Monitoring Study Group Meeting Minutes

March 17, 2010
CAL FIRE Mendocino Unit Headquarters, Howard Forest
Willits, California

The following people attended the MSG meeting: George Gentry (BOF—MSG chair), Dr. Matthew Buffleben (NCRWQCB), Richard Gienger (public/HWC/SSRC), Peter Ribar (CTM), Dr. Michael Wopat (CGS), Bill Stevens (NMFS), Dr. Kate Sullivan (HRC), Dennis Hall (CAL FIRE), Kevin Faucher (CTM), Lynn Webb (CAL FIRE-JDSF), Brad Valentine (DFG), Don Lindsay (CGS), Michael Huyette (CGS), Matt Goldworthy (NMFS), Dan Wilson (NMFS), Elizabeth Keppeler (USFS-PSW), and Pete Cafferata (CAL FIRE). **[Action items are shown in bold print]**.

The meeting began with general monitoring-related announcements:

- PowerPoint presentations from the USFS/University of California Cooperative Extension conference titled "Pre- and Post-Wild Fire Forest Management for Ecological Restoration and Fire Resiliency" held in Sacramento on Feb. 9-11, 2010 will be posted by April 1st at: http://groups.ucanr.org/wildfire2010/.

- Bill Stevens announced that NMFS has released its Central Coast Coho Salmon Recovery Plan (see: http://swr.nmfs.noaa.gov/recovery/Coho_Recovery_Plan_031810.htm). This is a public review draft and there will be three workshops held to describe the plan: March 31, 2010—Fort Bragg, April 8, 2010—Santa Cruz, and April 9, 2010—Santa Rosa. For additional information on these workshops, contact Bill at: William.Stevens@noaa.gov.

- The Western Forestry and Conservation Association will present a workshop titled "Forest Road Drainage: From Fundamentals to Watershed Impacts" on April 22, 2010 in Springfield, OR. For more information, see: http://www.westernforestry.org/road_drainage/Road_drainage_publicity.pdf The PowerPoint presentation for Mr. Jeff Grizzel's (WDNR) talk titled "Peak Flows, Debris and Washout Prevention: Options for Preventing Washouts and Diversions and Moving Large Wood Through the System" is expected to be available from Dr. Michael Wopat or Pete Cafferata in April.

- Richard Gienger and Kevin Faucher reported that the annual Salmonid Restoration Federation Conference, jointly held with the AFS on March 10th-13th in Redding, was a success, with approximately 600 people attending.

- "The California Water Atlas", a detailed description of water and water issues in California (long out of print), is now available online at: http://www.archive.org/details/The_California_Water_Atlas

- California state employees have access to the Journal of the American Water Resources Association (JAWRA) from the online version of the California State Library. PDF versions of full papers are available from 2007 to the present. Go to: http://www.library.ca.gov/services/online-resources.html." If you need assistance, contact Pete Cafferata.

- The USGS has posted a new geologic map of the entire United States (see: http://pubs.usgs.gov/atlas/geologic/. Also at this site there is an interactive web tool for the U.S. that allows the user to display information regarding water resources, climate, the environment, forest resources, geology, etc. See: http://nationalatlas.gov/natlas/Natlasstart.asp.

- New published paper: "Estimating Reservoir Sedimentation Rates at Large Spatial and Temporal Scales: A Case Study of California" by J. Toby Minear and Dr. Matt Kondolf, UC Berkeley, Water Resources Research, 2009. For a pdf version, contact Pete Cafferata.

- Recent book chapter: "Rehabilitation Strategies after Fire: The California, USA Experience" by Pete Wohlgemuth, Dr. Jan Beyers, and Dr. Ken Hubbert. In: Fire Effects on Soils and Restoration Strategies, 2009. The PDF is available online at: http://www.fs.fed.us/psw/publications/beyers/psw_2009_beyers%28wohlgemuth%29002.pdf

- "Cumulative Watershed Effects of Fuel Management in the Western United States" has now been published as RMRS-GTR-231, 2010. Available at: http://www.fs.fed.us/rm/pubs/rmrs_gtr231.pdf

- Michael Huyette announced that the USFWS very recently designated 1.6 million acres as critical habitat for the threatened California red-legged frog. For additional information, see: http://www.fws.gov/sacramento/ea/news_releases/2010_News_Releases/Critcal_Habitat_California_Red-Legged_Frog_2010.html

Assessment of Soil Creep Sediment Generation for TMDL Development

Dr. Matthew Buffleben, North Coast Regional Water Quality Control Board, provided a PowerPoint presentation on his recently completed Ph.D. dissertation titled "Assessment of Soil Creep Sediment Generation for Total Maximum Daily Load Development in a Northern Coastal California Watershed." Both Matthew's dissertation and PowerPoint are posted on the Monitoring Study Group's Archived Documents webpage at: http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_archived_documents/.

The presentation began with background information on: (1) sediment impairment in coastal California watersheds, including photos illustrating historic logging practices, (2) TMDLs in California, and (3) sediment budgets. Currently, 61% of the North Coast Region's area drains to sediment impaired waterbodies. Sediment budgets are used in TMDL development to determine and quantify sediment sources. Approaches include aerial photo analysis with limited ground verification, computer modeling, field surveys, and information obtained from nearby watersheds. A "margin of safety" is required for TMDLs; typically this is implicit, making conservative assumptions in the development of the sediment loadings. To date, 20 TMDLs have been completed for the North Coast Region. On average, current loading is estimated to be 228% of background, with a goal of obtaining an average of 134% of background (medium = 125%). Matthew stated that turbidity monitoring in north coastal watersheds suggest that managed watershed are currently 717% of background levels, citing the Klein et al. 2008 report he helped author. This raises the question whether sediment budget estimates have been considerably in error.

Dr. Buffleben chose to investigate soil creep, a sediment budget category that may be over-estimated due to limited information. Soil creep for this study was mainly considered colluvium material movement caused by gravity. Annual erosion volume (V) associated with soil creep can be calculated using an equation from the Washington Watershed Analysis Manual: $V = 2*C*D*L$, where 2 = the number of streambanks, C = creep rate, D = soil depth, and L = channel length. Matthew stated that creep is hard to measure since studies must be conducted for long periods of time. Previous sediment budgets have generally used creep estimates of 1-2 mm/yr. Surface creep rates were reported as ranging from 0 to 5 mm/a, with volumetric creep rates ranging from 0.1 to 3.5 cm^3/cm/a. Matthew explained that creep rates are not linear with soil depth, with fastest movement occurring at the soil surface, and that the maximum depth of soil creep is often considered to be 0.5 m.

A critical factor in estimating annual erosion volume associated with soil creep is the stream density, since this allows the total channel length to be determined. Aerial photographs underestimate stream density, since tree canopy obscures small headwater channels. Therefore, field surveys are recommended, with a comparison made of stream densities in managed and unmanaged watersheds. Matthew chose to examine stream density in the Elk River watershed located in Humboldt County near Eureka. This basin has been listed

as sediment impaired since 1998. Three sub-watersheds with differing management histories were examined: Little South Fork Elk River (LSFER), Corrigan Creek (CC), and South Branch North Fork Elk River (SBNFER). These are the basins used by Peter Manka for his Humboldt State University MS thesis—see the following website: http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_supported_reports/2008_supported_reports/robisonelkriverreport_032508_final.pdf. Stream density was determined by locating channel head locations in these three sub-watersheds using random sampling, GPS devices, and range finders where GPS readings were not possible. Channel heads were defined as the farthest upslope location of a channel with well defined banks. Matthew reported large differences between managed and unmanaged watersheds in drainage area required for channel heads. The mean drainage area required for SBNFER, CC, LSFER (road), and LSFER (no management) were: 0.69, 0.98, 1.40, and 3.10 ha, respectively. Matthew concluded from this work that the impacts of logging increased the drainage density by three times over natural conditions.

Soil creep sediment delivery was the next topic addressed. Matthew stated that, in general, there is large variation in creep rates due to soil depth and stream density. Mean soil creep rates calculated for the SBNFER, CC, and LSFER sub-watersheds were: 0.5, 0.4, and 0.4 t/ km^2/a, respectively. In comparison, natural landslide rates were 10.6, 17.2, and 23.7 t/ km^2/a, respectively. Compared to other sediment sources in these managed watersheds, soil creep was found to comprise less than 1% of the sediment budget (using the PALCO/HRC Elk River Watershed Analysis data and data being collected for the Elk River TMDL). Matthew then described methods that were used to provide a check on the soil creep estimates. Bank erosion was determined in the three sub-watersheds by measuring both voids and large wood volumes using random sampling by stream order. Matthew reported that the managed sub-watersheds had higher bank erosion rates, and that the wood methodology appears to result in unreasonably high bank erosion rates. Comparing the results to suspended sediment loads, measuring voids appears to be the superior method for estimating bank erosion.

In conclusion, Matthew stated that previous sediment budgets overestimated soil creep related sediment delivery due to inadequate information on stream length, creep rates, and depth of movement. Logging was found to increase drainage density and bank erosion. He stressed that additional turbidity monitoring station data is required to verify sediment budget estimates, and that while bank erosion and channel incision are important sediment sources, little information currently exists. During discussion following the formal presentation, Kate Sullivan questioned the mechanisms that are increasing channel lengths in managed watersheds. Kate asked whether this could be due to past ground-based logging vehicle traffic that caused the collapse of soil pipes, rather than increased peak flows due to reduced interception loss and evapotranspiration associated with timber harvest. There was considerable discussion regarding the silviculture/rate-of-harvest causal mechanism vs. the legacy yarding/skid trail initiation mechanism. Kate stated that it is not clear what mechanism caused the increase in channel length in the Elk River basin. Michael Huyette added that since there has not been any recent clearcutting in the Santa Cruz Mountains, it would be beneficial to examine this question in that region. Matthew concluded that we do not have all the answers at this time and that more research is needed, but that to prevent gullies from forming in headwater swales, prudent management measures include: (1) reducing the amount and rate of clearcutting, or changing silviculture to selection harvesting; (2) using equipment limitation zones for headwater streams and swales; and (3) using aerial yarding systems rather than ground-based yarding.

Geosynthetics in Forestry Application

Mr. Don Lindsay, California Geological Survey, provided a PowerPoint presentation on geosynthetics in forestry application. The presentation is posted on the MSG' s site at: http://www.bof.fire.ca.gov/board_committees/monitoring_study_group/msg_archived_documents/ and includes numerous photographs and diagrams to illustrate the use of these materials. Don's goal is to increase the knowledge base of practitioners and the Review Team agencies regarding geosynthetics. He began his talk by providing background information on these materials, which he defined as "planar, polymeric material used with soil, rock, earth, or other geotechnical-related material as an integral part of an engineered project, structure, or system." The main types include: geotextiles, geogrids, geocells, and geocomposites. The main functions are for separation, reinforcement, filtration, in-plain drainage, protection, and to act as a fluid barrier. The primary forest applications include: (1) erosion control systems, (2) soft subgrade reinforcement and separation, (3) subsurface drainage, and (4) reinforced slopes. Detailed information was provided for each of these applications.

1. Erosion control systems. There are numerous examples of how geosynthetics can be used in erosion control systems. They can be used instead of graded granular materials in hard armor structures, such as beneath rock slope protection along stream channels and bridge abutments. Geocells can be used as scour protection in low-water stream crossings, as well as increasing the bearing capacity (see Appendix A, Case Study #7 in the USFS publication "Low-Water Crossings: Geomorphic, Biological, and Engineering Design Considerations" at: http://www.fs.fed.us/eng/pubs/pdf/LowWaterCrossings/Lo_pdf/1_Intro.pdf). Also, erosion control blankets and mats are used to temporarily control and minimize erosion and sediment transport until vegetation is established on disturbed cut and fill slopes. The main advantages include reducing the use of expensive granular aggregate, expediting construction, and providing protection while promoting vegetation growth. Disadvantages include high expense, the additional time required to place material and avoid damage, oversight needed to prevent improper installation, and oversight required to prevent the use of the wrong geosynthetic for given site conditions, leading to failure.

2. Soft Subgrade Reinforcement and Separation. Filter fabric is commonly laid on roads to improve the stability of the running surface. The cost to rock roads can be substantially lowered when the road has a soft, yielding subgrade, and/or the haul distance is excessive, since the amount of rock required is considerably reduced. Geotextiles provide a relatively inexpensive separation method that has been used for many years in forestry (~$3/linear foot road). The main advantages include: (1) reducing stresses in the subgrade, (2) preventing contamination of surface rock, (3) reducing excavation of unsuitable subgrade materials, (4) reducing the thickness of aggregate applied, (5) aiding in compaction of surface rock, and (6) reducing maintenance and extending the life of the road surface. Disadvantages are the cost of the material and the need for proper oversight to prevent misapplication or improper installation.

3. Subsurface drainage. Geosynthetics can be used as a replacement for, or in conjunction with, conventional graded granular filters. Examples of this application include wrapped aggregate drains (e.g., "burrito drains") and geocomposite drains. Burrito drains use non-woven fabric, since this material has high porosity and permeability, producing high flow for a longer time period. It is critical to choose the appropriate fabric for the soil conditions, since too large an opening in the material can cause soil piping and too small an opening

can cause clogging, preventing water flow. The advantages of this application include preventing fines from contaminating the drain rock while allowing water to flow, allowing the use of less costly drainage aggregate, and more rapid construction. Disadvantages include possible poor installation without proper oversight, and possible improper choice of material for the site conditions without training and oversight.

4. Reinforced slopes. Geogrids and geotextiles (woven) are types of geosynthetics used to reinforce slopes, providing the ability to construct slopes steeper than those constructed using more traditional means. Reinforced slopes include a combination of functions: reinforcement, drainage, filtration, and separation. Perforated back-drains are commonly used to increase the integrity for the entire slope. They intercept groundwater and route it to a safe location below the road prism. Examples of wrapped face reinforced slopes with geocomposite drains on the Mendocino National Forest were provided. The main advantages of reinforced slopes are that they: (1) allow for the use of on-site, native material, (2) can eliminate the need for buttress elements, (3) reduce the area and volume of fills, (4) aid in compaction during construction, and (5) can stabilize landslides by unloading the head, reinforcing the toe, and providing internal drainage. Disadvantages include expense, including consultant fees for design; possible use of an improper product for the given function and site conditions, leading to failure; and the requirement for more complex construction techniques and stringent construction specifications. Don covered the accepted design procedure and a simplified design approach for constructing these types of structures.

In summary, Don stated that he hopes that this presentation will elevate resource professional awareness regarding these materials, as well as helping people find the existing information on this topic. Don asked participants if they perceived a need for a simplified design guidelines document related to the use of geosynthetic materials which could be produced in the near future. Peter Ribar stated that his company usually seeks professional help for complex designs, especially involving mainline roads. He added, however, that it would be beneficial to have a guidebook that could help RPFs determine where it would be appropriate for a non-Professional Engineer to develop a simplified design (i.e., find the “critical sweet spot” for RPF design). This type of guidebook could be used in conjunction with training workshops through CLFA and field training sessions.

Update on the Formation of a New BOF MSG Effectiveness Monitoring Committee

George Gentry stated that due to limited time related to a variety of Board of Forestry and Fire Protection (BOF) topics, little progress has been made since the last MSG meeting regarding updating the draft framework for the new Effectiveness Monitoring Committee and meeting with caucus groups explaining the goals and objectives of the proposed committee. **He anticipates that he will be able to work on this prior to the next MSG meeting.** George announced that Dr. Richard Standiford, UC Cooperative Extension Forest Management Specialist, has agreed to chair the newly forming BOF Research and Science Committee (RSC), which is expected to meet in the next two months. Dr. Standiford and George are currently working to populate the full committee. The RSC will have a strong influence on the formation of the Effectiveness Monitoring Committee.

Development of Riparian Management Pilot Projects Required by the ASP Rules

George Gentry informed the group that several informal meetings have been held following the Board’s Forest Policy Committee meetings regarding the development of two pilot

projects required by the Anadromous Salmonid Protection (ASP) rules to demonstrate the feasibility of using site specific provisions included in 14 CCR 916.9 (v). Pete Cafferata rapidly summarized key points from the last meeting, which include the desire to have: (1) private ownerships for the pilots if possible, (2) one coast project and one inland project, (3) a coast project likely involving large wood placement in the channel and an inland project involving management in the riparian zone to reduce catastrophic fire threat, (4) the pilots assist with the evaluation of cumulative impacts at the planning watershed scale, (5) monitoring plans for the pilot projects, (6) an MSG Subcommittee "core team" to develop the pilot projects—similar to the MSG IMMP Subcommittee which began in 2005, (7) the pilot projects developed, but not necessarily fully implemented in 18 months, and (8) a pilot project outline/framework with benchmarks available for this MSG meeting. Mr. Gentry provided the a one page framework document and briefly summarized its main points that span the next 16 months, including the development of a guideline document for implementation of the site specific/spatially explicit riparian management (SERM) approach, so that this method may be broadly applied.

Richard Gienger described Assembly Bill No. 2575, recently introduced by Assemblyman Chesbro, that formalizes the requirement for pilot project development and implementation, as well as improved cumulative impact assessment procedures and the need to place available information on a planning watershed basis on the Department's website (see: http://www.leginfo.ca.gov/pub/09-10/bill/asm/ab_2551-2600/ab_2575_bill_20100219_introduced.pdf. Mr. Gentry commented that the Chesbro bill is more ambitious than what has been discussed to date in the informal pilot project meetings.

There was considerable discussion on the merits of needing both an Effectiveness Monitoring Committee and a MSG Pilot Projects Subcommittee, as well as how to proceed with the pilot projects. Richard Gienger stated that there would be considerable overlap between the two committees. There was discussion regarding using BOF experimental forest status, State Forests, and existing PTEIRs for the pilot projects. Peter Ribar suggested picking less controversial options such as those described above for the coast and inland projects, and then building on likely success stories. In Mr. Ribar's view, if the preliminary work was completed for these projects (including permitting), a landowner would be much more likely to step forward and volunteer to participate in the pilot projects. Kate Sullivan agreed that it would be good to keep the projects small scale, then at a later time, address the larger scale cumulative impact assessment issue. Dennis Hall voiced his opinion that the committee structure/process could be outlined in four parts: (1) process development, including permitting, etc., (2) project analysis—assessing the impacts from small scale projects, (3) project design—including peer review, and (4) project monitoring design.

George Gentry concluded the discussion by stating that he would speak to Dr. Standiford prior to the next MSG meeting and solicit his opinions on how all of these committee concepts can be folded into a unified and coherent structure that can obtain the desired outcomes.

Next Monitoring Study Group Meeting Date

No date was selected for the next MSG meeting, but we anticipate holding the meeting in May or June. MSG staff will email possible dates out in April to determine a mutually agreeable date and let MSG participants know the date via a second email message.