



Insect Activity on the Helena National Forest: Assessment & Recommendations



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AmberDawn Kamps, *Lincoln District Ranger*

Amanda Milburn, *Forest Silviculturist*

Sharon Scott, *Vegetation Program Leader*

Nancy Sturdevant, *Entomologist*

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I. Introduction

The Helena National Forest is undergoing landscape-level changes in the forest due to insect activity, as evidenced by the red trees visible to anyone living in or visiting our area. The primary culprit of the mortality is the mountain pine beetle, with help from other mortality agents. The scale of impact is large enough to warrant a careful assessment of conditions and identification of management options available to the National Forest, private landowners, and communities affected. It is important to remember that large-scale ecological disturbances are beyond our capability to control; however, depending on landowner objectives and values at risk, management opportunities do exist that can be effective at influencing outcomes in localized areas. A landscape-level assessment of insect conditions and predictions was done in September, 2008 by forest specialists. This paper is intended to summarize the results of that effort, in addition to providing background information and identifying treatment options at multiple scales.

II. Insect Biology: What is At Work Here?

Understanding the biology of the insects present is critical to developing a viable strategy. Several insects are worthy of note, although the mountain pine beetle will be discussed most thoroughly as it is having the largest and most rapid impact. All of these insects are native to our ecosystem and have evolved with the tree species on the Helena National Forest. There are many insects that feed on trees; the public can utilize the sources listed at the end of this paper for more information.

a. Previews: Western spruce budworm and Douglas-fir beetle

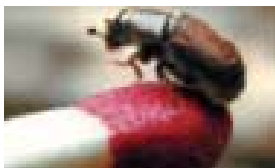


Western spruce budworm is a native defoliator of Douglas-fir, spruce, and true firs. It does not affect pine species. It eats the new needles of affected trees in the early summer as a caterpillar, causing the branch tips to look curled and brown. The insect becomes a moth in mid to late summer and lays its eggs which spend the winter inside branch tips and buds. This insect does not typically kill mature trees although it can kill saplings and seedlings. It also causes stress and deformation, pre-disposing trees to other mortality agents such as Douglas-fir beetle. This insect has chronic epidemics on the Helena NF, approximately every 20 years.

As an exception, budworm has caused atypical mortality in the Flesher Pass area. It is active across most of the Helena National Forest, with the Big Belt Mountains and Flesher Pass experiencing the most severe defoliation. The insect is expected to be active over the next few years. Western spruce budworm is favored by dry summer conditions and mild winters, and has the greatest impact on trees that are stressed from dense stocking and/or drought conditions. It is naturally regulated best by weather conditions, particularly late spring or early fall frosts, cold winters, and rainy springs/summers.



The budworm disperses by floating down on webs onto adjacent crowns and trees in the understory. Therefore, it thrives in dense, multi-storied stands. Managing stands to be more open and single-storied can reduce defoliation and enhance tree vigor to better withstand defoliation. It is also possible to spray a bacteria-based insecticide, BT (*Bacillus Thurengiensis*), over the crowns of trees in the spring to prevent defoliation. It is not generally cost effective to spray the National Forest due to the fact that most mature trees survive, and spraying must be done yearly through the course of an epidemic. However, it may be desirable for private landowners to maintain the aesthetic quality of their property. Spray may be applied from the ground or aerially.



Douglas-fir beetle is a native bark beetle which attacks large Douglas-fir trees, over 14" diameter. This beetle is moderately aggressive and can kill healthy trees when populations are elevated. Populations may become elevated after fires or during periods when trees are stressed, and can also

build up in green Douglas-fir slash. The Douglas-fir beetle became elevated after the large fires of 2000 in the Big Belt Mountains, but has since decreased and is currently affecting little of the National Forest. However, the insect is still present and large trees experiencing budworm defoliation or other stressors could provide hosts to build its population. Infestation is evidenced by reddish-brown boring dust on the bark, even though the foliage may appear green for a year after attack. Maintaining the vigor of large Douglas-fir trees by keeping stand density low can reduce the likelihood of Douglas-fir beetle attacks. Removal of infested trees can also help, and the pheromone MCH can protect healthy trees.



b. The Feature Creature: Mountain Pine Beetle



Most of the red trees we are seeing were killed by mountain pine beetle, which is an aggressive bark beetle affecting pine trees (ponderosa pine, lodgepole pine, whitebark and limber pine). It is a native insect that plays an important role in the ecosystem but can cause high levels of mortality. Mature beetles emerge from infested trees typically in July, and fly to infest new trees and lay eggs. Beetle larvae over-winter under the bark of infested trees. When it emerges, the beetle will generally go to the nearest susceptible tree, but is capable of flying several miles to find a new host. Initial infestation is often indicated by pitch tubes on the bark mid to late summer; infested trees appear green for up to 1 year. Copious amounts of boring dust in bark crevices and around the base of trees is also a good indicator of a successful attack. This insect, like all bark beetles, communicates via chemical signals (pheromones) to call other beetles to help mass-attack a tree, and then send beetles away once a tree is fully infested.



The mountain pine beetle is tiny, about the size of a cooked grain of rice. Tree death is caused by the feeding action of the beetle larvae which “girdle” the cambium, and is aided by blue-stain fungi that the beetle introduces into the tree. This insect prefers very dense, shady stands because the microclimate is conducive to their survival and communication. Additionally, trees in dense stands are less vigorous. Mountain pine beetle is first attracted to the largest trees available, but is also attracted to weakened trees and can kill trees as small as 5” diameter.

Historically mountain pine beetle has caused large, landscape-level mortality; an epidemic typically continues until either the beetle runs out of food (susceptible trees) or weather conditions cease to be conducive to their survival. Weather conditions that regulate the beetle population include very cold temperatures for extended periods in the winter, late spring or early fall frosts, and wet springs/summers. Lodgepole pine is a short-lived conifer species as compared to Douglas-fir and spruce, reaching maturity at around 80 years. Most of the lodgepole pine forests on the Helena NF mature. It is not possible to sustain mature and over-mature lodgepole pine forests across the landscape indefinitely as it is adapted to regenerate after stand-replacing wildfires and mountain pine beetle epidemics. There is evidence suggesting that due to the current warm dry climate conditions the mountain pine beetle is active at higher elevations, higher latitudes, and for longer durations than seen previously this century. The landscape today is largely dominated by homogenous mature forests that are susceptible to beetle infestation. Management options for the mountain pine beetle are discussed in detail in Section IV.

III. Current Condition and Forecast

Many areas on the Forest are infested by mountain pine beetle as evidenced by red trees across landscapes, similar to the photograph of Park Lake (right). Forest Health Protection provides yearly monitoring of conditions across the Region to help us track the magnitude and location of insect activity. The detection flights map beetle mortality evidenced by red and fading crowns. The detection estimates are behind the actual infestation because infested trees remain green for 1 year.



a. Regional Picture

Mountain pine beetle has caused large areas of mortality in areas of Colorado and British Columbia, more recently moving into Montana. Throughout Region 1 (Montana and North Idaho), the beetle is active at epidemic levels, infesting over 700,000 acres measured by the 2007 detection flight. The 2008 detection flight is ongoing but appears to show that mountain pine beetle increased dramatically, up to 12-fold in some areas. While current infestation levels seem quite large, they are still less than the acres infested during the last mountain pine beetle epidemic in the Region, which affected nearly 2,500,000 acres at its peak in 1981. The epidemic at that time was focused on the Flathead and Kootenai National Forests. The current infestation is occurring primarily on the Beaverhead-Deerlodge and Helena and Gallatin National Forests. The last epidemic to occur near this area was approximately in the 1930's.

b.

How Did we Get Here?

Several factors have contributed to creating homogenous, susceptible forests and today's mountain pine beetle epidemic, combining to create a "perfect storm" opportunity for large-scale beetle outbreaks.

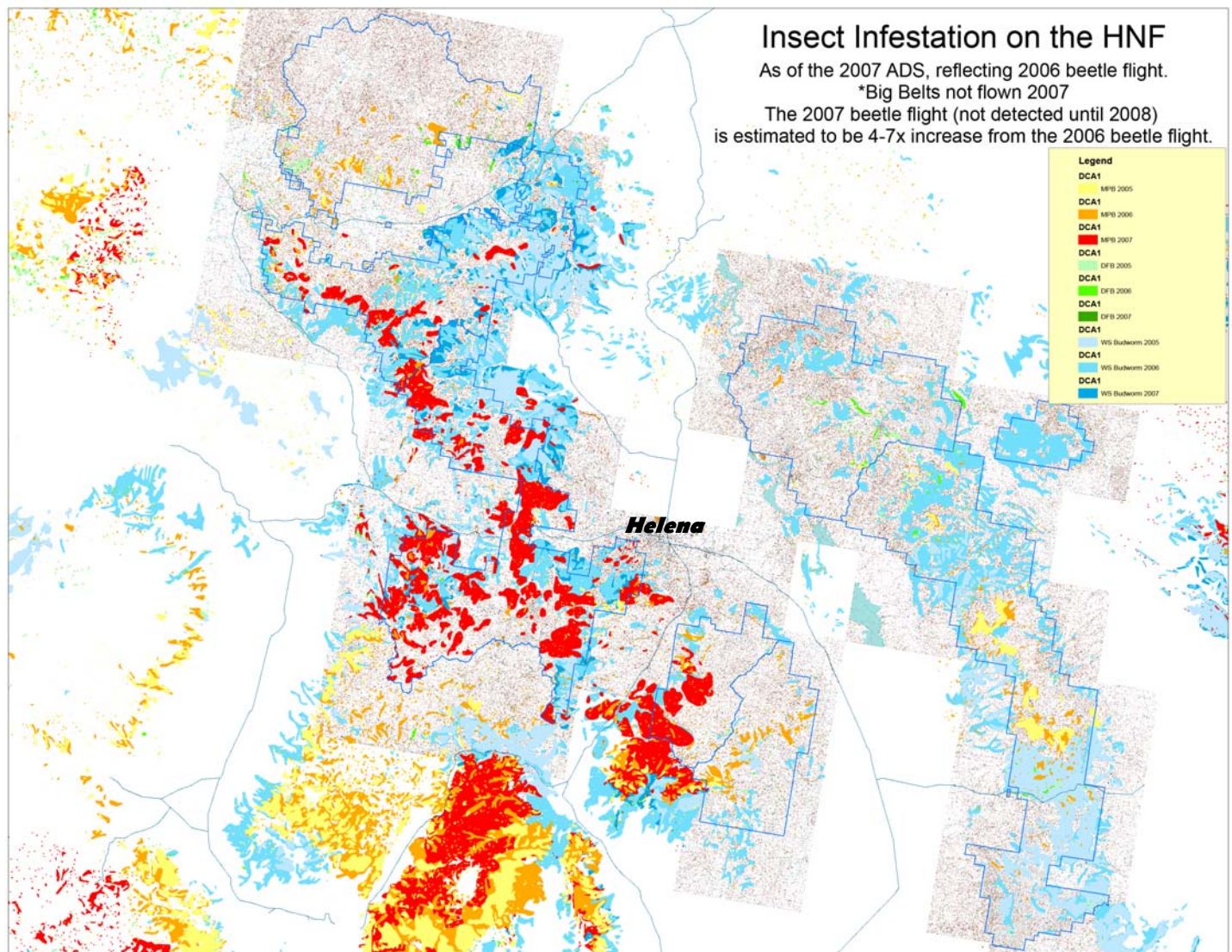
- ❑ Fire Suppression: Suppressing fires reduced natural fires which would have created more of a mosaic of age classes, species, and density.
- ❑ Weather & Climate: Much of the last century was dominated by cool, moist weather conditions which were conducive to growing dense trees. Following this moist period, the last few decades have been warm and dry, resulting in tree stress and conditions conducive to beetle survival, thereby increasing the chances and duration of epidemics.
- ❑ Harvest practices around the turn of the century resulted in large areas being cut to build the railroad and mining industries or fuel the growth of the 20th Century; these areas are even-aged and mature today.
- ❑ Small extent of harvest in recent decades: The extent of recent harvests has had limited success in breaking up the homogeneity of the landscape.

The Helena NF Plan contains goals and objectives to focus harvest in areas highly susceptible to mountain pine beetle. The Forest has continually monitored insect conditions and stand hazard through project planning and implementation. The Forest has had limited success in treating stands using tools such as harvest in recent years to alter the homogeneous nature of the landscape. Approximately 7% (57,000 acres) of the land base has been harvested since records started being kept in the 1950's, with the bulk (75%) being accomplished in the 1960's through 1980's. Since populations began to build, the Forest has focused on protecting high-use recreation and administrative sites with synthetic anti-aggregation pheromones (verbenone) and, more recently, spraying carbaryl and performing sanitation/salvage of hazard trees. Additionally, projects in planning and implementation phases have been designed to reduce localized beetle populations and stand susceptibility. More extensive treatments have not been implemented due to a variety of factors, including environmental analysis needs, resource considerations, lack of funding, and timing of the legal process applicable to natural resource management.

The typical progression of a mountain pine beetle epidemic is a 2 to 4-fold increase in mortality and extent per year. In 2007, the insect epidemic surprised managers by increasing up to 12-fold in some areas. The trees infested in 2008 will appear green for another year, making detection difficult, but on-the-ground visits indicate that the epidemic continued on this accelerated trend during this season as well. The rapid assessment and development of a strategy was undertaken to enable the National Forest as well as the public to understand what has happened, what is predicted to happen, and what can or should be done.

c. Current Infestation on the Helena National Forest

The mountain pine beetle was present at endemic (normal) levels in 2004 on about 14,000 acres on the Forest. The infestation built to 25,000 acres in 2005 (2-fold increase) and 34,300 acres in 2006 (1.5-fold increase) and 118,300 acres in the 2007 detection (3-fold increase) – this increase is typical of what we expect in an epidemic. The 2007 detection excluded the Big Belt Mountains due to smoke. The 2008 detection flight which measures 2007 mortality (the red trees evident in summer 2008) is expected to show up to a 12-fold increase in some areas, and map infestation on approximately 380,000 acres. The 2007 detection flight averaged 48 trees per acre dead on infested areas, with a range of 1 to 100 trees per acre. Levels of current infestation are critical in determining management options. The following map shows infestation as of 2007; red indicates recent mountain pine beetle infestation while orange and yellow are older infestations (2005 and 2006). Blue colors indicate western spruce budworm.



Forecast of the Epidemic:

The mountain pine beetle epidemic is expected to continue in the near term because susceptible trees remain and warm, dry weather conditions are likely to persist. A hazard and risk assessment was done to make predictions of tree mortality in the next few years. Hazard refers to stand conditions which make them susceptible to infestation, while risk is the current activity and distribution of mountain pine beetle-caused tree mortality. The critical factors in determining hazard used here include stand age, size class, density, and forest type. Numerous hazard ratings are available which use these and other stand variables. Assumptions regarding hazard were based on available hazard rating systems for mountain pine beetle in lodgepole and ponderosa pine and professional interpretation. Risk was assessed using Aerial Detection data from 2005-2007, as well as estimates and visual observations of the 2008 aerial detection in draft form.

Hazard: There are an estimated 335,373 acres of high hazard stands on the Forest, representing 32% of the land base. 63,852 acres are at moderate hazard (6%) and 7,253 acres (1%) at low hazard. The remaining 61% of the Forest is considered not to be susceptible. Based on the extent of the epidemic and verified in the field, we know that some “low” or “no” hazard stands have in fact been infested. In particular this applies to older “sapling” pine stands that were keyed out as no hazard. Additionally, some stands known to contain pine appear to have been typed as Douglas-fir, which keys them out as no hazard instead of low/moderate hazard. Due to these data limitations, estimates of low and moderate hazard are conservative.

Risk: As of the 2007 flight, over 100,000 acres total on the HNF were infested. 54% of this infestation was in high-hazard stands. Only slightly over 8% of the infestation was in low to moderate hazard stands. The remaining 37% of stands infested were categorized as having no hazard. This is explained by data limitations; infestation likely occurred in Douglas-fir dominated areas containing a minor pine component, or in larger sapling pine stands. Total infestation at this time represented 11% of the land base. Approximately 254,724 acres of high hazard stands remained un-infested.

The 2008 detection which measured 2007 beetle kill is not available digitally. Based on anecdotal estimates and field visits, beetle mortality expanded up to 12-fold. Conservative estimates were applied to increase the infestation in high hazard areas 6-fold; in moderate hazard 4-fold; in low hazard 3-fold; and 1-fold for stands with no hazard. Using these assumptions, it is likely that no high-hazard stands remain un-infested. It is estimated that approximately 380,000 acres could be infested, 80% high hazard, 8% moderate and low hazard, 10% no hazard, representing 40% of the total land base. Visual observations of the 2008 aerial detection sketch map support these general conclusions.

The beetles continued to be active in 2008; the newly infested trees will appear green and not detectable until 2009. It is reasonable to assume that the infestation has progressed into additional moderate, low, and no hazard areas. Not all infested areas are dead, but the timeline is accelerated and management options become more and more limited as infestation progresses. It is clear that beetle risk is high across the Forest.

Mortality Predictions: Mortality predictions are based on recent beetle trend data and published results. Areas that have high beetle hazard and risk will have very high levels of mortality over the next few years. It is expected that up to 90% of pine over 5 inches in d.b.h will be killed. The acreage that this prediction applies to is approximately 309,056 based on modeled hazard and risk estimates. Treatment opportunities in these areas are largely limited to salvage. Low and moderate hazard stands in proximity to high hazard stands will also likely experience high levels of mortality. Beetle-caused tree mortality will be lower (between 50-80%). The treatment recommendation for these stands includes salvage and sanitation-salvage. Limited opportunities to thin may exist in moderate and low hazard stands. Generally thinning can be planned in areas where current infestation levels are around 10% or lower. More opportunities exist in areas that have moderate, low, or no beetle hazard and risk ratings and where high hazard and risk stands are less prevalent. Even in these drainages time is of the essence. The greater abundance of lower hazard stands in a drainage, the more opportunity for success over the next 2-3 years. Beetle expansion rates are less in low and moderate hazard stands versus high. Very little mature pine will remain in most areas at the end of this outbreak. At the current rate, this will probably be realized within the next few years. After the aftermath of this epidemic, some trees will survive (mostly smaller suppressed ones).

IV. Mountain Pine Beetle Treatment Options and Expectations

a. We can't stop an epidemic - why?

The first step in a viable strategy is to develop realistic goals and outcomes. It is important to accept that we cannot stop a beetle epidemic in progress, particularly one that crosses national borders in extent. Even with limitless funds and labor, it would not be possible to remove every infested tree, to spray every susceptible tree, or to thin every forest. We can, however, impact the conditions that will remain after the epidemic and in localized areas change the shape of the insect activity and outcomes to provide for multiple resource objectives. We can hope that weather conditions will improve to provide conditions more conducive to tree vigor and lessen to beetle survival and expansion. The Forest needs all of the help of citizens and legislators to help identify opportunities for funding and authority to meet this challenge head on.

b. Small Scale Treatment Options

The small scale is where it is easiest to accomplish and see the results of mountain pine beetle treatments. Here, “small scale” refers to an area that does not represent a landscape or watershed, but rather a discrete stand or group of stands – generally less than a few hundred acres. This scale applies to many areas of private land and high-value or high-use areas on the National Forest such as campgrounds and some wildland urban interface zones. Treatments at this scale have little to no effect on the landscape or the beetle epidemic at large, but strive to maintain live stands of mature trees where treatment occurs. There are a several management options at this scale:

- **Thinning:** Creating a resilient stand is the best long-term way to reduce susceptibility and mortality from mountain pine beetle; tree density of around 80 basal area per acre or less is ideal (that is a spacing of 17-40’ between trees depending on how big the trees are – the bigger the trees, the wider the spacing). There are many studies that show thinning greatly reduces mortality in ponderosa as well as lodgepole pine, and is most effective if done before or at the early stages of an epidemic. All currently infested trees should be removed during thinning to reduce the local source of beetles. It is important to not perform thinning, chipping, or creation of green slash piles during or immediately prior to beetle flight, as the turpenes released could attract beetles to the area and facilitate the build-up of other insects such as pine engraver.
- **Sanitation/Salvage:** Removal of currently infested trees (sanitation) can reduce the localized beetle population. Infested trees are often those that have numerous pitch tubes but appear green. In addition to pitch tubes, a tree successfully attacked has copious amounts of boring dust in bark crevices and at the base; this dust may be hidden below the duff. Looking for beetles or larvae under the bark is the best way to identify infested trees. Infested trees should be removed from the area or burned prior to the next beetle flight. If this is not possible, infested trees should be cut into firewood lengths, the bark scored or removed, and scattered to facilitate drying. If wood must be piled in large pieces, burying it or wrapping it in tarps can mitigate beetle emergence, but are not highly recommended methods. Removal of dead trees (salvage) does not affect the beetle population or stand susceptibility, but can serve to recoup economic losses and reduce potential fire hazards. When sanitation/salvage is extensive enough to remove most or all trees, desirable regeneration can be managed for through site preparation for natural regeneration or planting (artificial regeneration).
- **Chemical Treatments:** Pheromones and carbaryl are chemical means of protection – neither option kills enough beetles to affect a change in the epidemic, but do provide protection for healthy trees.



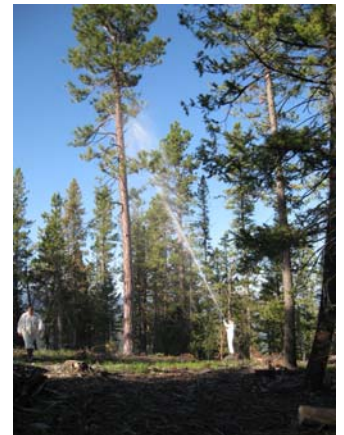
- **Synthetic pheromones** are plastic caps containing a chemical that mimics the beetles’ anti-aggregation signals. The capsules are stapled to trees on a grid basis for large areas (over 1 acre) or on individual trees (2-4 per tree). They are applied yearly before beetle flight. They are safe and easy to apply.



- a. **MCH** is for Douglas-fir beetle. It is usually 99% effective and is applied at a rate of 30/acre. Each cap generally costs \$1-3. These should be put up April to late May.

- b. **Verbenone** is for mountain pine beetle. It is 50-100% effective and applied at 20-30/acre. They are \$8-9 and should be applied late May/early June.

- **Carbaryl:** This chemical can protect individual trees. The entire trunk must be soaked up to 5” diameter, at least 30’ high. This provides 90-100% protection and needs to be applied every other year during the outbreak.



While there are anecdotal accounts of other tools, such as insecticide inserts, the use of these methods is not proven or supported by Regional entomologists for bark beetles at this time. There is work being done on a basal drench formulation of carbaryl that would make application easier, but it is not yet in use. Regardless of which treatment option is selected, currently infested trees should be removed to improve effectiveness.

c. Large Scale Treatment Options

The silver lining from this outbreak may be the opportunity to create a mosaic of size and age classes of pine stands across the landscape. Under these conditions, only some stands are susceptible to beetle at any one time instead on continuous landscapes. Treating large areas with a combination of treatments (at least 100 acres) is more effective under present beetle conditions. To treat landscapes effectively during an outbreak, large-scale treatments are necessary; otherwise, the beetle will overwhelm actions taken. The large scale is also where implementation is more difficult. "Large scale" refers to an area that represents a landscape or watershed. Treatments at this scale may have some effect on the beetle in that watershed, but still would not affect the epidemic. These treatments could help maintain green stands where treatment occurs and have some buffering effect on untreated areas.

Thinning, Sanitation/Salvage: The reasons for these treatments at the large scale are the same as for the small scale – to reduce susceptibility and increase tree vigor, remove infested individuals and reduce the beetle population, reduce fire risk and recover the value of dead trees. The larger the area treated, the greater the impacts to untreated areas nearby. The amount of harvest that can be done may be restrained by factors such as steep topography, sensitive soils, economic merchantability, land allocation, and accessibility. If an infestation is too far advanced in an area thinning may no longer be an option and all that is left is salvage. Providing for desirable regeneration is a strong consideration. In addition to general forest treatments, these tools can be focused on roadsides and recreation areas with an additional goal of providing public safety and protecting infrastructure.

Chemical Treatments: There is currently little to no utility of chemical treatments at the large scale. Pheromones are too costly and labor intensive to apply across a landscape. Similarly, the cost of spraying carbaryl on every tree is prohibitive, and it is only effective when sprayed from the ground due to the fact that the trunk must be soaked. Aerial application does not work for bark beetles because most of the chemical is caught by the tree foliage. There is research being done on the aerial application of verbenone "flakes" on landscapes that may have some utility if applied in areas "on the front" of the epidemic. The Forest plans to keep informed of the progress of this study and may explore options to use this tool.

Prescribed Fire: Utilizing stand-replacing prescribed fires under controlled conditions in dead or infested areas can serve to reduce the continuity of fuels and achieve a desired fuels matrix on the landscape, as well as promote desired regeneration in lodgepole pine forests. Additionally, burning currently infested trees can reduce the localized beetle population.

d. Ecosystem Management Considerations

There is the danger of not seeing the forest for the trees – there are many aspects to the ecosystem besides bark beetles and their hosts. Therefore, rather than "chase the bug" across the landscape, it is critical to look at everything that is important for today's and tomorrow's forests to set desired outcomes and determine appropriate responses. The assessment team took a variety of factors into account when developing the strategy, including but not limited to:

- i. *Regeneration* - - what do we want tomorrow's forests to look like?
- ii. *Fire Risk* - - what is the fire risk of red-needled trees, and trees on the surface once they fall? Where do these fuels occur and do they place values at risk in the event of a wildfire?
- iii. *Watershed Health* - - what role do the trees play in viable hydrological function of a watershed? What are the soils like, and what is the risk of erosion? What is the position and current condition of streams and other water sources?
- iv. *Wildlife Habitat* - - how will mortality affect wildlife habitat, particularly mature forest or old growth species? How can the appropriate mosaic of habitats be maintained?

- v. *Economics* - - in our timber management lands, how do we assure that the economic value of products are utilized for communities, and provided for in the future?
- vi. *Land Allocation* - - is the area wilderness, roadless, or otherwise such that management is not compatible? What is the Forest Plan management area designation?

V. Desired Condition: What does the Public want to see?

Public involvement is crucial to help develop and implement a strategy to respond to the mountain pine beetle epidemic. Toward this end, steps have been taken to form a collaborative community group. See VI(c) for more information on public involvement.

VI. Helena National Forest Response

A desirable future forest condition would be a mosaic of size and age classes created by disturbance at multiple scales. This condition can result from a combination of natural and prescribed fire and harvest. If left as is, the cycle will repeat itself in 80-100 years with widespread beetle epidemics and possibly devastating fires. While broad-scale mortality to mountain pine beetle is natural to a large extent, it is not necessarily compatible with the objectives for multiple-use management of the National Forest. This assessment takes into consideration public safety and the ecosystem management factors listed in Section IV(d) along with current laws, policy, and regulation when determining potential areas for treatment. The following recommendations may help chart the course for the Helena NF over the next few years.

- a. *Roadside, Infrastructure, & Recreation Site Hazard Tree Removal & Green Tree Protection*: It was determined that there is an immediate need to provide for public safety and protection of infrastructure along roadsides, trails, powerlines, landlines, administrative sites, and recreation sites Forest-wide. It is expected that mountain pine beetle-killed trees will start to fall 3-5 years after being killed; approximately 10-20% will fall each subsequent year and all are expected to fall within 10-15 years. Falling trees represent safety hazards, threats to infrastructure, and a large maintenance cost to keep roads open. Additionally, the downed trees will create large surface fuel loadings. It is recommended that hazard trees be cut and removed from roadsides, administrative sites, and recreations sites Forest-wide. It is critical to cut the dead trees while they still have commercial value so that it is financially possible to remove them. Dead lodgepole pine may retain its value for several years after being killed. In addition to cutting dead trees, the program of pheromones and carbaryl should continue in campgrounds and other recreation sites to protect remaining live trees, with a greater emphasis being placed on carbaryl due to greater efficacy.
- b. *New Program: Cutting Infested Trees on NFS Lands Adjacent to Private Land*: It was determined that it would be beneficial from a public safety, fire risk, and forest health perspective to provide a policy vehicle for private landowners to cut infested but “still-green” timber on the National Forest adjacent to their land. This process will involve an application process and the Forest Service will mark infested green trees within 100’ of a private boundary, and issue a permit to the landowner for the removal of those trees. Program is focused on landowners who are working on remedies to decrease beetle infestation on their own property. All material would be removed by hand with a firewood permit; no mechanical equipment will be used.
- c. *Public Outreach, Education, & Involvement*: The Forest has made strides in expanding public outreach and education efforts in the last several years, with the help of the Montana Discovery Foundation. This effort has included well-attended lecture series, facilitation of consolidated public pheromone ordering, website materials, handouts of information, numerous newspaper and television interviews, and the Helena National Forest Bug Information line. These efforts should be continued and perhaps expanded, and public

involvement will be crucial during the analysis and implementation phases of proposed projects. Toward this end we proposed additional efforts:

- i.* Develop refined talking points and consolidate all information resources.
 - ii.* Develop a presentation to share with community groups and the media.
 - iii.* Update and refine the information on the website.
 - iv.* Form a community collaborative group which will be involved in proposed projects.
 - v.* Solicit the public for their desired conditions on the National Forest.
 - vi.* Develop an information video.
 - vii.* Work with the public on appropriate firewood cutting procedures – potentially employ “firewood techs” on each District as needed.
- d. *Top Focus Areas for Small and Large-Scale Projects:* Through a coarse-filter process, 8 geographic areas were chosen to develop treatment proposals. “Coarse filters” used in the initial assessment included Forest Plan management areas, roadless areas, Research Natural Areas (RNA’s), wilderness areas, past harvest activity, large fire perimeters, road access & logging system complexity, wildland urban interface areas (Community Wildfire Protection Plans), forest type, insect risk and hazard, and the Northern Region Integrated Restoration and Protection Strategy. Wilderness, RNA, and roadless areas were excluded.

After initial designation, potential priority areas were brought forward and discussed in an interdisciplinary setting to identify opportunities to meet multiple resource objectives. Several opportunities were common to all priority areas:

- Protection of heritage resources
 - Maintenance of a large tree component on the landscape
 - Creating age/size class diversity on the landscape
 - Treating fuels & affecting fire per the desired future condition
 - Stewardship opportunities
 - Promoting goshawk habitat across the Forest (late seral open forest)
 - Promoting lynx habitat on the west side of Forest (multi-storied forest)
 - Pro-active management and development of fire management strategy
 - Providing for effective/safe fire fighting response
 - Promoting aspen where it occurs
 - Promoting ponderosa pine where it occurs and eliminating encroachment
 - Reducing fuels in wildland urban interface areas
 - Maintenance of green forests for hiding cover, watershed health, & visuals
 - Providing for a mosaic of undisturbed areas by watershed
 - Accomplish road improvements (such as culverts, BMP standards)
- ii. *Cabin Gulch, Townsend Ranger District:* This project area has already been analyzed. The Draft Environmental Impact Statement (DEIS) is due out in fall 2008. While this area is dominated by Douglas-fir, mountain pine beetle is active in the pine and treatments include sanitation/salvage. This area is dominated by timber production emphasis management areas and is one of the more accessible areas in the South Belts landscape. It is bordered by the Mt. Baldy roadless area to the north and is near the Maudlow-Toston fire of 2000. The Bear Gulch Fire of 2008 burned slightly into the project area. Cabin Gulch contains a small piece of a Priority 5 watershed per the Northern Region Integrated Restoration & Protection Strategy. The majority of the lodgepole has been killed. There are little to no thinning opportunities in pine other than in young stands. Sanitation/salvage could be viable if implemented by 2012.
- iii. *Stone Dry, Lincoln Ranger District:* This area has had a broad-scale watershed analysis completed and lies adjacent to private land north of the community of Lincoln

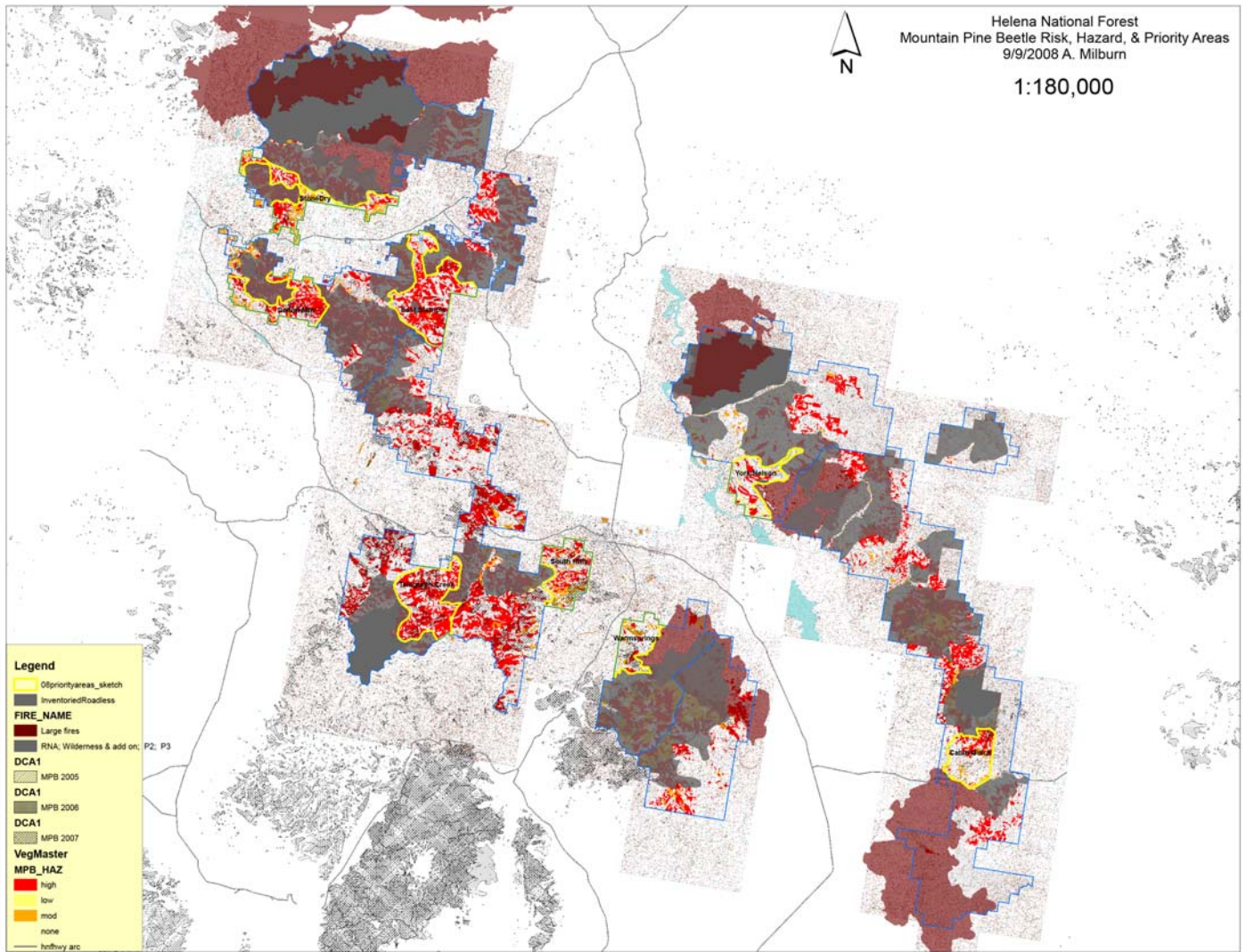
(wildland urban interface). Mountain pine beetle is currently active at moderate levels; this area contains opportunities for pro-active treatments to maintain green mature stands. There is significant investment in pine regenerating harvest units which could be enhanced. The area is dominated by timber-emphasis management areas and is bordered by a roadless area and the Scapegoat Wilderness. Stone Dry contains pieces of Priority 2, 3, and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. This landscape contains primarily moderate hazard stands. Thinning of un-infested pine stands could be effective, along with some sanitation/salvage and regeneration harvests, if implemented before beetle flight 2011. If harvest does not occur before 2011, thinning opportunities may be lost but salvage opportunities may remain until 2012. In addition to the opportunities common to all, interdisciplinary integration also identified opportunities to treat western larch and implement large-scale fire and WUI treatments adjacent to the wilderness.

- iv. *Telegraph Creek, Helena Ranger District:* This drainage is located in the Little Blackfoot, to the west of Tenmile. The area is dominated by mature lodgepole pine with moderate to high infestation levels. There are opportunities for pro-active treatments to maintain mature green stands. The area is dominated by timber-emphasis management areas with good access and is sprinkled with private in-holdings and wildland urban interface areas. Telegraph Creek contains pieces of Priority 1, 4, and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. Sanitation/salvage and regeneration harvests in infested stands mixed with thinning in un-infested stands could be effective if implemented on large units (>100 ac) before the 2010 beetle flight. If harvest does not occur before 2010, thinning opportunities will be lost but salvage opportunities may remain until 2012. In addition to the opportunities common to all, interdisciplinary integration also identified opportunities to make abandoned mine sites more fire ready, treating near private land where management is occurring, and address safety for the high number of private in-holdings. This landscape tied for #2 in the interdisciplinary ranking.
- v. *South Hills, Helena Ranger District:* This ponderosa-pine dominated wildland urban interface area is directly south of Helena. There have been treatments analyzed here as part of the Clancy Unionville and South Helena projects. Mountain pine beetle is at moderate levels but building quickly. The dense forests pose a wildland fire risk. Access is good and there are opportunities to reduce fire risk as well as enhance the mature ponderosa pine habitat. South Hills contains pieces of Priority 2 and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. Thinning of large low or un-infested pine stands could be effective if implemented before beetle flight of 2011. If thinning cannot be accomplished before 2011, salvage opportunities may remain until 2013. In addition to the opportunities common to all, interdisciplinary integration identified opportunities to treat weeds, mitigate the watershed impacts of a large wildfire, meet recreation and social values, and placed emphasis on ponderosa pine restoration, providing for smoke management, public interest and political concerns, and the potential for partnerships with the City and BLM. This landscape was ranked as #1 in priority in the interdisciplinary ranking.
- vi. *Dalton Mountain, Lincoln Ranger District:* The Dalton Mountain area is located west of the continental divide, near Helmville. This area contains a mosaic of forest types, and Douglas-fir beetle and mountain pine beetle are active. The majority of forests are mature and dense, with easy access and a large amount of timber-emphasis ground. Treatment opportunities here are likely dominated by sanitation/salvage. This area is in and near wildland urban interface areas. Treatment units have been proposed before with the Nevada Dalton and Helmville Face projects. Dalton Mountain

contains pieces of Priority 2, 3, and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. There are many high hazard stands present as well as some un-infested stands available. Sanitation/salvage and regeneration harvests mixed with thinning could be effective if implemented on large units (>100 ac) before the 2010 beetle flight. If harvest does not occur before the 2010 flight, salvage opportunities may remain until 2012.

- vii. *York/Nelson, Helena Ranger District:* This area is characterized by ponderosa pine and wildland urban interface. This landscape encompasses the communities of York and Nelson. Mountain pine beetle is building but there are opportunities for thinning and ponderosa pine restoration. The area contains a variety of management emphases but is easily accessible. Several recent projects, Jimtown and Bull Sweats, provide examples of successful pine treatments but larger-scale treatments are warranted to address insect and fire hazards. York/Nelson contains pieces of Priority 2 and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. Minor amounts of sanitation, mixed with thinning could be effective if implemented before beetle flight of 2011 or potentially 2012. If thinning cannot be accomplished before 2011, salvage opportunities may remain viable until 2014. In addition to the opportunities common to all, interdisciplinary integration also identified that hiding cover is of concern, as is treating near the community of York and maintaining some green forest in the North Belts landscape, and ponderosa pine restoration is an emphasis. This landscape tied for #2 in the interdisciplinary ranking.
- viii. *Warmsprings, Helena Ranger District:* This landscape is located in the North Elkhorns, near Strawberry Butte. It is adjacent to the Warmsprings Fire area of 1988 and a roadless area. It is characterized by mature ponderosa pine with some Douglas-fir and lodgepole pine at higher elevations. Mountain pine beetle is at high levels, causing significant mortality. Treatment opportunities will likely focus on sanitation/salvage and regeneration but there may be localized areas where thinning can be employed. Warmsprings contains pieces of Priority 4 and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. There may be some un-infested stands to thin if done before beetle flight in 2009, although this timeframe may not be achievable. Salvage could be viable until 2011.
- ix. *East Stemple, Lincoln Ranger District:* This landscape on the east side of Stemple Pass contains large areas of mature, dense lodgepole pine with mountain pine beetle at the early stages of infestation. The area is in the wildland urban interface and is experiencing western spruce budworm defoliation in Douglas-fir. Timber-emphasis management areas dominate. East Stemple contains pieces of Priority 1 and 5 watersheds per the Northern Region Integrated Restoration and Protection Strategy. Sanitation/salvage and regeneration harvests mixed with thinning could be effective if implemented on large units (>100 ac) before the 2010 beetle flight. If harvest does not occur before 2010, thinning opportunities may be lost but salvage may remain until 2013. In addition to the opportunities common to all, interdisciplinary integration also identified opportunities to treat whitebark pine, protect the RNA, treat abandoned mines to make them more fire-ready, maintenance of the quality of the Continental Divide National Scenic Trail, and protect isolated fish populations.

The following map shows general boundaries of the priority areas, along with modeled insect hazard, 2007 mapped infestation, roadless/wilderness areas, and recent large fires.



Why were other areas not chosen?

Each landscape on the Helena NF was assessed and many were not brought forward for detailed treatment proposals. The following summaries provide brief detail about the assessments for areas not chosen.

In the South Big Belts, much of the area was eliminated based on the presence of a mosaic of forest types and densities not as susceptible to beetle across landscapes – largely Douglas-fir and non-forested areas – or was burned in the Maudlow-Toston wildfire of 2000. Some was treated in the Greyson Bugs and Grassy Bugs timber sales. There is a proposed project called Hay Peggy south of the Deep Creek highway; this area was not selected to move forward as part of the insect response strategy because it is dominated by Douglas-fir and sagebrush habitats, with little pine and mountain pine beetle compared to other areas. North of the Deep Creek Highway, much of the area north of the Cabin Gulch area is in the Mount Baldy proposed wilderness & roadless area, and the Boulder Baldy roadless area. Moving into the North Big Belts, most of the areas outside of the roadless areas have been previously harvested or burned in wildfire (Wagner-Atlanta timber sale, Cave Gulch fire 2000 and salvage). The Gates of the Mountains wilderness lies to the north west of the York/Nelson area.

The Elkhorn Mountains are dominated by grasslands to the south, roadless areas in the interior, and the Warm Springs fire area from the interior to the north and east. The Warm Springs project area on the northwest side of the range was the only landscape where treatment for mountain pine beetle is an option.

The Continental divide landscape to the west of Helena was carefully assessed for opportunities. The most southern area, south of Lump Gulch, has no access and poor soils for management. Moving north, the Clancy Unionville project area, a current decision in the court system, encompasses much of the wildland urban interface from Lump Gulch to Park Lake and north to Unionville. Although mountain pine beetle infestation is heavy, no new proposals can be developed while the existing decision is in litigation. The South Helena project area to the north was brought forward as a priority area.

The Tenmile drainage, from Chessman Reservoir west to the Little Blackfoot drainage, was not chosen even though it is a municipal watershed for Helena and contains mountain pine beetle infestation. The National Forest does not currently have easements or access into the area, a process which takes time. There are also significant Forest Plan restrictions in place which allow for no road building, and the topography is such that potential logging systems are highly complex and difficult to implement given water quality and soils issues. Treatment opportunities in this landscape are largely limited to salvage with fire/fuels concerns paramount.

Moving west into the Little Blackfoot drainage, Telegraph Creek area was brought forward. The area from Telegraph to the Kading Campground is roadless and no opportunities exist aside from roadside salvage and hazard tree removal. West of Telegraph, to the area immediately south of Elliston, there is a project at the final phases of analysis (Elliston Face hazardous fuels) which will continue to proceed. There is very heavy mortality from the beetle in Kinney Gulch but the value is not expected to be maintained long enough for a viable salvage project and it is not a priority given its location and size.

Across Highway 12 to the west of MacDonald Pass up to Mullan pass, there are many opportunities for roadside salvage that would be incorporated into VI(a). The currently proposed Biathlon Project is in this area and a decision has been issued. Conditions are similar to the north up to the Lincoln district boundary, with sprinkled in-holdings and salvage opportunities. The area did not rise as a priority due to limited interface issues, past harvest areas, and other forest types that create more of a mosaic on the landscape. The most southern part of the Lincoln District west of the divide is encompassed by the Nevada Mountain roadless area and a roadless area near Dalton Mountain, where there are no treatment opportunities. Moving north, the Dalton Mountain area was chosen as a priority focus area.

North of Highway 200, the StoneDry landscape was chosen as a priority area, which encompasses the entire area adjacent to the Lolo National forest on the west, private land on the south, roadless and wilderness areas to the north, and the SnowTalon fire area (Copper Creek) to the east. The Alice Creek drainage to the east of Copper Creek is largely roadless. Moving west into the Stemple and Flesher pass areas, East Stemple rose as a priority area. Hogum and Flesher Pass were not chosen due to extensive roadless areas. The Mikehorse Dam / Rogers pass areas were not chosen due to Douglas-fir forest types, lack of urban interface issues, and little timber-emphasis ground.

VII. Potential Projects & 3-5 Year Analysis/Implementation Strategy

The team developed options for recommendations described in this document. The NEPA interdisciplinary team needed for vegetation projects includes the full suite of resource specialists, planning leader, project proponent, GIS support, and writer/editor. Given that the Forest capacity for work is 1-2 large NEPA per year, recommendations beyond that would require outside resource help such as Enterprise TEAMS or contracts. There are integrated resource opportunities and outputs in every area identified. A Forest out-year fuels program can be supported with the following option. All project areas include proportions of green thinning and salvage, but depending on the timeframe the proportion of those options shifts; the tables note “green opportunities” or “salvage” to indicate the most prominent condition. It is strongly recommended that insect activity and treatment option(s) be assessed yearly, and adjust priorities as needed to best meet the intent of the strategy.

Ongoing Items

Action Item/Project	Analysis Schedule & Notes	Potential Outcomes		Implementation Timeframes
		Acres	Outputs	
Roadside & Recreation Sites	Small NEPA, CE's	TBD	Public safety.	Immediately
Cutting Trees Adjacent to Private	Establish process. FS employee to admin.	TBD	Firewood, good neighbors.	Immediately
Public Outreach, Collaboration	Bug IC; “Bug-line”; public talks, etc.	N/A	%	Immediately and throughout!
Warmsprings	NFMA done. NEPA analysis 2009.	2,300	Green 60%,40% salvage; 10%/90% later *1,200 acres non-commercial	2010 - 2011.
Cabin Gulch	NFMA & DEIS done. Complete FEIS 2009.	4,000	16,000 MBF.	2010. Pine salvage component.

Priority Projects

**Implementation timeframes are highly aggressive & may be adjusted*

Action Item/Project	Analysis Schedule & Notes	Potential Outputs	Implementation Timeframes*
Telegraph Creek	NFMA done. Need to complete NEPA.	Green 60%; salvage 40%	2010 (green & some salvage)
South Hills	Need to complete NEPA.	Green 60%, salvage 40%	2010 (green & some salvage)
Stone Dry	Partial NFMA done. Need to complete NEPA.	Green 70%, salvage 30%	2010 (green & some salvage)
East Stemple	Need to complete NEPA.	Green 10%, salvage 90%	2011 (salvage & some green)
York/Nelson	Need to complete NEPA.	Green 100%.	2011 (green & some salvage)
Dalton Mountain	Partial NFMA done. Need to complete NEPA.	Green 10%, salvage 90%	2011 (primarily salvage)
Other Opportunities for Year 4-5. These areas could be assessed if capacity & budget are expanded; if insect activity changes; and/or if other issues are resolved.			
Little Blackfoot	NFMA done. Complete analysis 2011.	To be determined.	2012. Unknown mix of green/salvage.
Tenmile	NFMA partially done. Complete analysis 2011.	To be determined.	2012. Largely salvage.
MacPass/Mullan/Divide	Complete analysis 2011.	To be determined.	2012. Unknown mix of green/salvage.
Clancy Unionville	Pending outcome of Decision. Re-analyze 2012?	To be determined.	2013. Largely salvage.
Hogum /Rogers Pass	Complete analysis 2012.	To be determined.	2013. Unknown mix of green/salvage.
Alice Creek	Complete analysis 2012.	To be determined.	2013. Unknown mix of green/salvage.
TNC Lands	Complete analysis 2012.	To be determined.	2013. Unknown mix of green/salvage.

VIII. Supplemental Information

- **Helena National Forest Bug Info Line 406-495-3755**
- <http://www.fs.fed.us/r1-r4/spf/fhp/index.html>
- http://www.fs.fed.us/r1/helena/resources/insects_diseases/index.shtml