Monitoring Study Group Meeting Minutes

June 12, 2013
Bureau of Land Management Ukiah Field Office
Ukiah, California

The following people attended the MSG meeting: George Gentry (BOF—MSG Chair), Clay Brandow, (CAL FIRE), Dave Longstreth (CGS), Nick Kunz (SWRCB), Peter Ribar (CTM), Rich Wade (BOF), Dennis Hall (CAL FIRE), Collin Hughes (PWA), David Manthorne (HRC), Dr. Kate Sullivan, Robert Douglas (MRC), Matthew House (GDRCO), Kirk Vodopals (MRC), Julie Bawcom (CGS), Barry Hill (USFS), Liz Keppeler (USFS PSW), David Fowler (NCRWQCB), Brad Valentine (DFW), Stormer Feiler (NCRWQCB), Cherie Blatt (NCRWQCB), Jeanette Pedersen (CAL FIRE), Brandon Rodgers (CAL FIRE-JDSF), Lynn Webb (CAL FIRE-JDSF), Tom Daugherty (NMFS), and Pete Cafferata (CAL FIRE).

Participants on the GoToMeeting webinar/conference call included: Richard Gienger (public), Drew Coe (CVRWQCB), Dr. Cajun James (SPI), Joe Pisciotto (DFW), Trey Sherrell (CVRWQCB), Leslie Markham (CAL FIRE), and Matt Dias (BOF).

[Action items are shown in bold print].

The meeting began with general monitoring-related announcements:

- Richard Harris's Riparian Functions and Management webinar series (five 2-hour sessions held on Wednesdays in May, 2013); recorded presentations are available at: http://ucanr.edu/sites/forestry/Webinars/Riparian_ecology/.

- The "Roads and Road Management in the Tahoe Basin" workshop was held on June 13-14, 2013 In Stateline, NV (see: http://ucanr.edu/sites/forestry/Workshops/Roads_and_Road_Management_in_the_Tahoe_Basin/). PowerPoint presentations from the workshop have been posted. Two field trips in the Tahoe Basin are scheduled for July 15th and July 30th; see: http://ucanr.edu/sites/forestry/Workshops/Roads_and_Road_Management_in_the_Tahoe_Basin/Roads_field_trips_in_the_Tahoe_Basin/

- Caspar Creek 50 Year Celebration: "The Caspar Creek Research Project: 50 Years of Discovery; What are the Implications for Forest Management?" June 28, 2013, Caspar, CA. The session is currently closed for registration. The 50 year California Forestry Report summarizing Caspar Creek research and management applications is posted at: http://calfire.ca.gov/resource_mgt/downloads/reports/California_Forestry_Report_5.pdf

- California Forest Soils Council Summer Meeting; June 28-29, 2013. A joint CFSC/PSSAC soils-focused field tour in the Casper Creek Watersheds will be held June 29th (set to overlap with the 50th Anniversary Casper Creek celebration). To register for the CFSC/PSSAC event, see the following website: http://pssac.org/AnnualMeetingAlbums/2013Meeting/2013-Annual-Meeting.html

- SAF Summer Meeting. August 23-24, 2013. Challenges of Working Forests in the Santa Cruz Mountains. Field trip to Big Creek Lumber Company and Swanton Pacific Ranch timberlands.

- Salmonid Restoration Federation, 7th Annual Spring-run Chinook Watershed Symposium, July 22-23, 2013, Lodi, CA. See: http://www.calsalmon.org/node/472; 16th Annual Coho Confab, August 9-11, 2013, Petrolia, CA. See: http://www.calsalmon.org/node/471.

Trends in Sediment-Related Water Quality in the Freshwater and Elk River Watersheds

Dr. Kate Sullivan provided a PowerPoint (PPT) presentation titled "Trends in Sediment Related Water Quality after a Decade of Forest Management Implementing an Aquatic Habitat Conservation Plan." The PPT is posted at: http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_archived_documents/msg_archived_documents_/sullivan_2013_turbidity_trends_full_presentation_vs8.pdf. The final report that this presentation was based on is posted at: http://www.mrc.com/wp-content/uploads/2012/01/HCP_Turbidity-Trends-Report_SFS1.pdf. Dr. Sullivan began by providing background information on the Freshwater and Elk River watersheds, where the data were collected. Widely varying practices have been implemented here, including old-growth logging in the 1930's, PALCO clearcutting from 1986-1999, PALCO HCP practices from 1999-2008, and HRC unevenaged silviculture from 2008 to the present. The aquatic HCP included watershed analysis (including sediment budget work), sediment source assessments, and monitoring projects (effectiveness, stream channel long-term trend). Road improvement work was mandated to occur within 20 years.

Twenty one instream sediment monitoring stations with recording turbidimeters were established from 2003-2006 (15 minute interval sampling). Yearly relationships between field turbidity and laboratory turbidity were established to correct for instrument error. Water quality measures included annual sediment yield (suspended sediment) and turbidity (10% exceedence, % of time > 25 NTU, 70 NTU). Basin size ranged from 0.13-111 km^2 (~30 ac to 27,400 ac). Two basins had no recent management (one old-growth, one 60 yr second-growth); all the others had recent harvest and road construction. Geologic formations include the erodible Wildcat and Hookton Formations, as well as the harder Central Belt Franciscan and Yager Formations. The stations include a wide range of stream types and photos were shown illustrating representative sites in SF Elk River, NF Elk River, and Freshwater Creek. For most of the stations, nine years of data exist—a relatively short water quality record.

Extensive sediment budget work was used to develop hypotheses for sediment trends. For example, high sediment yields in water year 1997 for both Elk River and Freshwater Creek resulted from a December 1996 storm event that triggered extensive landsliding, with declining yields after that event. Challenges included very limited control basins, on-going management in nearly all the monitored watersheds, and no water quality data between 1997 and 2003. Weather conditions are understood to be an important determining factor for annual sediment yields, and an "erosivity index" (EI) was developed to account for year-to-year variations. The EI was defined as annual rainfall (in) x maximum daily rainfall (in) [similar to the rainfall factor in the USLE equation]. Using this factor, 2003 was the second highest year (62 yr return interval), with 1890 being the largest on record dating back to 1888. For most of the 21 stations, the EI was highly correlated with sediment yields and was consistently better than use of peak flow values. Following 2003, the majority of the annual EIs were approximately average, with the exception of 2006 and 2011, which were moderate years. This index indicates that sediment yields should be roughly average, and that there should be a declining trend in sediment yields through time (2003-2012).

Management factors considered included equivalent clearcut area (ECA), which was calculated for one year and two year harvest rates, the previous 10-15 year harvest rate, and the previous 10 year harvest rate (following the method used in Klein et al. 2012). Rate of harvest varied for the basins monitored at the 21 stations, with some increasing over the nine year period and some declining. Additionally, the amount of sediment saved per year based on a PWA road inventory and completed road work was considered. Based on this inventory, approximately 85% of the potential delivered sediment has been addressed in NF Elk River and Freshwater Creek.

Independent variables used for multivariate statistics included: watershed basin area, weather-related variables (EI, annual peak flow), timber harvest activity (e.g., ECA calculated for one and two-year harvest rates, previous 10-15 yr harvest rate, etc.), road work (sediment removed, sediment volume remaining), and time. The dependent variables were sediment response (annual suspended sediment yield, 10% turbidity exceedence, % of time > 25, 70 NTUs). Several different types of analyses were

conducted. Spatial patterns of annual sediment yield revealed relatively uniform response from the various Freshwater monitoring stations (43-87 MTons/km^2), while Elk River stations were more variable. In particular, stations 519 (S. Branch NF) and 533 (Tom Gulch) were high. Sediment yields ranged from 6 MTons/km^2 (station 534, the old-growth station) to ~300 MTons/km^2. Geologic impacts were detectable, but they did not display strong controls on prediction of sediment yield and turbidity.

Regarding temporal trends, sediment yield at 19 of the 21 stations showed a similar pattern of generally declining yields with time (from 2003-2012), which is what is expected based on the EI. This analysis, however, indicates that sediment yields declined faster than was indicated by the weather conditions alone at most of the stations. When rainfall erosivity was accounted for, other North Coast streams, such as Caspar Creek, seem to behave similarly to Elk River and Freshwater Creek. The 10% Exceedence Turbidity factor response over time was much weaker than sediment yield, and values at a number of stations increased over time. Dr. Sullivan concluded that turbidity is not as responsive as sediment yield, and that turbidity probably has not declined significantly as a whole.

Next, trends in relationships between sediment yields and sediment budgets were described. In general, sediment budget estimates decline over time due to lack of large landslides and implementation of road upgrading work. NCRWQCB estimates are generally close to the Elk River sediment budgets developed by HRC ($\pm$ 10%). Sediment yields were found to strongly decline in non-event (i.e., non-landslide or "average") years due to road improvement work, with the exception of a few monitored watersheds (e.g., Corrigan Creek). Declines were much less strong in "event" years. Multivariate regression over time confirmed these conclusions and showed that turbidity is not declining at the same rate as sediment yield, although statistically significant improvement was still documented.

Modern and legacy management effects were then discussed. Single variables such as 2-yr harvest rate, harvest in the previous 10-15 yrs, and sediment removal were not found to be good predictors of sediment yields or turbidity values. Multivariate statistical analysis with parametric and non-parametric models were then tried, looking for "best fit" models. All the models generated had an r^2 of 0.48, without management parameters being statistically significant. Other than weather, trends in time, 2-yr harvest, annual harvest, sediment removal, previous 10 yr harvest rate, previous 10-15 yr harvest rate, and legacy sediment volume did not show consistent correlation to sediment yields at the various monitoring stations (some stations were up, some down). The most successful management-related factor was legacy sediment volume, which relates to road upgrade work. Ten percent turbidity exceedence revealed that 2-yr harvest was generally correlated, indicating that harvest can have local impacts on turbidity, as was legacy sediment volume. Legacy sediment volume remaining was found to be statistically significantly related to sediment yield in Elk River, and to turbidity in the Elk River and Freshwater Creek basins.

The HRC data set was compared to that complied by Klein et al. (2012), published in *Geomorphology*. Dr. Sullivan generated similar results for 2005, the year analyzed by Klein et al. (i.e., harvesting 10-15 yrs previously correlated to 10% turbidity exceedence), but when all nine years were considered, this variable was still significant, but negative. In summary, Dr. Sullivan concluded that: (1) weather parameters are strongly explanatory, and (2) modern and legacy management factors influenced sediment yield and turbidity at individual stations (some significantly), but there were no consistent trends with harvest rate or road upgrading (some general progress has been observed with storm-proofing roads).

Previous studies were then described, to indicate if these results were consistent with earlier results. A THP turbidity study documented increased turbidity levels, but they were generally low level and the impacted area was described as too small to affect downstream turbidity at monitoring stations. A road surface erosion study reported that the amount of road sediment generated was significantly lower than estimated before storm-proofing. A skid trail study concluded that old skid trail crossings "leak" sediment during routine storms, and that a high density of skid trail crossings (~25/km^2) remain in these watersheds. This indicates that legacy sources are contributing to current sediment yields.

Overall summary points include: (1) sediment yield has declined significantly during the nine year period [mostly due to weather, some improvement due to cumulative effect of HCP management practices, especially road improvements; modern practices have some impact, but not significant, or consistent enough to predict; and likely not to reach sediment targets due to legacy sources], (2) turbidity has not improved very much, and (3) salmon have experienced lower sediment due to favorable weather.

Suspended Sediment Loads in the South Fork of the Albion River, Mendocino County

Mr. Kirk Vodopals, MRC, provided a PowerPoint presentation titled "Suspended Sediment Loads in the South Fork of the Albion River, Mendocino County, California." The PPT is posted at: http://bofdata.fire.ca.gov/board_committees/monitoring_study_group/msg_archived_documents/msg_archived_documents_/vodopals_2013_s._fork_albion_river_suspended_sediment_loads.pdf. He began by providing reasons why a monitoring station was established in this watershed, including: 303(d) listing for sediment, MRC is the majority landowner, the watershed is actively managed for timber harvest, and it is a productive coho watershed. The main hypothesis is that HCP conservation measures will measurably reduce sediment amounts compared with baseline instream sediment measurements. Other goals include determining how the loads compare with those reported at Caspar Creek and other North Coast watersheds, and determining impacts to fisheries.

The South Fork Albion River watershed covers 5,831 ac, average annual precipitation is ~40 in, road density is 7.8 mi/mi^2, and it is a NMFS core coho watershed for recovery. The SF Albion has a wide flood prone area and marshy habitat in the middle part of the basin, exposed bedrock in the lower main stem (confined), and generally good canopy. Fish population monitoring has occurred the last two years, with outmigrant data revealing a basin productive for both coho and steelhead. A Turbidity Threshold Sampling (TTS) monitoring station built in 2007 by Rand Eads is located at the bottom of the watershed below the marshy area. A number of road segments are surfaced with rock and the acres harvested in the watershed has ranged from ~50 to ~500 from 1992 to 2012. Only unevenaged management has been utilized by MRC. A watershed analysis was conducted in 2004 mainly with air photo work; it estimated a sediment input rate of 620 t/mi^2/yr (490 t/mi^2/yr from mass wasting and 130 t/mi^2/yr from the road network). This total does not include in-channel sources (e.g., bank erosion, incision, headcuts).

Suspended sediment load data exists for water years 2008-2012 and ranges from ~550,000 kg in 2008 to <50,000 kg in 2009. Annual rainfall totals have been near normal for these years. The Erosivity Index (EI) developed by Dr. Kate Sullivan (annual precipitation x daily maximum) was calculated and plotted. After water year 2008, it matches the sediment load estimates relatively well. There is no clear explanation why 2008 is an outlier. Suspended sediment data from SF Caspar Creek and NF Caspar Creek were compared to that generated for SF Albion River. On a unit area basis, loads in SF Albion were lower three of the four years all three stations were monitored (the exception was for the minor year 2009). Possible reasons for lower sediment yields in SF Albion include the existence of a significant debris jam located just upstream from the monitoring station and the marshy area located in the middle part of the basin. Sediment loads reported in other North Coast watersheds indicate that SF Albion may have lower sediment yields than Freshwater Creek, Elk River and Jacoby Creek (as well as NF and SF Caspar Creek), but this is preliminary due to the lack of large storms during 2008-2012 and different water years monitored at the stations in these watersheds.

Desired conditions for salmonid habitat were also considered. Indicators include number of days with turbidity values >27 NTUs (pristine watersheds have 11-25 days with turbidity exceeding this standard), and days above 25 NTUs (1-10 days desired). Timber production watersheds have been found to have 25-50 days over this threshold. SF Albion data for water years 2008-2012 have been found to float between these two standards (range 8-27 days). Newcombe and Jensen's (1996) scale of severity (SEV) for suspended sediment effects on salmonids was also used (SEV scores range from 0 to 14). In SF Albion, SEV scores have ranged from $\leq$ 2 for 2009 to ~6-8 in 2009 and 2010. A score of 8 equates to major physiological stress, poor condition, and/or long-term reduction in feeding rates and/or feeding success. The highest suspended sediment impacts were to the salmonid egg life stage.

The sediment budget estimate of 620 t/mi^2/yr averaged over a 20 year period was then compared to the measured suspended sediment loads of 5 to 65 t/mi^2/yr. The sediment budget load estimate is at least an order of magnitude larger than what that is being transported out of the system, but this must be considered within the context of a very short term record without large storm events and without bedload measurements. The unique topography and geology of the system may also be influencing sediment loads and storage (i.e., the estuary-like habitat in the upper portion of the main stem).

Draft MSG Effectiveness Monitoring Committee Charter Discussion

George Gentry provided a brief overview of the draft Effectiveness Monitoring Committee (EMC) Charter developed over the past five months. The EMC concept was discussed by the MSG from 2008-2009, but put on hold until the completion of the VTAC work. Drew Coe's 2009 MSG report documenting existing monitoring work being conducted in California did not provide evidence of a consistently effective feedback loop between monitoring data and decision-making, illustrating the need for an EMC (see: http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_monitoring_reports/draft_monitoring_tracking_report_09nov09.pdf). The draft version of the EMC Charter is posted at: http://www.bof.fire.ca.gov/board_business/binder_materials/2013/june_2013/management_committee/1.0_draft_effectivness_monitoring_committee_charter.pdf.

Initial versions of the EMC Charter focused exclusively on water quality-related monitoring, but more recent drafts have included monitoring for aquatic habitat and wildlife habitats, since funding sources are expected to include AB 1492, which calls for monitoring the effectiveness of regulations promoting ecological benefits. Mr. Gentry described how new Board member Stu Farber has taken a strong interest in the EMC Charter and provided extensive improvements. At the last Board Management Committee meeting held on June 3rd in Redding, the Committee decided to release the current draft for public review. **At the current MSG meeting, it was agreed that we would send out two versions of the Charter to the MSG email list—a track change version showing changes made since the February draft, and a clean version of the latest draft. Comments are to be sent to MSG staff (pete.cafferata@fire.ca.gov) by June 30th so that they can be considered for the July Board meeting.**

Peter Ribar stated that minor wording changes are needed and that membership composition still needs clarification in the document. Cajun James commented that it was inappropriate to state that there has been substantially less monitoring work conducted for terrestrial wildlife compared to that for water quality-related monitoring.

FORPRIEM Update

Clay Brandow provided a short PowerPoint presentation on the Forest Practice Rules Implementation and Effectiveness Monitoring (FORPRIEM) program, focusing on WLPZ total canopy monitoring data collected to date. Canopy measurements are made with a sighting tube and a 50-point systematic grid pattern covering a randomly located 200-ft WLPZ segment for a Class I or II watercourse. Both randomly sampled THPs and NTMP-NTOs have undergone FORPRIEM monitoring. Out of a total of 109 THPs in the sample, 83 have had WLPZs to sample—53 in areas covered by the Anadromous Salmonid Protection (ASP) rules, and 30 in non-ASP areas. Of these 83 plans, 41 had no harvesting in this entry in the WLPZ and 42 had harvesting with this entry. Total canopy for both Class I and II watercourses has averaged 81.8% for all 83 THPs (81.6% for Class I and 81.9% for Class II). THP WLPZ total canopy for no-harvest WLPZs averaged 82.1%, and 81.6% for WLPZs with harvest. THP WLPZ total canopy in the ASP area averaged 87.0%, compared to 72.9% for non-ASP areas (statistically significant difference). Canopy values were further broken down for Class I and Class II watercourses in ASP and non-ASP areas. It appears that total WLPZ canopy is increasing over time, as would be expected with implementation of the T/I and ASP rules: HMP (1999-2001)-73%; MCR (2001-2004)-78%, and FORPRIEM (2008-2013)-82%.

Total canopy data for NTMP-NTOs were collected only from the North Coast Region (all ASP plans). Out of 24 NTMP-NTOs in the random sample, 20 NTOs had WLPZs (12 with no harvesting this entry and 8 with harvesting). The WLPZ total canopy averaged 91.5%. Class I WLPZ NTO total canopy averaged 90.0% and Class II canopy averaged 91.9%. NTO no-harvest WLPZs averaged lower than harvest WLPZs (90.0% vs. 93.7%, respectively), perhaps due to past harvesting occurring under earlier THPs.

In summary, (1) THP WLPZ total canopy is higher on average in ASP areas than non-ASP areas, and (2) WLPZ total canopy is slightly higher on average for NTMP-NTOs than for THPs. **A complete FORPRIEM report covering WLPZ canopy and erosion, roads, and watercourse crossings will be written in 2013 after field QA/QC work is completed this summer.**

VTAC Pilot Project Update

Pete Cafferata provided a short PowerPoint presentation on the VTAC potential pilot projects under consideration. For several reasons, development of VTAC pilot projects have taken a slower course than producing the VTAC guidance document (posted on the VTAC webpage at: http://bofdata.fire.ca.gov/board_committees/vtac/vtac_guidance_document_/vtac_guidancedocument_dec21-2012_final.pdf). **CAL FIRE and DFW staff are acting as co-lead coordinators for the VTAC to: (1) organize pilot project pre-consultation field meetings, (2) attend pre-consultation field meetings and record observations, and (3) document successes and failures of the pilot projects for possible modifications to the guidance document and/or the Forest Practice Rules.**

Currently, three potential pilot projects are under varying stages of development by both private landowners and a State Demonstration Forest: (1) Campbell Timberland Management (CTM)—THP to fall up to 30 trees at 6 sites for large wood enhancement, (2) LaTour Demonstration State Forest—THPs to reduce wildfire risk in two areas along South Cow Creek, treating 10 ac in WLPZ in the lower reach and 14 ac in the upper area in the Class I WLPZ; establish group openings, with single tree selection between group selection units, and (3) Green Diamond Resource Company—large research project in the lower Klamath River basin to create gaps for enhancing light and nutrient input, improving salmonid production (full BACI design).

The CTM site-specific proposal has received the most review to date. The proposal is part of THP 1-13-031 MEN located in the Smith Creek drainage, a tributary to the South Fork Ten Mile River located in western Mendocino County. A field pre-consultation meeting was held on April 4th with 22 people participating. Agency recommendations were incorporated in the THP submitted to CAL FIRE. A focused PHI for this THP unit was held on May 30th and minor modifications have been recommended. The Board of Forestry and Fire Protection toured the upper LaTour site on June 4th and the field pre-consultation meeting will take place on June 20th. A new draft of the Green Diamond experiment study plan will be completed in the near future.

Additionally, training workshops for RPFs, landowners, and agency personnel are planned to begin in the late summer or fall of this year.

New and Unfinished Business/Public Comment

Dennis Hall stated that during Board Forest Practice Committee discussions on the Class II-L rule package (Class II-L Identification Methods), there have been suggestions to incorporate a monitoring requirement if the rule package is approved. Mr. Hall stated that this may be an appropriate topic for the newly forming Effectiveness Monitoring Committee to consider.

Next Monitoring Study Group Meeting Date

The next MSG meeting date is tentatively planned for September 2013, with the location to be determined. When a definite date, venue, and agenda are available, this information will be emailed to the MSG contact list.