Appendix I3

Water Quality Raw Data Source Description

Lower Hillsborough River Water Quality Master README

Southwest Florida Water Management District

2024-08-09

Summary:

This document summarizes water quality data collected that may support the Lower Hillsborough River (LHR) Recovery Strategy as part of the Task 10 data deliverable for District TWA:22TW0003992. This document is produced from summaries generated using SAS software to input, organize, and summarize water quality datasets provided mainly by the District and augmented by the consultant team.

Tables are provided within this document summarizing the general sampling characteristics of the monitoring program. Detailed descriptive statistics and data summaries are provided in the Task 10 – Initial Data Analysis – Extended deliverable associated with this project. The relative file path and source data files for the raw datasets are provided in each of the summary sections.

Water quality parameters were grouped into *in situ* "field" data and water quality data analyzed in the laboratory ("Lab") as follows:

Field data – *In situ* physical chemistry data including: dissolved oxygen (mg/L and percent saturation), specific conductance (us/cm), water temperature (C), salinity (ppt), turbidity (NTU), PH (SU), and secchi disk (m) as available.

Lab data - Water chemistry and biology including: color (pcu), chlorophyll a (ug/L), total nitrogen (mg/L), total Kjeldahl nitrogen (mg/L), nitrate-nitrite (mg/L), orthophosphate (mg/L), and total phosphorus (mg/L).

Parameter Definitions:

Note: In the master water quality database, the "Param" field can indicate multiple types of measurements for a particular constituent of interest. The Label field in the master dataset specifies the measurement type more specifically.

CHLA = Chlorophyll *a* (monochromatic.) (µg/L)
CHLA = Chlorophyll *a* (trichromatic.) (µg/L)
CHLA = Chlorophyll *a* (Total) (µg/L)
CHLAC = Chlorophyll *a* Corrected for Pheophyton (µg/L)
COLOR = Color (PCU)
COND = Specific Conductance (µs/cm)
DO = Dissolved Oxygen (mg/L)
DOSAT = Dissolved Oxygen Saturation (Percent)
DP = PHOSPHORUS, DISSOLVED (mg/L)
NH3 = Ammonia (mg/L)
NH4+ = Ammonium (mg/L)

NO23 = Nitrate-Nitrite (N) (Total) (mg/L)
OP = Orthophosphate (P) (Total) (mg/L)
ORGN = Organic Nitrogen (mg/L)
PH = pH (SU)
SALIN = Salinity (ppt)
SECCHI = Secchi-vertical (meter)
TEMP = Water Temperature (C)
TKN = Total Kjeldahl Nitrogen (mg/L)
TN = Total Nitrogen (mg/L)
TP = Total Phosphorus (mg/L)
TURB = Turbidity (NTU)
Velocity = Index Velocity
WSE_NAVD88 = Water Surface Elevation (NAVD88)

Data Management and Quality Control:
Data management included manipulating data into a common format including converting data in column (wide) format to long format where each reported water quality parameter is a separate row in the database that also includes station name, source, locational information, date, time, and sample level. Where data were provided in column format with surface and bottom measurements as separate fields, those fields were assigned "levels" in row format corresponding to their vertical location in the water column. Occasionally, sample depth, and more frequently total depth, is not reported in these instances.

Quality control procedures included setting any results with fatal qualifiers (i.e.: "V", "F", "N", "O", "Y", "H","J", "K", "Q", "?") to missing values and setting values qualified as below the detection limit (MDL) to the detection limit, where provided. A list of qualifier codes and their meaning is provided below.

List of Qualifier Codes	
?	Data should not be used
!	Data deviate from historically established concentration range
+	Good quality data
<	Less than MDL
>	Greater than max recorded value
A	Accepted
C	Subject to potential further verification
F	Flag
G	Above MDL in both sample and blank
I	Value is greater than MDL but less than PQL
J	Estimated value
K	Off scale low
L	Off scale high
Q	Beyond acceptable holding times
U	Analyte not detected
V	Blank value greater than sample
Y	Improperly preserved sample

The following samples (primarily from a probabilistic sampling design associated with Tampa Bay Water's HBMP program) had irreconcilable spatial coordinates and were removed from the database:

HR305781, HR511335, HR409048, 98HRUS41, HR512550, HR613359, HR612775, 98HR39, HR510384, HR409303, HR307279, 08HR629, HR101881, HR101372, 95HB16, 02HB34, 97HR32, 05HB12, 09HB11, 00HB4144

These sites represent individual sampling events at these locations as opposed to long term fixed station data.

Some data sources (e.g. the Environmental Protection Commission of Hillsborough County (EPC) include data prior to 1996, however, only data collected between January 01, 1996 and December 31, 2023 are characterized by this document.

Below is a linked table of All data sources included in this master dataset:

List of Data by Source

Southwest Florida Water Management District (District)

The District has collected and/or stored data from several water quality monitoring programs associated with the LHR Recovery Strategy. These datasets include:

1) permit-related sampling in the Hillsborough River Reservoir, the Tampa Bypass Canal (TBC) and Sulphur Springs. These data are collected by the City of Tampa (COT) and stored by the District. Questions about the data should be directed to the COT;

2) water quality vertical profile monitoring conducted to evaluate gradients in water quality within the target zone of the LHR (i.e. river kilometer 10.8 to 16), and

3) water quality sampling elements from source waters including; Blue Sink, Morris Bridge Sink, and Sulphur Springs.

These datasets were provided by the District and are summarized by sampling program in the subsections below.

Permit Related Sampling

Source data files are listed below and found in the relative file path: …/WMD/Permit/

WUP_2062_DID_10_SS_WQ_Monthly.xlsx
WUP_2062_DID_11_HRR_WQ_Monthly.xlsx
WUP_6675_DID_49_TBC_S161_WQ_Monthly.xlsx

These files were read in and joined in SAS. A summary table was generated to describe basic sampling characteristics of the dataset. The start and end years for each station, whether the station data include lab and or field parameters, the frequency of sampling, and the water column positions sampled for each station is listed in the table below.

Station	Start	End	Field/Lab	Annual Sampling Frequency	Levels
19219 (WUP 6675-DID-49-(TBC)	1996	2023	Both	12 until 2000 8 in 2001 4 after	Single reading assumed to be Surface level
610758 (WUP 2062-DID – 10 – (Sulphur Springs)	1996	2023	Both	Monthly	Single reading assumed to be Surface level

610759 WUP 2062-DID – 11 - (HRR)	1996	2023	Both	Monthly	Single reading assumed to be Surface level

Vertical Profile Monitoring

Source data files are listed below and found in the relative file path: …/WMD/

LHR01_200204_201304_Sid.xlsx
LHR01_201302_202304.xlsx
LHR01_202305_202307.xlsx
LHR02_200203_201304_Sid.xlsx
LHR02_201302_202304.xlsx
LHR02_202305_202307.xlsx
LHR03_200203_201304_Sid.xlsx
LHR03_200803_202304.xlsx
LHR03_202305_202307.xlsx
LHR04_200203_201304_Sid.xlsx
LHR04_201302_202304.xlsx
LHR04_202305_202307.xlsx
LHR05_200203_201304_Sid.xlsx
LHR05_201302_202304.xlsx
LHR05_202305_202307.xlsx
LHR06_200203_201304_Sid.xlsx
LHR06_201302_202304.xlsx
LHR06_202305_202307.xlsx
LHR07_200203_201304_Sid.xlsx
LHR07_201302_202304.xlsx
LHR07_202305_202307.xlsx
LHR08_200203_201304_Sid.xlsx
LHR08_201302_202304.xlsx
LHR08_202305_202307.xlsx
LHR16_202305_202307.xlsx
LHR09_200203_201304_Sid.xlsx
LHR09_200803_202305.xlsx
LHR09_202305_202307.xlsx
LHR09_202305_202307_LabOnly.xlsx
LHR10_200203_201304_Sid.xlsx
LHR10_201302_202304.xlsx
LHR10_202305_202307.xlsx
LHR11_200203_201304_Sid.xlsx
LHR11_201302_202304.xlsx
LHR11_202305_202307.xlsx
LHR12_200203_201304_Sid.xlsx
LHR12_201302_202304.xlsx
LHR12_202305_202307.xlsx
LHR13_200203_201304_Sid.xlsx
LHR13_200803_202304.xlsx
LHR13_202305_202307.xlsx
LHR14_200203_201304_Sid.xlsx
LHR14_201302_202304.xlsx
LHR14_202305_202307.xlsx
LHR15_200204_201304_Sid.xlsx
LHR15_201302_202304.xlsx
LHR15_202305_202307.xlsx
LHR16_200204_201304_Sid.xlsx
LHR16_200803_202304.xlsx

The start and end date for each station, whether the station data include lab and or field parameters, the frequency of sampling, and the water column positions sampled for each station is listed in the table below.

Station	Start	End	Field/Lab	Annual Frequency	Levels
LHR01_800043_RKm_16	2002	2023	Field	Inconsistent prior to 2020 then monthly	Surface, bottom, and 1 meter intervals
LHR02_800044_RKm_15.7	2002	2023	Field	Variable, near monthly 2020-2023	Surface, bottom, and 1 meter intervals
LHR03_19208_RKm_15.4	2002	2023	Both	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals

Station	Start	End	Field/Lab	Annual Frequency	Levels
LHR04_800045_RKm_15.1	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR05_800046_RKm_14.8	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR06_800047_RKm_14.5	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR07_800048_RKm_14.3	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR08_800049_RKm_13.9	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR09_19209_RKm_13.6	2002	2023	Both	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR10_800050_RKm_13.3	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR11_800052_RKm_13	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR12_800053_RKm_12.7	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR13_19235_RKm_12.3	2002	2023	Both	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR14_800054_RKm_11.8	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR15_800055_RKm_11.3	2002	2023	Field	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals
LHR16_19237_RKm_10.8	2002	2023	Both	Variable, near monthly pre 2010 and 2020-2023	Surface, bottom, and 1 meter intervals

Source Water Monitoring

Source water monitoring included water quality measurements at Blue Sink, Sulphur Springs Pool and Morris Bridge sink as well as water surface elevations and three sites in Morris Bridge Sink.

Blue Sink

Source data files are listed below and found in the relative file path: WMD/BlueSink

Six individual files for Blue Sink included:

WMD_BlueSink_SN670721_Chlorophyll_Total_Through_202305.xlsx,
WMD_BlueSink_SN670721_ Dissolved_Color_Through_202305.xlsx,
WMD_BlueSink_SN670721_Nitrate_Nitrite Total_Through_202305.xlsx,
WMD_BlueSink_SN670721_Orthophosphate Total_Through_202305.xlsx,
WMD_BlueSink_SN670721_NitrogenTotal_Through_202305.xlsx,
WMD_BlueSink_SN670721_Phosphorus Total_Through_202305.xlsx

Sulphur Springs

Source data files are listed below and found in the relative file path: WMD/SulphurSpringsPool_SN_18665/

Nine individual files for Sulphur Springs Pool directory included:

WMD_SSP_SN18665__Chlorophyll_a_Total_Through_202305.xlsx,
WMD_SSP_SN18665__Chlorophyll_Total_Through_202305.xlsx,
WMD_SSP_SN18665__Dissolved_Chloride_Through_202305.xlsx,
WMD_SSP_SN18665__Color_Through_202305.xlsx,
WMD_SSP_SN18665__Nitrate_Nitrite_Through_202305.xlsx,
WMD_SSP_SN18665__Nitrogen_Total_Through_202305.xlsx,
WMD_SSP_SN18665__Orthophosphate_Dissolved_Through_202305.xlsx,
WMD_SSP_SN18665__Orthophosphate_Total_Through_202305.xlsx,
WMD_SSP_SN18665__Phosphorus_Total_Through_202305.xlsx

Morris Bridge Sink

Source data files are listed below and found in the relative file path: WMD/Morris_Bridge_Sink/08-Hydrologic Data/

One water quality dataset and 3 files of water surface elevations in Morris Bridge Sink:

1 - MBS Consolidated Water Quality Data.xlsx
SurfaceWater_SID_709106_DailyMean.csv
SurfaceWater_SID_709107_DailyMean.csv
SurfaceWater_SID_709109_DailyMean.csv

The start and end date for each station, whether the station data include lab and or field parameters, the frequency of sampling, and the water column positions sampled for each station is listed in the table below.

Station	Start	End	Field/Lab	Annual Frequency	Levels
Blue Sink (Hillsborough)	2008	2009	Lab	1-2 per yr	Surface

Station	Start	End	Field/Lab	Annual Frequency	Levels
Sulphur Springs (Pool) at Sulphur Spring	1996	2023	Lab	Variable, 1-6 per yr	Surface
Morris Bridge Water Quality	2017	2023	Field/Lab	Field variable/Lab once per year	Field profiles and Surface Lab
Morris Bridge Marsh 709109	2008	2023	WSE	Daily	Surface
Morris Bridge Nursery 709107	2008	2023	WSE	Daily	Surface
Morris Bridge Sink 709106	2008	2023	WSE	Daily	Surface

Tampa Bay Water Hydrobiological Monitoring Program (HBMP) Data

This subsection describes the Tampa Bay Water HBMP data collected which includes *in-situ* profiles collected in association with the biological monitoring components of the HBMP as well as *in-situ* and Lab data collected with the water quality monitoring element. The Lower Hillsborough River HBMP reporting unit extends from the mouth of the river at Platt Street to the City of Tampa Dam, covering a distance of 16.34 kilometers. This spatial reporting unit was divided into six strata, five of equal length (2.55 km) below Sulphur Springs, and one of 3.61 km in length from Sulphur Springs upstream to the dam. The program was initiated in the year 2000 and was discontinued (with the exception of continuous recorders which are reported in the continuous recorder master database associated with this project) by 2012.

Data collected in the Lower Hillsborough River by the HBMP program was provided to District by Environmental Science Associates (contractor for Tampa Bay Water's HBMP) in the form of Microsoft Access Databases. Four individual Access databases were provided, each representing a different HBMP sampling component: benthic macroinvertebrates, fish, zoo/ichthyoplankton, and water quality:

Individual data tables from each database (deployment, lab (water quality only), and profile) were exported as text files for import into SAS. Data were then subset to include solely Hillsborough River stations (i.e. either the "REF2" or "Station" field contains "HR"). Data fields like station, date, time, etc., were merged from the deployment table with the profile and lab data to provide necessary fields in single files organized in "long" format with a single field for the water quality parameter of interest and a separate column for the "Result". Value qualifiers were handled according to FDEP protocols and values below the detection limits were set to the detection limit. Values where a missing result was reported as -999 or the like were set to missing represented by a period in SAS format.

Each HBMP element is summarized separately below. Because sites are randomly selected and thereby each sample has a unique Station value, the summary tables and sample counts are presented by year and parameter across stations.

HBMP Water Quality

Source data files are listed below and found in the relative file path:
…/TBW_HBMP/Data_Download_20230815/WQ/

HBMP WQ Archive Database_20191204.accdb

The Water Quality element of the HBMP was in operation in the LHR from April 2000 through September of 2012. This sampling element collected Lab samples as well as Field data from water column profiles. Sampling occurred monthly at spatially stratified random stations. Sample frequency by year is displayed below. Note counts vary across years for field parameters given differing depths (and thus different number of measurements per profile) at the random stations and laboratory parameter frequency varies due to changes in objectives of the program over time.

	Parameter																	
	CHLAC	COLOR	COND	DO	DOC	DOSAT	NH3	NH4+	NO23	OP	PH	SAL	TEMP	TKN	TN	TOC	TP	TSS
Year																		
2000	60	60	340	340	60	0	0	0	0	0	340	340	340	0	0	60	0	60
2001	84	7	479	479	7	0	0	0	0	0	479	479	479	0	0	7	0	7
2002	84	0	426	426	0	0	0	0	0	0	426	426	426	0	0	0	0	0
2003	84	0	391	391	0	0	0	0	0	0	391	391	391	0	0	0	0	0
2004	84	0	390	390	0	0	0	84	84	84	390	390	390	84	84	0	84	0
2005	83	0	357	357	0	0	0	83	83	83	357	357	357	83	83	0	83	0
2006	84	0	352	352	0	0	0	84	84	76	352	352	352	84	84	0	84	0
2007	84	0	389	389	0	0	0	84	84	77	389	389	389	84	84	0	84	0
2008	84	0	434	434	0	0	0	84	84	78	434	434	434	84	84	0	84	0
2009	85	0	421	420	0	0	0	85	85	85	421	421	421	85	85	0	85	0
2010	84	0	429	429	0	0	0	63	84	80	429	429	429	28	28	0	84	0
2011	84	0	441	441	0	0	0	78	78	78	441	441	441	49	50	0	71	0
2012	63	0	349	349	0	245	19	55	55	55	349	349	349	49	55	0	51	0

HBMP Benthic

Source data files are listed below and found in the relative file path:
…/TBW_HBMP/Data_Download_20230815/Benthic/

HBMP Benthic Archive Database_200731.accdb

The Benthic element of the HBMP was in operation in the LHR from June 2000 through September of 2011. The only water quality associated with this element is physical chemistry from water column profiles. Sampling occurred monthly at spatially stratified random stations. Sample distribution by year is displayed below. Note counts vary across years given differing depths (and thus different number of measurements per profile) at the random stations.

	Parameter				
	Conductivity (us/cm)	Dissolved Oxygen (mg/L)	PH (SU)	Salinity (ppt)	Temperature (C)
Year					
2000	484	484	484	484	484
2001	659	659	659	659	659
2002	601	601	601	601	601
2003	552	552	552	552	552
2004	573	573	573	573	573
2005	597	597	597	597	597
2006	570	570	570	570	570
2007	600	600	600	600	600
2008	642	642	642	642	642
2009	649	649	649	649	649
2010	627	627	627	627	627
2011	364	364	364	364	364

HBMP Fish

Source data files are listed below and found in the relative file path:
…/TBW_HBMP/Data_Download_20230815/Fish/

HBMP Fish Archive Database_20191204.accdb

The Fish element of the HBMP was in operation in the LHR from May 2000 through September 2012. The only water quality associated with this element is physical chemistry from water column profiles. Sampling occurred monthly at spatially stratified random stations. Sample frequency by year is displayed below. Note counts vary across years given differing depths (and thus different number of measurements per profile) at the random stations.

	Parameter				
	Conductivity (us/cm)	Dissolved Oxygen (mg/L)	PH (SU)	Salinity (ppt)	Temperature (C)
Year					
2000	402	402	402	402	402
2001	640	640	640	640	640
2002	603	603	603	603	603
2003	640	641	641	641	641
2004	615	615	615	615	615
2005	610	610	611	611	611
2006	637	638	638	637	638
2007	639	639	639	638	639
2008	613	613	613	613	613
2009	623	623	623	623	623
2010	622	623	623	623	623
2011	630	630	630	629	630
2012	462	461	462	462	462

HBMP Plankton

Source data files are listed below and found in the relative file path:
…/TBW_HBMP/Data_Download_20230815/Plankton/

HBMP Plankton Archive Database_20191204.accdb

The Plankton element of the HBMP was in operation in the LHR from April 2000 through September 2012. The only water quality associated with this element is physical chemistry from water column profiles. Sampling stations for plankton monitoring were randomly selected at the beginning of the HBMP and remained fixed. Sampling occurred monthly and plankton sampling dates were chosen each month based upon the appropriate correspondence of tide stage with time of day. Sample frequency by year is displayed below. Note counts vary across years given differing depths (and thus different number of measurements per profile) at the stations.

	Parameter				
	Conductivity (us/cm)	Dissolved Oxygen (mg/L)	PH (SU)	Salinity (ppt)	Temperature (C)
Year					
2000	466	466	466	466	466
2001	549	549	507	549	549
2002	604	604	604	604	604
2003	618	618	618	618	618
2004	600	600	600	600	600
2005	601	601	601	601	601
2006	583	583	583	583	583
2007	590	590	590	590	590
2008	648	648	648	648	648
2009	642	642	642	642	642
2010	469	469	469	469	469
2011	150	150	150	150	150
2012	467	467	467	467	467

Environmental Protection Commission of Hillsborough County (EPCHC)

Source data files are listed below and found in the relative file path: …/EPC/

WQMRWMSpreadsheet_ThroughCurrentReportMonth.xlsx
H400_EPC_ExtraData_Consolidated.xlsx

The EPCHC established a county-wide surface water quality monitoring program in 1972. The program grew in multiple steps, including a 2000 expansion (Hillsborough Independent Monitoring Program, or HIMP) in response to the construction of several potable water projects. After the cessation of HIMP, the monthly hydrographic surveys on the Hillsborough River were incorporated into the monitoring program. Stations in the LHR included sites where both field and lab data were collected as well as others where only field data were collected. Statistics for start and end dates, frequency of sampling, depth of sampling and category of parameters collected are indicated in the table below.

A special data collection “EPC Extra” was collected at the request of stakeholders to supplement vertical profiles at specific stations (i.e. 1514, 1515, and 270) in the lower river.

Station	Start	End	Field/Lab	Annual Frequency	Levels
2	1996	2023	Both	Monthly	Surface, Mid, Bottom
105	1996	2023	Both	Monthly	Surface, Mid, Bottom
106	1996	2023	Both	Monthly	Surface, Mid, Bottom
108	1996	2023	Both	Monthly	Surface, Mid, Bottom
137	1996	2023	Both	Monthly	Surface, Mid, Bottom
152	1999	2023	Both	Monthly	Surface, Mid, Bottom
165	2005	2023	Both	Monthly	Surface, Mid, Bottom
174	2007	2023	Both	Monthly	Mostly Midwater
176	2009	2023	Both	Monthly	Surface, Mid, Bottom
265	2016	2023	Both	Monthly	Surface, Mid, Bottom
266	2016	2023	Both	Monthly	Surface, Mid, Bottom
270	2018	2023	Both	Monthly	Surface, Mid, Bottom
1502	2009	2023	Field	Monthly	Surface, Mid, Bottom
1503	2009	2023	Field	Monthly	Surface, Mid, Bottom
1505	2009	2023	Field	Monthly	Surface, Mid, Bottom
1506	2009	2023	Field	Monthly	Surface, Mid, Bottom
1507	2009	2023	Field	Monthly	Surface, Mid, Bottom
1509	2009	2023	Field	Monthly	Surface, Mid, Bottom
1510	2009	2023	Both	Monthly	Surface, Mid, Bottom
1512	2009	2023	Field	Monthly	Surface, Mid, Bottom
1514	2009	2023	Field	Monthly	Surface, Mid, Bottom
1515	2009	2023	Field	Monthly	Surface, Mid, Bottom

United States Geological Survey (USGS)

The United States Geological Survey has several fixed station continuous recorders in the Lower Hillsborough River and Sulphur Springs. The USGS also has the capacity to report the data generated by these continuous recorders as daily statistics. The files below include daily statistics for the continuous recorders which measure Field data as well as flow and gage height in some cases.

USGS Daily Statistics

Source data files are listed below and found in the relative file path: …/USGS/

The following data files were read into SAS from their corresponding subfolders within the USGS data folder:

USGS_Fowler_Daily.xlsx
USGS_HannahsWhirl_Daily.xlsx
USGS_SSP_Daily.xlsx
USGS_I275_Daily.xlsx
USGS_Rowlett_Daily.xlsx
USGS_BLHannahs_Daily.xlsx
USGS_SSR_Daily.xlsx
USGS_Platt_Daily.xlsx

These data represent daily average (and minimum and maximum) Field data statistics based on continuous recorders deployed at these locations; however, in some instances these datasets represent a longer period of record than the corresponding continuous recorder datafiles in the CR master dataset. The period of record varies by station which are listed along with start and end years and other summary information in the following table.

Station	Start	End	Field/Lab	Annual Frequency	Levels
USGS 02304000 Fowler	1996	2023	Field	Daily	Surface, Bottom
USGS 02304510 Rowlett	1996	2023	Field	Daily	Surface, Bottom
USGS 02304515 Hannah's Whirl	2001	2005	Field	Daily	Surface, Bottom
USGS 02304517 BL Hannah's Whirl	2017	2023	Field	Daily	Surface, Bottom
USGS 02306000 SSP	1996	2023	Field	Daily	Surface
USGS 023060003 SSR	1999	2023	Field	Daily	Surface
USGS 023060013 I-275	1999	2023	Field	Daily	Surface, Bottom
USGS 02306028 Platt	1997	2023	Field	Daily	Surface, Bottom

Florida Department of Environmental Protection (FDEP)

Two FDEP programs have data pertinent to this study. The FDEP Statewide Biological Database had limited data available on biology and associated water quality within the LHR and the FDEP IWR database was queried to extract water quality data collected in the Lower Hillsborough River since 1996.

FDEP SBIO

Source data files are listed below and found in the relative file path: …/FDEP/

bio_wq_df.csv

The limited data were obtained by Frydenborg Ecologic from the FDEP's Statewide Biological Resources sampling program. Two stations had data with only 1 sample a year, see Table below. Only field water quality data were collected data were collected and are limited to those shown in the Table below.

		Parameter				
		Conductivity (us/cm)	Dissolved Oxygen (mg/L)	PH	Salinity (ppt)	Temperature (C)
Station	**Year**					
280903968209550	**2012**	1	1	0	1	1
	2013	1	1	1	1	1
53277	**2018**	1	1	1	0	1

FDEP Impaired Water Rule (IWR) Database for Hillsborough Reservoir

Source data files are listed below and found in the relative file path: …/FDEP/

IWRRUN65_HRR.csv

The Florida Impaired Waters Rule establishes a methodology to identify waters that will be included on the State's Clean Water Act Section 303(d) list of impaired waters. The state maintains a database referred to as the Impaired Water Rule Database that is updated periodically as new data are available. The latest version of this database (Run 65) was queried for data in the Hillsborough River Reservoir.

Stations in Hillsborough River Reservoir included sites where both field and lab data were collected as well as others where only field or Lab data were collected. Statistics for start and end dates, frequency of sampling, depth of sampling and category of parameters collected are indicated in the table below.

Station	Start	End	Field/Lab	Annual Frequency	Levels
112WRD 02304200	2000	2003	Both	Monthly 2002-2003	Mostly Midwater but also Surface & Bottom

Station	Start	End	Field/Lab	Annual Frequency	Levels
112WRD 280034082245900	2000	2003	Both	Monthly 2002-2003	Mostly Midwater but also Surface & Bottom
112WRD 280128082234600	2000	2003	Both	Monthly 2002-2003	Mostly Midwater but also Surface & Bottom
112WRD 280136082253000	2002	2003	Both	Monthly 2002-2003	Mostly Midwater but also Surface & Bottom
21FLHILL265	2016	2023	Both	Near monthly	Lab Surface, Profile Surface, Midwater & Bottom
21FLKWATHIL-HIIVER105-1	2000	2000	Lab	5 per year	Surface
21FLKWATHIL-HIIVER105-2	2000	2000	Lab	5 per year	Surface
21FLKWATHIL-HIIVER105-3	2000	2000	Lab	2 per year	Surface
21FLKWATHIL-HIIVER123-1	2005	2007	Lab	1-7 per yr	Surface
21FLKWATHIL-HIIVER123-2	2005	2007	Lab	1-7 per yr	Surface
21FLKWATHIL-HIIVER123-3	2005	2007	Lab	1-7 per yr	Surface
21FLKWATHIL-HIIVER128-1	2002	2014	Lab	Monthly most years	Surface
21FLKWATHIL-HIIVER128-2	2002	2014	Lab	Monthly most years	Surface
21FLKWATHIL-HIIVER128-3	2002	2014	Lab	Monthly most years	Surface
21FLKWATHIL-RIVER-131-1	2012	2012	Lab	1	Surface
21FLKWATHIL-RIVER-131-2	2012	2012	Lab	1	Surface
21FLKWATHIL-RIVER-131-3	2012	2012	Lab	1	Surface
21FLKWATHIL-RIVER-142-1	2008	2009	Lab	1-4	Surface

Station	Start	End	Field/Lab	Annual Frequency	Levels
21FLKWATHIL-RIVER-142-2	2008	2009	Lab	1-4	Surface
21FLKWATHIL-RIVER-142-3	2008	2009	Lab	1-4	Surface
21FLKWATHIL-RIVER-338-1	2011	2012	Lab	2-8	Surface
21FLKWATHIL-RIVER-338-2	2011	2012	Lab	2-8	Surface
21FLKWATHIL-RIVER-338-3	2011	2012	Lab	2-7	Surface
21FLSWFD19212	2000	2001	Both	4-11	Bottom, Midwater, & Surface
21FLSWFD19214	2000	2001	Both	3-11	Bottom, Midwater, & Surface
21FLSWFD19216	2000	2002	Both	5-16	Bottom, Midwater, & Surface
21FLSWFD19217	2000	2001	Both	3-13	Bottom, Midwater, & Surface
21FLSWFD28.013533382.38	2001	2001	Both	6	Surface
21FLSWFD28.02 82.40	2001	2001	Both	5	Surface
21FLSWFD28.024 82.42	2001	2001	Both	5	Surface
21FLSWFD28.024083382.39	2001	2001	Both	5	Surface
21FLTPA 24030122	1998	1998	Field	1	Surface

JMT

Source data files are listed below and found in the relative file path: …/FDEP/

bio_wq_df.csv

JMT was contracted by the District to conduct biological sampling in the Lower Hillsborough River. Water chemistry data were collected in conjunction with the biological sampling. The stations sampled for water chemistry and associated summary information is provided in the following table. Frydenborg Ecologic compiled the JMT water quality data and combined it with the FDEP SBIO data. These data are therefore located within the dataset under the FDEP folder.

Only Field data were reported by this program. Statistics for start and end dates, frequency of sampling, depth of sampling and category of parameters collected are indicated in the table below.

Biological Sampling

Station	Start	End	Field/Lab	Annual Frequency	Levels
Lower A	2020	2023	Field	16 in 2020, 6 in 2021 and 2022, and 24 in 2023	Surface, Mid, Bottom
Lower B	2020	2023	Field	16 in 2020, 6 in 2021 and 2022, and 21 in 2023	Surface, Mid, Bottom
Middle A	2020	2023	Field	18 in 2020, 6 in 2021 and 2022, and 21 in 2023	Surface, Mid, Bottom
Middle B	2020	2023	Field	15 in 2020, 6 in 2021, 3 in 2022, and 21 in 2023	Surface, Mid, Bottom
Middle C	2022	2023	Field	2022 (n=3) 2023 (n=9)	Surface, Mid, Bottom
Middle D	2022	2023	Field	2022 (n=3) 2023 (n=9)	Surface, Mid, Bottom
Upper A	2020	2023	Field	16 in 2020, 6 in 2021 and 2022, and 21 in 2023	Surface, Mid, Bottom
Upper B	2020	2020	Field	2020 (n=16) 2023 (6)	Surface, Mid, Bottom
Upper C	2023	2023	Field	1 sample in December 2023	Surface, Mid, Bottom
Upper D	2023	2023	Field	1 sample in December 2023	Surface, Mid, Bottom

Database Variable Labels:

Date = "Sample Date"

Grid = “LAMFE Model Grid Cell”

Label = "Parameter Label"

Lat = "Latitude"

Level = "Sample Level"

Location = "Sample Location"

Lon = "Longitude"

Param = "Parameter"

Qual = "Value Qualifier"

Result = "Measurement Value"

Rkm = "River Kilometer"

SampleDepth = "Sample Depth"

Source = "Data Source Agency"

Station = "Station"

StationName = “Descriptive Station Name”

StationLabel = “Station Label used for Graphics”

Time = "Time of Sample"

Total_Depth_m = "Total Depth meters"

Units = "Units of Measure"