be trees that are structurally unsound such that they may fail at any time in the next year and poses a threat to public safety or property should a failure occur. Identified tree hazards will be marked with flagging or other means and felled to minimize threats to the public. Priority areas for tree hazard survey and removal include all developed areas within the Memorial that have trees killed by mountain pine beetle.

Non-native Plants

As a result of soil disturbance there will be the opportunity for non-native plants to invade and/or spread within the Memorial. It is not known as to the extent or distribution of non-native plants currently within the Memorial, but disturbed lands will see the short-term invasion of non-native plants i.e., houndstongue (*Cynoglossum officinale)*, Canada thistle (*Cirsium arvense*), and mullein (*Verbascum thapsus*).

IV. RECOMMENDATIONS

Beetle Management Strategies

Mount Rushmore National Memorial proposes a proactive approach in managing bark beetles within the Memorial. There are a number of actions that can be used to reduce the impacts of mountain pine beetle. These actions fall into three categories: prevention, control, and monitoring. Prevention is an indirect action that addresses general forest health and also protects trees from attack that are considered to be high-value. Control is a direct action that deals with the symptoms, too many beetles, and is aimed at directly reducing the number of beetles present. Monitoring is an action that reveals the effectiveness of either direct or indirect actions.

There are a variety of treatments that the Memorial can prioritize and implement beginning this spring. Use of preventative sprays to protect high-value trees in the developed areas of the park infrastructure, along the Presidential Trail, and along Highway 244 should be considered as a high priority. Many of the trees in the developed areas are large diameter and will be very attractive to beetles. Mortality of these trees in the developed areas would cause a significant change in the feel visitors have when at the Memorial. As this is the beginning stages of the outbreak reaching the Memorial, it is likely that any trees to be protected with insecticide would have to be sprayed every year for the next 4-5 years until the beetle outbreak has passed. Preventative sprays are a high priority, it should be started prior to beetle flight (April-June) in 2010. Trees sprayed should be marked with metal tags and mapped with GIS using GPS locations.

In addition to protecting high value areas, the Memorial should continue its ongoing thinning practice of hazard fuel reduction. Infested trees have been felled and bucked the past few years as they have been located. This has certainly helped reduce the number of beetles coming out of the trees within the Memorial itself but it has not reduced the risk. This task is going to get much larger and harder to accomplish as beetle mortality increases in the coming years.

The use of thinning alone is not going to be effective in preventing beetles from infesting stands of pine. Treatments to promote a healthy forest are a highly recommended alternative for managing mountain pine beetle. Forest management, changing the condition of the forest, is the only way to minimize extensive losses to the beetle over long periods of time. These include maintaining a diversity of age classes, diversity of species where possible, and reducing basal area. Thinning of stands should proceed prior to beetle infestations, where possible. As pointed out above, the stand density may need to be reduced significantly to minimize beetle mortality considering the high level of beetle activity.

The use of pheromones is somewhat problematic. With the large beetle population nearby, it is not recommended to use the tree baiting method. Beetles are already moving into the Memorial and baiting will increase that. Also, with a relatively small amount of area to work with, finding areas that would be used as sacrifice areas where the trees are baited and thereby intentionally killed would be difficult. The use of lures and traps has not been shown to be an effective technique for significantly reducing beetle caused mortality. Traps that are hung on or near host trees will cause a spill-over attack and those

nearby hosts will become infested by beetles drawn to the traps, creating a similar situation as with the tree baits. The use of verbenone is not generally recommended. Past trials of verbenone with mountain pine beetle/ponderosa pine in the Black Hills have shown that it is ineffective in reducing beetle attacks. Since those trials, there have been improvements in the way verbenone is packaged and it is now used at a higher dose. Whether these differences would cause it to be more effective is questionable. While it is not recommend to use verbenone as a protective measure, because of the change in dose, an experimental use can be tried to test its current effectiveness.

This plan provides the Memorial the necessary response to the escalating mountain pine beetle epidemic in cooperation with its neighbors by providing for visitor safety, minimizing fire danger to visitors and neighboring communities, protecting dependent wildlife species and habitats, and providing for long-term sustained healthy forest ecosystems.

A. Prevention

1. Preventative Spray – In Developed Areas

This treatment is preventative only and will help protect high-value trees. Identify all non-infested, high-value trees within the developed areas of the park and along park roads and trails. These include historic and/or scientifically/culturally significant trees or stands of trees; trees that have high aesthetic importance in the visual aspect, or are deemed important within the context of the Memorial sculpture.

Spray these non-infested, high-value, potential brood trees with carbaryl as soon as snow is gone and before MPBs fly, generally from April to the end of June for the Memorial area. The trees sprayed should be marked with metal tags and located with GPS and mapped in GIS. Each year following the first spraying the tree should again be sprayed until the epidemic has passed. Carbaryl is generally considered to be the product of choice for controlling MPBs and has a very high efficacy (but not 100%) against mountain pine beetle. Trees in this category should be sprayed on their trunks and as high into the upper reaches until the tree reaches 6" in diameter. The spraying activity will be conducted from the ground using truck or ATV-mounted tank units. Safety is a primary objective of this treatment and care should be taken when moving into more rugged terrain. The effective range of one of these units is typically no more than 150 feet using hose.

Other insecticide options include the use of pyrethroids, such as "Astro," or a biphenthrin product, such as "Onyx." However, carbaryl is the most commonly used and effective insecticide.

This treatment would also include monitoring for treatment effectiveness as well as groundwater and water quality.

2. Mark and Remove Trees within Hardwood Areas

The purpose of this treatment is to remove pines from hardwood stands to provide a greater level of forest diversity and reduce susceptibility to mountain pine beetle. Trees identified for removal can be cut and scattered or chipped on-site or removed from the site depending on the number of trees involved and accessibility. It would be best if this was done prior to beetle infestation so that there are more options available for the disposal of the wood. Consideration should be given to leave the uninfected wood on the ground, if it does not contribute to abnormal fuel loading, so that it can provide wildlife habitat and nutrients back into the soil.

3. Thin Forest at a Variable Density

This thinning would substantially open the forest allowing the remaining trees open to more sun and nutrients thereby providing for a mosaic of forest stands making for a more sustainable and healthy forest which will be more insect and fire resistant. This thinning is done to trees that are not currently infested with mountain pine beetle. Selectively removing trees to increase the vigor of the remaining trees and their ability to withstand mountain pine beetle attacks also promotes the goal of a healthy forest. Thinning would occur in conjunction with and ancillary to hazard fuel

reduction projects. The sap from freshly-cut ponderosa pine trees contains turpentine, which can attract mountain pine beetles. The slash piles themselves can become infested, which can lead to the spread of mountain pine beetles. For this reason, tree thinning should occur when trees are driest (August through December). To prevent the spread of mature beetles, burning must occur before the beetles fly, usually in early July. If the cut wood has not dried sufficiently then the logs should be laid flat on the ground or removed. Fuels reduction projects are not specifically designed to address mountain pine beetle management, but can help to reduce the spread of beetles. Within developed areas of the Memorial, thinning should remove trees that are 6" diameter and smaller depending on aesthetics, fuel loads, and viewsheds.

Mountain Pine Beetle and Fire Buffer

As a part of this treatment specification it is recommended that a buffer be developed along the boundary of the Memorial and the Black Elk Wilderness. This buffer would consist of a 300' thinning buffer along the Memorial boundary on the west and south sides. The thinning would follow forest health practices and be thinned to a 40-60 basal area density. This buffer would be a preventative against mountain pine beetle attack and it would also be a benefit as a fire buffer.

B. Control

The treatment specifications listed below are those activities that will directly manage infested mountain pine beetle trees. The treatments essentially cut down infested trees and then either remove them from the area to a safe place or buck the tree up into firewood lengths to facilitate the drying of the tree thereby killing the beetles. The best method to kill the beetles is to remove the bark to expose the beetle to the sun and drying the wood. Once cut the tree should be removed or if left in place then the wood should be burned or the bark removed before beetle flight in early July.

1. Mark and Remove Infested Trees – Lop & Scatter

Based on a thorough and systematic search of the Memorial this treatment will cut and remove individual beetle-infested trees to stop insect spread and prevent further mortality in the area. Beetles can bore into a tree just above the soil line, so trees must be cut flush with the ground whenever possible. This technique will be used in close proximity to developed areas within the park to protect high-value trees in developed areas of the park and other areas that are accessible by vehicle and the wood removed. This technique would not ordinarily be used in fuels management areas, but can be employed when the extent of the infestation, proximity to developed areas, tree density and other factors warrant. In more inaccessible areas this technique would be used when live insects are present, and therefore tree felling, lopping and scattering, chipping, burning, or stripping the bark can be used if the cut wood is left on-site.

Trees marked for removal should be located using GPS and mapped in GIS. Tree parts left for burning should also be mapped using GPS.

It is necessary in order to mark infested trees for removal that mountain pine beetle infestations be recognizable. Here are the signs to look for if a tree is infested:

Trees larger than 8 inches DBH should be carefully evaluated. The mountain pine beetle begins attacking most pine species on the lower 30 feet of the trunk. There are several signs to look for when surveying trees to determine if they are infested with live mountain pine beetles.

- **Pitch Tubes** – When trees are not under stress, they will generally respond to a beetle attack by producing moderate to copious amounts of resin or pitch which flows out of the bark from the entrance holes produced by attacking beetles. Attacking beetles are often able to work their way through the pitch and to successfully attack the tree. Evidence of a successful attack is often a hole (or tube) that passes through the pitch to the tree. Pines under stress or suffering from drought may produce no pitch at all. Pitch tubes should not be used as a sole indicator of an infested tree.

Upon careful examination, pitch tubes may reveal the presence of adult beetles, which indicate that the tree was able to dispel at least some of the attackers. Depending on the health of the tree and number of attacking beetles, a tree may be successful in warding off an attack. A tree can be attacked over several years and still be successful in warding off these multiple attacks. This can be seen in different ages of pitch tubes. If there are a large number of fresh pitch tubes on the trunk of a tree there is a high probability that the tree will die from the attack.

If pitch tubes are hard to the touch and crumble when crushed in the hand, the tree has not been recently attacked. If the tree's foliage is still green in early summer, then the attack may have been unsuccessful (i.e., the beetles failed to kill the tree), particularly if the pitch tubes are hardened.

- **Boring dust (frass)** – Frass in bark crevices and around the base of a tree is often the sign of a bark beetle attack. A large amount of frass is an indication of a successful attack. However, frass does not necessarily mean the tree contains live bark beetles, and other symptoms should be checked to verify if live bark beetles exist. Also, frass can be created by other species of beetles. Trees that contain other species of beetles should not be removed.

- **Holes in the bark of the tree** – Adult beetles entering a tree will bore a hole through the bark to reach the phloem. These holes are typically located in cracks and crevasses between bark plates where the bark is thinnest. In healthy trees, these holes will usually include pitch tubes.

  Adult beetles feed within the tree before they emerge; when several feeding chambers coalesce, adults occur in groups under the bark. One or more beetles will then make an exit hole from which several adults will emerge. Exit holes are about 3/32 inch in diameter, they do not exude pitch and can occur anywhere on the trunk of the tree. Holes located on the bark surface and not between bark plates are almost always exit holes. The presence of exit holes is a sign that the adult beetles have left the tree and the tree may no longer be infested.

- **Foliage** - A healthy tree will have dark green needles whereas a tree that is dying will have light green to yellow needles. In late spring or early summer, trees with pitch tubes, boring dust and yellowing needles are usually infested and contain live beetles. Trees with brown needles and no green foliage may no longer contain live beetles. Further evaluation, such as debarking a small part of the tree, will verify if there are live beetles.

- **Debarking** - If there is still uncertainty if a tree contains live bark beetles, a hatchet, machete or drawknife can be used to remove a piece of bark to check for eggs, larvae, pupae and/or adults in the phloem layer of the tree and also look for the blue stain indicating the tree is infected with blue stain fungus and will die.

- **Blue Stain** – An associate of pine bark beetles is a fungal microorganism better known as "blue stain." During colonization, female beetles tunnel throughout the phloem tissue of the tree where they lay their eggs. As carriers of blue stain, the beetles induce thousands of low dosage fungal inoculations over a large portion of the tree bole allowing the fungus to become well established throughout the phloem before invading the sapwood (xylem). Sapwood occlusion by the blue stain fungus contributes to the quick death of beetle-attacked trees. Trees containing blue stain fungus will usually die within one year of being infected.

  The presence of eggs, larvae, pupae and/or adults and blue stain fungus under the bark are definite signs that a tree has been successfully attacked by bark beetles and will not

survive. The presence of blue stain fungus alone does not warrant the removal of a tree, as the beetles may have already emerged.

2. Mark and Remove Infested Trees – Whole Tree Removal

This treatment involves the removal of the infested whole tree. The reason for removing the whole tree is because the cutting and subsequent lopping and scattering would put too much fuel loading onto the site. This treatment would reduce the local beetle population on-site and reduce the spread of mountain pine beetle to adjacent areas. The trees would need to be removed to a "safe" site for treatment to kill the beetles. Removal can be made by either a truck if the area is accessible or by air if the area is not accessible by vehicle.

3. Verbenone Experimental Treatment

Verbenone is a pheromone, which are message-bearing chemicals emitted by mountain pine beetles, which can be artificially synthesized and are commercially available as lures to repel mountain pine beetle. It is an anti-aggregation pheromone. In addition, artificial pheromones can be used to bait a tree. These are aggregation pheromones. Mountain pine beetles concentrated within the baited trees can then be removed or destroyed. Pheromone traps can also be used to capture flying beetles. Presently there is no effective anti-aggregation pheromone for the mountain pine beetle in the Black Hills. Working with the USFS and others this treatment will explore the use of Verbenone and other pheromones to determine the feasibility of the use of pheromones within the Black Hills and the Memorial.

C. Monitoring

1. Monitor for Treatment Effectiveness and Forest Health Conditions

Monitoring is essential in evaluating control techniques. The Memorial will monitor mountain pine beetle infestations and control techniques. Techniques to be monitored include spraying, thinning, and prescribed fire techniques to determine if treatments are effective in protecting high-value trees and managing the spread of mountain pine beetle.

2. Monitor and Treat for Non-native Plants

The non-native plant monitoring and control specification outlines control of populations of non-native plants within and adjacent to treatment areas. Non-native plants will be treated immediately so that they do not have the opportunity to become established. Non-native plant control will help to maintain the ecological integrity and site productivity of native floristic communities. The Memorial should implement a "Good Neighbor" policy and control non-native plants on private lands in the public/private interface. The areas to be monitored include all of the treatment areas that disturbed the soils as a result of the treatment. These include those areas that will be mechanically thinned as well as those areas that will be burned by prescribed fire. The total acreage to be monitored for non-native plants are those acres that have be treated by thinning. The approximate acreage to be thinned is 975 acres and that is the acreage that should be monitored for non-native plants. In addition, the Memorial will burn a total of 1190 acres in prescribed burns. See the Fire Management Assessment, Appendix I. Lands disturbed by thinning activities will see the short-term invasion of non-native plants i.e., houndstongue (*Cynoglossum officinale)*, Canada thistle (*Cirsium arvense*), and mullein (*Verbascum thapsus*). Areas monitored and treated should be documented using photography, topographic maps, and GPS/GIS technology. Control methods for treating non-native plants will use Integrated Pest Management techniques including physical, mechanical, and chemical methods based on the non-native plants discovered.

V. CONSULTATIONS

Name, title, and agency	Telephone
Kurt Allen, Service Center Leader, USDA Forest Service-Rocky Mountain Region	605-716-2781
John Sowl, Regional Integrated Pest Management Coordinator, NPS Midwest Region	402-661-1872
Carol DiSalvo, Integrated Pest Management Program Coordinator, NPS WASO	202-513-7183
Jeff Connor, Resource Management Specialist, Rocky Mountain National Park, CO	970-586-1296

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Kurt Allen, Entomologist, US Forest Service, Rocky Mountain Region, Rapid City, SD	605-716-2781
Erv Gasser, IPM Coordinator, National Park Service, Pacific West Region, Seattle, WA	206-220-4263

Mount Rushmore National Memorial
Mountain Pine Beetle
Resources Assessment & Action Plan

CULTURAL RESOURCE ASSESSMENT

I. OBJECTIVES

- Assess potential affects to cultural resources, including historic and archaeological sites and properties significant to Tribes, affected by Mountain Pine Beetle (MPB) infestation or treatment of the infestation.
- Meet legal compliance including tribal consultation.
- Avoid or minimize adverse effects to cultural resources that may occur due to recommended treatments, and mitigate adverse effects that are not avoidable.

II. ISSUES

- Cultural resources may potentially be affected by MPB infestation, including increased threat of fire damage and damage to viewsheds within the cultural landscape.
- Cultural resources, including the landscape, archaeological sites and sites of tribal concern, may potentially be affected by recommended treatments.

III. OBSERVATIONS

A. Background

Many cultural groups have lived in and utilized the Black Hills. Earlier groups that were more nomadic tended to use the hills as a seasonal hunting area. Later groups utilized the hills with more frequency and many have a spiritual and or religious connection to the area.

Of the cultural groups known to have existed on the Plains, the earliest are those of the Paleo-Indian Tradition: These are the nomadic tribes who occupied the region from 13,000 to 4,000 B.C. Their movements followed the large game animals they hunted on the open plains and through the seasonal migration.

The period after about A.D. 900 marks the coming of the Plains Village cultures into the region. These are characterized by sizable populations located in sedentary villages where they planted corn, practiced horticulture, and made many varieties of ceramic wares. These groups were primarily centered on the major rivers where a good source of farmland could be found. The use of the Black Hills by these groups is known, but the full extent has not yet been determined.

By the 16th and 17th centuries, many of the village groups were displaced by nomadic groups. Of these groups known to have laid claim to the Black Hills region were the Plains Apache, Kiowa, Comanche, Kiowa-Apache, Arapaho, Arikara, Cheyenne, and finally the Lakota, or Teton Sioux, who inhabited the Black Hills region at the time of the Euro-American migration in the mid to late 19th century.

The Lakota entered the Black Hills near the end of the 18th century. The original Sioux nation ranged from Canada to Missouri and from Minnesota to Montana. Forced east from Minnesota by advancing white settlement and other tribes, the greater Sioux nation abandoned their culture as a woods-dwelling, agricultural society and thrived on the Plains. Their use of the forest is recorded only as transient shelter; as a result there is little evidence of persistent historical occupation by the Sioux in the area.

The Sioux called the hills Paha Sapa (black hills) or Khe Sapa (black mountains) because they were so heavily wooded with dark pine and spruce that from a distance they looked black. They were also called Wamakaognaka E'Cante, meaning the "Heart of Everything That Is" and O'onakezin, Place of Shelter. For the Sioux, the Black Hills are the dwelling place of the Great Spirit, Wakan Tanka, who is said to have declared the Hills the "Heart of the Earth". They continue to use them for spiritual renewal and for tribal ceremonies as well as historical uses as a means of transient shelter from severe weather, for providing water and food, lodge poles for tipis, and medicinal plants for healing.

In the middle of the nineteenth century, encroachment by white people into Sioux territory encouraged by the Homestead Act of l862 brought a flood of settlers to the West and led to many protracted and bloody confrontations.

The Treaty of Fort Laramie in Wyoming, signed in 1868 between the federal government and the Sioux, was intended to put a stop to these confrontations and established a permanent Great Sioux Reservation. The original terms of the treaty declared the reservation to be 26 million acres in the Dakota Territory west of the Missouri River including the Black Hills and specified hunting rights on an additional 30 million "unceded" acres extending south to the North Platte River in Nebraska and west to the Big Horn Mountains in Wyoming. The treaty ended hostilities between the Sioux and the United States Government. However, almost from the moment it was signed, the treaty was violated on multiple occasions until it was completely disregarded by the United States.

The pressures of white settlement and the discovery of gold in the Black Hills in 1874, however, led the government to try to purchase or lease the Black Hills. In 1877, Congress ratified the Manypenny Agreement, which transfers ownership of the Black Hills to the Federal Government without compensation to the Sioux and decreed that any Indian found off the reservation be considered "hostile". The agreement insisted that the Sioux shift to a farming economy on the poor soil of the reservation lands left to them. This left the Sioux totally dependent on the government for rations of food and clothing in order to survive.

The Dawes Act, also known as the General Allotment Act, of 1887 created further physical and spiritual divisions for the Sioux by fragmenting reservation land. The act divided the Sioux territory into six smaller, isolated reservations (called 'agencies' at the time) and forced them to hold land as individuals rather than as a tribe. Unfortunately, most of the land allotted through the act was not agriculturally viable. This same land was also to be held in trust for twenty-five years ensuring that the Indians could not sell their land. The Burke Act of 1906 was offered as an amendment to the Dawes Act. It allowed those Indians deemed "competent" by the government to be granted titles and allowed to sell their land as they wished. Ultimately, under this act, whites took more native land.

Twentieth century legislative treatment of the Sioux by the federal government began in 1903 with the Supreme Court decision of Lone Wolf v. Hitchcock, which upheld the violation of the 1868 Ft. Laramie treaty. The Sioux followed with multiple attempts through the legal system to regain the Black Hills. Congress created the Indian Claims Commission in 1946 to hear tribal claims against the U.S. Government. In 1975, the ICC ruled unconstitutional Congress's law of 1877 which took much of the land (including the Black Hills) of the Great Sioux Reservation from the Sioux Nation. The commission offered monetary compensation as settlement but it was refused by the Sioux and this amount has been held in trust since the decision. The Lakota leaders continue to demand the return of the Black Hills to the Sioux and various legislative attempts have been made such as the Bradley Bill, authored by New Jersey Senator Bill Bradley, in 1985.

In 1971, as part of a non-violent protest by the American Indian Movement (AIM), Mount Rushmore became an occupied site by twenty protesters demanding that the U.S. Government honor the terms of the 1868 Fort Laramie Treaty. The occupation lasted a week and was peacefully resolved between the Native Americans and National Park Service personnel.

Sites found during an archaeological survey within the Mount Rushmore National Memorial (Memorial) demonstrate the ongoing use and presence of Tribal people in the vicinity for

thousands of years.

History and significance of Mount Rushmore National Memorial
The following is taken from the Mount Rushmore National Memorial National Register nomination (1985) and Cultural Landscape Inventory (1999 revised 2008):

Sculpting a monument in the Black Hills was the brainchild of South Dakota State Historian Doane Robinson as a promotional effort for the State of South Dakota. Gutzon Borglum was chosen to carry this grand work out. At the time Borglum was in Georgia, carving a Confederate memorial on Stone Mountain. The historian enticed the sculptor with the proposal that the Black Hills offered 'opportunities for heroic sculpture of unusual character'.

Borglum had already enjoyed nearly forty years as a successful artist and sculptor by 1924. The evolution of his work shows the development of his nationalism and ideology, his increasingly larger concepts of the nation and its new role in the world. Gutzon Borglum's career began in California in the 1880s, where he produced landscapes idealizing the West. His work was typical of the late 19th century in which the West embodied values of resilience, bravery, and self-reliance. From 1889 to 1900, he and his wife Lisa (also an artist) traveled to Europe, where Borglum encountered French sculptor Auguste Rodin and symbolism.

Borglum's tours of Europe also impressed upon him the need to create gigantic American art. In 1901 he concluded that 'the amazing and expanding character' of American civilization 'clearly demands an enlarged dimension-anew scale'. Thinking in these terms, Borglum derisively observed by 1916: “There is not a monument in this country as big as a snuff box”. He would eventually state that the United States was living in an age of the colossal. 'Our age will some day ... be called the 'Colossal Age'.'

The opportunity to create a monumental sculpture meant the attainment of Borglum's dreams. He was invited to create an enduring monument to America in the Black Hills, placed high in the western heartland of the continent, hewn from the stone itself. The work would be more than a mere portrait gallery of great United States Presidents. It would represent Borglum's vision of the spirit of those men, and the spirit of the country.

Mount Rushmore National Memorial was established on October 1, 1925. Work began in 1927 and was completed in 1941. The Memorial was established to commemorate and “symbolize the spirit and ideals of the westward expansion of America and the growth of democratic ideals and institutions.”

The sculpture also illustrates the importance of the four presidents represented to the forming and growth of our nation. Mount Rushmore National Memorial is significant at the national level for: 1) its illustration of an important theme in our nation's history; 2) its important association with the lives of the four presidents represented; and 3) its representation of the work of a master and artistic value.

The sculpture is the key element of the historic district. Other resources include the facilities developed to create the sculpture, including the sculptor’s studio, and office/residence. Other character defining features of the site include historic retaining walls, culverts, walkways and stairways.

B. Findings

Field reconnaissance, records searches, and review of national register and cultural landscape inventory documentation resulted in the following findings:

- MPB infestation could result in heightened fire danger which could cause a direct adverse effect on irreplaceable, nationally significant resources at Mount Rushmore National Memorial, primarily the developed area from which the planning and staging for the sculpture was carried out
- MPB infestation could result in major loss of ponderosa pine trees that form a significant

part of the cultural landscape of the Memorial. This would dramatically and adversely affect historic view sheds

- 43 archaeological sites were inventoried during an archaeological survey undertaken in 2006-7. It is anticipated that no adverse effects would occur to these sites based on recommended treatments
- Cultural Resource personnel will need time to demarcate areas where extra care is necessary. These areas will include but not be limited to archaeological sites, view sheds and within the vicinity of historic resources

IV. RECOMMENDATIONS

A. Recommendations

The Project Manager for recommended actions will ensure archaeological sites are monitored for disturbance after thinning is complete. See specification on this position.

B Management Recommendations – Non-Specification Related

- Prior to carrying out thinning activities a single point of reference photographic record of each National Register (NR) eligible archaeological site should be acquired.
- After carrying out thinning activities and annually thereafter each NR eligible site should be monitored for disturbance, including a new photograph taken from the original point of reference.
- Trees removed during thinning activities should be removed from areas that have been demarcated as sensitive areas by cultural resource personnel.
- Pesticide spraying should be conducted without vehicles being driven across NR eligible sites.
- Thinning within demarcated areas should be carried out without the use of heavy equipment that may damage the resources.
- Prior to thinning within the developed area, the Midwest Regional Office-Cultural Resources Division-Cultural Landscapes Program should be consulted to ensure historic view sheds are not adversely affected.
- Complete consultation with Tribes and SHPO under Section 106 of the National Historic Preservation Act.

V. CONSULTATIONS

Name	Contact Info	Purpose of Contact
Paige Hoskinson Olson	SD SHPO	Initiate Section 106 compliance
Bill Hunt	NPS MWAC	Initiate Section 106 compliance with regional office
Geoffrey Burt	NPS MWRO	Initiate Section 106 compliance with regional office

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Stephen C. Rogers, Architectural Historian, National Park Service, MWRO, 601 N Riverfront Drive, Omaha, NE 68102 (402)661-1912

Mount Rushmore National Memorial

Mountain Pine Beetle
Resources Assessment & Action Plan

FIRE MANAGEMENT ASSESSMENT

I. OBJECTIVES

- Evaluate and assess Mountain Pine Beetle (MPB) impacts on fire hazard/crown fire potential in forests of Mount Rushmore National Memorial (Memorial).
- Determine the strategy and tactics necessary to lessen the potential for stand-replacing wildfire in the Memorial.
- Develop both short and long-term treatment strategies for hazard fuel reduction.

II. ISSUES

- Increasing potential for crown fire in Mount Rushmore forests as a result of high tree densities and ladder fuels.
- Increasing potential for crown fire in Mount Rushmore forests as tree mortality increases resulting from MPB infestation.
- Visitor safety as a result of treatment activities and from hazard trees.
- Prioritizing treatment prescriptions and methods based on susceptibility to MPB infestation and proximity to current outbreak.
- Coordinating treatment actions with surrounding agencies, work groups, and neighbors.
- Protecting developed areas in the memorial from wildfire, especially visitor areas and historic sites.
- Fire suppression planning
- Fire prevention
- Impacts of broadcast chipping on vegetation and soils
- Difficulties associated with burning hand piles during winters with unreliable snow cover.

III. OBSERVATIONS

A. Background

Ponderosa pine (*Pinus ponderosa*) forests have changed considerably during the past century, partly because recurrent fires have been absent for a century or more. Exclusion of episodic surface fires in ponderosa pine forests in the Black Hills has resulted in changes in forest structure, including increased tree densities and ladder fuels. These changes have increased the likelihood for widespread, catastrophic crown fires (Sheppard and Battaglia 2002, Brown and Cook 2006). The last widespread wildfire to burn through the Memorial occurred in 1893. An extensive crown fire at Mount Rushmore would severely impact the ecological and aesthetic setting of the sculpture. These conditions also make the forests of the Memorial very susceptible to mountain pine beetle infestation. If significant tree mortality were to result from MPB attack, increased crown fire potential would exist for one to two years while dead needles remained on the trees. Once the dead snags begin to fall, surface fuel loads would increase dramatically, further increasing the potential for catastrophic wildfire.

The historical fire regime at Mount Rushmore is best characterized as one of low-severity surface fires with occasional small patches of passive crown fire. The historical fire frequency at the Memorial was approximately 15-17 years, with a range of 3-39 years (Brown et al. 2008). This resulted in a forest with approximately 110 trees per acre and a basal area of 100 ft^2/acre. The ponderosa pine stands of the Memorial maintain many old growth characteristics, however, their structure has changed significantly over the past century. A