

Lake Sampling Form instructions

There are two types of records used for collecting lake water samples; one documents lake characteristics and the other documents the actual water samples. Site characteristics are documented on two forms called Lake Sampling – Site Documentation (Form 1 and Form 2). These forms are used to document new sampling sites and to clarify and update existing site information.

The Lake Sampling – Sample Records (Form 3 and Form 4) are used to record each sample site visit. These forms are to be completed each time you visit a sample site and collect data.

Site Information is needed at the top of each form, but varies slightly.

Forms 1 and 3

Basic Site Information (common to Forms 1 and 3)

1. Forest Name: document the National Forest where the sample will be collected.
2. Wilderness Name (if applicable): If the sample site is in a wilderness area, document the wilderness name.
3. Stream Name (USGS): Document the stream name where the sample site is located. In some cases the stream will not have a name, in this case document “Unnamed Stream” or “Unnamed Tributary to Name of Stream”.
4. Stream Name (Local): Document the local stream name. In most cases this will be the same as the USGS stream name. In some cases an unnamed USGS stream may have a local name associated with it.
5. Site Name: Document the specific site name, as there may be more than one site on a single stream there is a need for a unique sample site name. This unique site name should be developed at the project level. For example, you have a stream named “Mill Creek” with 3 different sample site locations you may call each site “Mill Creek SS1”, “Mill Creek SS2”, and “Mill Creek SS3”.
6. Site ID: There is a need to have a unique identifier for each sample site location and this Site ID should also be developed at the project level. The unique ID can be a mix of letters and numbers in any logical sequence (make sure to document the naming convention). In this case you may want to look bigger than the stream where the samples are being taken to a forest or regional scale. Using the example above, for site name “Mill Creek SS1” on the Smokey Forest, in Region 10. You may abbreviate the names and numbers in the ID, for example, R10SFMILLCKSS1. R10 = Region 10, SF = Smokey Forest, MILLCK = Mill Creek, SS1 = Sample Site 1.
7. Date of Visit: Enter the date you visit the sample site. Check the box whether this is the first “Initial” visit to this site to establish it as part of a survey or monitoring effort, or if this site has been visited and documented previously and therefore this is a “Subsequent” visit.
8. Field Team Leader Information: Enter the name, affiliation, phone number, and email address of the responsible field person.

9. Access Information: Check all boxes that apply to the access of this site. Document any travel directions (attach map if available), estimated time of travel and any additional information that may be helpful in getting to this site.

Forms 2 and 4

Basic Form Header (common to Forms 2 and 4)

Note that each of these Forms has space near the top to enter information that identifies the stream, sample site and the date of sampling. This is an abbreviated version of the “Basic Site Information” described above. It is important to fully complete this “header” information on each Form to ensure data is kept together and consistent.

The instructions for completing the following four attributes are described under Basic Site Information above.

- Stream Name (Local): see item 4 above.
- Date of Visit: see item 7 above.
- Site Name: see item 5 above.
- Site ID: see item 6 above.

Lake Sampling – Site Documentation Form 1

Site Verification, GPS Information

1. Stream Verified: Does the available data match conditions observed on the ground sufficiently to verify that the intended sampling site has been located (check Yes/No)? Check all methods used to verify that you have located the correct site.
2. GPS Information: Record the coordinates from the GPS unit—Latitude and Longitude in decimal degrees (if possible to 6 decimal places)—include the Datum of the collected coordinates (e.g., NAD83). Record the Elevation in feet or meters, and if the GPS unit has the capability, record its accuracy in feet or meters.

Lake Assessment

The lake assessment data will be collected from field observations and recorded at the lake.

1. Shoreline Characteristics: Estimate the percentages of vegetation types within 20 meters of the shoreline (i.e., forest/shrub, herbaceous, wetland, barren). Also look at the observed land use in the same area, identify shoreline modifications (e.g., dock, riprap), development and/or agriculture. Use the following classes for these estimates (record the percent range on the form):
 - a. Rare (< 5%)
 - b. Sparse (5-25%)
 - c. Moderate (25-75%)
 - d. Extensive (> 75%)

2. Hydrologic Lake Type: Record the hydrologic type of the lake from the following:
 - a. Reservoir (Artificial human-made dam).
 - b. Drainage (outlet stream present; may or may not be flowing at time of visit).
 - c. Seepage (no outlet stream present, regardless of whether or not it is flowing at the time of visit).

If a dam is present select the appropriate type (e.g., artificial, augmented or natural). Record the number inlets and outlets of the lake (if present).

3. Macrophyte Observation: From a quick visual survey of the lake, estimate the percent of lake area covered by “emergent/floating” and “submergent” macrophytes (rooted aquatic plants large enough to be seen without magnification). Select the appropriate percent class (i.e., 0-25%, 25-50%, 50-75% or >75%). Record the average density of the macrophyte community (i.e., absent, sparse, moderate, dense)? Identify (if known) the one to three most prevalent macrophyte species.
4. Lake Trophic State: Eutrophication is the process whereby a body of water becomes over-enriched in nutrients, resulting in increased productivity of algae or aquatic plants (biomass) and sometimes also decreased dissolved oxygen levels. Based on the amount of biomass in the lake, record your estimation of the lake’s trophic state from the following classes:
 - a. Oligotrophic (low biomass production). Oligotrophic lakes are most common in cold regions underlain by resistant igneous rocks (especially granitic bedrock).
 - b. Mesotrophic (moderate or intermediate level of biomass productivity). These lakes are commonly clear water lakes and ponds with beds of submerged aquatic plants and medium levels of nutrients.
 - c. Eutrophic (high biomass productivity due to excessive nutrients, subject to algal blooms). Eutrophic waters commonly lack fish species like trout which require cold, well-oxygenated waters.
 - d. Hypereutrophic (very high biomass productivity - nutrient-rich). Lakes are characterized by frequent and severe nuisance algal blooms and low transparency.

Watershed Assessment

Most of this information can be obtained in the office through GIS analysis and aerial photo interpretation prior to visiting the sample site. It can be helpful to have this information completed prior to the first sampling visit. This information will help to locate the targeted sample location. In addition, the information is useful to verify (in the field) if the GIS analysis appears to be a valid identification of watershed characteristics.

1. Vegetation/Cover: Using GIS, ortho and/or aerial photos estimate the different vegetation types including exposed rock and talus. Document this as a percent of the watershed area above the sample site. Verify in the field if this appears to be a valid identification.
2. Lithology: If GIS information on bedrock lithology is available, indicate the primary lithology (e.g., granitic, volcanic, metamorphic). If there is more than one lithology, make note of additional significant lithology.

3. Watershed area: Using GIS digitize the watershed area above the sample site (the watershed size will vary based on the sample site location). Calculate the watershed area in acres or hectares. It will be helpful to determine the watershed area and boundary prior to determining other watershed assessment attributes.
4. Watershed aspect: the primary aspect of the watershed is determined by estimating the direction the watershed is facing based on the direction of stream flow. Indicate the aspect in degrees with North being 0°, East 90°, South 180°, and West 270°.
5. Average watershed slope: A simple way of calculating average slope percent within the watershed boundary is to use DEM GIS files and Zonal Stats in GIS Spatial Analyst.
6. Stream order: Identify the stream order at the sampling site location using the Forest Service NHD dataset.

Lake Sampling – Site Documentation Form 2

Establish Lake Level Reference Point

On the initial visit (or subsequent visit) to the lake establish a “Reference Point” for measuring lake level. If it is allowed, permanently monument the lake level location by marking a shoreline rock (e.g., inserting a bolt). Check the appropriate box (yes or no) indicating if there is a permanent marker. If a permanent monument is not allowed, identify a landmark (e.g., bathtub ring, rock formation or outcrop) to measure lake level from. Record in the space provided the type of monument or landmark used to mark the “Reference Point”. Describe the lake level reference point location with measurements and photos, document on Form 2 under Description and Sketch of Lake and Photo Log.

Measure the lake level at the time of establishing the reference point; record the distance from lake level to the reference point—include measurement units (feet, inches, meters or centimeters).

Description and Sketch of Lake and Sample Location

Record a description and sketch of the lake. This information can help in locating and characterizing the lake, it may include lake access, land marks, and land use indicators. Make sure to include sampling locations (e.g., mid-lake, shoreline or outlet), lake level reference point location, and photo points.

Photo Log

Take photos of the lake sampling site that will help identify the precise location. On the initial visit to the site it can be helpful to take additional photos to visually record lake and site characteristics (e.g., land use and vegetation). Record the photo ID or file name, date photographed, and description of the photo. It is recommended to attach these photos to the site documentation forms to include in the Forests hard copy files.

Additional Notes

Add any additional information that may help to identify, locate, or describe this site.

Lake Sampling – Sample Record Form 3

Basic Site Information

Suggested Revisions: Examine information recorded on the Lake Sampling-Site Documentation Forms. Indicate any suggested revisions or updates to the site documentation form. Place a check mark in all boxes requiring revision; explain the suggested revision in the space provided.

Water Samples and Replicates

1. Time Sampled: Indicate time of sample collection, using a 24-hour clock (thus, 4 pm is 1600). Note that the time recorded on the bottle(s) and syringe(s) for the replicates should differ from the time recorded for the normal (regular) sample. This is important! The recommended protocol is to separate the sampling times for normal and replicate samples by one minute.
2. Sample ID: Enter the unique identification code assigned to the sample (developed at the project level). These Sample ID codes are designed to be familiar to the project personnel and can represent the specific site, sample, type, and date, etc. For example, the Site ID combined with the sample type and/or date (e.g., "SITEIDREG" for a regular sample or SITEIDDUP for a duplicate sample). Note: Bar Codes provided by the ARM Lab are a unique identifier and have a specific location for placement on the form (see item 6 below).

The sample ID represents a sample of water (bottle(s) and/or syringes) intended to represent conditions at a particular location, on a particular day, at a particular time. *Note that multiple containers (bottle and/or syringes) obtained within one time window represent the SAME sample and receive the SAME ID code (and Bar Code).* Replicated samples will receive different ID codes (and Bar Codes).

3. Sample Depth: Record the depth at which the sample was collected. Indicate the units of measure (ft or m).
4. Sample Depth Zone: Record the limnetic zone (i.e., epilimnion or hypolimnion) where the sample was collected. If the limnetic zone is not known record either "surface" or "deep".
5. Sample Type: Record the type of sample collected (i.e., regular, replicate, or field blank).
6. Bottle Type: Record the type of bottle (or syringe) used for sample collection (i.e., plastic, glass, or syringe).
7. Number of Bottles: Record the number of sample aliquots (bottles or syringes) collected for the normal (regular) sample and any replicates that may have been collected.
8. Bar Code: The bar code (a unique number/letter ID) will be prepared and provided by the ARM Lab. Each year the lab provides new bar codes specific for that year. The bar code sheets will have multiple stick-on copies of the same barcode. These can be organized prior to field sampling and subsequently be affixed to the Stream Sampling Record Form, the Chain of Custody Form, and to each container (bottle or syringe) for the sample.
9. Collection Location: If the sample was not collected at the intended (targeted) location, explain the reason for changing the sample location.

General Observations

1. Record the time (24hr) when the general observations were made.
2. Air and Water Temperature: Record the air and water temperature collected to the nearest degree; check the units in degrees C or degrees F. Document the instrument used for measurement (e.g., certified thermometer or Clinefinder).
3. Weather Condition (current and previous): Check the boxes that best describe the collection day weather up to the time of sampling and the average weather over the previous 3 days (if known).
4. Lake Level Change: Measure the distance from lake level to the reference point (see initial or previous years established reference point for location) and record the measurement plus or minus (+ / -) the reference point—include measurement units (i.e., ft, in, m or cm). If there is no change from the reference point mark the “zero change” box on the form.
5. Observed Discharge Level: Indicate the observed level of discharge from the lake at the time of sampling. Check the appropriate box (i.e., no flow, low flow, normal flow, high flow or flood).

Lake Sampling – Sample Record Form 4

Transparency Data

Record two depth measurements using the secchi disk, 1) when the disk disappears and 2) when the disk reappears; select the appropriate unit of measurement. If the secchi disk was visible to the bottom of the lake, check the “Yes” box for clear to bottom.

Depth/Temperature Profile

1. Method/Instrument: Document the EPA/SM/USGS method used for the measurements, as well as the make and model of the equipment used for the profile.
2. Index Location and Depth: Indicate if the depth profile was measured at the index site or not. If the profile was collected in a different location explain reason. Record the total depth at the location of the profile and select the appropriate units.
3. Measurements: Collect the depth and measurements for that depth; record the depth and measurement values in the profile table for each parameter. Check the appropriate box for units of measure (temperature and DO). Indicate whether conductivity measurements are corrected to 25°C.

On-Site Water Data (optional)

If on-site water data were collected, record the measured values—the time measurements were taken, air temperature and water temperature (at sample site). Check the box for the appropriate measurement units. Note: Field Instrument Data - Express DO in units of mg/L and, if possible, % DO. Correct specific conductance to 25° C. Record the measurements, instruments and methods used for on-site water data collected.

Photo Log

Take photos of the lake sampling site that will help identify the precise location. It may be helpful to take additional photos to visually record lake and site characteristics (e.g., land use and vegetation). Record the photo ID or file name, date photographed, and description of the photo. It is recommended to attach these photos to the site documentation forms to include in the Forests hard copy files.