Stan Van Velsor
7/21/10

++++++++++++++DRAFT version 06/17/2010++++++++++++++++

VERIFYING MANAGEMENT PRACTICE EFFECTIVENESS--MONITORING

A monitoring program is a critical component of the WQMP. The monitoring program assesses the success of the USFS in protecting and improving water quality, identifies program elements that can be made more effective through adaptive management (Chapter X), and evaluates trends in water-quality conditions resulting from natural and anthropogenic factors.

Objectives

The objectives of the monitoring program are:

1. Early detection of actual or potential water-quality problems associated with current management activities.
2. Documentation and correction of known deficiencies in BMP implementation.
3. Assessment of long-term (3 to 5 year) effectiveness of water-quality protection measures.
4. Evaluation of linkages between resource management activities, including BMP implementation and watershed restoration programs, and cumulative watershed effects.
5. Calibration of thresholds of concern for cumulative watershed effects analyses.
6. Evaluation of water-quality trends affecting beneficial uses in receiving waters downstream of forest management activities, including waters listed as impaired under section 303(d).
7. Assessments of water quality in relatively pristine reference streams for comparison with listed and potentially listed impaired waters.

Program Management

1. The monitoring program will be a regional program coordinated by the Regional Office and conducted by the national forest staffs.
2. Annual targets for all monitoring activities will be set by the Regional Office and communicated to the State and Regional Boards. Targets will be changed as necessary to reflect changes in priorities, funding, and staffing.
3. Funding to support monitoring will be allocated based on assigned targets.
4. Watershed staff will be used to conduct monitoring to the extent possible, but monitoring may also be conducted by other trained USFS personnel.
5. The USFS Regional Office will prepare a Quality Assurance Project Plan (QAPP) for the monitoring program within one year of adoption of this Water Quality Management Plan.
6. Relevant data provided by other agencies and organizations that meets QAPP criteria will be used as part of the monitoring program.
7. Annual summary reports will be prepared and distributed to Forests and the public. Reports will summarize QAPP and WMP and detail trends and water quality conditions

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Comment [DB1]: Well stated, and consider including:
8. Recommend chances to improve water quality measures where deficiencies have been identified.
9. Coordinate and offer technical assistance to adjacent land owners (in holdings) and road right of ways jurisdictions where resource and road management activities may impact FS lands.

Numerous private in holdings and non-FS system roads exist within Forest Service boundaries, often shown as checker board. Management of these lands and right of ways have direct water quality (and other resources) linkages to Forest Service lands. Private or other public agencies activities have significant nexus to water quality issues and concerns. For example, in many cases private, county and State roads are failing to adequately maintain or improve road designs to reduce and minimize water quality impacts that effect FS lands and water ways.

Impacts to FS lands and waters ways can come from outside timber operations, retreat and other developments, water agencies, railroads, highways, Electric companies, mining , salting and sanding of winter roadways, to name a few.

Further discussion of monitoring protocols of these influences need to be addressed because water quality impacts derived from these sources may mask otherwise positive FS activities. ... [1]

Comment [DB2]: I presume you are talking about water quality boards?

Comment [SV3]: Monitoring is critical to BMP effectiveness. Without adequate funding to cover the costs of monitoring, problems will not be identified in a timely manner and water quality will suffer. Funding for long-term monitoring should be allocated as a component of project implementat ... [2]

Comment [DB4]: Who defines targets and at what HUC level? One very impaired watershed can be masked by the larger basin.

Individual BMP "checklist" forms need revision.

Comment [SV5]: Adequate training is essential to the success of a monitoring program!

Comment [S6]:

for each monitoring station or subwatershed of interest. Data will be presented as a "Report Card", citing recommendations and actions taken.

Monitoring Protocols

This plan will rely on existing well-documented monitoring methods. Hillslope monitoring for current management activities will use the Best Management Practice Evaluation Program (BMPEP, U.S. Forest Service, Pacific Southwest Region, 2002) protocols. In-channel monitoring will follow Stream Condition Inventory (SCI, U.S. Forest Service, Pacific Southwest Region, 2005) protocols.

Incentive-Based Approach

The monitoring program will follow the incentive-based approach adopted by the North Coast Regional Board waiver approved on June 10, 2010. Under this incentive-based approach, each national forest will establish a network of baseline in-channel and hillslope monitoring sites at the watershed (5th field hydrologic unit) scale (described below). This network fulfills most monitoring requirements and eliminates the need for project-level monitoring within the monitored watersheds, with the exception of the BMP checklists described below. Projects in watersheds that do not have baseline monitoring sites will be required to conduct project-level monitoring (described below).

Baseline Hillslope and In-Channel Monitoring

A. Hillslope monitoring of current management activities and corrective actions

1. All projects will have BMP implementation monitoring using a "checklist" approach. BMP implementation checklists will document whether, and when, the site-specific BMPs specified in NEPA analyses were implemented. These checklists will be the primary systematic means for early detection of potential water-quality problems, and will be completed early enough to allow corrective actions to be taken, if needed, prior to any significant rainfall or snowmelt throughout the duration of the project. Checklists will need to be completed several times during the life of most projects, including prior to ground-disturbing activities, prior to winter periods, and at the completion of the project. Checklists will be developed by USFS watershed staff based on BMPs identified in NEPA documents. Checklists will be completed by USFS project staff (timber, range, recreation, engineering, etc.) and will be coordinated and reviewed by the Forest Hydrologists.
2. The BMPEP, with random site selection, will continue to be the primary means of assessing the effectiveness of water-quality protection for current projects on NFS lands at the hillslope scale. Random effectiveness monitoring for BMPEP protocols that have consistently scored 95% or higher for 5 consecutive years at the Regional level will be reduced to allow staff resources to be used for non-random BMP evaluations and in-channel monitoring.
3. National forests will conduct road patrols to the extent allowed by weather, safety, and road conditions during and after major storms to detect and correct road drainage problems that could affect water quality.

Comment [DB7]: How do you define this incentive? An incentive-based approach is good as long as Forests are pro-active in funding and tactically remedying water quality problem areas. All too often significant problem areas are masked in the larger data pool which results in maintaining the status quo or only marginally makes improvement. A quick review of past monitoring reports can lead one to conclude that resource management practices in our National Forests has little impact on water quality. This is far from the case. I can't go to any Forest and NOT find significant anthropomorphic erosion particularly from roads. A true incentive-based approach builds upon success and rewards superior effort. Unfortunately, if current monitoring methods and p… [3]

Comment [DB8]: For "current" projects this approach may help deter potential water-quality problems. However, as often seen in the field, misplaced or flatly using the wrong BMP measure for a site, systematic checklists can skew relevant and necessary data for prescriptive improvements.

Geotechnical staff, experienced and trained in hillslope geomorphology and fluvial processes are essential in evaluating BMP measures and detailing corrective actions.

BMP checklists do not identify wh… [4]

Comment [DB9]: Random site selection is never a good idea for effective water quality protection. That's like a doctor telling a patient that "we looked at your lungs and found no prostate cancer." Unless the patient has lesions all over their body a random site selection will statistically score "95% or higher" while the patient dies.

An effective monitoring program has to be systematic, non-random, and watershed specific. BMP evaluations can be very anal and can yield useless data for improving water quality. The purpose for monitoring is to identify what'… [5]

Comment [DB10]: Historically, road patrols were the major method for inventorying road problems and for reducing potentially larger impacts and costlier maintenance needs. Developing road patrol reporting protocols would further refine proposed action priorities and expanded to include all classes of roads. Field evidence shows all too often the same site-specific erosion sources and road drainage problems. Document problems, document "corrective" measures taken, and track if or when, anything gets done. Field evidence shows, if road patrols are being conducted, corrective measures ar… [6]

B. Retrospective hillslope monitoring of past management activities

1. Follow-up BMPEP monitoring for sites that were evaluated and rated as "not implemented" or "not effective" the previous year will be conducted to determine if corrective actions have been taken.
2. Sample pools will be developed annually for BMPs evaluated in the previous 3 to 5 years that were rated as effective, and sites will be selected randomly from this pool for retrospective BMPEP effectiveness evaluations.
3. Retrospective BMPEP evaluations will follow the standard BMPEP protocols. If protocols change between the time of the original evaluation and the retrospective evaluation, the current protocol will be used.
4. Results of retrospective monitoring will be compared to original BMPEP effectiveness scores to determine if BMPs remained effective over a period of 3 to 5 years.
5. The recurrence interval for the highest peak flow during the period between the original and retrospective evaluations will be estimated for the stream nearest the site of the evaluation. Recurrence interval estimates will be compared to long-term effectiveness in national forest and regional BMPEP reports.

C. Representative in-channel monitoring

The purpose of in-channel monitoring is to determine whether USFS BMPs and restoration activities collectively are effective in protecting and improving water quality at the watershed scale. Effectiveness will be assessed by monitoring trends in channel characteristics that affect beneficial uses and by comparing measures of central tendency for channel characteristics of streams downstream of actively managed areas with those in pristine or nearly pristine reference watersheds. Reference watersheds will be defined using the State Board Surface Water Ambient Monitoring Program (SWAMP) criteria (Ode, 2009). Actively managed watersheds are those that do not meet criteria for reference watersheds.

Representative in-channel monitoring sites will be selected for 5th field hydrologic units (watersheds), which are generally between 20 and 200 square miles in area. Each watershed in the baseline monitoring network will have one site representative of reference conditions and one site representative of actively managed conditions. Relating downstream channel changes to upstream activities is problematic in large watersheds (MacDonald and Coe, 2006), so monitoring sites will be located on relatively small headwaters streams (6th and 7th field hydrologic units). Monitoring sites will be selected to have similar valley segment and stream reach characteristics (Bisson and others, 2006).

1. Fixed long-term locations for SCI surveys will be selected by national forest aquatic specialists and Regional Office in cooperation with the State and Regional Board staffs. These locations will remain in the monitoring pool unless removed by consensus of the national forest, Regional Office, and Regional and State Boards.
2. SCI surveys will be conducted annually, with the goal of monitoring each 5th field watershed at least once every 5 years and as soon as possible following major (RI>10 year) floods. Roughly 20% of the watersheds will be surveyed each year, on average. Survey locations will be rotated among all 5th field watersheds within each 4th field sub-

Comment [DB11]: The purpose for "retrospective" BMPEP monitoring is to document and provide BMP effectiveness trends and to recommend adaptive adjustments to improve specific measures. What incentive is there for Forests to document their water quality problems when fixing problems cost money? Those Forests that proactively do should be greatly rewarded.

Evaluations are subject to the observations of the reviewer and observation points are discretionary. Without systematic evaluation method and procedures, "not implemented or not effective" determinations are moot. If the BMP monitoring program was working as currently written watershed condition and water quality would be improving.

Comment [DB12]: Current standard protocol relies too heavily on in-house staff for evaluation review. Third party evaluations are require to help promote BMP effectiveness.

Comment [DB13]: This section is a vast improvement over the above section. My question is where do you find a "pristine" reference watershed with comparable stream type?

Fixed long-term locations will be selected by Forest aquatic specialists. Does this mean there will be permanent turbidity sampling as well as bugs, fish and stream morphology in actively managed watershed stations? Significant amounts of fine sediment occurs during and immediately after rainfall events that is often missed at remote stations. Roads are the primary source for this sediment fraction. Without proper turbidity sampling frequency determination of road BMP effectiveness will be misleading. In addition, extensive mining activities have altered channel substrate composition in a number of ways. Small headwaters streams can be the most relatively impacted.

Comment [SV14]: Significant water quality decline can occur within 5 years. I assume the reason for this timeframe is due to funding concerns. Recommend striving for monitoring once every 3 years at a minimum.

Comment [SV15]: Establish a desired timeframe here.

basin. For repeat surveys, the recurrence interval of the highest peak flow between consecutive surveys will be estimated and reported.

3. For watersheds 303(d) listed for water temperature, SCI water-temperature monitoring will be conducted for at least one full snow-free season. In addition, effective shade will be monitored using Solar Pathfinders.

Project-Level Monitoring for Projects in Watersheds without Baseline Monitoring

A. Hillslope monitoring of current management activities and corrective actions

1. All projects will have administrative BMP implementation monitoring using a "checklist" approach, as described above for baseline monitoring.
2. Projects in watersheds without baseline monitoring will be included in sample pools for random annual BMPEP monitoring as described for baseline monitoring above.
3. Projects will have non-random BMPEP effectiveness monitoring for all high-risk activities. High-risk activities include road construction or reconstruction, stream crossings, grazing, and all activities within designated riparian buffers, including riparian reserves, riparian conservation areas, riparian habitat conservation areas, and streamside management zones.
4. Follow-up BMPEP monitoring for sites that were evaluated and rated as "not implemented" or "not effective" the previous year will be conducted to determine if corrective actions have been taken.

B. Project-level in-channel monitoring

1. SCI surveys will be made at the nearest suitable reach downstream of the project area before any ground-disturbing activities and after project completion.
2. For repeat surveys, the recurrence interval of the highest peak flow between consecutive surveys will be estimated and reported.
3. SCI survey results will be compared to BMPEP results to evaluate relations between BMP effectiveness and stream-channel responses.
4. For watersheds 303(d) listed for water temperature, SCI water-temperature monitoring will be conducted for at least one full snow-free season. In addition, effective shade will be monitored using Solar Pathfinders.

Reporting

All monitoring results will be reported annually by each national forest to the appropriate Regional Board(s). A summary of results for all national forests in the Pacific Southwest Region will be provided to the State Board annually. Detailed reports summarizing results, including hydrologic conditions, will be prepared and provided to the State Board at intervals of 3 to 5 years.

References

Bisson, P.A., Buffington, J.M., and Montgomery, D.R., 2006, Valley segments, stream reaches, and channel units: Chapter 2 in Methods in Stream Ecology, Elsevier Publishing, p. 23-49.

Comment [DB16]: See comments above. Why bother duplicating the same points?

Comment [DB17]: See above.

Comment [DB18]: Reports and raw data should also be made available on line, at each Forest's website with links to Regional Board sites. Often the best feedback to provide water quality and resource management incentives comes from public observations. There are far more visitors to Forests than resource personnel. Visitors often cover more ground and could advance BMP effectiveness monitoring by reporting their observations. The public aren't necessarily experts in erosion control measures or other elements of water quality protection but they do know when a road is washed out, barely passable, rutted and flow courses passing dirty water. Usually they would only notice the extreme condition.

Reports are prepared based on limited discretionary observations and checklist evaluation sites, really not detailed at all. The timing, locations, number of site-specific inventories within an "evaluation" are subjective. These data points are then further diluted to a watershed, then Forest scale. All BMP evaluation forms, i.e. checklists need revision and BMP protocols changed to increase resolution and adequately represent actual field conditions.

Reports should reflect objectives, rarely do they. Mostly they focus on BMP strengths, not weaknesses. Stating the strengths but focusing on improving weaknesses should be the goal in incentive based "adaptive" management. Each stated objective above needs to be addressed fully in the report. For example, Objective 1) trained staff should easily detect the most obvious potential water quality problems associated with resource management activities, yet poor documentation exists for those sites. Therefore, when reports are written they are skewed. Forests need to be transparent with their data or lack thereof. Reports need to reflect an "analysis" approach and not just lump all data together as is often the case. No BMP measure is weighed the same and the degree of consequence is highly variable. No report I've seen delineates the types and number of each BMP evaluated. It's hard for line managers and decision makers to improve programs without detailed and actuate analysis of annual data.

Reports I have read generally have little substance, very weak in detail and limited, if any, in delineating future actions and strategies to address p… [7]

Frazier J.W., Roby, K.B., Boberg, J.A., Kenfield, K., Reiner, J.B., Azuma, D.L., Furnish, J.L, Staab, B.P., and Grant, S.L., 2005, Stream Condition Inventory Technical Guide Version 5.0: USDA Forest Service, Pacific Southwest Region - Ecosystem Conservation Staff, Vallejo, California, 111 pp.

MacDonald, L.H., and Coe, D., 2006, Influence of headwater streams on downstream reaches in forested areas: Forest Science 53(2):148-168.

Ode, P. 2009. Recommendations for the development and maintenance of a reference condition management program (RCMP) to support biological assessment of California's wadeable streams. Report to the State Water Resources Control Board's Surface Water Ambient Monitoring Program (SWAMP), SWAMP Aquatic Bioassessment Laboratory/ Water Pollution Control Laboratory California Department of Fish and Game

USDA Forest Service, 2002, Investigating water quality in the Pacific Southwest Region, Best Management Practices Evaluation Program: A User's Guide: USDA Forest Service, Pacific Southwest Region, Vallejo, California.

Page 1: [1] Comment [DB1] **David Burns** **8/9/2010 11:31:00 AM**

Well stated, and consider including:
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Numerous private in holdings and non-FS system roads exist within Forest Service boundaries, often shown as checker board. Management of these lands and right of ways have direct water quality (and other resources) linkages to Forest Service lands. Private or other public agencies activities have significant nexus to water quality issues and concerns. For example, in many cases private, county and State roads are failing to adequately maintain or improve road designs to reduce and minimize water quality impacts that effect FS lands and water ways.

Impacts to FS lands and waters ways can come from outside timber operations, retreat and other developments, water agencies, railroads, highways, Electric companies, mining , salting and sanding of winter roadways, to name a few.

Further discussion of monitoring protocols of these influences need to be addressed because water quality impacts derived from these sources may mask otherwise positive FS activities.
Comment # 53.1

Page 1: [2] Comment [SV3] **Stan Van Velsor** **9/13/2010 9:39:00 AM**

Monitoring is critical to BMP effectiveness. Without adequate funding to cover the costs of monitoring, problems will not be identified in a timely manner and water quality will suffer. Funding for long-term monitoring should be allocated as a component of project implementation.

Page 2: [3] Comment [DB7] **David Burns** **9/13/2010 9:39:00 AM**

How do you define this incentive? An incentive-based approach is good as long as Forests are pro-active in funding and tactically remedying water quality problem areas. All too often significant problem areas are masked in the larger data pool which results in maintaining the status quo or only marginally makes improvement. A quick review of past monitoring reports can lead one to conclude that resource management practices in our National Forests has little impact on water quality. This is far from the case. I can't go to any Forest and NOT find significant anthropomorphic erosion particularly from roads. A true incentive-based approach builds upon success and rewards superior effort. Unfortunately, if current monitoring methods and protocols were working they would high light the dismal condition of our streams and rivers The purpose for evaluating a monitoring program is Maximizing an incentive-based approach

Developing "baseline" data is often misleading unless the basin is in pristine condition to begin with.

Page 2: [4] Comment [DB8] **David Burns** **9/13/2010 9:39:00 AM**

For "current" projects this approach may help deter potential water-quality problems. However, as often seen in the field, misplaced or flatly using the wrong BMP measure for a site, systematic checklists can skew relevant and necessary data for prescriptive improvements.

Geotechnical staff, experienced and trained in hillslope geomorphology and fluvial processes are essential in evaluating BMP measures and detailing corrective actions.

BMP checklists do not identify whether the measure was located in the appropriate location to begin with, nor do they evaluate long term stability and effectiveness after the project is no longer considered "current".

Page 2: [5] Comment [DB9] **David Burns** **9/13/2010 9:40:00 AM**

Random site selection is never a good idea for effective water quality protection. That's like a doctor telling a patient that "we looked at your lungs and found no prostate cancer." Unless the patient has lesions all over their body a random site selection will statistically score "95% or higher" while the patient dies.

An effective monitoring program has to be systematic, non-random, and watershed specific. BMP evaluations can be very anal and can yield useless data for improving water quality. The purpose for monitoring is to identify what's working but more importantly, draw attention to what's not. Repeatable watershed and/or road analysis, with inventoried erosion features, etc, would probably provide better long term water quality management direction.

Page 2: [6] Comment [DB10] **David Burns** **9/13/2010 9:40:00 AM**

Historically, road patrols were the major method for inventorying road problems and for reducing potentially larger impacts and costlier maintenance needs. Developing road patrol reporting protocols would further refine proposed action priorities and expanded to include all classes of roads. Field evidence shows all too often the same site-specific erosion sources and road drainage problems. Document problems, document "corrective" measures taken, and track if or when, anything gets done. Field evidence shows, if road patrols are being conducted, corrective measures are NOT being taken (evidenced, for example, by the same stream diversions even on highly traveled roads).

Page 4: [7] Comment [DB18] **David Burns** **9/13/2010 9:40:00 AM**

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Reports I have read generally have little substance, very weak in detail and limited, if any, in delineating future actions and strategies to address problem areas. The vast majority of water quality problems come from former management activities of the three biggies: mining, road building and logging practices. Water quality problems are far fewer from current practices, but still persist. Little is being done to correct this legacy impact in a timely manner. I would propose a different BMP and evaluation strategy altogether. The current methods have made little headway in remediating water quality problems.