

Monitoring Study Group Meeting Minutes

September 5-6, 2007

USFS-Pacific Southwest Research Station, Fresno

The following people attended the MSG meeting: Dennis Hall (CAL FIRE), Lisa Gymer (DFG), Marty Hartzell (CVRWQCB), Tom Whitaker (USFS-PSW), John Munn (CAL FIRE), Andrea Stanley (Lahontan RWQCB), Clay Brandow (CAL FIRE), Stormer Feiler (NCRWQCB), Jessica Auman (USFS-PSW), Mike Laing (Federation of Fly Fishers), Dr. Carolyn Hunsaker (USFS-PSW), Kerry Elliott (CVRWQCB), Allison Shaidnagle (CTM), Jason Smith (USFS-PSW), Kurt Weidich (USFS-PSW), Bill Solinsky (CAL FIRE), Anthony Toto (CVRWQCB), Dan Wermiel (CALFED), Bethany Mills (CVRWQCB), and Pete Cafferata (CAL FIRE). **[Note: action items are shown in bold print].**

We began the meeting with general monitoring-related announcements:

- The California Forest Soils Council (CFSC) 2007 Summer Field tour meeting was held on September 7th-8th at UC's Blodgett Forest near Georgetown and on the Eldorado and Tahoe National Forests. Jeff TenPas, CFSC Chair, was the contact for the meeting and can be reached at (707) 562-8955.
- A workshop titled "Designing, Improving and Maintaining Rural Low Standard Roads in Calaveras County" will be held on October 11, 2007 in San Andreas. Dr. Richard Harris is organizing the workshop and it will include a half day of indoor presentations and a half day in the field in the Upper San Antonio Creek watershed on SPI timberlands. For more information, see the UC Center for Forestry webpage at: http://forestry.berkeley.edu/events/Flyer_Roads_Calaveras_Oct_07.pdf.
- A workshop titled "Culvert and Road Drainage Practices to Protect and Benefit Steelhead and Water Quality in the Central Coast Region" (aka Roads and Culverts Field School) will be held on October 23-25th in Santa Barbara County. Course instructors are Dr. Bill Weaver and Danny Hagans of Pacific Watershed Associates (PWA). The workshop is sponsored by the Salmonid Restoration Federation and the California Department of Fish and Game Coastal Salmon Recovery Program. See the PWA webpage for more information: <http://www.pacificwatershed.com/pacific-watershed/news/news-item-3.html>.
- The National Council for Air and Stream Improvement (NCASI) West Coast Regional Meeting will be held on September 26-27th in Portland. On September 27th, Dr. George Ice is leading a session titled "Forest Management-- Applying Scientific Findings to Practical Forest Management Practices, Guidelines, and Rules." For more information, see the NCASI website: <http://www.ncasi.org/Programs/Events/Detail.aspx?id=102>.
- The proceedings of the Redwood Region Forest Science Symposium are now available on line as USFS-PSW General Technical Report No. 194 at: http://www.fs.fed.us/psw/publications/documents/psw_gtr194/. There are several watershed papers available, including an MSG-supported paper titled "The Significance of Suspended Organic Sediments to Turbidity, Sediment Flux, and Fish Feeding Behavior" by Dr. Mary Ann Madej, Dr. Peggy Wilzbach, Dr. Ken Cummins, Colleen Ellis, and Samantha Hadden (also posted on the MSG Supported Reports webpage—see http://www.bof.fire.ca.gov/board/msg_supportedreports.asp).

Kings River Experimental Watershed Project Presentations

Dr. Carolyn Hunsaker, USFS-PSW Research Ecologist (Figure 1), provided the MSG with a PowerPoint presentation introducing the Kings River Experimental Watershed Project (KREW). The study area is located in the headwaters of the Kings River, mainly on the Sierra National Forest. Primary goals of the KREW project include: (1) understanding processes and quantifying system variability in headwater stream ecosystems, since long-term experimental watershed studies have not been conducted in central or southern Sierra Nevada, (2) evaluating the effects of forest management (i.e., thinning, prescribed fire), (3) evaluating ecosystem stressors (i.e., air pollution, climate change), and (4) applying data to existing models (e.g., nutrient, soil erosion). This project is described as integrated watershed research, since it includes measurements in the fields of hydrology, meteorology, air quality, sedimentation and turbidity, soils, geomorphology (longitudinal profiles, cross sections, pebble counts, large wood loading, headcut monitoring, etc.), water chemistry, and biology (stream macroinvertebrates, algae, riparian and upland vegetation, etc.). Handouts on the KREW project were provided to MSG meeting participants and detailed information is available on the USFS-PSW webpage at: <http://www.fs.fed.us/psw/programs/snrc/water/kingsriver/>.

Dr. Hunsaker explained that there are two main KREW study areas: the Providence watersheds, located at an elevation of 5,000 to 6,000 feet (Southern California Edison timberlands are included and they are a project collaborator), and the Bull/Teakettle watersheds, located at an elevation of 7,000 to 8,000 feet (Figure 2). Each of these two areas has three watersheds which will be treated and a control basin (watershed sizes range from 120 to 560 ac).¹ Both sites have perennial first and second order streams and are characterized as mixed conifer, high elevation, snow or rain-snow dominated, granitic watersheds (Figure 3). Total annual precipitation ranges from approximately 30 to 80 inches, with a mean of roughly 45 inches. The reference or control basin for the Bull sites is the unlogged headwater catchment in the Teakettle Creek drainage, where data has been collected periodically since 1938 (Figure 4).² The study design calls for 4-5 years of pre-treatment data (beginning in 2002 for the Providence sites and 2003 for the Bull sites), 2 years of treatments (each site has a watershed that is thinned only, burned only, and thinned and burned), and 5-7 years of post-treatment measurements.³ Two “integrating” stations were established in 2005 and 2006 below treated watersheds at the Providence and Bull sites to document water quality impacts associated with larger drainage areas. There are also four meteorological stations with telemetry for data transmission to Fresno (Figure 5).

Carolyn stated that it was recently announced that the KREW project was selected to be part of the Consortium of Universities for the Advancement of Hydrological Science (CUAHSI) (i.e., universities allied for water research). CUAHSI receives support from

¹ Total cost to install a station is approximately \$30,000 (labor and equipment).

² For more information on vegetation and historical measurements at the Teakettle Creek watershed, see USFS-PSW General Technical Report No. 186 by North et al. (2002) (<http://www.fs.fed.us/psw/publications/gtrs.shtml>).

³ Watershed treatments are currently delayed due to a pending lawsuit dealing with US Forest Service management practices and potential impacts to the fisher. The natural fire cycle at the higher elevation Bull sites was 20-25 years and approximately 12-15 years at the lower elevation Providence sites.

the National Science Foundation to develop infrastructure for the advancement of hydrologic science and education in the United States. Dr. Roger Bales, UC-Merced, is heading up this new aspect of the project, which will include additional equipment to measure system inputs and fluxes.

KREW research is currently costing approximately \$600,000/year (including salaries), with more than half coming from sources outside the USFS-PSW. CALFED has been a significant funding contributor, but this funding source will be fully expended by the end of next year. **Dr. Hunsaker stated that she will be writing grant proposals and that she is seeking additional funding sources from state and federal agencies, private companies, etc. to keep this project funded through 2015.** Following Carolyn's presentation, her staff provided detailed information regarding several aspects of the study.

Tom Whitaker, USFS-PSW Hydrologist, gave a PowerPoint on measuring stream discharge at KREW. Flow data has been collected since 2002 and 2003 at the Providence and Bull sites, respectively. Due to large variations in discharge during a water year (e.g., 0.01 cfs to 35 cfs), a double Montana flume system (with a larger flume located upstream of a smaller flume) set on bedrock is used to measure stream discharge (Figures 6 and 7). Water height (stage) is continuously measured using an ISCO bubbler, with data recorded every 15 minutes. AquaRods are used for backup discharge measurement. On average, more than 60% of the annual discharge occurs during a three month period in the spring due to snow melt. During the low flow summer period, large diurnal variations in daily discharge are produced by transpiration (Figure 8). Flow data are available for water years 2004-2006 at the following website: <http://www.fsl.orst.edu/climhy/>. Historic annual peakflow data (1958-1980) for the Teakettle Creek watersheds are available on the USGS website at the following address: <http://nwis.waterdata.usgs.gov/usa/nwis/peak>.

Jessica Auman, USFS-PSW Chemist, made a presentation on measuring chemical parameters for the KREW project. Water chemistry is measured in precipitation, in the shallow soil profile, and in stream water. Throughfall lysimeters are used for snowmelt collection, Prenart vacuum lysimeters for shallow soil water sampling, and grab samples for streams. Parameters measured include: cations, anions, nutrients (nitrate, ammonium, phosphate), pH, and conductivity. Stream, snowmelt chemistry, and shallow soil water samples are collected every two weeks in the winter season. Data measurements to date document baseline conditions for these parameters. Stream pH values range from approximately 6.5 to 8; conductivity is minimal (mostly less than 30 microSiemens (μS), and alkalinity is relatively low (<10 mg CaCO_3/l). Year-to-year and within-year variation at individual sites is relatively small, so treatment effects should be evident if they occur. A detailed report titled "Kings River Experimental Watershed Water Chemistry Summary Report, Years 2002-2005" is available.

A presentation on soil erosion, sediment, and WEPP modeling was provided by Kurt Weidich, USFS-PSW Hydrologic Technician. Coarse sediment is measured in settling basins that are excavated after each winter period (Figure 9). Sediment accumulation generally correlates well with yearly precipitation but sediment yields vary considerably by basin (e.g., Providence 304 produces an average of eight times more sediment than

P301). Organic content in the basins varies from approximately 5 to 50%, depending on volume of material collected (lower percent organics for heavy sediment years).

Sediment fences have been installed and measured for three winters along roads and in headwater swales by CSU graduate student Abby Korte and Dr. Lee MacDonald to measure surface erosion (Figure 10). They have documented high variability in road sediment production rates between years, between different types of road surfaces, and between individual road plots. Native and mixed surface roads produced approximately three times more sediment than gravel surfaced roads. Headcut gully measurements have been made in meadows by UC Merced graduate student Sarah Martin and V-star measurements have been taken in stream pools. WEPP erosion models were compared to measured erosion data. Roads and meadow headcuts appear to be the dominant sediment sources. Erosion data will be used to produce a detailed sediment budget, updating earlier work done by Reid and Dunne (1996) for the Teakettle Creek watershed.

Tom Whitaker gave a second presentation on measuring turbidity at the KREW stations. Suspended sediment concentrations and turbidity are measured with ISCO pumped samples and DTS-12 recording turbidimeters (installed in the summer of 2005). Turbidity Threshold Sampling (TTS) is not used. Relationships between turbidity and suspended sediment concentrations are very good (e.g., $r^2 = 0.98$), but are unique for individual storm events. Elevated turbidity is only observed during rain storm events (not from spring snowmelt). Turbidity spikes up to approximately 100 NTUs have been measured (note these values are very low compared to Coast Range readings). The majority of the sediment yield is coarse material that is trapped in the sediment settling basins.

Logistics for the field trip to the KREW sites were discussed after the formal PowerPoint presentations. **Dr. Hunsaker stated that if there was sufficient interest, a second field trip in mid to late October could be scheduled for MSG participants and others who were unable to attend this meeting. If you have interest in a second field trip, contact Carolyn at: chunsaker@fs.fed.us.**

Brief Updates on Ongoing MSG Projects

Due to time limitations following the KREW presentations, updates provided for ongoing MSG topics were very brief.

MSG Monitoring and Tracking Subcommittee

George Gentry, BOF Executive Officer and MSG Chair, informed Pete Cafferata that this agenda item was deferred until the next MSG meeting in November.

MSG Interagency Mitigation Monitoring Program (IMMP) Subcommittee

Pete Cafferata reported that Shane Cunningham, CAL FIRE Redding, sent out revised IMMP protocols on August 29th for review by the IMMP Coast and Inland Team members. Some protocol questions were significantly altered and some were eliminated. Additional questions have been added to address water drafting

approaches at watercourse crossings. Shane stated that these revised protocols reflect two days of Inland Team IMMP meetings and many hours of work and consultation. **The IMMP project still requires a database and Shane has requested assistance from MSG IMMP Subcommittee members who had previously volunteered to assist with database development.** No dates have been set for final field testing of the revised protocols this fall.

FORPRIEM Program (formerly MCR Monitoring Program)

Clay Brandow briefly summarized new aspects of the FORPRIEM (Forest Practice Implementation and Effectiveness Monitoring) program. He stated that this phase of the study will use a random 10% sample of THPs, based on year of submission, that have been completed and are undergoing Work Completion Reports. Clay stated that the FORPRIEM protocols are available on the Monitoring Study Group website at: http://www.bof.fire.ca.gov/PDFS/FORPRIEM_ProceduresandMethodsCompletePackage_BandW_07122007.pdf. Additionally, he informed the group that the final report from the first phase of this monitoring work is available on the MSG site at: http://www.bof.fire.ca.gov/pdfs/MCRFinal_Report_2006_07_7B.pdf. The first FORPRIEM training session was held on August 28th on a THP located near Georgetown. Clay Brandow and Pete Cafferata trained 9 CAL FIRE Forest Practice Inspectors from the CAL FIRE Region 4 area. The goal is to train all CAL FIRE Forest Practice Inspectors before December. Field staff from the other Review Team agencies are invited to participate in FORPRIEM training. Interested participants should contact Clay at: clay.brandow@fire.ca.gov. **The next scheduled FORPRIEM training sessions are tentatively set for the following dates: Mendocino—Sept 18, Nevada-Yuba-Placer—Sept 24, Siskiyou—Oct 17, and Humboldt—Nov 6-7 (other CAL FIRE units are yet to be scheduled).** Slight modifications to the FORPRIEM methods and procedures document are being made based on input from the first training session. Similar to the IMMP, the FORPRIEM program still requires a database to store monitoring data.

BOF Technical Advisory Committee (TAC)

Pete Cafferata reported that the BOF's TAC was formed to oversee a scientific literature review of studies pertinent to riparian buffers and functions. The TAC has developed a list of key questions that a Board-appointed contractor will focus on in the literature for each riparian function. On August 21, 2007, the two bids received for the TAC contract were opened, with the state rejecting both bids. The decision was made in consultation with the Request for Proposal (RFP) evaluation panel and with input from the full TAC. The action was based on the need to: (1) clarify previously stated Board goals for ensuring appropriate scientific experts are conducting the literature review tasks, (2) clarify estimated contract value, and (3) eliminate tasks that have been already completed or are non essential. **On September 11th, the TAC will recommend to the Board to consider revisions to the RFP and re-issue the contract.**

Next Monitoring Study Group Meeting

The next MSG meeting date is tentatively planned for November in Willits. When the date, location, and agenda are available, they will be emailed to the MSG list.



Figure 1. Dr. Carolyn Hunsaker, USFS-PSW, explaining how the larger upper flume is used to measure stream discharge during large winter storm events at the Bull 203 station.

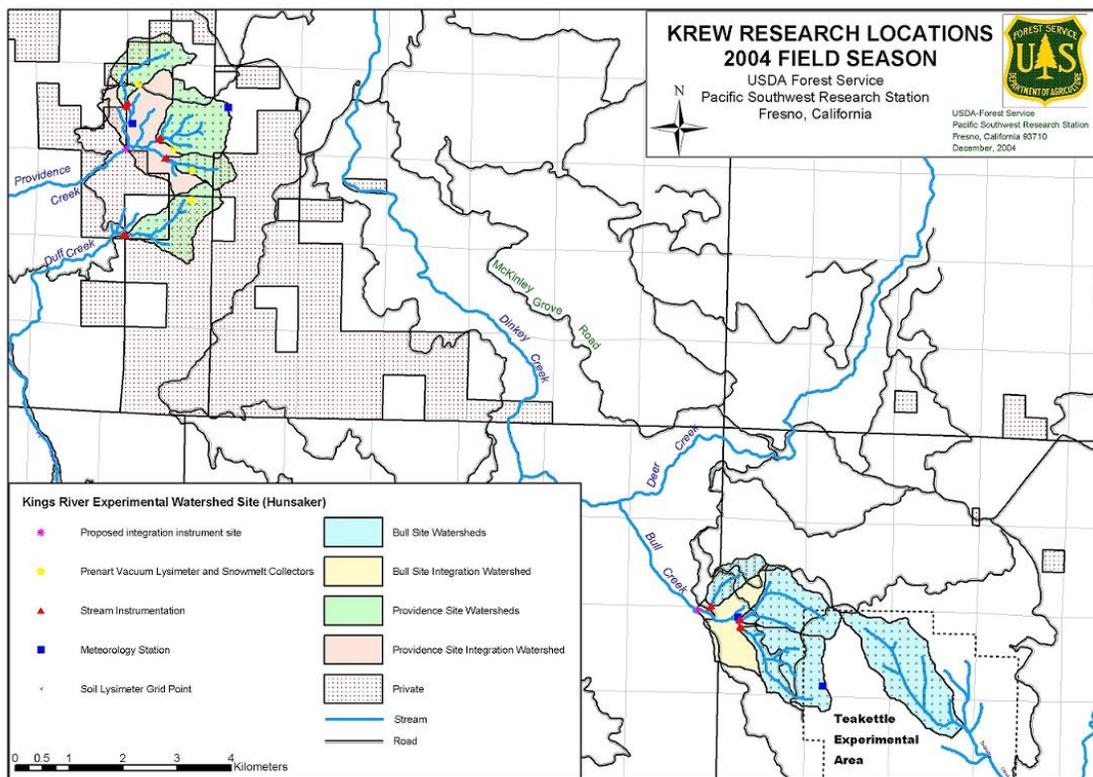


Figure 2. Map of the KREW watersheds. The Bull and Teakettle watersheds are located in the southeastern corner of the map; the Providence watersheds are in the northwestern corner.



Figure 3. Un-entered, high elevation mixed conifer (true fir dominated) old-growth forest above the Teakettle Creek control station (T003).



Figure 4. The weir (90° V notch) and weir pond built in the late 1930's in the Teakettle Creek Experimental Forest. This is station T003, the control watershed for the Bull Creek sites for the KREW Project.

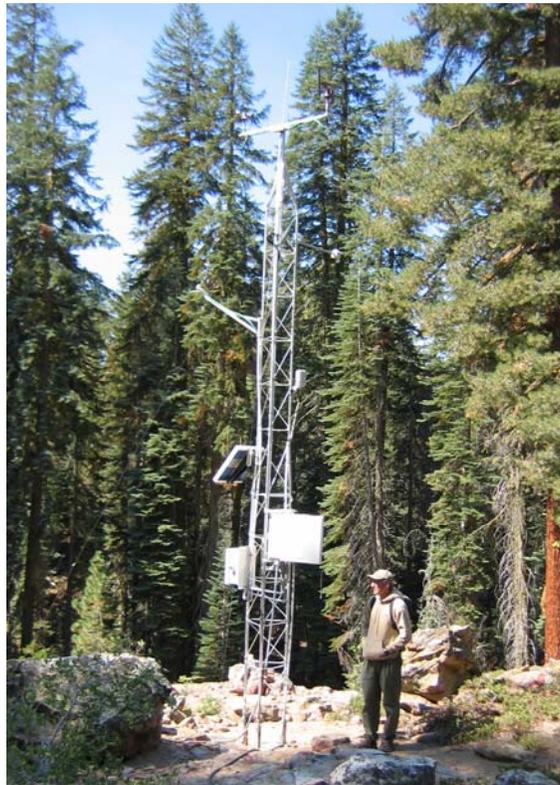


Figure 5. Tom Whitaker, USFS-PSW, explaining how one of four meteorological stations operates. This station is located near the Bull 203 gaging site.



Figure 6. Observation of the smaller Montana flume at the Bull 203 station that is used for low flow measurements. Stream discharge was approximately 0.7 l/s (0.02 cfs) on September 6, 2007.



Figure 7. Large upper Montana flume at the Bull 203 station for measuring winter storm discharge.

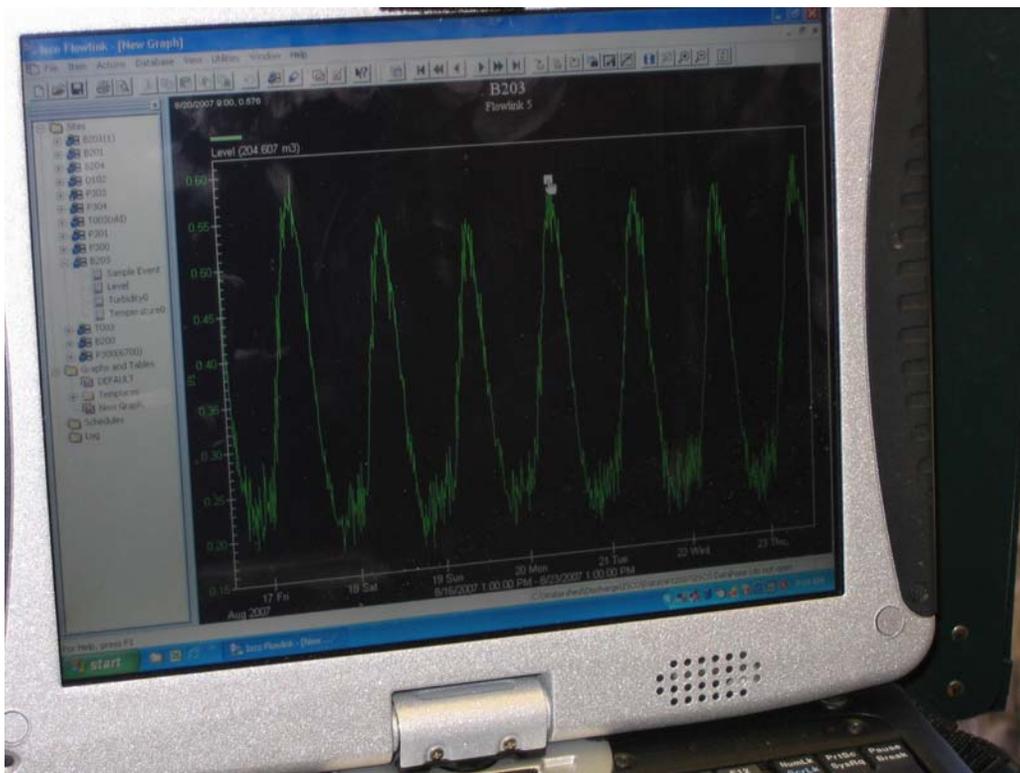


Figure 8. Laptop computer screen displaying stream discharge data collected at the Bull 203 station from August 16 to Aug 23, 2007. Diurnal cycles due to transpiration by vegetation are evident, with daily discharge varying from approximately 0.6 to 0.2 l/s. The maximum flow rate occurs at about 9:00 a.m.



Figure 9. Sediment settling basin for the Bull 203 station. Coarse bedload sediment is excavated and weighed after each winter.



Figure 10. Example of one of the sediment fences installed by Ms. Abby Korte, Colorado State University graduate student, to measure road surface erosion for the KREW project. Note that two fences are installed so that if the initial structure is overtopped, the second fence can still capture sediment.