# Step-by-Step Instructions

# For Snapshot Day Water Quality Assessment

## STEP 1: Go to site.

Follow the detailed directions and map provided to the sampling site. If you are at a site that has previously been inspected, you should find either a white tag hanging from a nearby branch or colored flagging in the ground near the streambank location. If you do not find any survey stakes, tags or flagging, then you will have to carefully define your own section. (This location is able to be documented on the both the Field Data Sheet and the Visual Assessment Sheet.) At this point, you will complete each of the following:

- **Fill out all forms (field data, begin visual assessment and weed mapping);**
- **Conduct water quality field measurements;**
- **Collect water quality samples (or grab samples);**
- **Complete the Stream and Shore Walk - Visual Assessment Form;**
- **Complete the Invasive Weed Mapping Sheet**
- **Photo document (take pictures of) the site.**

## STEP 2: Complete the Field Data Sheet (green sheet).

Locate the green Field Data Sheet. Fill out each portion of the Field Data Sheet including the following:

**1. Date**

**2. Station ID** - each stream or shoreline location has been given a unique 7- or 9-digit alphanumerical code. The first three digits represent the major watershed (i.e. NLT=North Lake Tahoe, SLT=South Lake Tahoe, MTR=Middle Truckee River, and LTR=Lower Truckee River). The next four digits represent the stream or location. If there are two additional numbers, these represent the location of the point on the stream with –00 at the mouth, -01 upstream, -02 further upstream, and so on.

**3. Creek Name**

**4. Site Description –** succinctly describe the water quality monitoring site

**5. Team Leader & ALL team members** who went to the site

**6. Observations –** WRITE TIME that observations are conducted; circle one for each of the following:

- **Cloud cover**
- **Precipitation –** this is precip that is happening at the time of sampling; Rain in the Past 24 Hours will be posted the morning of Snapshot Day for you to record on this sheet.
- **Wind**
- **Water Clarity –** how clear is the water? How far can you see into it?
  **Clear =** water is clear and the observer can easily see the bottom.
  **Cloudy** = water is somewhat cloudy but observer can see **> 4 inches** below the surface of the water, or the bottom of the waterway can be seen in **> 4 inches** of water.
  **Murky =** water is turbid and observer cannot see any more than 4 inches below the surface of the water, or observer cannot see the bottom of the waterway in 4 inches or less of water.
- **In-Stream Flow –** what is the flow of the water in the stream?
  **Dry creek bed =** no water in the channel
  **Isolated Pools =** there is water in pools along the reach but there is no flow occurring between these pools
  **Trickle =** there is a minimal amount of water flowing in the channel; a wide portion of the channel bed sediments are exposed

**Slow =** the greater portion of the bed is underwater, but the flow is smooth and gentle; water fills less than 1/3 of the channel
**Moderate =** all the bed materials are underwater and flow is contained within the banks; water fills approximately 33-66% of the channel.
**High =** water fills the greater portion of the channel but is contained within the banks
**Flooding =** water is flowing over the banks unto the floodplain

- **Sample color –** it may be helpful to use a clear plastic or glass cup (if available) to determine water color; describe other color if different from available choices
- **Sample odor** - an odor of natural or human-induced origin may be present at a specific point of your survey reach that you can detect; circle one of the choices or provide description for other.

**7. Field Measurements** – at this time you will conduct water quality measurements and collect samples according to the protocols described in the next section; however, don't forget to complete the remainder of the Field Data Sheet when doing this.

- write in time that measurements were conducted
- for each measurement write in the **Instrument ID**, a number written on the equipment
- fill in the **Result** of the measurement
- do not write in the gray areas; these are for quality assurance purposes
- estimate **Creek width** and **Creek Depth**; use a tape measure if you brought one; make a note of the measurement units and note if using estimate or measurement
- estimate **Channel Width** (also known as Bankfull Width); you may need to draw a stream cross-section to describe the shape of the stream and the location you chose for channel width
- If you are at a USGS gaging station, you will see a small silo or building; these instruments measure the stream flow. Write the USGS gage number down if you can find it.
- At this point you will collect water samples (see below). Make sure to circle the **Measurement Depth**

## STEP 3: Water Quality Field Measurement Protocols.

Not all teams will have the same equipment available on Snapshot Day, nor will all teams have all the equipment necessary to conduct all field measurements. Relatively inexpensive and simple-to-use kits are generally given to volunteer monitors. Meters and sophisticated lab equipment may be more accurate, but they are also more expensive, less flexible, and will only be given to teams with more experience. Decisions about field measurements for each location are based upon available monitoring equipment, volunteer capability, and the types of water quality problems and pollution sources likely to be encountered.

**NOTES:**

- If you have any problems finding the site or questions about sampling use a cell phone to call your Clean Water Team Coordinator:
  _____ .

- For a detailed description of why each of the following parameters is an important indicator of water quality, see **Appendix A** of your **Team Leader Training Handbook**.

1. **Water Temperature**
   Obtain air temperature first with a hand held thermometer in shaded location near stream.

   Obtain water temperature with hand held thermometer in center of flow or on edge in flowing water. Read thermometer while it is in the water. Place the thermometer in the water and keep it there for at least one minute. Read the temperature with the thermometer submerged and record the result and remember to report the units (degrees C or F).

**2. pH**

Take out one pH strip and dip it in the water for about 5 seconds. Compare the strip to the color chart on the outside of the box (close box first and don't forget to check both sides of box). Record the result. If the strip's colors are anywhere in between two standards, then record the midpoint number; for example, if the colors are between 7.0 and 7.5, record it as 7.25, and write 7.0 – 7.5 in the "Bracket" column. Place the spent pH strip in the dissolved oxygen kit for return to your coordinator.

**3. Dissolved Oxygen**

Fill the tube to the top with water and place an ampoule, sharp side down, in the tube. Snap the tip of the ampoule off and allow it to fill (it will turn blue as it fills). Remove the ampoule and invert a few times making sure the air bubble travels the length of the ampoule while inverting. Compare the ampoule to the standards provided in the kit with your back to the sun (don't wear sunglasses when making your reading.) Record the result in ppm. If the ampoule's color is anywhere in between two standards, then record the midpoint number; for example, if the color is between 8 and 10, record it as 9. You may pour out the remaining water in the tube, as it does not get contaminated in the testing process. Place the spent ampoule back in the kit for return to your coordinator.

**4. Electrical Conductivity (used for determining total dissolved solids, TDS)**

Standing down stream of your sampling site remove the cap and dip the hand-held conductivity meter in the water. You must read the result while the meter is still in the water. If you cannot do this, you may use the cap to collect a water sample. If this is necessary, dip (up stream) and pour (down stream) three times, then dip one final time (up stream) and carefully place the cap containing sample water back on the probe. Be careful not to get water above the protective gasket. Turn the instrument on and record the result (in μS = microseimens). Shut off the instrument, remove the cap and empty it. Dry and replace the cap before storing.

## STEP 4: Collect Water Samples ("Grab Samples")

Water samples are collected for analyzing conductivity, turbidity, nutrient and fecal coliform bacteria (not all sites). Follow the following steps for collecting water samples:

In general, sample away from the streambank in the main current. If you are located on a bend in the stream, the outside curve of the stream is often a good place to sample (the main current tends to hug this bank). DO NOT SAMPLE in a backwater area, an eddy or behind boulders. To collect water samples use the following procedures:

1. Label all bottles with the Site Location ID, date and time (if not already labeled).
2. Avoid touching the inside of the bottle or the cap.
3. Remember to take all bottles with you to the sample point. Try to disturb as little bottom sediment as possible. If you need to get into the water to collect the sample, enter from downstream of the sampling point. In any case, be careful not to collect water that has sediment from the bottom disturbance. Stand facing upstream. Take a few moments to let any sediment pass through the system before placing the container in the water.

4. Rinse the bottle three times prior to collection of the sample: fill the bottle each time about 1/5 full; shake the water around so that it coats the entire inside of the bottle. Do not use your hand to cap the end of the jug. Pour the water out over the bottom of the lid. Repeat two more times.
5. Collect the water sample on your upstream side, in front of you:
   - ❖ Hold the bottle in one hand by its neck and use the other hand to stabilize the base.
   - ❖ Dip the bottle sideways into the water so the mouth is facing upstream.
   - ❖ Collect the sample approximately 6 inches beneath the surface if possible, or mid-way between the surface and the bottom if the stream is shallow. In very shallow streams hold the mouth at the water surface.
   - ❖ The most critical thing is not to disturb bottom sediments that can end up in the sample.
   - ❖ Fill the bottle, leaving a 1-inch air space.
6. For **BACTERIA samples**, pour 100 ml of water from the milk jugs into the fecal coliform container. Note that you **do NOT** rinse the fecal coliform containers!!!
7. Cap each bottle carefully, remembering not to touch the inside.
8. **IMPORTANT:** fill in the bottle number and/or site number on the appropriate field data sheet. This is so the lab coordinator will know which bottle goes with which site.
9. Place samples in a cooler and take them to the drop-off location.

## STEP 5: Complete the Stream and Shore Walk-Visual Assessment (yellow)

**Introduction**

The Lake Tahoe–Truckee Stream and Shore Walk Visual Assessment protocol and data sheets are intended to provide a template for volunteer monitoring groups to collect baseline data for gross problem identification within a watershed. Survey reach lengths should be approximately 100 meters in length (approx. 300 feet), **depending on the terrain and accessibility.** Citizen volunteers should be able to survey a reach of stream or shore within 2-3 hours, depending on terrain and accessibility.

**Instructions for Completing the Visual Assessment Form (yellow sheet)**
**C**omplete this form in as much detail as possible. Begin at the starting point of your stream reach.

**A member of your team can begin taking photos at the starting point (Following the Photo Documentation Procedure outlined below).**
**A member of your team can begin drawing the site map (page of the Visual Assessment).**

**Clarification and instructions for required field data**:

**1. Date** **2. Station ID –** see instructions from Field Data Sheet

**3. Creek Name** **4. Site Description - see instructions from Field Data Sheet**

**5. Reach Length -** Indicate the distance of stream or shore surveyed. The protocol recommends surveying 100 meters (300 feet). If a different survey length was surveyed please explain why in the notes section. To determine the length of the reach use your stride, maps or landmarks. 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.

**6. Team Leader –** name and contact information

**7. Starting Point Description:** where possible, begin your survey at the downstream survey stake (write downstream survey stake). If you do not find one, begin 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. Provide enough details and instructions so that someone who had never been to the site could locate it.

**8. Latitude & Longitude (optional)-** GPS the starting point if a unit is available. Please use UTM Zone 11, NAD 27.

**9. Water Inputs or Discharges –** while walking upstream, note any other waters that discharge to and enter the stream for which you are completing the visual assessment. Since there may not be any discharges, you may not need to fill out this section. Circle one descriptor of the categories listed below for EACH discharge point. If there are more than two discharges, use a blank section of the form to write in information regarding as many discharges as you observe. If you circle other, please provide a written description.

- **Input/Discharge Point:** what is the source of the discharge? Circle one.
  - **Pipe-** a culvert or some other type of pipe; draw location on map.
  - **Concrete drain channel –** a concrete channel of some sort
  - **Earth drainage ditch –** a drainage ditch that is dirt
  - **Swale-** a vegetated depression or channel
  - **Tributary-** a stream or creek that is flowing into the stream being assessed
- **Type of Input/Discharge-** circle one circle one or describe other
  - **Seep/spring –** water that appears to be coming out of the ground; the source of the water is not apparent
  - **Pond drainage-** water draining from a detention pond or other ponded source of water
  - **Industrial-** water draining from an industry
  - **Sewage –** water that drains a wastewater treatment plant or septic water
  - **Runoff –** water being discharged as a result of either: 1) snowmelt, 2) a rain event or 3) urban runoff
- **Flow discharge –** circle the flow of the discharge water into the stream
- **Water color –** circle one or describe other
- **Odor –** circle one or describe other
- **Other –** note the presence of any of the following, or any other observations:
  - **Algae or water plants**
  - **Oily sheen**
  - **Foam or suds**
  - **Litter or trash** (pick it up and remove it!)

**10. Dominant stream- or shore-side vegetation -** this section is for observers who have knowledge of the local flora. If you do not know primary plant species or native vs. nonnative plants, put a slash through this section. Otherwise, briefly describe the vegetation, including the following:

- **Percent 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).
- **Percent 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.).

11. **List land uses and activities:** Based on your observations, record the primary land uses and/or activities occurring within the reach you are surveying. Use the Land Use Observation Codes and list land use codes (by corresponding numbers) in order of dominance.
12. **Fish Barriers, Water Diversions, Modifications and Stream Channelizations:** If you encounter any possible barriers to fish passage, stream/shore modifications, such as diversions, stream channelization, or armoring (e.g., rip rap), 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 on the back 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.
    - CIRCLE the underlined word that best describes what you see.
    - WRITE a description of the location and include this location on the map on the back.
    - PHOTO documentation – take a photo of the various barriers, diversions, modifications or channelization that you observe

13. **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 the observed problem.
14. **Ending point:** If no survey stake is identified to define the reach boundary, 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.

15. **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).
16. **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.).

## STEP 6. Photo document the site

Use your photographs to provide a qualitative, and potentially semi-quantitative, record of conditions in a watershed or on a water body. Use your photographs 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 to document temporal progress for restoration efforts or other projects designed to benefit water quality. Photos provide a visual portrait of water resources to those who never have the opportunity to actually visit a monitoring site.

Photos can be used in reports, presentations, or uploaded onto a computer website or GIS program. Briefly describe photo information on the stream and shore walk form so that any photos taken during the survey can be scripted.

**Complete the photo-log from the photo documentation protocol.**
Take all necessary photos as described below. In general, there are eight (8) specific photos that are required:

1. Station ID Sheet (yellow sheet)
2. Picture of Monitoring Team (should show all members of the monitoring team –if possible)
3. Start Point – Looking Upstream

4. Start Point – View of Stream Bed
5. Start Point – Looking Across Stream
6. End Point – Looking Downstream
7. End Point – View of Stream Bed
8. End Point – Looking Across Stream

The remaining photos may be used to show unusual conditions or for fun photos. Stream walks should be initiated from a downstream position, traveling upstream. If possible, try to include a black board or yellow photo sign in the view, marked with the location ID. A photo sign will be included in your Snapshot Day materials.

## STEP 7: Complete the Invasive Weed Mapping Sheet

While you are conducting the visual assessment, look around the area to see if you can identify any invasive weeds. Invasive weeds are non-native plants that are prolific, highly competitive, and hard to control. They:

- Displace native plants,
- Decrease wildlife habitat,
- Reduce recreational values and uses,
- Damage water quality and clarity, and
- Cost millions of dollars each year in treatment and losses in productivity.

If you see anything that looks like any of the species provided in the pictures, please fill out this form as completely as possible. If you're not sure of the identification, collect a sample and make a note on the form. Also, make sure to take a few pictures of the plant, (one close-up and one with the landmarks that will help us find the location).

## STEP 8: Return to Your Staging Area Location:

At check-out:

- **Make sure that all of your forms are complete**
- **Make sure that all sample bottles are labeled with the following:**
    1. **Station ID**
    2. **Team Leader Name**
    3. **Date**
    4. **Time**
- **Complete "check out" form: return all forms, equipment, camera, and samples.**
- **Complete "chain of custody" form for all lab samples when you return to Staging Area Locaton.**
- **Complete a Snapshot Day Evaluation.**

## STEP 9: Utilize the Information That You Have Shared and Learned

Your inventory and monitoring data can serve as the basis for protecting your stream and potentially harmful land use decisions, or restoring your stream if it is already degraded.

You, your family friends and neighbors, and the people you elect to government offices at the local level are the real resource managers. By learning more and helping to promote environmental stewardship, you will in turn help to create an informed public voice that collectively can influence decisions that affect our environment, and subsequently our water resources.

THANK YOU FOR PARTICIPATING IN SNAPSHOT DAY!!!