Stream Temperature And Potential Uses in the Chesapeake Bay Watershed

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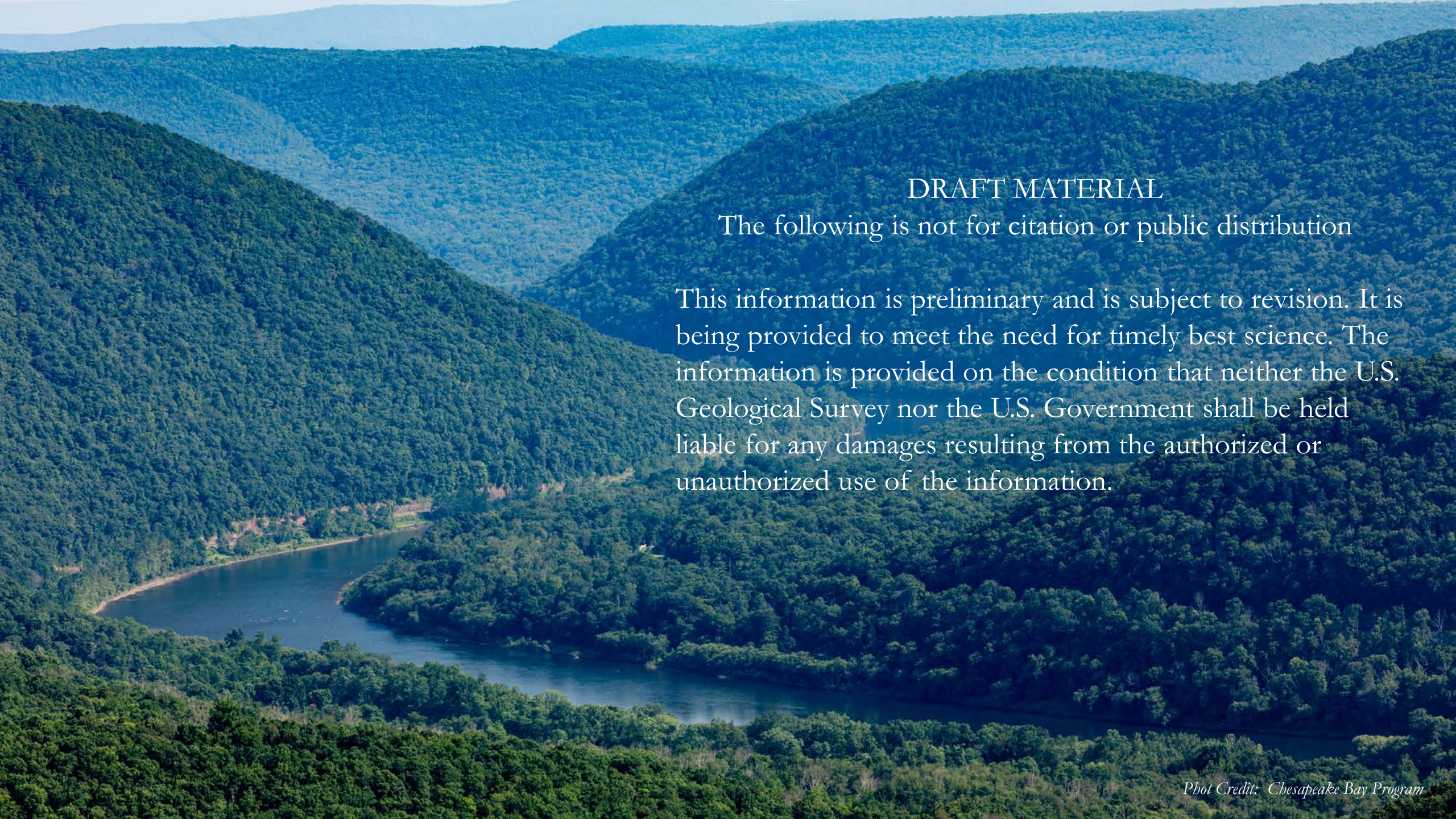
USGS science for a changing world

Phot Credit: Chesapeake Bay Program



DRAFT MATERIAL

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Phot Credit: Chesapeake Bay Program

Stream Temperature

Data Compilation	• Discrete • Continuous
Methods	• Scripts/Data Pulls • QA/QC
Data Exploration	• Summaries • Visualizations
Future Plans	• Status and Trends • Stakeholder Engagement
Use Cases	• Healthy Watersheds • Feedback

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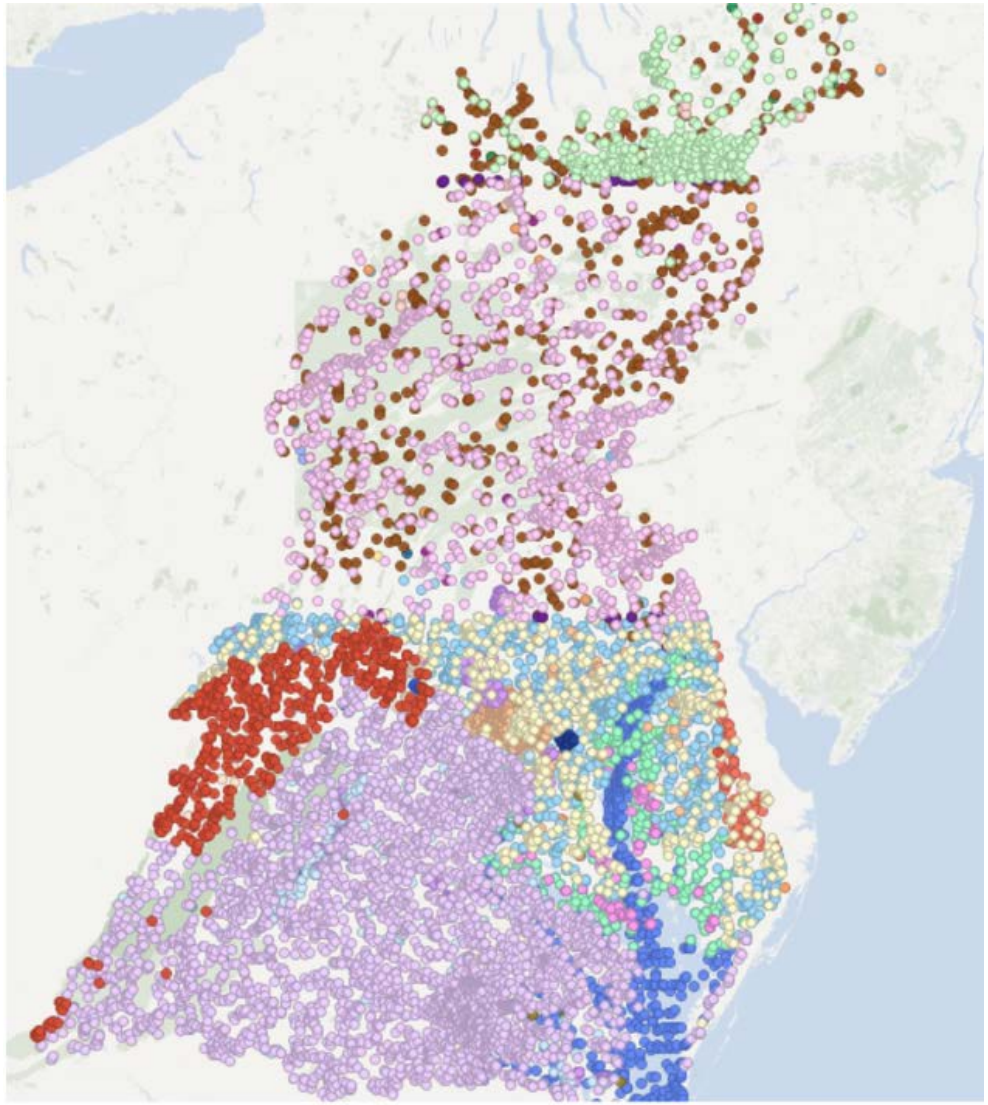
Identify Discrete Monitoring Stations and Metadata



Create a Script that pulls Discrete Observations

discrete_temp_sites.csv

n=30,695

discrete_temp_data.csv

n=2,073,870

→ discrete_temp_data_sites_final.csv

n=1,468,011 (after filter QA, etc.)

DiscreteData_WaterTemp_WQP.R

Source on Save | Run | Source

```
1  setwd("C:/Users/jclune/FILES/GENERAL/R/Projects/Bay_Temp")
2
3  install.packages("dataRetrieval")
4  library (dataRetrieval)
5
6  # Pulls and saves site information for discrete sites in Bay watershe
7  discrete_temp_sites_pull <- whatWQPsites(huc=c("0205*","0206*","0207*
8
9  # Pulls and saves temperature data for sites in Bay watershed
10 discrete_temp_data_pull <- readWQPdata(huc=c("0205*","0206*","0207*",
11
12 # Removes unwanted columns (see Methods - Appendix I for notes on col
13 discrete_temp_sites <- discrete_temp_sites_pull[which(names(discrete_
14 discrete_temp_data <- discrete_temp_data_pull[which(names(discrete_te
15
16 # Merge discrete_temp_sites & discrete_temp_data
17 discrete_temp_data_sites <- merge(discrete_temp_sites, discrete_temp_
18
```

- Uses dataRetrieval for WQP records (1901-2020)
- Pulls Sites and Data by HUC and Merges
- Removes Unwanted Columns
- Filter Data (streams only, non QA, units, etc)

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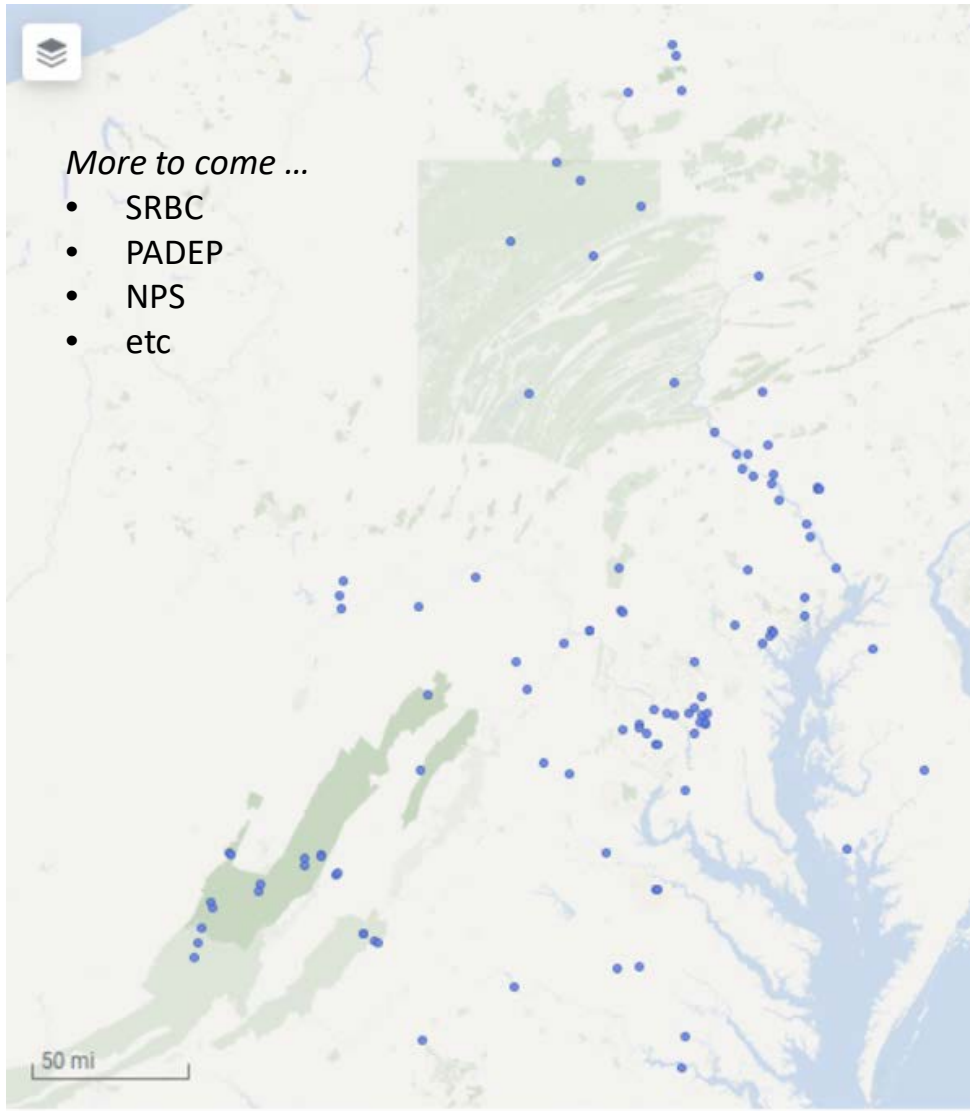
Identify Continuous Monitoring Stations and Metadata



Create a Script that pulls Continuous Observations

cont_temp_sites.csv

n=111

cont_temp_uv_data.csv

n=a lot

ContData_WaterTemp_NWIS_UV.R

Source on Save | Run | Source

```
library(dataRetrieval)

#Input a list of HUC8s (minor HUCs) for Chesapeake Bay Watershed.
huc8_cb <- read.csv("huc8_cb.csv", header = TRUE, colClasses = "character")
#Create a list of HUC8s from the input.
huc8 <- huc8_cb[,1]

#whatNWISdata input.
service <- "uv"
siteType <- "ST"
parameterCd <- "00010"

site_data <- NULL
#Start of the "for" loop that breaks the HUC8 list into groups of 10 (the min
for (i in 1:ceiling(length(huc8)/10)) {
  huc <- na.omit(huc8[c(i*10-9,i*10-8,i*10-7,i*10-6,i*10-5,i*10-4,i*10-3,i*10
  #Feed each group of HUCs to whatNWISdata to retrieve the site list of inter
  what_data <- whatNWISdata("huc" = huc, "service" = service, "siteType" = si
  #Build a site list from all input HUCs.
  site_data <- rbind(site_data, what_data)
```

- Uses dataRetrieval for NWIS unit values (any timeframe)
- Pulls Sites and Data by HUC code list
- Innovated Loop to Pull All Sites and All UVs
- Filter Data by timeframe needed

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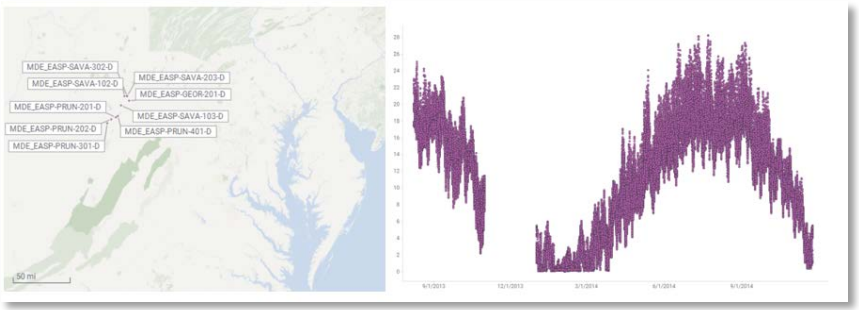
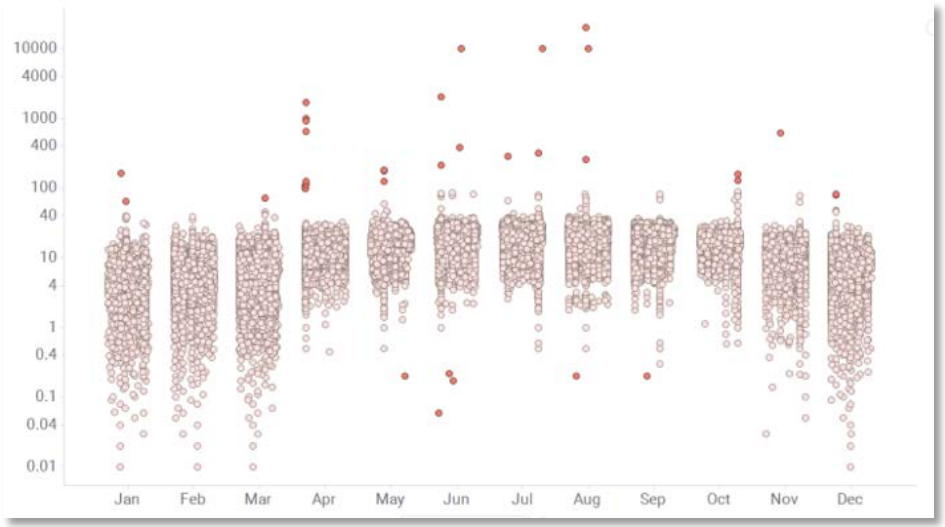
Methods/QA

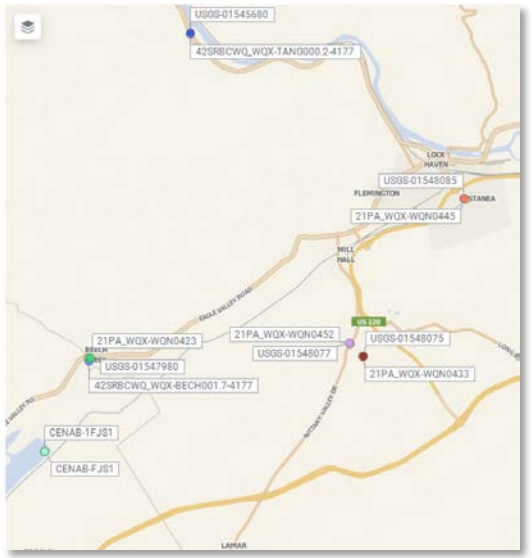
Mixed Formats



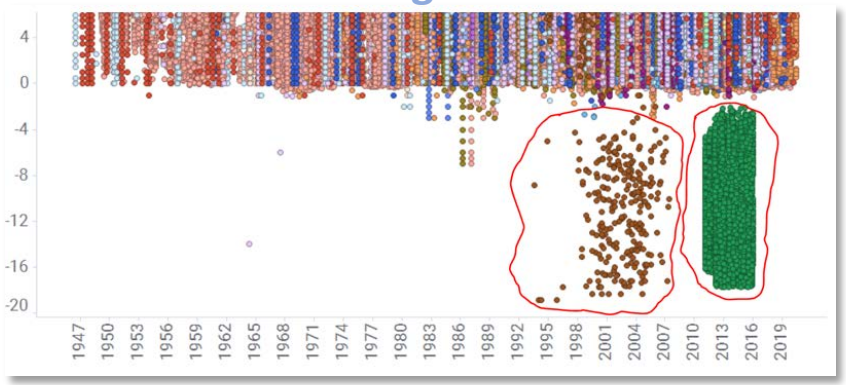
Outliers



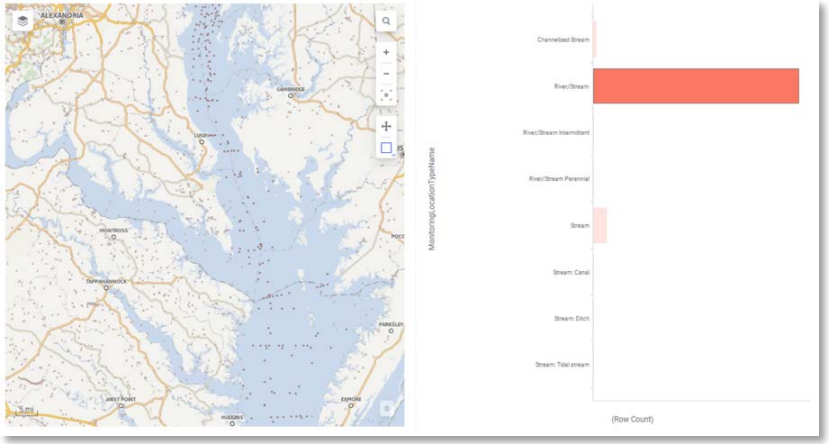
Site Duplication



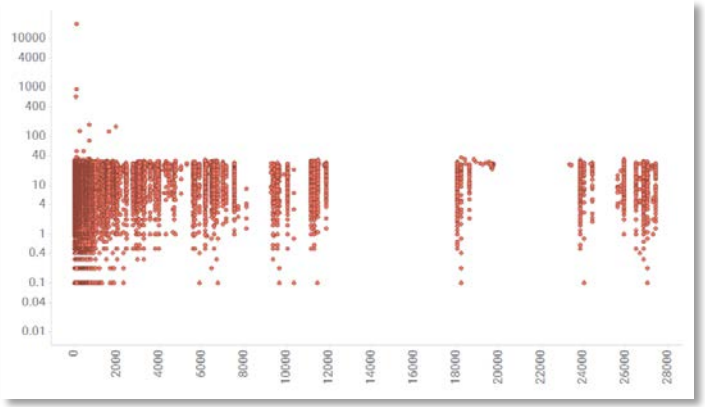
Wrong Units



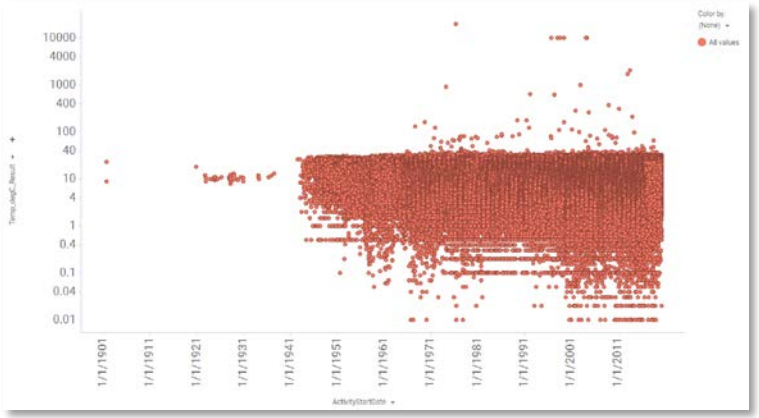
Coding Issues

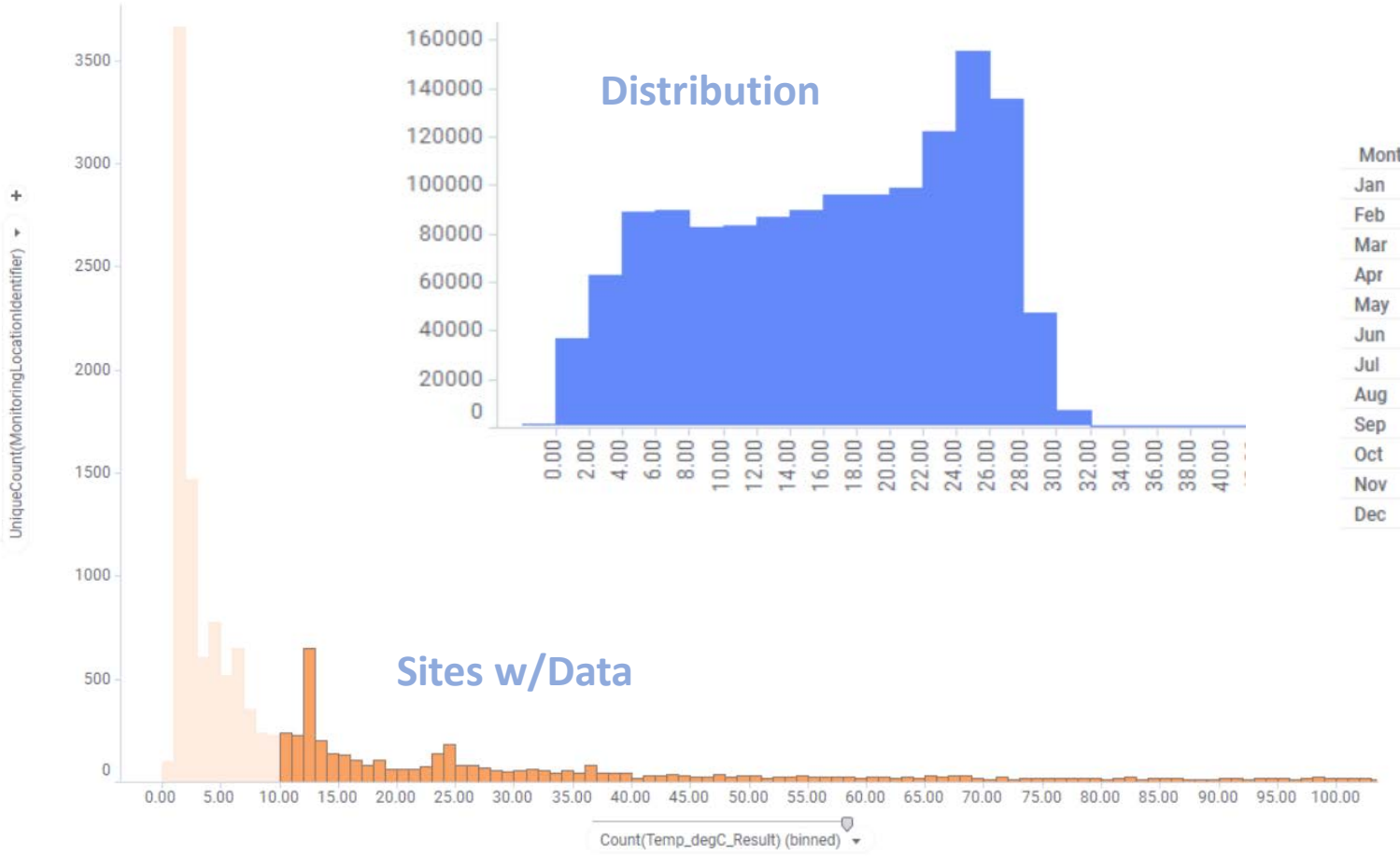


Incomplete Metadata



Detection Limits





Sites w/Data

Distribution

Summary Tables

Month	Count(Temp_degC...	P10(Temp_degC...	Median(Temp_degC_...	P90(Temp_degC_...
Jan	79286	0.00	3.70	7.20
Feb	80671	0.20	3.50	7.01
Mar	112233	2.46	6.50	10.72
Apr	138394	7.58	11.90	16.37
May	140127	12.30	17.00	21.20
Jun	148191	16.82	22.61	26.40
Jul	160287	20.50	25.80	28.53
Aug	159996	19.40	25.91	28.30
Sep	139427	14.70	23.10	26.00
Oct	141383	9.00	17.10	21.40
Nov	84737	6.00	11.50	14.90
Dec	76181	3.00	7.00	10.80

Future Plans

- Complete Data Compilation
- Additional Datasets
- QA/QC
- Summaries/Data Exploration
- Status and Trends Analysis
- Stakeholder Feedback/Meetings
- Use Cases

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(switch to live demo)