USDA Forest Service
Briefing Paper

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Topic: Watershed Impacts of Bark Beetle Epidemic

Issue: Massive die-off of lodgepole pine in Region 2 is expected to have direct and indirect effects on watershed processes including water yield, water quality and timing of flows.

- Annual water yields are expected to increase, with earlier onset and longer duration of spring snowmelt flows. Increases in peak flows during snowmelt runoff will be minor.

- Increases in water yield will be staggered across the landscape based on patterns of beetle mortality. The greatest increases in water yield will occur several years after mortality, when needles have fallen from dead trees. Effects of climate change on snowmelt and precipitation patterns may make it difficult to isolate the specific responses of the bark beetle epidemic.

- Hydrologic models suggest that water yield may increase by up to 30% in some watersheds, mostly in wet years. Actual increases in many watersheds are likely to be less due to understory regrowth and the varying dynamics of the epidemic. As the forest regrows, water yields will gradually return to pre-epidemic patterns over the next 50 – 60 years. However, this may be altered by climate change effects.

- Water quality is not expected to be impacted by lodgepole mortality alone, as good ground cover will remain to promote infiltration and prevent hillslope and channel erosion.

- Erosion potential and risks to soil and water quality increase dramatically if severe wildfires occur. These risks may be greatest a few decades after the epidemic when a new forest has grown amidst the heavy fuels on the ground. The magnitude of impacts, including debris flows and channel erosion, will depend on fire severity, fuel conditions, underlying geology, steepness of terrain, and intensity of storm events on the burned area.

- Management actions such as fuel reduction and salvage logging reduce fire risk, but also have the potential to affect watershed processes. Even with implementation of Best Management Practices, the effectiveness of individual practices, such as riparian buffers, are uncertain with an epidemic of this magnitude.

- Ongoing research at the Rocky Mountain Research Station and Fraser Experimental Forest is providing information to inform our understanding of watershed responses to this epidemic.

Background: National Forests are the major source of water in the Inland West. For example, 68 % of Colorado's surface water and 53 % of Wyoming's surface water originates on NFS lands. Much of the water infrastructure (reservoirs, ditches, pipelines) critical to the delivery of this water to rural and urban populations is also located on NFS lands. Clean up of reservoirs from the impacts of large wildfires has proven costly in the past, and we are actively working to reduce risk of damage to such facilities that may result from the bark beetle epidemic.

Summary: Changes to watershed process are anticipated as a result of the bark beetle epidemic. Affected landscapes are being actively managed where possible to reduce the risks of potential negative impacts.