Visual Assessment Fact Sheet

Sensory Observations of Water Quality and Aquatic Habitat

What is It?

Evaluations of water quality and aquatic habitat using sensory observations are usually referred to as *Visual Assessments*. Odor and taste, also sensory observations, are sometimes included in visual assessment as well[1]. Together, these observations provide the first level of information available to you about the condition of the aquatic environment. This FACT SHEET describes the sensory water quality characteristics that are most obvious to the casual observer, and offers guidance on how to make sensory observations a useful tool in citizen monitoring.

Why is It Important?

Visual assessments provide the first level of information about an environment and can serve as useful screening tools to help focus more detailed investigations. They are important because they permit us to gather useful information over a large area, or within a short amount of time, relative to other approaches requiring more detailed analysis of environmental conditions.

The following sensory water quality characteristics are the most obvious to the casual observer.

Algae: Excessive algal growth may be an indication of insufficient flow, high water temperatures, lack of riparian cover, excessive nutrients or other factors. The presence of some algae is natural and important because it forms the base for the food chain. An imbalance in the amount of algae can decrease water clarity and alter the color of the water.

Foam: The presence of foam may be an indication of detergents, excessive nutrients or other unnatural inputs to the waterway. While foam may be an undesirable result of pollution, it can also result from the presence of natural protein sources (for example, kelp and other natural organic matter whipped into a frothy foam due to wave action along a beach.)

[1] For purposes of citizen monitoring, it is not advisable to taste the water found in drains, streams, lakes, and bays. Such untreated water may contain contaminants and microorganisms that can cause illness.

Turbidity: In a general sense, this is also referred to as a lack of transparency or clarity. It is most commonly associated with rainfall events but can also be associated with excessive algal growth (e.g., a red tide) or point source pollution. In addition to visual observations of turbidity, this parameter can also be measured by empirical procedures.

Color: Color can be assessed for both flowing water (e.g. in streams) or in lakes, estuaries or bays. Poor color (e.g. brown or yellowish) can indicate turbidity caused by sediment, pollution, or excessive algae blooms.

Oil: Oil on the surface of water may be a result of naturally occurring lipids, but more commonly is an indicator of petroleum. Most of the hydrocarbon molecules found in petroleum are lighter than water and therefore float at its surface. Even very small amounts of oil can cause large rainbow colored "sheens," which result from the fact that hydrocarbon molecules are repelled by water molecules. When weathered oil winds up on a shoreline, the lighter molecules evaporate or degrade, and the remaining tar is left behind. While petroleum is biodegradable, it is also toxic.

Litter: Litter degrades the aesthetic quality of a water body, but is often detrimental to wildlife due to entanglement or even ingestion. Litter can also increase nutrient loading.

Odor: Certain odors, such as chemical, petroleum, decay, fecal matter, and "rotten egg" smells can indicate water quality problems.

How is It Measured?

Measuring these characteristics of water quality through visual assessment requires careful recording of observations. It also requires that the information be collected in an objective, unbiased manner. The principal methods require minimal technical equipment and training and rely primarily on the monitor's sensory abilities and common sense. The narrative approach involves the use of standardized forms to interpret visual (and other sensory) observations into words or numeric descriptions. The photographic approach provides a permanent visual documentation of specific conditions.

Standard Operating Procedure (SOP)-4.2.1.3

California Stream and Shore Walk Visual Assessment

(CARCD 2001, Written by TAC Visual Assessments work group)

Introduction:

The Stream and Shore Walk Visual Assessment protocol and data sheets are intended to provide a template for volunteer monitoring groups throughout California to collect baseline data for gross problem identification within a watershed. The protocol is designed for use by volunteers with limited equipment and training. Two to three volunteers should be able to survey a reach of stream or shore within 2-3 hours, depending on terrain and accessibility.

Survey reach lengths should be approximately ¼ to ½ mile in length, depending on the terrain and accessibility.

Frequency of Survey: Frequency of the survey should be based on the monitoring goals. Two types of goals are provided below:

1) Gross problem identification. In this situation, it is assumed that, based on the results of an initial Stream or Shore Walk, a more in-depth monitoring program will be designed to evaluate specific non-point or point source pollution problems.

2) Baseline monitoring. For baseline monitoring, it is recommended that volunteers survey the same reach 2-3 times per year, specifically during early spring (before trees or shrubs are in full leaf and water levels are generally high), late summer (when water levels are low), or late fall (US EPA 1997).

Equipment:

Required

- Data sheets and clipboard
- Pencil/pen
- Topographic Map
- Road map
- Camera and Film
- Ruler (for scale)
- Waterproof boots or waders

Optional

- Plant communities guide for your region
- Additional water testing equipment
- Transparent cup for evaluating the color of the water
- GPS unit

Monitoring Team:

For safety and logistical purposes there should always be a minimum of two people performing the survey. The duties of the team are as follows:

- Note-taker
- Observer
- Observer/Photographer

Safety Concerns:

Stream and shore walk volunteers should ALWAYS put safety first. For safety reasons, always have at least 2 volunteers for the survey. Make sure that the area(s) you are surveying either are accessible to the public or that you have obtained permission from the landowner prior to the survey.

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.

Instructions for completing the California Stream and Shore Walk Visual Assessment Form:

Body of Water: Write in the name of the stream or tributary you are surveying. If you are surveying a lake, reservoir, estuarine or coastal environment write in the name of that lake or water body.

Watershed Name: Write in the name of the watershed you are surveying in. The watershed and stream name will often be the same name. If you are surveying a tributary to a bigger watershed, the watershed name will be different. For instance, if your survey reach is on Deer Creek which flows into the Sacramento River, the Stream Name

will be "Deer Creek" but the Watershed Name will be "Sacramento River." In coastal environments the watershed will be that of the river or creek flowing into the bay nearest your position. For example, if you are surveying Surfrider Beach on Santa Monica Bay (the waterbody) in the vicinity of the mouth of Malibu Creek, then the watershed would be "Malibu Creek."

County: Please write the name of the County your survey reach is located in.

Volunteers: List the names of all volunteers present during the survey

Date: Write the date when the survey was actually conducted.

Reach Length: Indicate the distance of stream or shore surveyed. The protocol recommends surveying ¼ to ½ mile. If a different survey length was surveyed please explain why in the notes section. To determine the length of the reach use your maps or the odometer of your car. There may be cases when physical landmarks such as bridges, roads, or tributaries will bracket the reach. In such cases these starting and ending landmarks may dictate the length of the reach.

Start Time: Include the start time of the survey (when you began to collect information). Be sure to include "a.m." or "p.m."

End Time: The time you finished collecting information. Be sure to include "a.m." or "p.m."

Weather in past 24 hours:

Record any applicable weather codes using the codes provided on the right side of the datasheet. Of special importance is any precipitation information (see below).

Precipitation in past 24 hours:

If any rainfall has occurred within the last 24 hours, circle "yes." If no rain has occurred during the last 24 hours, circle "no." If you know how much precipitation occurred during the last 24 hours, please record the amount in inches. If you record the inches of precipitation, reference your source for that information (e.g., newspaper, rain gauge, weather service website, television, etc.) here or in the comments section.

Current weather conditions:

Record all applicable weather codes at the start of the survey. For instance, if the weather is sunny and windy, record a "0" and a "2" in the box.

Starting point: Where possible, begin your survey at a prominent landmark (e.g. a bridge, or some other feature that will be easy to find again on subsequent surveys). If no prominent landmark is present, describe the starting point in detail. In some cases, you can use surveyor's flagging, stakes or some other type of reference mark for subsequent visits. Provide enough details and instructions so that someone who had never been to the site could locate it. On streams, if possible, try to plan your observations so that the starting point is downstream of the ending point (i.e., you then proceed upstream.)

Station ID: Give the starting and ending point a unique station identifier for database use. An example for the lower reach of Pescadero Creek would be "PC-LWR-001."

Latitude: Determine latitude from a topographic map, GPS unit, software program, or other means and record it in the box.

Longitude: Determine longitude from a topographic map, GPS unit, software program, or other means and record it in the box.

Starting Point Observations:

The following eight parameters should be assessed using the codes provided on the right side of the datasheet.

Odor: An odor, of natural or human-induced origin, may be present at a specific point of your survey reach that you can detect. If so, record the number of odor type from the "Terms and Descriptions" page. If "other" is chosen, describe the type of smell present.

Algae: Any type of algal growth present in the stream or waterway should be classified by the percentages listed on the "Terms and Descriptions" page.

In a stream, or flowing waterbody, excessive algal growth may be an indication of insufficient flow, high water temperatures, lack of riparian cover, excessive nutrients or other factors.

The presence of algae in a lake or bay is important because algae converts inorganic material to organic material; oxygenates the water; provides the base for the food chain; and affects the amount of light penetrating the water column. An imbalance in the

amount of algae in a lake or bay can decrease water clarity and alter the color of the water. Too much algal growth can be a sign of excessive nutrients.

Foam: If foam is present at a particular site, assess whether the foam appears as:

0) **None**-no sign of foam or bubbles.
1) **Separated bubbles**-floating bubbles or groups of small bubbles on the surface of the water that do not form a contiguous layer on the surface; bubbles do not form patches greater than 3 inches in diameter.
2) **Moderate foam**- contiguous bubbles (bubbles attached together) forming foam patches with a diameter of more than 3 inches but having a height of less than 1 inch.
3) **High foam**-large frothy accumulations of foam, approximately 1 inch or more in height and with a diameter greater than 1 foot.

The presence of foam may be an indication of detergents, excessive nutrients or other unnatural inputs to the waterway. While foam may be an undesirable result of water pollution, it sometimes can result from natural causes (for example, kelp and other natural organic matter whipped into a frothy foam due to wave action along a beach).

Turbidity: Turbidity can be described in 3 ways:

0) **Clear**-the water is clear and the observer can easily see the bottom.
1) **Cloudy**- the water is somewhat cloudy but the observer can see greater than 4 inches below the surface of the water, or the bottom of the waterway can be seen in greater than 4 inches of water.
2) **Murky**- the water is very turbid and the observer cannot see any more than 4 inches below the surface of the water, or the observer cannot see the bottom of the waterway in 4 inches or less of water.

If your group has sampled and measured for turbidity at time of your survey, then in addition to the narrative turbidity observation, also give the measured result along with its units (e.g., 5.5 NTU).

Turbidity is most commonly associated with rainfall events but can also be associated with excessive algal growth or point source pollution.

Flow: Estimate the amount of water present in the channel, or the flow status. The flow categories for streams are described below:

0) **None**- dry (no water is present in the channel.)
1) **Low**- water fills 25-50% of the channel.
2) **Medium**- water fills 50-75% of the channel.
3) **High**- water fills 75-100% of the channel and reaches the base of both lower banks.
4) **Flooding**- water level exceeds channel and bankfull.

If you are aware of a measured flow rate (e.g., provided by an agency), or if your group has measured the flow at the time of your survey, then in addition to the narrative flow observation, also give the measured flow rate along with its units (e.g., 10 cubic feet per second). If agency flow data is used give its source (e.g., USGS, DWR, etc.). You may need to use the comment section if this information does not fit in the flow box.

If you are surveying the shoreline of a lake or reservoir then mark the flow box **NA**. If you are surveying a tidally influenced shore, record whether or not the tide is low or high as follows:

HT **High tide**
ET **Ebb tide**, between high and low tide when the tide is falling
LT **Low tide**
FT **Flood Tide,** between low and high tide when the tide is rising

Oil: The visual presence of petroleum or other oily substances can be described in 3 ways:

0) **None**- no oily sheen present.
1) **Light sheen**-a thin accumulation of oil (<1/8 inch) at the surface of the water with the appearance of rainbow colors or metallic appearing patches.
2) **Slick**-a thick accumulation of oil (>1/8 inch) floating at the surface.
3) **Tar on banks/bed**-Solid or semi-solid accumulations of oil on the shore (e.g. adhering to the sediment or rocks above the water line).

Litter: Include all litter observed within the waterway, along the banks or shore within a 20 meter diameter area (10 meter radius of your position.) Banks or shoreline should be surveyed away from the water for 10 meters.

Color: Color can be assessed for both flowing water (e.g. in streams) or in lakes, reservoirs, estuaries or bays. Poor water color (e.g. brown or

yellowish) can indicate turbidity caused by sediment, excessive algal growth and/or a point source pollution problem.

Flowing water-To determine water color in flowing streams where little canopy cover is present, determine the color by just looking at the stream.

If it is difficult to determine the water color due to extensive canopy cover, shallow water (substrate visible) or light reflection, use the "cup method:"

a) Use a transparent plastic cup to collect a sample of water from the stream. Be sure to minimize the bottom sediments in the sample.
b) Place a piece of white paper behind the cup and with the sun at your back observe the color of the water.

Lakes, reservoirs, estuaries and bays- Observe the color at the water surface, and record the narrative results (blue, blue-green, etc.).

The Forel-Ule color scale is traditionally used in estuarine or marine environments. If you have a Secchi Disc and a Forel-Ule color scale, use the following method: With the sun at your back, and the Secchi disc near its extinction depth, determine the best match with the Forel-Ule scale. In cases where wave action, current flow, or boat movement make Secchi observations difficult, raise the disc to the depth which minimizes the interference caused by movement but still allows for adequate color. When recording the Forel-Ule color always label the result starting with FU, then give the Roman Numeral, with the corresponding Arabic number in parentheses. For example, **FU IV (4)**. **Even if you use the Forel-Ule scale also record the narrative color (e.g., blue-green).**

List land uses and activities:

Based on your observations, record the primary land uses and/or activities occurring within ¼ mile of the waterway you are surveying. You may also be able to obtain a copy of a land use map for the area through your county or city planning department.

Discharges, seeps or leaks:

If you come across any obvious discharge points during the survey, fill out the "discharges" section with the discharge(s) observed. A discharge point may not necessarily be a pipe or drain but could

also be a dumping location for trash, etc. If no discharge points were observed, write zero or "none" in this section. You may also use the "Notes" section if you need additional room.

Briefly describe the location (you may need to use additional space provided in the "Notes" section).

Using the codes provided on the bottom of the datasheet, list the "discharge point" (e.g., pipe, open concrete storm drains, earthen drains) and the "discharge type" observed (if there are any). Also fill out the information regarding flow, odor, foam, turbidity, color, oil and litter in the same manner described above.

Dominant stream- or shore-side vegetation:

***Note: this section is for observers who have some knowledge of the local flora. If you do not know primary plant species or native vs. nonnative plants, put a slash through this section.**

% Native- Estimate the percentage of native vegetation present throughout the reach surveyed. Optional: If you can identify the primary species, list them or describe them (common names are acceptable).

% Non-native- Estimate the percentage of non-native vegetation present throughout the reach. If you can identify the primary species, list them or describe them (common names are acceptable).

Natural vegetation zone width- Estimate the overall width of the natural vegetation on both sides of the stream or along the shoreline. If there is little or no natural vegetation present, please describe what is present (e.g., golf course, cement path, etc.).

Ending point: Where possible, end your survey at a prominent landmark (e.g. a bridge), something that will be easy to find again on subsequent surveys. If no prominent landmark is present, describe the ending point in detail. In some cases, you can use surveyor's flagging, stakes or some other type of reference mark for subsequent visits. Provide enough details and instructions so that someone who had never been to the site could locate it. Record the Station ID, Latitude and Longitude in the same manner as described above for the Starting point.

Ending point observations:

Fill this section out the same way the "Starting point observations" section was filled out.

Notes, special problems, comments:

Use this section to describe any of the above parameters in further detail. This section can also be used to identify any special problems, illegal activities, or interesting observations (e.g. wildlife, fish, etc.).

Photos taken: We strongly recommend that this survey be used in conjunction with photo documentation. Standard Operating Procedure 3.11.3 is the recommended protocol for photo documentation. We encourage that you briefly include photo information on the stream and shore walk form so that any photos taken during the survey can be tracked. When taking photos, complete and attach the photo-log from the photo documentation protocol.

Draw a map of the reach or shoreline:

After you have walked the reach, draw a map or sketch of the reach that depicts the key features including: start and stop points; vegetation features; discharges; stream or shoreline modifications; stream diversions; possible fish barriers; erosion, photo point locations, direction of flow, and a "north arrow" (approximate direction of north).

Possible barriers to fish passage, stream/shore modifications, such as diversions, stream channelization, or armoring (e.g., rip rap):

If you encounter any of the above problems, use this section to describe each location where a barrier, diversion, modification or channelization was observed. Make sure you include it in your map or site sketch as well. With regard to possible fish barriers, take into consideration flow levels throughout the year, i.e., will an object or structure be a barrier to fish passage at the time of the year in which fish migration occurs.

Erosion, unstable banks, bed conditions (sedimentation):

If you encounter any areas of erosion, bank instability or excessive bed sedimentation during the survey, describe each location and, using the codes provided on the Terms sheet, list the code that corresponds to the observed problem.

Special problems: Using the codes provided on the Terms sheet, list any special problems observed.

Comments: Use this section for any other pertinent comments or information regarding survey observations.

Glossary

The following definitions were taken from the following references: 1. California Deptartment of Fish and Game, California Salmonid Stream Habitat Restoration Manual, 1998; 2. Oregon Watershed Enhancement Board, Oregon Watershed Assessment Manual, Salem, Oregon 1999; 3. United States Environmental Protection Agency, Volunteer Stream Monitoring: A Methods Manual, EPA 841-B-97-003, 1997.

Bankfull stage: Corresponds to the discharge at which channel maintenance is most effective, that is, the discharge at which moving sediment, forming or removing of bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels. The bankfull stage is the most effective or is the dominant channel-forming flow, and has a recurrence interval of 1.5 years.[1]

Benthic: Pertaining to the bottom (bed) of a water body.[3]

Canopy cover: The terrestrial vegetation that projects over the stream. [1]

Channel: A natural or artificial waterway of perceptible extent that periodically or continuously contains moving water. It has a definite bed and banks which serve to confine the water. [1]

Channelization: The straightening of a stream; this often is a result of human activity. [3]

Cobble: Medium-sized rocks (2-10 inches) that are found in a streambed. [3]

Cover: Anything that provides protection from predators or ameliorates adverse conditions of stream flow and/or seasonal changes in metabolic costs. May be instream cover, turbulence, and/or overhead cover, and may be for the purpose of escape, feeding, hiding, or resting. [1]

Culvert: Man-made construction that diverts the natural flow of water. [3]

Deposition: The settlement or accumulation of material out of the water column and onto the streambed. Occurs when the energy of flowing water is unable to support the load of suspended sediment. [1]

Effluent: Wastewater discharge. [3]

Embeddedness: The degree that larger particles (boulders, rubble, or gravel) are surrounded or covered by fine sediment. [1]

Fish habitat: The aquatic environment and the immediately surrounding terrestrial environment that, combined, afford the necessary biological and physical support systems required by fish species during various life history stages. [1]

Flow: a) The movement of a stream of water and/or other mobile substances from place to place; b) The movement of water, and the moving water itself; c) The volume of water passing a given point per unit of time. Synonym: Discharge. [1]

Glide/run: Section of a stream with a relatively high velocity and with little or no turbulence on the surface of the water. [3]

Headwaters: The origins of a stream. [3]

Instream cover: Areas of shelter in a stream channel that provide aquatic organisms protection from predators or competitors and/or a place in which to rest and conserve energy due to a reduction in the force of the current. [1]

Lake: An inland body of standing water of considerable size.

Macroinvertebrate: Organisms that lack a backbone and can be seen with the naked eye. [3]

Outfall: The pipe through which industrial facilities and wastewater treatment plants discharge their effluent (wastewater) into a waterbody.[3]

Pool: Deeper portion of a stream where water flows slower than in neighboring, shallower portions. [3]

Pool-riffle ratio: The ratio of the surface area or length of pools to the surface area or length of riffles in a given stream reach, frequently expressed as the relative percentage of each category. [1]

Reach: A section of stream possessing similar physical features such as gradient and confinement; usually the length of stream between two tributaries.[2]

> Representative reach: A length of stream that represents a large section of the stream with respect to area, depth, discharge, and slope.
>
> Specific reach: A length of channel uniform with respect to selected habitat characteristics or elements (discharge, depth, area, slope, population of hydraulic units), fish species composition, water quality, and type and condition of bank cover.

Reservoir: An artificial lake where water is collected as a water supply.

Riffle: Shallow area in a stream where water flows swiftly over gravel and rock. [3]

Riparian: Pertaining to anything connected with or immediately adjacent to the banks of a stream or other body of water. [1]

Riparian vegetation: Vegetation growing on or near the banks of a stream or other body of water on soils that exhibit some wetness characteristics during some portion of the growing season. [1]

Riparian area: The area between a stream or other body of water and the adjacent upland identified by soil characteristics and distinctive vegetation. It includes wetlands and those portions of floodplains and valley bottoms that support riparian vegetation. [1]

Rip-rap: Rocks used on an embankment to protect against bank erosion. [3]

Sediment: Fragmental material that originates from weathering of rocks and decomposition of organic material that is transported by, suspended in, and eventually deposited by water or air, or is accumulated in beds by other natural phenomena. [1]

Seep: An area of minor ground water outflow onto the land surface or into a stream channel. Flows are too small to be a spring. [1]

Sheen: The glimmering effect that oil has on water as light is reflected more sharply off of the surface. [3]

Stream (includes creeks and rivers): A stream is a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation. [1]

Types of streams:

Ephemeral: One that flows briefly only in a direct response to precipitation in the immediate locality and whose channel is at all times above the water table.

Intermittent or seasonal: One in contact with the ground water table that flows only at certain times of the year as when the ground water table is high and/or when it receives water from springs or from some surface source such as melting snow in mountainous areas. It ceases to flow above the streambed when losses from evaporation or seepage exceed the available flow.

Perennial: One that flows continuously throughout the year. Synonym: Permanent stream.

Stream bank: The portion of the channel cross section that restricts lateral movement of water at normal water levels. The bank often has a gradient steeper than 45 degrees and exhibits a distinct break in slope from the stream bottom. An obvious change in substrate may be a reliable delineation of the bank. [1]

Substrate: The mineral and/or organic material that forms the bed of the stream. [1]

Thalweg: The line connecting the lowest or deepest points along a streambed. The deepest part of the channel. [1]

Tributary: A stream feeding, joining, or flowing into a larger stream. [1]

Undercut bank: A bank that has had its base cut away by the water action along the man-made and natural overhangs in the stream. [1]

Velocity: The time rate of motion; the distance traveled divided by the time required to travel that distance. [1]

Watershed: A catchment area or basin. The total land area draining to any point in a stream, as measured on a map, aerial photo or other horizontal plane. [1]

Wetland: An area subjected to periodic inundation, usually with soil and vegetative characteristics that separate it from adjoining non-inundated areas. [1]

CALIFORNIA STREAMWALK VISUAL ASSESSMENT

Stream Name:

Watershed Name:

Start Time:

End Time:

Volunteers:

Date:

County:

Reach Length (Write approx. length of reach surveyed):

WEATHER (please write all weather codes that apply)**:**

0. Clear/sunny
1. Calm
2. Lt. Breeze
3. Windy
4. Very windy
5. Overcast/cloudy
6. Partly cloudy
7. Foggy
8. Drizzle
9. Rain
10. Snow
11. Hail
12. Other

Past 24 hours:

Current conditions:

Precipitation in past 24 hours: **inches:**

yes

no

STARTING POINT (Describe):

Site #:

GPS Latitude:

GPS Longitude:

STARTING POINT OBSERVATIONS:

Odor:
0. None
1. Feces
2. Fishy
3. Musty
4. Decay
5. Ammonia
6. Petroleum
7. Sulfide
8. Chlorine
9. Other

Odor:

Algae:
0. None
1. Light (<5%)
2. Mod. (5-25%)
3. High (26-50%)
4. Dense (>50%)

Algae:

Foam:
0. None
1. Separated bubbles
2. Moderate (<1/2 in high)
3. High (>1/2 in high)

Foam:

Turbidity:
0. Clear
1. Cloudy (can see the bottom in >4" water)
2. Murky (can't see bottom in 4" or less)

Turbidity:

Flow:
0. None
1. Low
2. Med.
3. High
4. Flood

Flow:

Oil:
0. None
1. Light sheen
2. Slick
3. Tar on banks/bed

Oil:

Litter:
0. None
1. Light (< 5 pcs)
2. Mod. (6-10 pcs)
3. High (11-25 pcs)
4. Somewhat dense (26-50 pcs)
5. Dense (> 50 pcs)

Litter

Color:
0. None
1. Blue
2. Brown
3. Olive brown
4. Green
5. Red
6. Yellow
7. Other

Color:

Depth in meters: Notes: _____

Depth 1: **Depth 2:** **Depth 3:** **Depth Avg:**

Width in meters:

Width 1: **Width 2:** **Width 3:** **Width Avg:**

Cross Section Shape:
0. Rectangular
1. U-shaped
2. V-shaped
3. Flat, homogeneous

Cross Section Shape:

Stream Type:
0. Straight
1. Channelized
2. Meandering
3. Braided

StreamType:

Pools Present:
0. yes
1. no

Pools?:

Riffles Present:
0. yes
1. no

Riffles?:

Overhead Canopy:
0. 0-25%
1. 25-50%
2. 50-75%
3. 75-100%

Overhead Canopy:

CALIFORNIA STREAMWALK VISUAL ASSESSMENT

WITHIN REACH: Banks are described as you look downstream

LAND USES (in order of importance, within 1/4 mile of stream reach):

0. undeveloped
1. residential
2. rural residential
3. commercial/offices
4. auto repair/gas station
5. industrial
6. sewage treatment
7. institution/school
8. landfill
9. agriculture
10. grazing (animals present?)
11. animal feedlot/dairy (animals present?)
12. fish hatchery
13. construction
14. logging
15. mining, tailings, pits
16. golf course
17. park/recreation facilities
18. timberland, undisturbed forest
19. open space (describe)
20. other (describe in comments)

left:				right:			

ROADS:

0. None
1. Trails (hiking/biking)
2. Trails (ATV)
3. Dirt roads
4. Gravel Roads
5. Paved / parking lots

left:				right:			

DISCHARGES:

Discharge Points:
0. none
1. pipes
2. concrete storm drains
3. earthen drainage ditches
4. other (describe)

Odor:
0. none
1. feces (sewage)
2. fishy
3. musty
4. decay (dead organisms)
5. ammonia
6. petroleum
7. sulfide (rotten egg)
8. chlorine
9. other (describe)

Algae:
0. none
1. light (<5%)
2. moderate (5-25%)
3. high (26-50%)
4. dense (>50%)

Foam:
0. none
1. separated bubbles
2. moderate (<1/2 inch high)
3. high (>1/2 inch high)

Turbidity:
0. clear
1. Cloudy
(can see the bottom in >4" water)
2. Murky
(can't see bottom in 4" or less)

Types of Discharges:
0. none (no flow)
1. groundwater seep or spring
2. pond drainage (overflow or from pipe)
3. industrial
4. sewage treatment plant discharge (after treatment)
5. residential/commercial/road storm water
6. agricultural
7. feedlot/dairy/grazing
8. leaking pipeline
9. illegal trash/waste dump site
10. other (describe)

Flow:
0. none
1. low
2. medium
3. high
4. flooding

Oil:
0. none
1. light sheen(rainbow)
2. slick
3. tar on banks/bed

Litter:
0. none
1. light (<5 pieces)
2. moderate (6-10 pieces)
3. high (11-25 pieces)
4. somewhat dense (26-50 pieces)
5. dense (>50 pieces)

Color:
0. none
1. blue
2. brown
3. olive brown
4. green
5. red
6. yellow
7. other (describe)

	Point	Type	GPS Location	Odor	Algae	Foam	Turb	Flow	Oil	Litter	Color
left:											
right:											

Riparian Vegetation Abundance:

0. None/Sparse
1. Occasional
2. Common

left:	right:

What causes the RIPARIAN ZONE to end?

0. Oak/Native woodland
1. Road (paved)
2. Road (dirt)
3. Logging
4. Agriculture
5. Residential
6. Commercial
7. Graded Land

left:	right:

Natural Vegetation Zone Width:

Estimate the width of natural vegetation along the banks or shore

0. 0-5m
1. 5-10m
2. 10-15m
3. 15-20m
4. > 20m

left:	right:

Dominant Streamside Vegetation: Estimate the percentage of native vegetation and non-native vegetation.
List species/common name, if known

Native Plants:
0. Barren
1. Coniferous trees
2. Broadleaf trees
3. Chaparral/Shrubs (<20')
4. Grasses

	left:	right:
% Native:		

List Native Plants:

left:	right:

Non-Native Plants:
0. Scotch Broom
1. Ivy
2. Vinca
3. Star Thistle
4. Blackberry
5. Arundo
6. Tamarisk
7. Others (describe)
8. Black Locust
9. Winter Vetch
10. Bermuda Grass

	left:	right:
% Non-native:		

List Non-Native Plants:

left:	right:

CALIFORNIA STREAMWALK VISUAL ASSESSMENT

WITHIN REACH -- CONTINUED

CHANNEL CONDITIONS

Stream banks:

0. Natural streamside cover degraded
1. Banks artificially modified/stabilized
2. Garbage/junk adjacent to stream
3. Discharge adjacent to stream
4. Evidence of camping/living
5. Fire
6. Natural condition

left:	right:

Stream Diversions:

0. None
1. Ditch
2. Pipe
3. Weir

left:	right:

Garbage/junk in stream:

0. None
1. Organic (food, grass clippings)
2. Plastics (cups, bags, bottles)
3. Recyclables - not plastic (paper, glass)
4. Large items (appliances, cars, tires)
5. Cigarette butts

Presence of logs/ woody debris in stream:

0. None
1. Occasional
2. Common

Presence of other organic debris in stream:

0. None
1. Occasional
2. Common

Possible barriers to fish passage; stream channeling, straightening, modification.

(If only one bank, describe by R for rig and L for left as you look downstream.)

0. natural waterfall (>3' high)
1. beaver dam
2. man-made waterfall or dam
3. culverts/stream crossings
4. other (describe)
5. stream diversion
6. channelization
7. concrete channel
8. rip-rap
9. other (describe in comments)

	Location:	Type:
left:		
right:		

Erosion: unstable stream banks, sedimentation, bed conditions

Unstable bank conditions

0. none
1. loss of vegetative cover
2. collapsing vegetation
3. stream bank collapsed
4. stream banks eroding
5. other (describe)

Bed Conditions: (Sedimentation)

1. mud
2. Sand (up to 2 mm diameter)
4. Gravel (2 mm - 8 mm diameter)
5. Cobble (8 mm - 25 cm diameter)
6. Boulder (> 25 cm diameter)
7. other (describe)

	Location:	Bank conditions:	Bed conditions:
left:			
right:			

CALIFORNIA STREAMWALK VISUAL ASSESSMENT

ENDING POINT (Describe):

Site #:

GPS Latitude:

GPS Longitude:

ENDING POINT OBSERVATIONS:

Odor:
0. None
1. Fece
2. Fishy
3. Must
4. Deca
5. Ammonia
6. Petroleum
7. Sulfide
8. Chlorine
9. Other

Odor:

Algae:
0. None
1. Light (<5%)
2. Mod. (5-25%)
3. High (26-50%)
4. Dense (>50%)

Algae:

Foam:
0. None
1. Separated bubbles
2. Moderate (<1/2 in high)
3. High (>1/2 in high)

Foam:

Turbidity:
0. Clear
1. Cloudy (can see the bottom in >4" water
2. Murky (can't see bottom in 4" or less)

Turbidity:

Flow:
0. None
1. Low
2. Med.
3. High
4. Flood

Flow:

Oil:
0. None
1. Light sheen
2. Slick
3. Tar on banks/bed

Oil:

Litter:
0. None
1. Light (< 5 pcs)
2. Mod. (6-10 pcs)
3. High (11-25 pcs)
4. Somewhat dense (26-50 pcs)
5. Dense (> 50 pcs)

Litter

Color:
0. None
1. Blue
2. Brown
3. Olive brown
4. Green
5. Red
6. Yellow
7. Other

Color:

Depth in meters: Notes: _____

Depth 1: **Depth 2:** **Depth 3:** **Depth Avg:**

Width in meters:

Width 1: **Width 2:** **Width 3:** **Width Avg:**

Cross Section Shape:
0. Rectangular
1. U-shaped
2. V-shaped
3. Flat, homogeneous

Cross Section Shape:

Stream Type:
0. Straight
1. Channelized
2. Meandering
3. Braided

StreamType:

Pools Present:
0. yes
1. no

Pools?:

Riffles Present:
0. yes
1. no

Riffles?:

Overhead Canopy:
0. 0-25%
1. 25-50%
2. 50-75%
3. 75-100%

Overhead Canopy:

Notes, special problems, comments or wildlife sightings:

0. none
1. fish kills
2. wildlife kills
3. flooding
4. no flow
5. other

PLEASE REMEMBER TO FILL OUT END TIME AT TOP OF PAGE ONE

PHYSICAL HABITAT QUALITY
(California Stream Bioassessment Procedure)

WATERSHED/ STREAM: _____ DATE/ TIME: _____

COMPANY/ AGENCY: _____ SAMPLE ID NUMBER: _____

SITE DESCRIPTION: _____

Circle the appropriate score for all 20 habitat parameters. Record the total score on the front page of the CBW.

Parameters to be evaluated within the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/ Depth Regimes *(deep<0.5 m, slow<0.3 m/s)*	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow).	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in an area longer than the sampling reach

HABITAT PARAMETER	CONDITION CATEGORY			
	OPTIMAL	**SUBOPTIMAL**	**MARGINAL**	**POOR**
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.
	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities haveimpacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
	Left Bank 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Standard Operating Procedure (SOP) 4.2.1.4

Stream Photo Documentation Procedure

(CARCD 2001, Written by TAC Visual Assessments work group)

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)
- Steel fence posts for dedicating fixed photo points in the absence of available fixed landmarks

How to Access Aerial Photographs:

Aerial Photos can be obtained from the following federal agencies:

USGS Earth Science Information Center
507 National Center
12201 Sunrise Valley Drive
Reston, VA 22092
800-USA-MAPS

USDA Consolidated Farm Service Agencies
Aerial Photography Field Office
222 West 2300 South
P.O. Box 30010
Salt Lake City, UT 84103-0010
801-524-5856

Cartographic and Architectural Branch
National Archives and Records Administration
8601 Adelphi Road
College park, MD 20740-6001
301-713-7040

Roles and Duties of Team:

The team should be comprised of a minimum of two people, and preferably three people for restoration or other water quality improvement projects, as follows:

1. Primary Photographer
2. Subject, target for centering the photo and providing scale
3. Person responsible for determining geographic position and holding the photo sign forms or blackboard.

One of these people is also responsible for taking field notes to describe and record photos and photo points.

Safety Concerns:

Persons involved in photo monitoring should **ALWAYS** put safety first. For safety reasons, always have at least two 2 volunteers for the survey. Make sure that the area(s) you are surveying either are accessible to the public or that you have obtained permission from the landowner prior to the survey.

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.

Recording Information:

Use a systematic method of recording information about each project, photo point, and photo. The following information should be entered on the photo-log forms (blank form included in this document) or in a dedicated notebook:

- Project or group name, and contract number (if applicable, e.g., for funded restoration projects)
- General location (stream, beach, city, etc.), and short narrative description of project's habitat type, goals, etc.
- Photographer and other team members
- Photo number
- Date
- Time (for each photograph)
- Photo point information, including:
    - Name or other unique identifier (abbreviated name and/or ID number)
    - Narrative description of location including proximity to and direction from notable landscape features like roads, fence lines, creeks, rock outcrops, large trees, buildings, previous photo points, etc. – sufficient for future photographers who have never visited the project to locate the photo point
    - Latitude, longitude, and altitude from map or GPS unit
- Magnetic compass bearing from the photo point to the subject
- Specific information about the subject of the photo
- Optional additional information: a true compass bearing (corrected for declination) from photo point to subject, time of sunrise and sunset (check newspaper or almanac), and cloud cover.

For ambient monitoring, the stream and shore walk form should be attached or referenced in the photo-log.

When monitoring the implementation of restoration, fuel reduction, or Best Management Practices (BMP) projects, include or attach to the photo-log a narrative description of observable progress in achieving the goals of the project. Provide supplementary information along with the photo, such as noticeable changes in habitat, wildlife, and water quality and quantity.

Archive all photos, along with the associated photo-log information, in a protected environment.

The Photo Point: Establishing Position of Photographer:

1. Have available a variety of methods for establishing position: maps, aerial photos, GPS, permanent markers and landmarks, etc. If the primary method fails (e.g., a GPS or lost

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.

3. Time series: Photographs of these subjects at the same photo points should be repeated annually during the same season or month if possible.

4. Event monitoring refers to any unusual or sporadic conditions encountered during a stream or shore walk, such as trash dumps, turbidity events, oil spills, etc. Photograph and record information on your photo-log and on your Stream and Shore Walk Visual Assessment form. Report pollution events to the Regional Board. Report trash dumps to local authorities.

All Restoration and Fuel Reduction Projects – Time Series:

Take photos immediately before and after construction, planting, or vegetation removal. Long term monitoring should allow for at least annual photography for a minimum of three years after the project, and thereafter at 5 years and ten years.

Meadow Restoration:

1. Aerial view (satellite or airplane photography) if available.

2. In the absence of an aerial view, a landscape, long view showing an overlapping sequence of photos illustrating a long reach of stream and meadow (satellite photos, or hill close by, fly-over, etc.)

3. Long view up or down the longitudinal dimension of the creek showing riparian vegetation growth bounded on each side by grasses, sedges, or whatever that is lower in height

4. Long view of conversion of sage and other upland species back to meadow vegetation

5. Long view and medium view of streambed changes (straightened back to meandering, sediment back to gravel, etc.)

6. Medium and close views of structures, plantings, etc. intended to induce these changes

Stream Restoration/stabilization:

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 up or down the stream (from stream level) showing changes in the stream bank, vegetation, etc.

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.

5. Optional: Use a tape set perpendicular across the stream channel at fixed points and include this tape in your photos described in 1 and 2 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.

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):

PHOTO SIGN FORM: Print this form on yellow paper. Complete the following information in black marker for each photograph. Include in the photographic view so that it will be legible in the finished photo.

Location:

Subject Description:

Date:

Time: