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Final Report on

2011-2012 Mountain Pine Beetle Program

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The massive swaths of dead trees, caused by mountain pine beetle in the Black Hills, elicits a strong emotional response in many residents. For many years it was believed that mountain pine beetles were not a threat to ponderosa pine growing at lower elevations. In the fall of 2010, a resident requested that Rapid City Urban Forester Gary Garner inspect a few trees on his property that he suspected of having a beetle problem. SD State Pest Specialist John Ball confirmed that the trees were infested with mountain pine beetles. In the fall of 2011 Rapid City Parks employees thoroughly surveyed Skyline Wilderness and Dinosaur Park areas and identified 20 newly infested trees. Several dead trees were identified that showed signs of past beetle activity. These dead trees indicated that beetles had been in this area for at least several years and that the beetles may have always been present as mountain pine beetle is a native insect. In the coming weeks as media attention grew an increasing number of residents called to have their trees inspected. The Fire Department also reported finding infested trees while assessing properties for the Wildland/Urban Interface Fire Risk Assessment and Hazardous Fuel Removal Program.

On November 2, 2011 Parks and Recreation present to Rapid City Public Works Committee that 47 trees currently infested with mountain pine beetles had been located within city limits on city owned lands and property held in trust along the Skyline Drive and M Hill/ Cowboy areas. In response to this, the Mountain Pine Beetle Suppression Plan was created. Time constraints created by the beetle's biology dictated a program had to be developed and implemented in a short period of time. City council actions needed to implement a program included a declaration of an emergency, creation of an

incident command system, ordinance revisions, a resolution to waive certain fees at the landfill and emergency funding, totaling $350,000 was appropriated to address the mountain pine beetle issue in Rapid City. A 75% cost-share program for tree removal and disposal was adopted as part of the suppression plan. This cost share provided for a maximum reimbursement of $3,000 per parcel of land. The cost share required complete removal and documented disposal of the trees. The rugged terrain and difficult access in some areas required that exceptions were made later when it became obvious that some places were too difficult to access to remove the trees. The trees were then cut and chunked according to recommendations from the State of South Dakota.

Properties were selected as potential targets by looking at a 'parcel lines overlay' on aerial photography. Over 2,000 letters were mailed to property owners in late December informing them of the suppression plan and the cost-share program. Press releases were distributed to the local media which resulted in stories being run on television, radio and in the local newspaper. A webpage regarding the mountain pine beetle program was created and posted on the City's website. Owners were encouraged to request a free inspection from the City by telephone or by filling out an online form. They were encouraged to apply for reimbursement should any infested trees be found on their property. A list of approved tree removal contractors was developed and distributed to property owners.

Six Parks Division maintenance employees were selected and trained to inspect trees and identify symptoms of Mountain Pine Beetle infestation. In addition, two seasonal employees were hired to facilitate the program to conduct clerical, mapping and data management.

By the end of the first week of January, 2012, the City received more than 300 requests for property inspections. Maps of the properties were created using the City's RapidMap program by outlining the parcel boundary in red on 2008 aerial imagery. These maps were attached to inspection request forms which contained contact information for the property owner. This information was organized in binders and separated into the following groups:

- Area 1: West of Sheridan Lake Rd and south of Jackson Boulevard
- Area 2: East of Sheridan Lake Rd and south of Main Street, and
- Area 3: North of Jackson Blvd and Main Street

Area 1 was considered the highest priority because of the heavily hit trees we were already aware of, and our expectation that we would find the most infested trees there.

Crews began inspecting properties the second week of January. Computers were set up for seasonal employees who were trained to use the database that had been developed by GIS. (Parcel data from the original mailing list was already stored in the database.) Inspection data was entered as it came in and then a survey report was generated stating the number of infested trees found. This information was mailed to the property owner with a letter outlining the steps to be taken to be eligible for the cost-share program and a list of approved tree removal contractors. When property owners submitted two quotes for tree removal, a permit was generated using the database. After the trees were removed, owners brought back the permit along with a scale sheet from the City Landfill and an invoice marked “paid in full”. A purchase order for reimbursement was then created and submitted to the City Finance Office.

Between January and May, 2012, crews surveyed close to 5000 acres (fig. 1) within Rapid City to identify and locate trees attacked by mountain beetles in the summer and fall of 2011. Scattered throughout all of the forested areas of the city, 1,234 infested trees were found (fig. 2). This number is nowhere near epidemic levels. It is more than we expected. With the exception of the Wildwood neighborhood, no real pockets were found. Most infested trees were by themselves or occasionally in clusters of 2-5 trees. The infested trees proved to be very widely scattered throughout the city. The overall number of infested trees was 1 per .25/acre. This was much higher in some localized areas. For example, in Wildwood the average was 1.31/acre.

More than1,360 properties, including City parcels, were inspected. Of these, 1,012 parcels were free of infestation and 351 parcels had 1,234 infested trees. Permits for removal were issued for 800 trees as part of the cost-share program. Of these, we know that 20 were cut and chunked due to accessibility issues, some were chipped on site, and the majority were removed and disposed of at the landfill. One tree was deemed too dangerous to remove. We have no confirmed record of the disposal method for the

421 trees that were removed outside of the cost-share program. 191 trees were reported to have been cut and chunked; 90 of these were on a large parcel owned by a homeowners' association on their self-inspected acreage. The 1,222 infested trees removed in 2012 should have an impact on the number of infested trees identified this coming season. It's difficult to predict what will occur in the future. It would be unreasonable to assume there won't be any mountain pine beetles in the city in 2013. It's likely that the outbreak outside of Rapid City will continue to move closer to the city boundary, creating more beetle pressure. Mountain Pine Beetles will continue to make their way into Rapid City on infested firewood or fly in from outside city limits. We will also see beetle movement inside the city limits as the program was voluntary so there are almost 2000 acres that were not surveyed.

Rapid City is in the unique position of being able to address the potential beetle problem effectively because the beetle activity is not at a crisis point. Compared to the numbers of infested trees in most areas of the Black Hills, those in Rapid City are extremely low. This is of little consolation to the homeowner whose favorite tree gets killed by the beetles. The City has time to continue to develop plans to forestall the encroachment of the mountain pine beetle. Responding quickly this year helped keep those numbers low; now is the time to carefully consider the structure of future mountain pine beetle suppression plans. In 2011-2012 $149,000 was spent on reimbursements, seasonal labor and supplies. In-kind labor costs accounted for an additional $87,000 in expenses.

Preventative action should be encouraged. Thinning is considered the most effective means of reducing the spread of mountain pine beetles. The Rapid City Fire Department has a program in place that includes thinning. The "Hazardous Fuel Removal for Wildland Fire Mitigation in the Wildland Urban Interface Areas of Rapid City" program targets areas with dense forest cover which are most prone to attack by mountain pine beetle. This is perhaps where the most benefit can be gained, as two problems can be dealt with in one treatment. The City Council has approved the addition of this program to the MPB Suppression Plan. Any means of bolstering this program would aid in the prevention of mountain pine beetle

Spraying is considered a very effective means of prevention if done correctly. Spraying can become cost prohibitive when large numbers of trees are involved. Most

landowners make the investment in protecting their highest valued trees. If the City identifies such trees on its own property, it may warrant investing in protective spraying. But as a means of decreasing the beetle population, spraying only works if beetles land on the tree. When the infestation level is as low as it is in Rapid City (1 infested tree per 4 acres inspected) it would be extremely difficult to predict, with any degree of accuracy, which individual trees are likely to be attacked. There are environmental risks and potential threats to beneficial insects and organisms. It is imperative that these risks be fully evaluated before spraying any insecticide and label directions for use are closely followed.

When the level of infestation is as low as it is here, removing infested trees, or cutting and chunking can have a greater effect than in more heavily infested areas where the number of beetles is high. Encouraging the identification and prompt removal of newly infested trees should help keep the numbers low. The cost of tree removal can become very expensive. In this past years program the cost of removal of a single tree charged by contractors ranged from $150-$1200. Most were in the $200-$300 range. Cutting and chunking is said to only reduce the population by 80%, yet sometimes that may be the most cost effective means of suppression. Crews discovered some treacherous terrain, where cut and chunk was the only practical means for destroying the infested tree.

One of the most difficult tasks, and one that should really be given careful consideration, is determining how to define “infested.” It is not as clear cut as one might think. The sure way to know if a tree is infested is to cut into it and find live specimens. However, cutting into it and not finding doesn’t mean there are none. The most common way to diagnose a tree infested by mountain pine beetle is by the presence of pitch tubes. The number and nature of the pitch tubes can indicate how likely it is that the beetles were successful. On this point there is a vast array of strong opinions and little research to determine what the marker is. At the start of our surveys city crews took an aggressive approach and chose 3 hits (pitch tubes) as our criteria for calling a tree infested. The criteria changed to 8 hits after a few weeks for 2 reasons:

1) Forestry experts in the community felt that a tree with only 3 hits has not been successfully attacked.

2) The funding available would not support such an aggressive approach to the problem.

There are several factors to consider when deciding if a tree has been successfully infested with mountain pine beetle.

1. Presence of boring dust is perhaps the best indicator of success of attack than number of hits. This dust is not always easy to see.
2. Not all infested trees are created equal. A tree in a stand of many trees is not likely to be as emotionally important to an owner as a single legacy tree in a front yard.
3. Differences in size and tree vigor also will affect how many beetles it takes to overcome a tree's defenses.

A tree's natural defense is to swamp the beetle with sap. Sometimes a beetle can still be seen in the pitch tube after a tree has successfully pitched it out. Sometimes a beetle makes it into the tree, but can't survive long enough to produce brood. These pictures were taken in May. The tree had more than 20 hits, and yet it was most likely not a successful attack. Pictured to the left, there is a dead adult beetle that made it under the bark, but no larval galleries were found. There was still significant sap flowing. At least 7 cuts were made on different sides of the tree, at different heights, at points of beetle entry holes. All of them were sappy, no blue stain or larval galleries were found. Granted, pitch tubes went up another ten feet out of reach, but it's believably not infested with live beetles and therefore at no risk to other trees. When a tree like this survives, it is common to see it attacked the following year, if not by mountain pine beetle then by Ips and/or red turpentine beetles. Since it was located in a forested stand

with reasonable access, it made sense to remove it and take no chances.

Sometimes distinguishing mountain pine beetle pitch tubes from red turpentine pitch tubes can be difficult. Some are obviously one or the other, but there is a range where only seeing an actual beetle would confirm what kind of pitch tube it is. Again, taking an aggressive approach, when there was doubt we opted on the side of caution, not wanting to risk allowing other trees to become infested.

Recommendations:

1. Get representatives from the various agencies together to find out what methods they use to assess mountain pine beetle damage. This would allow an industry standard to be developed for establishing the number and type of hits on the tree when declaring the tree invested.
2. Focus on thinning by providing financial support to the Fire Department's fuel reduction cost share program.
3. Education of landowners through direct mailings and media messages. This needs to include the numerous other insect problems associated with ponderosa pines. These insects include Zimmerman Moth, IPS or Engraver Beetles and Red Turpentine Beetle.
4. Offer property inspections in the fall of the year. Residents were very appreciative of this free service. It may be necessary to charge a fee for this service to generate revenue. This revenue could be used to hire seasonal employees to conduct these inspections. The use of full time parks maintenance

workers, this past season, had a significant impact on the ability of the parks division to accomplish other tasks.

5. Assess the cost share program used in 2011-2012. If future funding is available for Mountain Pine Beetle control there may be other uses of the dollars rather than direct cost share to landowners. If direct cost share is used an audit of the process should be conducted to perhaps develop a more efficient method of documenting and issuing the permits.
6. If the mountain pine beetle program continues in the coming years in may be necessary to hire a fulltime employee with a GIS and forestry background to accomplish the data management aspects of the program. In the 2011-2012 program two seasonal employees were hired to assist with the clerical, data management and GIS aspects of the program. These two employees will have worked their allowable 1040 hours by mid July thus making them unavailable until 2013 to work as seasonal employees. It is imperative we have a person, with a forestry background, on staff with GIS, ARC, Access knowledge and proficient in their use.
7. If a mountain pine beetle control program is conducted in 2012 we should start taking landowner requests for pine beetle survey by mid September. Surveys should be completed by January 1, 2013 thus allowing more time for removal of infested trees.

As a result of the work we have done these past several months the City has acquired a great deal of information on battling the mountain pine beetle. Now is the time to review the details of the original plan to see what should be continued and what should be changed.

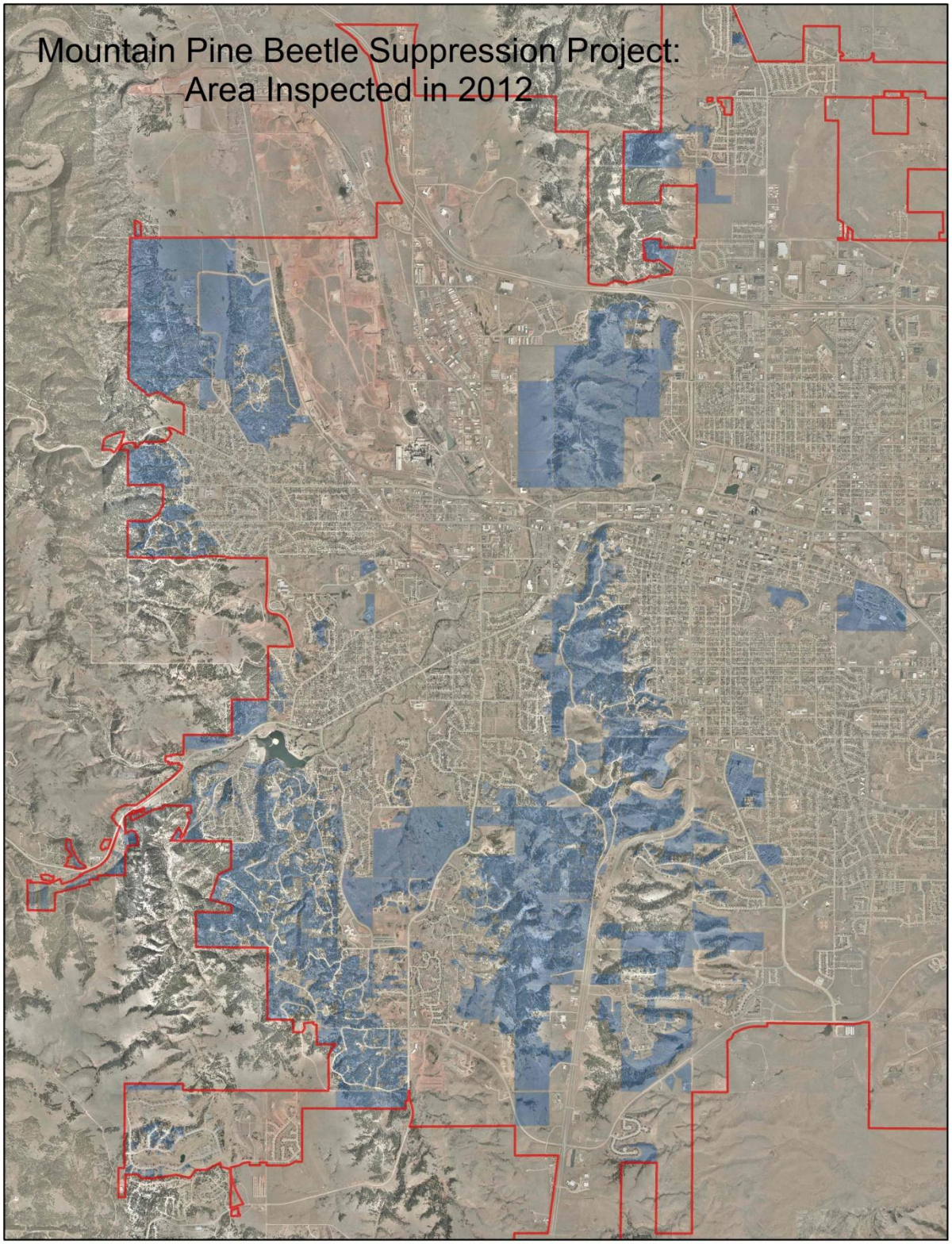

Figure 1. The area shaded in blue was inspected for mountain pine beetle activity.

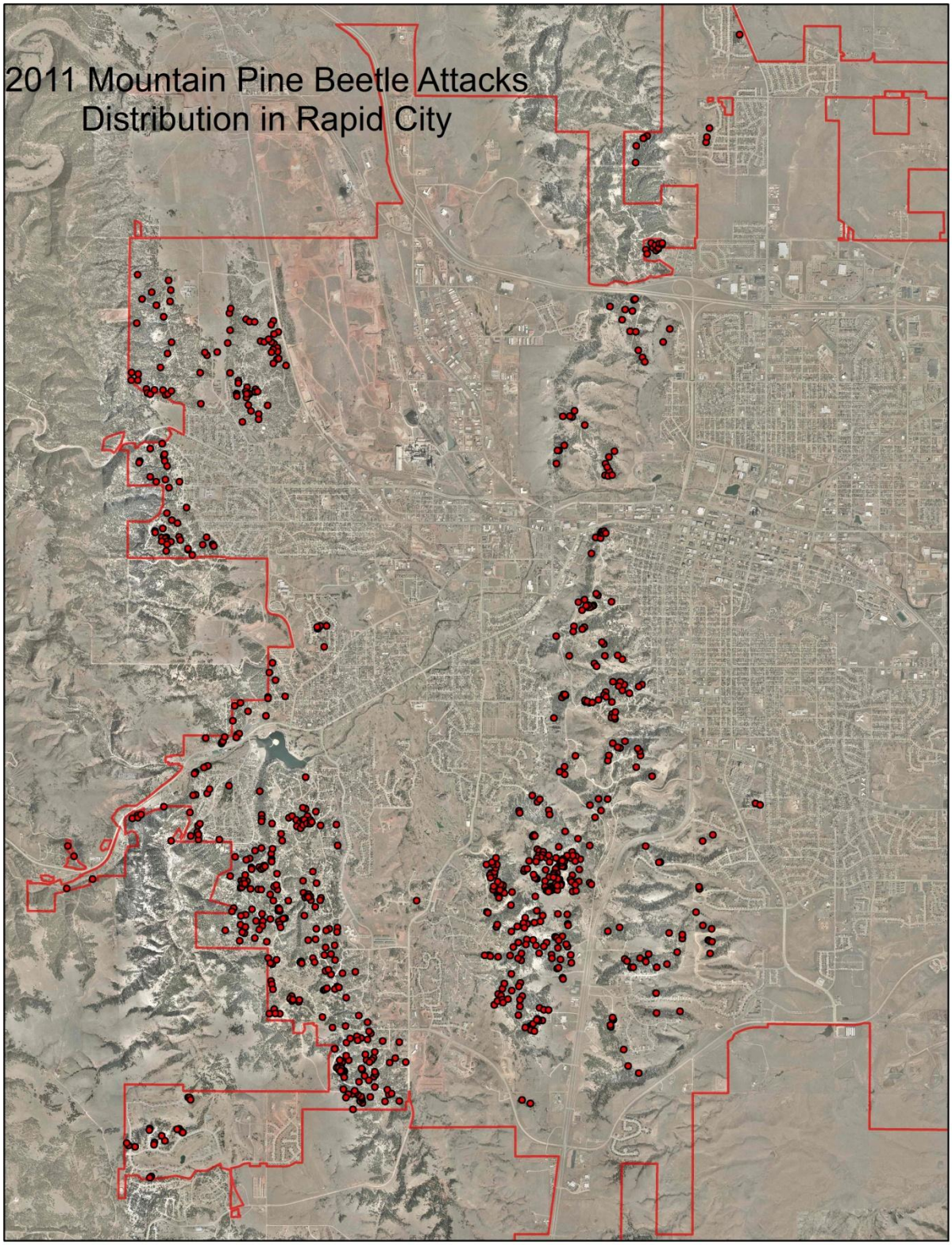

Figure 2. Distribution of 2011 mountain pine beetle activity in Rapid City.