Potential AMA Research Themes (Aquatics)

Theme One. Stand manipulation to restore altered rain-on-snow hydrology.

Watershed restoration activities have treated many of the hydrologic modification and slope stability issues relating to roads and road drainage. However, forest stand characteristics that slow runoff from forested hillslopes have not returned and are slow to develop. Air movement and snow retention by canopies are important in the snowmelt processes and delivery of water to the soil. The parameters that are most important are the stand structure that controls the rain drip and snow retention characteristics (limb size, canopy closure, multi-layers) and the transmission of wind through the stand during storms (multi-storied, multi-layered). The characteristics of the understory and litter layer are also important due to a "sponge effect" during storms that afford longer water retention and for erosion reduction.

A research theme would explore the possible stand manipulations that would help restore the processes of snow accumulation and melt. Considerable research was conducted to describe the changes in the snow accumulation and melt from clearcut harvest. The science allows us to make predictions and projections of those effects on watershed processes and peak flows, but there is no sound way to describe how long those effects persist nor how the practice of thinning a stand that is in some phase of recovery effects rain-on-snow processes. Being able to better determine when snow melt/runoff recovery occurs during stand development and what impacts partial harvest would have on changes in water delivery are important to determine the degree of risk of hydrologic disruption posed by selective tree harvest.

A component of this research would look at soil and litter conditions following harvest, post-harvest burning, and from natural fire on the development of the resulting stand. To what degree do altered soil and litter conditions affect stand development and what corresponding effect does the stand development have on the recovery of the water content of the soil and litter? The study could be accomplished through instrumentation of some plots (replications) to look at soil/litter moisture retention and delivery for a variety of stands and stand treatments.

Theme Two. Condition of riparian areas

There is considerable work being done in Riparian Reserves with the objective to restore riparian conditions that maintain and restore multiple resource goals as defined in the Aquatic Conservation Strategy (ACS) Objectives. However, there is no widely accepted agreement about what type of activities would best achieve the desired results or how to evaluate competing potential treatments to evaluate their probable effectiveness.

This research theme would quantify the degree to which riparian functions of that have been altered using landform mapping of riparian areas in the AMA. By comparing the landform mapping results to conditions in reference watersheds in the North Cascades

National Park, a more solid basis to determine what treatments, if any, are most appropriate to restore riparian processes/conditions in the AMA would be determined.

Landform mapping comparisons would allow the evaluation of actions/treatments that would result in measurable (amount and rate) improvement in conditions/processes above what would occur without intervention.