

Santa Barbara Coastal Long Term Ecological Research (SBC-LTER) Project

Stream Chemistry Sample Collection Protocol

Sampling Strategy

- Stream water samples are collected either manually (grab) just below the water surface in the thalweg, or by auto-samplers with a hose fixed to the bottom of the channel.
- Water samples are taken every two weeks during the dry season (approximately May through October) and once a week during the rainy season. These samples are termed *baseflow* samples.
- Water samples are collected every one to four hours during rainstorms. These samples are termed *storm* samples.
- The frequency of sampling during a storm is hourly throughout the rising limb of the hydrograph to capture the flashy nature of the streams in the study area and then extended to a frequency of several hours as flow subsides to pre-storm levels, which can be multiple days depending on the magnitude of the storm.

Sampling Protocol and Equipment

- All samples are collected in high-density polyethylene (HDPE) bottles which have been rinsed three times with deionized water.
- Bottle size depends on the target analytical procedure (60 mL, 500 mL, 1000 mL, and 2000 mL).
- Bottles are labeled with the site location code, date and military time (e.g., MC00 2/5/08 14:25).
- The information on each bottle label is recorded on a datasheet with the stream stage (for storm grab samples and baseflow samples) and any observations.
- Visual stage readings are taken either from a permanently fixed staff gauge (painted or bolted onto a structure) or measured from a fixed datum with an engineer's rule in feet.
- Once a sample is collected, it is immediately placed in an ice chest with ice and transported to the analytical laboratory at UC Santa Barbara where it is stored at 4° C until processed.
- Field datasheets are transferred into Microsoft Excel spreadsheets and merged with the analytical results; discrepancies between field notes and laboratory log sheets are corrected at this time.

Manual Sampling

I. Baseflow Sample Collection

- During baseflow conditions when the suspended sediment load is low, a filtered aliquot is collected in the field using a Nucleopore 47mm filter holder equipped with a Gelman A/E 1-micron glass fiber filter.
- A syringe is used to force the sample through the filter unit.
- Prior to sample collection the filter is flushed with approximately 100 mL of stream water.
- Filtered samples are collected in 60 mL bottles; bottle and cap are rinsed three times with filtered sample water before a sample is taken.
- An unfiltered stream water sample is collected at the same time, either 2 L for particulate analysis and electrical conductivity or 250 mL for electrical conductivity, depending on the sampling objective.

II. Storm Sample Collection

- During storms, unfiltered samples are collected in 500 mL bottles.
- Bottles and caps are rinsed with stream water three times before collecting a sample.
- At lower storm flows, samples are collected by wading into the stream, facing upstream and plunging the bottle below the surface with the open mouth also facing upstream.
- If wading to the thalweg of the stream is considered questionable or dangerous, samples are collected from a bridge by lowering a 500 ml bottle in a weighted holder into the center of flow.
- At some sites, a dipper on an extendable pole is used to collect samples from the thalweg.

Auto-Sampling

- Portable auto-samplers (Model 6712 Full Size Portable Sampler, Teledyne ISCO, Inc., Lincoln, NE, USA) are used when site suitability and access permits.
- The auto-sampler is powered by either an ISCO 934 Nickel-Cadmium battery or a standard 12-volt deep-cycle marine battery with an adapter.
- The auto-sampler and battery is secured in a chained or fastened aluminum box to minimize risk of potential vandalism or theft.
- The auto-sampler contains 24 500 mL polyethylene bottles in a radial configuration; water is transferred from the stream to the sample bottles through a vinyl suction hose (1/4 or 3/8 inches in diameter) using a peristaltic pump.

- Sample bottles and caps are rinsed three times with DI water before being placed in the auto-sampler.
- Ice is placed in the center of the carousel of sample bottles to keep samples cold throughout the sampling period.
- The vinyl suction hose is routed within a PVC pipe to protect it from stream transported debris or animal damage.
- The PVC pipe is anchored to the channel with lag bolts and metal clips.
- The auto-sampler can be preprogrammed to sample at a given interval, starting at a specific time, or when triggered by a flow activation switch (ISCO 1640 Liquid Level Actuator) placed at a selected stage elevation.
- The suction hose is automatically rinsed and purged before a sample is taken.
- Samples are collected at the completion of the sampling cycle (24 samples) and transported to the analytical laboratory at UC Santa Barbara where they are stored at 4 °C until processed.