

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

Monitoring & Reporting Program No. R3-2005-0054
Big Basin Water Company - Filter Plant and Fallen Leaf Units
(1-04NTMP-011 SCR), Santa Cruz County

Prepared March 2, 2005

SECTION I

- A. **MINIMUM MONITORING** – Under this option, compliance with the California Department of Forestry and Fire Protection (CDF) Forest Practice Rules is required and CDF conducts Forest Practice Rules compliance monitoring.
- B. **IMPLEMENTATION/EFFECTIVENESS MONITORING** - used to determine whether activities are carried out as planned and are effective at achieving desired results.

Implementation Monitoring is used to determine whether activities are carried out as planned. Implementation Monitoring may be applied at a range of spatial scales, focusing on specific management measures or rule sets for multiple years. Examples of Implementation Monitoring include:

- Determine whether the discharger is properly applying and maintaining applicable Forest Practice Rules and specific prescriptions in a harvest plan, where the general conditional waiver or waste discharge requirements order (WDRs) incorporates such requirements.
- Determine whether waiver conditions or WDRs are being properly met during the terms over which such waivers or WDRs apply.
- Inform development of waiver conditions or WDRs and adaptive management processes in order to maximize implementation success.
- Implementation Monitoring is more informative when combined with Effectiveness or Water Quality Compliance Monitoring.

Effectiveness Monitoring is used to determine whether particular land management prescriptions (e.g., erosion control measures, riparian buffers) are effective at achieving desired results. Effectiveness Monitoring may be applied at a range of spatial scales, focusing on specific management measures for multiple episodic events or multiple years. Examples of Hillslope Effectiveness Monitoring objectives include:

- Determine whether measures applied during THP operations are resulting in the intended hillslope conditions.
- Determine whether applicable waiver conditions or WDRs are producing, on a programmatic scale, the hillslope conditions they were designed to produce.
- Inform development of waiver conditions or WDRs and adaptive management processes in order to improve the performance of prescribed measures.
- Examples of Instream Effectiveness Monitoring objectives include:
 - Determine whether hillslope conditions created by timber operations are resulting in the intended instream conditions.

- Given hillslope effectiveness monitoring data, determine whether waiver conditions or WDRs, on a programmatic scale, are adequately protecting instream aquatic resources and meeting Basin Plan standards.
- Given hillslope effectiveness monitoring data, determine whether certain conditions or measures are necessary to ensure water quality protection.
- Inform development of waiver conditions or WDRs and adaptive management processes in order to minimize adverse impacts to aquatic resources and achieve compliance with Basin Plan standards.

Effectiveness Monitoring is most successful when instream and hillslope components are linked.

1. MONITORING POINTS

- a. **VISUAL MONITORING POINTS** – Visual monitoring points shall include all roads, watercourse crossings, landings, skid trails, water diversions, all watercourse confluences, known landslides, and all mitigation sites in the timber harvest plan area.
- b. **PHOTO-POINT MONITORING POINTS** – Photo-point monitoring points shall be at locations within the timber harvest plan area where timber harvest activities have the greatest risk of potential discharge (sites may be established during the pre-harvest inspection). Photo-point monitoring points shall include up and down stream of each newly constructed or reconstructed Class I and Class II watercourse crossings and landings within a Class I or II Watercourse or Lake Protection Zone (WLPZ).

The Discharger shall:

- i. Utilize the attached document titled “Standard Operation Procedure 5.2.3 - Photo Documentation Procedure” (including any subsequent revisions to SOP 5.2.3) as the protocol for all photo-point monitoring (attached).
- ii. Utilize flagging, rebar, or another method of establishing the photo-point site locations.
- iii. Utilize all photo-point locations until this Monitoring and Reporting Program is rescinded.

2. MONITORING CONSTITUENTS/FREQUENCY

- a. **VISUAL MONITORING:** The Discharger shall monitor all visual monitoring points for existing or potential sources of erosion. The Discharger shall perform visual monitoring within 12 hours of storm events of two inches of rain or greater within a 24-hour period. If a storm terminates or two inches is reached between the hours of 3:00 pm (1500 hours) and 9:00 pm (2100 hours) visual monitoring shall occur within 18 hours.

Year 1 – The Discharger shall monitor a minimum of three times. Year one monitoring will continue through the first winter after a timber harvest is completed. Year two monitoring begins one year after a timber harvest is completed.

Monitoring Event One - The Discharger shall perform the first monitoring event within 12 hours of the first storm event that includes two inches of rain or greater within a 24-hour period.

Monitoring Events Two and Three - The Discharger shall perform the next two monitoring events within 12 hours of the next two storm events (one monitoring event each storm) that include two inches of rain or greater within a 24-hour period and soil saturation (i.e., soil saturation typically

occurs after about four inches of accumulated precipitation during the wet season (the wet season begins October 15 of each year)).

Years 2-5 – In the second year of monitoring following completion of timber harvest operations and a determination that implemented management practices are functioning to protect water quality and beneficial uses, the Discharger shall monitor consistent with a Road Management Program (Attached).

Summary of Visual Monitoring frequency:

Year 1 = 3 events (minimum)

Year 2 - 5 = consistent with a Road Management Program

b. **PHOTO-POINT MONITORING:** The Discharger shall monitor all photo-point monitoring points:

Year 1 - The Discharger shall monitor through the first winter after a timber harvest is completed. Year two monitoring begins one year after a timber harvest is completed.

- Following the first significant storm event (First Storm) (One Photo Set).
- Following completion of timber harvest activities (One Photo Set).
- Following a significant storm event during the month of April (April Storm) (One Photo Set). A significant storm event means any storm with two inches of rain or greater within a 24-hour period and soil saturation (i.e., soil saturation typically occurs after a minimum of four inches of precipitation during after the start of the wet season (October 15)).

Additionally, The Discharger shall photograph new or reconstructed Class I and Class II water crossings:

- Before construction begins, after construction is completed, and after the crossing structure is removed (if crossing is temporary).

The Discharger shall conduct photo-point monitoring within seven days of each event below:

1. The First Storm
2. Completion of timber harvest activities
3. April Storm events. If no significant storm event occurs in the month of April, the Discharger shall complete photo-point monitoring by April 30 of the same year.

Years 2 and 5 - If implemented management practices are adequately protecting water quality and beneficial uses, as determined by the Regional Board Executive Officer, the Discharger shall conduct April Storm photo-point monitoring.

If implemented management practices are not adequately protecting water quality and beneficial uses, as determined by the Regional Board Executive Officer, the Discharger shall repeat year one monitoring.

Specific Actions and Photo Sets: The Discharger shall photograph S30 and M18 within the proposed harvest area. Even though the proximity is close, these two locations will be treated as separate photo points. The Discharger shall photograph these sites in year one prior to any activity in the watercourse, following completion of activities or prior to October 15th, and following the end of the

first winter period prior to April 30th. The Discharger shall photograph sites S30 and M18 in years 2 and 5 .

Year 1 = 3 photo sets

Year 2 = 1 photo set

Year 5 = 1 photo set

C. FORENSIC MONITORING - used to detect significant pollutant sources (e.g., failed management measures) in the field for purposes of timely remedial action.

Forensic Monitoring is typically applied at a sub-watershed or project scale, focusing specifically on stream conditions and sensitive receptors downstream of potential pollutant sources. Examples of Forensic Monitoring objectives include:

- Locate sources of sediment production in a timely manner for rapid corrective action, where feasible and appropriate.
- Determine, where feasible, cause/effect relationships between hillslope activities, hydrologic triggers and instream conditions.

Forensic Monitoring is most successful when criteria such as storm events of particular size or instream sampling results are used to trigger field investigations allowing for timely detection and repair of controllable pollutant sources.

The Discharger shall perform visual monitoring of all roads, watercourse crossings, landings, skid trails, water diversions, all watercourse confluences and known landslides in the timber harvest plan area to detect failed management measures, failed implementation of management measures, or natural features that are contributing to observed water quality impacts.

- If at any time during implementation or effectiveness monitoring, a discharge is observed, the Discharger shall conduct forensic monitoring to identify failed management measures and/or source of discharge.
- If management measures fail (this includes failure to implement appropriate management measures), the Discharger shall photo document them and implement management practices immediately to prevent discharge and impacts to water quality.
- If timber activities cause a discharge (sediment, soil, other organic material, etc.) into waters of the state, the Discharger shall measure instream turbidity (using grab samples) in the closest Class I or II watercourse downstream of the discharge.
- If at any time during implementation or effectiveness monitoring, the Discharger observes a discharge, the Discharger shall notify the Regional Board within 24 hours.
- The Discharger shall submit to the Regional Board a written report, including photo documentation, water quality data, and the management measures or corrective actions and a description of their effectiveness within 10 working days. , The Discharger shall complete any additional actions necessary for the protection of water quality and beneficial uses, as determined by the Regional Board Executive Officer following review of the report and notification of the Discharger.

Frequency: The frequency of Forensic Monitoring is coincident with implementation and effectiveness monitoring, or at anytime a failed management measure and/or discharge is reported or observed.

FORENSIC MONITORING AREAS OF CONCERN

The following areas need to be addressed during forensic monitoring if water diversion, feral pig activity, or trespass activities are leading to impacts to water quality.

WATER USAGE: The Discharger shall monitor the water diversion point(s) for total daily water usage when water is being diverted. The Discharger shall monitor the creek to ensure no more than 10 % of the creek flow is diverted.

FERAL PIG ACTIVITY: During any inspection, the Discharger shall document all evidence of feral pig activity near watercourses that may be contributing discharges to waters of the state.

TRESPASS ACTIVITY: During any inspection, the Discharger shall document all evidence of trespassing near watercourses that may be contributing discharges to waters of the state.

D. WATER QUALITY COMPLIANCE MONITORING - used to determine whether pollutant discharges from land use activities are in compliance with water quality standards.

Water Quality Compliance Monitoring is typically applied at a sub-watershed or project scale, focusing on the combined effects of a single project for some number of years greater than the active life of the project. Examples of Water Quality Compliance Monitoring objectives include:

- Isolate and quantify pollutant discharges to waters of the State from timber harvesting and related activities.
- Determine whether discharges from timber harvesting and related activities meet Basin Plan water quality objectives, including objectives for temperature, turbidity and sediment.
- Determine whether discharges from timber harvesting and related activities meet applicable TMDL, waiver, or permitting requirements.

D.1 - Temperature - The Discharger shall monitor temperature continuously ("Hobo temps" shall be used for continuous temperature monitoring) in Class I watercourses (from May 1 through October 15) upstream, near the upper extent of timber operations, and downstream, near the lower extent of timber operations. Temperature shall be monitored when timber harvest operations occur in Class I or II WLPZ.

If no Class I watercourse exists on the parcel where timber harvest activities occur, and there is water in the Class II from May 1 through October 15, temperature monitoring shall be conducted in the Class II WLPZ when timber harvest operations occur in Class II watercourse.

Year 1 - Year one monitoring shall continue through the first winter after a timber harvest is completed. Year two monitoring begins one year after a timber harvest is completed.

Monitoring Frequency:

Temperature - The Discharger shall monitor temperature during the months of May through November.

Years 2 and 5

Monitoring Frequency:

Temperature - The Discharger shall monitor temperature from May 1 through October 15 in year two and five following completion of timber harvest operations and a determination that implemented management practices are adequately protecting water quality and beneficial uses.

If implemented management practices are not adequately protecting water quality and beneficial uses, as determined by the Regional Board Executive Officer, the Discharger shall repeat year one monitoring. In addition to supplementary monitoring, the Regional Board Executive Officer will determine additional management measure implementation required to prevent temperature increases of more than 5°F above natural receiving water temperature.

Specific Actions and Temperature Data Sets: Temperature monitoring shall occur on the Class I Jamison Creek above and below where the Class II watercourses from the Filter Plant unit enter Jamison Creek.

Year 1 = 1 data set

Year 2 = 1 data set

Year 5 = 1 data set

D.2 Turbidity - The Discharger shall monitor all newly constructed or reconstructed Class I and II crossings within the timber harvest plan area in place after October 15th for turbidity (a hand held turbidimeter is acceptable for this purpose). Turbidity shall be measured approximately 25 feet upstream and downstream of all newly constructed or reconstructed Class I and II road crossings. Turbidity monitoring may be required as determined by the Regional Board Executive Officer if no newly constructed or reconstructed crossings exist within a proposed timber harvest plan and the plan has activity within a Class I or II WLPZ.

Monitoring Frequency:

Turbidity - The Discharger shall monitor turbidity within 12 hours of a storm event with two inches or more of rain within a 24-hour period. If a storm terminates or two inches is reached between the hours of 3:00 pm (1500 hour) and 9:00 pm (2100 hour) turbidity monitoring shall occur within 18 hours.

Year 1 – The Discharger shall monitor a minimum of three times in year one. Year one monitoring will continue through the first winter after a timber harvest is completed. Year two monitoring begins one year after a timber harvest is completed.

Monitoring Event One - The Discharger shall perform the first monitoring event within 12 hours of the first storm event that includes two inches of rain or greater within a 24 hour period.

Monitoring Events Two and Three - The Discharger shall perform the next two monitoring events within 12 hours of the next two storm events (one monitoring event each storm) that include two inches of rain or greater within a 24 hour period and soil saturation (i.e., soil saturation typically occurs after about four inches of precipitation during after the start of the wet season (October 15)).

Years 2-5 - In the second year of monitoring following completion of timber harvest operations and a determination by the Regional Board Executive Officer, that implemented management practices are adequately protecting water quality and beneficial uses, the Discharger shall conduct turbidity monitoring based on need as determined by level C (forensic) monitoring.

If implemented management practices are not adequately protecting water quality and beneficial uses, as determined by the Regional Board Executive Officer, repeat year one monitoring.

Specific Actions and Turbidity Data Sets: Turbidity will be collected above S30 where a culvert is being replaced with a bridge and below M18 where a check dam is being removed.

Year 1 = 1 data set (minimum of three events)

Year 2 - 5 = as needed

SECTION II

DATA LOGGING AND REPORTING

- a. **LOGBOOKS:** The Discharger shall maintain logbooks for recording all visual and water analysis data. These logbooks shall be available for inspection to the Regional Board staff.
- b. **SEDIMENT RELEASE REPORTING:** The Discharger shall report to the Regional Board within 48 hours whenever at least one cubic yard of soil is released to a waterway due to anthropogenic causes or at least five cubic yards of soil is released to a waterway due to natural causes, or when turbidity is noticeably greater downstream compared to upstream (of a crossing or the Plan area). The Discharger shall submit a written report to the Regional Board within 10 days of detection. The Discharger shall investigate source areas of sediment. If sources are found, the Discharger will locate and document the source and size of the release. If sources related to timber harvest activities are found, the Discharger shall immediately correct the source if possible, or schedule corrective action at an appropriate time given the site conditions.
- c. **ROAD INVENTORY PROGRAM:** The Discharger shall implement a Roads Management Program (similar to the Big Creek Lumber Company's "Protocol for Conducting Company Road Inventories & Maintenance" (See Attached May 23, 2001 document)) within the THP area. After each storm event that triggers an inspection, the Discharger shall perform a field inspection and prepare a field form as described in the Protocol. The Discharger shall enter the data into a logbook (same as described in item a. above) and database or spreadsheet which tracks observations, work completed, and dates of last review. If the need for repair is immediate, the Discharger shall promptly develop an appropriate treatment so that the Discharger can complete corrective action as soon as practical.
- d. **VIOLATION REPORTING:** The Discharger shall report any violation of the Forest Practice Rules related to water quality, to the Regional Board within 48 hours. The Discharger shall provide the report in writing to the Regional Board within 10 working days of the violation. The written report shall include photo documentation and water quality data before and after remedial action. Upon review of the report, the Regional Board Executive Officer will determine completeness of the report and the need for additional actions necessary for the protection of water quality and beneficial uses.
- e. **ANNUAL REPORT:** By November 15 of each year, The Discharger shall submit an Annual Report to the Regional Board that addresses the following:
 - i. A status of active timber harvest operations
Previous year activities, wet weather problems observed, etc.
Planned activities
 - ii. A summary of all violations.
 - iii. Summary of the water quality monitoring performed during the previous year including submittal of data and photos in electronic format.
 - iv. With the first annual report, submit a copy of the road management program.
 - v. A summary of the road management program¹ and actions implemented for the protection of water quality and beneficial uses.
 - vi. Recommendations for improving the monitoring and reporting program.

¹ Big Creek's Road Inventory Program may be used as a model.

- f. The Discharger is responsible for ensuring that all monitoring is done in a safe manner. If any monitoring point is too dangerous to sample, then the Discharger shall report this circumstance to the Regional Board within 48 hours.
- g. The Regional Board Executive Officer may modify or rescind this Monitoring and Reporting Program at any time, or may modify or rescind the monitoring and reporting program as to a specific discharger.

MONITORING PROGRAM REVIEW AND UPDATE

Data collected will be evaluated after 24 months (two summer and two winter seasons shall be evaluated) to determine the need for monitoring program modification.

Ordered By: _____
Roger W. Briggs, Executive Officer

Date

**BIG CREEK ROAD INVENTORY PROGRAM (BCRIP)
PROTOCOL FOR CONDUCTING COMPANY ROAD
INVENTORIES & MAINTENANCE**

Purpose

Big Creek Lumber Company owns and controls over 11,000 acres of forestlands on which there are over 60 miles of permanent, temporary, surfaced, and un-surfaced roads. Maintenance of these roads requires frequent monitoring and treatment.

This document has been drafted to provide the standard operating procedures for conducting and recording road inventories and for the use of the inventory to direct appropriate treatments. This protocol has been drafted so as to guide road inventories consistent with Big Creek goals & objectives and with the certification of Big Creek's lands with the Forest Stewardship Council (FSC).

Process of Road Inventory

Big Creek conducts road inventories on varying intervals, depending upon (1) the designated use of the road, (2) the intensity and duration of precipitation received, (3) the hydrologic activity of the stream system in the area, (4) the susceptibility of the road and appurtenant crossings to failure or damage, and (5) the interval of time since that portion of road was used.

On properties where there has been recent activity or road use, especially if road drainage was altered or improved, review of the roads is conducted more frequently. For each portion of road, Big Creek has designated a standard interval of 2 inches of rain per storm event as the cue to send out maintenance crews. The 2" standard interval is subject to change based on the relationship between the five factors listed above.

When indicated by the interval period, or when deemed necessary otherwise, an individual or group of persons will review the portion of road. Road inventory may be conducted on foot, by pickup, or (especially in wet periods) by ATV or other light-tracking vehicle. While conducting the inventory, the person or persons will do handwork, where necessary, to clear and improve drainage structures and culverts.

Each instance a portion of road is inventoried, a form is filled out recording the observations of the person (see Appendix B, Road Inventory Form). This form allows the person to record the location, date, problem, and proposed solution. This form is then submitted to the Chief Forester of Operations (CFO).

After the road inventory form is completed, it is entered into the roads inventory database (a spreadsheet which tracks observations, work completed, and dates of last review for a portion of road).

If the need for repair or maintenance is immediate, the road reviewer will immediately notify the Chief Forester of Operations so that an appropriate treatment may be planned and initiated. All road inventory forms submitted to the CFO are reviewed, and potentially urgent problems are further analyzed to determine if immediate treatment is necessary. When immediate treatment is prescribed, the project is listed with indication of urgency on a dry erase board posted in the Big Creek Forestry Office. As soon as resources are available to conduct the treatment operations, the necessary equipment, materials, and personnel are dispatched to the site.

After the site is treated, the CFO or the CFO's designee will review the site to determine the success of the treatment. This site, at an interval dependent upon the treatment, will be reviewed over time to evaluate success of treatment and to determine if follow-up treatment is necessary.

For sites that do not require immediate treatment, the records for that site will not be further reviewed until the biennial summary of roads is prepared (May 1 and November 1 of every year). At these times corresponding to the approximate end and beginning, respectively, of the winter period, the latest records for each property are reviewed and responsibility for appropriate treatments are delegated. Subsequent evaluation of the treatment's success is conducted, and follow-up treatment prescribed, if necessary.

ELEMENTS OF THE FIVE FACTORS THAT DETERMINE INSPECTION TRIGGERS FOR THE BCRIP:

Watershed:

- Threatened and Impaired
- 303 (D) Listed Stream Segments
- Sub-division/home proximity to project area
- Orographic effect:
 - South county vs. North county
- Project elevation, low vs. high in the watershed
- Road conditions outside of project area that contribute or receive flow
- Watercourse classifications for project area

Porosity:

- Fast vs. slow
- Soil type – sandstone/shale/granite
- High vs. low rock content
- Ground saturation point/springs begin to flow at higher rates

Topography:

- Steep/flat/undulating
- Indication of instabilities/ tipped trees/earth fractures/slides
- Proximity to San Andreas Fault

Vegetative Cover Type:

- Brush/oak woodland/conifer
- General vegetative cover

General Elements Associated with Infrastructure:

- Age of road:
 - Older vs. newer road/existing leaf cover/general vegetation cover
- History:
 - Legacy problems/old humboldt crossings
 - Who designed and implemented the existing road/crossings
 - Past performance and condition of general infrastructure
- Location of road:
 - Ridge top/steep ground/proximity to watercourse/roads on unstable areas
- Road surfacing:
 - Rocked/ based/seeded/straw mulched/slash packed/un-surfaced
- Road Standard:
 - Insloped/outsloped/crowned/re-contoured:
 - Spittler outslope of new roads
 - Full bench road cut/balanced cut and fill/fill
 - Through cuts/long run of through cut
 - Berms on outside edge of road
 - Seasonal/all winter road
- Type of drainage and crossings:
 - Waterbars/rolling dips/bridges/culverts/rocked fords
 - Current condition of erosion control structures/How much do you think they can handle
- Trespass
 - 4WD/motorcycles/mountain bikes/horses/foot traffic
- Watercourse crossing location and frequency
- Gopher holes
- Pig wallows/rooting
- PG&E access road
- EHR rating in THP

Weather:

- Interval of time since the last rain event
- Type of rain year/El nino/are storms holding more rain
- Jet stream status
 - High pressure or low pressure
- Wind direction:
 - South East – Strong high pressure
 - South – Storm medium pressure
 - Southwest – Storm low pressure
 - East/Southeast – Strong extreme low pressure
 - West – Clearing
- Check the barometer
- Soaking, low intensity, rain vs. hard, high intensity, rain
- General weather patterns

Trigger Assessment Tools:

- Weather radio
- Barometer
- Local contacts:
 - Forest landowners
- Local news forecasts
- Tell tail locations:
 - Creek mouths open to the ocean
 - General overland flow
 - Bridge crossings of major rivers/streams/creeks throughout the county
 - Etc...
- State wide contacts
 - Other foresters and forestry companies
- California Newts:
 - Moving uphill vs. downhill
- Weather web sites (rainfall, stream flow, satellite imagery, forecasts, flood warnings, etc...):
 - <http://www.wrh.noaa.gov/mtr/>
 - <http://www.goes.noaa.gov/>
 - http://water.usgs.gov/cgi-bin/waterwatch?map_type=real&state=ca
 - <http://cdec.water.ca.gov/misc/realStations.html>
 - http://www.weather.com/maps/maptype/satelliteworld/pacificoceansatellite_large_animated.html?
 - <http://www.wrh.noaa.gov/mtr/gettext.php?pil=RR5&sid=RSA>
 - <http://www.surflife.com/home/index.cfm>
 - <http://weather.cnn.com/weather/forecast.jsp?locCode=SRU>

Standard Operating Procedure 5.2.3

Photo Documentation Procedure

Introduction:

Photographs provide a qualitative, and potentially semi-quantitative, record of conditions in a watershed or on a water body. Photographs can be used to document general conditions on a reach of a stream during a stream walk, pollution events or other impacts, assess resource conditions over time, or can be used to document temporal progress for restoration efforts or other projects designed to benefit water quality. Photographic technology is available to anyone and it does not require a large degree of training or expensive equipment. Photos can be used in reports, presentations, or uploaded onto a computer website or GIS program. This approach is useful in providing a visual portrait of water resources to those who may never have the opportunity to actually visit a monitoring site.

Equipment:

Use the same camera to the extent possible for each photo throughout the duration of the project. Either 35 mm color or digital color cameras are recommended, accompanied by a telephoto lens. If you must change cameras during the program, replace the original camera with a similar one comparable in terms of media (digital vs. 35 mm) and other characteristics. A complete equipment list is suggested as follows:

Required:

- Camera and backup camera
- Folder with copies of previous photos (do not carry original photos in the field)
- Topographic and/or road map
- Aerial photos if available
- Compass
- Timepiece
- Extra film or digital disk capacity (whichever is applicable)
- Extra batteries for camera (if applicable)
- Photo-log data sheets or, alternatively, a bound notebook dedicated to the project.
- Yellow photo sign form and black marker, or, alternatively, a small black board and chalk

Optional:

- GPS unit
- Stadia rod (for scale on landscape shots)
- Ruler (for scale on close up views of streams and vegetation)

Some safety concerns that may be encountered during the survey include, but are not limited to:

- Inclement weather
- Flood conditions, fast flowing water, or very cold water
- Poisonous plants (e.g.: poison oak)
- Dangerous insects and animals (e.g.: bees, rattlesnakes, range animals such as cattle, etc.)
- Harmful or hazardous trash (e.g.: broken glass, hypodermic needles, human feces)

We recommend that the volunteer coordinator or leader discuss the potential hazards with all volunteers prior to any fieldwork.

General Instructions:

From the inception of any photo documentation project until it is completed, always take each photo from the same position (photo point), and at the same bearing and vertical angle at that photo point. Photo point positions should be thoroughly documented, including photographs taken of the photo point. Refer to copies of previous photos when arriving at the photo point. Try to maintain a level (horizontal) camera view unless the terrain is sloped. (If the photo can not be horizontal due to the slope, then record the angle for that photo.) When photo points are first being selected, consider the type of project (meadow or stream restoration, vegetation management for fire control, ambient or event monitoring as part of a stream walk, etc.) and refer to the guidance listed on *Suggestions for Photo Points by Type of Project*.

When taking photographs, try to include landscape features that are unlikely to change over several years (buildings, other structures, and landscape features such as peaks, rock outcrops, large trees, etc.) so that repeat photos will be easy to position. Lighting is, of course, a key ingredient so give consideration to the angle of light, cloud cover, background, shadows, and contrasts. Close view photographs taken from the north (i.e., facing south) will minimize shadows. Medium and long view photos are best shot with the sun at the photographer's back. Some artistic expression is encouraged as some photos may be used on websites and in slide shows (early morning and late evening shots may be useful for this purpose). Seasonal changes can be used to advantage as foliage, stream flow, cloud cover, and site access fluctuate. It is often important to include a ruler, stadia rod, person, farm animal, or automobile in photos to convey the scale of the image. Of particular concern is the angle from which the photo is taken. Oftentimes an overhead or elevated shot from a bridge, cliff, peak, tree, etc. will be instrumental in conveying the full dimensions of the project. Of most importance overall, however, is being aware of the goal(s) of the project and capturing images that clearly demonstrate progress towards achieving those goal(s). Again, reference to *Suggestions for Photo Points by Type of Project* may be helpful.

If possible, try to include a black board or yellow photo sign in the view, marked at a minimum with the location, subject, time and date of the photograph. A blank photo sign form is included in this document.

marker post) then have an alternate method (map, aerial photo, copy of an original photograph of the photo-point, etc).

2. Select an existing structure or landmark (mailbox, telephone pole, benchmark, large rock, etc.), identify its latitude and longitude, and choose (and record for future use) the permanent position of the photographer relative to that landmark. Alternatively, choose the procedure described in *Monitoring California's Annual Rangeland Vegetation* (UC/DANR Leaflet 21486, Dec. 1990). This procedure involves placing a permanently marked steel fence post to establish the position of the photographer.
3. For restoration, fuel reduction, and BMP projects, photograph the photo-points and carry copies of those photographs on subsequent field visits.

Determining the Compass Bearing:

1. Select and record the permanent magnetic bearing of the photo center view. You can also record the true compass bearing (corrected for declination) but do not substitute this for the magnetic bearing. Include a prominent landmark in a set position within the view. If possible, have an assistant stand at a fixed distance from both the photographer and the center of the view, holding a stadia rod if available, within the view of the camera; preferably position the stadia rod on one established, consistent side of the view for each photo (right or left side).
2. Alternatively, use the procedure described in *Monitoring California's Annual Rangeland Vegetation* (UC/DANR Leaflet 21486, Dec. 1990). This procedure involves placing a permanently marked steel fence post to establish the position of the focal point (photo center).
3. When performing ambient or event photo monitoring, and when a compass is not available, then refer to a map and record the approximate bearing as north, south, east or west.

Suggestions for Photo Points by Type of Project:

Ambient or Event Monitoring, Including Photography Associated with Narrative Visual Assessments:

1. When first beginning an ambient monitoring program take representative long and/or medium view photos of stream reaches and segments of shoreline being monitored. Show the positions of these photos on a map, preferably on the stream/shore walk form. Subjects to be photographed include a representative view of the stream or shore condition at the beginning and ending positions of the segment being monitored, storm drain outfalls, confluence of tributaries, structures (e.g., bridges, dams, pipelines, etc.).
2. If possible, take a close view photograph of the substrate (streambed), algae, or submerged aquatic vegetation.

4. Long view and medium view of streambed changes (thalweg, gravel, meanders, etc.)
5. Medium and close views of structures, plantings, etc. intended to induce these changes.
6. Optional: Use a tape set perpendicular across the stream channel at fixed points and include this tape in your photos described in 3 and 4 above. For specific procedures refer to Harrelson, Cheryl C., C.L. Rawlins, and John P. Potyondy, *Stream Channel Reference Sites: An Illustrated Guide to Field Techniques*, United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report RM-245.

Vegetation Management for Fire Prevention ("fuel reduction"):

1. Aerial view (satellite or airplane photography) if available.
2. In the absence of an aerial view, a landscape, long view showing all or representative sections of the project (bluff, bridge, etc.)
3. Long view (wide angle if possible) showing the project area or areas. Preferably these long views should be from an elevated vantage point.
4. Medium view photos showing examples of vegetation changes, and plantings if included in the project. It is recommended that a person (preferably holding a stadia rod) be included in the view for scale
5. To the extent possible include medium and long view photos that include adjacent stream channels.

Stream Sediment Load or Erosion Monitoring:

1. Long views from bridge or other elevated position.
2. Medium views of bars and banks, with a person (preferably holding a stadia rod) in view for scale.
3. Close views of streambed with ruler or other common object in the view for scale.
4. Time series: Photograph during the dry season (low flow) once per year or after a significant flood event when streambed is visible. The flood events may be episodic in the south and seasonal in the north.

PHOTO- LOG FORM

Project:

Location:

Date:

Photographer:

Team members:

Photo #	Time	Photo Point ID	Photo Pt. Description & Location	Bearing to Subject	Subject Description

General Notes or Comments (weather, cloud cover, time of sunrise and sunset, other pertinent information):