

## Moderated Group Discussion - Impacts to hydrology and water quality

April 10, 2013

1. Jeff Lukas (JL): Has anyone's perspective changed today?
  - a. Good to hear it presented as multiple trajectories are possible--something other than doom and gloom.
  
2. JL: Do you have concerns that have not been addressed today?
  - a. When we are looking at spruce forest as a whole, we may not have a concern. However, what about specific uses and special areas? What are their concerns? What management activities might we undertake in high use areas (campgrounds, trails, ski areas)? What about the impact on visual quality?
  - b. What are the impacts to recreation, wildlife, sensitive species that we need to consider?
  - c. Public safety is a real issue and it is not receiving the headlines or the budgets to support actions in fire and beetle zones.
  - d. Increase in temperatures, forest changes, and other societal responses are going to affect recreation patterns and change what is possible/practical (down wood on trails, etc)
  
3. JL: How would you use the information on runoff and water quality?
  - a. Monitoring nitrates should be a concern.
  - b. What are rapid response actions that we should consider, in preparation of sudden changes from beetles or fires?
  - c. During the summer, we receive intensive monsoon events. Do these extreme precipitation events create stronger responses that we need to know about?
    - i. Grand County may be an example, are there differences/similarities for erosion?
    - ii. White River NF had seen erosion and gullyng, however they also cleared forests for ski area runs
    - iii. Studies from the 80's show that disturbed soils are the concern, more than the beetle changes.
  - d. Changes in peak flow and timing [for lodgepole forests] are inside the historic range of variability so far, but what is the change in late summer base flows, when transpiration is a larger portion of the water budget?
    - i. Does the net balance over decrease/increase in transpiration balance?
    - ii. How will this change affect fish habitat and riparian flows?
  
4. JL: Are hydrologists planning on doing more monitoring of water quantity and quality?
  - a. We are doing monitoring in higher elevation lakes/chemistry; can it be utilized (analyzed differently) to look at other changes in the watershed?
  - b. Can we identify paired watersheds with existing gauges that can then be monitored for forest changes? (WWA can potentially coordinate assessment of appropriate watersheds)
  - c. We could use repeat photography and other monitoring techniques:

- i. Answering questions for the public- monitoring project could be worth establishing photo points in managed and unmanaged areas of the spruce-fir forest, using volunteers as a way to capture historic event.
  - ii. Monitoring changes in composition, decomposition, understory, canopy using repeat photography.
  - iii. Connecting to historic records of the past and archives, as a way to demonstrate that changes in the landscape have been a part of the forest history of the past, present and future.
  - iv. Are there any studies that are tracing beetle areas that have burned (two influences)? Can fire resources be used to bring some funding and studies to beetle + fire sites?
  
- 5. What are management options prior to an outbreak? What problems might we create if we try to manage in advance of an outbreak?
  - a. (Participant from Telluride Mountain Village) How could we increase resilience of our watershed at our ski area, in advance of an outbreak?
    - i. Are there measured advantages of managing for diversity of species, age classes, and sizes?
    - ii. What are the additional management needs (managing undergrowth, fencing off areas)?
  - b. Has anyone been monitoring areas where people are trying to manage for beetle outbreaks and the effects (Wolf Creek actions over time)? What works at endemic versus epidemic levels?
  - c. What is the best bang for the buck for land owners or managers?
  
- 6. JL: What are the most important uncertainties and research gaps that need to be filled?
  - a. Run-off- better info on quantity in San Juans- entire year budget, soils, transpiration, lower elevation
  - b. Repeat the process-level hydrology studies [that have been done in lodgepole forests] in the spruce-fir zone (if we get more of our runoff from spruce-fir, we need equal information for spruce-fir)
  - c. Repeat studies in other regions for San Juan area, so that we have better information
  - d. Move quickly--how can we improve our ability to extrapolate from other studies, as we have limited time to start new studies.
  - e. Develop working hypotheses for adaptation for local land managers to test in an applied world. Options and guidance for culvert sizing, infiltration, etc.
  - f. Follow up on the *Ips*-beetle infestation in pinyon-juniper [early 2000s] 10 years later.
  - g. Mechanical treatment changes to trajectory of vegetation in a forest--what are the changes in the trajectories, understory, and ultimate forest cover? What would be worth monitoring here in the San Juans?
  - h. Research looking at a broad perspective of the landscape--wildlife, recreation, human perception.
  - i. Monitor the understory as it is important in resilience for regeneration. What is the role of the understory in assisting with resilience (species mix, canopy, physical properties)?

- j. What would be the specific effects to the riparian in spruce-fir? Water table depth?  
Increase in large woody debris, sedimentation and erosion?
  - i. Ecohydrologic effects in the riparian zone?
- k. What are the impacts of spruce beetle infestation on grazing (domestic and wildlife)--  
would changes be expected through the changes in range and browsing? What are the  
management responses to changes for grazing?

Other comments-

- 7. Move downstream in the watershed (Colorado River) to find funding and partners (e.g., Los Angeles)