

## **Cumulative Watershed Effects Monitoring Item 19**

**OBJECTIVE:** Determine cumulative watershed effects and to promote management consistent with water quality goals.

**DATA SOURCE:** Monitoring of cumulative watershed effects is done indirectly through the evaluation of existing conditions for specific projects, TMDL-oriented monitoring and the effectiveness of the Forest watershed improvement program. Direct and indirect watershed effects are also measured directly through river stream reach monitoring. Cumulative watershed effects are estimated with WEPP (erosion) and ECA (water yield) models results during environmental analysis and verified with stream reach surveys and project monitoring.

**FREQUENCY:** One timber sale that includes road construction per District per year.

**REPORTING PERIOD:** 2014 and 2015

**VARIABILITY:** Exceeding geomorphic threshold of concern.

### **EVALUATION:**

#### **Cumulative Effects Evaluation**

**Meadow Vapor Project:** Evaluation of the Meadow Vapor thinning project in the East Fork Bitterroot River watershed began in 2013. This project is looking at fuels adjacent to private land, forest health and a roads analysis will be conducted to look at forest roads and access needs in the future. Efforts focused on data collection related to sediment source inventory on roads and existing road conditions on roads in the Meadow Vapor project area that extends from Meadow Creek, east to Reynolds Creek; mostly along the south side of the river. Data collection and analysis will continue in 2016 to refine and supplement existing condition information.

**Como Forest Health Project:** Analysis on this project began in 2010 and as it continued the project was separated into two projects, one within the immediate Lake Como Recreation Area (which was completed in 2012) and the other in the area between the recreation area and Lost Horse Creek, which was released for public comment in October of 2014. The analysis was completed and decision made in July of 2015. The project was implemented winter of 2015/2016. Watershed concerns for this project are related to ground disturbance related to harvest activities, temporary roads and track line machines, analysis of undetermined roads in the analysis area and access needs for future recreation and forest management.

**Westside Collaborative Project:** Analysis for the Westside project began in 2014 and continued through 2015. The July 5, 2016 decision included 2,327 acres of forest treatments (commercial and non-commercial thinning, prescribed fire), 3.8 miles of new specified road, 3.8 miles of temporary road and a new bridge across Camas Creek. It also decommissions 5.9 miles of road and stores 1.3 miles. Implementation is currently on hold pending results of litigation. Cumulative effects analysis results suggested minimal water resource concerns due to large percentage of unmanaged (roadless) lands, and low erosion potential due to thinning prescriptions, low precipitation and low angle slopes in the area. The bridge would be a clear-span design that will not obstruct aquatic organisms or inhibit natural processes.

Several small projects were evaluated in the Small NEPA process during the 2014-2015 time period that involved watershed analysis of effects of the effects of small, often administrative actions that occur on national forest lands. Table XX, displays these projects that were determined to have no negative effect to the watershed resource due to either project design or mitigation and have either been implemented or will be as funding allows.

**Table 1 - 2014 and 2015 Small NEPA Projects**

Hughes Creek Firewood	Lost Trail Bike Fest, 2014 and 2015	Lost Trail Parking Expansion "A"	Millmee Small Sale (dropped following scoping due to conflicts with long-term research project)
Lost Horse Grooming Proposal	Como Trail Footbridge	Sam Billings Campsite Development	Upper West Fork Woody Debris
Behm Small Tracts Sale	Medicine Tree Cattle Ford	Johnson Creek Tree Planting (Mustang Fire)	Downing Mtn. Reforestation
Thinning Gold Creek Test Plantation	Sheep Creek Culvert Replacement	10 Year Outfitter and Guide Permit Renewals	Como Water System Repairs Project
New Outfitter and Guide Permits	Forest-Wide Timber Stand Improvement (hand thinning) projects	Access Trail 505 Reroute	Indian Ridge Trail Reroute
Copper Queen Mine Special Use Permit	Nee-Me-Poo/Waugh Fuels Reduction	Short-term Temporary Road Use Permit	Rick Wemple Outfitter Permit Renewal

**MONITORING:**

**Watershed Improvement Projects**

Watershed improvement projects are implemented to reduce cumulative watershed effects and improve watershed conditions. Watershed improvements focus was on increasing infiltration, reducing compaction, reducing sediment contributions to streams from active surface erosion and reducing the risk of mass failure associated with roadbeds no longer maintained for public travel and improving vegetation cover. Road storage/stabilization treatments included surface decompaction, recontouring, construction of waterbars, culvert removal, associated channel reshaping, seeding, mulching, and planting of shrubs adjacent to stream crossings. The following section provides information on projects implemented 2014-2015.

**Table 2 - Watershed Accomplishments 2014-2015**

Completion of Martin Creek Watershed Restoration Project Store: 0.2 miles (treated) 2.1 miles (no treatment) Decommission: 3.2 miles (treated) 2.1 miles (no treatment)	Darby Lumber Lands Project. Store: 13.8 miles (treated) 10.7 miles (no treatment) Decommission: 14.0 miles (treated) 11.0 miles (no treatment)	Burn Pile Seeding: Slash piles burned following Trapper Bunkhouse, Lower West Fork, Three Saddles and other smaller projects were seeded and fertilized to improve vegetative cover along 12.9 miles of road in Pierce Creek, Hart Bench Loop, Christiansen Creek, Haake Creek and Willow-St. Clair areas.
Block one ATV trail, slash, seed, and fertilizer. Reynolds Creek vicinity		Three Saddle Road Decommission : 2.0 miles (treated)

**Table 3 - Highlights the Past or On-Going Projects that were monitored for Compliance, Implementation, and Effectiveness 2014. Individual Monitoring Reports are Available from Forest Hydrologists.**

Activity	Location and Findings
Watershed Improvement Monitoring	<p>Lower West Fork project watershed improvements were completed in 2013. Results of monitoring is discussed below.</p> <p>Multiple road storage and decommission sites in the Lower West Fork project were monitored in 2014 and 2015. Monitoring found that vegetation recovery on some sites was good while others was fair. South facing slopes that were weedy and a source of weed seed to the disturbed area were prone to having knapweed along with the seeded grasses growing on-site.</p> <p>Burned Area Recovery Road Storage and Decommissioning. Storage of NFSR (National Forest System Road) 73313 (Mink Creek), the road system in Elk Creek, a tributary to Slate Creek (13833, 13828, 13859, 13860) occurred in the fall of 2014. The Elk Creek road system has good vegetation recovery and stream crossings are stable and well vegetated (refer to Monitoring Item 22). The Mink Creek site was also stable and vegetated.</p> <p>Monitoring of burn piles seeded in 2013 along NFSR 373 in the Lower West Fork project area found that slender wheat grass was growing well but scattered across seeded burn piles. Initial results point towards this species doing well in poor soil conditions such as where piles burned.</p>
Road Existing Condition Inventories	<p>Road inventory was completed in the Meadow Vapor Project area. Underdetermined roads were reviewed for sediment sources while open road or seasonally closed roads were reviewed for BMP needs.</p>
Other Project Monitoring	<p>Meadow Tolan Allotment Monitoring</p> <p>Sula Peak East Fork Allotment Monitoring Sites (Spring Gulch)</p> <p>Camp Waugh Allotment Monitoring</p> <p>Slate Creek Campground revegetation monitoring</p> <p>Revegetation efforts on NFSR 725 ditches</p> <p>Three Frogs Campground seeding and fertilizing</p> <p>MEF landing revegetation</p> <p>In 2014 the user created ATV trail that connects the Reynolds pit to NFSR 5770 was reseeded and slash was spread at the upper end to restrict access where it crosses the road.</p> <p>BMP effectiveness monitoring occurred on revegetation efforts at Lost Trail on the yurt waste-water line corridor and drainfield.</p>

## Watershed Improvement Monitoring - Discussion

### Burned Area Recovery Implementation: Road Storage



NFSR 73313 in Mink Creek (East Fork Bitterroot River tributary) was stored in 2004 as part of the Burned Area recovery project. This road was recontoured from the entrance to the stream crossing, allowing the stream crossing to recover without intervention. The road is located in an area where knapweed is common. Early in the growing season, a variety of plants are growing on the recontoured road: snowberry, young Douglas-fir, aspen, spirea, ninebark and various unnamed flowering forbs. As knapweed matures, the natives become dwarfed by the robust growth of knapweed.

The stream crossing on NFSR 73313, has changed considerably in 10 years. Stream-side shrubs are greater than six feet in height in 2014, and it is difficult to locate the ford. At the crossing (the ford) the bankful stream channel is well vegetated but is still approximately 2.5 times wider than the stream above and below the ford. This short section of stream is similar in shape and dimension to the ford prior to the road being closed but is heavily vegetated with shrubs.



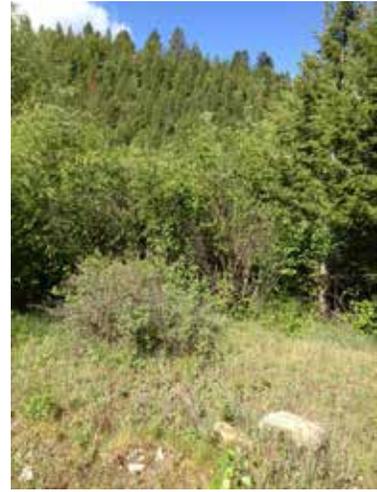
Stream Crossing in 2005      2014





**Crossing in approximately 2012 on the left.**

**Crossing in 2015 on the right.**



This crossing was not planted, the shrubs have spread from above and below the crossing to fill the void, making it difficult to locate the old ford.

Elk Creek Road Storage, NFSR 13833, 13858, 13859, 13860. These roads were decompacted with the two lower stream crossings on Elk Creek removed. At the present time, decadent grass is providing organic matter to the site, live grasses and shrubs are growing on the stream banks and on road prisms. The stream has made minor adjustments since 2010 when the culverts were pulled but is stable with a cobble/boulder substrate and vegetated streambanks. Shrubs were planted at this site and have survived but are still a minor component of the

In the Burned Area Recovery Project, approximately 11 miles of the 105 miles identified for road storage remain untreated and will be deferred until Travel Planning is completed or until equipment is in the area to reduce the cost of implementation. Many of these mid-slope or on ridgetop roads with limited proximity to water. Often these types of treatments are preempted by higher priority work on roads from other project areas that are near to or contributing sediment to streams. All 46 miles of road decommissioning that was identified in Burned Area project has been completed.

### Lower West Fork Project Monitoring

A monitoring plan included in the FEIS listed 5 items to be reviewed as the project was implemented.



- **Monitoring Item 1:** Validate assumptions in WEPP and ECA. A site visit to timber sale units located along NFSR 5630A occurred in 2014 to review the harvest and determine if the amount of harvest was similar to the estimates of crown cover removed when modeling changes in forest cover (potential for water yield). We concluded that there was not sufficient information on crown cover prior to harvest to answer the question of how much was removed. However, we did find that project did not meet the silvicultural intent in the area we visited as too many trees were left on site.

- **Monitoring Item 2:** Monitor effectiveness of straw bales installed to reduce sediment contributions from haul routes. Monitoring on this item was reported on in the 2010-2013 Monitoring

Report.

- **Monitoring Item 3:** Monitor culvert removals. Removal of a 36" culvert on a tributary to East Piquett Creek on NFSR 13411 was monitored by both the project fisheries biologist and hydrologist. Results indicate that insufficient removal of the bedding material and construction of a too small channel contributed to downcutting, channel widening and streambank erosion that left 2-3' high erosive banks along portions of the constructed stream channel. Another culvert was removed from a stored road on a tributary to Lavene Creek. This site also had downcut more than we expected which was likely due to incomplete removal of the bedding material. Culverts removed in Violet Creek were acceptable. There are always some adjustments stream elevation, width and depth that take place after a culvert is removed. Monitoring indicates that during culverts removals ensure that as much bedding material is

removed as possible to reduce downcutting, lay back side slopes to prevent over-steepened stream banks and limit erosion as the stream adjusts

- **Monitoring Item 4:** Tracking of Watershed Restoration proposals to ensure they occur as planned. Improvements were input into WIT (Watershed Improvement Tracking) database that is housed within National Resource Management or NRM, where several Forest Service tracking databases are located. The database will be updated with 2013 and 2014 completed improvements. All watershed improvements identified in the FEIS were completed by the end of FY2013 and documented in WIT
- **Monitoring Item 5:** Monitor RHCA buffers in Units 32, 33, and 60a to determine if the buffer was effective in limited sediment contributions and protecting water quality. These units have not yet been burned, monitoring will occur as activities are completed.

The Lower West Fork watershed improvements were completed in 2013. Monitoring of vegetation recovery and effectiveness occurred in 2014 and is summarized here.

In the Lower West Fork project road 13838 was decommissioned in East Piquett Creek. The entrance to this road was a harsh site, where small to medium cobble sized rock made up most of the “soil”. In an effort to improve revegetation success, loose straw was mixed in with the rocky soil to provide additional organic matter. Despite high rock content, vegetation establishment was surprisingly good, notice that transplanted shrubs are green and the presence of grasses in the cobbly soil.



2012, Immediately Following Recontour



2013



2014

On cooler aspects of 13838, where soils were deeper, revegetation was good with Idaho fescue and other tall grasses contributing to about 60% ground cover. On dry, hot sites, knapweed and cheatgrass were the most common plant. On those hot dry sites, other more desirable plants were present but were not as robust as the weeds.

Road 74313, also in East Piquett Creek, was decommissioned in 2013. Vegetation recovery on this site was fair with a considerable amount of cheat grass. There was an ephemeral draw (without culvert) that was recontoured on this road. In 2014, there was evidence of flow through the recontoured crossing either from snowmelt or during a storm event; after restoration of this crossing, runoff generated from the lands above the crossing can now move downhill in a more normal runoff pattern.

Road 74006 was decommissioned in 2013 and vegetation recovery was fair. A considerable amount of mullien grew on some sections of the road. It is interesting to note that mullien growth/establishment on treated roads in the Lower West Fork project was much greater than we've seen on other parts of the forest. Although not a “noxious” weed, it is not native to this area.

NFSR 13411 was the site of the largest culvert removal of the Lower West Fork project. NFSR 13411 was stored in 2013 and a large culvert on a tributary to East Piquett was removed to allow aquatic life (including fish) to reach upstream habitat. Photo Number 1, (below) shows the site in 2013 immediately following culvert removal. The following year had high runoff and this site had more downcutting and bank erosion than at most sites where culverts have been removed. It is possible the large runoff contributed to channel erosion but it could also be caused by insufficient removal of bedding material. When limited bedding material is removed, the stream can downcut through that creating over steepened streambanks that are erosive. Photos Number 2 and 3 show the site in mid-summer 2014 after the stream high water. We are not positive that the erosion was caused by excess bedding material or high flows but attention should be given to remove as much bedding material as possible and lay back the slopes of the new streambanks to match the landform above and below the crossing. The stored

road around the crossing was mulched, seeded and fertilized, but knapweed was growing well on the site while other desirable vegetation is struggling.

**Photo Number 1**



**Photo Number 2**



**Photos Number 3**



NFSR 13828 was stored in the Lower West Fork project and included decompaction of the travel way with a culvert removal on an unnamed tributary to Lavene Creek. Mullien was growing well in several locations along this road. At the stream crossing, grasses, planted shrubs and mulch were providing ground cover. Some adjustments had occurred to the stream channel but generally conditions were good at this site.

Several closed system roads were opened to provide access for timber harvest in the Lower West Fork project area. Review of these roads found that road widening was necessary as roads had narrowed due to cutslope and fillslope slumping. This resulted in cutslopes that are steeper than the angle of repose that will slough and erode until they stabilize and wide travelways with limited vegetation. Following use for the Lower West Fork Timber Sale water bars were installed on roads and a few grasses are invading the road prism. Needle cast and organic materials from adjacent forested areas limit road travelway erosion. These roads are not sediment sources (they are not within sediment contributing distance of streams) but they will take several years to revegetate to pre-project condition.

Temporary roads used for the timber sale had been recontoured, slashed and vegetation was starting to grow on them. The restoration of these met the intent of the mitigation in the FEIS.

A number of burn piles along NFSR 5630A were seeded and fertilized in 2013. As seen in the photos below, slender wheat grass was growing well on these burned soils. Other burn pile sites on this road as well as along the road to the Baker Lake Trailhead were seeded and fertilized in late 2014 and 2015. Burn piles located along 12.9 miles of road in the Trapper Bunkhouse project, Lower West Fork Project and several small sales were seeded and fertilized in 2015. The photos below show vegetation recovery on burn piles seeded in 2013.



### Other Monitoring

Two helicopter landings associated with the Middle East Fork project were seeded and fertilized in 2013. One, near Bertie Lord Creek was seeded and fertilized in 2013. Monitoring this year found good recovery of slender wheatgrass on the burned soils. The other landing, near Jennings Camp Creek, was used as a storage area for waste materials from the East Fork Highway reconstruction after being used as a Middle East Fork landing. It was seeded but the mix included sweet clover that although not an invasive species is not desired on forested landscapes. The landing sprayed in 2012 to kill the sweet clover, then reseeded, fertilized and mulched in 2013. Monitoring in 2014 found sweet clover again on the site but at a slightly lower level. The forest decided to take no additional action monitor the site as sweet clover is a biennial (it only lasts a couple years) and should not persist on the site after several years.

Monitoring of vegetation recovery on disturbed soils on the yurt drainfield and sewer line corridor and around the outhouses at Lost Trail Ski Area near the bottom of Chair 3 has occurred for several years. Vegetation recovery around the outhouses has been gradually improving while the drainfield was seeded just this year and grasses are recovering well at this time. Monitoring in 2014 found that sufficient grasses have recovered on the disturbed soils that no additional monitoring at these sites is needed.



**Taylor Creek Headcut**

Taylor Creek, a small tributary to Hughes Creek, experienced an impressive headcutting event that is rare on the Bitterroot National Forest. First identified in 2013, the stream has downcut 1-3 feet over much of the distance between the stream crossing of County Road 9630 (Hughes Creek Road) and the end of the nonsystem road that provides access to the mine in the watershed, a distance of approximately ¼ mile. This road parallels the stream but is 50 to more than 100' from the stream. Above the end of the road, the valley becomes more narrow and steep, and the stream has a rockier substrate that helps to resist headcutting. The cause of the headcut is not known but there has been various activities in the watershed: there's a history of mining in Taylor Creek, old timber harvest, and road construction, and fire has occurred in the watershed. In 2000, wildfire burned about 40% of the headwaters of the Taylor Creek watershed, and is the likely cause of the headcutting event. The headcut is occurring in a deep alluvial riparian area that could be destabilized by changes in flow, velocity and bank vegetation. Many small drainages in the Bitterroot National Forest have been burned in recent fires but not experienced a headcutting event such as this. They also are located in more rocky soils. Monitoring will continue with efforts taken to understand the cause of the headcut.

In the mid-2000's, Slate Creek above the West Fork Highway began migrating and attempting to abandon the culvert that had been installed in about 1997 to pass Slate Creek under the highway. To prevent migration and damage to the highway, Ravalli County armored the stream banks immediately above the culvert. Access to the culvert inlet was through the lower end of Slate Creek Campground. After completion of stabilization project the access route was seeded and fertilized but vegetation recovery was limited due to rocky, compacted soils. Risk

of sediment contribution to Slate Creek was low due to topography but better cover in this streamside zone is desired. In 2010 the watershed crew was working in the area on another project and decompacted, reseeded, mulched, and fertilized the area in an effort to improve vegetative cover. Monitoring since then has found that vegetation was slow to recover and so the site was again seeded and fertilized in 2012. In 2014, vegetation cover is improving and the addition of organic material from the growth and decay of the existing plants should contribute to gradual improvement.

### **Martin Creek Watershed Restoration**

The majority of road storage and decommission in the Martin Creek Watershed Restoration project was completed in 2013, monitoring of these roads found various levels of vegetation recovery. Undetermined roads 73011 and 73015, located in Bertie Lord Drainage, were implemented through a partnership with Trout Unlimited. The stream crossings had very good vegetation recovery with native shrubs, grasses, forbs and seeded varieties present on the disturbed soils. There was very little bare ground. Away from the stream channel, most of the recontoured soils on both roads were well vegetated with seeded grasses but there was also a component of robust knapweed growing on site.



**Entrance to Road 73011**

**Stream Crossing**

**Area of Less Robust Vegetation**

Undetermined roads 73605 and 73606 in Swift Creek and 73279 and 73280 in Lodgepole Creek were also decommissioned in 2013. Vegetation recovery on these roads wasn't as good as on the Bertie Lord roads but there was vegetation on site that has the potential to provide good ground cover as it matures.

The stream crossing on Bugle Creek on undetermined road 73623 had steep erosive banks left from when the culvert was either removed or washed out some time in the past. The angle on the stream banks were laid back to facilitate revegetation, the areas seeded, fertilized and mulched in 2013. Conditions were good at this site with good grass cover and less bare soil in 2014 and in 2015.

### **Sula Peak East Fork AMP**

Eight sites in the allotment have been identified as long term monitoring sites. Sites were selected based upon potential for livestock use that would reflect typical use in that portion of the allotment, where livestock were known to frequent, or sites that were problem areas prior to the change in management that followed the 2000 fires. Management of the allotment since 2000 has resulted in much riparian improvement due to reduction in livestock numbers, reduction and changes in season of use. Planned monitoring consists of a channel stability rating and streambank trampling measurements. At wetland sites, Proper Functioning Condition will be used to track trends. Monitoring will occur at five year intervals, more frequently if budgets and time allow. The Sula Peak East Fork Grazing Allotments EA was signed in August of 2010.

NFSR 5727 provides access to Sula Peak Lookout and recreation traffic. This road is a constant threat to Spring Gulch riparian health due to its location right next to the stream in a narrow v-shaped valley. In 2014, there were fresh (unvegetated) deposits of sediment from an eroding road travelway deposited in several locations along the riparian area. Two of the deposition sites were located where there was no defined channel or wetland, the other deposited sediment into a dry defined channel. It looks like the sediment was deposited prior to road maintenance, maybe spring of 2014, as there was no rilling of the road surface or evidence of sediment movement on the road at the time of monitoring. In October, attempts were made by watershed staff and the forest road crew to remove these sediment deposits with limited success. It is important to keep this road well maintained to reduce erosion into Spring Gulch.

In 2014 monitoring occurred at the two Spring Gulch sites, while in 2015 all eight sites were monitored. The site on Cameron Creek in the Daniels Horse Pasture had poorer conditions than previously but other sites had either improved or maintained condition. The complete report is available at the Supervisor's Office.

### **Waugh Andrews AMP**

Six sites have been identified for monitoring in the Waugh Andrews Allotment Management Plan Environmental Analysis, stream bank trampling and cross section trend measurements are taken at each site. Sites are identified with stakes, flagging and GPS locations at upper and lower reach locations and at the cross section. No livestock have used the allotment since 2009. Conditions along streams are good with improvements in streamside vegetation from lack of livestock pressure. The complete report is available at the Supervisor's Office.

### **Meadow Tolan AMP**

Monitoring continued for the 17<sup>th</sup> year on the Meadow Tolan Allotment and consists of measuring stream bank trampling, tracking photo points, and profiling the valley/stream cross-section at 14 established reaches each fall following the end of the allotment grazing season. The Bunch Gulch portion of the allotment was grazed in 2009 and no other grazing has occurred on the allotment since then. This has allowed vegetation to flourish along streambanks and woody shrubs to grow larger and more robust. 2015 monitoring found that most reaches on the allotment saw low levels of stream bank trampling due to wildlife, with the greatest amount of bank trampling was on the reach located inside the enclosure on Bulge Creek that was measured at 3% of the stream bank trampled. The complete report is available at the Supervisor's Office and includes monitoring results for the years 1998-2015.

### **Watershed Improvement Needs Inventory**

Roads in the Meadow Vapor project area not evaluated in 2013 were reviewed for watershed improvement needs in FY2014 and 2015. Many of the roads reviewed are classified as "undetermined", have good vegetative cover, some with ephemeral draws recontoured, and some have been planted with conifers while others were naturally recovering with shrubs and trees growing on the travelway. Most undetermined roads in the Meadow Vapor project area are not accessible to motorized vehicles due to vegetative recovery and are not sediment sources.

For specifics on the various environmental analysis discussed in this report please refer to the analysis found on the forest website: <http://www.fs.usda.gov/bitterroot/> If the analysis is not available on this website due to its age, please contact the Supervisors Office to review.