Appendix I2A

CR Raw Data Source Description

Lower Hillsborough Continuous Recorder Master README

Southwest Florida Water Management District

2024-08-02

Summary

This document summarizes the Continuous Recorder (CR) data that may support the Lower Hillsborough River (LHR) Recovery Strategy for the period of June 1, 1996 to December 31, 2023, as part of the Task 10 data deliverable for District TWA: 22TW0003992. This document is produced from R software code that reads in raw datasets and summarizes that key variables of interest, then combines individual files into a master dataset. Readme documentation is provided as a header paragraph for each dataset followed by summary statistics and histograms of the raw data. A line of qualifier code types is provided where present and a reported result of "character(0)" indicates no codes were available.

Where specific conductance but not salinity was provided, salinity was calculated using the equation of Schemel (2001) using the compensateR package:

R = specific_conductance/53087

Salinity=round(0.012 + -0.2174$R^{0.5}$ + 25.3283R + 13.7714$R^{(3/2)}$ + -6.4788R^2 + 2.5842*R^(5/2),digits=2)

Note: for some plot labels Specific Conductance is abbreviated as Spec. Conductance or Spec. Cond. in order to fit label on plot. ***

United States Geological Service (USGS) Data

This subsection describes the individual USGS continuous recorder data files provided in the data dictionary.
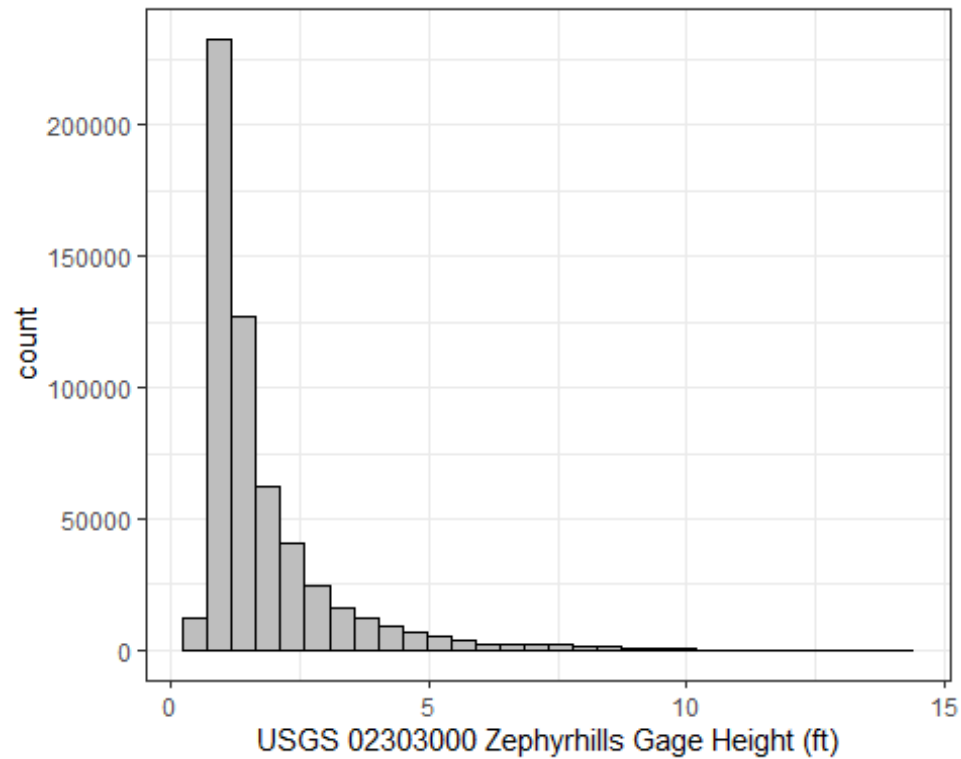

USGS 02303000 Hillsborough River @ Zephyrhills

File name and path:/USGS/Zephyrhills/USGS_Zephyrhills_Continuous.xlsx
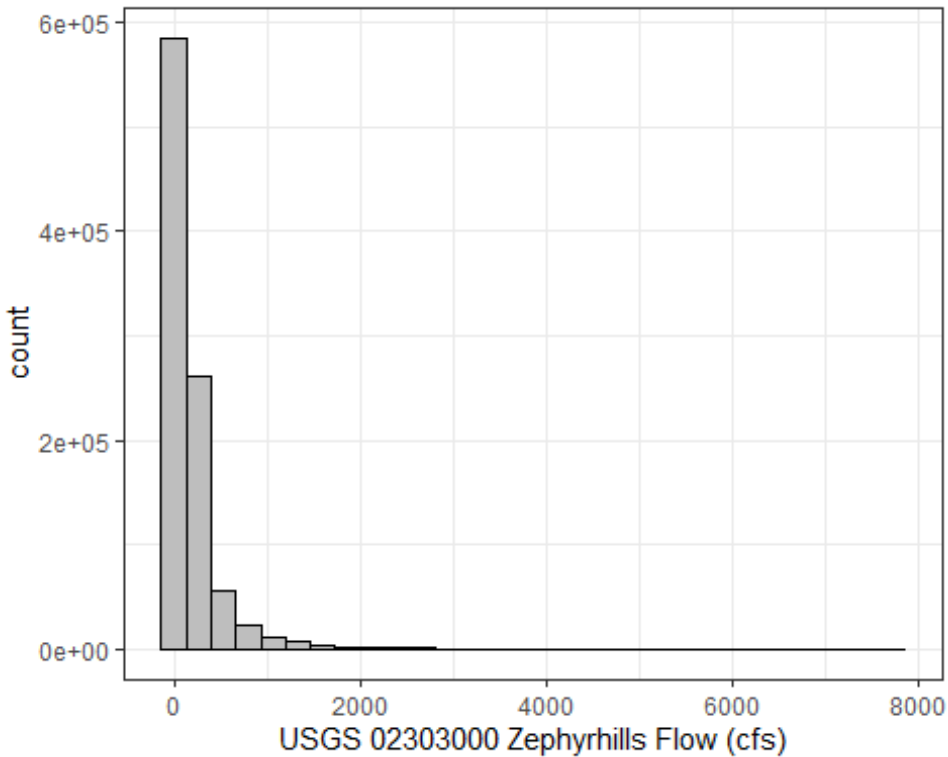
Metadata: R Script provided in tab in raw data file was run to pull the 15 minute continuous data through December 31, 2023 for Hillsborough RV at State Park NR Zephyrhills, FL - 02303000.

Data include flow and gage height.

Summary statistics are summarized below based on the period of record of January 1, 1996 to December 31, 2023.


```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     0.6     1.0     1.3     1.8     2.0    14.3  413000

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    26.0    75.0   107.0   218.1   204.0  7750.0   25139

## [1] "A"       "A [91]" "A [92]" "A [93]" "A e"     "A R"     "P"
```

USGS 02304000 Hillsborough River @ Fowler

**File name and path:/USGS/Fowler/USGS_Fowler_Continuous.xlsx**

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough R at Fowler AV Near Temple Terrace FL – 02304000.

Data include temperature, gage height, flow, dissolved oxygen and specific conductance. Single level only assigned as surface reading.
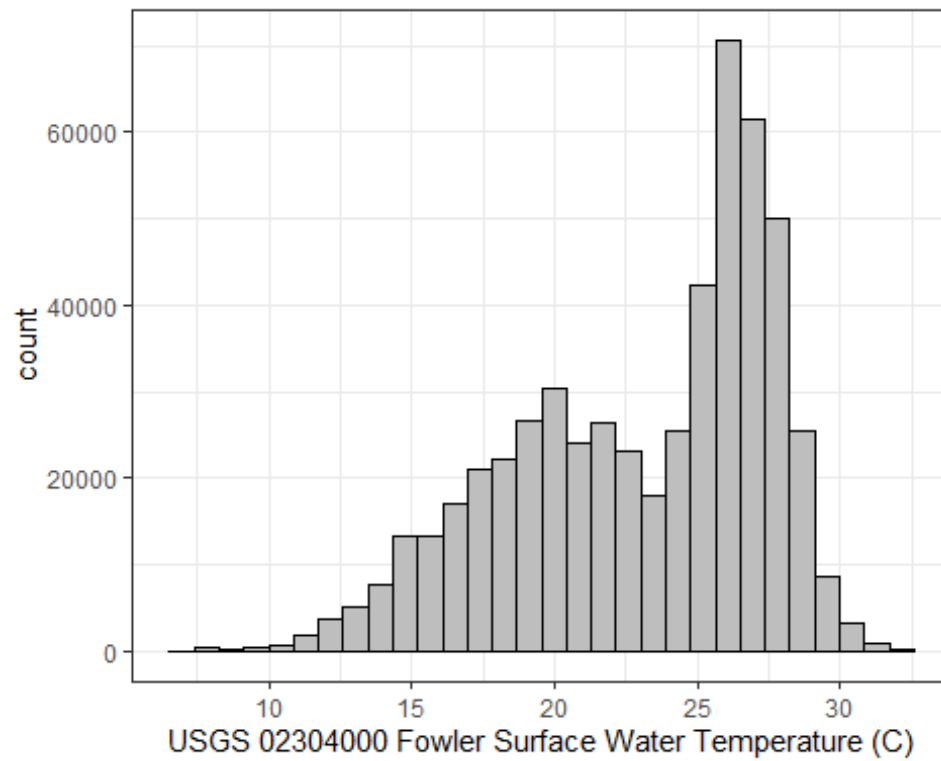
Summary statistics for surface parameters are summarized below based on the period of record of June 1, 2008 to December 31, 2023.

USGS 02304000 Fowler Gage Height (ft)
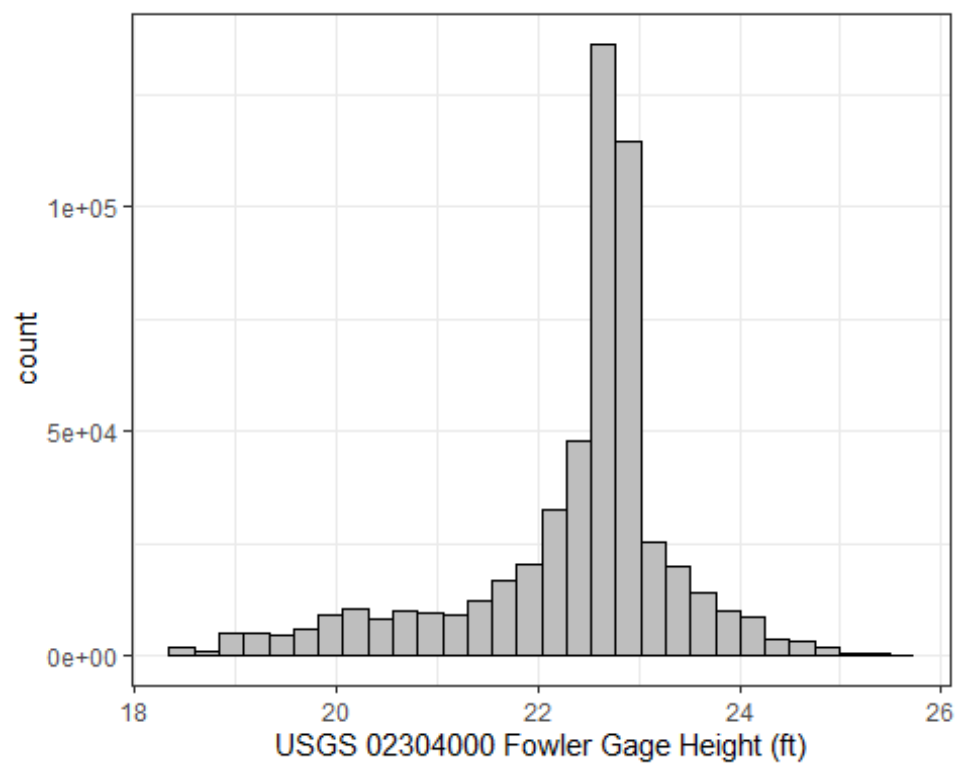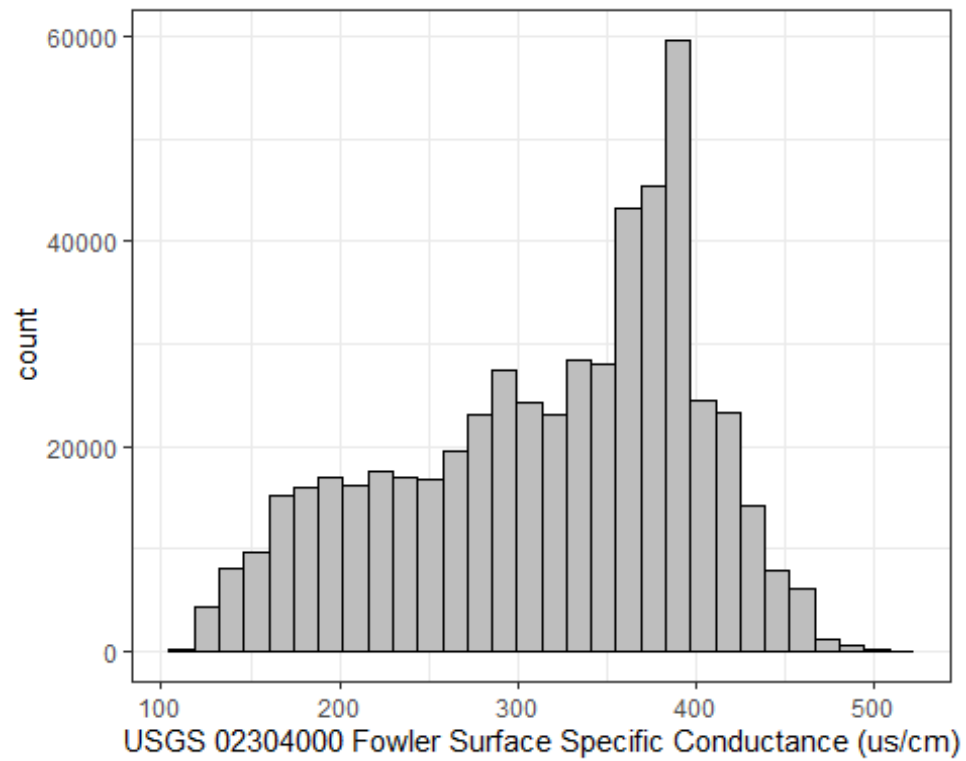
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   18.47   22.12   22.68   22.36   22.88   25.61    1128

## [1] "A" "P"
```
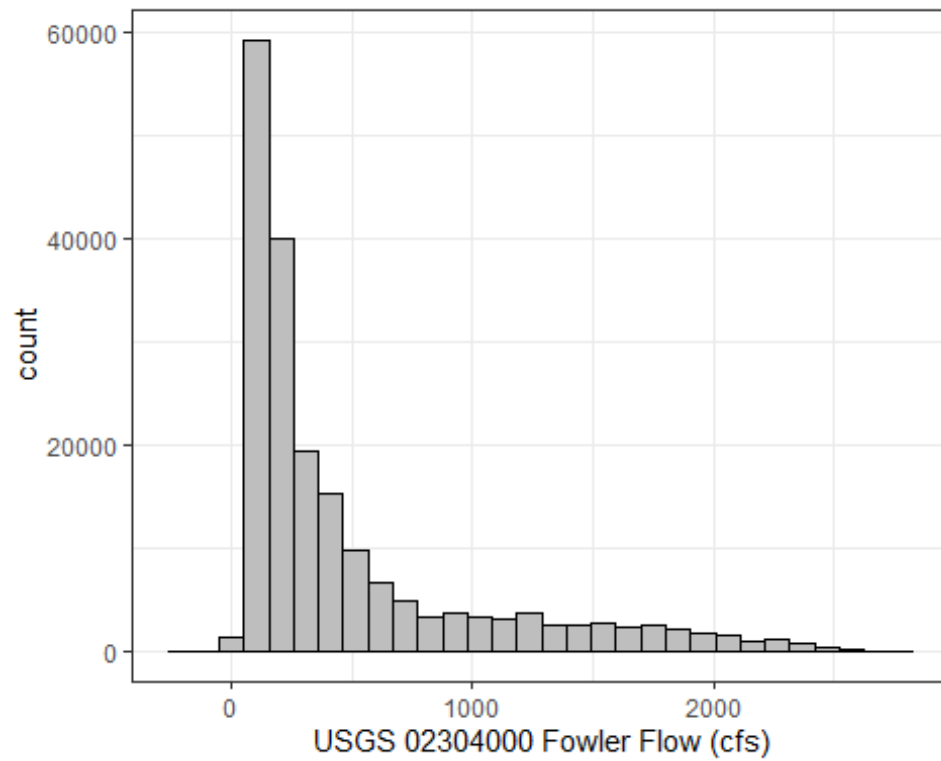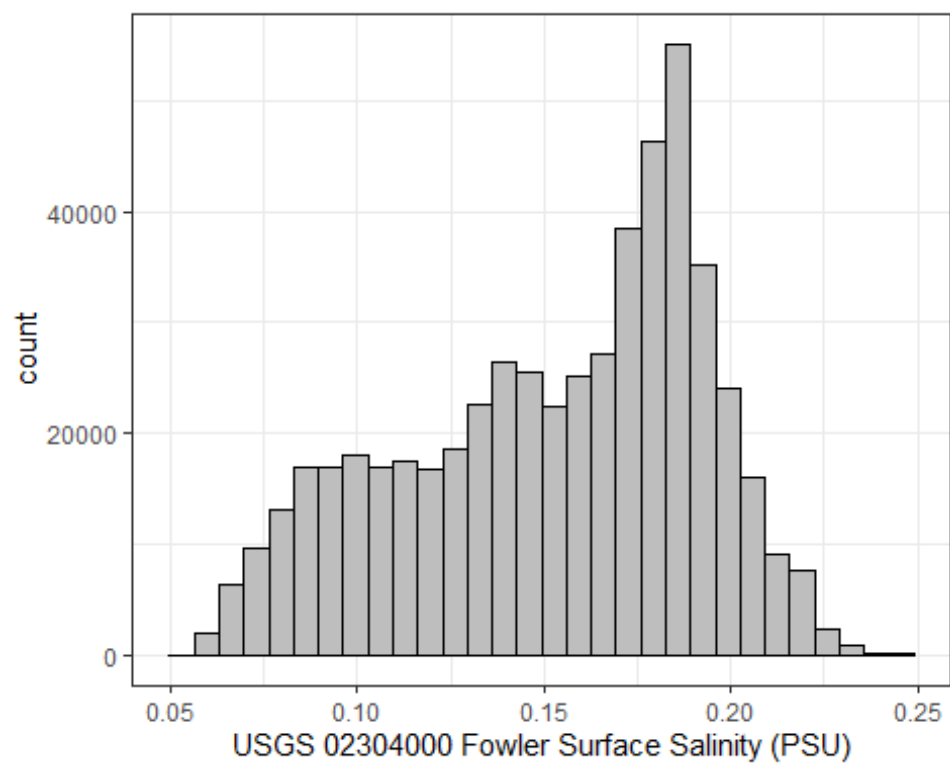
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
## -205.0   132.0   249.0   486.8   583.0  2780.0  351540

## [1] "A"    "A e" "P"
```
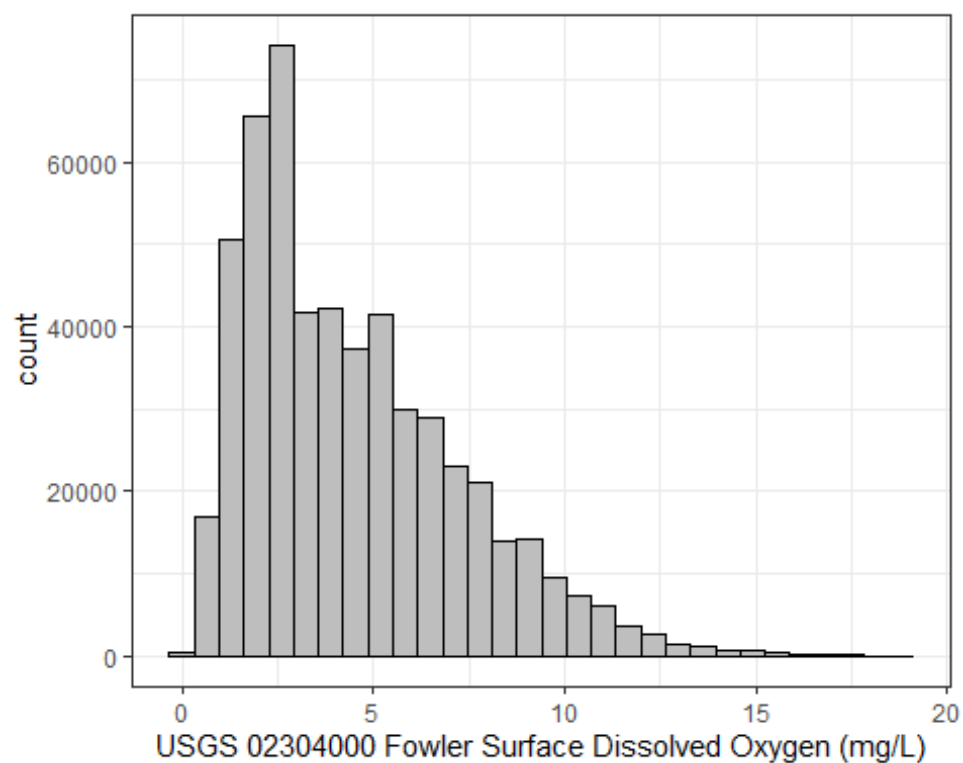
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     7.20   19.60   24.50   23.05   26.70   32.40    2714

## [1] "A" "P"
```

USGS 02304000 Fowler Surface Specific Conductance (us/cm)

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##   110.0   255.0   335.0   316.6   384.0   514.0   8837

## [1] "A" "P"
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.056   0.123   0.161   0.153   0.185   0.248    8837
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.200   2.300   3.900   4.489   6.200  19.000   10514

## [1] "A" "P"
```

Metadata: R Script provided in tab in raw data file was used to pull the hourly continuous data through December 31, 2023 for Hillsborough River Near Tampa FL - 02304500.
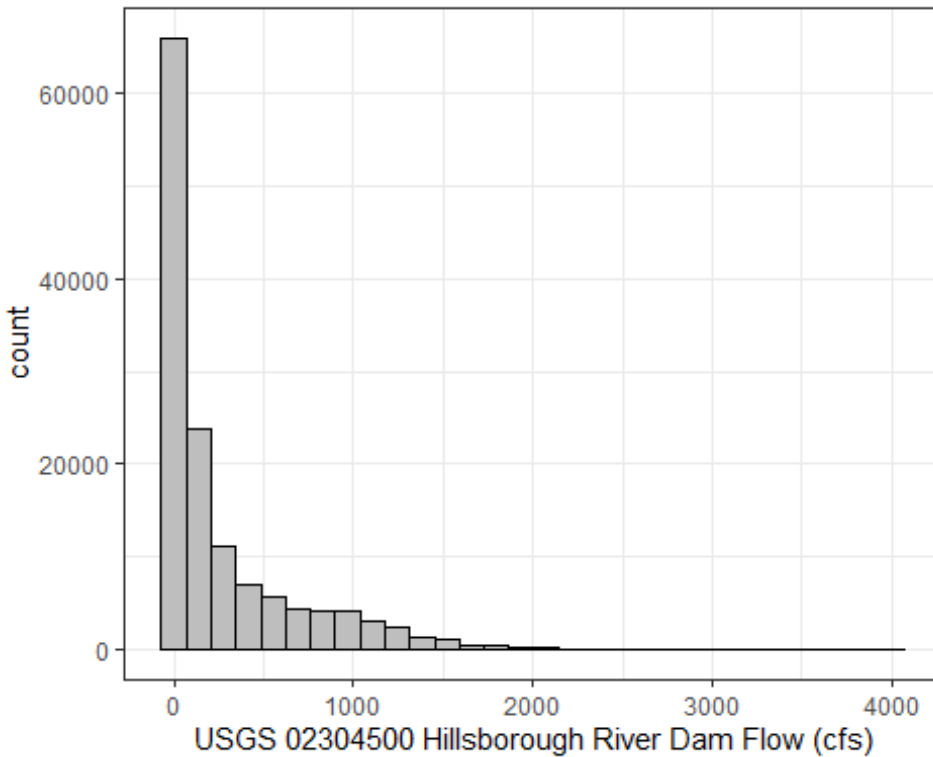
Data include flow and gage height information

Summary statistics are summarized below based on the period of record of October 1, 2007 to December 31, 2023.

USGS 02304500 Hillsborough River Dam Gage Height (ft)
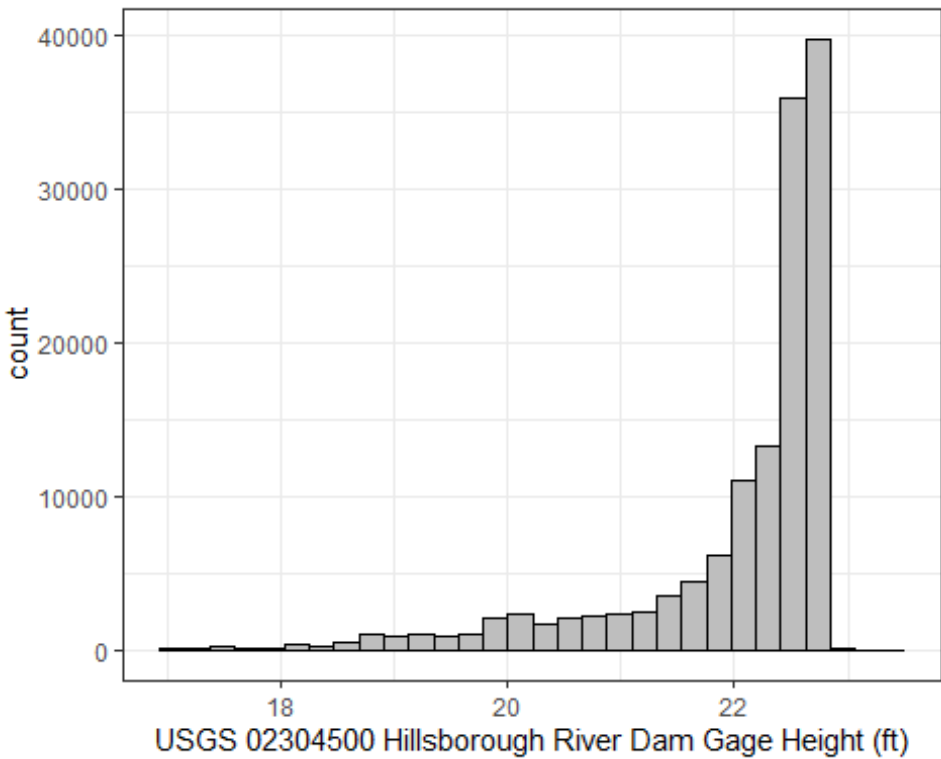
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   17.01   21.92   22.49   22.05   22.65   23.35    6373

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##     0.0     0.0    76.0   256.2   350.0  4010.0   7566

## [1] "A" "P"
```

USGS 02304510 Hillsborough River @ Rowlett Park Dr.

**File name and path:/USGS/Rowlett/USGS_Rowlett_Continuous_19870711_20070930.csv**

Historical Rowlett data (1987-2007) was originally provided via email on April 15, 2024 to SWFWMD from USGS, this data is still considered provisional. The data is for Hillsborough River at Rowlett PK DR Near Tampa FL - 02304510. These data were combined with Rowlett data from 2007 through December 31,2023 as described below.

**File name and path:/USGS/Rowlett/USGS_Rowlett_Continuous_20071001_20231231.xlsx**

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough River at Rowlett PK DR Near Tampa FL - 02304510.

Data include surface and bottom gage height, temperature and specific conductance

Summary statistics for surface and bottom parameters are summarized below based on the period of record of January 23, 1996 to December 31, 2023.
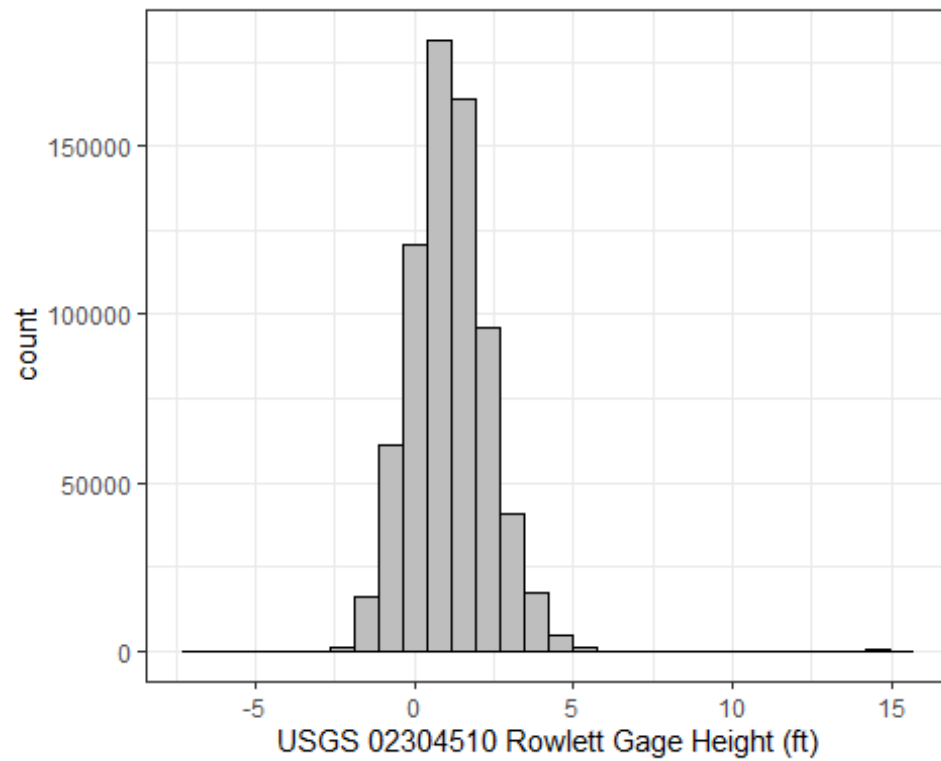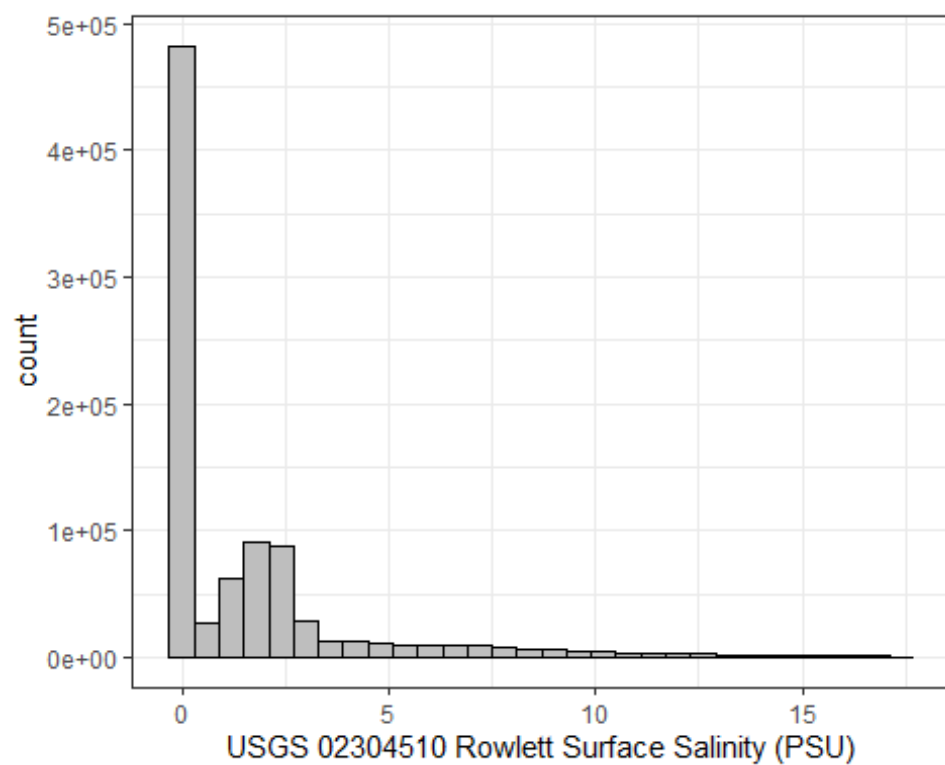
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    -7.04    0.27    1.04    1.10    1.83   15.20  274708

## [1] "A" "P"
```
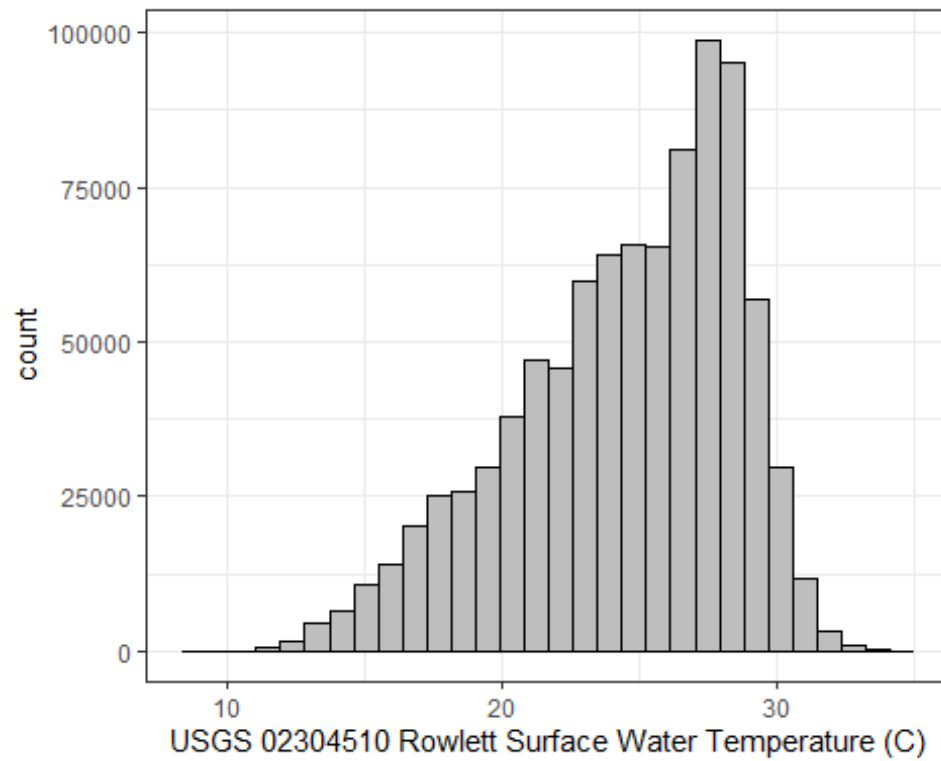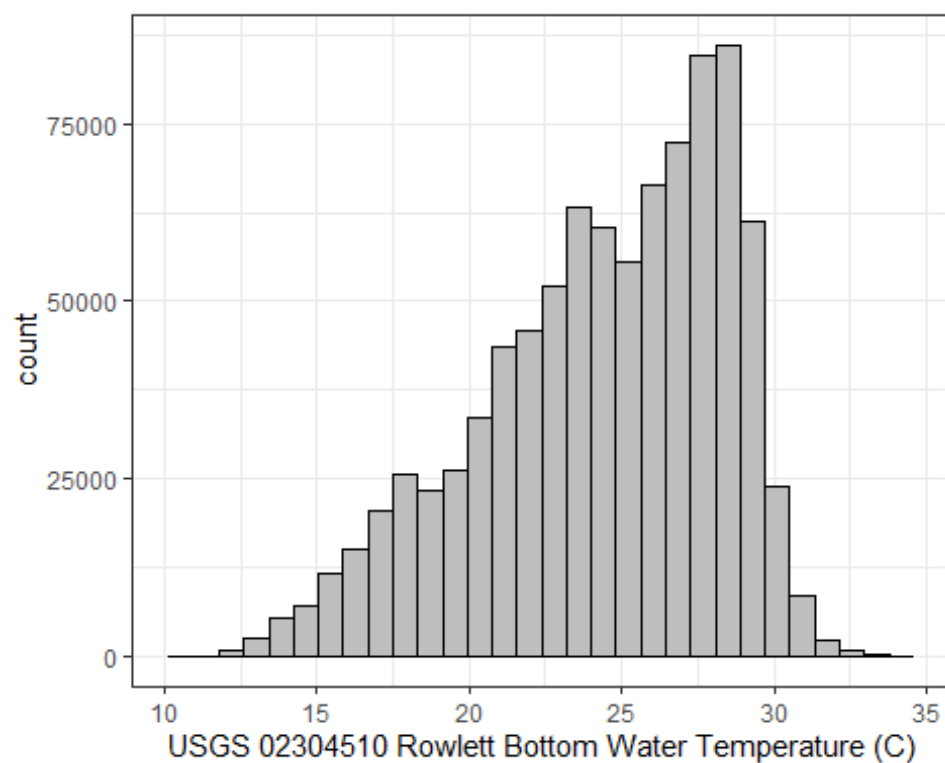
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     8.60   21.80   25.10   24.44   27.70   34.30   78908

## [1] "A" "P"
```

USGS 02304510 Rowlett Surface Spec. Conductance (us/cm)
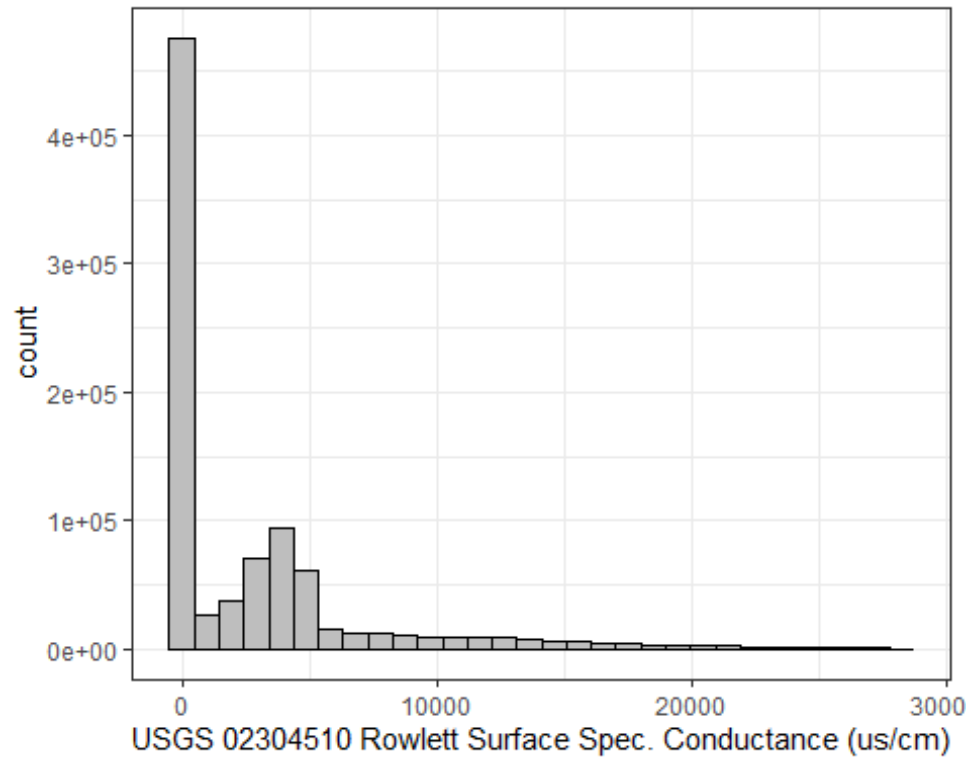
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##       82     265     382    3103    4100   28342  78698

## [1] "A" "P"
```

```
##     Min. 1st Qu.  Median   Mean 3rd Qu.    Max.    NA's
##     0.04    0.13    0.18   1.72    2.17   17.44   78698
```
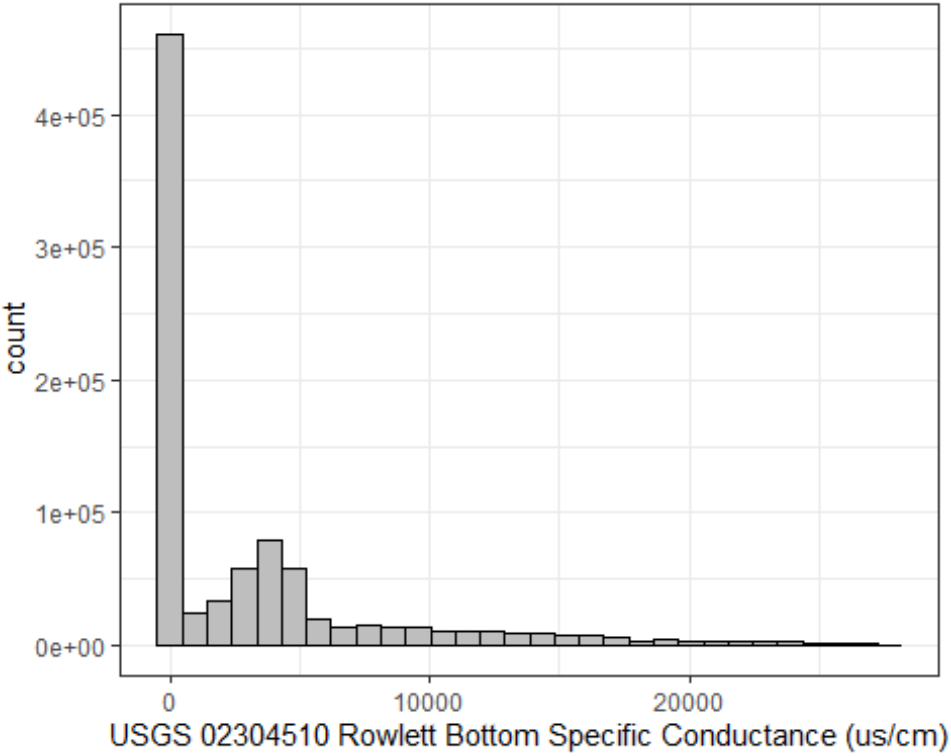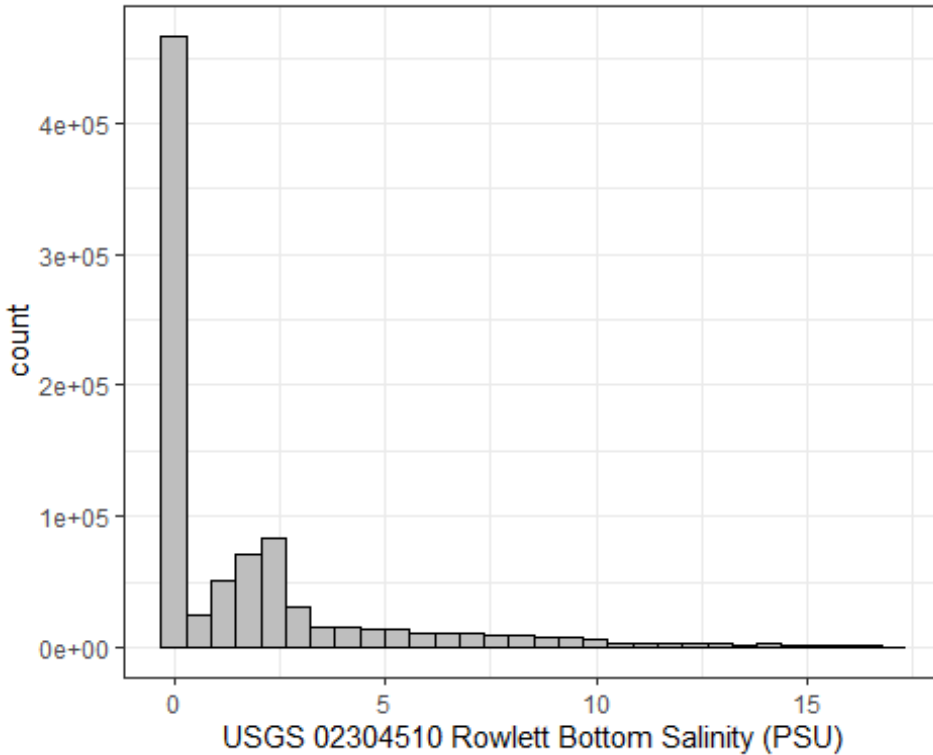
```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.     NA's
##     10.50   21.70   25.00    24.38   27.70    34.10    82784

## [1] "A" "P"
```


USGS 02304510 Rowlett Bottom Specific Conductance (us/cm)

```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.     NA's
##        88     261     383     3345    4370    27803   102503

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.05    0.13    0.18    1.86    2.32   17.08  102503
```

USGS 02304517 Hillsborough River @ BLHannah

**File name and path:/USGS/BLHannahs/USGS_BLHannah_Continuous.xlsx**

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough R BL Hannahs Whirl NR Sulphur Spgs FL – 02304517.

Data includes flow, and surface and bottom temperature, dissolved oxygen and specific conductance.

Summary statistics for surface parameters are summarized below based on the period of record of October 1, 2017 to December 31, 2023.
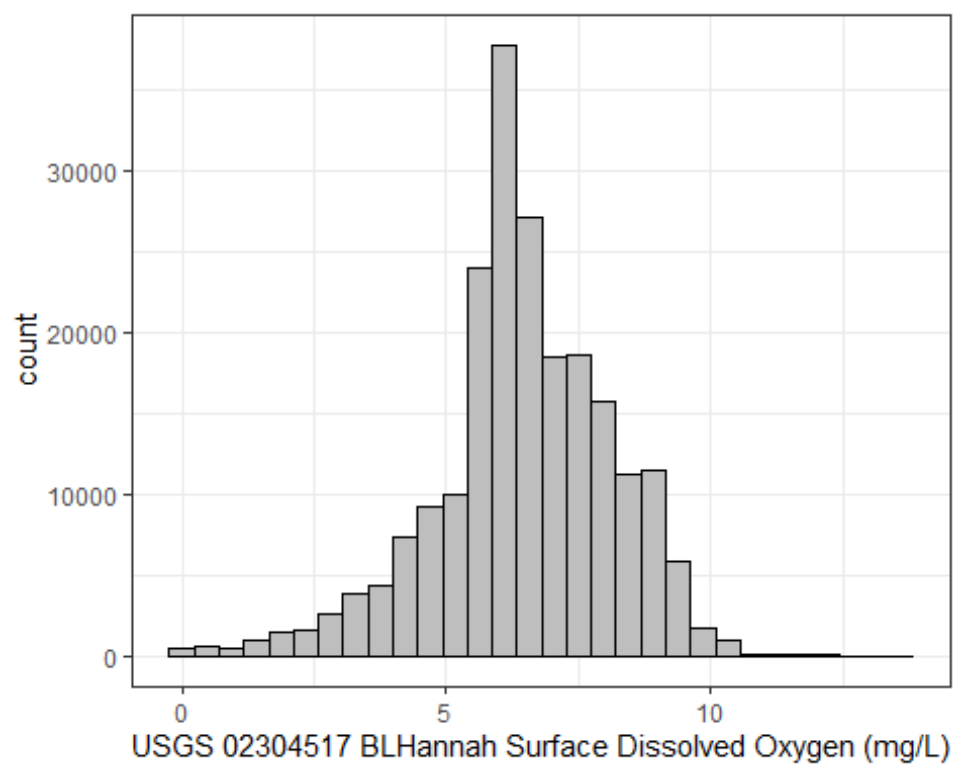
USGS 02304517 BLHannah Surface Water Temperature (C)
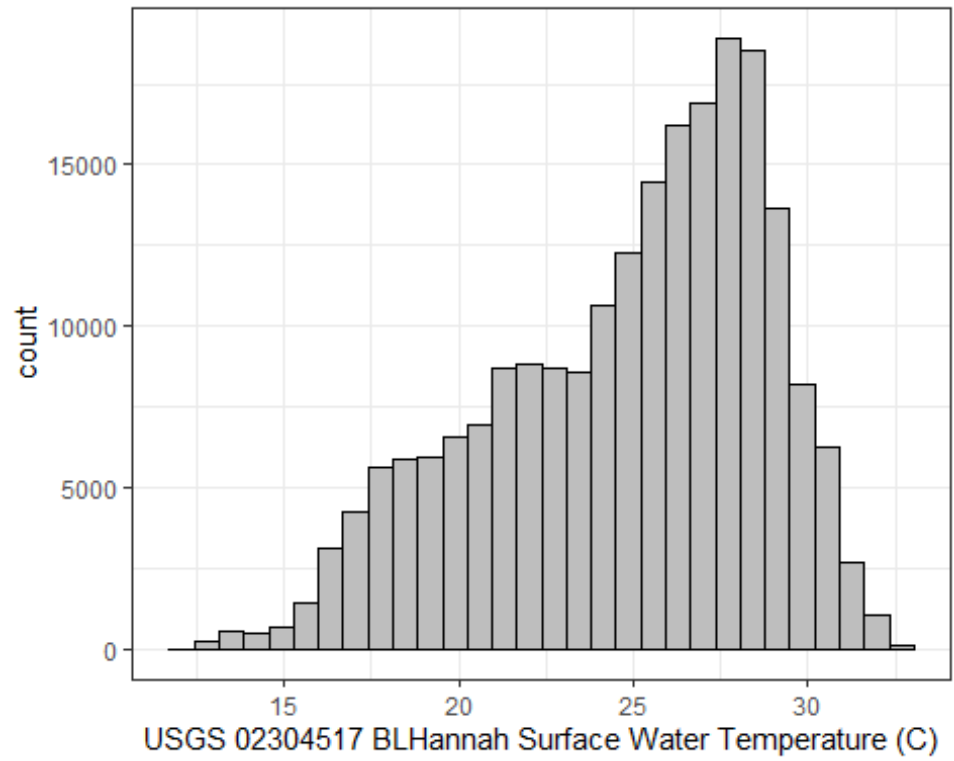
```
##     Min. 1st Qu.  Median   Mean 3rd Qu.   Max.   NA's
##     12.4    21.9    25.7   24.8    27.9   33.0   2732

## [1] "A" "P"
```

USGS 02304517 BLHannah Surface Spec. Cond. (us/cm)
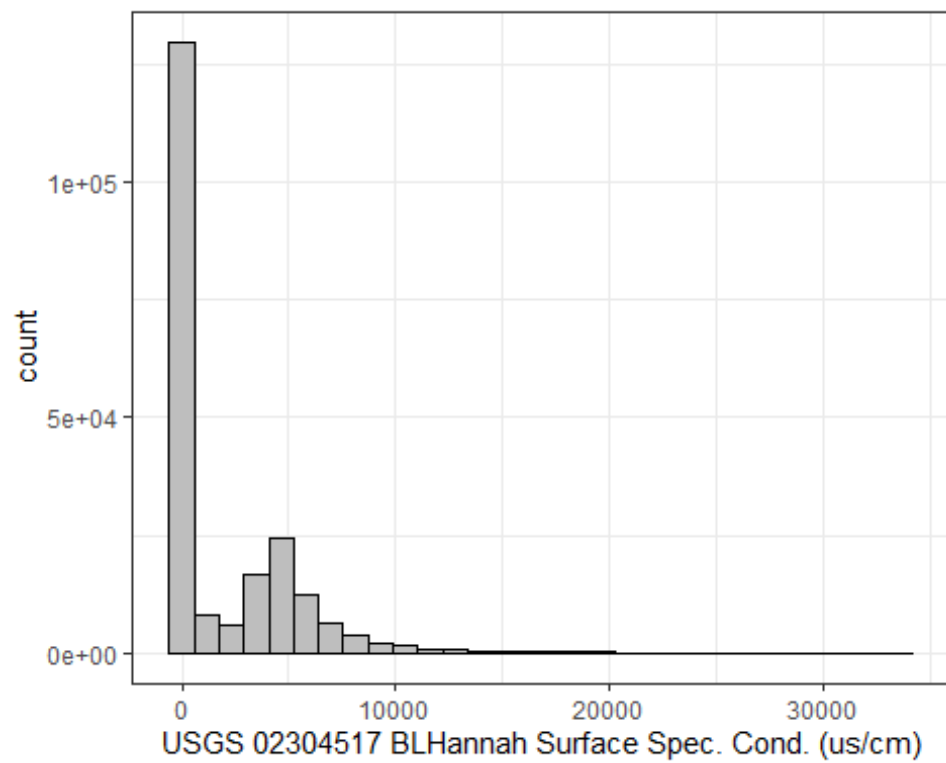
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     115     260     339    2256    4110   33800    3124

## [1] "A" "P"
```
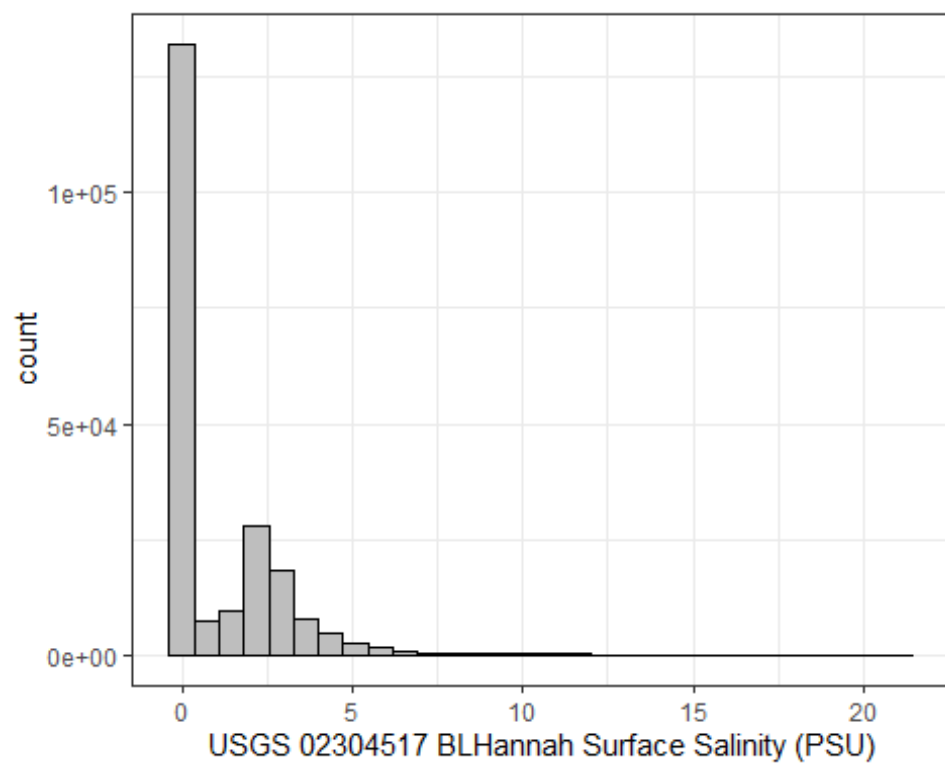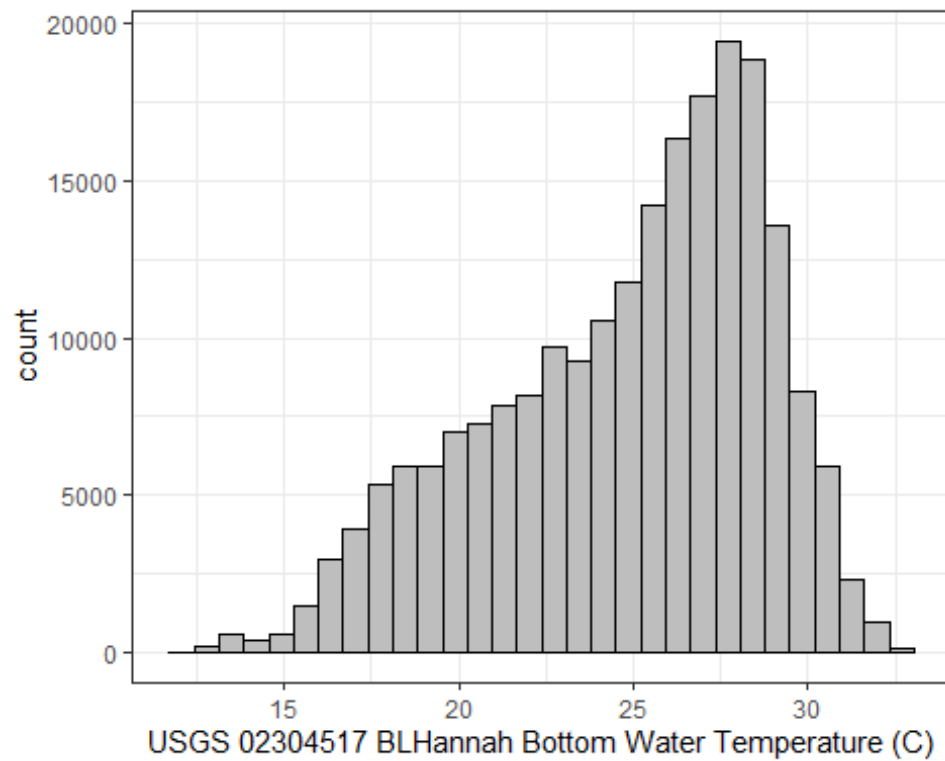
```
##    Min. 1st Qu. Median    Mean 3rd Qu.    Max.    NA's
##  0.0581  0.1254  0.1631  1.2213  2.1746 21.1707    3124
```
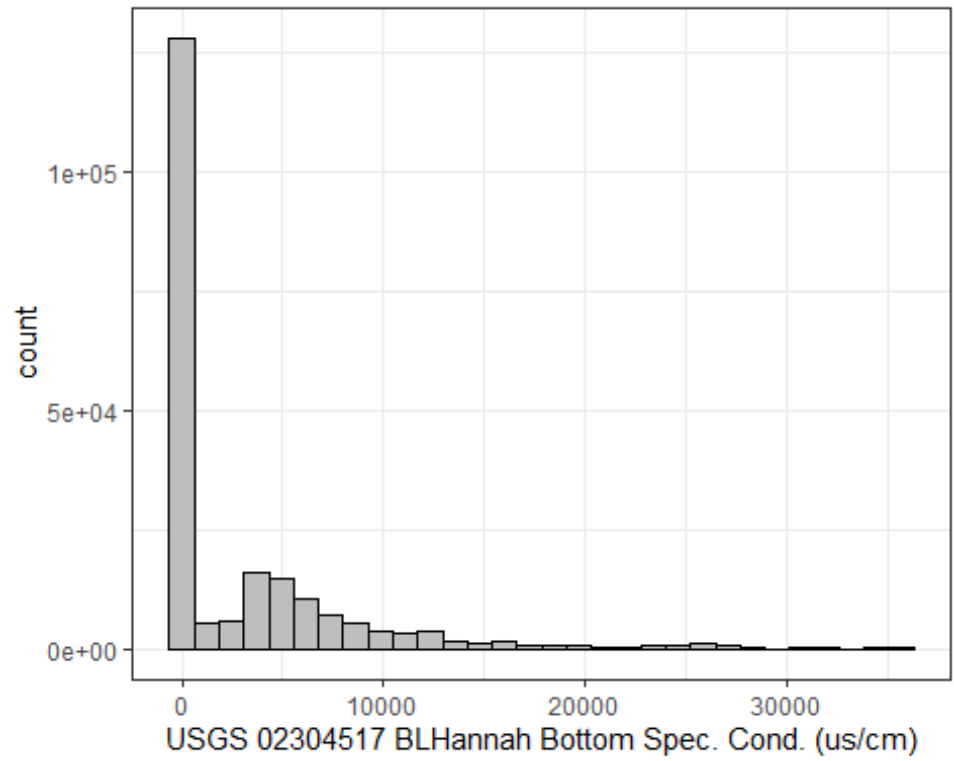
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     0.000   5.600   6.400   6.449   7.600  13.600    2874

## [1] "A" "P"
```


USGS 02304517 BLHannah Bottom Water Temperature (C)
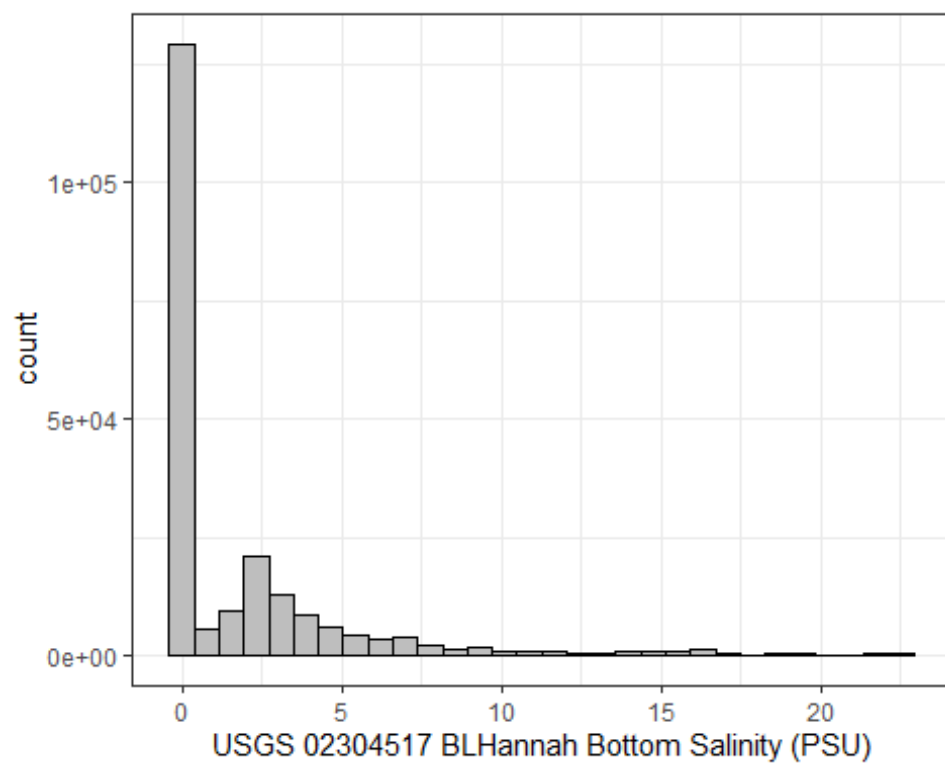
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     12.40   22.10   25.70   24.83   27.90   33.00    2556

## [1] "A" "P"
```
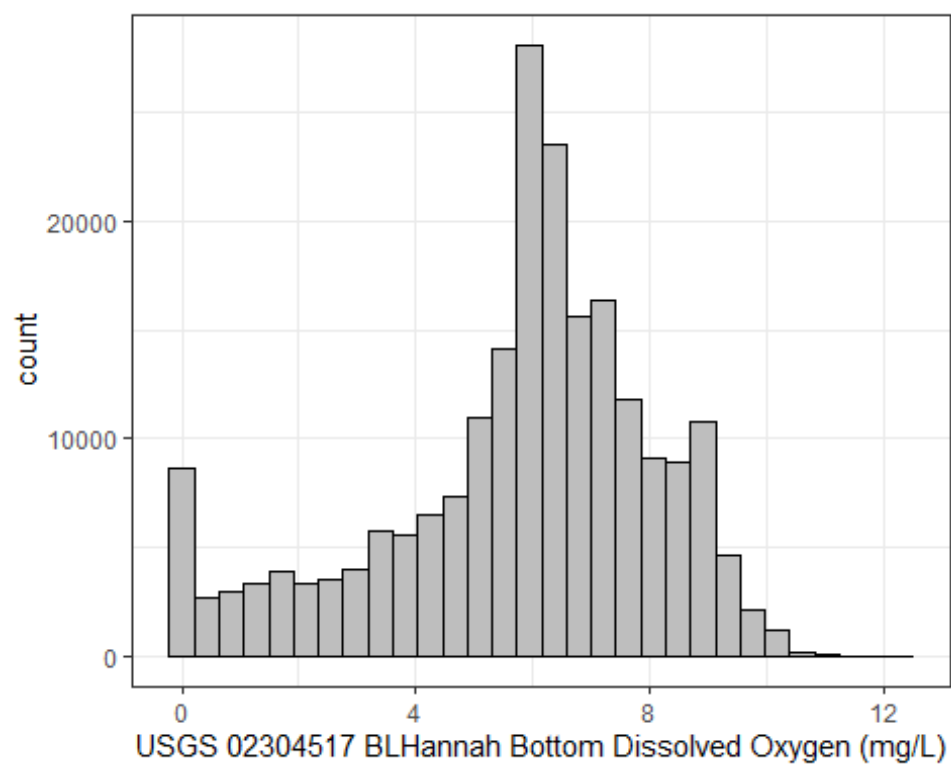
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##      94     252     336    3392    4830   35800   2649

## [1] "A" "P"
```

USGS 02304517 BLHannah Bottom Salinity (PSU)

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
## 0.0487  0.1216  0.1617  1.9100  2.5816 22.5591    2649
```


USGS 02304517 BLHannah Bottom Dissolved Oxygen (mg/L)

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.000   4.700   6.100   5.735   7.300  12.300    4226

## [1] "A" "P"
```


USGS 02304515 Hillsborough River @ Hannah's Whirl

File name and path:/USGS/HannahsWhirls/USGS_HannahsWhirl_Continuous.xlsx

Metadata: The District provided a dataset and R Script in a tab in raw data file that was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough River @ Hannah's Whirl USGS 02304515. This file had an odd format for dattime that was corrected by converting to a csv and manually removing the "UTC" suffix from the datetime field. This csv file USGS_HannahsWhirl_Continuous.csv is read in by the code below

Data includes surface and bottom temperature, dissolved oxygen and specific conductance.

Summary statistics for surface parameters are summarized below based on the period of record of June 15, 2001 to July 01, 2002.
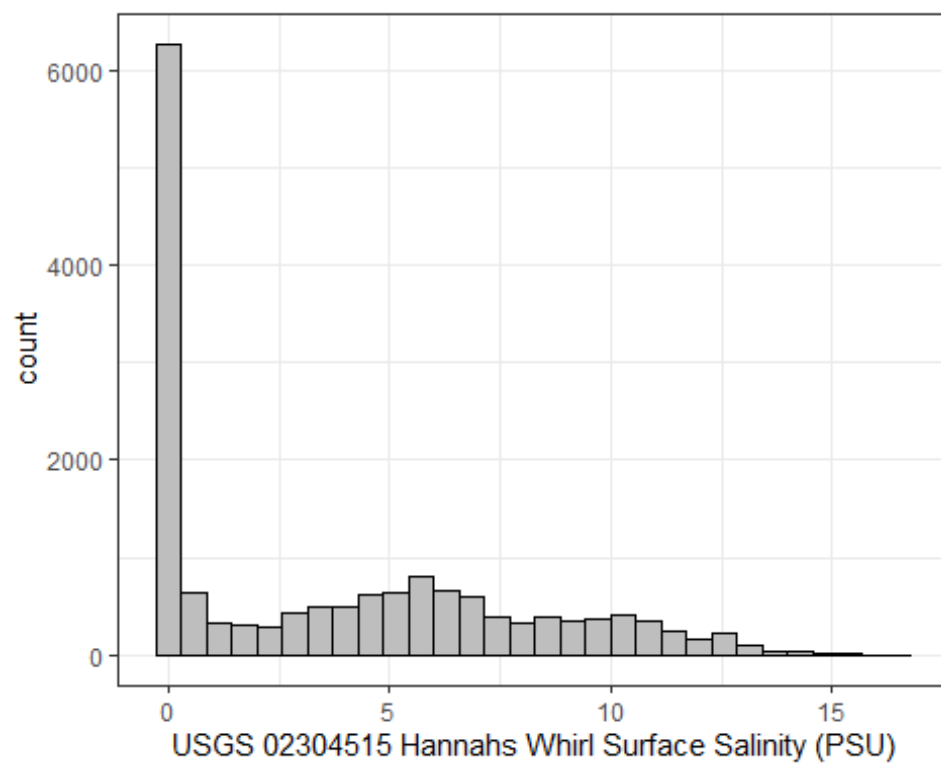

USGS 02304515 Hannahs Whirl Surface Water Temperature (C)
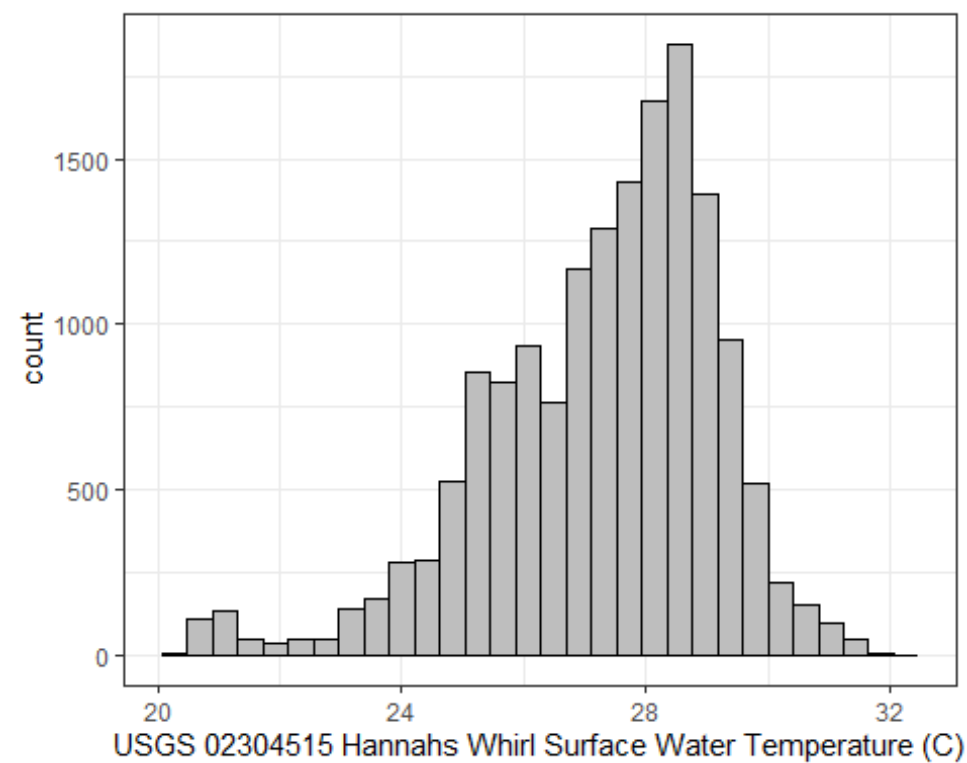
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    20.30   26.10   27.70   27.27   28.60   32.30   20859

## [1] " " "A"
```

USGS 02304515 Hannahs Whirl Surface Spec. Cond. (us/cm)
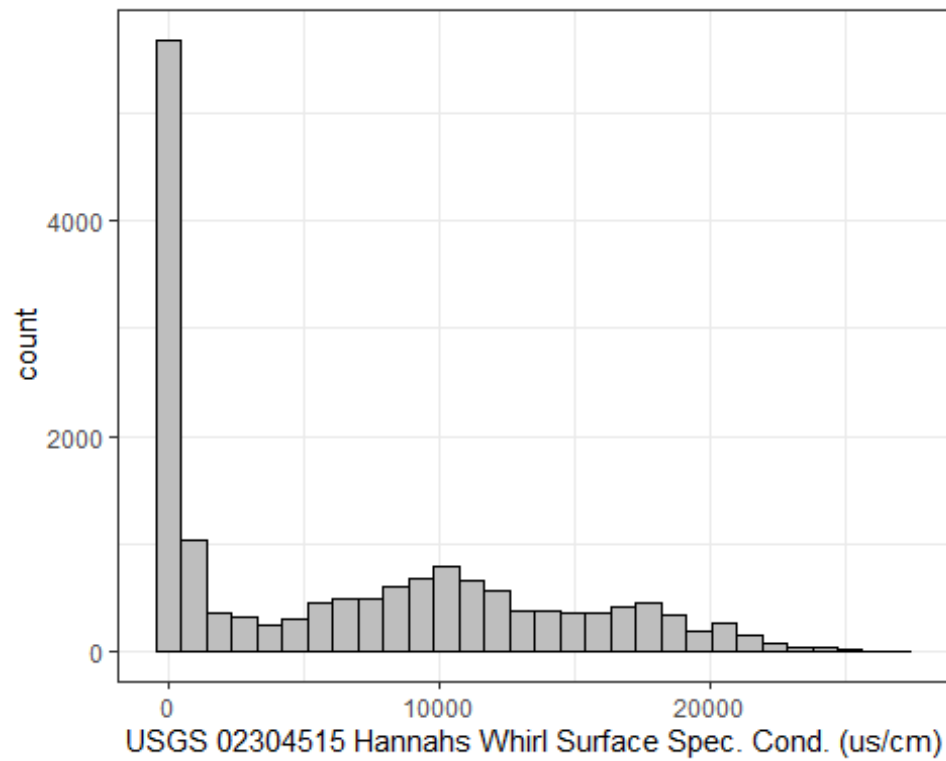
```
##    Min. 1st Qu. Median   Mean 3rd Qu.   Max.   NA's
##     108     285   5318   6655   11600  27100  20842

## [1] " " "A"
```

USGS 02304515 Hannahs Whirl Surface Salinity (PSU)

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.055   0.137   2.860   3.809   6.600  16.602   20842
```


USGS 02304515 Hannahs Whirl Surface Dissolved Oxygen (mg/L)
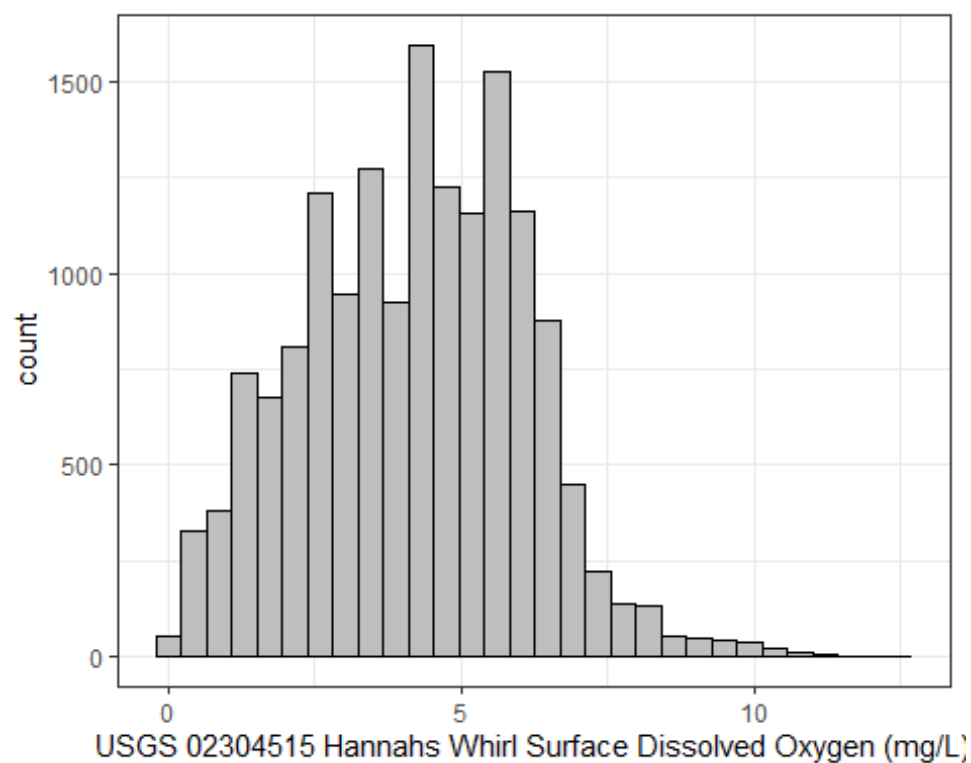
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.000   2.800   4.300   4.182   5.600  12.500   20835

## [1] "A"
```


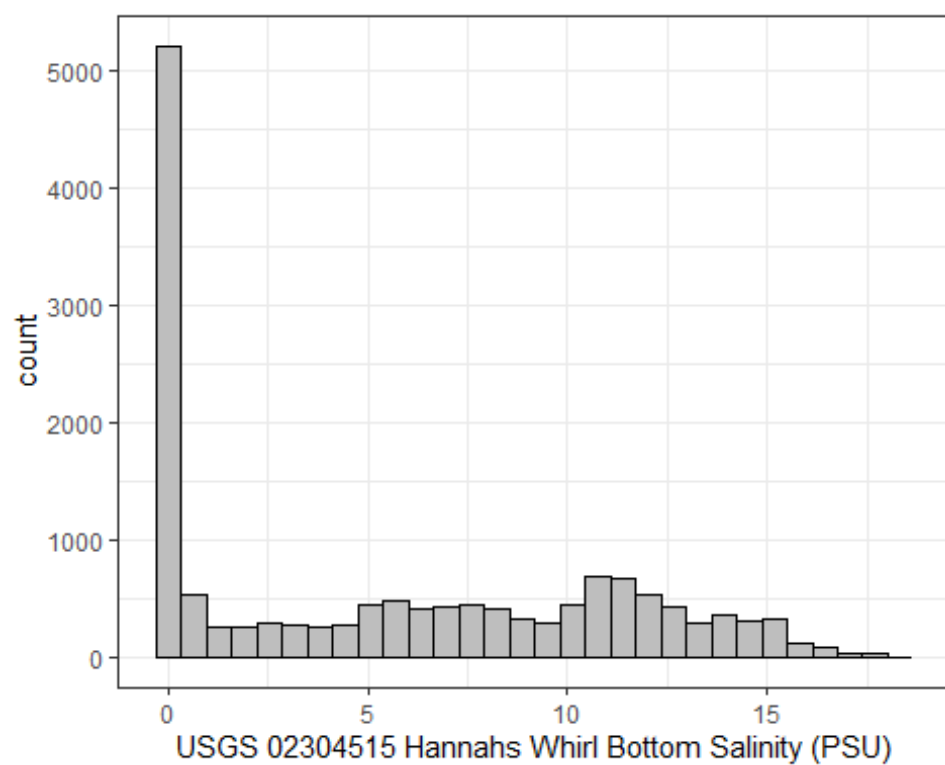USGS 02304515 Hannahs Whirl Bottom Water Temperature (C)
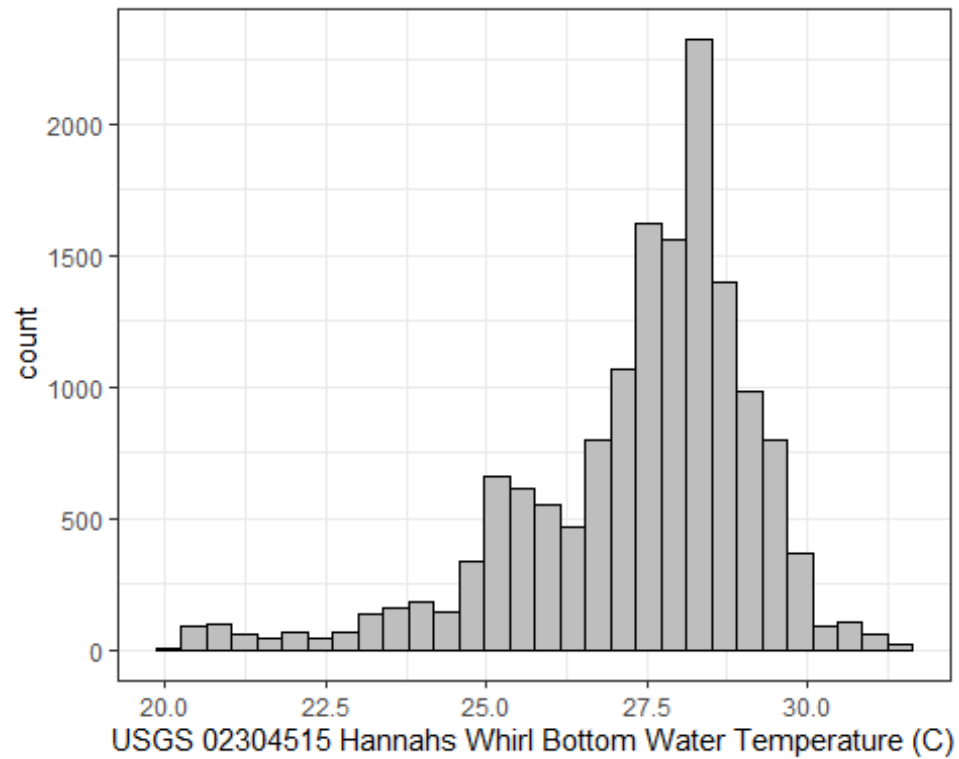
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    20.20   26.50   27.80   27.36   28.60   31.60   21906

## [1] " " "A"
```

USGS 02304515 Hannahs Whirl Bottom Spec. Cond. (us/cm)
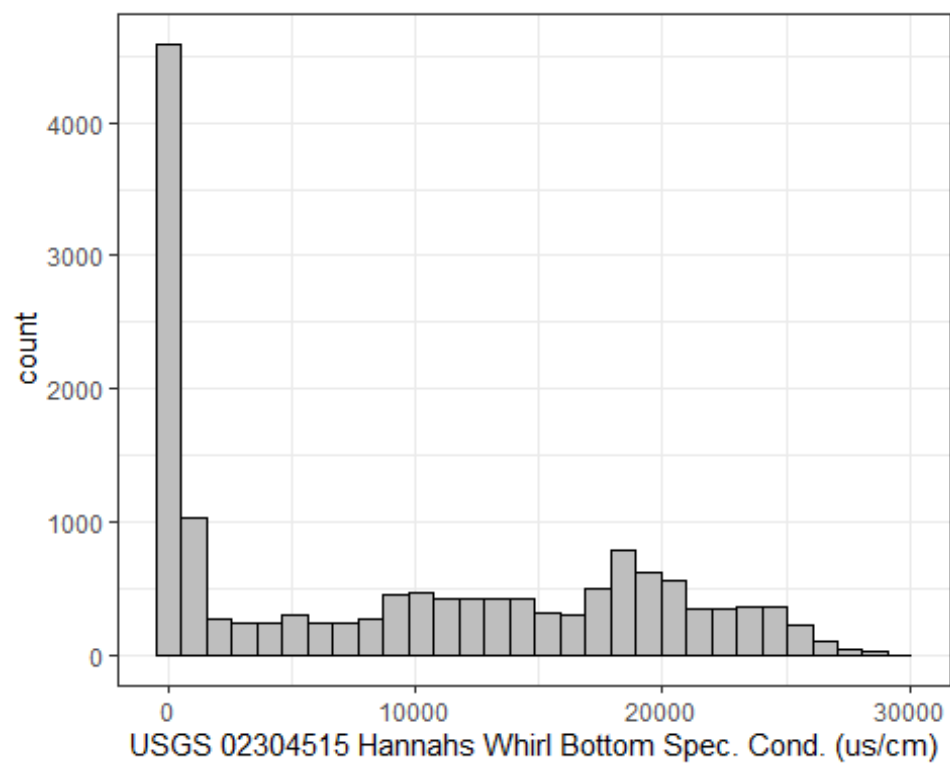
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      170     324    8840    9477   17928   29800   21901

## [1] " " "A"
```

USGS 02304515 Hannahs Whirl Bottom Salinity (PSU)

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.083   0.156   4.926   5.553  10.574  18.427   21901
```


USGS 02304515 Hannahs Whirl Bottom Dissolved Oxygen (mg/L)
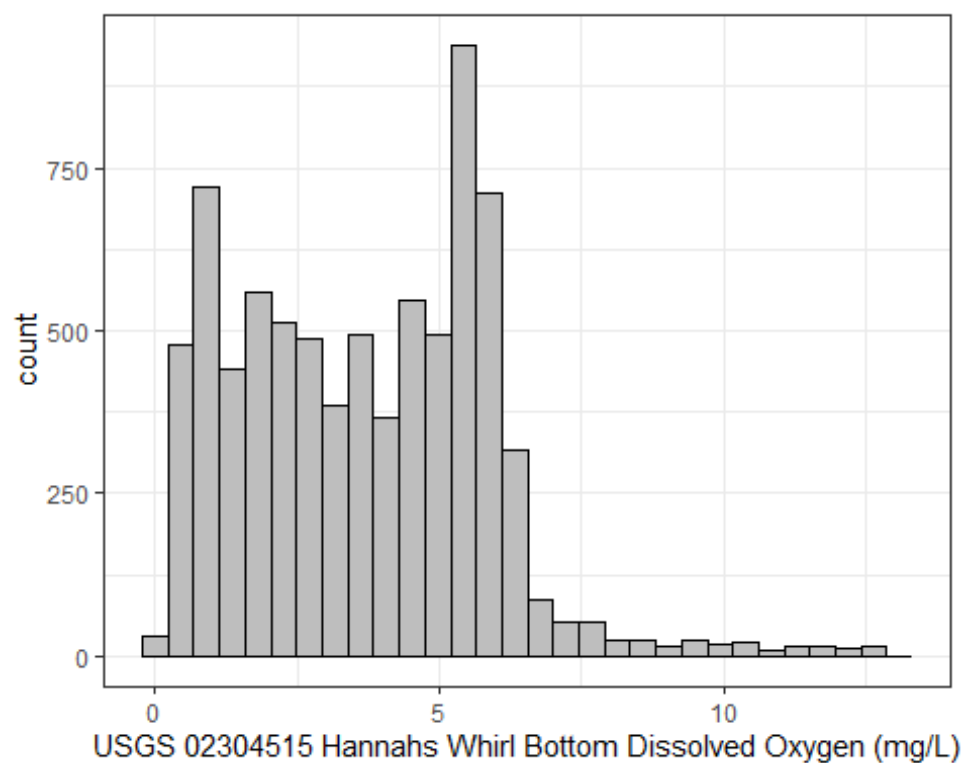
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.000   1.800   3.700   3.666   5.400  13.100   28994

## [1] " " "A"
```


USGS 023060013 Hillsborough R. at I-275 Bridge at Sulphur Springs FL.

**File name and path:/USGS/I275/USGS_I275_Continuous.xlsx**

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough R. at I-275 Bridge at Sulphur Spgs FL - 023060013.

Data include gage height and surface and bottom temperature and specific conductance.

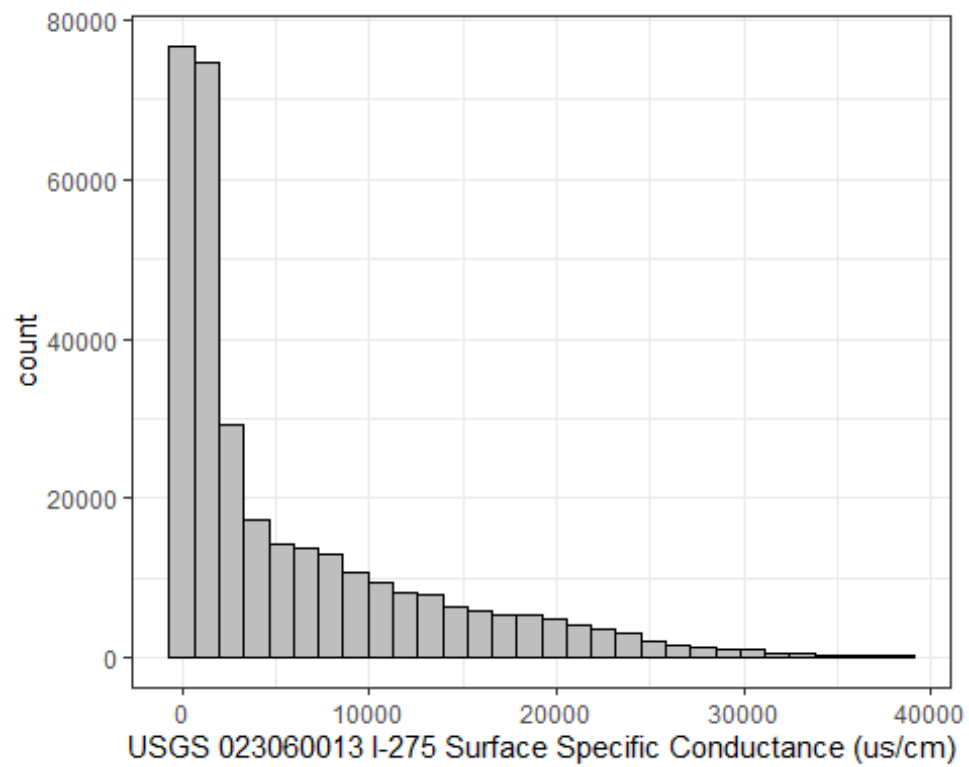Summary statistics for surface parameters are summarized below based on the period of record of June 30, 2011 to December 31, 2023
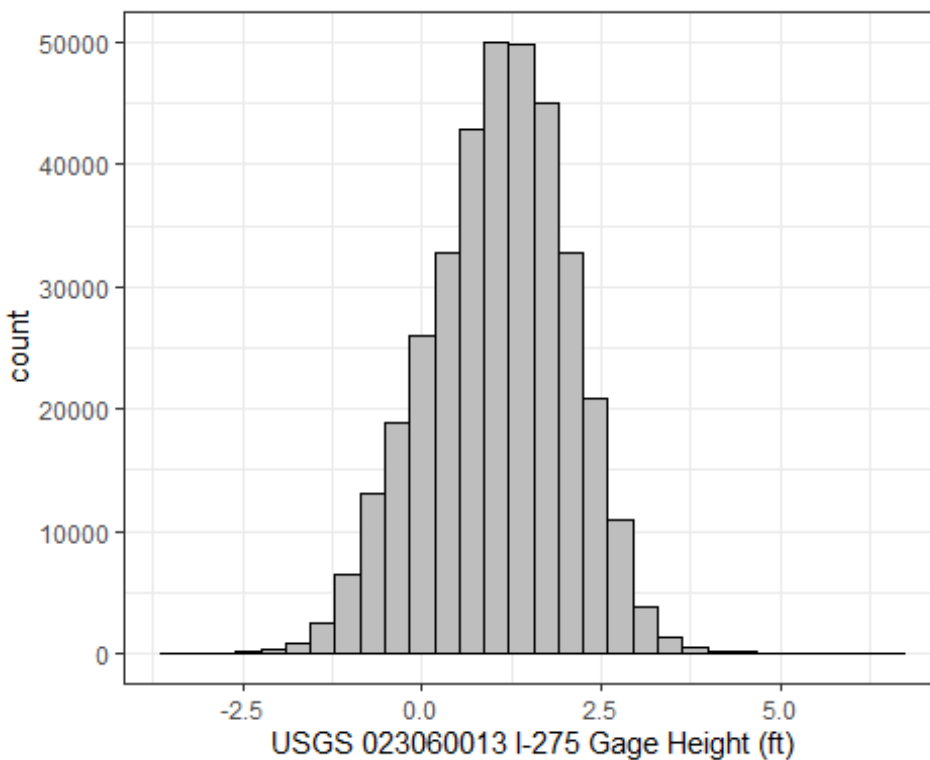

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    -3.38    0.41    1.12    1.06    1.74    6.66   79640

## [1] "A" "P"
```
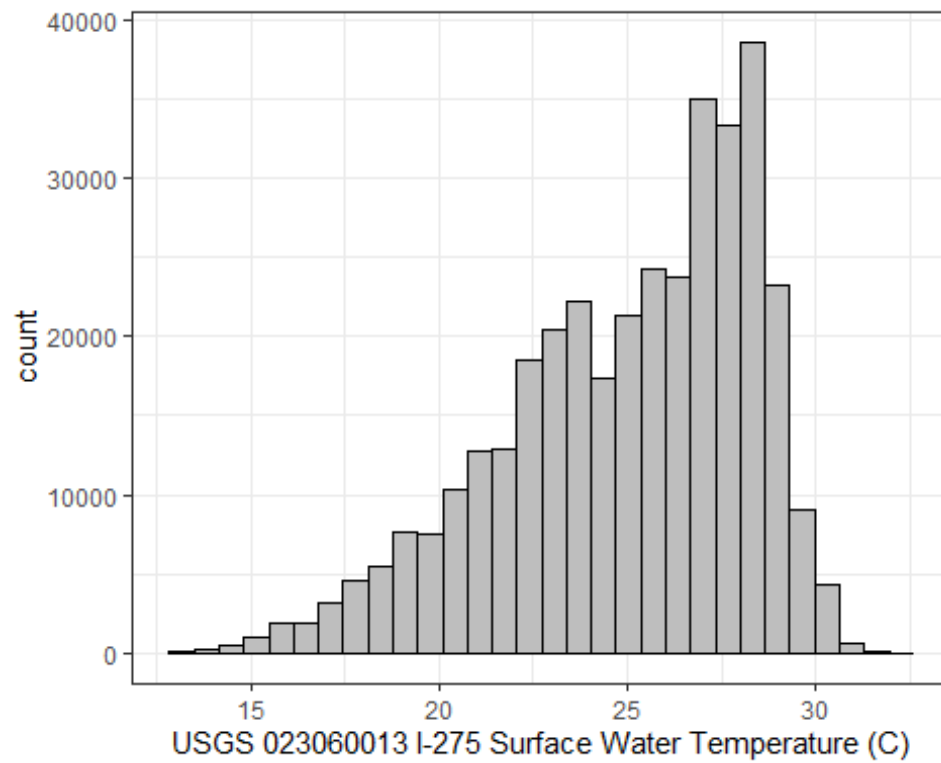
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    13.00   22.80   25.70   24.99   27.70   32.10   76747

## [1] "A" "P"
```

USGS 023060013 I-275 Surface Specific Conductance (us/cm)

```
##    Min. 1st Qu. Median    Mean 3rd Qu.    Max.    NA's
##     171     690    2290    5831    8840   38600  117943

## [1] "A" "P"
```

USGS 023060013 I-275 Surface Salinity (PSU)
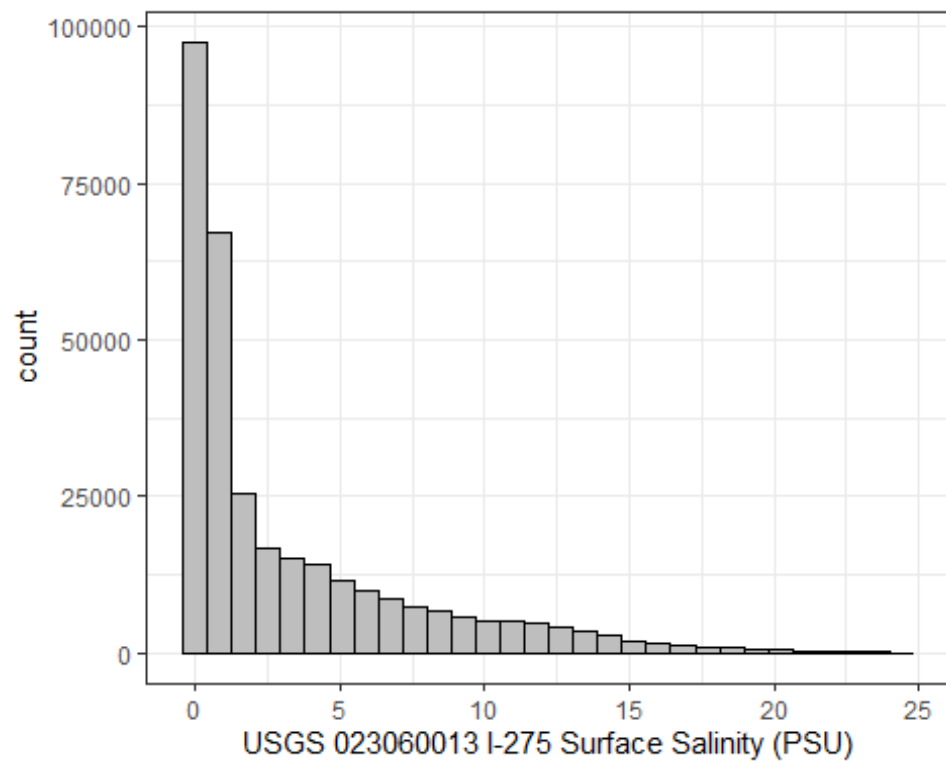
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.08    0.34    1.17    3.33    4.93   24.52  117943
```


USGS 023060013 I-275 Bottom Water Temperature (C)

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
## 13.20    22.90   25.80   25.04   27.60   31.40   82143

## [1] "A" "P"
```
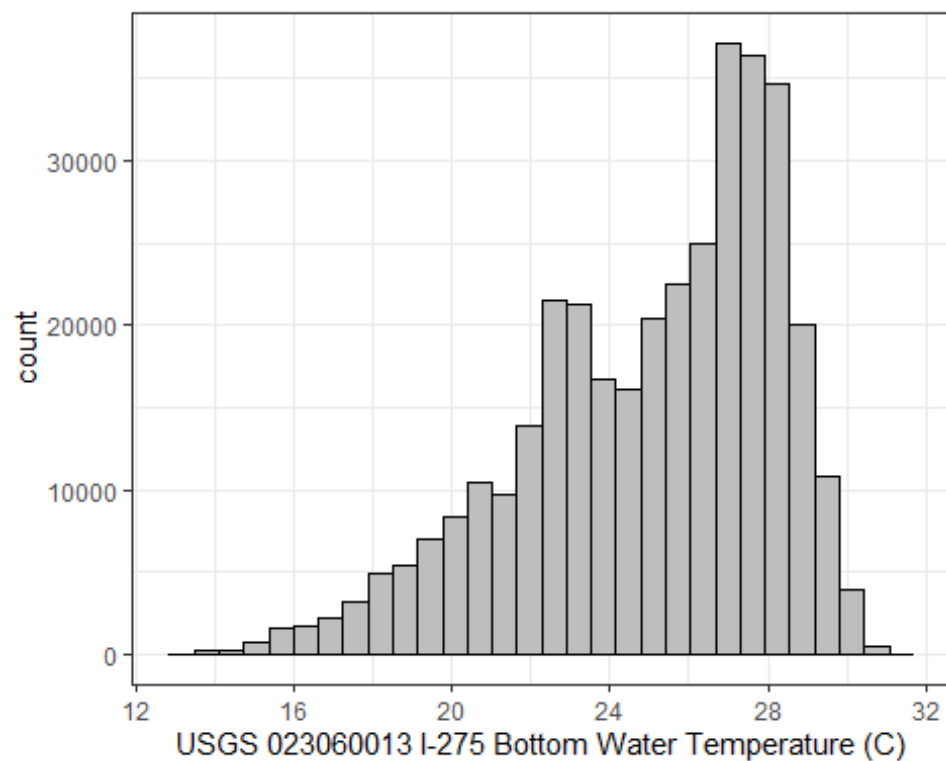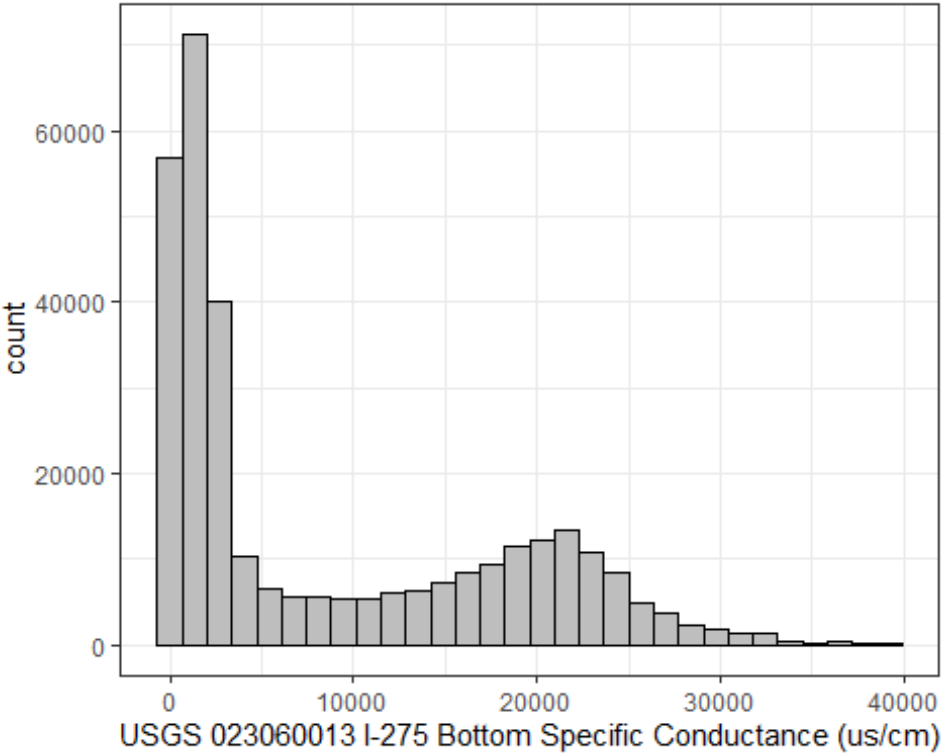


```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.     NA's
##      183     1010    2910    8701   17500   39400   120131

## [1] "A" "P"
```
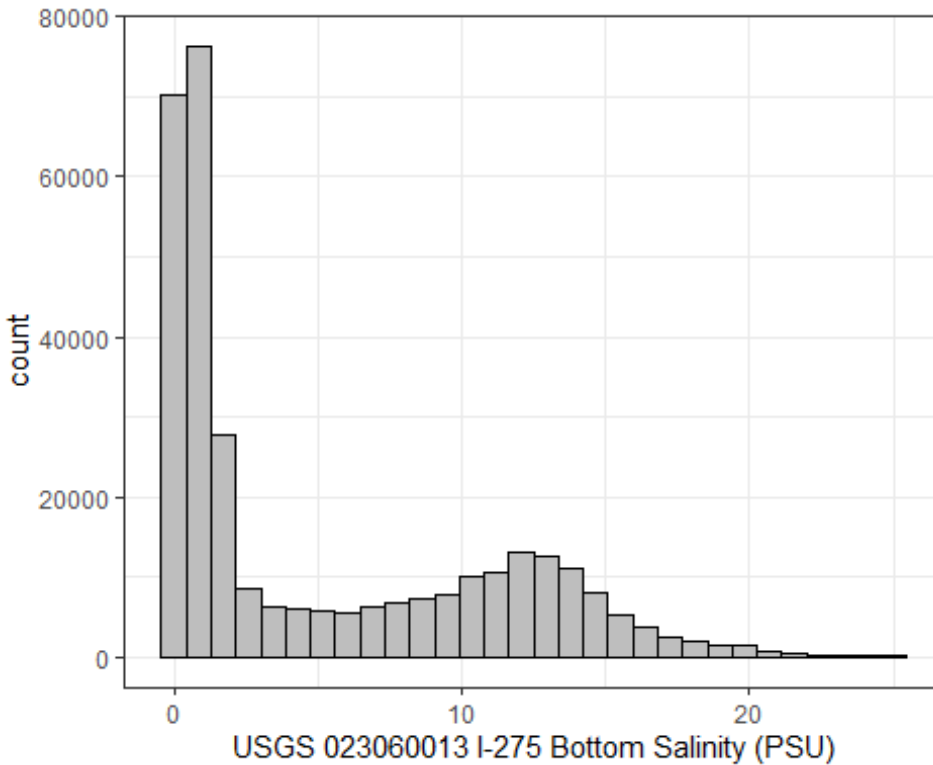
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     0.09    0.50    1.51    5.10   10.30   25.09  120131
```

USGS 02306028 Hillsborough River @ Platt Street

File name and path:/USGS/Platt/USGS_Platt_Continuous.xlsx"

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Hillsborough River at Platt Street at Tampa FL - 02306028.

Data include surface and bottom temperature and specific conductance

Summary statistics for surface parameters are summarized below based on the period of record of June 1, 2008 to December 31, 2023
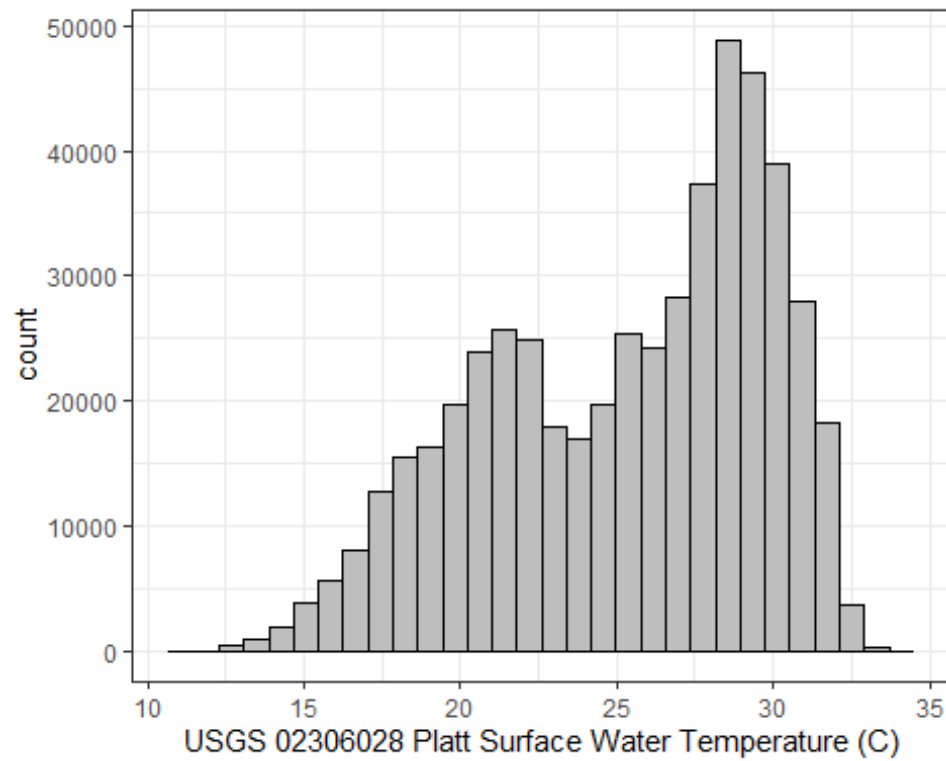
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   11.30   21.70   26.30   25.33   29.10   34.30   32507

## [1] "A" "P"
```

USGS 02306028 Platt Surface Specific Conductance (us/cm)
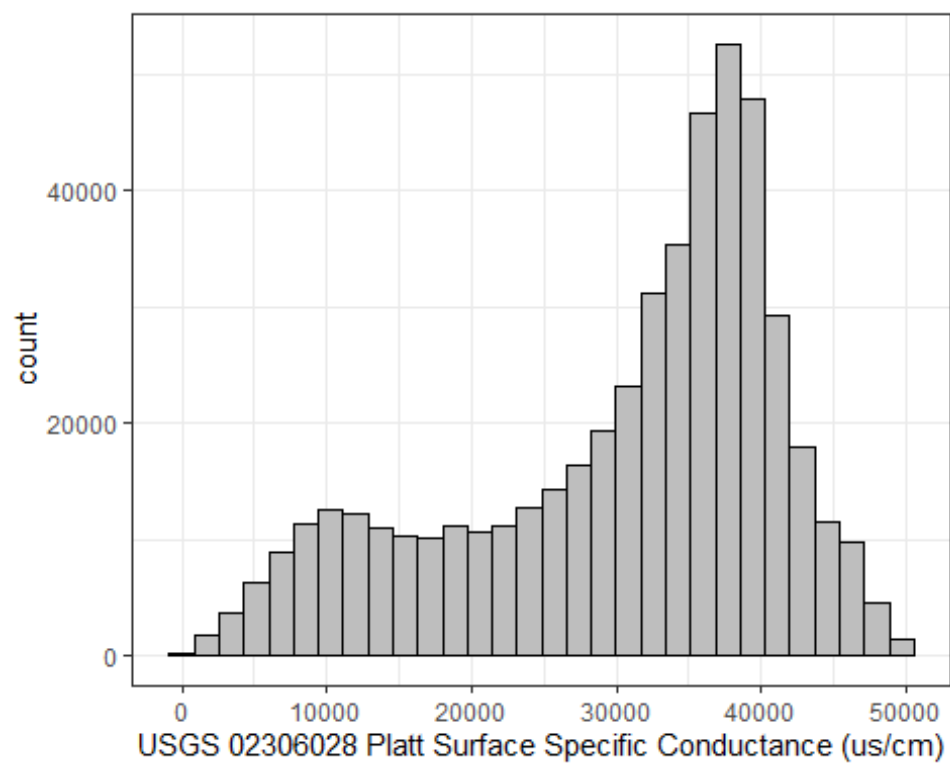
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     220   23500   33900   30362   38500   49900   51447

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.11   14.20   21.24   19.00   24.45   32.65   51447
```
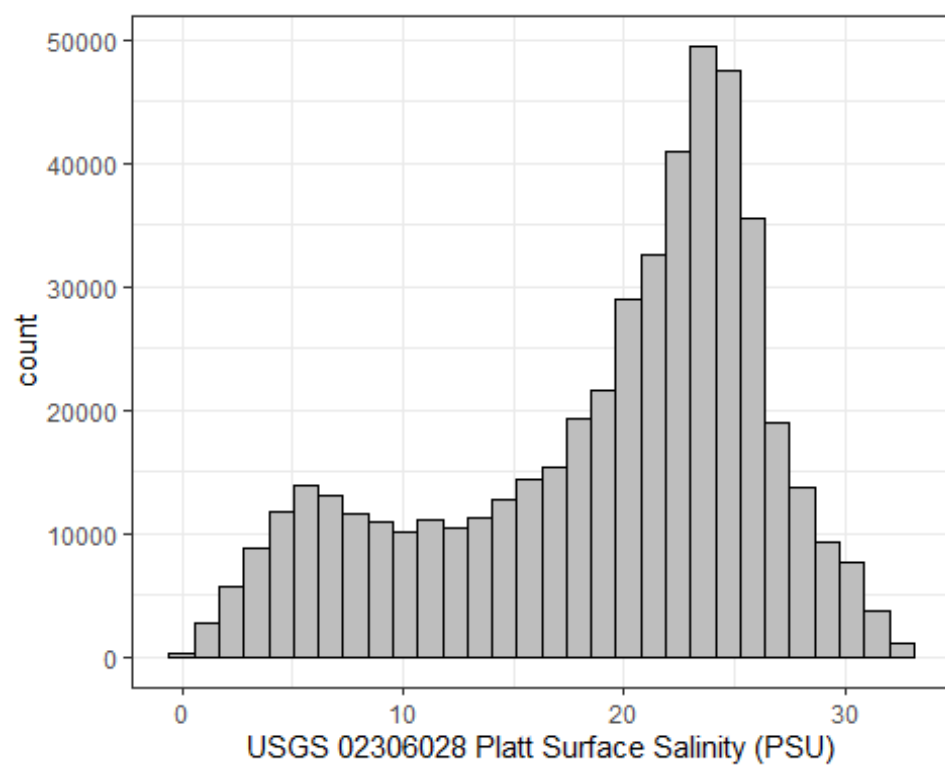
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
## 12.80    21.20   26.00   25.15   29.40   33.50    7586

## [1] "A" "P"
```
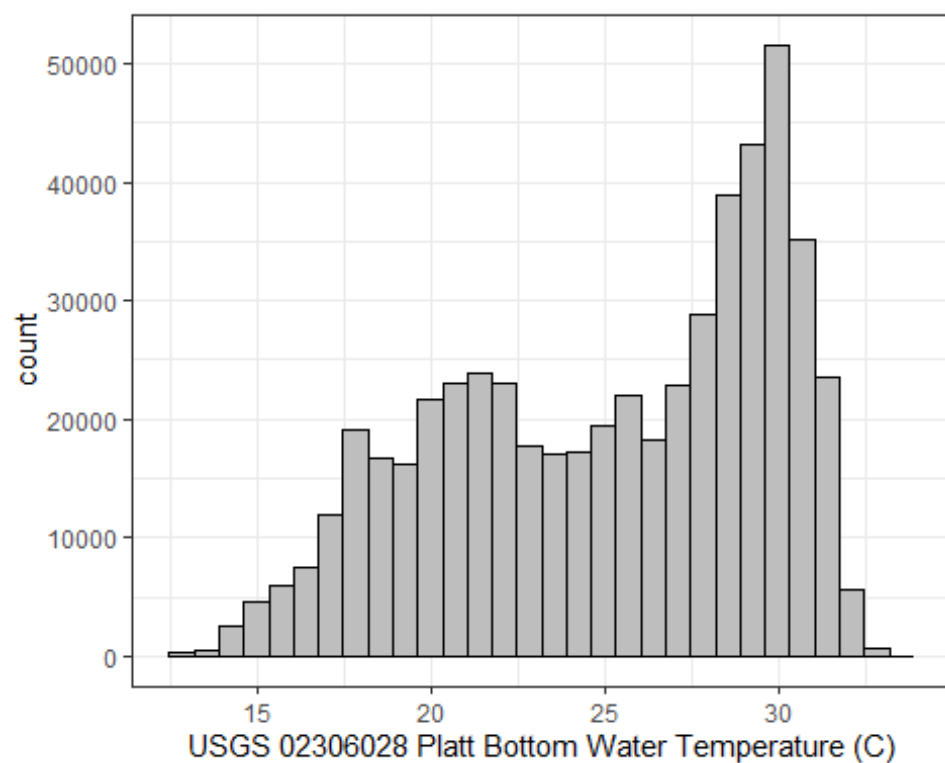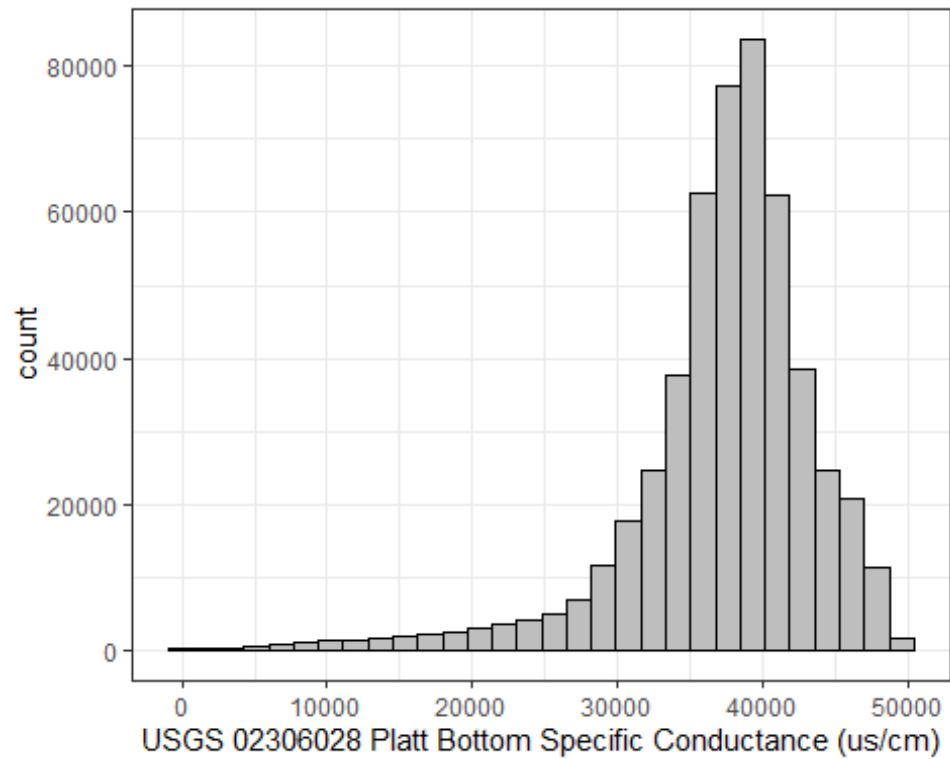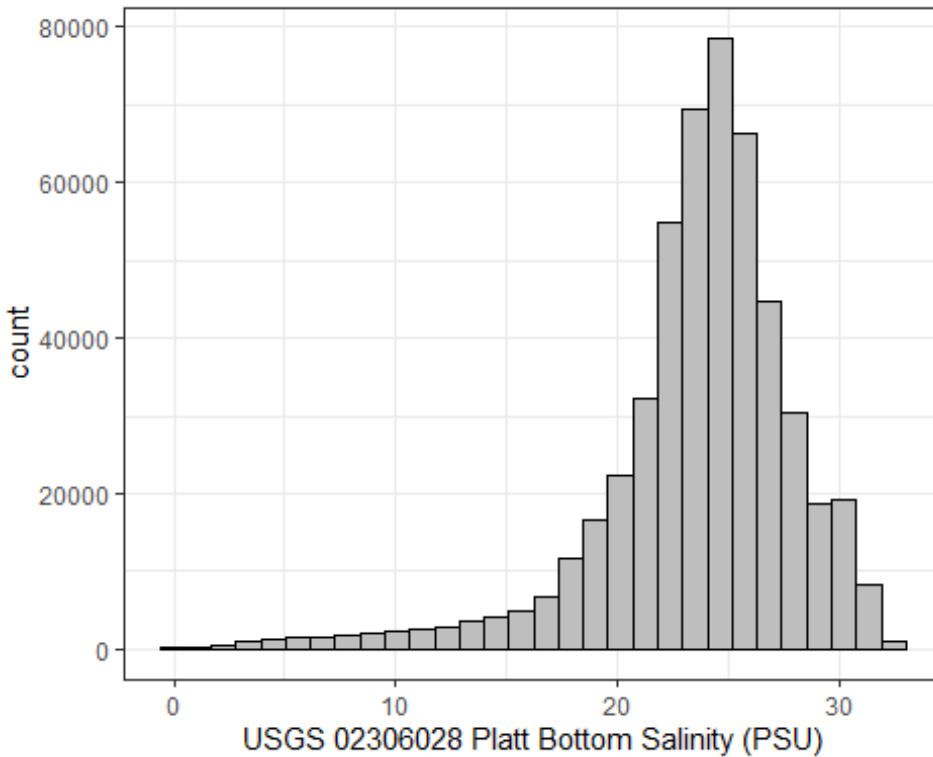


```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      275   35000   38200   37228   40900   49800   35090

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.13   22.00   24.24   23.62   26.15   32.58   35090
```

USGS 02306000 Sulphur Spings Pool

File name and path:/USGS/SSP/USGS_SSP_Continuous.xlsx

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Sulphur Springs at Sulphur Springs FL - 02306000.

Data include gage height and surface temperature and specific conductance

Summary statistics for surface parameters are summarized below based on the period of record of October 1, 2007 to December 31, 2023

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
## -0.100   6.500   7.020   6.382   7.130   7.500   9265

## [1] "A" "P"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   23.80   25.10   25.30   25.29   25.60   26.20   11492

## [1] "A" "P"
```

USGS 02306000 SS Pool Surface Specific Conductance (us/cm)
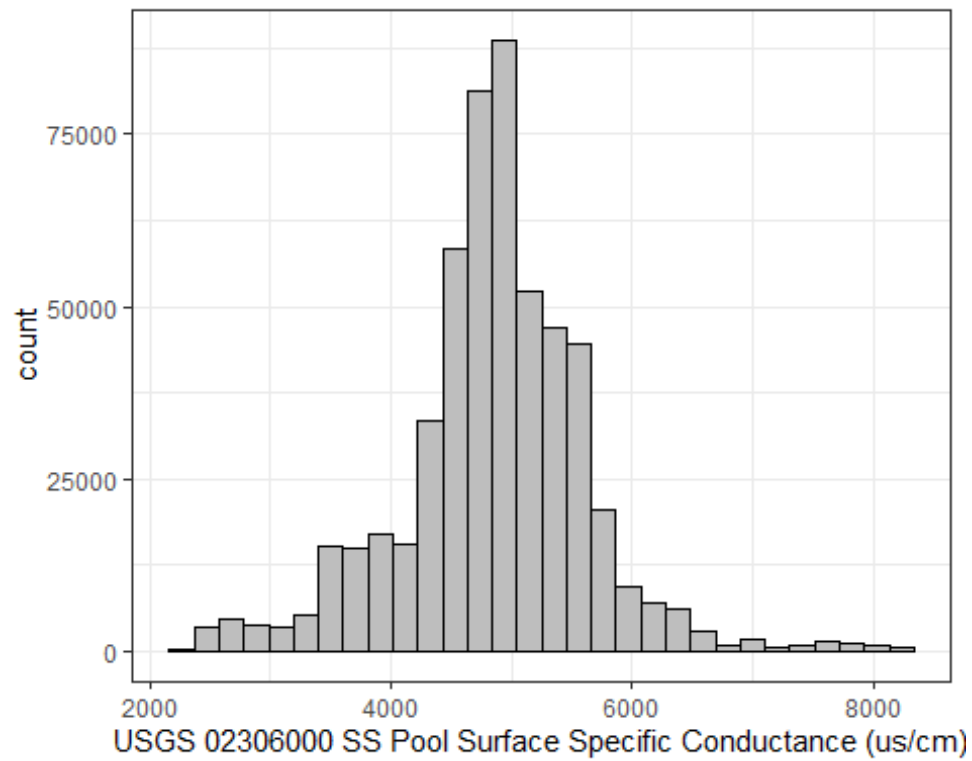
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     2310    4500    4860    4850    5290    8280   26547

## [1] "A" "P"
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    1.183   2.394   2.599   2.596   2.844   4.592   26547
```
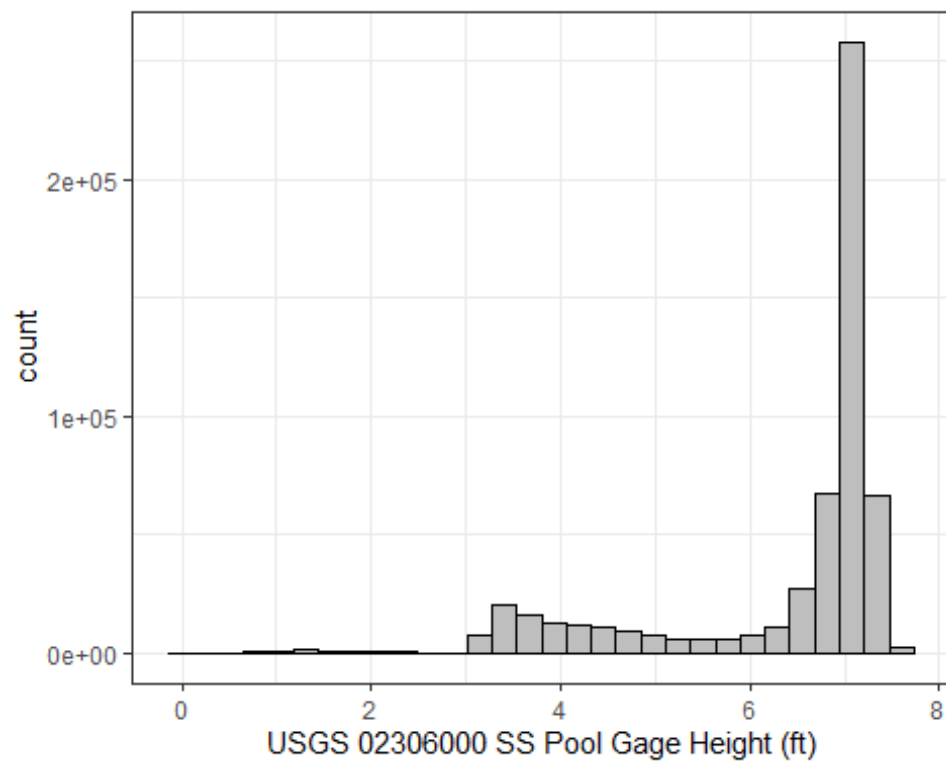
USGS 023060003 Sulphur Spings Run
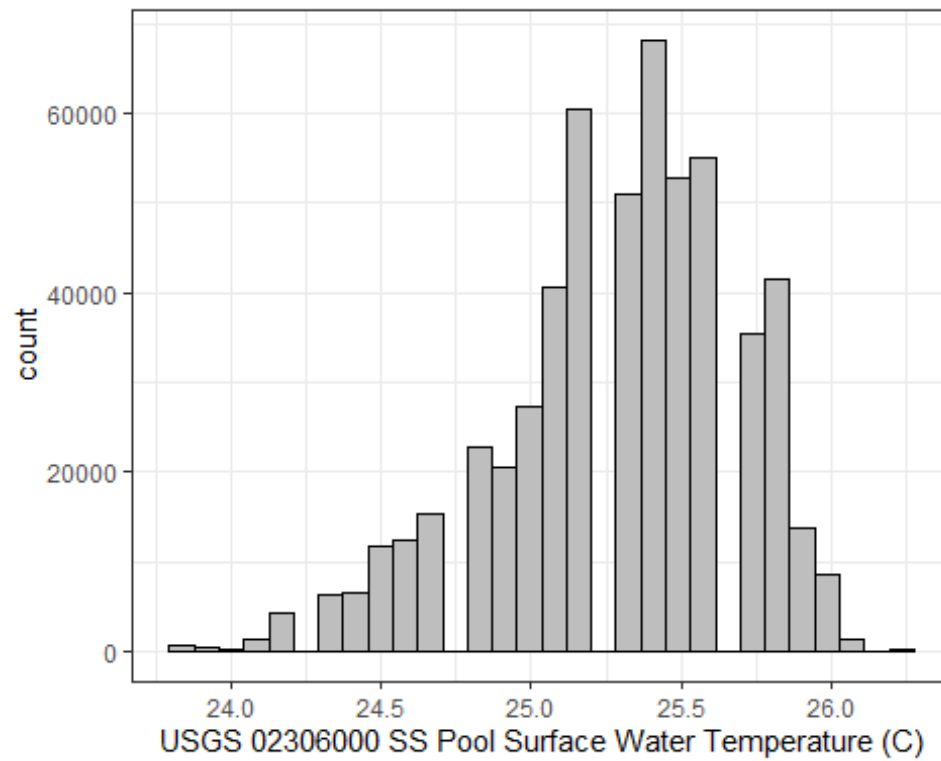
File name and path:/USGS/SSR/USGS_SSR_Continuous.xlsx

Metadata: R Script provided in tab in raw data file was used to pull the 15 minute continuous data through December 31, 2023 for Sulphur Springs Run at Sulphur Springs FL - 023060003.

Data include gage height, and surface temperature, and specific conductance

Summary statistics for surface parameters are summarized below based on the period of record of October 1, 2007 to December 31, 2023
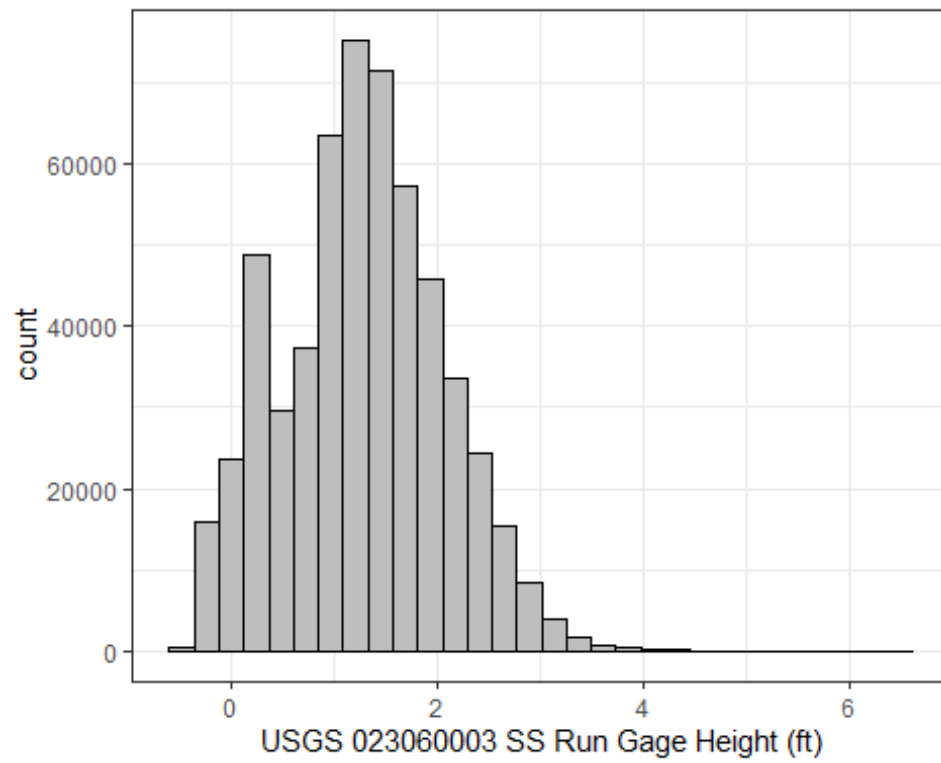
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   -0.53    0.76    1.28    1.27    1.78    6.45   11941

## [1] "A" "P"
```

USGS 023060003 SS Run Surface Water Temperature (C)
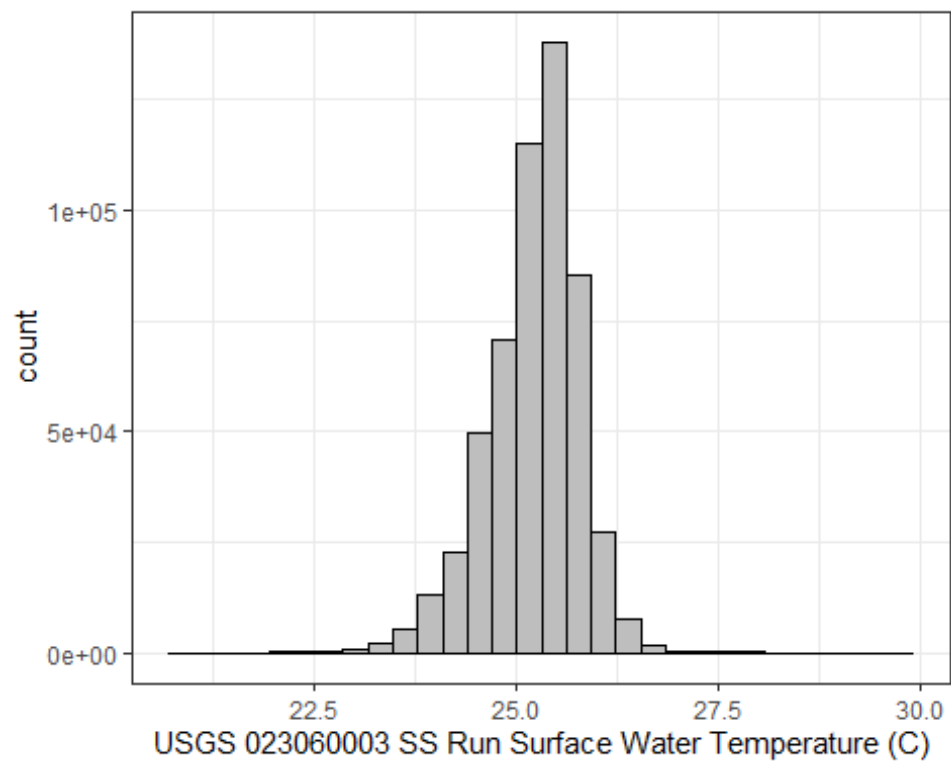
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    21.00   24.90   25.30   25.24   25.60   29.90   25679

## [1] "A" "P"
```

USGS 023060003 SS Run Surface Spec. Conductance (us/cm)
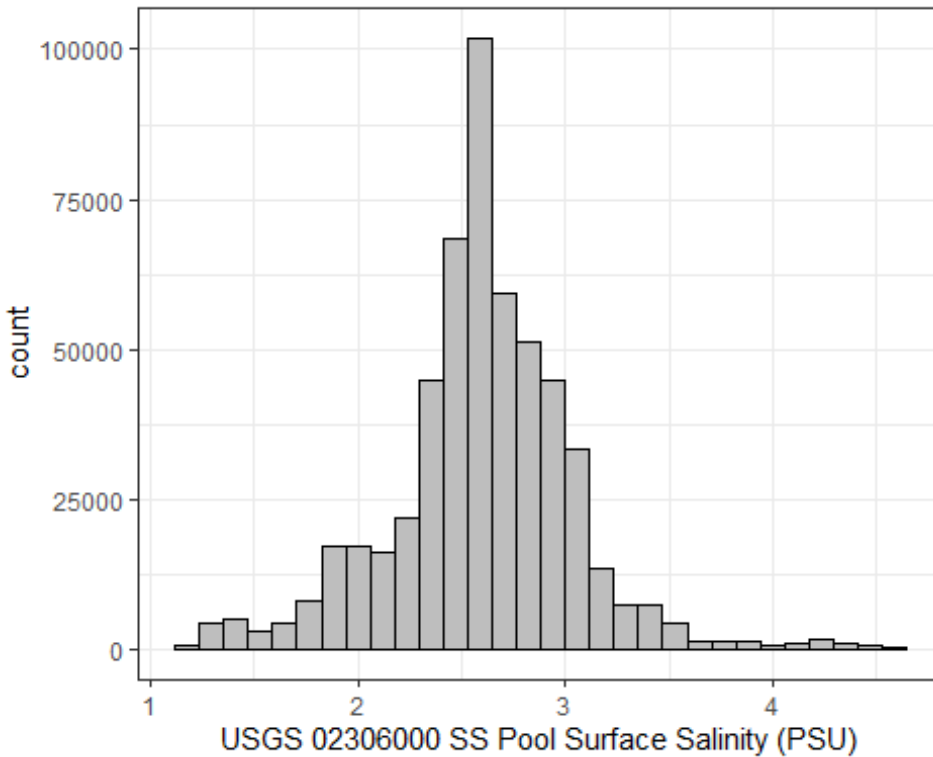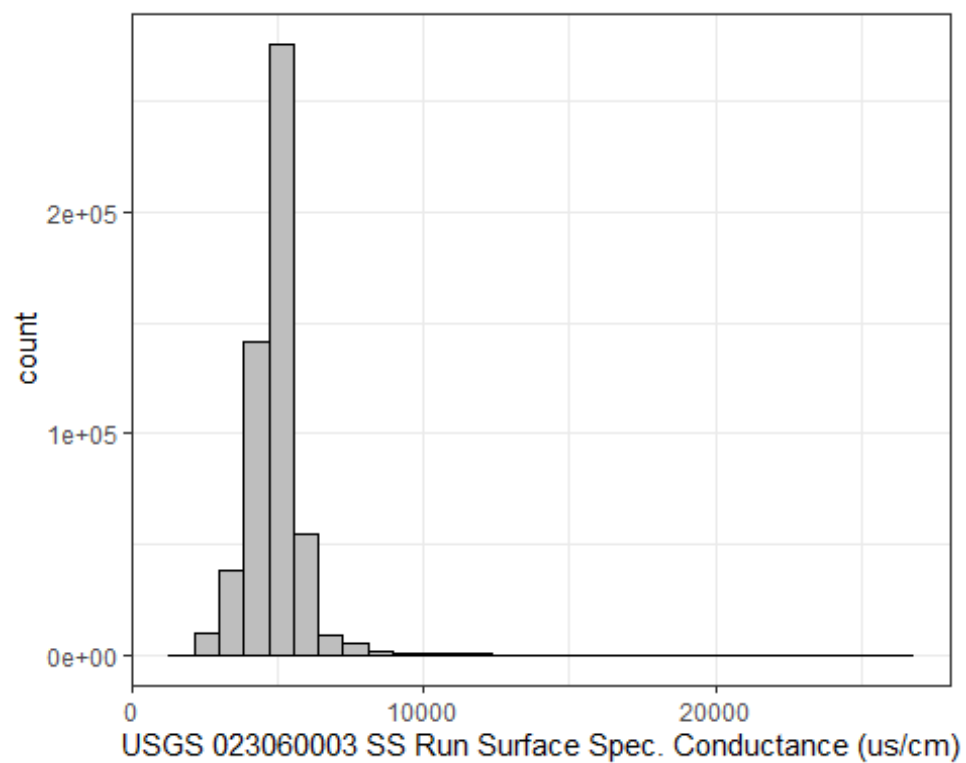
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##    2020    4520    4850    4888    5250   26700   32742

## [1] "A" "P"
```
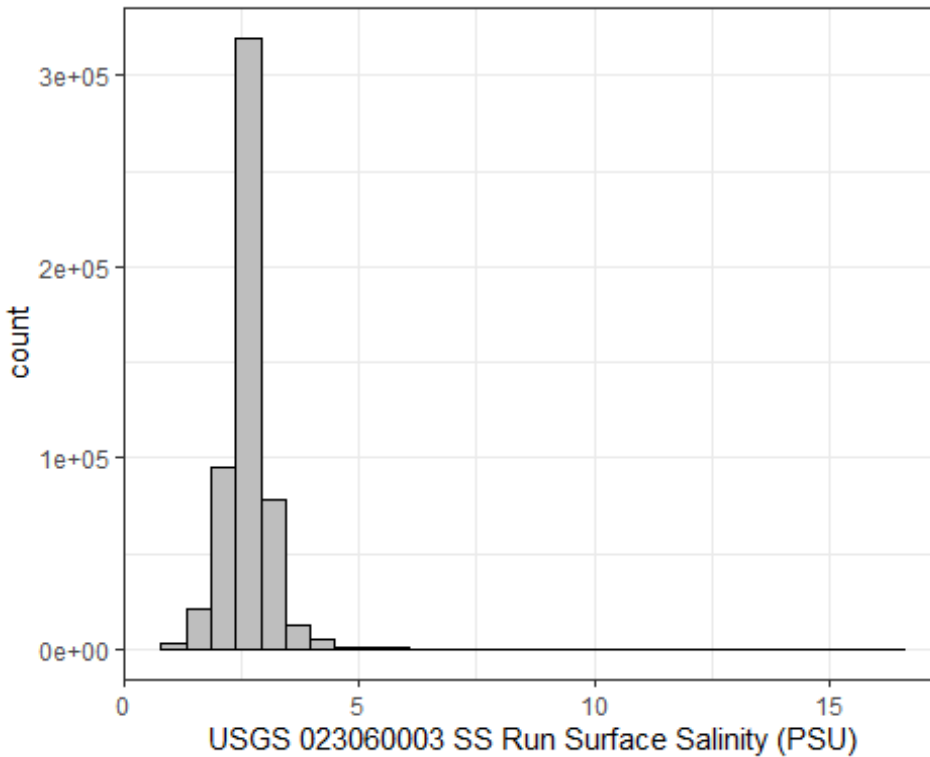
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    1.03    2.41    2.59    2.62    2.82   16.33   32742
```

City of Tampa (COT) Hourly data

This subsection describes the individual COT continuous recorder data files provided in the data dictionary.

Blue Sink Pumped to Base of Dam

File name and path:/COT/Bluesink_to_BOD/COT_BS_Pumped_2_BOD_Hourly_20170822_20231231.xlsx

Metadata: This data was provided by John Ring, City of Tampa. The file contains City of Tampa hourly pumpage data for the Lower Hillsborough River Recovery Strategy and minimum flow implementation.The file was truncated by Danielle Rogers, Environmental Flows and Levels Section, Southwest Florida Water Management District to only represent one source, water pumped from Blue Sink to the base of dam by City of Tampa.

Summary statistics for parameters are summarized below based on the period of record of August 22, 2017 to December 31, 2023.
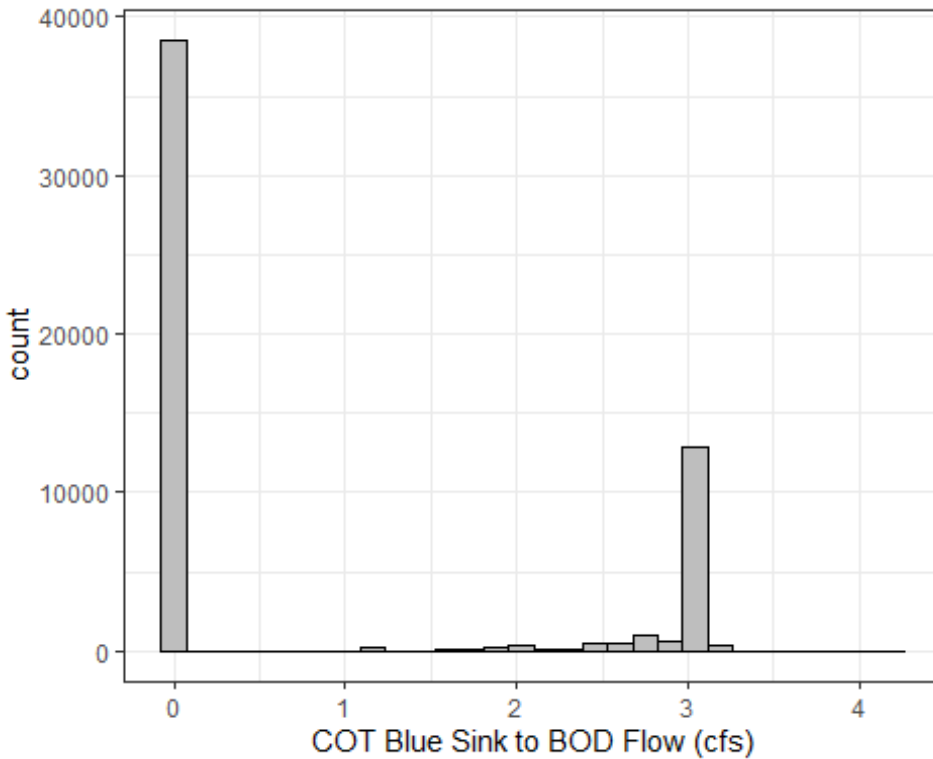
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##  0.0000  0.0000  0.0000  0.8996  2.8000  4.2000     555
```

Hillsborough Reservoir Pumped to Base of Dam

File name and path:/COT/HRR_to_BOD/COT_HRR_Pumped_2_BOD_Hourly_20180720_20231231.xlsx

This data was provided by John Ring, City of Tampa. The file contains City of Tampa hourly pumpage data for the Lower Hillsborough River Recovery Strategy and minimum flow implementation.The file was truncated by Danielle Rogers, Environmental Flows and Levels Section, Southwest Florida Water Management District to only represent one source, water pumped or delivered via sluice gate from the Hillsborough River Reservoir to the base of dam by the City of Tampa.

Summary statistics for parameters are summarized below based on the period of record of July 20, 2018 to December 31, 2023.

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.000   0.000   0.000   1.295   0.000  26.900     493
```
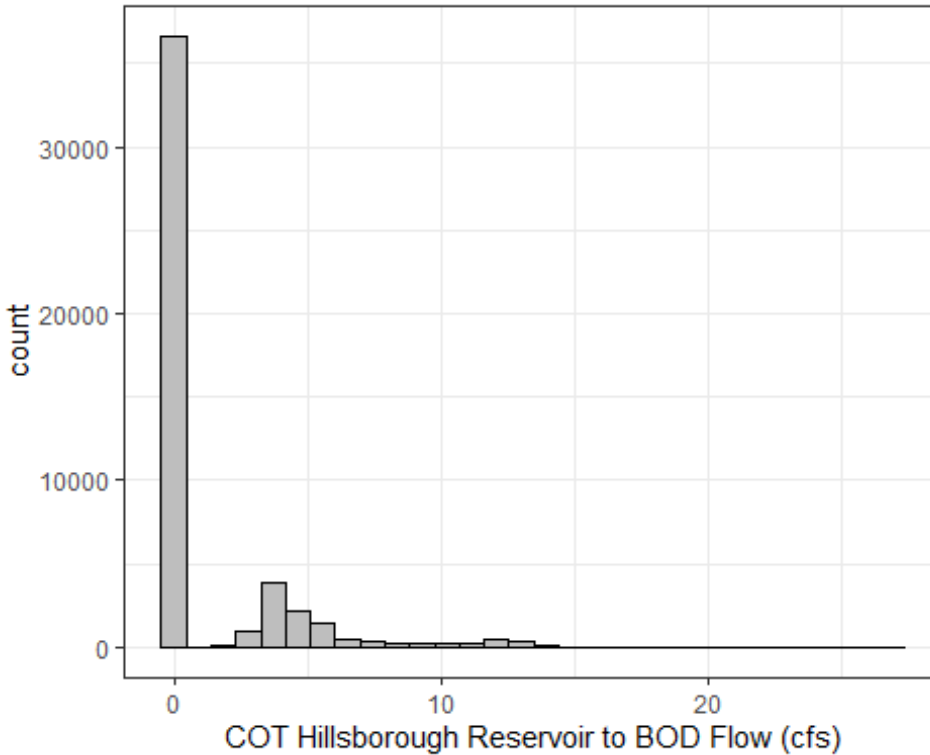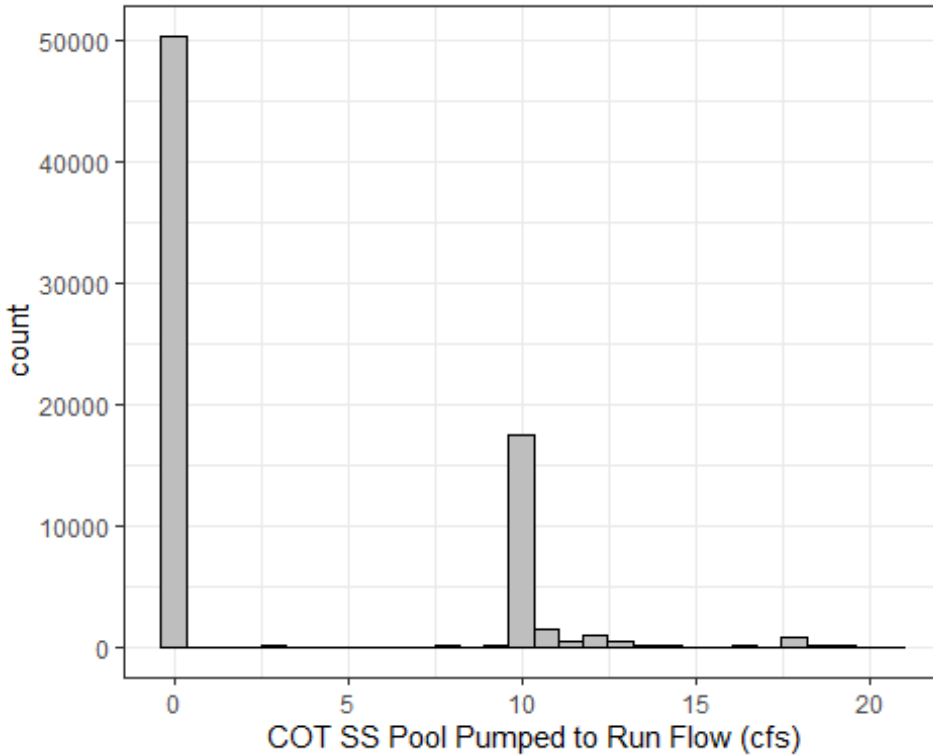
Sulphur Springs Pool Pumped to Run

File name and path:/COT/SS_Pumped_to_Run/COT_SS_Pumped_2_Run_Hourly_20150601_20231231.xlsx

This data was provided by John Ring, City of Tampa. The file contains City of Tampa hourly pumpage data for the Lower Hillsborough River Recovery Strategy and minimum flow implementation.The file was truncated by Danielle Rogers, Environmental Flows and Levels Section, Southwest Florida Water Management District to only represent one source, water pumped from Sulphur Springs Pool to Sulphur Springs Run by the City of Tampa.

Summary statistics for parameters are summarized below based on the period of record of June 1, 2015 to December 31, 2023.

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00    0.00    0.00    3.35   10.00   20.70    1721
```

Sulphur Springs Pool Pumped to Base of Dam

File name and path:
/COT/SS_to_BOD/COT_SS_Pumped_2_BOD_Hourly_20150601_20231231.xlsx

This data was provided by John Ring, City of Tampa. The file contains City of Tampa hourly pumpage data for the Lower Hillsborough River Recovery Strategy and minimum flow implementation.The file was truncated by Danielle Rogers, Environmental Flows and Levels Section, Southwest Florida Water Management District to only represent one source, water pumped from Sulphur Springs Pool to the base of dam by City of Tampa.

Summary statistics for parameters are summarized below based on the period of record of June 1, 2015 to December 31, 2023.
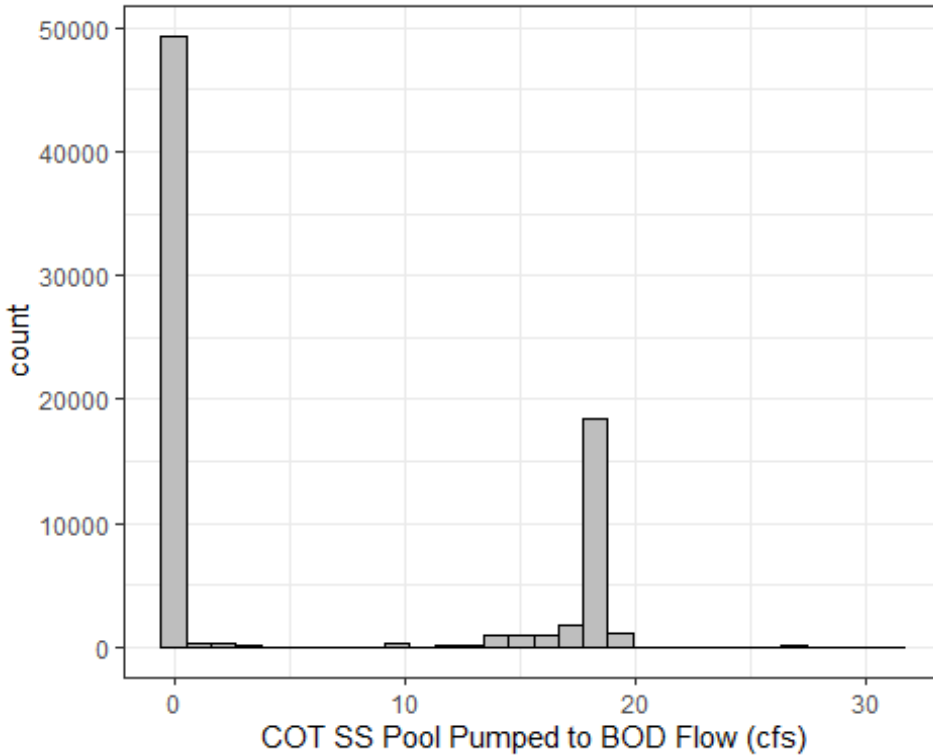
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.000   0.000   0.000   5.875  18.000  31.200      44
```

Tampa Bay Water HBMP Data

Filename and path:/TBW_HBMP/LHR_HBMP_CR.txt

The Tampa Bay Water Hydrobiological Monitoring Program deploys and maintains three continuous recorders in the Lower Hillsborough River at Columbus, Crosstown, and Sligh Avenue. Emily Keenan from ESA provided an excel file of continuously recorded data at the three sites on May 18 2024 which were read into SAS software, organized and prepared for analysis as a single file. Results where data were flagged as "NV" or where the qualifier2 field was denoted as "Rejected" were set to missing as described in the metadata below. Therefore, no quality codes were imported. Specific conductance was converted to us/cm from ms/cm by multiply values by 1000.

Summary statistics are provided below based on the period of record of February 15, 2001 to December 31,2023.

#### Columbus: Latitude 27°57.987 Longitude 82°28.497

Metadata: Continuously recorded data (15-minute interval) collected at Columbus Avenue on the Hillsborough River. Salinity, specific conductance and temperature data at two vertical locations (bottom and floating top) were collected. All data have undergone an

internal quality control/quality assurance review. Only data without a flagged result of 'NV' should be used for analysis and reporting.

In addition to the metadata procedures, additional QC was performed to remove data with a qualifier2 value of "Rejected" based on examination of data where specific conductivity and salinity data were obviously out of range.
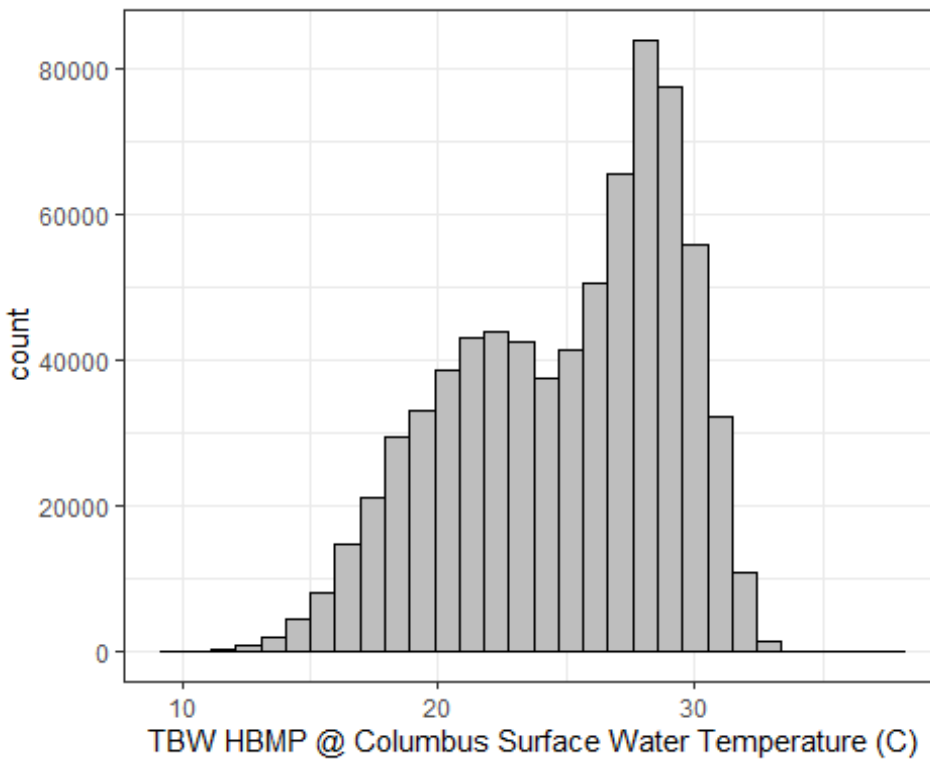

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    9.89   21.54   25.84   24.92   28.48   37.96   65571
```

TBW HBMP @ Columbus Surface Spec. Conductance (us/cm)
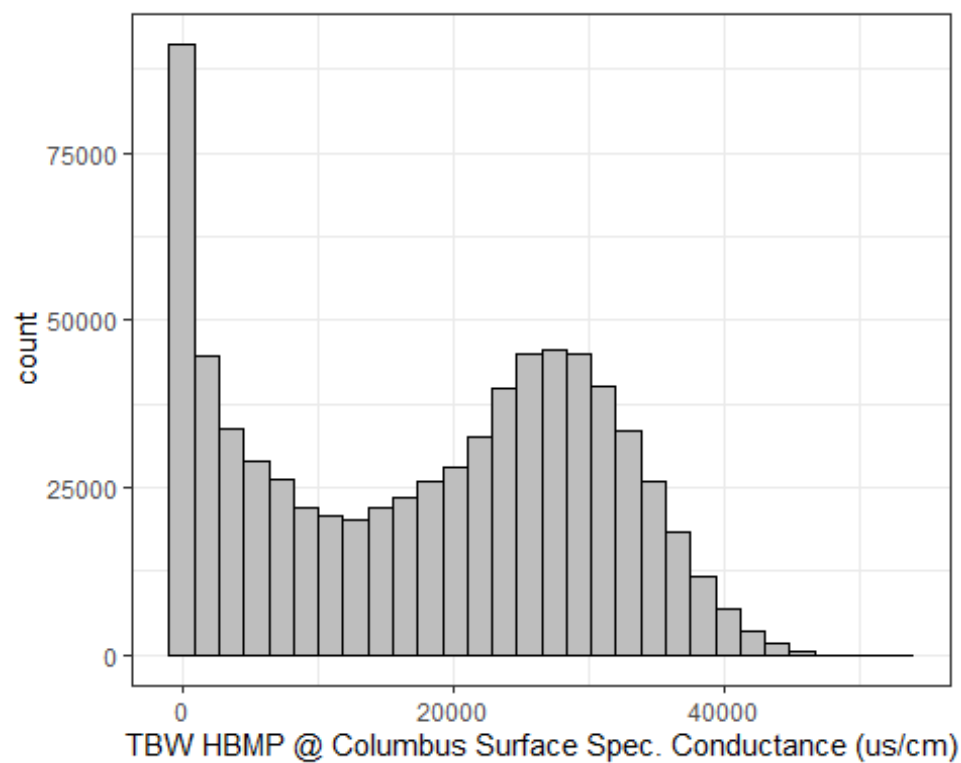
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##       0    5460   19810   18024   28440   53010   65681
```


TBW HBMP @ Columbus Surface Salinity (PSU)
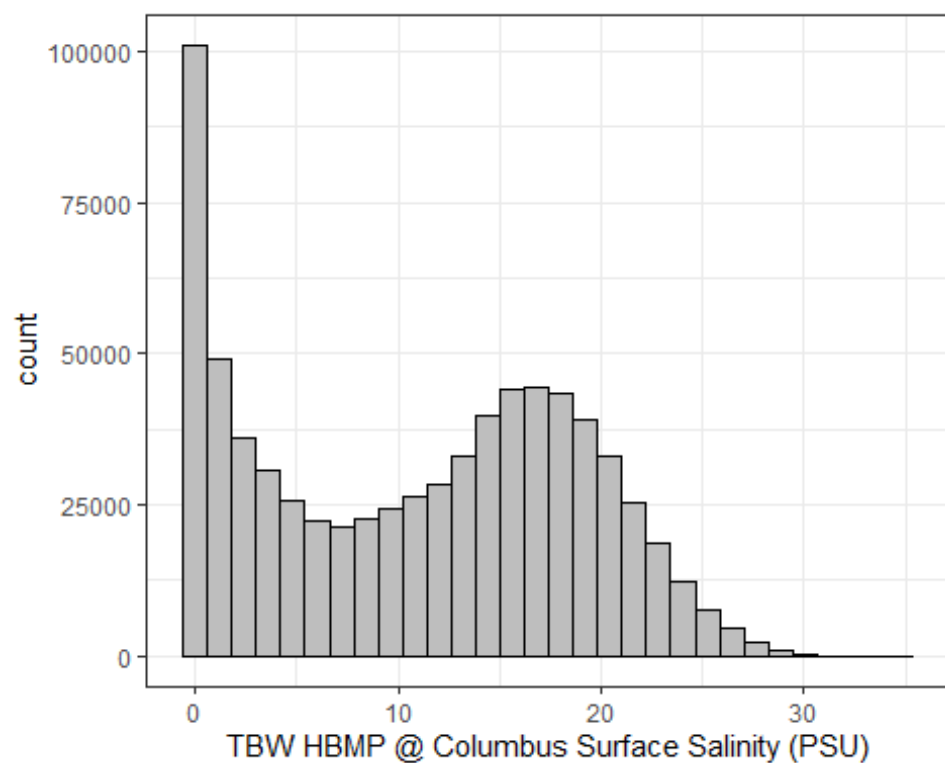
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      0.00    2.94   11.79   10.96   17.51   34.85   65610
```


TBW HBMP @ Columbus Bottom Water Temperature (C)
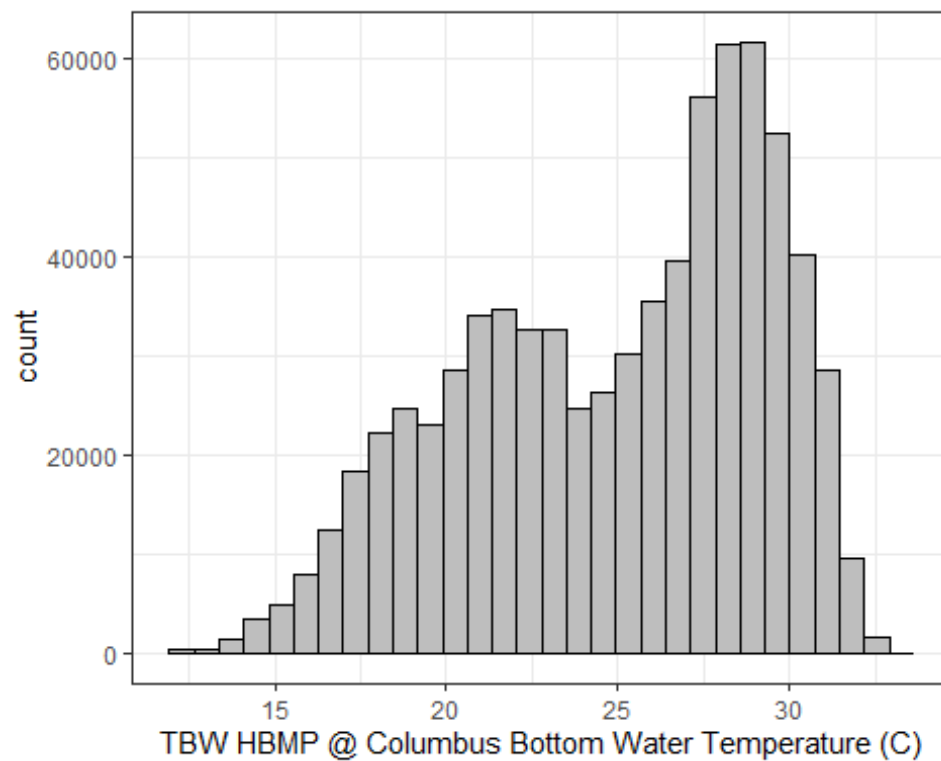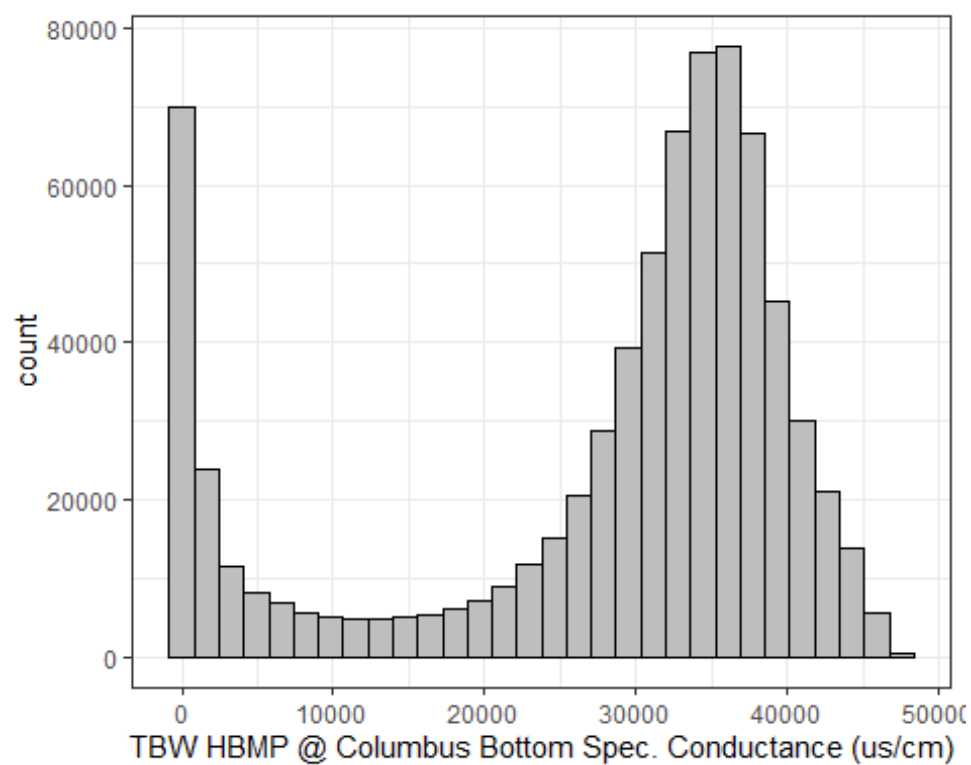
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     11.95   21.46   25.92   24.97   28.64   32.92   54022
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##     180   23900   32800   27805   36810   47720   58708
```
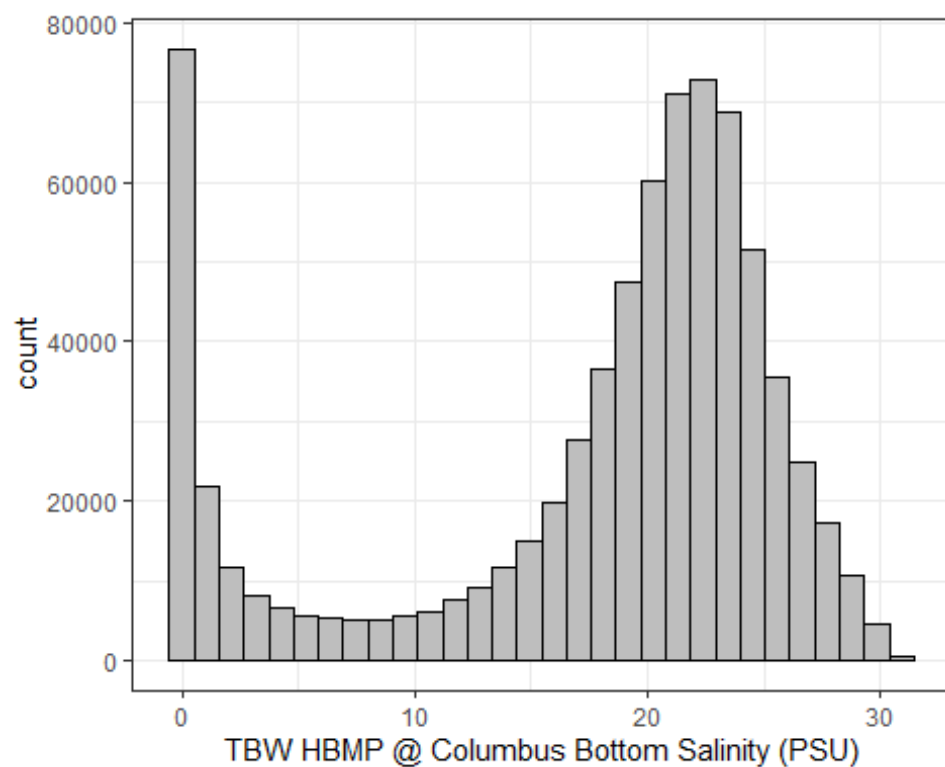
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      0.08   14.51   20.50   17.43   23.30   30.98   53490
```

Sligh: Latitude 28°0.65 Longitude 82°27.99

Metadata: Continuously recorded data (15-minute interval) collected at Sligh Avenue on the Hillsborough River. Salinity, specific conductance and temperature data at two vertical locations (bottom and floating top) were collected. All data have undergone an internal quality control/quality assurance review. Only data without a flagged result of 'NV' should be used for analysis and reporting.

In addition to the metadata, additional QC was performed to remove data with a qualifier2 value of "Rejected" based on examination of data where specific conductivity and salinity data were obviously out of range.
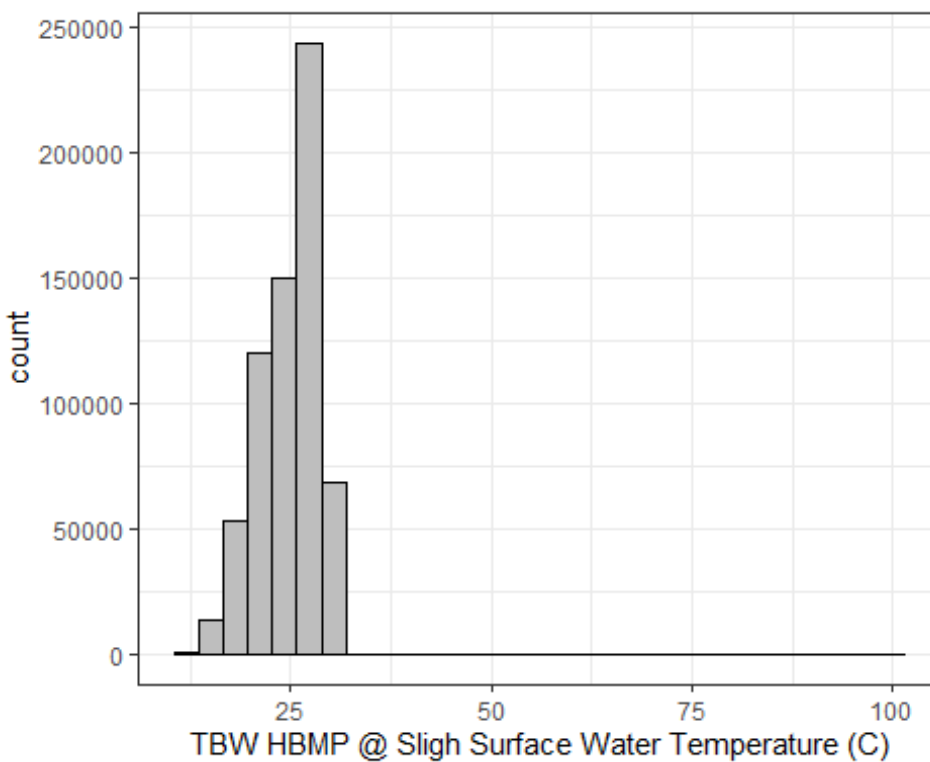

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     11.99   22.27   25.55   24.83   27.78  100.00  154565
```

TBW HBMP @ Sligh Surface Specific Conductance (us/cm)
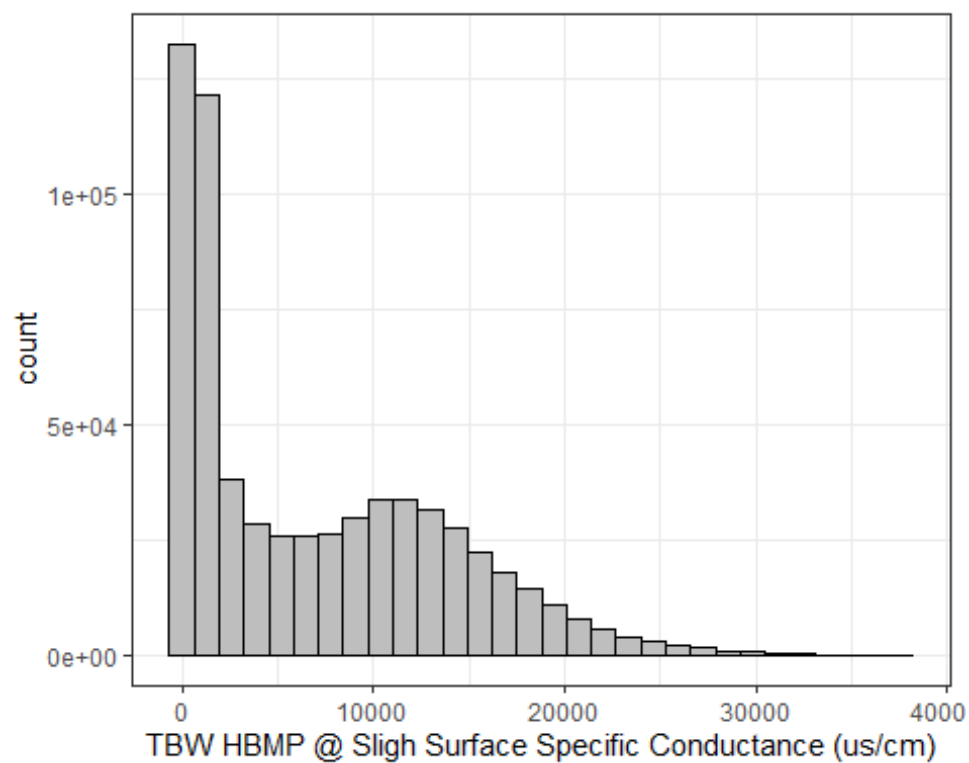
```
##    Min. 1st Qu.  Median   Mean 3rd Qu.   Max.   NA's
##       0     780    4660   6885   11900  37600 156478
```


TBW HBMP @ Sligh Surface Salinity (PSU)
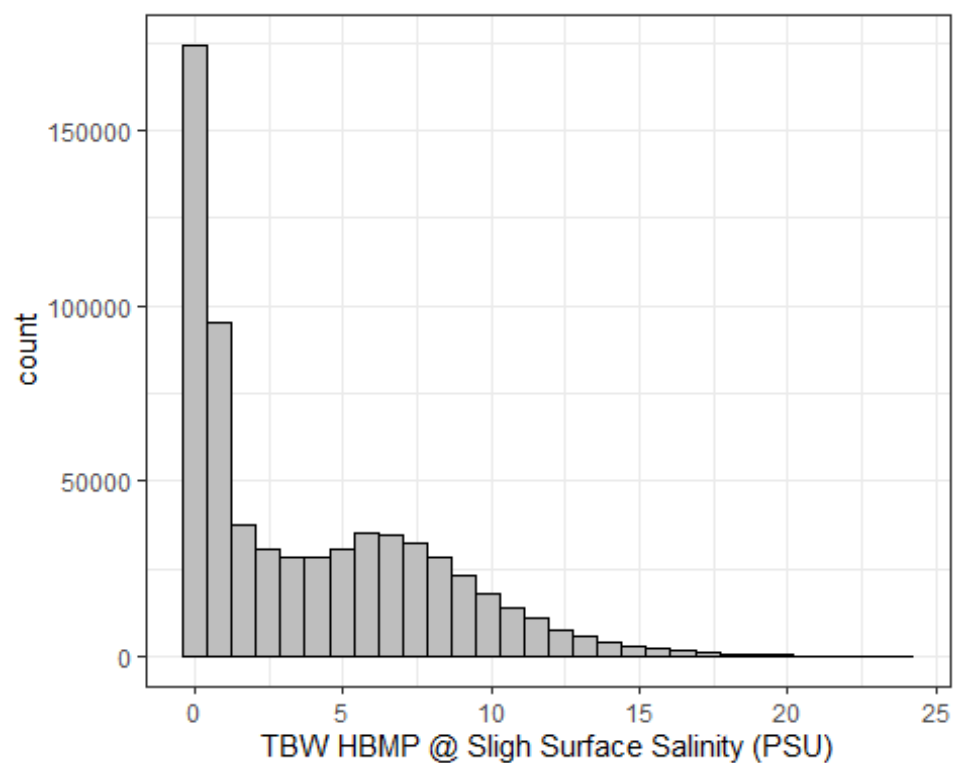
```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.     NA's
##      0.00    0.38    2.48     3.93    6.79    23.86   156439
```
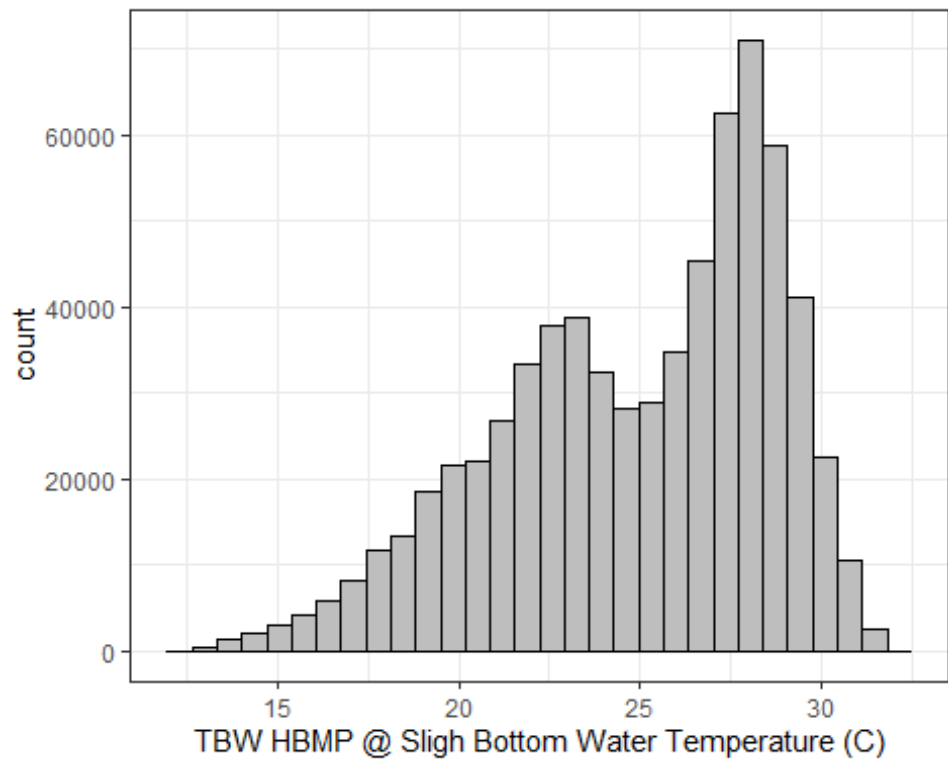


```
##      Min. 1st Qu.  Median     Mean 3rd Qu.     Max.     NA's
##     12.16   22.22   25.76    24.93   28.04    32.00   114542
```
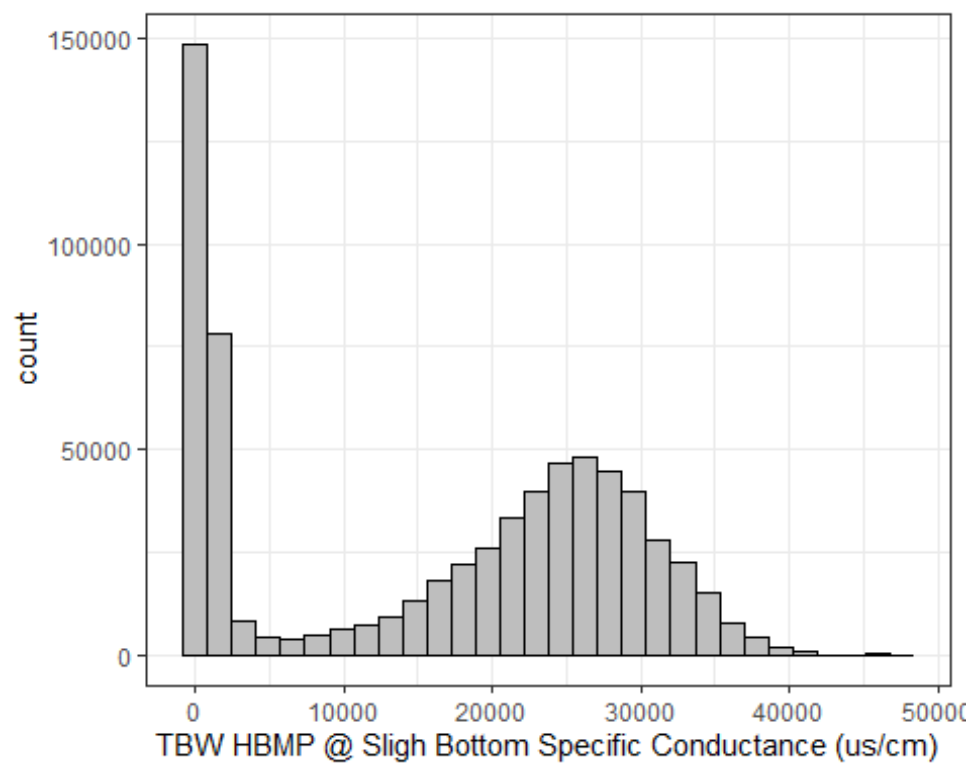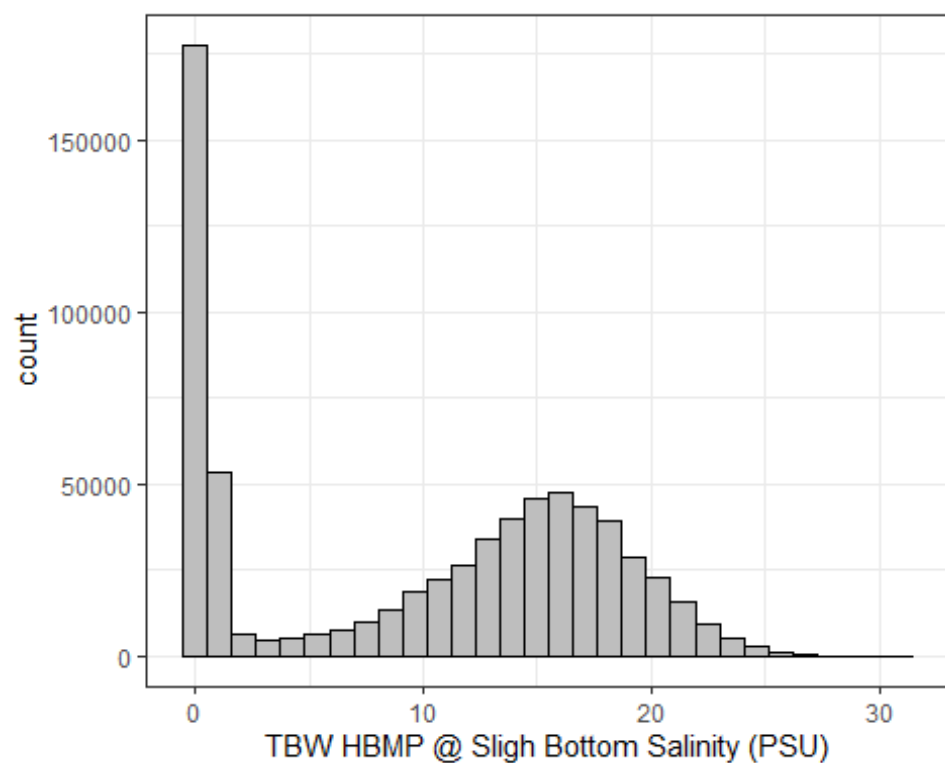
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      10    1020   20050   16292   26900   47629  119257
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     0.00    0.51   12.02    9.96   16.53   31.01  114562
```

Crosstown: Latitude 27°56.578 Longitude 82°27.53

Metadata: Continuously recorded data (15-minute interval) collected at Crosstown on the Hillsborough River. Salinity, specific conductance and temperature data at two vertical locations (bottom and floating top) were collected. All data have undergone an internal quality control/quality assurance review. Only data without a flagged result of 'NV' should be used for analysis and reporting.
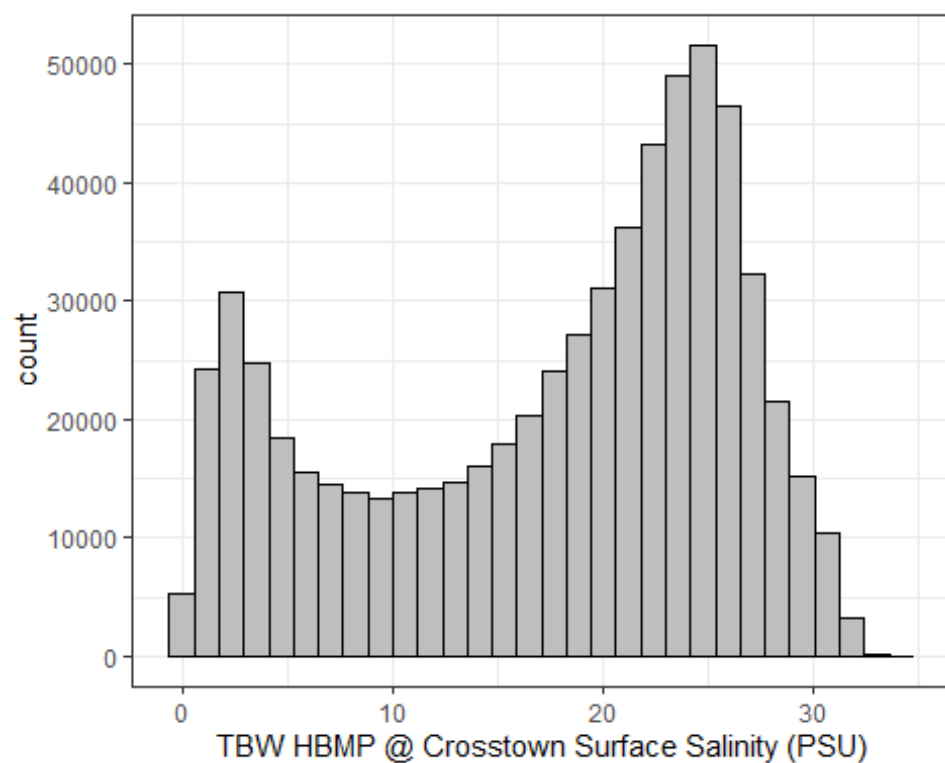
In addition to the metadata, additional QC was performed to remove data with a qualifier2 value of "Rejected" based on examination of data where specific conductivity and salinity data were obviously out of range.
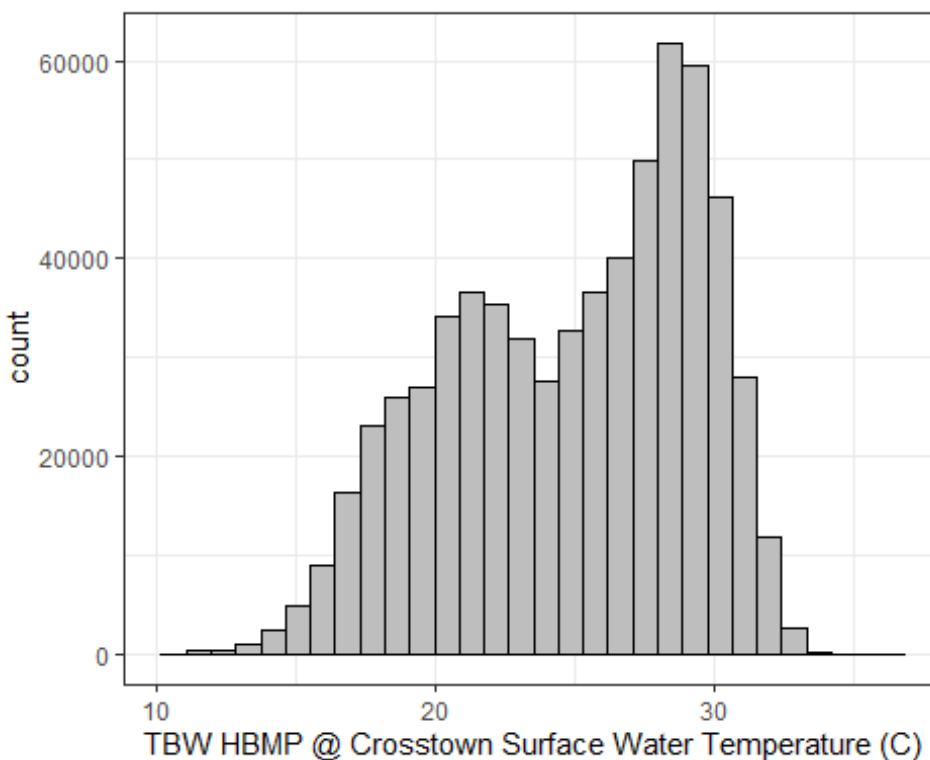

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    10.50   21.28   25.64   24.89   28.68   36.25  158124
```
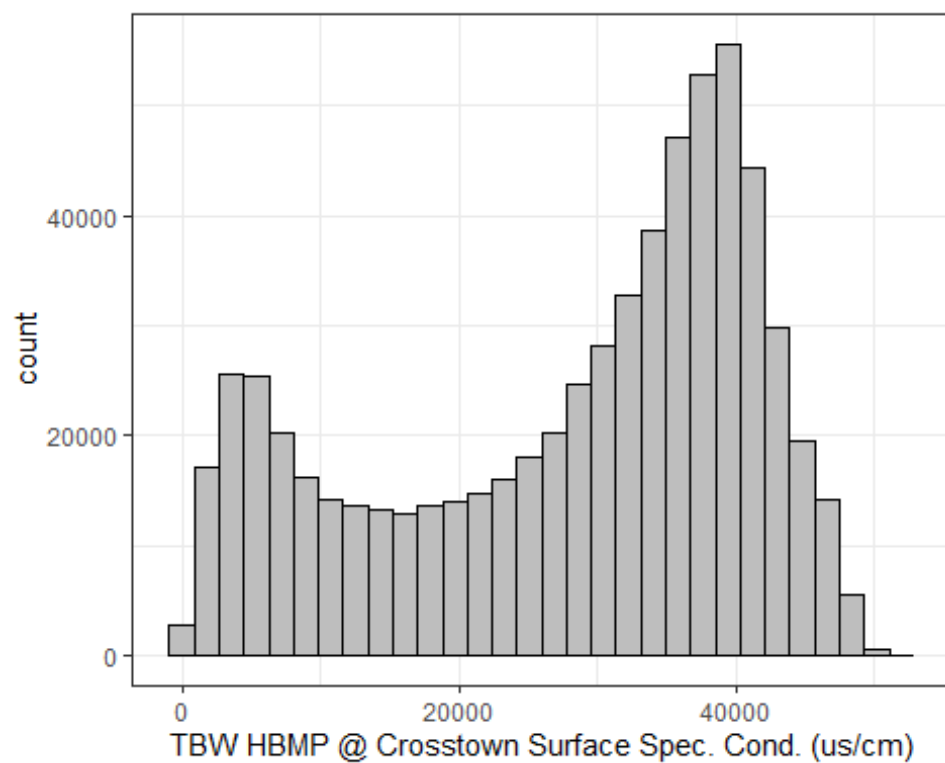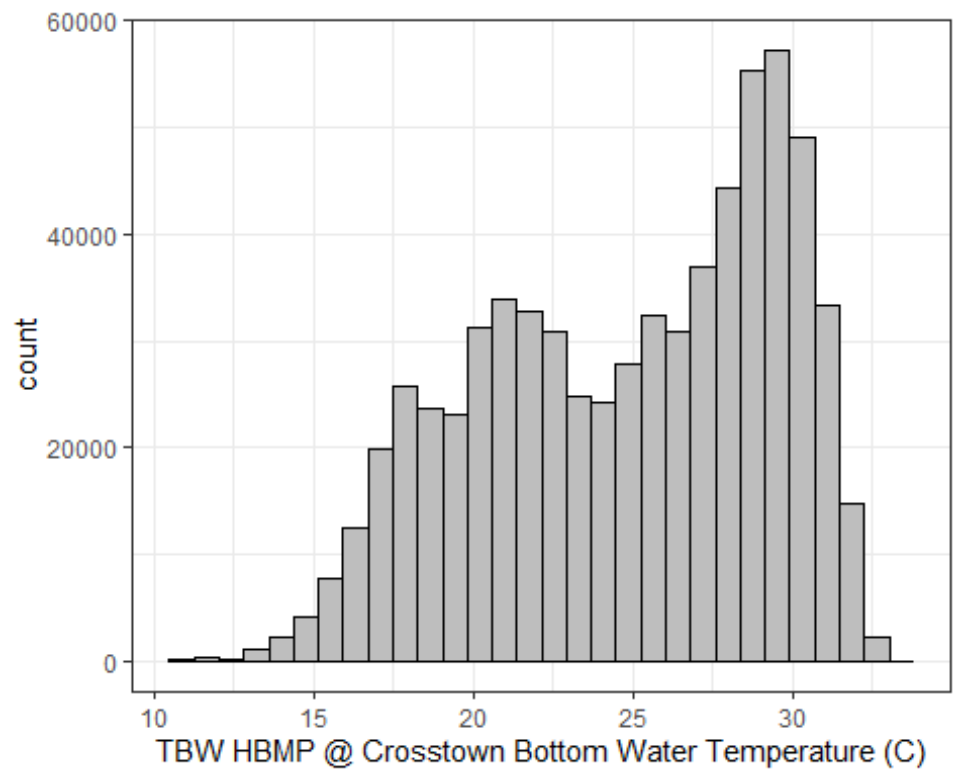
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##       6   17200   32180   27933   38700   51930  151726
```
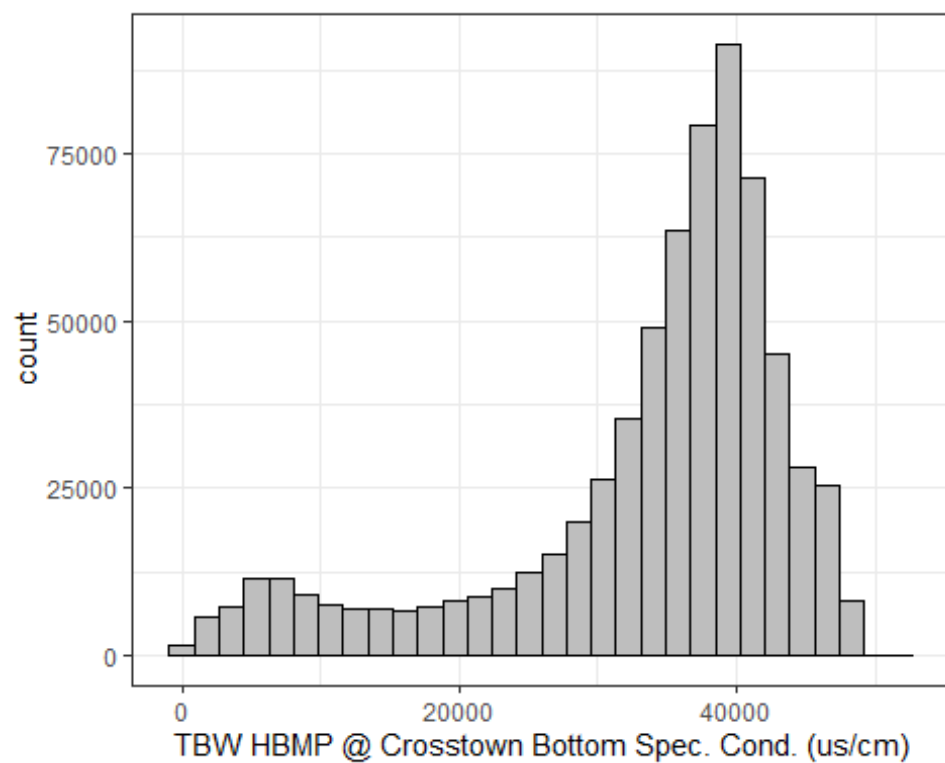
```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      0.00   10.17   20.09   17.50   24.62   34.22  153638
```


TBW HBMP @ Crosstown Bottom Water Temperature (C)

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     11.03   21.01   25.63   24.86   28.94   33.57  121194
```

TBW HBMP @ Crosstown Bottom Spec. Cond. (us/cm)

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##        4   30550   36920   33589   40450   51918  125390
```


TBW HBMP @ Crosstown Bottom Salinity (PSU)
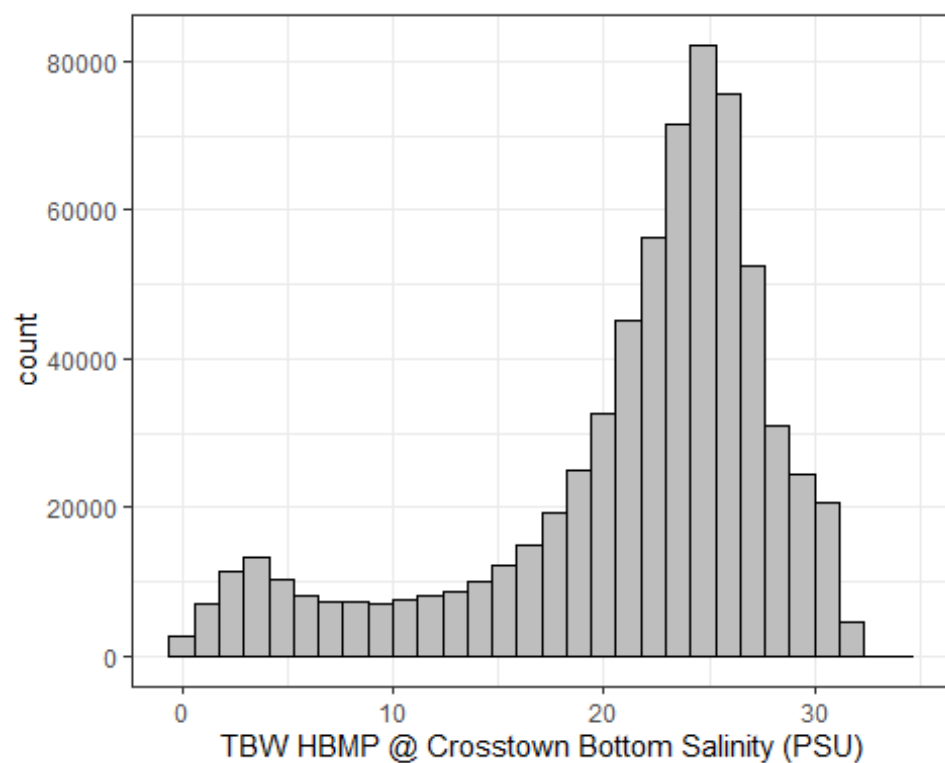
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00   18.90   23.34   21.19   25.84   34.10  125440
```

Hillsborough County Environmental Protection Commission (EPC) Data

Nebraska (RKm 13.7) Lat: 28.018383 Lon: -82.44595.

Filename and path: /EPC/EPC_HRCM_all.xlsx

Metadata: This is a single continuous recorder cited in the first 5 year assessment report. It is located near Nebraska Avenue (Rkm 13.7).

The 15 minute continuous data were obtained from Sara Markham EPC on November 1, 2023. No metadata or quality codes were provided with the source file.

Data include surface and bottom temperature, dissolved oxygen, conductivity, and salinity. Average surface depth is 0.3M and total bottom depth is 1.1m

Summary statistics for parameters are summarized below based on the period of record of May 14, 2002 to May 15, 2015.


```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    6.69   21.33   25.00   24.27   27.74   33.86  204722
```
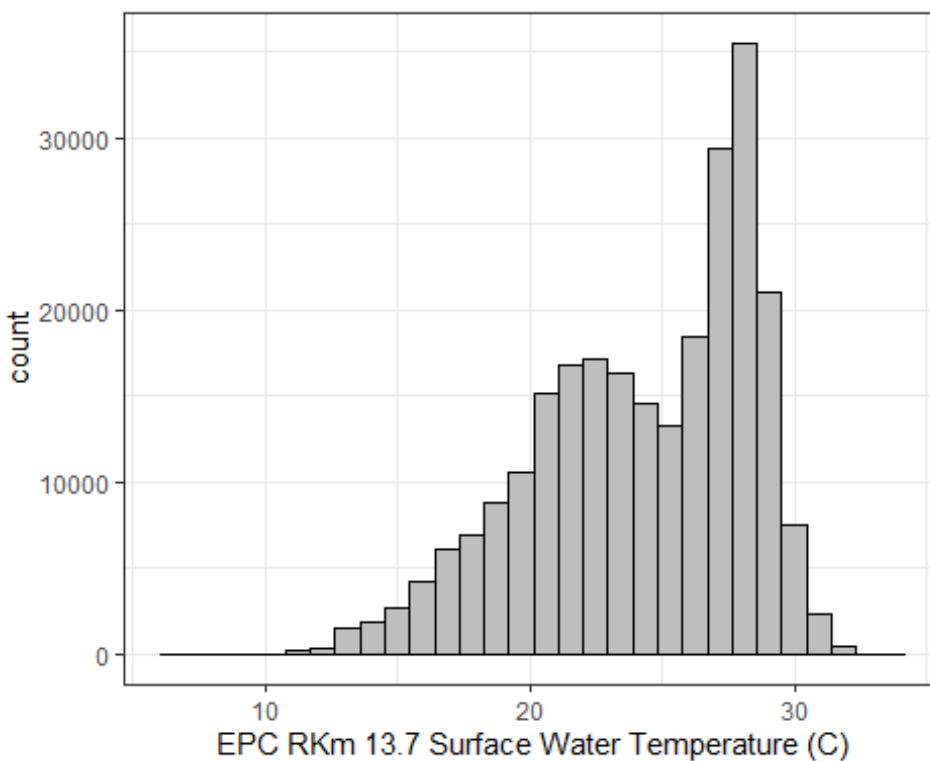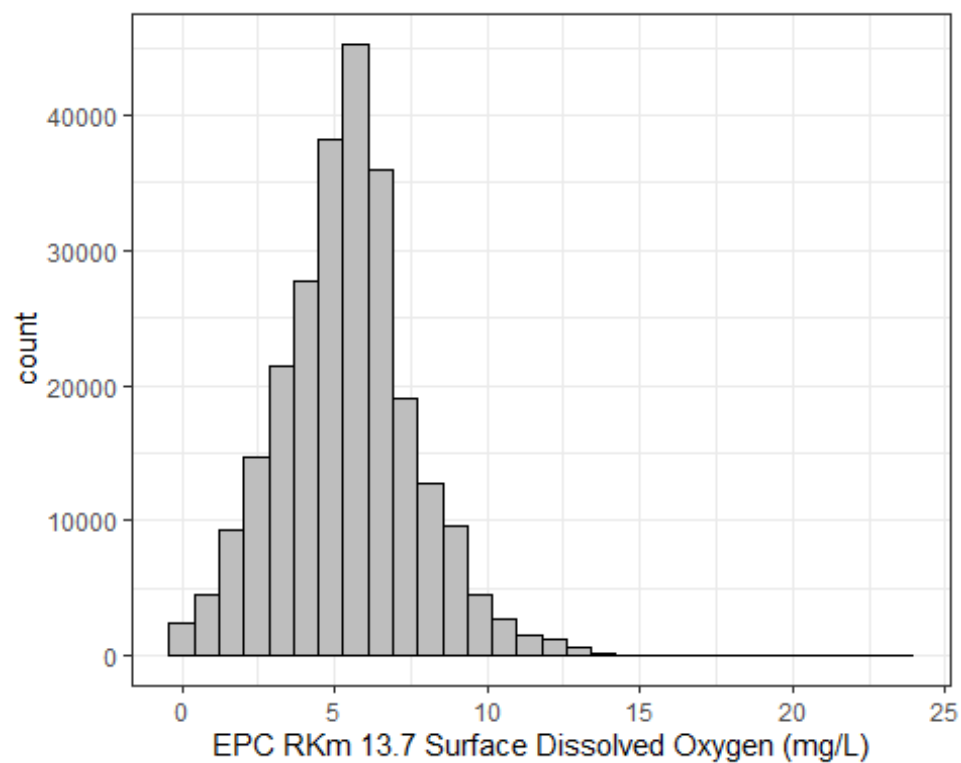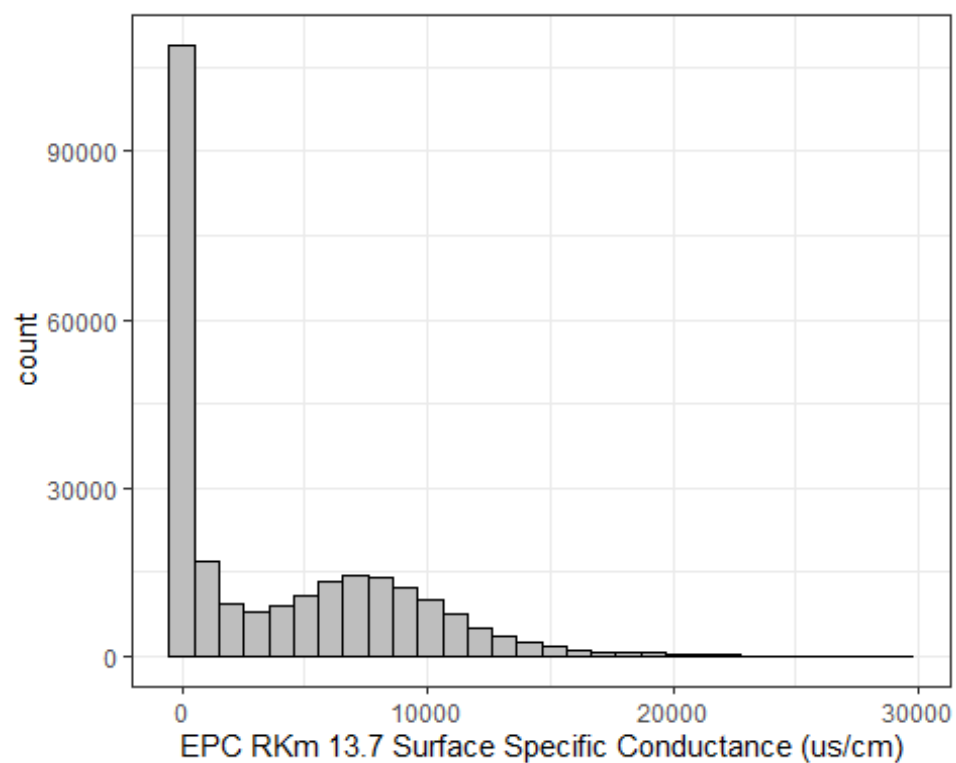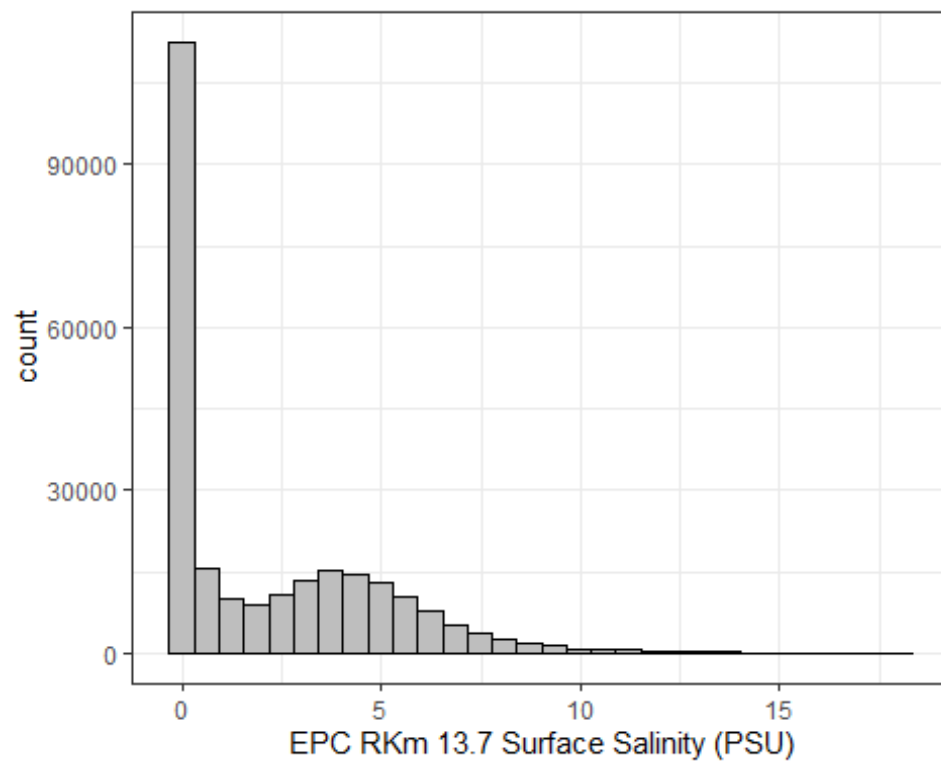
```
##     Min. 1st Qu.  Median   Mean 3rd Qu.   Max.    NA's
##     0.01    3.98    5.42   5.40    6.62  23.57  204720
```
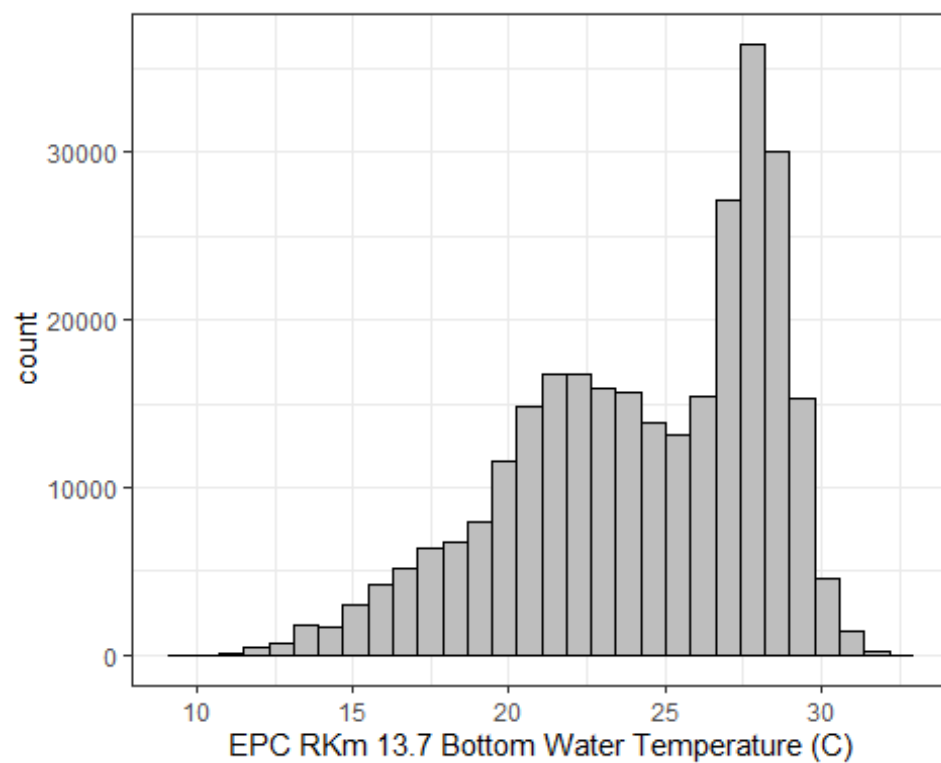
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##        0     268    1490    4030    7410   29300  204720
```
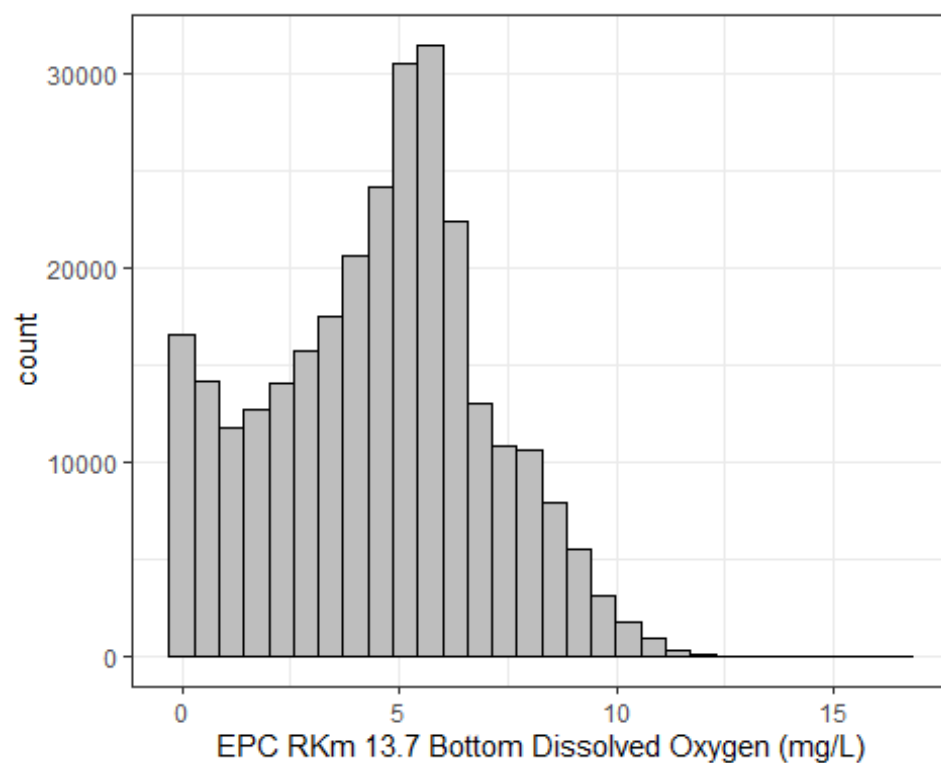


```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     0.00    0.13    0.76    2.24    4.08   18.05  205703
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.      NA's
##      9.73    21.39   25.02     24.29   27.75     32.76    168452
```

```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##      0.00    2.64    4.75    4.50    6.11   16.56  170261
```
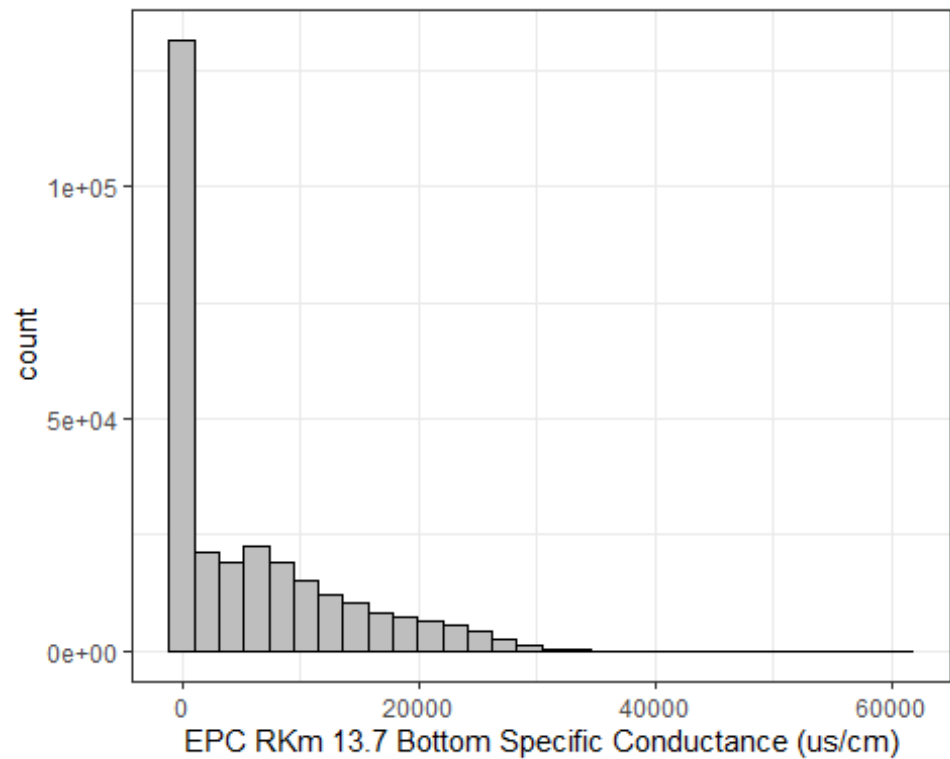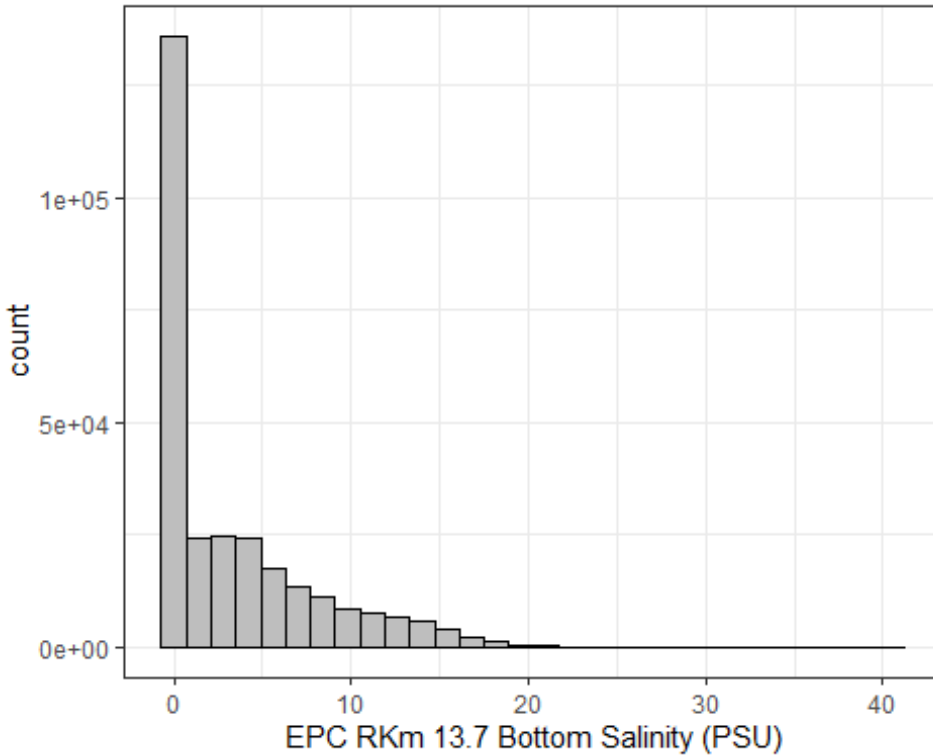


```
##      Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##         0     264    2180    5948    9710   60800  168456
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##    0.00    0.13    1.09    3.41    5.41   40.59 168457
```

Southwest Florida Water Management District Continuous Recorder Data

The District has deployed and maintained continuous recorders in Blue Sink and the LHR to monitor various water quality parameters . These data were provided by the District and are described below.

CR 19206 Hillsborough River @ Sulphur Springs

Filename and path: /WMD/Continuous_SN_19206

Metadata: This data was downloaded from the Environmental Data Portal. This is hourly water quality data collect by the District at station number 19206. Each parameter contains its own separate file.

Dissolved Oxygen - TSData_SID19206_District_Hour_DO.csv

pH - TSData_SID19206_District_Hour_pH.csv

Salinity - TSData_SID19206_District_Hour_Salinity.csv

Specific Conductance - TSData_SID19206_District_Hour_SC.csv

Turbidity - TSData_SID19206_District_Hour_Turbidity.csv
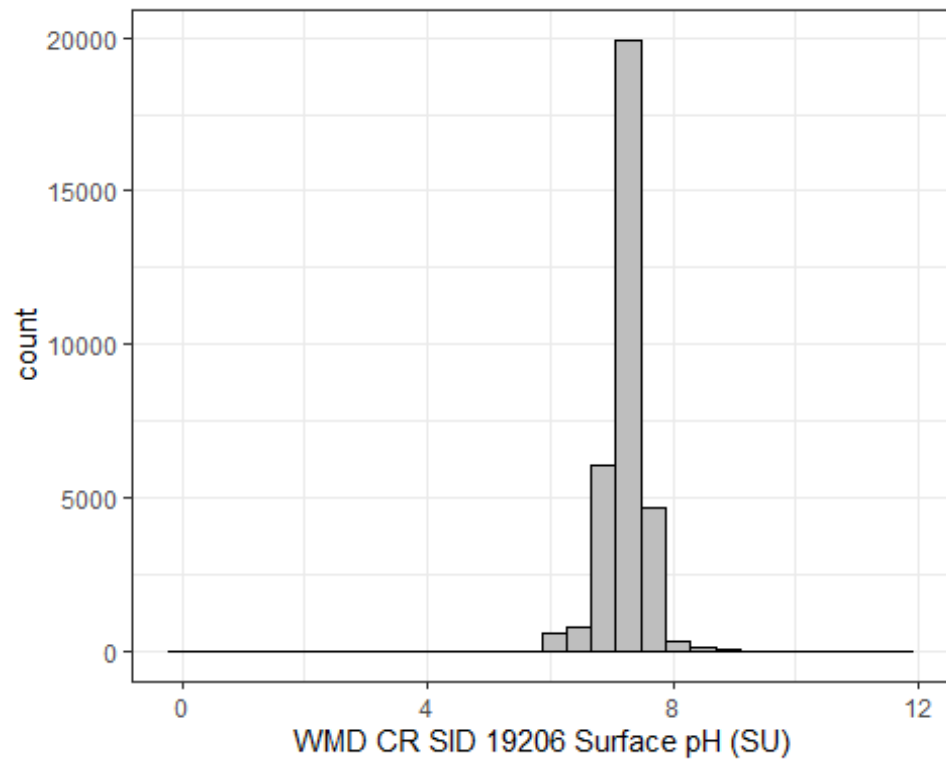
Water Temperature - TSData_SID19206_District_Hour_WTemp.csv

-1 = No code supplied 1 = Good Quality Data 26 = Good Daily Read Records 95 = Estimated 140 = Data Unchecked

WMD CR SID 19206 Surface Diss. Oxygen (mg/L)
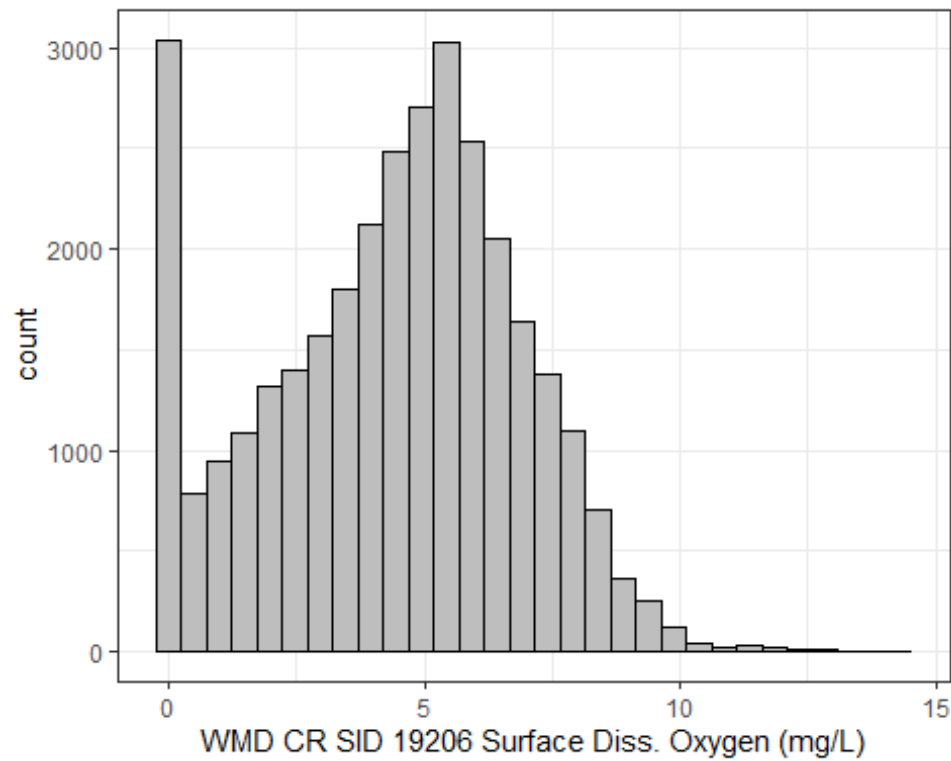
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##  -0.120   2.580   4.630   4.353   6.070  14.190    179

## [1] "-1"  "1"    "140" "95"
```

```
##     Min. 1st Qu.  Median    Mean 3rd Qu.     Max.    NA's
##     0.00    7.10    7.27    7.24    7.41   11.72     180

## [1] "-1"   "1"    "140" "95"
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.000   0.140   0.620   1.977   3.270  21.100     179

## [1] "-1"   "1"    "140" "95"
```
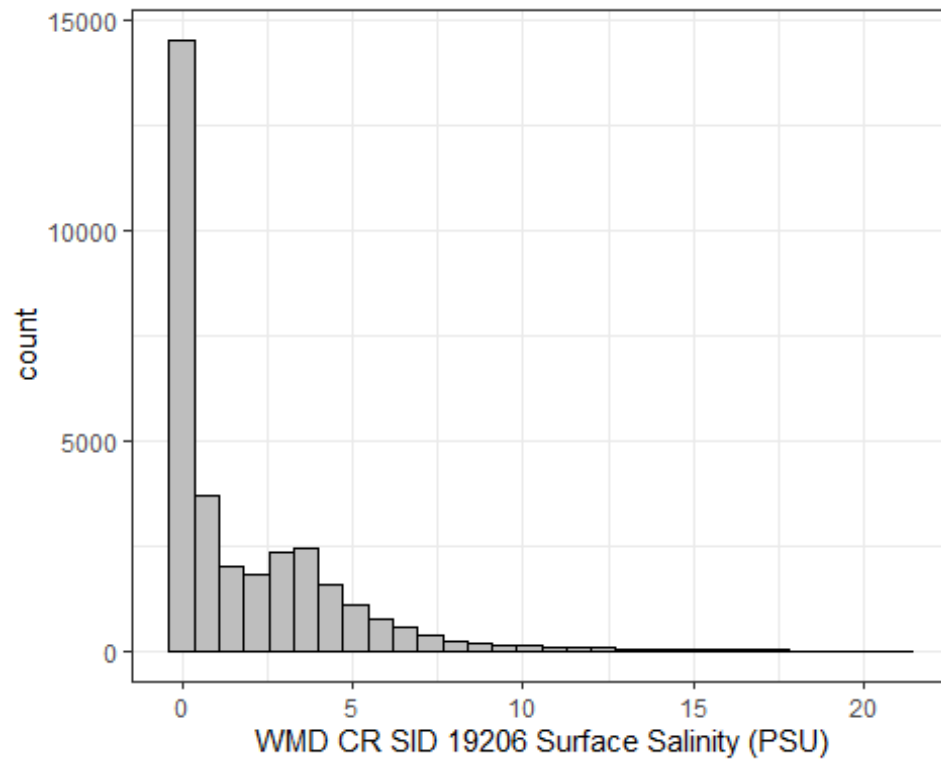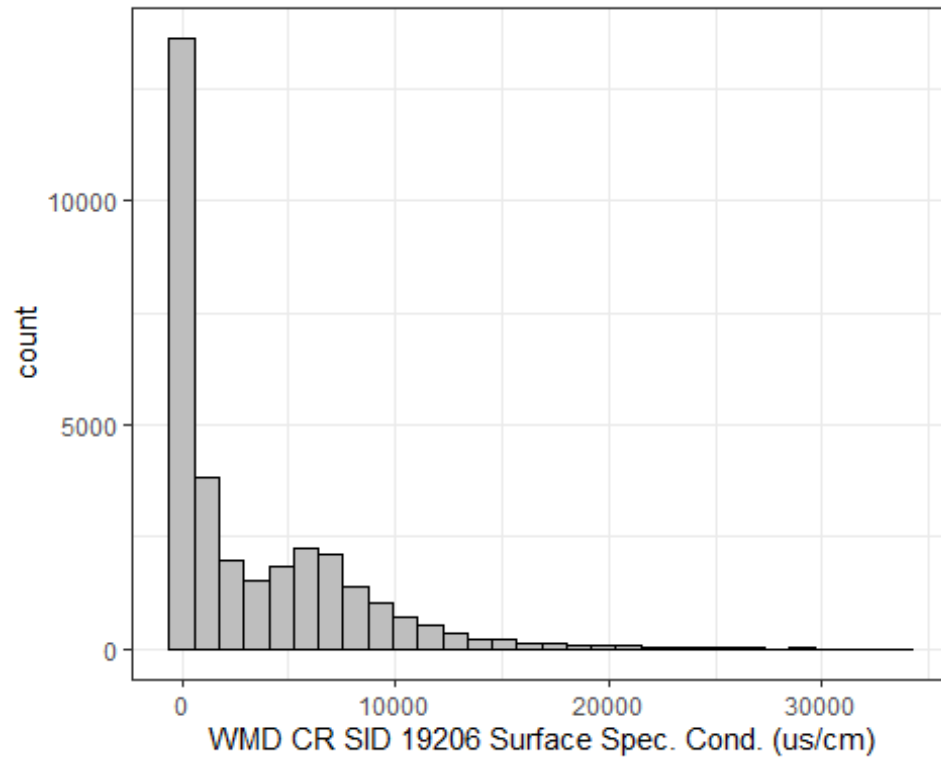
```
##      Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
##     -0.04   300.32  1256.80  3577.40  6036.44 33711.32      179

## [1] "-1"  "1"    "140" "26"   "95"
```

WMD CR SID 19206 Surface Turbidity (NTU)

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.   NA's
##   -4.13   -1.26   -0.18   16.20    1.35 7999.00    179

## [1] "-1"   "140" "95"
```
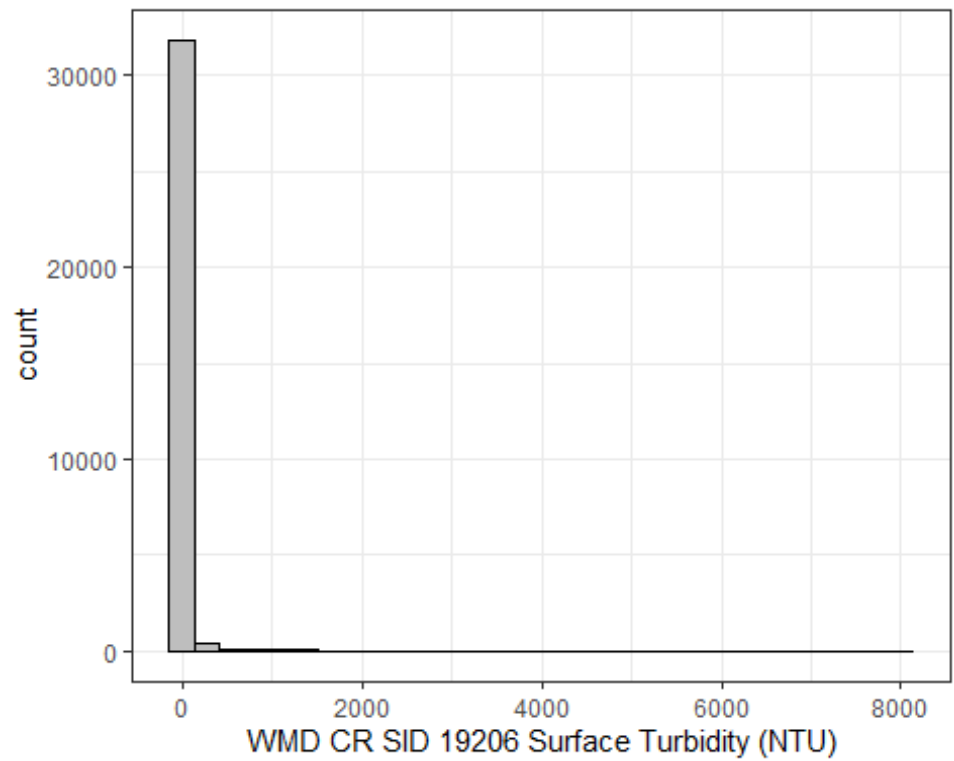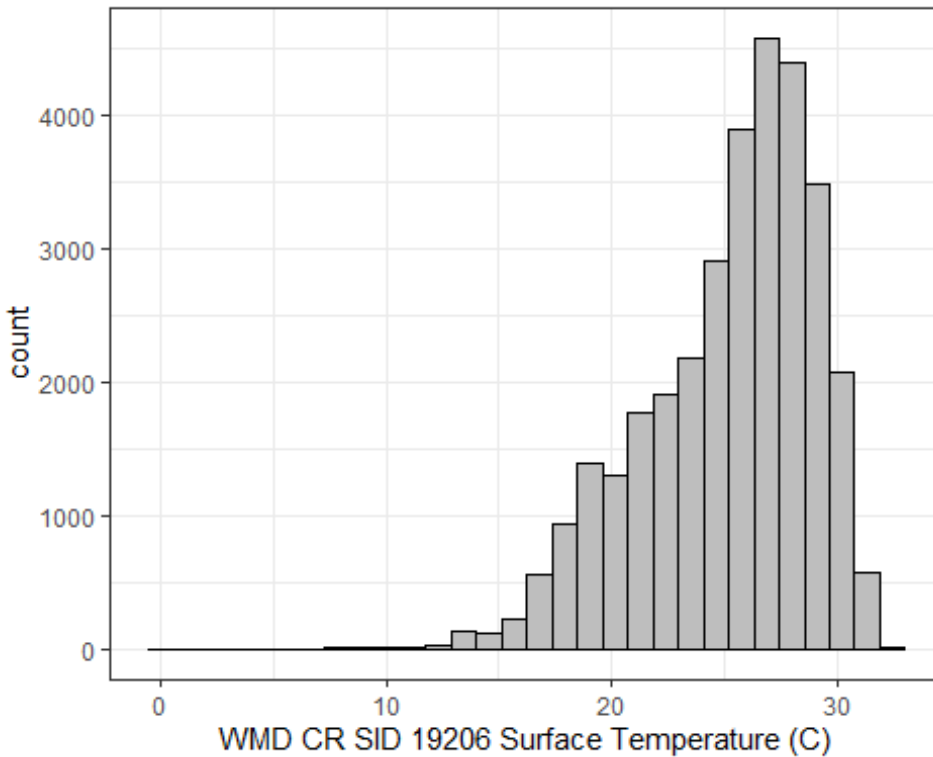
```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00   22.74   25.95   25.15   27.95   32.44     179

## [1] "-1"   "1"    "140" "95"
```

Blue Sink Water Surface Elevation

Filename and path:
WMD/BlueSink_SN_670721/z_Other/WMD_BlueSink_SN670721_NAVD88_WL.xlsx

Metadata: The District maintains is a single continuous (15 minute) water surface elevation recorder in Blue Sink, station number 670721. Data was downloaded from the Environmental Data Portal. Summary statistics for parameters are summarized below based on the period of record of December 10, 2007 to December 31, 2023
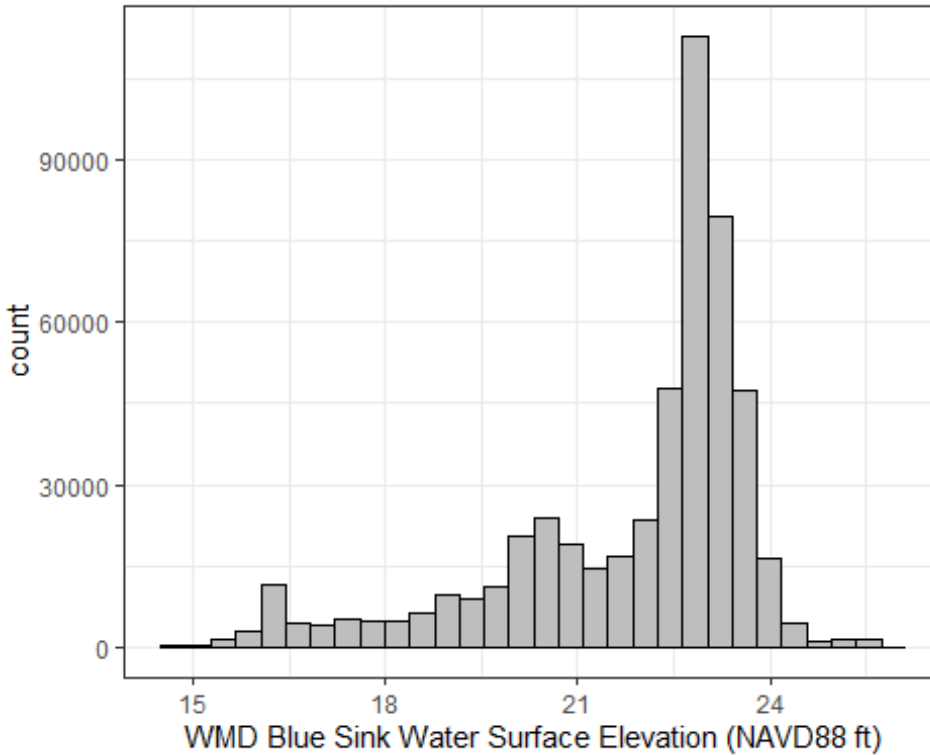
```
##     Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    14.68   20.83   22.69   21.87   23.11   25.90   58331
```

```
## [1] "1" "2"
```

Combine and Export Master Dataset

Filename: LHR_CR_Master

Final Master Continuous Recorder dataset is exported as an R dataset and as a comma separated text file by source due to the large file size.

Descriptive statistics (median and interquartile range) are provided for each variable below. The term "unknown" refers to missing values.

```
## Input object size:    2485107296 bytes;   36 variables    8750335
observations
## New object size: 2450122488 bytes;   36 variables    8750335 observations
```

Variables labels are embedded in Rfile and are as follows:

dateTime = "Timestamp",

Flow_Inst = "Flow or Pumpage in cfs",

GH_Inst = "Gage Height (ft)",

GH_Inst_cd = "Gage Height Quality Code",

Hour = "Hour Time",

TOP_Wtemp_Inst = "Surface Water Temperature (C)",

TOP_Wtemp_Inst_cd = "Surface Water Temperature Code",

TOP_SpecCond_Inst = "Surface Specific Conductance (us/cm)",

BOTTOM_SpecCond_Inst = "Bottom Specific Conductance (us/cm)",

BOTTOM_SpecCond_Inst_cd = "Bottom Specific Conductance Code",

BOTTOM_DO_Inst = "Bottom Dissolved Oxygen (mg/L)",

TOP_DO_Inst_cd = "Surface Dissolved Oxygen Code",

agency_cd = "Agency Code",

Flow_Inst_cd = "Flow Quality Code",

tz_cd = "Time Zone",

StationName = "Station Name",

BOTTOM_Wtemp_Inst = "Bottom Water Temperature (C)",

TOP_SpecCond_Inst_cd = "Surface Specific Conductance Code",

Top_Sal = "Surface Salinity (PSU)",

BOTTOM_DO_Inst_cd = "Bottom Dissolved Oxygen Code",

MIDDLE_Wtemp_Inst = "Middle Water Temperature (C)",

site_no = "Site Number",

Date = "Date",

BOTTOM_Wtemp_Inst_cd = "Bottom Water Temperature Code",

Bot_Sal = "Bottom Salinity (PSU)",

TOP_DO_Inst = "Surface Dissolved Oxygen (mg/L)",

MIDDLE_Wtemp_Inst_cd = "Midwater Water Temperature Code",

MIDDLE_SpecCond_Inst = "Midwater Specific Conductance (us/cm)",

MIDDLE_SpecCond_Inst_cd = "Midwater Specific Conductance Code",

TOP_Turbidity_Inst = "Surface Turbidity (NTU)",

WSE_NAVD88_ft = "Water Surface Elevation relative to NAVD88")