Monitoring Watershed and Salvage Logging Effects on the 2005 School Fire, Umatilla National Forest, Southeast Washington

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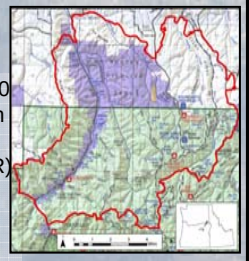
The Fire

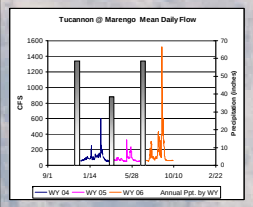
In August, 2005 the School wildfire in Southeast Washington burned over 52,000 acres of federal, state, and private land. Over 60% of the area experienced high and moderate burn severity creating a landscape vulnerable to accelerated runoff, erosion, and invasive weeds. Burned Area Emergency Response (BAER) treatments were implemented to help reduce impacts. Two years of monitoring indicate treatment effectiveness at the hillslope scale (Robichaud and others, 2007). Salvage of fire-killed timber proceeded on state land soon after the fire however logging on federal lands was delayed by longer planning timeframes and legal challenges. The first round of National Forest sales are now complete with monitoring of watershed and salvage activity effects ongoing.

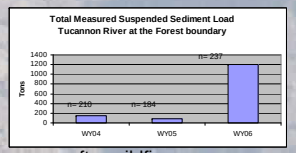


Location and ownership patterns on the 2005 School fire

Fire Effects and Watershed-Scale Monitoring

Pre-fire measurements of suspended sediment, water temperature, and channel morphology provide a baseline for comparing post fire watershed-scale effects. Annual precipitation was 66% of the 30 year average the year of School Fire (WY05) and near normal in WY 04 and first year post fire (WY06).

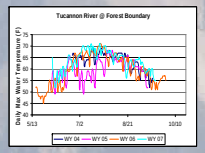




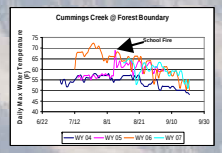
Peak flow and water yield increases after wildfire complicate separation of sediment load increases due to post fire erosion from that due to increased stream power.

Sediment loads measured on the Tucannon River at the Forest boundary appear to be almost an order of magnitude higher in the first year after the fire, however, data are provisional and incomplete due to operational problems (equipment failure, data backlog).

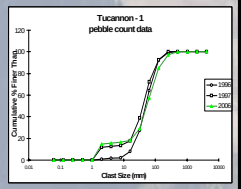
Loss of stream shade has increased daily maximum water temperatures on streams already 303d listed. Tributary effects are more pronounced than mainstem.



27% of HUC 5 in high and moderate burn severity



58% of HUC 6 in high and moderate burn severity



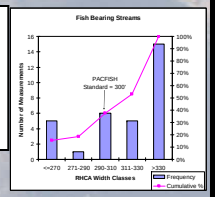
Tucannon River reference reach at the Forest boundary, slightly more (3%) fine sediment (<4-8mm) compared to 1997.

Implementation and Effectiveness of Salvage BMPs

An Environmental Impact Statement to salvage log on the National Forest was signed in August, 2006. Clean Water Act compliance for forestry activities includes Best Management Practices (BMPs) to protect water quality. BMPs are administrative and procedural measures and include on-site erosion control during harvest operations, road management requirements, and riparian protection zones.

Stream buffers were measured on 18 harvest units before logging activities (23% of units near stream channels). On average, buffer widths met or exceeded standards. Post-fire change in the stream network led to buffer adjustments prior to sale.

	Average (ft)	Number of Measurements	PACFISH Standard
Fish Bearing Streams	325	32	300
Perennial Non Fish Bearing	187	59	150
Intermittent	150	87	100
Dissected Ephemeral	36	34	No standard BMP = 25'



Stream buffer monitoring results

Effectiveness of stream protection was evaluated on 3 skyline units after logging was completed. No sediment reached stream channels from logging units. Appropriate logging systems, in combination with corridor spacing and stream protection zones are mutually-reinforcing BMPs.

Road use rules limit the amount of turbid runoff from roads. Sale administrators monitor and enforce rules; during the Nov. 2006 region-wide rain event, road use was halted, erosion control was in place, and rilling and sedimentation into stream channels was avoided.

Water bars route runoff from road surface

Policy Implications

- Watershed response to wildfire disturbance is highly variable in space and time, depending on the indicator of interest: short term response in water temperature readily detectable at the tributary scale, other attributes such as channel morphology more likely to respond over decades
- Distinguishing human activity effects (BAER and salvage) from fire effects at the watershed scale is unlikely given natural variability, complex cause and effect relationships, and technical challenges in measuring some response variables (sediment)
- Care in designing and implementing BMPs is critical for site protection during salvage activities. BMPs are adaptive, additive, and mutually reinforcing
- Fire disturbance presents challenges to addressing water quality impairment (303d listed streams) for example where shade is targeted for improvement

Small stream in severely-burned area seeded with native grasses, one year after the fire

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