

STREAM SAMPLING PROTOCOL

Terrestrial Group

SBC-LTER

University of California, Santa Barbara

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Sampling Strategy

Stream water samples are collected either manually (grab), just below the water surface in the thalweg, or by auto-samplers. Water samples are taken every two weeks during the dry season, approximately May through October, once a week during the rainy season, and every one to four hours during storms. 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 (60mL, 500mL, 1000mL, and 2000mL). Bottles are colored labeled with the site location code, date and military time (e.g., CP00 2/5/03 14:25). The label color indicates the required analytical procedure. The information on each bottle label is recorded on a datasheet with the stream stage, an estimate of the stream turbidity and any observations. Visual stage readings are taken either from a permanently fixed staff gauge (painted or bolted onto channel bank or wall) or measured from a fixed datum with an engineer's rule in feet. Once a sample is taken, it is then placed in an ice chest with cold packs or ice and transported within 48 hours to the analytical laboratory at UC Santa Barbara. There it is stored at 4° C until processed and between analyses. Field datasheets are transferred into MS Excel spreadsheets and merged with the analytical results; discrepancies between field notes and laboratory log sheets are corrected at this time.

Manual sampling:

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 thru the filter unit. Each new filter is pre-flushed with > 100 ml of DI water; prior to sample collection the filter is flushed with approximately 50 ml of sample water. Filtered samples are collected in 60mL 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 2L for particulate analysis and electrical conductivity or 500mL for electrical conductivity, depending on the sampling objective.

During stormflow unfiltered samples are collected in either 500mL, 1L or 2L bottles, depending on the sampler's estimate of sediment load (larger samples are needed when sediment load is low to provide adequate material for particulate analyses). Bottles and caps are rinsed with stream

water three times before collecting a sample. At low 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 by rope either a 2 gallon plastic bucket or a 500 ml bottle in a weighted holder into the center of flow; bucket samples are transferred to the appropriate size sample bottle while keeping the bucket constantly in motion to prevent sample segregation. At some sites, a dipper on an extendable pole is used to scoop samples from the stream. Dippers and buckets are rinsed three times before a sample is taken.

Auto-sampling:

Portable auto-samplers (ISCO 6712) are utilized at remote or difficult to access sampling locations (e.g., on private land with restricted access or storm drain manholes). They are powered by either an ISCO model 946 lead-acid battery, a ISCO 934 Nickel-Cadmium battery or a standard 12-volt deep-cycle marine battery with an adaptor. The auto-samplers and batteries are secured in chained or fastened aluminum boxes to minimize vandalism.

The auto-sampler contains 24 500mL polyethylene bottles; 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. The vinyl suction hose is placed in PVC or steel pipe to protect it from stream transported debris or animal damage. Hose and pipe are 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, 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.