for the site condition/evaluation form earlier in this report will facilitate the assessment process. Professional archeologists should enter burned-over areas as soon as possible after a fire to access and record any damage to known sites, and to identify any new sites exposed due to the fire. Assessment of the potential for erosional damage needs to be made as soon as possible for any mitigating measures to be enacted, e.g., water diversion berms. Survey and revisits to all effected sites should also be conducted about a year after a fire when rain and snow have washed all of the ashes off the surface. In addition, the park should be prepared for post-fire erosion control measures on sites such as hay bales and even re-seeding. The USFS has had extensive experience with these tasks and should be consulted. Finally, a report will need to be prepared for the NPS and SHPO describing all actions taken concerning cultural resources impacted by the fire.

Climate Change, Cultural Resources, and Fire Management

Workshop discussion on the effect of climate change, given its still uncertain nature, was limited and focused on the view that information from current climate and ecosystem change should be integrated into fire planning and policy as it becomes available. Since this workshop follows an earlier 2007 RMNP workshop on climate change, conclusions and recommendations from that meeting constitute a starting point for discussing the interrelationships of climate change, cultural resources, and park fire management. For the immediate and longer term, the climate workshop report (RMNP 2007: 2) stated that expectations are for:

> "• an increase in temperature, especially in winter and early spring, and especially for minimum temperatures.
> • reduced snowpack
> • earlier snowmelt
> • increased dryness due to increased evapotranspiration
> • increase in intense storms"
>
> and that:
>
> • Climate modeling is evolving at a rapid pace. The park can benefit from working with partners to stay apprised of model refinements and emerging trends."
>
> It was also concluded that:
>
> "Forest fires will increase in intensity and frequency in the near term with warming and drying of the climate…[leading to the expectation that]

• More extreme fire behavior due to drying will pose greater threats to human life and structures in and adjacent to the park.
• Diseases and insect infestations associated with climate change may result in a "window" when dying lodgepole forests are especially vulnerable to fire. However, this window may close quickly as dead needles fall to the ground and crown fires become less likely.
• Beetles, whose prevalence is likely a direct effect of climate change, will play a significant role, perhaps greater than that of fire, in shifting forest structure.
• In the long term, a drier climate may decrease fire incidence because of a decrease in fuel accumulation.
• Ponderosa pine forests are likely to expand within the park, unless elk continue to impair seedling establishment." (RMNP 2007: 11)

Finally, it was also recommended that the park should also:

• Learn more about forest recovery after fire, beetle infestation, and other disturbances in order to assess whether active management is advisable. Some areas in Canada have already gone through large beetle outbreaks and may provide examples of post-beetle recovery.
• Begin a public education program on likely changes in fire activity.
• Policy guidance is needed on how fire management tools such as thinning and prescribed fire should be used in a changing climate.
• Develop forest models to understand the most appropriate use of fuel treatments on the Wildland Urban Interface." (RMNP 2007: 11).

When, and if, the above anticipated climate change conditions occur, increased risk to park cultural resources would arrive in the form of increased erosion due to more frequent and violent storms, a decrease in protective vegetation cover in many areas, and increased fire frequency with accompanying burn and post-burn threats discussed earlier.

Recommendations for Climate Change Variables in Cultural Resource Management and Fire Protocols

While not an immediate factor, climate change factors related to risk to cultural resources should be kept in mind as fire management policies and actions are updated over time. The FMO and his or her staff should be annually advised on the state of research and monitoring data for climate-related changes in the park's ecosystem, topographic landscapes, and other natural systems. Current and future GIS modeling efforts to simulate the effects of climate change in the park and its region should include information from cultural resource layers, including the locations of significant and potentially vulnerable sites. Future funding initiatives associated with climate-change research should, independently or as integrated components, include cultural resource studies. Once climate change effects begin to emerge from on-going research programs, surveys and monitoring of known sites and areas of predicted high site probabilities with predicted increased erosion, fire, and other risks should be undertaken.

Conclusion

This report presents recommendations on developing fire management policies and protocols to better protect sensitive cultural resources in Rocky Mountain National Park. The recommendations derive to a large extent from a November 2009 workshop involving a cross-section of fire, climate, and cultural resource experts from federal and state agencies, universities, a non-profit heritage organization, a private cultural resource consulting firm, and the Northern Ute Tribe. Report content also benefited from a decade and a half of park cultural resource and GIS experience of its authors, the former RMNP archeologist, a university archeologist with extensive research experience in the park, and a GIS professor also with extensive park research experience. Recommendations cited in the report are substantive, but also only constitute the beginning of long-term evolutionary process designed to integrate cultural resource protection and preservation practices within the park's fire management plan. They are not an instant solution to protecting irreplaceable cultural resources from fire management actions or the consequences of natural fires or, ultimately, climate change in the future. Along with the recommendations and their supporting documentation, the authors have produced a preliminary listing of the most significant and potentially vulnerable prehistoric and historic sites (and structures) in the park. Those sites have been integrated into a GIS data layer (with metadata) appended with this report that represent a first important step in creating a database for management planning and implementation.

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Appendix A

List of RMNP Fire Workshop Participants

Name	Affiliation	Professional Role
Tim Burchett	RMNP	Archaeologist/Museum Curator
Ben Baldwin	RMNP	Continental Divide Learning Center
Sonia Bechtel	RMNP	Park Intern
Paul Cerda	RMNP	Fire Management
Jeff Connor	RMNP	Park Naturalist
Matt Dutton	RMNP	Fire Management
Skip Edel	RMNP	Fire Management
Eric Jones	RMNP	Fire Management
Sue Langdon	RMNP	Park Ranger/Native American Liaison
Mike Lewelling	RMNP	Fire Management
Bruce Lloyd	RMNP	Fire Management
Jeff Singer	RMNP	Fire Management
Ron Thomas	RMNP	GIS
Cheri Yost	RMNP	Continental Divide Learning Center
Doug Watry	RMNP	Fire Management
Karen Waddell	RMNP	Historian/Compliance
Theresa Ely	NPS-IMR	Natural Resources
David Hammond	NPS-IMR	GIS
Lisa Hanson	NPS-IMR	Fire Archeologist
Christine Whitacre	NPS-IMR	Historian/Heritage Resources
Janet Wise	NPS-IMR	Natural Resources
Glade Hadden	BLM-Uncompahgre	Fire Archeologist
Bill Wyatt	BLM-Kremmling	Fire Archeologist
Nicole Branton	USFS-Arapahoe-Roosevelt	Archeologist
Lawrence Fullenkamp	USFS-Arapahoe-Roosevelt	GIS
Jim Lindberg	National Trust for Historic Preservation	Historian
Shina DuVall	Colo SHPO	Historian
Joe Salibar	Colo SHPO	Historian
Betsy Chapoose	Northern Ute Tribe	Tribal Cultural Resource Director
Marilyn Martorano	RMC (Consultants)	Contract Archeologist
Robert Wunderlich	RMC (Consultants)	Contract Archeologist
Bill Butler	UNC/RMNP (Ret.)	Archeologist

Bob Brunswig	UNC	Archeologist
David Diggs	UNC	GIS
Jim Doerner	UNC	Geographer/Climate Change

Appendix B redacted