**Protocol for downloading water quality data**

Updated 12/07/23

1. **Determine boundaries of desired area/estuary**
   1. Refer Table 1 for boundaries. Add updates to Table 1 as needed.
   2. Confirm existence of KML area file in the Water-Quality-Processing/KML project folder. Create file if needed by following Site\_Section\_file\_creation\_SOP document and naming the file using the code in Table 2.
   3. Ensure files are named appropriately based on estuary, data source (Table 2), and years of data.
   4. Determine water quality data sources and refer to following sections as needed:
      1. National water quality monitoring council (Section II)
      2. (Section III)
2. **Retrieve water quality data from the National water quality monitoring council (“Portal”)**
   1. Go to <https://www.waterqualitydata.us/portal/> to download the water quality data for the desired area.
   2. Select the “Advanced” option near the top of the screen.
   3. In the “Select Location Parameters” section:
      1. A screenshot of a computer

         Description automatically generated with medium confidenceWithin the ‘Bounding Box’ area, enter in the bounding box coordinates using decimal degrees. Do not put anything in the country, state, or county boxes.
      2. Under ‘Site Type’ select “Estuary”, “Ocean”, “Wetland”, and “Stream”.
   4. Under the “Filter Results” section:
      1. In the “Sample Media” box, select “Water”.
      2. In the “Date Range” section, enter the starting and ending dates for the time period (5 year increments is best).
      3. In the “Minimum Sample Activities per Site” and “Minimum Results per Site” enter “12”.
   5. A screenshot of a computer

      Description automatically generatedUnder the “Download the Data” section:
      1. Make sure all items under “Data Source” are selected.
      2. File format: MS Excel 2007+
   6. Select “Site Data Only” under the “Data Profiles” area and select “Download” at the bottom of the page. Select “Continue” in the pop-up window.
   7. Navigate to where the downloaded file is saved, rename the file using the estuary and data source naming convention from Table 2, “Site data”, starting year, and ending year separated by underscores (ex. CR\_Portal\_Site data\_2012\_2022). Save the file to the WQ “Raw\_data” folder.
   8. Return to the webpage and select “Sample Results (narrow)” under “Data Profiles”. Select “Download” at the bottom of the page. Select “Continue” in the pop-up window. If the results are too large, modify the date range by cutting into 2 or more sections. Repeat 9 with the updated date ranges in separate files.
   9. Navigate to where the downloaded file is saved, rename the file using the estuary code and data source naming convention from Table 2, “Results”, starting year, and ending year separated by underscores (ex. CR\_Portal\_Results\_2012\_2022). Save the file to the WQ “Raw\_data” folder.
3. **Retrieve water quality data from the water atlas** (counties included: Lake, Manatee, Orange, Polk, Sarasota, Seminole, Pinellas, & CHENP).
   1. Go to the primary water atlas web page at <https://wateratlas.usf.edu/> and select one the desired atlases. All atlases can be downloaded together in the data selection process, so it isn’t as important which is chosen in this step.
   2. Under the “Maps/Data” section, chose “Data Download”.
   3. Accept the disclaimer then select the data type:
      1. Surface Water Quality – primary data
      2. Surface Water Hydrology – flow and water level data
   4. Select the following parameters then select Submit:
      1. By Location: Water atlas, and watershed
      2. By Site Info: Water body type
      3. By Sample Info: Date range, Parameter
   5. Complete the selection page as follows:
      1. Water Atlas: select desired data sources
      2. Watershed: select desired watersheds from list
      3. Water Body Type: select Bay and Stream/River
      4. Date Range: Specify date range for data
      5. Parameter: Select parameters. Include all the following plus any additional as needed. Parameters can be searched for by name using the search box. Select submit once all parameters have been selected.
         1. Depth, bottom, ft
         2. Secchi disk depth, ft
         3. Salinity, PSS and PPT
         4. Dissolved oxygen (DO)
         5. Dissolved oxygen saturation (%)
         6. Temperature, water (deg C & deg F)
         7. pH
         8. Turbidity (NTU)
         9. Chlorophyll a (probe relative fluorescence)
         10. Chlorophyll a, corrected for pheophytin
         11. Total suspended solids
      6. Select “Give me all station data” on the next screen (Step 4 of 5).
      7. Compile data to download by specifying “Excel” as the file type and “Row” as the file format and selecting “Generate file to download”. Then “Download File” once the file has been generated.
   6. Navigate to where the downloaded file is saved, rename the file using the estuary code and data source naming convention from Table 2, “Site data”, starting year, and ending year separated by underscores (ex. CR\_WA\_Site data\_2012\_2022). Save the file to the WQ “Raw\_data” folder.
      1. Open the file to make sure the data is converted properly: Select Yes to open and read the file, then select Convert in the 2 pop-up windows.
      2. Once the data is converted, select columns A (WBodyID) through column F (Actual\_StationID) and change cell type to ‘Text’.
      3. Save the file as a .xlsx file using the same name.
4. **Clean raw data and map station locations**
   1. Make sure to have a local instance of the R Project folder and a closely located data folder using the following schema:
      1. \local\Water-Quality-Processing: *Files from repo\R Project files*
      2. \local\Water-Quality-Processing-Data: *Relational folders for reading and writing data files*
         1. \*\Raw\_data : *Location for all portal and atlas raw data files*
         2. \*\Raw\_cleaned: *Location for all cleaned data files (proper units, outliers removed, etc.)*
         3. \*\Compiled\_data: *Location for summary data outputs (i.e. daily, monthly, etc.)*
   2. Save all “Site data” and “Results” files to the “Raw\_data” folder in your local drive.
   3. Open the Water Quality Processing R project.
   4. Open the WQ\_data\_compilation R code file and run following in-code annotations.
      1. Additional notes:
         1. Minimum column requirements for location data (“keep\_site”):
            1. c("MonitoringLocationIdentifier", "OrganizationIdentifier", "OrganizationFormalName", "MonitoringLocationName", "MonitoringLocationTypeName", “MonitoringLocationDescriptionText", "LatitudeMeasure", "LongitudeMeasure", "HorizontalCoordinateReferenceSystemDatumName", "StateCode", "CountyCode", "ProviderName")
         2. Minimum column requirements for results data (“keep\_results”):
            1. Portal: "MonitoringLocationIdentifier", "ResultIdentifier", "ActivityStartDate", "ActivityStartTime/Time", "ActivityStartTime/TimeZoneCode", "CharacteristicName", "ResultMeasureValue", "ResultMeasure/MeasureUnitCode"
            2. Atlas:
         3. Minimum parameter “Characters” to keep:
            1. c("Salinity", "Temperature, water", "Depth, bottom", "Depth, Secchi disk depth", "Temperature, air, deg C", "Turbidity", "Conductivity", "Specific conductance", "pH", "Dissolved oxygen (DO)", "Dissolved oxygen saturation", "Chlorophyll a, corrected for pheophytin", "Chlorophyll a", "Total dissolved solids", "Total suspended solids", "Zooplankton", "Diatoms", "Stream flow, instantaneous", "Flow, severity (choice list)", "Stream stage", "Flow", "Stream flow, mean. Daily")
5. Navigate to the Mapping\_grids/WQ folder. Open the R project file and “WQ\_data\_compilation” R code file. Run code through to save compiled, cleaned, and filtered data as a CSV file.
6. Close the “WQ\_data\_compilation” R code file and open the “WQ\_data\_selection” R code file to select desired data. This code will help output the area data and a map of WQ stations.

**Table 1**. State grids by region. North, south, east, and west boundaries of state grid indicated. State grids in which estuary reside are indicated (Estuary), and existence of KML file noted by name. Update as appropriate.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Estuary** | **North** | **South** | **East** | **West** | **Estuary KML** |
| Caloosahatchee | 27.1 | 26.1 | -81.4 | -82.4 | CR |
| St Lucie | 27.3 | 27.1 | -80.1 | -80.3 | SL |
| Lake Worth | 26.84362 | 26.527 | -80.03102 | -80.05384 | LW |
| Loxahatchee | 27.0 | 26.9 | -80.0 | -80.2 | LX |
| Tampa Bay | 28.7 | 27.45 | -82.3 | -82.9 | TB |

**Table 2.** Naming conventions to be used for file names. Estuary or data source indicated by shorthand can be found in column 2. Update as appropriate.

|  |  |
| --- | --- |
| **Naming convention for files** | **Estuary or data source** |
| *Estuaries* | |
| CR | Caloosahatchee |
| SL | St. Lucie |
| LW | Lake Worth |
| LX | Loxahatchee |
| *Data sources* | |
| Portal | National water quality monitoring council |
| WA | Water atlas sources |