**README: MFE Sensor Database**

Created by Kaija Gahm on 17 May 2021

*Note: This database is a companion to the main MFE database, which contains other types of data besides high-frequency sensor data. You can find that database* [*here*](https://caryinstitute.figshare.com/articles/dataset/MFE_database_Data_from_ecosystem_ecology_research_by_Jones_Solomon_and_collaborators_on_the_ecology_and_biogeochemistry_of_lakes_and_lake_organisms_in_the_Upper_Midwest_USA/7438598)*.*

This database contains high-frequency sensor data from the MFE project.

**Database Structure**

***Meta Tables***

The top-level table in this database is **SITES**, which contains location information for each sensor placement site. The **lakeID** and **location** columns make up a composite primary key for SITES. **LakeID** also serves as a foreign key referencing the **LAKES** table in the main MFE database (linked above); these are the same lakes as the ones sampled for non-sensor data.

As in the main MFE database, **METADATA** has primary key **metadataID** and contains information about data collection and processing, as well as the names of more detailed metadata documents (also included in this repository under MetadataFiles.zip). Other database tables link to this one through their **metadataID** columns.

**UPDATE\_METADATA** contains information about updates to the sensor database. Primary key **updateID** shows up in each data table’s **updateID** column to link individual data rows to the database update in which they were added or changed. The rest of this table gives more detailed information about each update—who did it, what did they change, when was it, and why was the change made.

**UNITS** translates the column names of each other database table, providing the table name, column name, units, and a brief description of the data in that column.

**CHANGES\_CODE\_KEY** translates the numeric change codes found in each **\*\_CORR** data table (more about this below).

***Data Tables***

All sensor data is run through the B3 program for quality control prior to being entered in the database. As a result, each sensor type has two paired tables: a **\*\_RAW** table (data before being QC’ed in B3) and a **\*\_CORR** table (data after being QC’ed in B3). The **\*\_CORR** data tables contain additional ‘changesCode’ columns (one for each column of measured data) to note whether a change was made in B3. The **CHANGES\_CODE\_KEY** table explains the numeric change codes found in these columns.

The data tables are as follows (in RAW/CORR pairs)

DO\_RAW and DO\_CORR: Data from dissolved oxygen sensors; also includes temperature.

HOBO\_METSTATION\_RAW and HOBO\_METSTATION\_CORR: Includes meteorological data from the lake surface. Pressure, wind speed, relative humidity, dew point, light levels.

HOBO\_PRESS\_RAW and HOBO\_PRESS\_CORR: Underwater pressure data. This data is used to determine lake depth by comparison to atmospheric pressure. Derived depth values are not included in the database.

HOBO\_TCHAIN\_RAW and HOBO\_TCHAIN\_CORR: Light and temperature data at successive depths.

PRECIP\_RAW and PRECIP\_CORR: Data from lake-surface precipitation gauges.

YSI\_RAW and YSI\_CORR: Data from YSI water quality sensors. Includes water chemistry measurements like DO, pH, and specific conductivity.