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Bark Beetle Situation in Colorado

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The forests of Northern Colorado are dying by bark beetle epidemics at a historically unprecedented scale. This has brought urgent concerns about threats posed by dead forests such as wildfire risk to communities and watersheds, loss of key wildlife habitats, and impacts to local economies and infrastructure.

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The Mountain Pine Beetle (*Dendroctonus ponderosae* Hopkins) is one of 600 bark beetle species native to western U.S. It is also one of the few bark beetles that kill the tree after a successful attack. Once the beetle finds a potential host (lodgepole, ponderosa, and limber pine) it attempts to enter into the inside of the bark, if successful it will attract other beetles to the tree and mass attack it, overcoming the resistance of the host. The beetles mate underneath the bark, and the female constructs a gallery where she lays her eggs. Once the eggs hatch the larvae start feeding in the inner bark. They also carry a fungus (blue stain fungus, *Ceratocystis montia* (Rumb.)); this fungus colonizes the water transport system of the tree. The conjunction of breeding attacks, maturation feeding by the larvae and water obstruction by the fungus contributes to the death of the tree.

The bark beetle epidemic is part of the natural cycle of these forest ecosystems. These outbreaks occur every 15-20 years. They reduce average stand diameter and age, and influence such things as canopy closure, stand structure, species composition, forage production, wildlife habitat, fuel loading, and water yield.

Many factors have contributed to the unprecedented epidemic levels reached these past years. The primary factors causing susceptible conditions for an epidemic in a stand of trees are stand density, extensive areas of mature and over mature forests (>80 years), average diameter (> 8 in), and a triggering event. In Northern Colorado, the triggering event for mountain pine beetles appear to be the recent drought, given rise to stressed trees that are not able to resist bark beetle attack; and warm winters that allow a higher percentage of larvae to survive. Fire suppression and lack of forest management have led to forest conditions that are highly susceptible to bark beetles.

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There are over 3.2 million acres of coniferous forests in Northern Colorado. Over 425,000 acres were infested by the end of 2005. The majority of forest stands are at moderate-high risk.

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Spread 1996-2005

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Due to this vast mortality and predicting future spread the following resource areas are felt to be at risk in Northern Colorado (Strategy and Assessment by Northern Bark Beetle Cooperative):

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- Recreation:

- Developed recreation areas: loss of shade, wind protection, reduction of buffering of visual and sound disturbances, and a loss of visual screening of facilities, increase removal of hazard trees
 - Ski areas: loss of wind blocks for lifts, facilities, snow retention; increase in the amount of hazard trees; increased fuel hazard and resultant fire risk; increased risk of blow-down of remaining trees
- Habitat: Nest trees (Goshawk), carrying capacity (red squirrels, songbirds), change in composition (Canada lynx), and change in stream-riparian corridors.
- Watershed condition:
 - Stream channel stability: mortality of trees likely will increase water yield in watersheds, channel erosion, and sedimentation.
 - Municipal watersheds: large scale mortality may lead to additional sedimentation in reservoirs, causing additional operations and maintenance costs.
 - Existing infrastructure: increase water flows could exceed capacity of culverts.
- Wildfire risk/potential for loss: The fuel hazard and resultant risk of loss (life and property) due to wildfire in and adjacent to populated areas and infrastructure is increased.
 - Residential interface:
 - Communities: Many mountain communities are in forested areas, there are 67,000+ acres of moderate and high susceptibility hosts within 1 mile of high density developments.
 - Subdivisions: 299,000+ acres of moderate and high susceptibility hosts are within ½ mile of moderate or low density developments.
 - Transmission lines: 55,000+ acres of moderate and high susceptibility stands are close proximity (1/4 mile) to major power transmission lines.
 - Increased fuel hazard across landscape: increased likelihood of more large high intensity fires.
- Suitable timber base: northern Colorado has 680,000+ acres of moderate and high susceptibility stands. This is more than 80% of suitable timber base in area. The loss of live growing stock may impact the ability to meet long term sustained yield objectives. The loss of tree cover and the additional risk of losses due to wildfires creates concern about regenerating stands.
- Ecosystem function: There are significant effects that are likely to have management repercussions for a long time into the future. These include:
 - Profound shifts in the age class structure and species composition.
 - Significant alteration of water yield and quality, wildlife and fish habitat, and potential alteration of fire risk, behavior, and severity effects.
 - Potential mortality of pine trees resistant to the exotic disease white pine blister rust.
 - Potential for invasion of exotic species, soil erosion, and alteration of water quality in watersheds supplying a significant portion of Colorado's population

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One of the main factors controlling the bark beetle population is temperature. Prolonged temperatures below -40 F may kill 98% of the population. There are also many natural organisms that control the population, but only at endemic levels.

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A Strategy for Action, comprising short- and long-term phases, has been built by the Cooperative to deal comprehensively with the epidemic.

The short term phase focuses on prompt removal of infested trees, preventive and thinning in high-value, high-risk areas, and suppression and salvage in already infested areas.

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The long-term phase focuses on actions that can ensure diversity and increase the resilience of forests to future infestations. Actions include prevention, direct control, and salvage/protection. Not every acre can be treated; actions will be planned across jurisdictional boundaries to address the highest priorities in the area assessed. Forest plans must be allowed to be implemented.

Ultimately, we need to have an effective use of the wood products. We need to create a sustainable supply for the future to be able to attract businesses, and have an effective market (diversity and flexibility of products).

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Example of forest management.