

CAMP Benthic Invertebrate Field Sampling Protocol

Benthic invertebrate samples are collected in the late summer and fall within nearshore and offshore sampling areas (polygons) established within each of the CAMP waterbodies. The spatial extent of the nearshore and offshore polygons is 100 m x 100 m (at minimum) and large enough to adequately accommodate five replicate stations. A replicate station is a specific, fixed sampling location within a sampling area that can be determined, recognized, re-sampled, and defined quantitatively (e.g., UTM position and a written description). Replicate stations are minimally 10 m x 10 m and separated from other replicate stations by at least 20 meters. The same replicate station locations are re-sampled using the target UTM coordinates from previous sampling years. Three randomly collected benthic invertebrate samples (sub-samples) are combined into one composite sample in each of the five replicate stations, resulting in five invertebrate samples per nearshore and offshore polygon.

Sampling Methods

Nearshore polygon: Kicknet travelling kick/sweep

- The nearshore polygon targets water depths of ≤ 1 m in areas where substrate composition is reasonably consistent among replicate stations and water velocity is zero to low. Areas with aquatic macrophyte beds and inflows are avoided.
- Each replicate station is comprised of a 3-minute composite sample. Three one-minute sub-samples are collected along separate, randomly selected transects. Each transect is sampled using a zigzag travelling kick/sweep method in a perpendicular direction from the water's edge to ≤ 1 m water depth. The width of zig-zag is approximately 1 m. Transects are sampled by kicking the substrate to disturb it to a depth of approximately 5 cm and sweeping dislodged/disturbed invertebrates into the net bag.

Offshore polygon: Ekman/petite Ponar grab

- The offshore polygon targets water depths of 5 to 10 m in areas with homogeneous substrate and water velocity is zero to low.
- Each replicate station is comprised of three grabs (sub-samples) combined into one sample. Three sub-samples are collected using a random number table and sampled from designated sampling locations around an anchored boat within a replicate station.

Benthic invertebrate samples are sieved through a 500 μ m mesh rinsing bucket. All materials, including invertebrates, retained by the screen are transferred to labelled plastic jars and fixed in a 10% formalin solution. Internal labels are added to individual sample jars and checked to ensure the information matches the external sample jar data. Fixed and labelled samples are shipped to the laboratory for analysis.

Supporting Habitat Variables

A substrate grab sample is collected from each replicate station for laboratory analysis of particle size (percent sand, silt, and/or clay) and total organic carbon (TOC). Offshore substrate samples are collected with the same grab sampler used to collect invertebrate samples. Nearshore substrate samples are collected with a ladle/scoop or by hand at about 0.2 to 0.5 m water depth at a point or along points of the sampling transect. Sediment samples are not collected at sites where the nearshore substrate is predominantly hard (i.e., bedrock, boulder, and/or cobble); instead, a photograph and estimation of the substrate composition are recorded. Sediment samples are kept cool and in the dark until submitted to the analytical laboratory for analysis.

Site and supporting aquatic habitat data are recorded as described below.

At each polygon:

- Date, time, waterbody, habitat polygon, and field crew;
- Air and water temperature, cloud cover, precipitation; and
- Cardinal photographs using a GPS-linked camera.

At each replicate station:

- Location waypoint in UTM;
- Dominant riparian vegetation and percent canopy cover;
- Algae present or absent;
- Water colour, clarity, and Secchi depth; and
- Water velocity.

For each sample:

- Water depth; and
- Substrate composition (i.e., relative percents of coarse substrates, fine substrates, and organic matter).

Water Level Observations

Relative water level observations are recorded at all sites as described below.

Sites with Manitoba Hydro water level gauging stations:

- The temporary benchmark is located using the UTM and the benchmark description from past years. A description, UTM, and photographs of the benchmark are recorded; and
- The current water level and high-water mark relative to the benchmark location are photographed and the date and time are recorded.

Sites without Manitoba Hydro water level gauging stations:

- The temporary benchmark is located using the UTM and the benchmark description from past years. A description, UTM, and photographs of the benchmark are recorded;
- One end of line or string is affixed to the temporary benchmark (e.g., tie to nail on tree). The free end of the line is extended straight to the water line and pulled taught. A pocket-sized line level is placed in the middle of the line to ensure the line between both points is level; and
- The vertical distance from the free end of the line to the water line is measured using a standard measuring tape. The vertical distance from this line to the current water line and to the high-water mark (if apparent) is recorded.