Lake Erie Baseline Assessment Framework - Technical User Guide (A Supplemental Guidance to LEBAF SOP)

Welcome to the Lake Erie Basin Assessment Framework (LEBAF) as part of the Lake Erie Volunteer Science Network (LEVSN)! Before you begin monitoring the waters of the Lake Erie Basin using LEBAF, please familiarize yourself with the mission and structure of LEVSN and LEBAF's primary monitoring purpose, data uses and intended data users, as all of these provide the context for the technical specifications below. Outputs from this technical design are validated, managed results ready to turn into information, please see the *Information and Program User Guide* to understand steps, capacity and planning required of groups. In addition all groups participate in program and study design formative and summative annual evaluations. The technical design specifications below provide guidance on the minimum technical and programmatic elements for participation and program planning. This document is not meant to replace specific SOP instructions, for more detail, please reference the complete Lake Erie Baseline Assessment Framework (LEBAF): A Standard Operating Procedure Manual, which also has an overall workflow checklist. Furthermore, detailed guidance on site selection, number of sites, and other suggested (not standardized) study design considerations can be found in TITLE.

Parameters, Specifications, and Equipment

Network participants must collect four aquatic chemistry parameter readings (dissolved oxygen, temperature, pH, and conductivity) using sensor technology and following the corresponding prescribed operations and maintenance as outlined by the device manufacturer. Participant sensor technology must follow the specific technology ranges below:

Parameter	Conductivity	Dissolved Oxygen	pH	Temperature
Resolution	0.001 mS (0 to 0.500 mS) 0.01 mS (0.501 to 50.00 mS) 0.1 mS (>50.0 mS)	≦ 0.01 mg/L	≦ 0.01	≦ 0.1° C
Accuracy	±0% to ±1%	For 0 to 200% Saturation: Between ±0% and ±2% of the reading OR between ±0% and ±2% air saturation. For 200% to 500% Saturation: Between ±0% and ±6% For 0 to 20 mg/L: Between ±0% and ±2% OR between ±0 mg/L and ±0.2 mg/L For 20 mg/L to 50 mg/L: Between ±0% and ±6%	±0% and ±0.2	±0° to ±0.3° C
Range	At Least 0 to 200 mS/cm	At Least 0 to 50 mg/L [OR] 0 to 500% Saturation	0-14	At Least 0° to 50° C

Participants may use their own sensors that meet the specifications above or use a loaned device from the LEVSN for use during an agreed upon period of time. While on loan, device maintenance, care, and operation is the responsibility of the participant. Some examples of compatible sensor kits include:

- YSI ProQuatro Multiparameter Meter w/ 4 Sensors (Cond, DO, pH, Temp)
- YSI ProDSS Multiparameter Meter w/ 4 Sensors (Cond, DO, pH, Temp)
- Eureka Manta 20+ Multiprobe Unit w/ 4 Sensors (Cond, DO, pH, Temp)
- Hach Pocket Pro+ Multi 2 Tester (Cond, pH) AND YSI 20 DO Meter (DO, Temp)
- YSI ProQuatro Multiparameter Meter w/ 2 Sensors (Cond, DO) AND Vernier Go Direct pH Sensor (pH) AND Vernier Go Direct Temperature Probe (Temp)

During each field visit, a number of additional fields must be collected, including timing of the event, weather conditions, some observation of stream level or flow condition, and quality assurance information for the sensor(s).

Monitoring Frequency
Participants are expected to conduct monitoring at least one time per month from April through October. More frequent visits are encouraged and flexibility is allowed depending on weather conditions and equipment availability. Sensors are to be calibrated prior to each sampling event and/or in accordance with manufacturer instructions. During the sampling season, participants should also collect measurements at different times of the day, when possible.

Monitoring Stations
Monitor at least one station during the sampling season. More stations are welcome. Ideally monitor at least one station on each major tributary in your organization's coverage area. At the selected sampling station, monitor at a representative location and flow within the stream channel. Ensure selected monitoring stations promote field safety and easy accessibility. Locational information about each station, including a unique identifier, will be recorded in an online data sharing platform described below.

Data Management
Completion of a field data sheet is required per sampling event to capture metadata. LEBAF employs Water Reporter (WR), an online data sharing platform, to standardize collection, storage, management, analysis, and reporting of LEVSN data. Participant access to WR is covered by the LEVSN. WR standard operating procedures and best management practices are outlined in the LEBAF Data Manager's Manual and LEBAF - SOP Chapter 3.

- Each LEBAF participating organization will provide LEBAF station information and be provided a full group setup with an appropriately configured data source for data contribution and upload. We request that upon engaging with the LEBAF the program lead, contact support@waterreporter.org to establish your organization and data source in the platform immediately.
- Data entry into WR within one week of each sampling trip is recommended. At the latest, data must be entered into WR by the end of October to be included in annual analyses.
- Validation of metadata and results occurs every fall, with groups responsible for error correction.

Groups may conduct individual analyses at any time using the information outputs produced by the LEVSN web widget such as summary statistics, maps, and plots. LEBAF conducts a standardized group analysis and report at the local, direct tributary, large river and Lake Erie scales every other year (2023, 2025, etc.). A simpler and smaller summary statistics report is produced at the local, direct tributary, and large river scales the interim Lake Erie report years. This allows groups to share results every year in a fall workshop, reflect, adjust study designs, desired outcomes and consider additional standardized parameters or other program adjustments. This is when program evaluation also occurs. A regional monitoring dashboard hosted by the Cleveland Water Alliance features all data collected across the region.

Any questions? Feel free to contact Max Herzog, Program Manager at Cleveland Water Alliance, at mherzog@clewa.org.