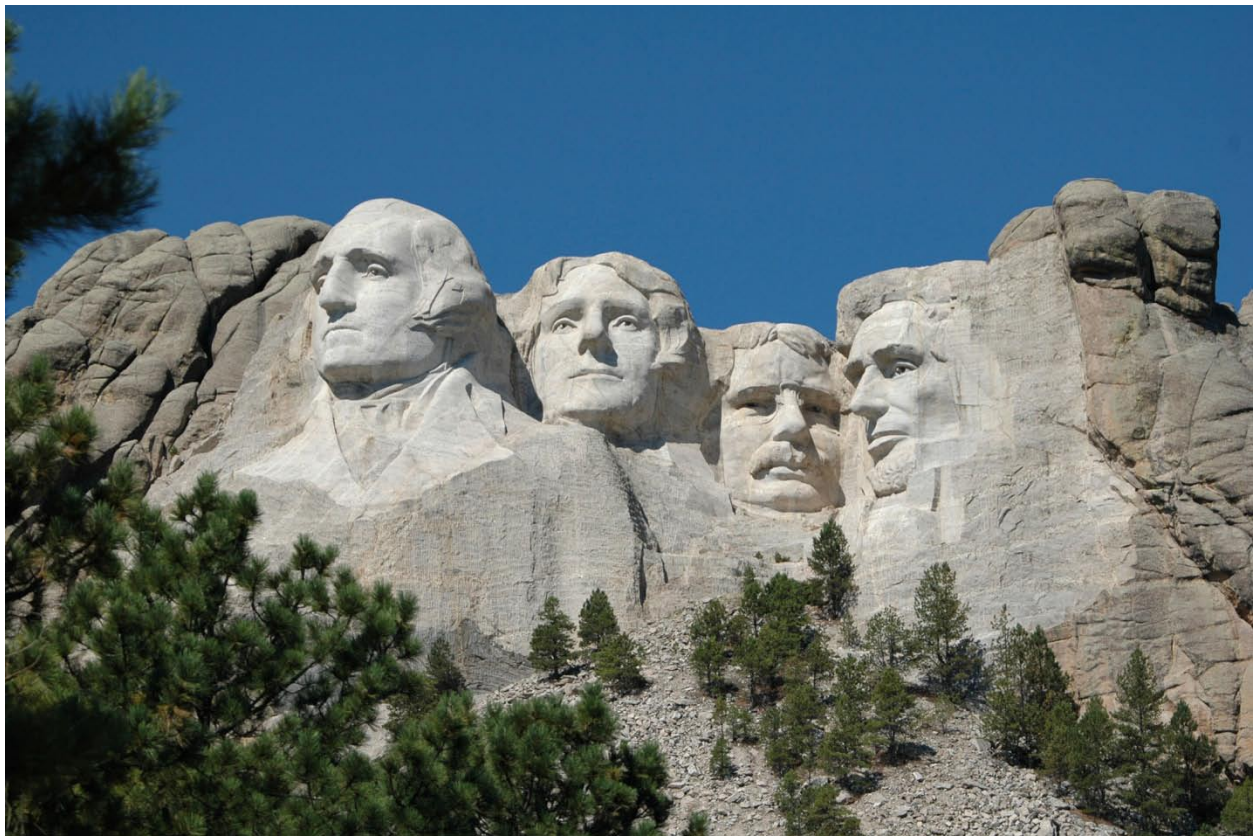


Mount Rushmore National Memorial
Mountain Pine Beetle
Resource Assessment and Action Plan



NATIONAL PARK SERVICE

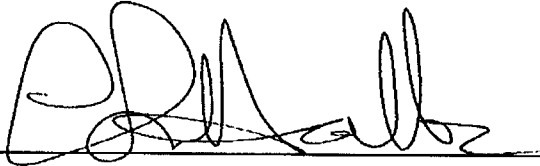
Mount Rushmore National Memorial, South Dakota

April 2010



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

REVIEW AND APPROVAL -- National Park Service



Recommended by Rapid Resource Assessment Team – Chris Holbeck, NPS

4/22/2010
Date



Gerard Baker, Superintendent, Mount Rushmore National Memorial, NPS

4/23/10
Date

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

EXECUTIVE SUMMARY

A landscape-level mountain pine beetle (MPB) epidemic is occurring in the central Black Hills of South Dakota. The most active area of MPB infestation and highest concentration of tree mortality is in close proximity to Mount Rushmore National Memorial. Tree mortality has reached nearly 100% in much of the affected area, and the oncoming infestation has recently been observed within the Memorial. The current outbreak appears to be larger and more widespread than historically typical. The outbreak may be caused in part by overly dense stands of ponderosa pine caused by years of fire suppression. The plan recommends thinning the forest to make it fire and insect resistant, protecting high value scenic vista trees, and suppressing the outbreak by treating green affected trees. These actions, especially hazard fuel thinning may help restore the forest of the memorial to one that is more consistent with a natural, historic condition.

Mountain Pine Beetle

Mountain pine beetle (*Dendroctonus ponderosae*) is a native species. In the Black Hills it primarily attacks ponderosa pine. Populations of mountain pine beetle are typically found at low or endemic levels, reproducing in the trees of stressed and overly dense forests. MPB epidemics are cyclic in nature, driven by certain environmental conditions that cause beetle populations to increase dramatically, correspondingly other environmental conditions then cause the epidemic to decline. Dead and dying trees increase fuel loading, which increases fire danger. The current epidemic threatens visitor safety, visitor enjoyment, as well as cultural and natural resources of the Memorial.

Mount Rushmore Forests

Ponderosa pine (*Pinus ponderosa*) forest is the dominant vegetation at the Memorial. Because forests of the Memorial have been protected from timber harvest, these stands maintain many old growth characteristics. However, they have become much more dense over the past century due largely to fire suppression. 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, or return interval, was approximately 15-17 years, with the last widespread wildfire burning through the Memorial in 1893. Subsequently, today's forest has an abundance of small, young trees and fewer large, old trees across the landscape. These conditions make the forest overly dense, and susceptible to severe wildfires and insect outbreaks.

Rapid Resource Assessment

On Tuesday February 23, 2010, a National Park Service Rapid Resource Assessment Team (RRAT) arrived at the Memorial to evaluate the potential impacts of mountain pine beetle infestation in the ponderosa pine forests of the Memorial and to develop an action plan to mitigate the potential impacts. The team met with memorial staff, local, state, and federal partners for an in-briefing to understand the issues, develop objectives, and begin to develop an action plan.

Issues of importance identified at the in-briefing include:

- Loss of legacy forest due to MPB or wildfire
- Trees with cultural significance
- Loss of park infrastructure from wildfire
- Historic significance of the sculpture and surrounding forested landscape
- Visual aesthetics of large significant trees in proximity to the sculpture
- Ecological integrity

- Treatment effectiveness
- Water quality associated with insecticide
- Communication and public relations
- Visitor and employee safety
- Historic forest structure
- Coordination with park neighbors
- Exotic plants
- Catastrophic wildfire

The team identified the following primary objectives of the Mountain Pine Beetle Resource Assessment and Action Plan:

- Evaluate potential impacts of mountain pine beetle (MPB) infestation on forests of the Memorial
- Determine strategies and tactics necessary to mitigate the impacts of MPB
- Develop both short and long-term treatment strategies for MPB
- Develop appropriate fire management strategies to defend the Memorial from unwanted fire
- Evaluate fire ecology and fire management strategies
- Provide long-term sustained healthy forest ecosystems
- Identify geographic treatment units, and establish treatment priorities for each unit
- Develop cost estimates for treatment plans
- Develop an action plan for implementation
- Evaluate proposed actions within the scope of NPS policy and legislation
- Maintain and strengthen relationships with neighbors, partners, state & local governments

The team consulted with interagency forest specialists including professionals from the U.S. Forest Service, Custer State Park, U.S. Fish and Wildlife Service, United States Geological Survey, and South Dakota State University. Through consultation and staff involvement an action plan was drafted. The draft plan was made available for public comment for 15 days. Public and staff comments are incorporated in the final plan found [here](#).

Mount Rushmore Management Direction

A General Management Plan (GMP) for the Memorial was completed in 1980. The National Park Service is engaged in a planning process leading to a new GMP. Through that process the Memorial has created a Purpose Statement, identified a Significance Statement, and identified Fundamental Resources and Values.

Purpose Statement:

“The purpose of Mount Rushmore National Memorial is to commemorate our national history and progress, and to preserve and protect the sculpture and the historic, cultural, and natural setting while providing for the education, enjoyment, and inspiration of the public.”

Significance Statements:

- Mount Rushmore is an internationally recognized symbol representing the ideals of freedom and democracy for all.
- Mount Rushmore preserves a diverse ecological landscape in a dramatic setting of granite walls and spires.
- Mount Rushmore preserves one of the largest contiguous stands of old growth ponderosa pine forest and associated habitat remaining in the Black Hills region.
- The sculpting of Mount Rushmore is an early example of heritage tourism as an economic revitalization tool.
- Mount Rushmore is a marvelous engineering achievement.

- The carving is an artistic expression that forever changed the natural landscape to create a cultural icon reflecting the nation's history.

Fundamental Resource and Values:

- The sculpture
- The natural setting
- The American story
- Unimpeded views of the sculpture

These resources and values maintain the Memorial's purpose and significance, and if these resources are allowed to deteriorate, the Memorial's purpose and significance would be jeopardized.

In 2004 the park prepared a Fire Management Plan (FMP), including an Environmental Assessment, and Finding of No Significant Impact. The FMP outlines the need of fire management in order to return the forest to its historic condition. One hundred years of fire suppression within the Memorial has caused an imbalance in the forest health and condition. The FMP outlines a plan of action to make the Memorial defensible against wildfires while also returning the forest to a sustainable condition. Many of the actions in this action plan comply with actions evaluated in the FMP.

Mount Rushmore is managed in a manner consistent with legislation, federal regulations, and NPS policies. NPS policies suggest that we will allow natural processes to occur. NPS policies emphasize a servicewide understanding that natural processes and species are evolving and that the parks will allow this evolution to continue, with minimal influence by human actions. Allowances are considered within the policies for human interaction in natural processes for the protection, restoration, or preservation of the natural environment or human life and safety. The policies state,

The Service will not intervene in natural biological or physical processes, except

- when directed by Congress;
- in emergencies in which human life and property are at stake;
- to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities; or
- when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities.

Any such intervention will be kept to the minimum necessary to achieve the stated management objectives. (*Management Policies 2006*, Chapter 4.1)

Actions within this plan to address and possibly mitigate the MPB epidemic fall within the scope of human intervention within the natural environment for the protection of human health, facility safety, and the restoration of the ecosystem to its natural state. Human intervention is necessary within the scope of this epidemic to mitigate damage due to the pine beetle, restore the forest to a healthy, sustainable condition, and to protect human health and facilities from beetle damaged trees and wildfire risks.

The actions proposed in this plan strike a balance between taking no action, allowing natural processes to occur, and the very aggressive thinning of the forest. The action plan is consistent with federal regulations, including the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA).

Recommendations

NPS management policies suggest that human intervention "will be kept to the minimum necessary to achieve the stated management objectives." (*Management Policies 2006*, Chapter 4.1) With this in mind, a range of actions to address the problem are proposed.

- Protect high aesthetic-value trees by treating with insecticide
- Inventory and treat green infested trees throughout the Memorial
- Thin trees less than 10 inches throughout the Memorial
- Introduce low intensity prescribed fire (after thinning)
- Communicate MPB management issues to the public
- Monitor for exotic plants and treatment effectiveness

Proposed specifications for treatment encompass a suite of treatment options and when taken collectively comprise a multipronged approach to manage MPB, while offering protection from catastrophic wildfire. This plan recommends an approach that would restore the Memorial's forest to a more natural, insect and fire resistant condition.

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

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

The objective of the Rapid Resource Assessment Team (RRAT) is to develop a professionally credible, actionable, and fundable resource assessment and action plan that addresses the presence of Mountain Pine Beetle in Mount Rushmore National Memorial.

Specific Rapid Resource Assessment Team Objectives

- See executive summary

PART A - RRAT TEAM ORGANIZATION

POSITION	TEAM MEMBER / AFFILIATION
Team Leader	Chris Holbeck, NPS – Midwest Regional Office
Forest Health	Erv Gasser, NPS – Pacific West Region
Cultural Resources	Stephen Rogers, NPS – Midwest Regional Office
Historian	Amy Bracewell, NPS Mount Rushmore
Fire Management	Jim McMahon, NPS – Midwest Regional Office
Fire Ecology	Cody Wienk, NPS – Midwest Regional Office
Education and Outreach	Navnit Singh, NPS Mount Rushmore
Education and Outreach	Blaine Kortemeyer - NPS Mount Rushmore
Education and Outreach	Rhonda Schier – NPS Mount Rushmore
Geographic Information	Jon Freeman, NPS – NGP Fire Mgmt Office
Resource Management/Park to Team Liaison	Bruce Weisman, NPS – Mount Rushmore

Resource Advisors: (Note: Resource Advisors are individuals who assisted the RRAT with the preparation of this plan. See the consultations Section of this plan for a full list of agencies and individuals who were consulted or otherwise contributed to the development of this plan.

Name	Affiliation	Specialty
Coe Foss	SD DOA	Forester
Kurt Allen	USFS	Entomologist
John Ball	SDSU	Entomologist
Dan Swanson	NPS Fire	Fire Ecologist
Mike Bynum	NPS I&M	Botanist

Spec #	Title	Units	Cost per Unit	FY10	FY11	FY12	FY13	FY14	FY15	FY16	Total
Administration and Education											
1	Project Manager	1 person detail		\$35,000							\$35,000
2	Education Outreach and Public Information	1 person detail		\$25,000							\$25,000
Prevention											
3	Preventative Spray in developed areas	1000 trees	\$35 per tree	\$35,000	\$35,000	\$35,000	\$35,000	\$35,000			\$175,000
4	Fuels Thinning w/ chipping of 6 inch or less and piling of 7 to 10 inch trees	1,200 acres	\$1,250 per acre	\$1,500,000							\$1,500,000
5	Prescribed fire					\$51,240	\$89,240	\$49,640	\$38,690	\$29,240	\$258,050
6	Verbenone Experimental treatment	6 areas	\$320	\$1,920	\$1,920	\$1,920	\$1,920	\$1,920			\$9,600
Control											
7	Identify and Treat Green Infested Trees	1,200 acres	\$58 per acre	\$69,800	\$69,800	\$69,800	\$69,800	\$69,800			\$349,000
Monitoring											
8	Monitor and Treat for non-native plants	100 acres	\$488 per acre		\$48,800	\$48,800	\$48,800	\$48,800			\$195,200
9	Monitor for Treatment Effectiveness	1200 acres	\$73 per acre			\$88,000					\$88,000
TOTALS				\$1,666,720	\$155,520	\$294,760	\$244,760	\$205,160	\$38,690	\$29,240	\$2,634,850

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

Part C SPECIFICATIONS

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	MPB Action Plan Project Manager	Spec-#	1
FISCAL YEAR(S)	2010	Spec Cost	\$35,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>A. General Description: A COR qualified NPS employee detailed to the memorial to oversee mountain pine beetle projects</p> <p>B. Location/(Suitable) Sites: Mount Rushmore National Memorial</p> <p>C. Design/Construction Specifications:</p> <ol style="list-style-type: none"> 1. Project Manager will coordinate all aspects of the MPB Action Plan including administering contracts, documentation of treatments installed, maintaining financial tracking of cost, providing at least annual reports of treatment progress, submitting supplemental requests for funding, ensuring the completion of all approved treatments, and coordinating treatments with other divisions in the park, other agencies and potential private landowners. 2. Project Manager will coordinate on-the-ground implementation of treatments including site orientation of contractors, developing daily/weekly work plans for contractors/crews, and supervising their work. 3. Project Manager will submit any necessary project funding proposals 4. At completion of the funding period the Project Manager will prepare a final accomplishment report for each of the treatments conducted. <p>D. Purpose of Treatment Specifications (relate to damage/change caused by fire): Due to the complexity of the MPB Action Plan, a Project Manager will provide the Memorial the management, administrative, and fiscal support for proper administration of the short and long-term treatments of the Action Plan. This specification should fund the oversight necessary for the installation of all treatments.</p> <p>E. Treatment consistent with Agency Land Management Plan (identify which plan): Position and grade is consistent with NPS Management Guidelines.</p> <p>F. Treatment Effectiveness Monitoring Proposed: Review of projects, financial accountability, and oversight will be conducted by Chief of Natural Resources, Mount Rushmore National Memorial.</p>
--

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES:	COST / ITEM
One project manager detailed to the park to manage project implementation. Cost is limited to travel cost.	\$35,000
TOTAL PERSONEL SERVICE COST	\$35,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2010	4/15/2010	9/30/2010	F				\$35,000
TOTAL							\$35,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	P, T
3. Estimate supported by cost guides from independent sources or other federal agencies	P, T, E, M
4. Estimates based upon government wage rates and material cost.	P, T
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Executive Summary.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Mountain Pine Beetle Education Outreach and Public Information Operations	Spec-#	2
FISCAL YEAR(S)	2010	Spec Cost	\$25,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>A. General Description: Develop MORU education and outreach interpretive and public information programs</p> <p>B. Location/(Suitable) Sites: Mount Rushmore National Memorial and the surrounding area</p> <p>C. Design/Construction Specifications: N/A</p> <ol style="list-style-type: none"> 1. Produce Press Releases and other media communication for the actions surrounding the MPB plan 2. Represent the park with communication with the public and media concerning the plan actions 3. Assist the park in interpretive and educational opportunities on the MPB epidemic <p>D. Purpose of Treatment Specifications (relate to damage/change caused by fire): Education and outreach</p> <p>E. Treatment consistent with Agency Land Management Plan (identify which plan): Program development and interpretive publications should be consistent with guidelines and themes found in the memorial's General Management Plan, Long Range Interpretive Plan and other management plans</p> <p>F. Treatment Effectiveness Monitoring Proposed: Yearly GPRA surveys, classroom program evaluations and other visitor evaluations can be used to determine effectiveness of interpretive programs and goals.</p>

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES:	COST / ITEM
One PIO/Education Specialist detailed to the park to manage public information during project implementation. Cost is limited to travel cost.	\$25,000
TOTAL PERSONEL SERVICE COST	\$25,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
TOTAL MATERIALS AND SUPPLY COST	

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	
TOTAL TRAVEL COST	N/A
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
	\$
TOTAL CONTRACT COST	N/A

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2010	4/1/2010	9/30/2010	F				\$25,000
TOTAL							\$25,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	E,M
3. Estimate supported by cost guides from independent sources or other federal agencies	E,M
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See education and outreach resource assessment, Appendix I.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Preventative Spray in Developed Areas	Spec-#	3
FISCAL YEAR(S)	2010-2014	Spec Cost	\$175,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>A. General Description: Protect identified high-value trees in developed areas of the Memorial from mountain pine beetle through the use of an insecticidal spray.</p> <p>B. Location/(Suitable) Sites: Trees within developed areas, along roads and major trails throughout the park.</p> <p>C. Design/Construction Specifications:</p> <ol style="list-style-type: none"> 1. 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 significant trees or stands of trees; trees that have high aesthetic importance in the visual aspect, or are deemed important to the park's "front country" scene. These trees would be preventatively sprayed (sprayed prior to beetle infestation) with an approved pesticide for mountain pine beetle. Protection will allow maintenance of existing trees in developed areas and reduce the costs of dead tree removal from these areas. Identified trees would be marked with a metal tag and located with a GPS and mapped in GIS. 2. Application of this insecticide should be done by a licensed pesticide applicator. 3. Pesticides of choice would either be carbaryl (Sevin) or permethrin (Astro or Onyx). 4. Trees will be sprayed with a ground sprayer (mounted in a truck or ATV) to cover the bole of the tree to a height where the tree is 6 inches in diameter. Pesticide treatments to the same tree should be done between April 15 and June 15 each year for approximately the next 5 years or until local beetle populations have declined. 5. Treatments should be completed at a time when there is no rain expected for 4 hours following treatment. Treatments should be done in low wind (less than 5 mph) conditions to reduce the possibility of drift. 6. Locations to be sprayed should be communicated to park staff. 7. Applications should be made at a time of the day when visitation is minimal or when the park is closed to the public (11:00pm-5:00am). 8. Consideration should be given to signing treated sites. 9. Access to treated sites is possible when the spray has dried on the tree, generally 4 hours after spraying. 10. Project Manager to oversee this treatment and act as COTR. See Project Manager Specification. <p>D. Purpose of Treatment Specifications (relate to damage/change caused by fire): To protect live high-value trees from being attacked from mountain pine beetle in developed areas.</p> <p>E. Treatment consistent with Agency Land Management Plan (identify which plan): Treatment is in line with NPS Management Guidelines and policies.</p> <p>F. Treatment Effectiveness Monitoring Proposed: Visually inspect protected trees every September/October post spray to make sure none have been attacked. Record tree information and treatment in a database. Monitor surface and groundwater quality to be sure that spray runoff is not impacting water quality.</p>
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LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
Project Manager to complete project oversight and COTR. See Project Manager Specification.	
TOTAL PERSONEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	

TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	
TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
\$35/tree @ 1000 trees/year x 5 years	\$175,000
TOTAL CONTRACT COST	\$175,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2010	4/15/2010	6/15/2010	S	trees	\$35	1000	\$35,000
2011	4/15/2011	6/15/2011	S	trees	\$35	1000	\$35,000
2012	4/15/2012	6/15/2012	S	trees	\$35	1000	\$35,000
2013	4/15/2013	6/15/2013	S	trees	\$35	1000	\$35,000
2014	4/15/2014	6/15/2014	S	trees	\$35	1000	\$35,000
TOTAL							\$175,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies	C
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Forest Health Assessment Appendix 1, and Beetle Risk Map, Appendix IV.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Fuels thinning w/ chipping of 6 inch or less and piling of 7 to 10 inch trees	Spec-#	4
FISCAL YEAR(S)	2010	Spec Cost	\$1,500,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>A. General Description: There are a significant number of stands of old growth ponderosa pine within Mount Rushmore National Memorial. Due to successful suppression practices in the area, the ponderosa regeneration has grown significantly and poses a danger to the large ponderosa pine as ladder fuel should a fire come into the area. The objective of this thinning project is to enter the area and thin all ponderosa pine 6-inch diameter at breast height (DBH) and smaller and chip it on sight with dispersal to be spread out with the use of an articulating chipper. 7 inch to 10 inch DBH ponderosa pine would be cut and hand piled for later burning.</p> <p>B. Location/(Suitable) Sites: Thinning and chipping locations are located throughout the entire 1,278 acre Mount Rushmore National Memorial.</p> <p>C. Design/Construction Specifications: Treatments will be implemented in accordance with the following:</p> <p><u>Specifications</u></p> <p>Because the unit is in Mount Rushmore National Memorial, minimizing the visual evidence of work, and minimizing the impacts on leave trees is of great importance.</p> <ol style="list-style-type: none"> 1. Chainsaws used in project area will have approved spark arresters (.023-inch mesh screen) 2. Cut and chip green ponderosa pine with a DBH of 6 inch and less. Trees from 7 inches to 10 inches will be cut and hand piled as well as any paint marked trees. 3. All stumps will be cut parallel to the ground and cut no higher than one inch above the ground 4. All slash will be piled on site in a manner that facilitates safe burning at a later date 5. Chip specs as follows: <ul style="list-style-type: none"> → Chipped material will be left in place and must remain within the unit boundaries. No areas shall have chips greater than 3 inches deep 6. Pile specs as follows: <ul style="list-style-type: none"> → All stems and tops from cut trees shall be piled. → Slash piles will not be located on top on stumps or downed logs → Only wood that is cut will be piled. Leave previous dead and down in place. → All felled trees will be completely limbed. → Piles should be in a cone or teepee shape so they will collapse inward as they burn → Piles will be constructed in a compact way with little air space inside pile so that COTR will not be able to push a closed fist through the pile → All slash will be bucked to 5 feet or less before piling. → All stems and tops from cut trees shall be piled. → Previous storm damaged trees already on the ground WITH needles shall be bucked, top down until the stem is greater than 5.0 inch D.B.H. The remaining stem shall be left on the ground. → All slash piles will be a minimum of 4 feet in diameter and 4 feet high and a maximum of 6 feet diameter and 6 feet high. All ends that stick out of piles must be bucked off and piled. → Slash piles will be placed in the center of openings between trees and no closer than 20 feet from existing standing trees or closer than 10 feet from each other. 7. The contractor shall NOT use any mechanized equipment to construct the piles. 8. To ensure field crews understand and remember all the specifications, the contractor will keep a copy of the statement of work on site during operations. <p><u>Limitations</u></p> <ul style="list-style-type: none"> ▪ No off road vehicle use ▪ All work associated vehicles will park together in designated area ▪ Use of motorized equipment other than hand held equipment will not be permitted ▪ Avoid cutting Aspen and birch ▪ All conduct outside the specified work is subject to park rules and regulations concerning: littering, wildlife harassment, collecting, resource damage and other topics as specified for the NPS in the Code of Federal Regulations title 36 <p>D. Purpose of Treatment Specifications: In light of over one hundred years of suppression practices in the area the ponderosa regeneration has grown significantly and poses a danger to the large ponderosa pine as ladder fuel should a fire come into the area</p> <p>E. Treatment Consistent with Agency Land Management Plan: Mount Rushmore National Memorial, Midwest Region, National Park Service. Fire Management Plan and associated Environmental Assessment.</p> <p>F. Treatment Effectiveness Monitoring Proposed: NPS Fire Effects Monitoring protocols will be conducted following treatment to determine treatment effectiveness.</p>	
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LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
Total Personnel Service Cost	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
Total Equipment Purchase, Lease Or Rental Cost	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Total Materials and Supply Cost	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
Total Travel Cost	\$ 0
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
\$2500 a acre per National Fire Plan IDIQ Fuels site x 600 acres	\$1,500,000
Total Contract Cost	\$1,500,000

SPECIFICATION COST SUMMARY

[illegible]

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser. V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	C
3.	Estimate supported by cost guides from independent sources or other federal agencies	E,M
4.	Estimates based upon government wage rates and material cost.	
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

Treatment Unit Map (appendix 4)

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Prescribed Fire	Spec-#	5
FISCAL YEAR(S)	2012- 2016	Spec Cost	\$258,050

WORK TO BE DONE (describe or attach exact specifications of work to be done):

<p>A. General Description: The use of prescribed fire will decrease fire related risks to life, property and Park resources. Reintroduction of prescribed fire will increase ecosystem health in Mount Rushmore National Memorial.</p> <p>B. Location/(Suitable) Sites: Prescribed Fire burn units are located throughout 1,278 acre Mount Rushmore National Memorial. .</p> <p>C. Design Specifications: Prescribed Fire Treatments will be implemented in accordance with the following:</p> <ol style="list-style-type: none"> 1. Provide for public and fire personnel safety during implementation of the project. 2. Burn 70-90% of the burnable project area. 3. Decrease fuel loading by 40-60% 1 yr. post burn <p>D. Purpose of Treatment Specifications: In light of over one hundred years of suppression practices in the area the fuel loading has increased significantly and poses a danger to the Memorial.</p> <p>E. Treatment Consistent with Agency Land Management Plan: Mount Rushmore National Memorial, Midwest Region, National Park Service. Fire Management Plan and associated Environmental Assessment.</p> <p>F. Treatment Effectiveness Monitoring Proposed: NPS Fire Effects Monitoring protocols will be conducted following treatment to determine treatment effectiveness.</p>

LABOR, MATERIALS AND OTHER COST:

	PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
	Personnel costs are figured to the per acre cost of burns based on previous burns of similar size and fuel type. Many federal agencies do not charge for their base 8 hourly rate so other federal agencies will reciprocate on their projects. Overtime pay and weekend overtime can drive up the cost per acre. Though fall and spring burning happen with shorter days. (12hours)	\$246,850
	Total Personnel Service Cost	\$246,850
	EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
	Prescribed burn support to replace burst hoses and misc fire equipment (i.e., broken shovels, pulaskis) \$2000 yr x 5 years	\$10,000
	Total Equipment Purchase, Lease Or Rental Cost	\$10,000
	MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
	50 gallons of diesel fuel x \$3 a gallon x 5 yrs	\$750
	30 gallons of unleaded gasoline x \$3 a gallon x 5yrs	\$450
	Total Materials and Supply Cost	\$1,200
	TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
	Not applicable -	
	Total Travel Cost	\$ 0
	CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
	Not applicable	
	Total Contract Cost	

SPECIFICATION COST SUMMARY

FISCAL YEAR	TREATMENT UNIT	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY12	Starling	10/01/2012	09/30/2013	F	245	\$200		\$51,240
FY13	Baldy	10/01/2013	09/30/2014	F	435	\$200		\$89,240
FY14	Grizzly	10/01/2014	09/30/2015	F	237	\$200		\$49,640
FY15	Housing	10/01/2015	09/30/2016	F	162	\$225		\$38,690
FY16	Lafferty	10/01/2016	09/30/2017	F	108	\$250		\$29,240
TOTAL								\$258,050

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	P,M,T,E
3.	Estimate supported by cost guides from independent sources or other federal agencies	P,E,M
4.	Estimates based upon government wage rates and material cost.	P,T
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Mount Rushmore National Memorial Treatment Units Map for identified management treatment unit priorities ((Appendix IV)
 Example of personnel by position required for similar burns based on fuel type and geographic area. (80-90 personnel total)

POSITION	MINIMUM NUMBER NEEDED	MINIMUM QUALIFICATIONS
Burn Boss	1	RXB2
Firing Boss	1	FIRB
Holding Specialist	1	TFLD
***Hand Crew	2 (20 FFT2)	Type 2 Hand crew
Holders	10	FFT2
Fire Effect Monitor	2	FEMO (t)
Engine Boss	5	ENGB
Engine Crew Members	10	FFT2
ATV/UTV Operators	3	ATVO
Lighters	8	FFT2
Law Enforcement Rangers- At briefing, available to close road	2	Do not need red card

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Verbenone Experimental Treatment	Spec-#	6
FISCAL YEAR(S)	2010-2014	Spec Cost	\$9,600

WORK TO BE DONE (describe or attach exact specifications of work to be done):

- A. General Description:** This would be an experimental treatment with the USFS. Use of verbenone, which is considered to be useful in some pine/mountain pine beetle scenarios as an anti-aggregation pheromone, may be of unknown effectiveness in the Black Hills. At this time it has shown little effectiveness in ponderosa pine systems in the Black Hills. This treatment would be a test in conjunction with the USFS to determine its effectiveness against mountain pine beetle in the Black Hills.
- B. Location/(Suitable) Sites:** Treat selected stands as a trial in the Memorial.
- C. Design/Construction Specifications:**
1. Stands removed from high visitor use areas will be selected to be tested for the effectiveness of verbenone.
 2. At this time, the use of verbenone should be restricted to pouches as opposed to flakes; the use of flakes has even less testing in field trials now.
 3. Verbenone should be applied in June just prior to beetle flight.
 4. Verbenone should be applied at the rate of 35-40 pouches an acre, spread evenly across the stand to be protected.
 5. Area to be treated is approximately 6 acres.
 6. Locations of treated trees will be marked by a metal tag as well as with GPS and mapped into GIS.
 7. NPS will cooperate with USFS personnel to implement this treatment.
- D. Purpose of Treatment Specifications (relate to damage/change caused by fire):** To prevent beetle attacks in uninfested trees with anti-aggregation pheromones.
- E. Treatment consistent with Agency Land Management Plan (identify which plan):** Treatment is in line with NPS Management Guidelines.
- F. Treatment Effectiveness Monitoring Proposed:** Visually inspect treated areas in September/October for newly attacked trees.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
Conducted by USFS personnel.	
TOTAL PERSONEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
Verbenone, 40 pouches/acre @ 6 acres x 5 years @ \$8.00/pouch	\$9,600
TOTAL MATERIALS AND SUPPLY COST	\$9,600
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	

TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2010	7/15/2010	10/15/2010	F	acres	\$320	6	\$1,920
2011	7/15/2011	10/15/2011	F	acres	\$320	6	\$1,920
2012	7/15/2012	10/15/2012	F	acres	\$320	6	\$1,920
2013	7/15/2013	10/15/2013	F	acres	\$320	6	\$1,920
2014	7/15/2014	10/15/2014	F	acres	\$320	6	\$1,920
TOTAL							\$9,600

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies	E
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Forest Health Assessment Appendix 1 and See Appendix IV, Beetle Risk Map.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Inventory & Treat Green Infested Trees	Spec-#	7
FISCAL YEAR(S)	2010-2014	Spec Cost	\$349,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

A. General Description: Marking and removing infested trees would be accomplished 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. Sanitation involves the removal of currently infested trees. In this specification, the infested trees will be treated on site, either by cutting the bole into 2 foot lengths or chipping or piling and burning.

B. Location/(Suitable) Sites: Throughout the memorial.

C. Design/Construction Specifications:

- Green infested trees within the developed areas of the Memorial will be treated.
- Green, infested trees will be identified yearly and marked for removal and located using GPS and mapped into GIS.
- Infested trees will be treated in place by felling and then either bucking into 2 foot lengths, chipping the bole, or piling and burning. Treatment of infested trees should be done by June.
- Wood that is lopped and scattered, chipped, or burned on-site should not produce fuel loads that are unacceptable to fire hazard.

D. Purpose of Treatment Specifications (relate to damage/change caused by fire): To reduce local beetle populations on site and reduce spread of mountain pine beetle into adjacent areas.

E. Treatment consistent with Agency Land Management Plan (identify which plan): Treatment is consistent with NPS Management Guidelines and the Memorial's Fire Management Plan.

F. Treatment Effectiveness Monitoring Proposed: Visually inspect treated areas in September/October for newly attacked trees and spread from previous years treatment areas.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
NPS, 2 person crew (GS-5), \$1,600/week x 28 weeks/year x 5 FYs	\$224,000
TOTAL PERSONEL SERVICE COST	\$224,000
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
Marking paint/flagging/saw parts/computer supplies	\$5,000
TOTAL MATERIALS AND SUPPLY COST	\$5,000
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	

TOTAL TRAVEL COST		
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):		
Professional tree fallers to fall marked green infested trees		\$20,000
TOTAL CONTRACT COST		\$20,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2010	9/15/2010	4/15/2010	F	acres	\$118	900	\$69,800
2011	9/15/2011	4/15/2011	F	acres	\$118	900	\$69,800
2012	9/15/2012	4/15/2012	F	acres	\$118	900	\$69,800
2013	9/15/2013	4/15/2013	F	acres	\$118	900	\$69,800
2014	9/15/2014	4/15/2014	F	acres	\$118	900	\$69,800
TOTAL							\$349,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies	C, E
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Forest Health Assessment Appendix 1 and See Appendix IV, Beetle Risk Map.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Monitor and Treat for Non-native Plants	Spec-#	8
FISCAL YEAR(S)	2011-2014	Spec Cost	\$195,200

WORK TO BE DONE (describe or attach exact specifications of work to be done):

A.	General Description: 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.
B.	Location/(Suitable) Sites: Treatments will be used across the entire Memorial, wherever treatments occur.
C.	Design/Construction Specifications: <ol style="list-style-type: none"> 1. All forested areas on the memorial will be monitored and treated for non-native plants wherever treatments have been conducted. 2. Treatments will consist of inspecting areas that have been treated for invasive species. 3. If invasive plant species are located, appropriate management will occur, which could include cultural, mechanical, physical, and chemical treatments. 4. Non-native plant management should occur on a yearly basis to detect infestations while they are small.
D.	Purpose of Treatment Specifications (relate to damage/change caused by fire): Reduce impacts from non-native plants.
E.	Treatment consistent with Agency Land Management Plan (identify which plan): Treatment is consistent with NPS Management Guidelines.
F.	Treatment Effectiveness Monitoring Proposed: Post treatment inspection of stands. Yearly monitoring and treatment where needed.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
NPS, 2 person crew (GS-5), \$1,600/week x 28 weeks/year x 4 FYs	\$175,200
TOTAL PERSONEL SERVICE COST	\$175,200
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
Spray equipment for use in backcountry areas	10,000
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	\$10,000
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
Herbicides (annual acquisition) \$4000/year x 4 FYs	\$16,000
TOTAL MATERIALS AND SUPPLY COST	\$16,000
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	

TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2011	10/1/2011	4/15/2012	F	acres	\$508	100	\$48,800
2012	10/1/2012	4/15/2013	F	acres	\$508	100	\$48,800
2013	10/1/2013	4/15/2014	F	acres	\$508	100	\$48,800
2014	10/1/2014	4/15/2015	F	acres	\$508	100	\$48,800
TOTAL							\$195,200

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies	C, E, M
4. Estimates based upon government wage rates and material cost.	P
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Forest Health Assessment Appendix 1 and See Appendix IV, Beetle Risk Map.

PART C - INDIVIDUAL TREATMENT SPECIFICATION

TREATMENT/ACTIVITY NAME	Monitor for Treatment Effectiveness	Spec-#	9
FISCAL YEAR(S)	2012	Spec Cost	\$88,000

WORK TO BE DONE (describe or attach exact specifications of work to be done):

A. General Description: This treatment will provide for overall monitoring of treatments to be sure that they are effective and also to monitor the forest health conditions. Inventory of forest stand conditions across the Memorial at regular intervals.

B. Location/(Suitable) Sites: Entire Memorial, focusing on treatment sites and general forest health conditions.

C. Design/Construction Specifications:

1. A regularly scheduled monitoring across the Memorial landscape to get information on effectiveness of treatments and current forest health conditions.
2. Monitoring should be based on a tiered approach of aerial and ground acquired data.
3. Every 3 years obtain high resolution aerial photography or satellite imagery to delineate stand boundaries.
4. After analysis of aerial imagery, a systematic ground validation of stand conditions through a series of fixed plots should be installed.
5. Aerial and ground data should be summarized to provide a current vegetation condition report.
6. A compilation of all monitoring conducted for the various treatments will be completed on an annual basis and entered into a computer program and mapped into a GIS.
7. Conduct analysis of the treatment effectiveness to determine if treatment modifications need to be made.
8. An annual report will be developed on the treatment effectiveness and forest health conditions. This report should be made available to Memorial cooperators in this activity, division chiefs, and the superintendent.
9. Develop a presentation and scientific articles for delivery to a resource management conference.
10. Project Manager to provide oversight and act as COTR. See Project Manager Specification.

D. Purpose of Treatment Specifications (relate to damage/change caused by fire): Determine effectiveness of treatments on long term changes to forest conditions.

E. Treatment consistent with Agency Land Management Plan (identify which plan): The specification is consistent with plan.

F. Treatment Effectiveness Monitoring Proposed: This will be used to monitor the current forest conditions on the Memorial.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
TOTAL PERSONEL SERVICE COST	
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	
TOTAL MATERIALS AND SUPPLY COST	
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	

TOTAL TRAVEL COST	
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	
USGS contract to monitor water quality annually \$50,000	50,000
USGS or University Contract @ \$38,000	38,000
TOTAL CONTRACT COST	\$88,000

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
2012	9/2012	8/2016	F	Acres	11	1,200	\$88,000
TOTAL							\$88,000

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1. Estimate obtained from 2-3 independent contractual sources.	
2. Documented cost figures from similar project work obtained from local agency sources.	
3. Estimate supported by cost guides from independent sources or other federal agencies	C
4. Estimates based upon government wage rates and material cost.	
5. No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, **E** = Equipment **M** = Materials/Supplies, **T** = Travel, **C** = Contract, **F** = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Forest Health Assessment, Appendix 1.

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

APPENDIX I RESOURCE ASSESSMENTS

- **FOREST HEALTH**
- **CULTURAL RESOURCES**
- **FIRE MANAGEMENT**
- **COMPLIANCE**
- **PUBLIC COMMUNICATION AND EDUCATION**

Slash pile burning (NPS file photo)



Inspection of green infested tree, 2/27/10 (NPS file photo)



Mount Rushmore landscape (Peter Brown)

**MOUNT RUSHMORE NATIONAL MEMORIAL
MOUNTAIN PINE BEETLE
RESOURCE ASSESSMENT AND ACTION PLAN**

FOREST HEALTH ASSESSMENT

I. OBJECTIVES

- Evaluate and assess Mountain Pine Beetle (MPB) impacts to forests of Mount Rushmore National Memorial (Memorial).
- Determine the strategy and tactics necessary to lessen the impacts of MPB.
- Evaluate the potential for noxious/non-native plant invasion into native plant communities within the Memorial as a result of treatment activities.
- Develop both short and long-term treatment strategies for MPB.
- Provide for long-term sustained healthy forest ecosystems.

II. ISSUES

- Saving trees in developed areas, especially cultural trees and old growth forest from MPB.
- Provide for visitor safety as a result of treatment activities and from hazard trees.
- Prevent noxious/non-native plant invasion.
- Prioritize treatment prescriptions and methods.
- Coordinate treatment actions within the Memorial, with surrounding agencies, and neighbors.
- Minimize fire danger to visitors and neighboring communities.
- Protect dependent wildlife species and habitats.

III. OBSERVATIONS

A. Background

The purpose of this assessment is to address the potential impacts of the mountain pine beetle and the strategy and tactics necessary to minimize their impact to the forested landscape of the Memorial.

The mountain pine beetle (*Dendroctonus ponderosae*) is the number one insect killer of pine trees throughout the western United States. The mountain pine beetle (MPB) is native to the forests of western North America and to the Black Hills region of South Dakota and attacks most pine species including ponderosa pine in the Black Hills.

MPBs develop under the bark of pines, particularly ponderosa, lodgepole, Scotch, and limber. Adult flight typically occurs in July and August, with the peak flight around the first week of August. During this flight, adult beetles leave previously infested trees and attack new large-diameter host trees. Adult beetles usually fly up to 300 feet from the host tree, but under certain conditions can fly several miles. However, under epidemic or outbreak conditions, small diameter trees may also be infested. The adults attack green trees, chew through the bark and construct galleries, along which eggs are laid. Larvae hatch from the eggs and begin feeding on the phloem of the tree in late summer to early fall. Larvae, pupae or callow adults overwinter under the bark of the infested tree. In the spring, the beetle finishes its maturation process under the bark of the tree.

Populations of mountain pine beetle are typically found at an endemic level, killing and reproducing in stressed or weakened trees, including lightning struck and root-diseased trees. At times, beetle populations increase dramatically. In the increasing and outbreak stages, any host trees, healthy or stressed, are attacked and often killed.

Mountain pine beetles are native to the Black Hills forest ecosystem, with outbreaks occurring periodically. The first recorded outbreak in the Black Hills occurred from the late 1890's through the early 1900's and killed an estimated 1-2 billion board feet of timber. Outbreaks also have occurred in the 1930's, 1940's, 1960's and 1970's, each lasting 8-13 years with the 1970's outbreak being larger and causing more mortality than any of the others, except for the turn of the century outbreak.

In the mid 1990's, beetle-caused mortality was at low, endemic levels across the Black Hills. Starting in the late 1990's large beetle epidemics started and over the past 10 years there have been outbreaks in Beaver Park in the northern Hills and a large outbreak occurring in the central Hills from Deerfield Reservoir down to Bear Mountain and east to the Black Elk Wilderness. The outbreak in the central Hills is one that is causing landscape-level changes in the forest. The first significant signs of beetle mortality started occurring in Black Elk Wilderness in about 2003, and have continued to grow since then.

Outbreaks of the beetle can cause considerable changes in the forest, including a reduction in average size and density of the trees. Tree mortality levels of 25% can be expected throughout the landscape surrounding outbreak areas and levels of up to 50% or more can occur in heavily attacked areas. Outbreaks can conflict with land management objectives: they reduce tree density, affect wildlife habitat, increase short-term fire risks, and can negatively affect visual and recreation values (Allen and Long, 2008).

Signs and symptoms of MPB attack include:

- Popcorn-shaped masses of resin, called "pitch tubes," on the trunk where beetle tunnelling begins. Pitch tubes may be brown, pink, or white;
- Boring dust in bark crevices and on the ground immediately adjacent to the tree base;
- Evidence of woodpecker feeding on the trunk. Patches of bark are removed and bark flakes lie on the ground or snow below the tree;
- Foliage turning yellowish to reddish throughout the entire tree crown. This usually occurs eight to 10 months after a successful MPB attack;
- Presence of live MPB (eggs, larvae, pupae and/or adults) as well as galleries under bark. This is the most certain indicator of infestation; and
- Blue-stained sapwood is present.

Ponderosa pine stands in the Black Hills differ in their susceptibility to the mountain pine beetle. Generally stands of trees are considered to be most susceptible when 75% of the trees are in the 7-13 inch diameter range and the tree density is over 120 square feet of basal area per acre. It should be noted that these are general hazard rating guidelines for MPB attacks and most tree inventory data are based on tree averages; small areas that have high numbers of trees within a low density stand can provide a focal point for beetle build-up. Stand hazard ratings for MPB give an indication of which stands are most likely to have initial beetle infestations. Once an outbreak has started, any areas containing suitable host trees are likely to have damage. These ratings also give no indication of local beetle pressure. However, hazard ratings can help to prioritize what stands can be treated to minimize beetle susceptibility. It also points out that the best approach to reducing losses due to the mountain pine beetle for the long-term is forest management to reduce tree densities. Decreases in tree densities will lower the probability that beetle outbreaks will be initiated, but it is a continual process to keep forests at a lower hazard. Recent work has shown that areas treated to 60 ft²/acre basal area can be expected to reach high hazard (120 ft²/acre basal area) again in about 25-50 years. Stands treated to 80 ft²/acre basal area can reach 120 ft²/acre basal area in 13-36 years, and stands treated to only 100 ft²/acre basal area will be back to 120 basal area in 9-16 years.

Generally, when beetle populations reach outbreak proportions, as is the case in the Black Hills, natural enemies, such as birds and predaceous or parasitic insects, are not numerous enough to have a noticeable effect on the outbreak. Natural enemies are more important in limiting mountain pine beetle populations that are in the endemic level. Likewise, environmental factors cannot be counted on to mitigate the outbreak. For example, temperatures of -10° F can kill beetles in October but temperatures

of -25° are needed by February. These temperatures need to be reached under the bark, in the phloem, as opposed to air temperatures. Beetles survive low temperatures by removing water from within their cells and replacing it with glycoproteins, which act as a type of anti-freeze. This is a process known as cold hardening. Beetles have supercooling points, the temperature at which ice crystals start to form in body tissues, as low as -32° F in January. Phloem temperatures become equal to air temperatures only when they persist for 24 hours or more. Generally, phloem temperatures are found to be 5 to 10° F warmer than air temperature.

1. Mountain Pine Beetle Current Conditions

There is currently a landscape level mountain pine beetle epidemic occurring in the central Black Hills. The most active area of population growth and most concentrated tree mortality in the past 3 years has been in and around the Black Elk Wilderness. The wilderness borders the west and south sides of the Memorial. Most of the mortality to date has occurred in the south and west portions of the wilderness. Tree mortality has reached close to 100% in much of the affected area and the beetles have begun attacking small diameter trees (3-4") and non-host trees such as spruce as the preferred host supply has been depleted. The area north and east of Harney Peak was only lightly infested in 2008, but in the summer of 2009, there was considerable tree mortality beginning to occur in the Elkhorn Ridge, Upper Pine Creek area, and the ridges above Horsethief Lake. See Appendix IV, Mountain Pine Beetle progression map which shows beetle activity, based on aerial surveys, over the past 4 years in the Norbeck/Mount Rushmore area.

Ground surveys in the fall of 2009 in the northeast part of the wilderness (roughly from Willow Creek/Palmer Gulch KOA to Iron Mountain Picnic Ground and points north and east) were completed to assess the conditions that were present. In this area there were about 10 trees per acre killed over the past 3 years (trees currently infested in '09, 1 year old dead trees killed in '08 and 2 year old dead trees killed in '07). Of these, 83% were currently infested, 13% were 1 year old dead trees, and 4% were 2 year old dead trees. Already roughly 10% of the trees per acre have been killed over the past 3 years. This affirms the picture that this area at lower elevations on the northeast side of Harney Peak has not had much activity until the past year or 2 and that the beetles are rapidly moving into the area. The increase in currently infested trees compared to those killed in 2008 indicates a 4 times increase in newly attacked trees to those attacked the previous years in this part of the wilderness. There are typical spots of 20-50 green attacked trees showing up in this area, with very few previously killed red trees, again indicating that the beetles are rapidly moving into this area from upslope.

The stand conditions throughout the entire wilderness and most of the natural forest of the Memorial are highly susceptible to continued beetle mortality and expansion. This is the case in the northeast part of the wilderness where average tree diameters are about 14.5 inches DBH (diameter at breast height) and stand densities average around 130 ft² per acre basal area. With areas that are high hazard and the large resident mountain pine beetle population this results in an area of high risk.

Mountain Pine Beetle Hazard

Areas of ponderosa pine can be hazard rated for initiating and sustaining beetle epidemics based on forest conditions. Trees that have an average diameter of over 7 inches are rated as being high or low hazard based on tree density. Beetle risk is an indication of whether there are beetles in the area that could infest trees. Overall, tree hazard is high and beetle risk is high for the Memorial creating a high likelihood of significant beetle infestation over the next 3-5 years. Appendix IV shows the map of estimated beetle hazard for the forests in the Memorial. There is only one area that is rated as low hazard based on its basal area. It is in the rocky area at the very northern edge of the park. This map, (See Appendix IV, Pine Beetle Infestation), also indicates a very conservative rate of beetle infestation spread over the next 2 years. The rate of MPB spread is estimated at 300 feet per year based on currently mapped beetle locations. This does not take into consideration longer range dispersal of new beetle-infested trees in this time frame, which is likely to occur.

2. Vegetation Communities

The flora of the Memorial includes 425 species of vascular plants in eight vegetation associations (Natural Resource Condition Assessment of MORU, 2009), see Vegetation Classes/Land Use Map, Appendix IV. Ponderosa pine (*Pinus ponderosa*) forest is the dominant vegetation type in the Memorial and throughout the Black Hills (NRCA). It is found from low to high elevations and in all soil types. This forest type was shaped by small-scale, patch-replacing fires and by low-intensity ground fires, both of which have been suppressed since the late 1880s. The most common understory shrub of the ponderosa pine forest in the Memorial is common juniper (*Juniperus communis*), followed by snowberry (*Symphoricarpos occidentalis*), currant (*Ribes* spp.), and chokecherry (*Prunus virginiana*). The herbaceous layer consists of Kentucky bluegrass (*Poa pratensis*), sedges (*Carex* spp.), Junegrass (*Koeleria macrantha*), rough-leaved ricegrass (*Oryzopsis asperifolia*), bluejoint reedgrass (*Calamagrostis canadensis*), poison ivy (*Toxicodendron radicans*), bearberry (*Arctostaphylos uva-ursi*), harebell (*Campanula rotundifolia*), timothy (*Phleum pratense*), and pinedrops (*Pterospora andromedea*) (National Park Service 2003).

Quaking aspen (*Populus tremuloides*) is an important component of the vegetative cover of the Memorial and the region, occurring mostly along streams in cool, moist sites. Aspen is often the first tree to regenerate after fire, but the lack of this disturbance is causing existing stands to be lost to pine encroachment. White spruce (*Picea glauca*) and bur oak (*Quercus macrocarpa*) also occur in the Memorial. Bur oak is typically found in the stringer bottoms and in lowland riparian plant communities with other deciduous trees or as a shrub under ponderosa pine stands. White spruce is found at high elevations and in cooler drainage bottoms (NRCA, 2009).

At mid to high elevations in the Black Hills, a dense shrub zone occurs along streams and around the edge of wet meadows and beaver dams. The vegetation consists of a mixture of several willow species, including *Salix bebbiana*, *Salix lutea*, and *Salix interior*. Shrubs include red osier dogwood (*Cornus stolonifera*), wild rose (*Rosa* spp.), raspberry (*Rubus* spp.), and currant (*Ribes* spp.). The wet meadows are dominated by several species of sedge, including *Carex aurea* and *Carex rostrata*. In better drained meadows, grasses such as tufted hairgrass (*Deschampsia caespitosa*) and northern reed grass (*Calamagrostis inexpectata*) also occur along with many wildflowers, particularly asters (*Aster* spp.) and sunflowers (*Helianthus* spp.). Most of these plant communities have been disturbed by clearing, burning, and spraying. In the Memorial, relatively intact but small (<0.1 ha) wet meadows are found along the creeks, especially Beaver Dam Creek in Starling Basin (NRCA, 2009).

3. Non-native Plants

The entire extent or distribution of non-native plants within the Memorial is not known, however the NPS Northern Great Plains Exotic Plant Management Team has recorded areas within the Memorial that have received treatments (mechanical and chemical) for non-native plants. Non-native plants that exist within the Memorial include: musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), St. Johnswort (*Hypericum perforatum*), and yellow toadflax (*Linaria vulgaris*). In addition, disturbed lands are often invaded by non-native plants such as houndstongue (*Cynoglossum officinale*), Canada thistle, and common mullein (*Verbascum thapsus*). Species such as smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), and annual bromes (*Bromus* spp.) are not currently abundant in the Memorial, but would be very difficult to control if they become established. These should be high priorities for future monitoring and treatment efforts.

4. Threatened & Endangered and Sensitive Flora and Fauna

According to the U.S. Fish and Wildlife Service website for South Dakota, Pennington County, there are no threatened or endangered plant species listed in the county. In addition, no federally endangered or threatened or state-listed plant is known to occur in the Memorial. However, one plant, Selkirk's violet (*Viola selkirkii*), is listed by the Black Hills National Forest as sensitive and does occur in the Memorial (NRCA, 2009). Two vegetation associations, bur oak/ironwood forest and paper birch/beaked hazelnut, occur in the Memorial but are considered rare in the Black Hills (NRCA, 2009).

Also, according to the website (<http://www.fws.gov/southdakotafielddoffice/endsppbycounty.htm>), there are three species listed as endangered or proposed for listing within the county. They are: Whooping Crane

(*Grus Americana*) and Least Tern (*Sterna antillarum*) both listed as endangered and Black-footed Ferret (*Mustela nigripes*) listed as proposed. There is no suitable habitat within the Memorial for any of these species. However, no federally endangered or threatened or state-listed fauna is known to occur in the Memorial. The northern leopard frog (*Rana pipiens*) has been documented in the Memorial and is currently under consideration for federal protection by the US Fish and Wildlife Service.

Consultation with US Fish and Wildlife Service resulted in concurrence, and was closed March 15, 2010.

B. Findings

Mountain pine beetle is at epidemic proportions in the Norbeck Wildlife Preserve. Significant changes on the landscape have already occurred and these changes will continue to occur into the future. In ponderosa pine in the Black Hills, it has been estimated that around 80% of susceptible trees had been killed in portions of the Bear Mountain area in the late 1980's and early 1990's and 100% of susceptible trees had been killed in some stands in the Beaver Park area in the late 1990's through 2000. The final totals for mortality in the Norbeck Wildlife Preserve have already equaled or surpassed the 50% level in moderate or high risk stands, some reaching 100% mortality, and the mortality is still growing and expanding.

There is a growing mountain pine beetle outbreak occurring in areas surrounding Mount Rushmore National Memorial. At the present time, infested trees have been identified within the Memorial. However, rapidly increasing populations are now very close, at the edge of the Memorial boundary within the Black Elk Wilderness and the Norbeck Wildlife Preserve. It appears that increased mortality in the Memorial is imminent and that starting in the summer of 2010 tree mortality could start rising dramatically.

The mountain pine beetle does play an important regulatory role in fire ecology. In the first few years after an outbreak, the dead needles on standing trees provide a highly combustible source of fine fuels. The stand conditions resulting from beetle mortality, once the dead needles have fallen to the ground, probably won't sustain crown fire. Then, as the killed trees begin to fall, the accumulated dead vegetation provides the high fuel load required to sustain high-intensity fire. Finally, as the downed trees decay and rot, they provide a source of ignition for lightning strikes. Once ignited, decaying logs are capable of smoldering for weeks or even months, waiting the time when prevailing conditions (hot, windy, and dry) are conducive for expansion into a full-blown fire.

The only effective long-range strategy to minimize beetle-caused mortality is promoting forest health over large landscapes and monitoring for areas of beetle build-up. Treating large landscapes does not mean every stand needs to be treated. Denser stands can be left for other objectives and should be afforded some protection from beetles if the surrounding area has been treated to reduce stand density and beetle hazard. Denser stands will require more intense monitoring, as they are still more susceptible to beetles. If beetles are found in these stands, then there should be a contingency plan guiding whether they will be treated or not. Creating diverse stand conditions across the landscape will result in an overall forest that is less susceptible long term to landscape-level beetle events.

Mountain pine beetle are a native organism in the Black Hills, and forest changes, driven by insect outbreaks leading to forest mortality are a natural part of forest ecology. However, the forest of the Memorial is overly dense, due to approximately 100 years of fire suppression. Natural fire would have kept the Memorial's forest thinner with trees of different age classes and size classes. Because the forest is overly dense, it is susceptible to unwanted fire, and susceptible to insect outbreaks, both of which may occur at greater intensity than historically documented. Therefore, the interventions prescribed in this plan are proposed. These actions are consistent with the policies that guide management of National Park System units.

IV. RECOMMENDATIONS

Beetle Management Strategies

Mount Rushmore National Memorial proposes a proactive approach in managing mountain pine beetles within the Memorial. There are a number of actions that can be used to reduce the impacts of MPB. 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 susceptible 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 hazard fuel thinning practice for hazard fuel reduction. Some green infested trees have been felled and bucked into rounds, where they are left to dry, thereby killing the beetle larva. This may have helped reduce the number of beetles coming out of the trees within the Memorial itself but it has not entirely reduced the risk.

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 recommended 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 tank units is typically no more than 150 feet using hose.

Carbaryl is an insecticide, is toxic to humans and wildlife and should be used carefully and according to the safe application standards of its label. Carbaryl should not be used close to standing or flowing water, and visitors should not enter areas where trees have been sprayed until the tree is dry. This treatment would also include monitoring for treatment effectiveness as well as groundwater and water quality monitoring.

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 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 cut into lengths, exposed to the air, and turned once, before beetle flight in early July.

1. Identify and Treat Green Infested Trees on Site

Based on a thorough and systematic search of the Memorial this treatment will cut and treat 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 and the bark removed. No trees would be cut that are healthy and unaffected by mountain pine beetle. In the back country of the memorial this technique would be used when live insects are present. Green infested trees would be cut, bucked into two foot lengths, and spread out on the ground to dry. The beetle larvae under the bark are quite fragile, so drying the tree in this manner would kill the larvae, and prevent pupation into adult beetles, therefore limiting the summer flight of beetles into neighboring trees. The goal of this treatment is to suppress the spread of the beetle by treating green infested trees, so as to slow the exponential growth of beetle populations within previously unaffected area.

It is necessary to mark infested trees for removal so mountain pine beetle infestations are 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.

Signs of Infestation:

- **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 beetle attack. A large amount of frass is an indication of a successful attack. However, frass does not necessarily mean the tree contains live beetles, and other symptoms should be checked to verify if live 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 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 MPB 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. 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 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 prevention and control techniques. The Memorial will monitor mountain pine beetle infestations and control techniques. Techniques to be monitored include spraying, infested tree treatment, 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 of native floristic communities. The areas to be monitored include all of the treatment areas where soils have been disturbed as a result of the treatment. These include those areas that will be thinned as well as those areas where prescribed fire is applied. See the Fire Management Assessment, Appendix I. Lands disturbed by thinning activities may experience the 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.

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**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 1862 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 increased dead tree stands and a 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.
- Through compliance consultation with SHPO, the SHPO office recommends a buffer of 100 feet around all NR eligible sites. This recommendation should be applied before work is done around cultural sites.

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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Mount Rushmore National Memorial Cultural Landscape Inventory
1999 (revised 2008)

Mount Rushmore National Memorial National Register nomination form
1985

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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

- Increased potential for crown fire in Mount Rushmore forests as a result of high tree densities and ladder fuels.
- Increased potential for crown fire in Mount Rushmore forests as tree mortality increases resulting from MPB infestation.
- Visitor safety as a result of treatment activities
- 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 ft²/acre. The ponderosa pine stands of the Memorial maintain many old growth characteristics, however, their structure has changed significantly over the past century. A

lack of fire and protection from timber harvest has resulted in an abundance of smaller diameter trees throughout the Memorial (Appendix 3). Today's forest has more than 1000 trees per acre and a basal area over 120 ft²/acre. This has largely been the result of an explosion of small, young trees and the loss of large, old trees across the landscape. These conditions make the forest susceptible to severe wildfires and insect outbreaks (Shepperd and Battaglia 2002, Brown and Cook 2006).

B. Findings

Fuels Management

To date there have been no prescribed fires within the Memorial boundary, because fuel loads and tree densities are too high to safely manage prescribed fire. A mechanical hazard fuel reduction program was established in 1990. The program included thinning forest stands and stacking debris along road corridors. Approximately 190 acres were thinned between 1990 and 1997. The program was expanded to "backcountry" areas in 2003 and an additional 240 acres have been treated (Appendix 4). A series of fire management projects have been implemented in an attempt to restore the historic structure to the forest stands of Mount Rushmore and make them less susceptible to stand-replacing disturbances, such as high intensity fire and mountain pine beetle epidemic (Appendix 3). Forest thinning is done by hand with power saws. The trees cut are of small diameter, and are either stacked and later burned, or are chipped with a gas powered chipper. Thinning generally does not involve removing the cut trees from the site, and there are no activities like road building or log skidding. Fuel thinning is not a commercial operation because the material thinned is not removed from the site or sold.

A portion of the Memorial has been thinned and application of prescribed fire is planned over a large portion of the Memorial once thinning is completed. The goal is to restore the old-growth structural characteristics of the forest, which would lead to an increase in the abundance and diversity of understory vegetation and provide benefits for wildlife and other species. This would also make the stand less susceptible to intense, stand replacing fires and more resilient to mountain pine beetle outbreaks (Shepperd and Battaglia 2002, Brown et al. 2008).

The traditional approach to thin ponderosa pine stands has included mechanically removing smaller trees, piling the resulting material, and burning slash piles when adequate snow cover allows. Since winter snow cover is unreliable in the central and southern Black Hills, managers are interested in exploring alternatives to this method. Chipping the thinned material and broadcasting the chips on site is an alternative that has been used in other western forests (Appendix 3). Because of uncertainties about impacts of this type of treatment to herbaceous vegetation and the soil, there has been hesitation to use this treatment in National Park Service units. A research project was initiated in 2008 at the Memorial to assess the impacts of thinning, chipping, and use of heavy machinery on vegetation and soils, and to determine the validity of landscape scale chipping treatments.

Fire Suppression

Due to the small size of the Memorial, the Mount Rushmore FMP directs that all wildfires within the Memorial will be suppressed. Wildfire occurrence has been low over the past several decades, with 22 wildfires reported in the Memorial since 2000, the majority of which have been less than 2 acres in size. Ten of these fires have resulted from fireworks displays, and the largest, at 96 acres, occurred in February 2006 following the burning of piles created during a mechanical thinning project. The absence of periodic, low intensity natural fire has increased fuel loads, which elevates the potential for catastrophic wildfire.

A cooperative interagency agreement for fire management exists between federal agencies and the State of South Dakota. Local cooperating agreements also exist with the Keystone Fire Department. The Northern Great Plains Interagency Dispatch Center provides fire dispatch service for Mount Rushmore under the closest forces concept. That is, the closest fire suppression resources, regardless of agency, will respond to incidents in the Memorial. Recently, a response plan has been developed to manage evacuations and notifications for

the Memorial and local communities in the event of a wildfire in the Black Elk Wilderness.

Fire Prevention

Fire prevention activities include all activities designed to reduce the number of human-caused wildfires that could occur within the Memorial. These include prevention discussions with Memorial employees, posting signs in high visitation areas in times of high or extreme fire danger, and prevention patrols during high and extreme fire danger (Staffing Classes 4 and 5). The entire Black Hills area is a No Open Fire Zone, so additional warnings are posted in the Memorial during high and extreme conditions. No smoking bans are put in place within the boundaries of the Memorial during extreme fire danger, applying to both visitors and employees.

IV. RECOMMENDATIONS

B. Recommendations

- **Mechanical Thinning**
Four areas within the Memorial have been identified to receive mechanical fuel reduction (Appendix 4). In these stands, trees less than 10" DBH(spell out first usage) should be removed. Trees 6" DBH and less can be cut and chipped on site, and trees 7-10" DBH would be cut to 4 foot lengths and piled for burning when there is adequate snow cover. In areas where it is feasible to remove the material from the site, that would be considered. A summary of the Symstad and Bynum (2005) stand exam data was completed and is included in Appendix V. It appears that thinning trees less than 10" DBH would result in a mosaic pattern of stand structure across the thinning units. A summary such as this can be used to refine the thinning treatment prior to application.
- **Prescribed Fire**
The Memorial has been divided into five treatment units (Appendix 4), which have been prioritized to receive low intensity prescribed fire treatments. Prescribed fire can be applied after piles resulting from mechanical thinning have been burned. Prior to application of prescribed fire, burn plans will be developed that meet interagency guidelines. Prescribed fire is applied in the spring or fall when temperature, relative humidity, and fuel moisture all are within targeted levels. When prescribed fire is applied under appropriate conditions, fuel loads can be reduced while keeping overstory tree mortality to a minimum. Monitoring data from Mount Rushmore, Wind Cave, and Devils Tower demonstrate that fall and spring prescribed fire in ponderosa pine forests can reduce fuel load by more than 50% while overstory tree mortality is less than 15%.
- **Thinning Along Hwy 244 Corridor**
The Black Hills National Forest has been actively thinning along highway 244 up to the west boundary of the Memorial (Appendix 4). The primary purpose of the "Peter Norbeck Scenic Byway Enhancement Project" was to improve the visual quality along the scenic Byway. The fuel break that was created as a result of the project was a secondary benefit. This would allow fire managers the opportunity to safely take action along the road if a wildland fire occurred near or adjacent to highway 244. The thinning would be continued in the Memorial to coincide with the work that has been done by the BHNF. Trees 10" and smaller should be cut and removed from the area. As long as the trees are not infested with MPB, cut trees could be hauled off site for use as firewood. Chipping and hauling the material would also be an option. Remaining trees would be pruned up to 10 feet off the ground to eliminate ladder fuels.
- **Monitor Treatment Effectiveness**
It is critical to continue and expand monitoring of fuels treatment effectiveness. Protocols are in use to monitor changes in vegetation composition, forest structure, and downed woody fuel load. Particular attention should be placed on changes in non-native plant populations, tree densities, and fuel loads.

B. Management Recommendations – Non-Specification Related

- Update the Mount Rushmore Fire Management Plan to reflect new terminology in wildland fire and changes in national fire policy (Five year revision). Use the new approved Interagency Fire Management Template that was recently approved in the fall of 2009.
- Develop interagency unified command delegation of authority

V. CONSULTATIONS

Name	Contact Info
Mike Battaglia	USFS, Rocky Mountain Research Center
Todd Pechota	Black Hills National Forest
Joe Lowe	State of South Dakota, Department of Agriculture Division of Wildland Fire Suppression
Eric Allen	NPS, Northern Great Plains Fire Management
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Amy Symstad	USGS, NPWRC Black Hills Station

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

COMPLIANCE ASSESSMENT

I. OBJECTIVES

- Assure recommended actions comply with applicable laws and regulations
- Complete necessary NEPA review for actions occurring within the Memorial involving the Mountain Pine Beetle (MPB) epidemic
- Complete necessary Section 106 review. Consult with MWRO, SD SHPO, and THPOs/Tribes, as necessary

II. ISSUES

- Environmental effects from park actions on MPB
- Effects to cultural resources within the park, including cultural landscapes
- Monitoring and mitigating issues surrounding archeological sites, invasive weeds and other adverse affects from the actions
- Effects to areas of tribal cultural sensitivity
- Water quality effects from actions
- Legacy forest effects from MPB and treatments

III. OBSERVATIONS

A. Background

Mount Rushmore National Memorial consists of 1,278 acres containing ponderosa pine forests, granite outcrops, and cultural sites including archeological sites and historic resources associated with the sculpture carving. Management of the natural and cultural resources is guided by federal legislation and regulations along with National Park Service management policies and guidelines. Many federal laws and regulations are used in concert with one another to help protect and preserve the resources within the park.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) was created in 1969 to provide a decision process to federal agencies in the protection and management of natural and cultural resources. NEPA establishes a goal for federal decision-making to provide a balance between use and preservation. To implement NEPA, agencies are required to undertake an assessment of the environmental effects of their proposed actions prior to making decisions. This includes an in-depth study of the environmental effects of the proposed action, the consultation with specialists, other federal agencies, and other interested parties, and to use the collected research and information to make an informed decision as to the appropriate course of action.

Within the NEPA process, there are varying levels of compliance. Initial scoping into the proposed project or action will determine the appropriate level of compliance. Many times, scoping can help focus the project, eliminate unnecessary parts to the project, and clarify the environmental impacts. Scoping also helps the interdisciplinary team to evaluate alternative actions and determine the appropriate and needed course of action.

Once the scoping of the project is complete, the interdisciplinary team will determine the appropriate NEPA pathway. The five options or pathways include:

- Memo to file – This is a prepared memo to the administrative file when the proposal has already been analyzed in site-specific detail in a previous NEPA document and no different impacts or changes to the project are expected.
- Categorical Exclusions for which no formal documentation is necessary – This option is applicable when the action is described using one of the categorical exclusions listed in Director's Order 12 and Handbook: Conservation Planning, Environmental Impact Analysis, and Decision-Making (DO-12), Section 3.3, and no exceptions exist.
- Categorical Exclusions for which a record is needed – This involves the preparation of records when the action is described using one of the categories outlined in DO-12, Section 3.4 and no exceptions exist.
- Environmental Assessment (EA) – An EA is prepared when the significance of impacts is unknown, the proposed action is not described within the categorical exclusion list or the list of actions that normally require an EIS, or when the significance of the impacts of the action are not known.
- Environmental Impact Statement (EIS) – an EIS is needed when the potential for significant impact to the human environment exists, as indicated by an Environmental Assessment (EA), scoping, or because the proposed action or alternative is described within DO-12, section 4.4.

The NEPA process also incorporates and includes the actions and requirements outlined in other federal, state, and local regulations. The NEPA process serves as an umbrella process for managing the compliance required with other federal legislation, including the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA) as well as other natural and cultural laws and Executive Orders as they apply to the action.

Endangered Species Act

The Endangered Species Act (ESA) was signed into legislation in 1973. This environmental law is designed to protect endangered or threatened species or candidate species. Section 7 of the ESA requires that a federal agency consults with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service on any action that may affect sensitive species. Consultation and analysis are typically done within the NEPA process outlined above.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) of 1966, as amended, outlines steps and processes required of federal agencies to ensure proper protection, preservation, and continued use of historic resources. The NHPA applies to historic structures, archeological sites, cultural landscapes, and many other historic resources. The act also provided for the National Register of Historic Places, the list of National Historic Landmarks, State Historic Preservation Offices (SHPO), and Tribal Historic Preservation Offices (THPO).

Among other requirements outlined within NHPA, Section 106 of the act requires federal agencies to consider the effects of their actions and proposals on historic properties and to provide the SHPO and/or THPO a reasonable opportunity to review and comment on these actions. This consultation should occur simultaneously and is normally included within the larger NEPA process. Both the Section 106 and NEPA processes should be coordinated to avoid duplication of public involvement efforts and other requirements.

National Park Service Legislation and Policy

The National Park Service also operates under its own legislation, guidelines and policies. The larger scope of management policies, Director's Orders and other requirements are created to add direction and guidance to the service's enabling legislation. The foundation of the National Park Service is found within the Organic Act from 1916 and states that,

The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purposes of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (16 USC 1)

To provide further guidelines based on the Organic Act, the National Park Service developed a set of management policies that help direct the management of natural and cultural resources within the parks. The 2006 publication of park service management policies outlines the guidelines for natural resource management. The policies emphasize a servicewide understanding that natural processes and species are evolving and that the parks will allow this evolution to continue, with minimal influence by human actions. This idea supports the *Organic Act* belief in unimpaired resources. The policies go on to define the “natural condition” as, “the condition of resources that would occur in the absence of human dominance over the landscape.” (*Management Policies 2006*, Chapter 4, Introduction)

Allowances are also outlined within the policies for human interaction in natural processes for the protection, restoration, or preservation of the natural environment or human life and safety. The policies state,

The Service will not intervene in natural biological or physical processes, except

- when directed by Congress;
- in emergencies in which human life and property are at stake;
- to restore natural ecosystem functioning that has been disrupted by past or ongoing human activities; or
- when a park plan has identified the intervention as necessary to protect other park resources, human health and safety, or facilities.

Any such intervention will be kept to the minimum necessary to achieve the stated management objectives. (*Management Policies 2006*, Chapter 4.1)

The management policies continue with guidance on restoration, monitoring, collections, environmental studies, among other resource management strategies connected with the adherence to the *Organic Act* and other previously mentioned federal regulations.

Park Management and Policy

Management at Mount Rushmore encompasses all of the federal regulations outlined above, NPS management policies, Director's Orders as well as park specific management documents. An updated General Management Plan (GMP) is currently being developed. According to the pending GMP, “The purpose of Mount Rushmore National Memorial is to commemorate our national history and progress, and to preserve and protect the sculpture and the historic, cultural, and natural setting while providing for the education, enjoyment, and inspiration of the public.” The pending GMP also identifies fundamental resources of the memorial to include the forest setting, the sculpture, the old growth forest, and unimpeded views of the sculpture. These resources and values maintain the park's purpose and significance, and if these resources are allowed to deteriorate, the park purpose and/or significance could be jeopardized.

The park also prepared an EA and Finding of No Significant Impact in 2004 for the park's Fire Management Plan (FMP). The FMP outlines the need of forest management in order to return the forest to its historic and sustainable condition which will be the healthiest and fire defensible condition. Fire suppression within the Memorial has caused an imbalance in the forest health and condition. The FMP outlines a plan of action to make the Memorial defensible against wildfires while also returning the forest

to a sustainable condition. Please see the Fire Management Assessment within this report for further information.

Cultural resource management is also at the forefront of park planning at Mount Rushmore. The memorial conducted an archeological survey in 2006-2007 that provided a 100% survey of the park and identified prehistoric and historic archeological sites. Other historic resources, including cultural landscapes and classified structures, are monitored and maintained for the preservation of the park's historic assets. A Cultural Landscape Inventory, revised in 2008, discusses the significant elements that make up the cultural landscape. There is no Cultural Landscape Report for the Memorial.

The current landscape level mountain pine beetle (MPB) epidemic occurring in the central Black Hills is entering the memorial property from the west and occurrences have been identified within the park. The pine beetle infestation has the potential of affecting some of the fundamental resources of the park and altering the historic viewscape of the memorial. Ponderosa pine and the forest as a whole are visually significant for the visitor experience as well as culturally significant for the history of the landscape.

B. Findings

Actions within this plan to address and possibly mitigate the MPB epidemic fall within the scope of human intervention within the natural environment for the protection of human health, facility safety, and the restoration of the ecosystem to its natural state. As stated above, the legacy forest and viewsheds within the cultural landscape as a whole are fundamental resources to the memorial that are identified within the GMP for protection and preservation. Human intervention is necessary within the scope of this epidemic to mitigate damage due to the pine beetle, restore the forest to a healthy, sustainable condition, and to protect human health and facilities from beetle damaged trees and wildfire risks.

NPS management policies suggest that human intervention “will be kept to the minimum necessary to achieve the stated management objectives.” (*Management Policies 2006*, Chapter 4.1) With this guideline in mind, a range of possible actions to address the problem were considered and analyzed by the park's interdisciplinary team. A list of actions that were identified, considered, but were ultimately rejected because of their affects or effectiveness include:

- No Action – If the memorial chose to do nothing to mitigate the pine beetle epidemic, the memorial could see a widespread mortality of the ponderosa pine forest. This would not only damage the fundamental resources of the park, but the dead stand would possibly close the park because of safety issues and result in a parkwide removal of dead trees. The spread of the pine beetle through the park would also result in the future spread of the beetle to neighboring lands and increase the fire risk for the entire neighboring community of the Memorial. The team decided not to pursue this action for these reasons.
- Thinning of the forest to a sparse basal area (ba) – Some specialists and community members believe that a major thinning effort to create a basal area anywhere from 20 – 40 ba would create a sparse enough landscape to deter any pine beetle infestation within the memorial. This action would require a great deal of removal of trees and the possible use of a helicopter to remove logs. This action would resemble a clear-cutting or commercial logging venture within the memorial. While cost-recovery sale of timber is allowed in certain instances within the NPS, this action is not necessary if the park can mitigate the pine beetle epidemic with less impact, and keep overall impacts to the “minimum necessary to achieve the management objectives.”

The proposed actions within this plan were identified as a balance between no action and a larger thinning of the landscape. Compliance with federal regulations and NPS policies has been completed or is in process and will be concluded by the time of the proposed actions. Consultations and compliance reviews include:

NEPA

The Rapid Response Action Team, along with the park's interdisciplinary team, analyzed the situation and concluded that the actions proposed within this plan were the most appropriate actions to address the pine beetle epidemic. The team's meetings and discussions were a part of the initial scoping within

the NEPA process. The draft plan was placed on the NPS's Planning, Environment and Public Comment (PEPC) website and the public was given 15 days to review and comment on the draft document. This invitation for public review was not associated with the official NEPA requirements of public review as is done when soliciting comments for an EA or EIS. This call for comments was simply used to generate further discussion concerning the initial scoping ideas outlined in the draft plan. During this time, interagency specialists were also consulted and encouraged to submit comments and suggestions about the plan.

In analyzing all comments and reviewing currently scholarship and thoughts concerning the pine beetle epidemic, the management team revised the action plan and narrowed the scope of work to reflect a more balanced and feasible course of action. The resulting recommendations for action were then analyzed under the NEPA process and the following determinations were made:

Preventative Spraying of High Value Trees

This action falls under the Categorical Exclusion E.3 (DO-12 Section 3.4.E.3). This Categorical Exclusion includes "The removal of park resident individuals of non-threatened/endangered species which pose a danger to visitors, threaten park resources or become a nuisance in areas surrounding a park." Appropriately applied to the high value trees, the preventative spray should not pose a threat to visitor or environmental threats. Safety measures during the spray should include the closing of the spray area and appropriate signage and visitor education concerning the sprayed area.

Mark and Remove MPB Infested Trees

This action falls under the Categorical Exclusion E.3 (DO-12 Section 3.4.E.3). This Categorical Exclusion includes "The removal of park resident individuals of non-threatened/endangered species which pose a danger to visitors, threaten park resources or become a nuisance in areas surrounding a park." Trained park staff and specialists will identify and mark infested trees and fell the individual trees so as to kill the tree's beetle population and prevent further infestations.

Fuels Thinning of Trees Less than 10 Inches

This action falls under Mount Rushmore's 2004 Fire Management Plan. This plan incorporated an EA and a FONSI was signed. The plan includes actions of forest thinning for sustainable conditions and prescribed fire for fuels reduction. Because of the age of the FMP, Memorial staff will consider the impacts of this action as they may have been considered under the FMP, and if appropriate, execute a Memo-to-File indicating that the environmental considerations of the current action are sufficiently covered by the FMP EA.

NHPA

The memorial's Cultural Resource Management(CRM) team was contacted and consulted about the proposed actions. The CRM team concurred that the actions would not adversely affect cultural resources within the park. The South Dakota SHPO was also consulted and concurred with the park's finding. Consultation letters were sent to the South Dakota tribal officials and THPO representatives for their input. Further contact with the tribes is planned after their 30 day review period is over. Historic resources and archeological sites should be monitored during the project to ensure protection.

ESA

In compliance with the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service was consulted concerning this project. The Fish and Wildlife Service confirmed that there are no federally listed threatened or endangered species or areas listed as critical habitat within the projected area. They also confirmed that there are no federal candidate species within the park.

IV. RECOMMENDATIONS

Management Recommendations – Non-Specification Related

- Complete the compliance process and paperwork for each action within the plan
- Publish all compliance related decisions on the PEPC public website
- Complete necessary consultations with associated Tribes, SHPO, THPOs

- Maintain and complete NEPA review through PEPC website
- Complete an integrated pest management permit of the use of chemical sprays through the Pesticide Use Proposal System (PUPS)
- Conduct site visits to the archeological sites to determine level of protection needed during the project

V. CONSULTATIONS

Name	Contact Info	Purpose of Contact
Nick Chevance	NPS MWRO (402) 661-1844	NEPA consultation
Sandra Washington	NPS MWRO	NEPA consultation
Paige Hoskinson Olson	SD SHPO (605) 773-6004	Section 106 Consultation

VI. REFERENCES

Allen, Kurt. 2009 Mount Rushmore Mountain Pine Beetle Forest Health Evaluation

2008 Section 106 Programmatic Agreement, NPS and ACHP and NCSHPO

NPS Director's Order 12 and accompanying manual

NPS Management Policies, 2006

Amy Bracewell, Mount Rushmore National Memorial, National Park Service, (605) 574-3114

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

PUBLIC COMMUNICATION AND EDUCATION ASSESSMENT

I. OBJECTIVES

- Provide continuing public information, press releases and updates regarding actions being taken, i.e. spraying, tree thinning, and monitoring
- Inform neighbors, surrounding communities and the public about issues related to the Mountain Pine Beetle (MPB)
- Provide educational and interpretive information to Mount Rushmore National Memorial visitors on the MPB
- Inform sensitive groups about upcoming chemical applications
- Close and post areas where insecticides are to be applied, as necessary

II. ISSUES

- Public knowledge and understanding about forest management strategies such as fire suppression and thinning
- Public knowledge and understanding of National Park Service policies regarding management of natural resources, wildlife and native species
- Public information about partnership efforts and actions with cooperating agencies, political leaders, private land owners and business
- Public information and education about the mitigation to slow the advance of the MPB infestation
- Safety measures and risks regarding spraying and related ground water quality

III. OBSERVATIONS

A. Background

The purpose of this assessment is to address the opportunities for education outreach about the natural history, entomology, and ecological impacts of the MPB and strategies and tactics necessary for effective management of the forest for the future. Education opportunities will be developed to cultivate interest and promote curiosity, build scientific knowledge and understanding and promote partnerships and civic engagement geared toward the preservation and stewardship of our natural resources.

The memorial hosts approximately 2.5 million visitors each year. Visitation includes individuals, family and group recreation/vacation, organized tour groups, special interest groups, and education source groups from all states, various cultures, and international visitors. Park visitation and relationships (both formal and informal) with other entities and agencies present unique interpretation, outreach and public information opportunities to educate and inform the public about specific park operations and projects regarding the MPB.

Park management, interpretive programs, and park publications adhere to and promote the National Park Service *Organic Act* as well as the park service's mission statement. The *Organic Act* states that "The

service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purposes of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” The mission statement outlines that the National Park Service, “preserves unimpaired the natural and cultural resource and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The National Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.”

These fundamental guidelines outline clear goals of resource management and opportunities for education. While the *Organic Act* and the mission seek to preserve the natural resources of the park service as unimpaired, the increase in tree mortality from the MPB epidemic is causing an imbalance in the forest ecosystem that may negatively impact the fundamental resources and values of Mount Rushmore. The Memorial is an active member of the Black Hills forest community that is tackling management issues surrounding the MPB epidemic. Vast areas of Ponderosa pine to the west of the Memorial on U.S. Forest Service lands have already been attacked and some areas have seen 100% mortality of the forests. Pine beetle infested trees have also been identified within the Memorial forest. The mortality of trees infested by the pine beetle increases fire danger within the forest community and creates fire danger concerns for visitor health and safety at the Memorial.

Natural history and the history of the Black Hills have traditionally played a minor role in exhibits and programs at the Memorial. Interpretive programs, exhibits, and publications at the Memorial have predominantly focused on the sculpture carving history and American history. A few site bulletins and other visitor publications have been distributed in the past with general information on the wildlife in the park. Over the past two years, natural history topics have been integrated into the newly created Kid’s Exploration Area at the park that provides hands on activities for young visitors on a variety of thematic topics. The ‘Rangers in the Classroom’ program has also provided curriculum programs on wildlife adaptation to local school groups.

B. Findings

Discussions on the National Park Service’s perspective on natural resource management as well as the proposed actions to address the MPB epidemic lead to educational opportunities to increase visitor understanding and engagement about park resources and actions needed to protect and preserve the natural setting. Education outreach is necessary to inform park staff, visiting public, park neighbors, education communities, and partner groups about forest health and the challenges of forest management in order to promote public understanding, support and assistance. Opportunities for educational exploration include:

- The development of a communications plan to help direct public information operations
- Continue ongoing programs on the significance of the cultural landscape of the sculpture and the surrounding forest
- Implement the NPS mission as it pertains to MPB management at the Memorial
- Integrate ideas of the significance of unlogged, old growth forest at the memorial, the risks of catastrophic wildfire, and historic fire and forest management tactics into programs and publications

Memorial interpretation staff would be involved in developing communication, signage and educational programs throughout the various phases of this plan. Appropriate signage and visitor communication would occur during necessary park closures. Front line interpreters would provide formal and informal interpretation opportunities during the project and communicate directly with the public. Interpreters would communicate safety messages, the goals and purpose of the proposed actions, and engage in discussions concerning the diverse perspectives on forest management.

Increased focus on natural resources in interpretive programs and publications would also help bring greater focus and engagement to the issues surrounding the MPB epidemic. Memorial interpretive themes and programs would incorporate topics and issues of forest management and the natural history of the Black Hills.

These topics would be explored through specific, targeted measures designed to develop, implement and sustain interpretive and public information capabilities at the memorial. Effectiveness will depend upon the quality of deliberate planning, resource advocacy, authorization and funding of capacity-building measures, and implementation of proposed measures.

Public information and media affairs are also integral tools in public understanding and engagement. An NPS Public Information Officer devoted to this project would produce press releases updating the news and the public on weekly developments. Media events, briefings and meetings with interested parties would also help facilitate communication and awareness of the project. Active communication with media outlets would help manage community understanding and expectation about the actions carried out under this plan.

IV. RECOMMENDATIONS

C. Recommendations

- Employ a temporary, NPS detailed, Public Information Officer devoted to the media affairs of this project during periods of high activity

B Management Recommendations – Non-Specification Related

1. Provide staff training on the natural history, entomology, and ecological impacts of the MPB, forest history, health and management
2. Develop natural history themes related to the MPB and incorporate into education and interpretation programming
3. Develop and deliver on-site field education studies focusing on life cycle and short-term and long-term methods to inhibit infestation
4. Develop web-based curriculum resources for teachers and students
5. Engage educational institutions and civic organizations in education activities and events such as demonstrations, guest speakers and panel discussions
6. Create publications, kids' newspaper and multi-media to educate and inform
7. Include pine beetle information in park publications, web site postings and news releases
8. Comply with requirements to report or otherwise communicate information on chemical treatment type, locations, dates and treatment methods, application schedules and safety information
9. Integrate MPB management issues into current environmental education curriculum, as appropriate
10. Through press releases and media advisories, the park will notify local media about MPB control activities, dates, locations and treatment methods, as necessary
11. Develop and implement a communication plan for public information

V. REFERENCES:

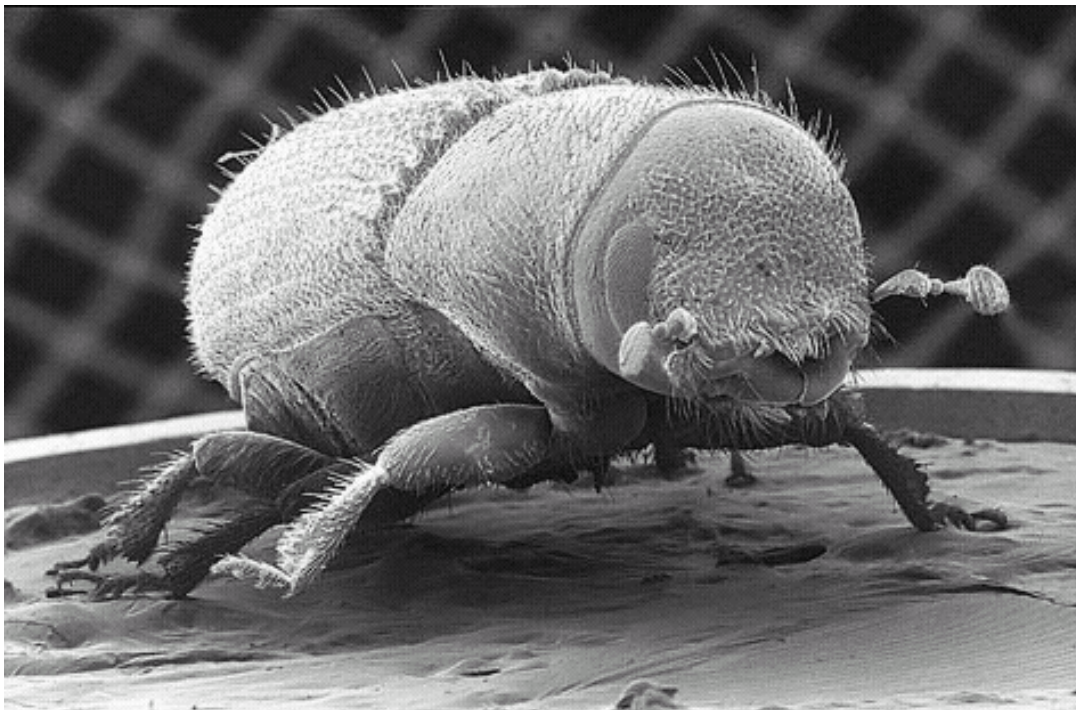
Mount Rushmore General Management Plan, Fire Management Plan, and Long Range Interpretive Plan

Contacts: Navnit Singh, Blaine Kortemeyer, Rhonda Schier, MORU Interpretation.

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

APPENDIX II PHOTO DOCUMENTATION

- **FOREST HEALTH**
- **CULTURAL RESOURCES**
- **FIRE MANAGEMENT**



Mountain pine beetle (FS photo)

Forest Health



Adult mountain pine beetle and larvae in beetle galleries



MPB infestation in Black Elk Wilderness



Photo showing thinned forest resistance to infestation



Carbaryl spraying in ponderosa pine forest



Truck or ATV mounted sprayer for Carbaryl treatments



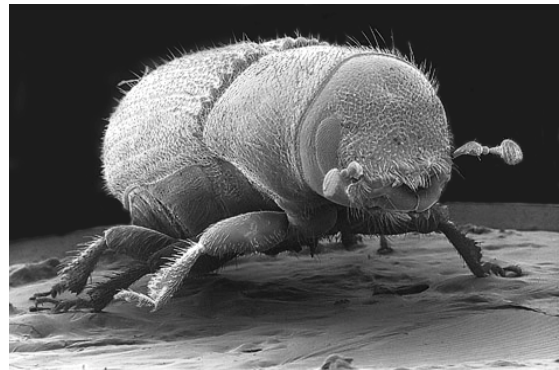
Pitch tubes showing successful beetle infestation



Black Hills ponderosa pine forest effectively thinned to mitigate MPB and fire hazards



Cut and chip fuel treatment in the Black Hills



Mountain pine beetle (*Dendroctonus ponderosae*)

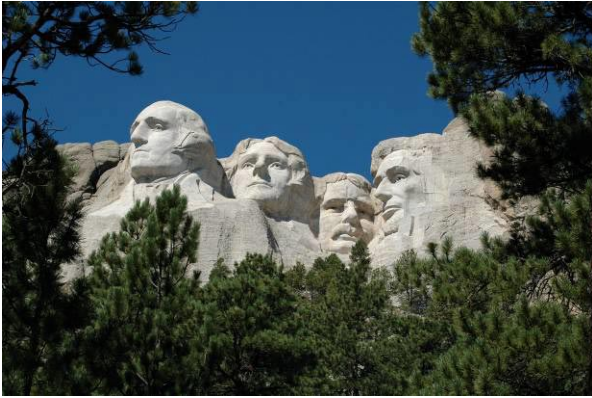


Verbenone pouch (repellent)



Blue stain
MPB-induced "blue stain" fungus

Cultural Resources



Mount Rushmore National Memorial Sculpture



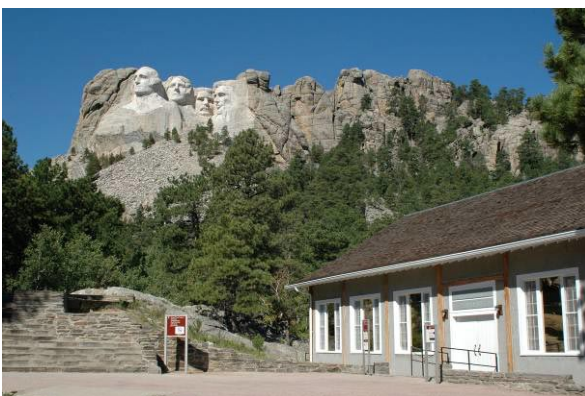
Avenue of Flags



Scenic View



View of Developed Area



Artist's Studio



Artist's Studio Interior

Fire Management



Thinning project pre-treatment



Thinning project post-treatment



Chipper working at Mount Rushmore



Chips on the ground in thinning unit



Burning slash piles at Mount Rushmore

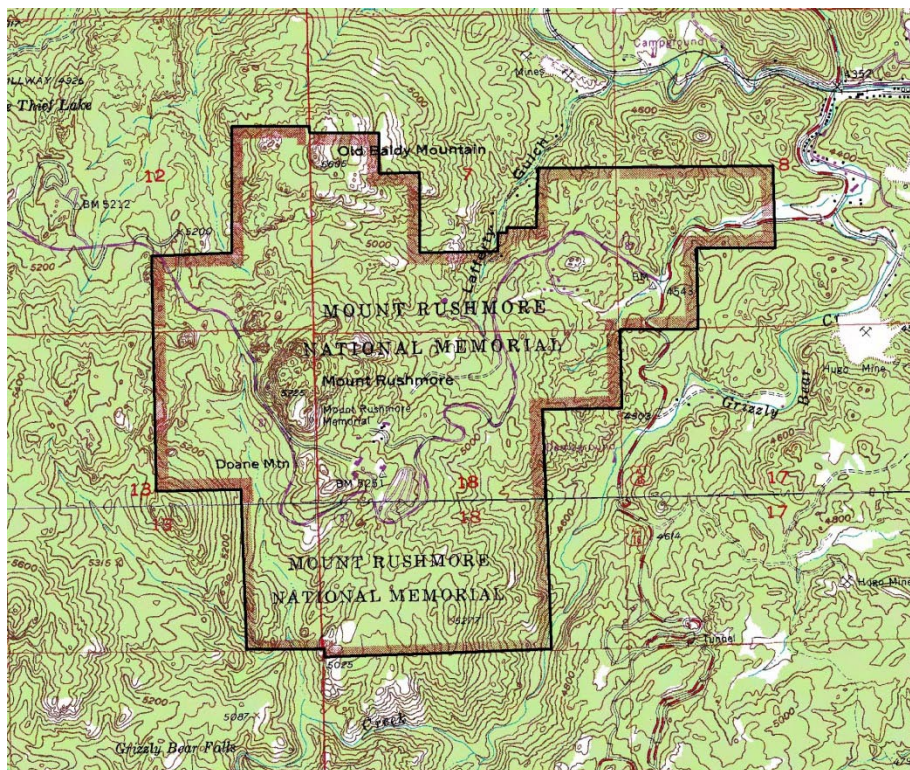


Prescribed fire in Black Hills ponderosa pine

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

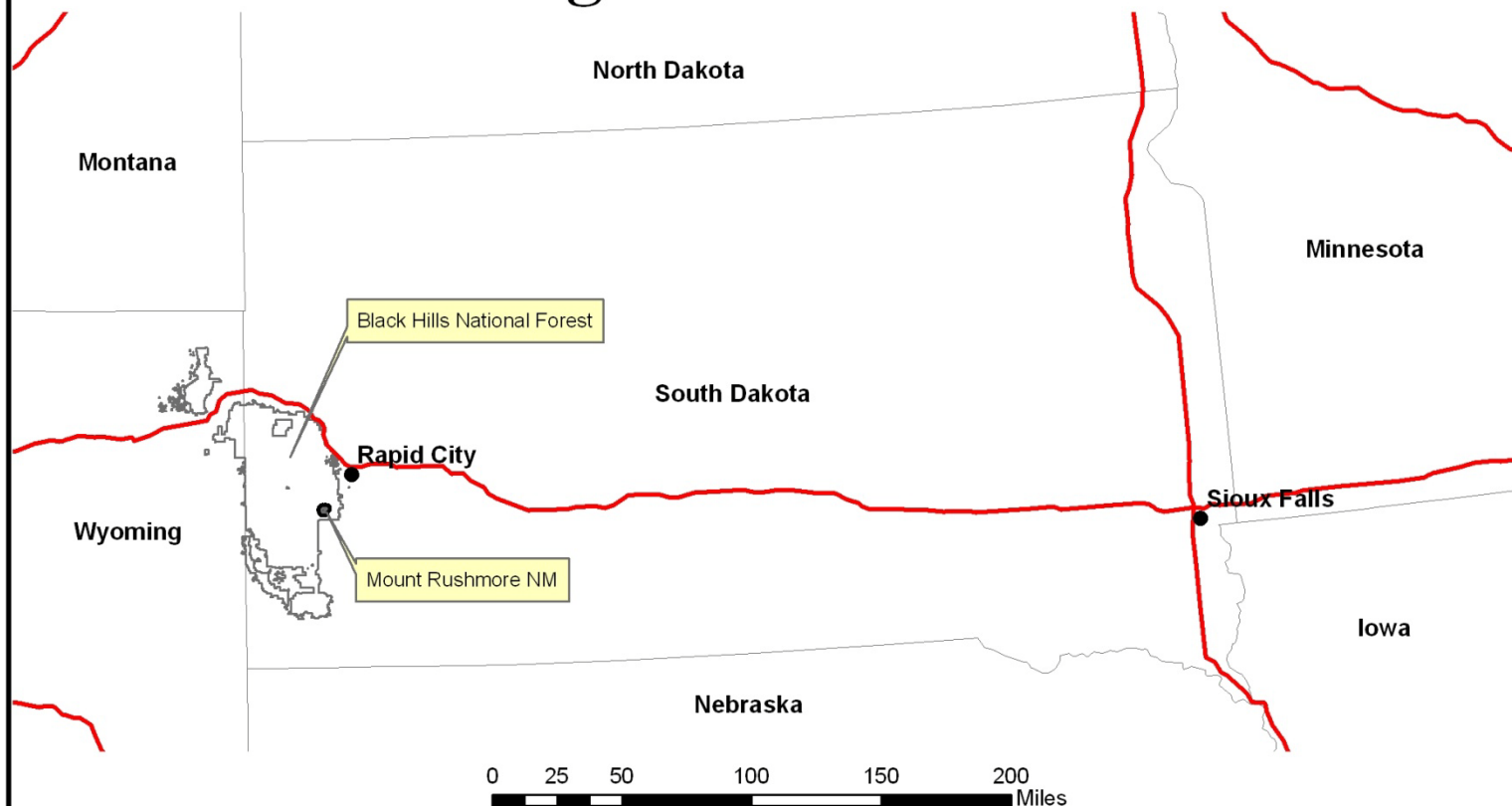
APPENDIX III MAPS

1. Regional overview
2. Black Hills area overview showing Mount Rushmore NM relative to 2009 MPB infestation
3. Local area overview showing Mount Rushmore NM relative to 2009 MPB infestation
4. Mount Rushmore NM MPB risk assessment for 2010 and 2011
5. Mount Rushmore NM forest health assessment and tactics
6. Black Hills National Forest adjacent fuel treatments 2000-2010
7. Black Hills National Forest MPB aerial detection results 2006-2009
8. Mount Rushmore NM vegetation classification and land use cover
9. Mount Rushmore NM fire treatment units





Mount Rushmore National Memorial Regional Overview



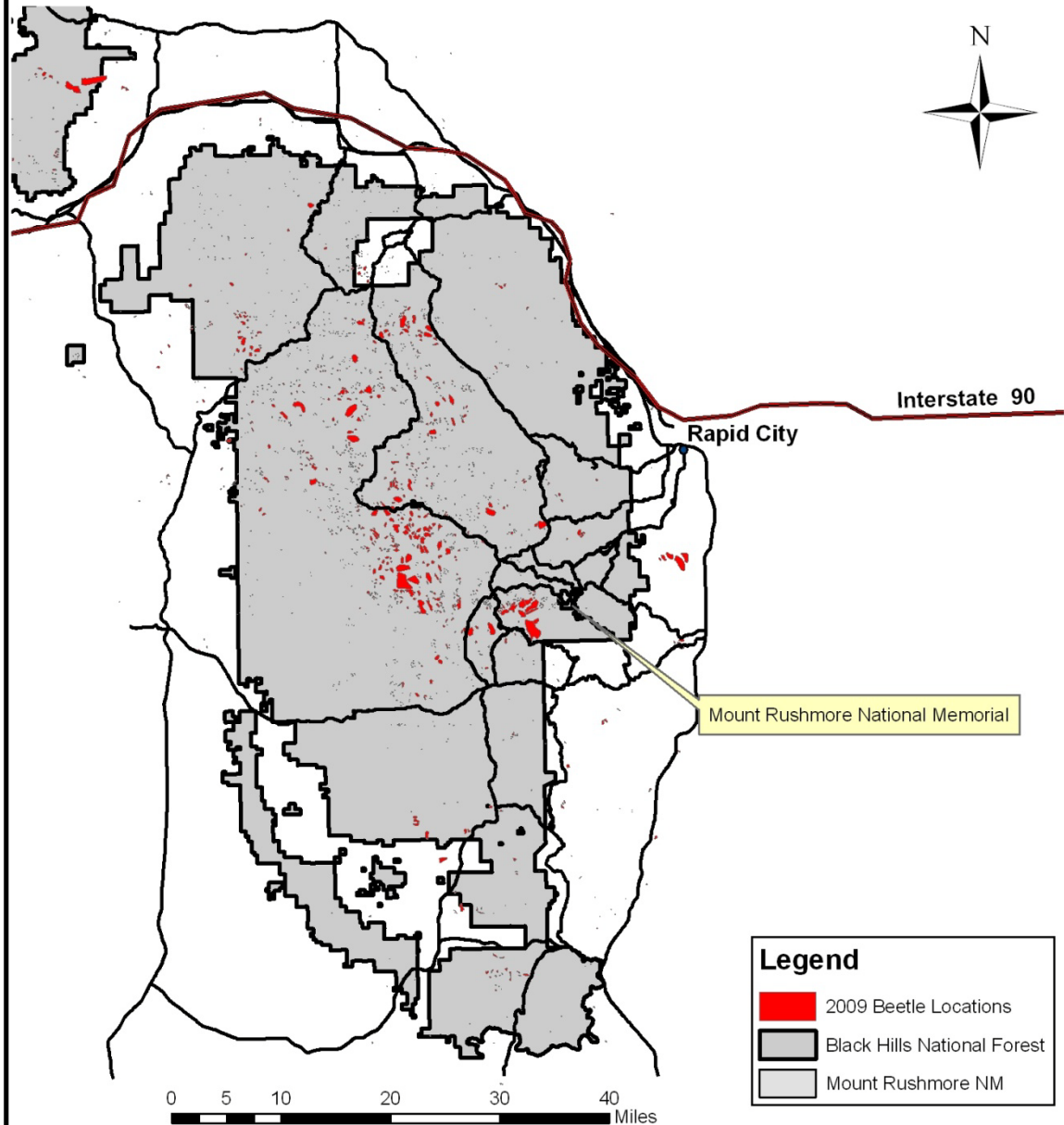
Produced by RRAT GIS specialist

February 2010



Mount Rushmore National Memorial

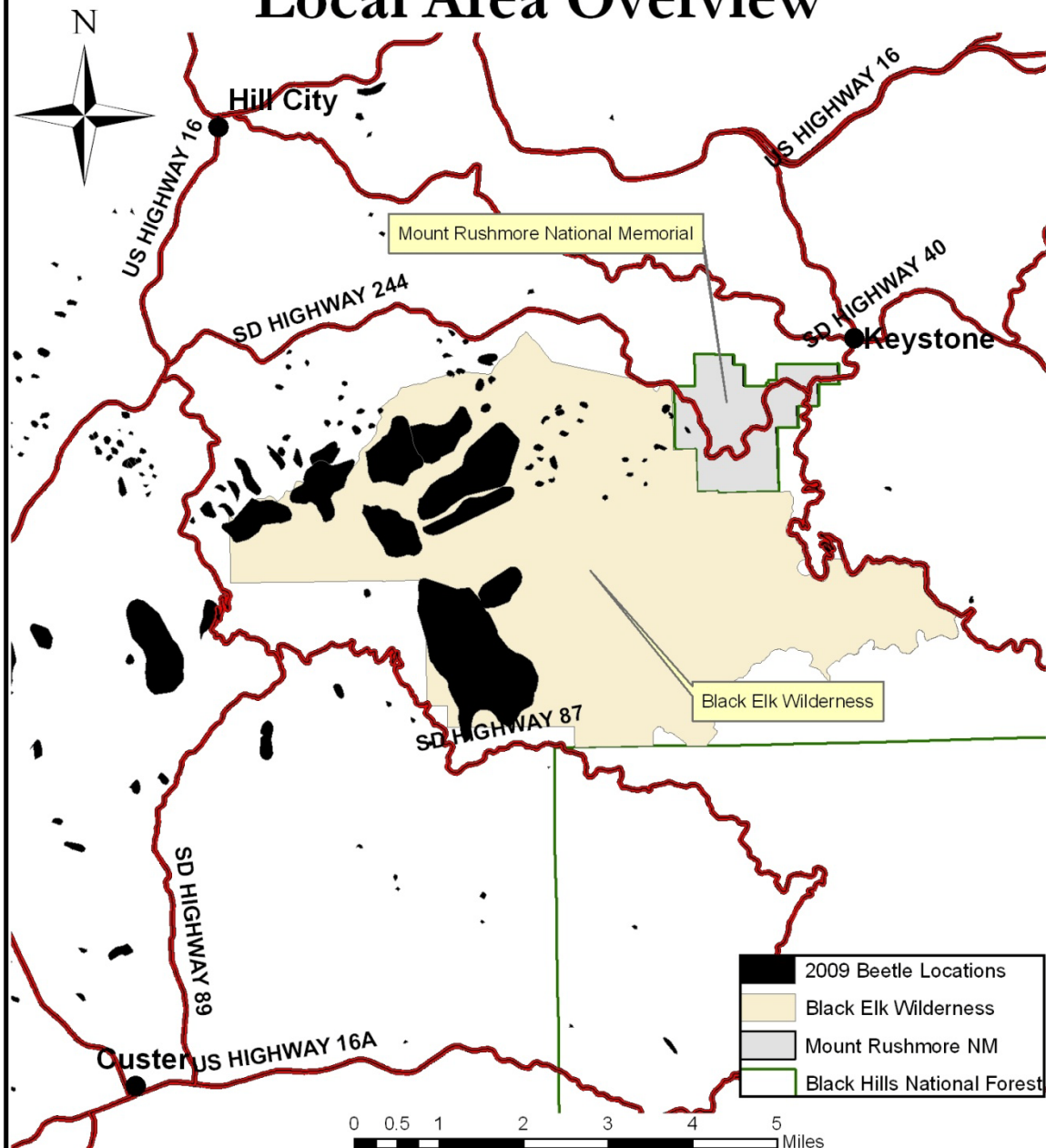
Black Hills Area Overview





Mount Rushmore National Memorial

Local Area Overview

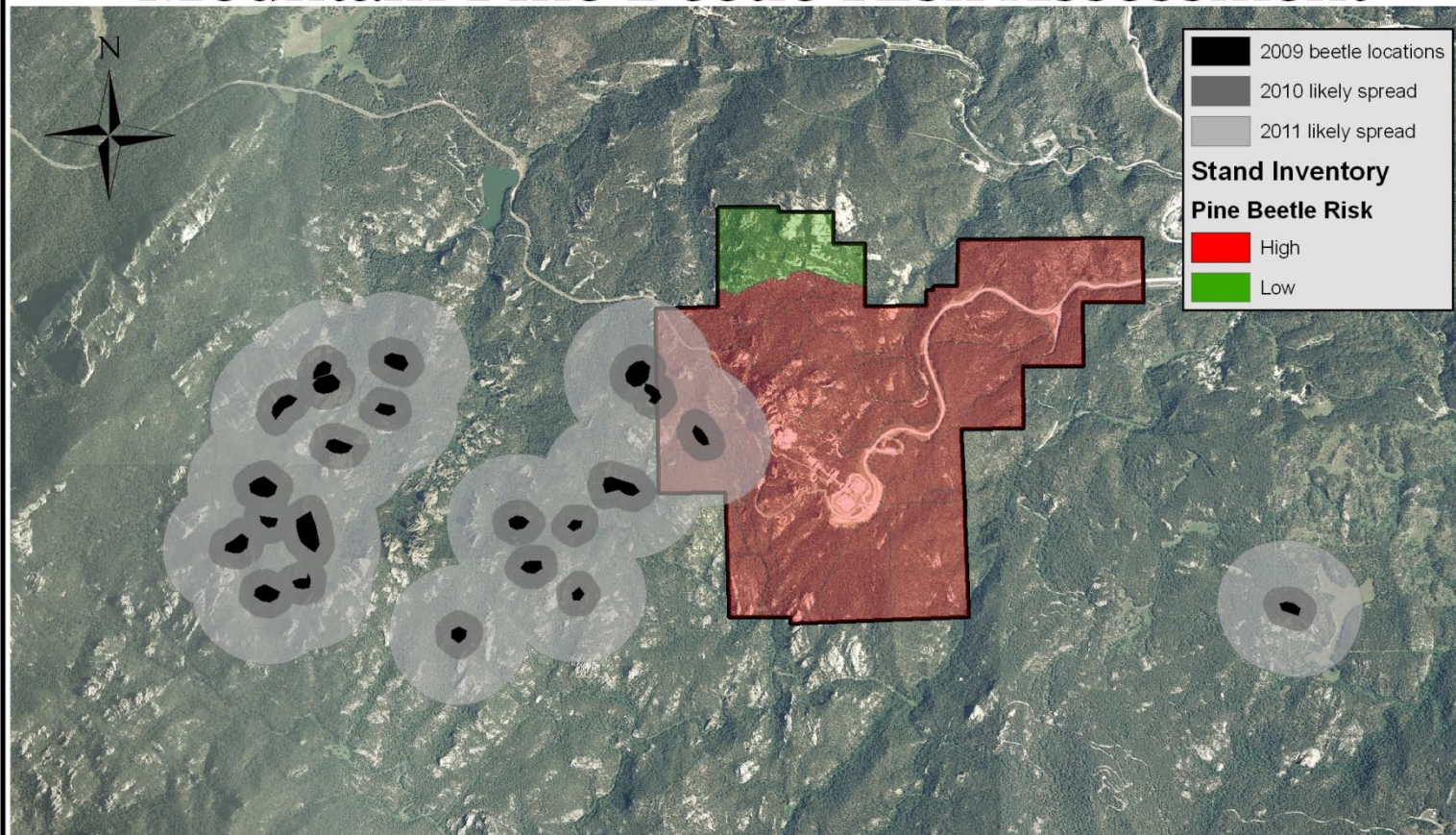


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Mount Rushmore National Memorial Mountain Pine Beetle Risk Assessment

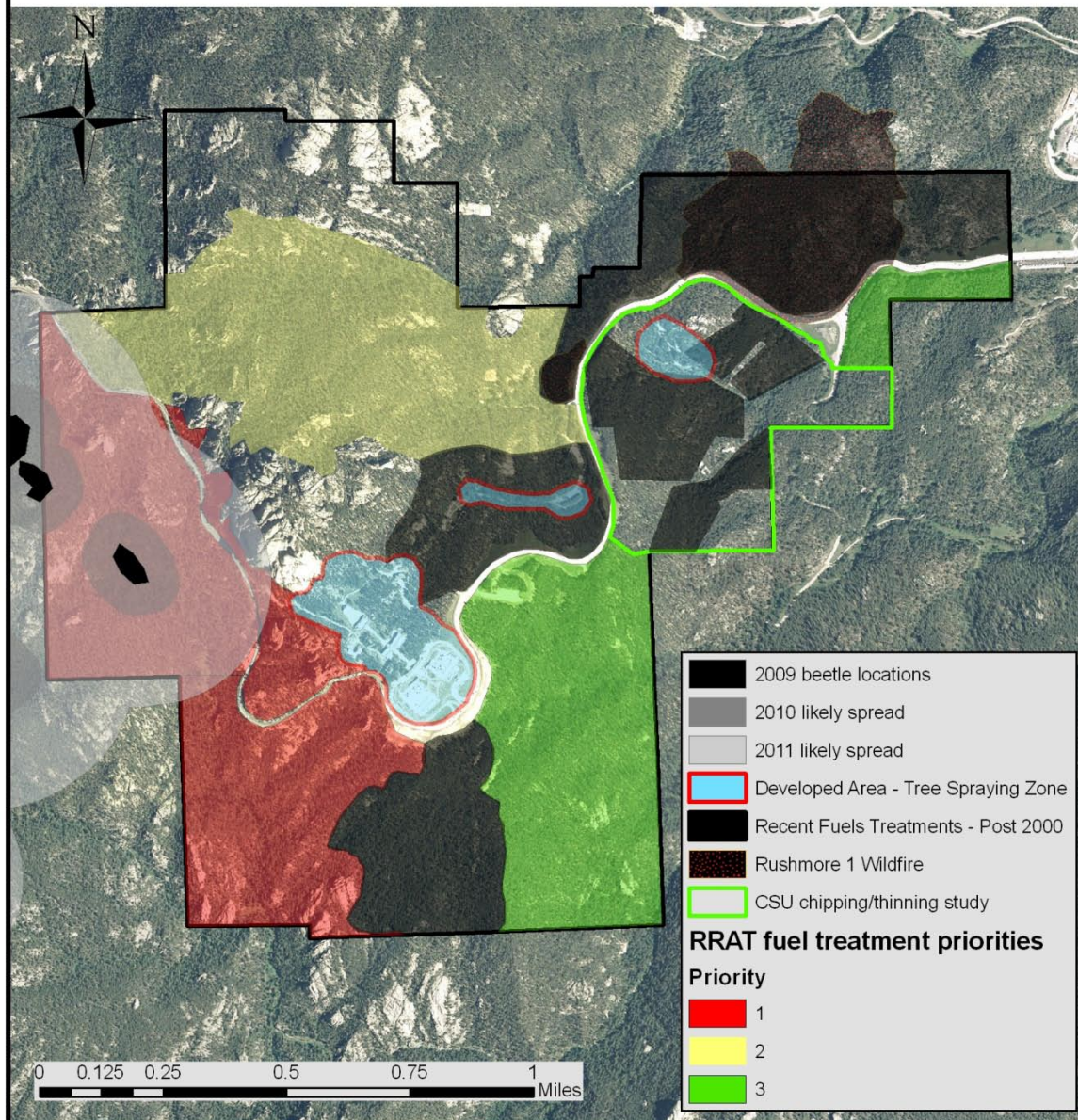


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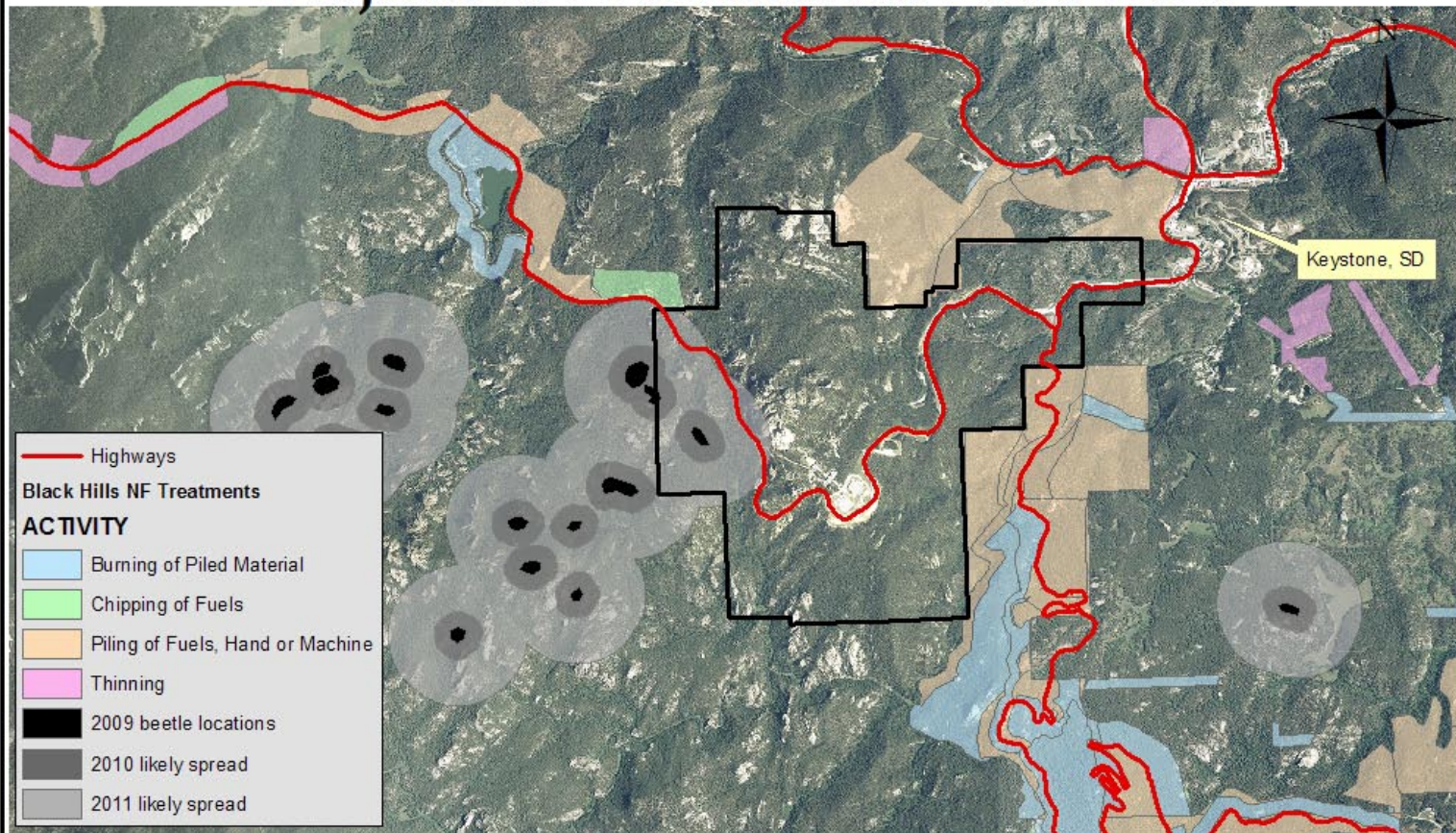


Mount Rushmore National Memorial Forest Health Assessment





Black Hills National Forest Adjacent Treatments 2000-2010

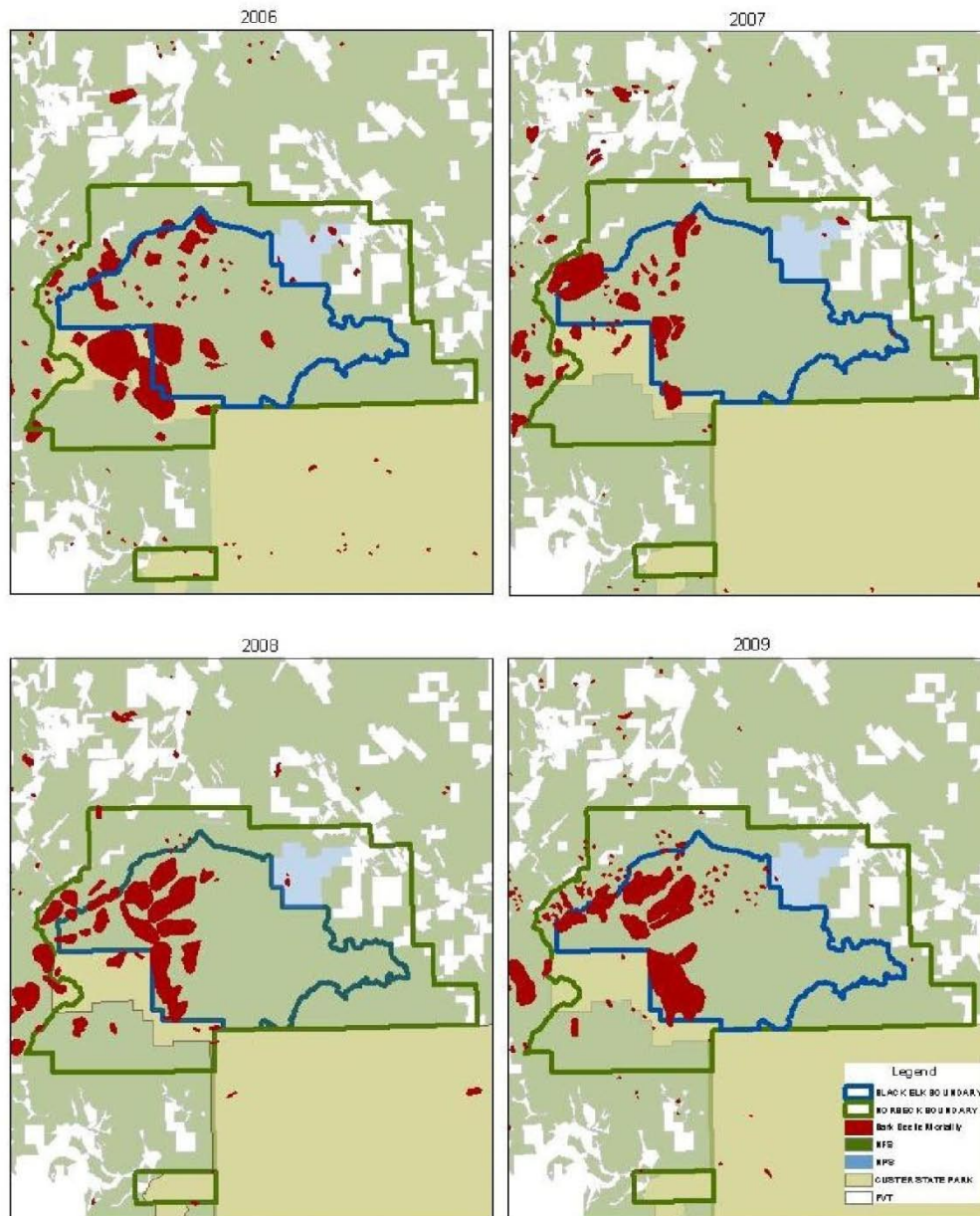


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Progression of Mountain Pine Beetle Infestation US Forest Service Aerial Detection 2006-2009

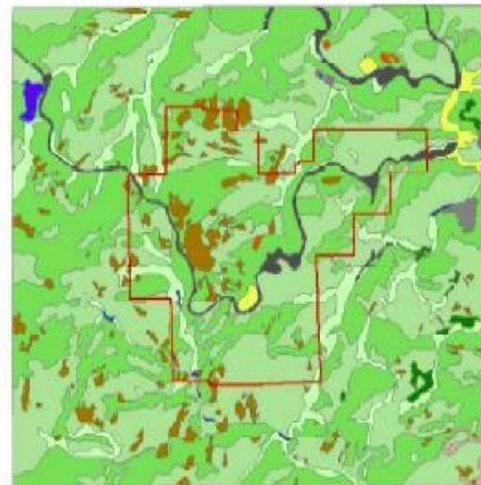


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Mount Rushmore National Memorial Vegetation Classification and Land Use Cover



Map Unit	Map Unit Name	Associations Included
HB	Bur Oak / Ironwood Forest	• Bur Oak / Ironwood Forest
PJ	Ponderosa Pine / Common Juniper Woodland	• Ponderosa Pine / Common Juniper Woodland
P1	Ponderosa Pine Complex I	<ul style="list-style-type: none"> • Ponderosa Pine / Little Bluestem Woodland • Ponderosa Pine / Sun Sedge Woodland • Ponderosa Pine / Bearberry Woodland • Ponderosa Pine / Rough Leafed Rice Grass Woodland
P2	Ponderosa Pine Complex II	<ul style="list-style-type: none"> • Ponderosa Pine / Bur Oak Woodland • Paper Birch / Beaked Hazel Forest



Mount Rushmore National Memorial Fire Treatment Units

