Considerations for Sharing, Using, and QC'ing Data

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Water Data Integration Branch

EPA Office of Water

Learning Objectives

- To discover the potential data sources and formats that may be available from both the Tribe and other data partners for use in producing a water quality assessment
- To identify the factors that can affect the quality and suitability of data used for a water quality assessment
- To understand how to prepare data for analysis

What Do We Want From Our Data?

- Inclusive: covering key parameters of concern
- Credible: to accurately reflect water quality conditions
- Robust: to reflect conditions under a variety of rainfall/flow regimes
- Useful: helping us identify appropriate solutions
- Efficient: the least cost for the most benefit!

Considerations for Assessing Data

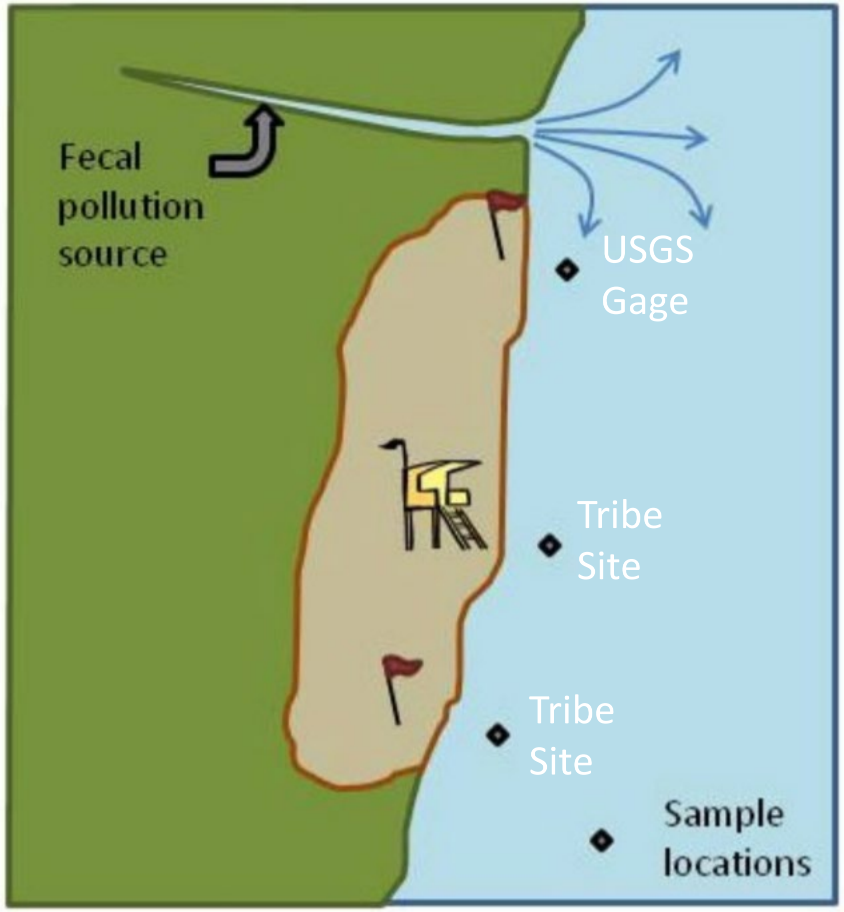
- Are there procedures for validating data?
  - Decision points to accept, reject, or qualify data
  - Procedures could include:
    - Examining results for high/low results
    - Checking calculations
    - Calculating precision & accuracy of instruments
- Are data adequate for a water quality assessment?

A note about tribal data

- Tribal data collected with 106 funding must be shared with EPA at the end of each grant cycle (WQX/WQP).
- Tribal data collected using other resources does not have to be shared

Why Consider Using Other Data?

- Might help to create a more comprehensive water quality assessment
- To fill data gaps
- To obtain other relevant information that supplements tribal data
- Important for tribes interested in TAS for Section 303(d)
- Supplement organizational monitoring for efficiency and cost savings

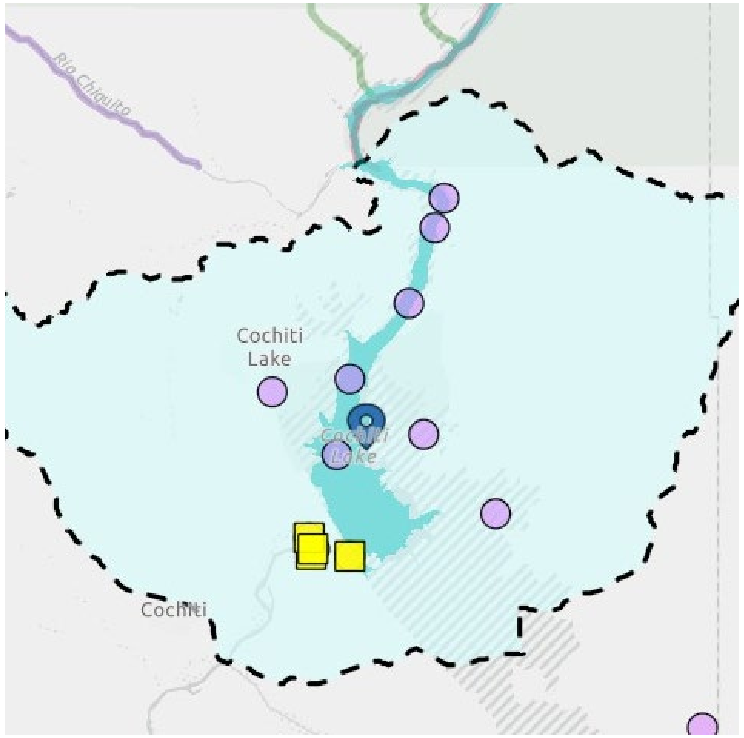


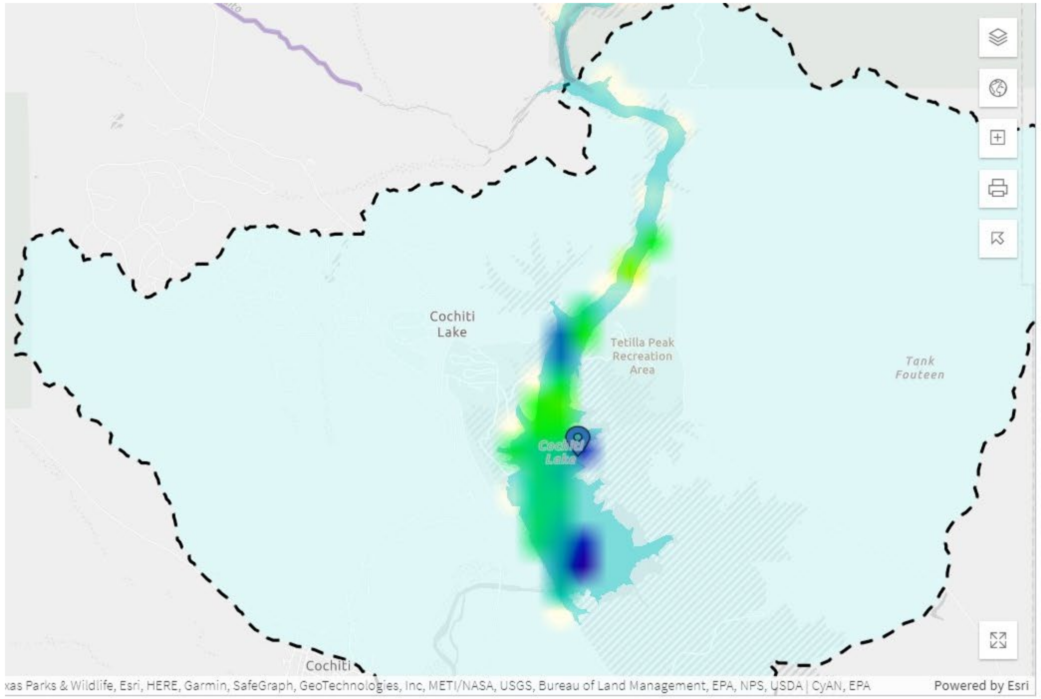
What Other Types of Data Can Tribes Consider?

- Volunteer monitoring data
- Beach closure notices
- Fish consumption advisories
- Fish kills
- Source water assessments
- Waste site inventories
- Land use/cover data
- Hydrology, climate, geological studies/reports
- And more!

Possible Sources for Additional Water Quality Data: Federal Agencies

- U.S. Environmental Protection Agency (ATTAINS, NARS)
- EPA & USGS Water Quality Portal (WQX/WQP)
- U.S. Geological Survey
- NASA Satellite Data




Cochiti Lake
Tetilla Peak Recreation Area
Tank Fouteen
Cochiti Lake
Cochiti
xas Parks & Wildlife, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA | CyAN, EPA
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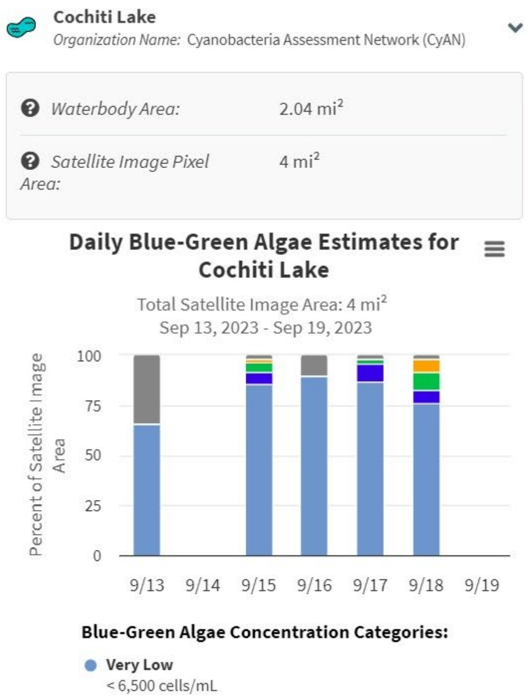

Cochiti Lake

Organization Name: Cyanobacteria Assessment Network (CyAN)

Waterbody Area:	2.04 mi^2
Satellite Image Pixel Area:	4 mi^2

Daily Blue-Green Algae Estimates for Cochiti Lake

Total Satellite Image Area: 4 mi^2

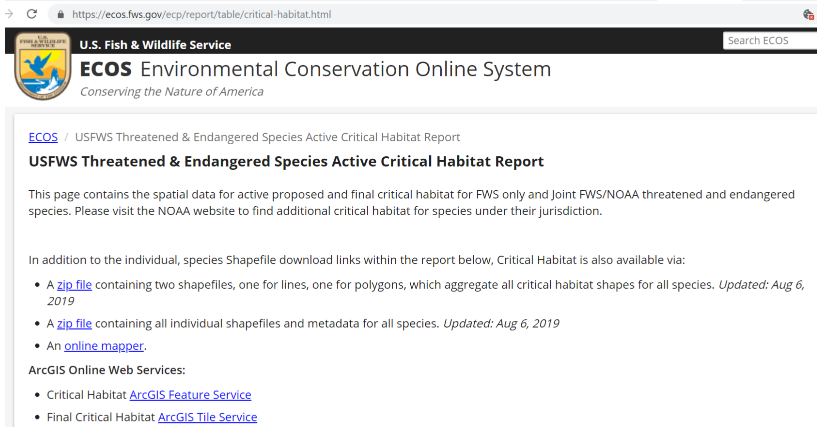
Sep 13, 2023 - Sep 19, 2023

Blue-Green Algae Concentration Categories:

● **Very Low**
< 6,500 cells/mL

Possible Sources for Additional Water Quality Data: Federal Agencies, Other Groups

- U.S. Fish and Wildlife Service
  - Fish, habitat
- U.S. Department of Agriculture Forest Service
  - Forest management plans
- National Oceanic Atmospheric Administration (coastal and estuarine data for both oceans and Great Lakes)


https://ecos.fws.gov/ecp/report/table/critical-habitat.html
U.S. Fish & Wildlife Service
Search ECOS

ECOS Environmental Conservation Online System

Conserving the Nature of America

ECOS / USFWS Threatened & Endangered Species Active Critical Habitat Report

USFWS Threatened & Endangered Species Active Critical Habitat Report

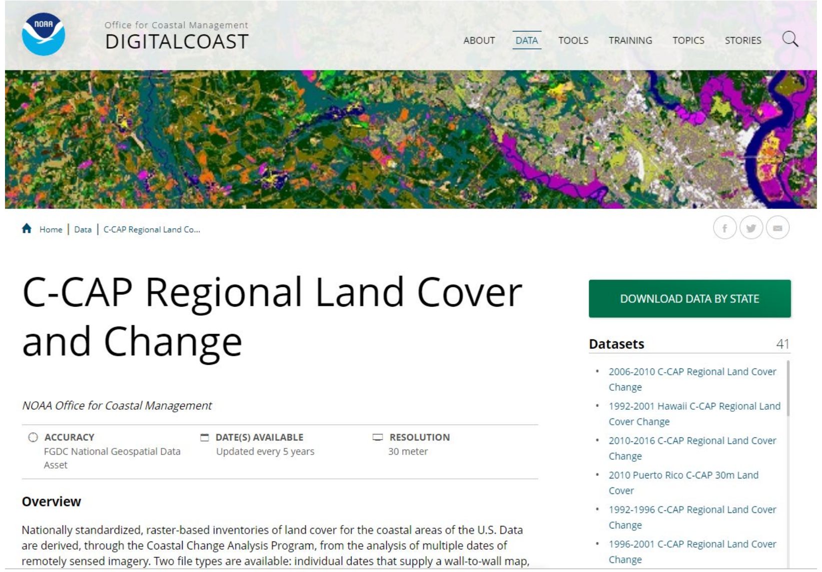
This page contains the spatial data for active proposed and final critical habitat for FWS only and Joint FWS/NOAA threatened and endangered species. Please visit the NOAA website to find additional critical habitat for species under their jurisdiction.

In addition to the individual, species Shapefile download links within the report below, Critical Habitat is also available via:

- A zip file containing two shapefiles, one for lines, one for polygons, which aggregate all critical habitat shapes for all species. *Updated: Aug 6, 2019*
- A zip file containing all individual shapefiles and metadata for all species. *Updated: Aug 6, 2019*
- An online mapper.

ArcGIS Online Web Services:

- Critical Habitat ArcGIS Feature Service
- Final Critical Habitat ArcGIS Tile Service



C-CAP Regional Land Cover and Change

NOAA Office for Coastal Management

ACCURACY
FGDC National Geospatial Data Asset

DATE(S) AVAILABLE
Updated every 5 years

RESOLUTION
30 meter

Overview

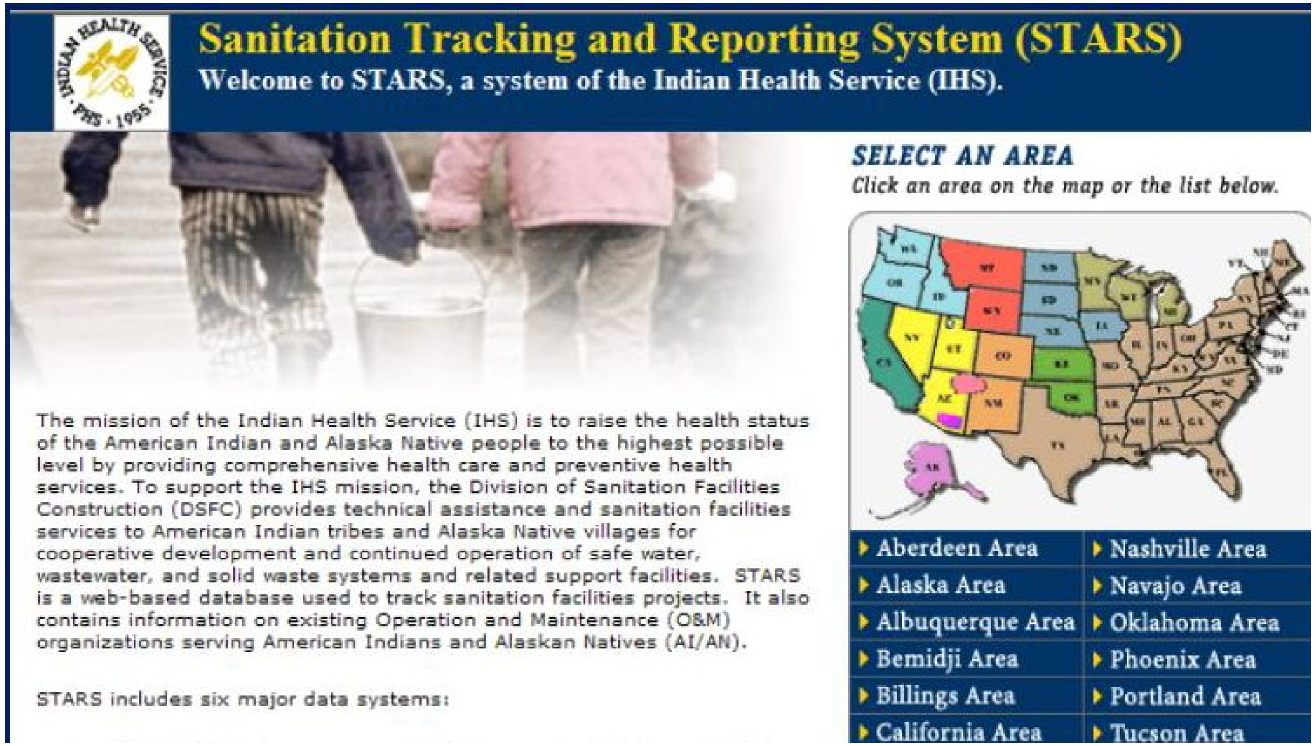
Nationally standardized, raster-based inventories of land cover for the coastal areas of the U.S. Data are derived, through the Coastal Change Analysis Program, from the analysis of multiple dates of remotely sensed imagery. Two file types are available: individual dates that supply a wall-to-wall map,

Datasets 41

- 2006-2010 C-CAP Regional Land Cover Change
- 1992-2001 Hawaii C-CAP Regional Land Cover Change
- 2010-2016 C-CAP Regional Land Cover Change
- 2010 Puerto Rico C-CAP 30m Land Cover
- 1992-1996 C-CAP Regional Land Cover Change
- 1996-2001 C-CAP Regional Land Cover Change

Possible Sources for Additional Tribal Water Quality Data

- Bureau of Indian Affairs
- Indian Health Services
- Tribal commissions and ceded territory agencies
- Range of possible data
  - Water quality
    - Monitoring data
    - Fisheries (census and contaminant data)
    - Natural resources
    - Drinking water intake results
  - Source information
    - Septic systems
    - Landfills/waste sites



Sanitation Tracking and Reporting System (STARS)

Welcome to STARS, a system of the Indian Health Service (IHS).

The mission of the Indian Health Service (IHS) is to raise the health status of the American Indian and Alaska Native people to the highest possible level by providing comprehensive health care and preventive health services. To support the IHS mission, the Division of Sanitation Facilities Construction (DSFC) provides technical assistance and sanitation facilities services to American Indian tribes and Alaska Native villages for cooperative development and continued operation of safe water, wastewater, and solid waste systems and related support facilities. STARS is a web-based database used to track sanitation facilities projects. It also contains information on existing Operation and Maintenance (O&M) organizations serving American Indians and Alaskan Natives (AI/AN).

STARS includes six major data systems:

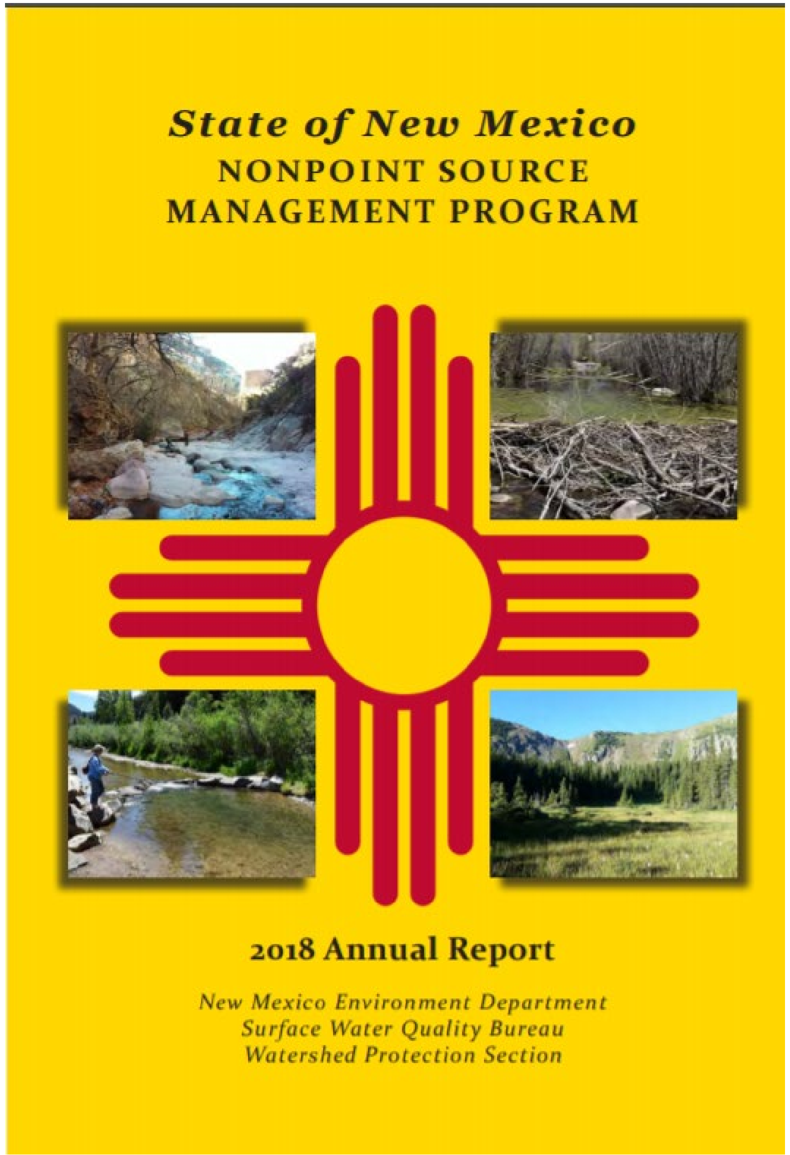
SELECT AN AREA

Click an area on the map or the list below.

- Aberdeen Area
- Alaska Area
- Albuquerque Area
- Bemidji Area
- Billings Area
- California Area
- Nashville Area
- Navajo Area
- Oklahoma Area
- Phoenix Area
- Portland Area
- Tucson Area

Possible Sources for Additional Water Quality Data: State Agencies

- State Departments of environmental protection (305(b)/303(d) water quality assessment data, modeling, NPS assessments, source water protection assessments, watershed plans)
- Departments of natural resources (scenic rivers monitoring)
- Departments of health (recreational waters bacteria sampling, septic systems)



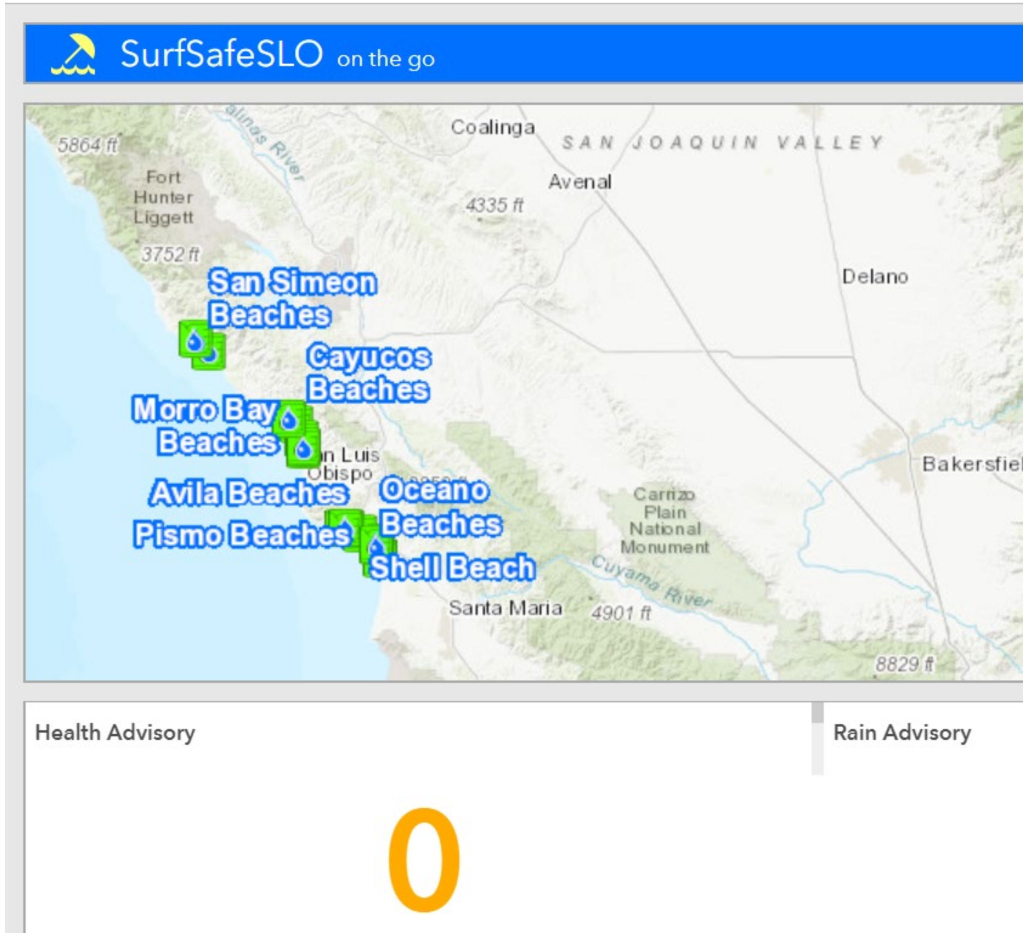
State of New Mexico
NONPOINT SOURCE
MANAGEMENT PROGRAM

2018 Annual Report

New Mexico Environment Department
Surface Water Quality Bureau
Watershed Protection Section

Possible Sources for Additional Water Quality Data: Local Agencies

- Departments of Health
  - Septic system data
  - Beach monitoring data
- Water Utilities
  - Wastewater data
  - Drinking water monitoring data
- Soil and Water Conservation Districts
  - Water quality
  - Septic
  - Beach data



Possible Sources for Additional Water Quality Data: Other Local Partners

- Universities
  - Research studies
  - Lab reports

- Watershed groups
  - Volunteer monitoring
  - Modeling
  - Nonpoint source assessments

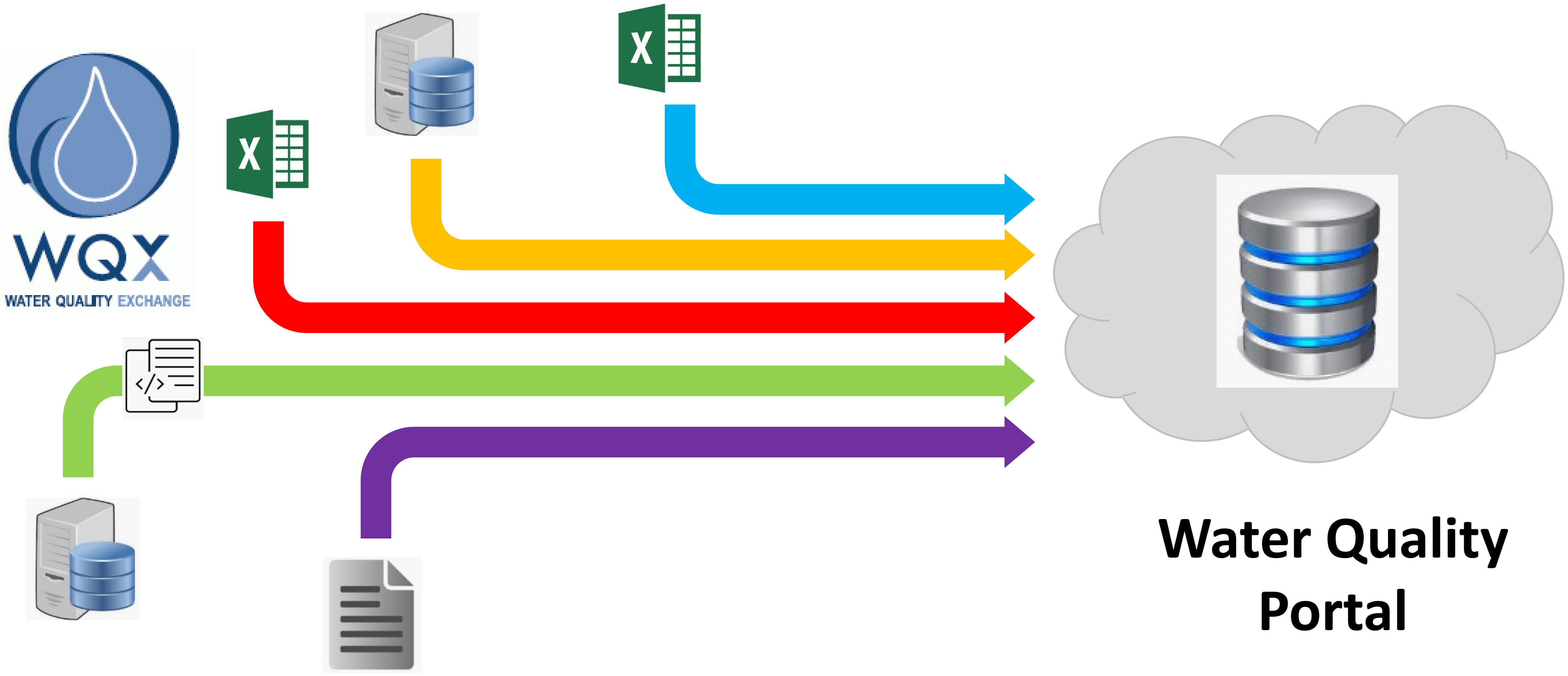
Online Data Sources/Tools

- Watershed Index Online: https://www.epa.gov/wsio
- Recovery Potential Screening: https://www.epa.gov/rps
- Healthy Watersheds Protection: https://www.epa.gov/hwp
- WATERS GeoViewer: https://www.epa.gov/waterdata/waters-geoviewer
- NOAA National Estuarine Reserve System-Wide Monitoring Program Data: https://coast.noaa.gov/digitalcoast/data/nerr.html
- How’s My Waterway: https://mywaterway.epa.gov/
- National Aquatic Resource Surveys: https://www.epa.gov/national-aquatic-resource-surveys

When Asking for Data From Potential Partners

- Be specific about data needs and intended use of the requested data
- Ask for the timeframe to fill data request
- Request a point of contact for follow-up
- Ask for the information needed to evaluate data quality
  - Metadata
  - QAPP
- Ask about the data format; be prepared to reformat

Data Submission, Retrieval, and Assessment

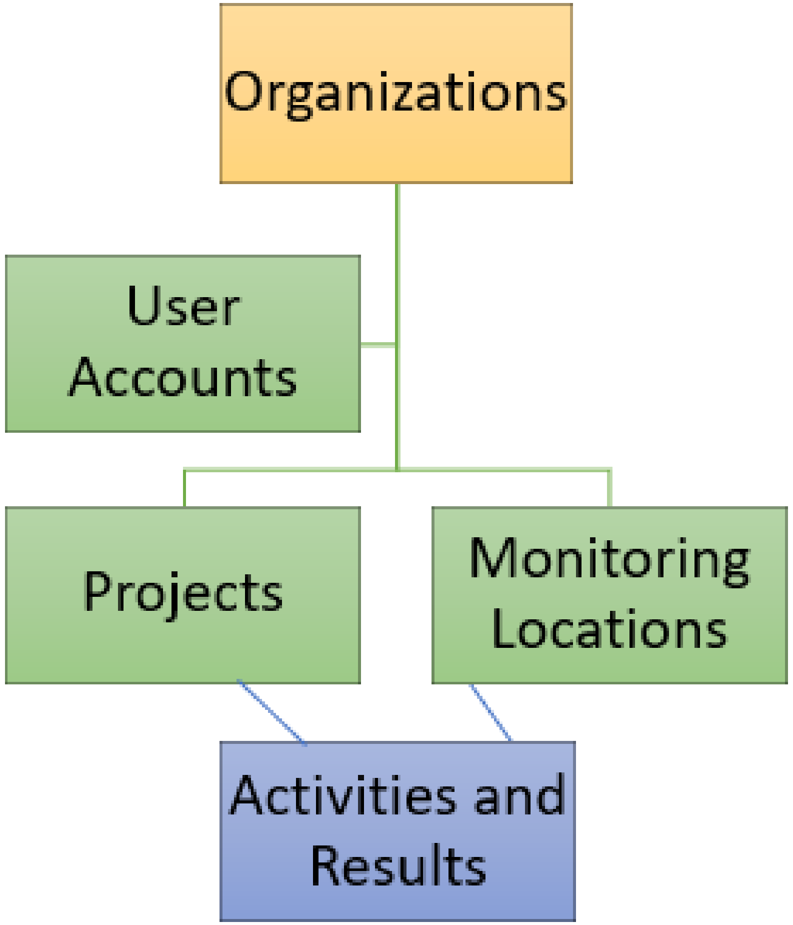


Water Quality eXchange (WQX) Web and Nodes

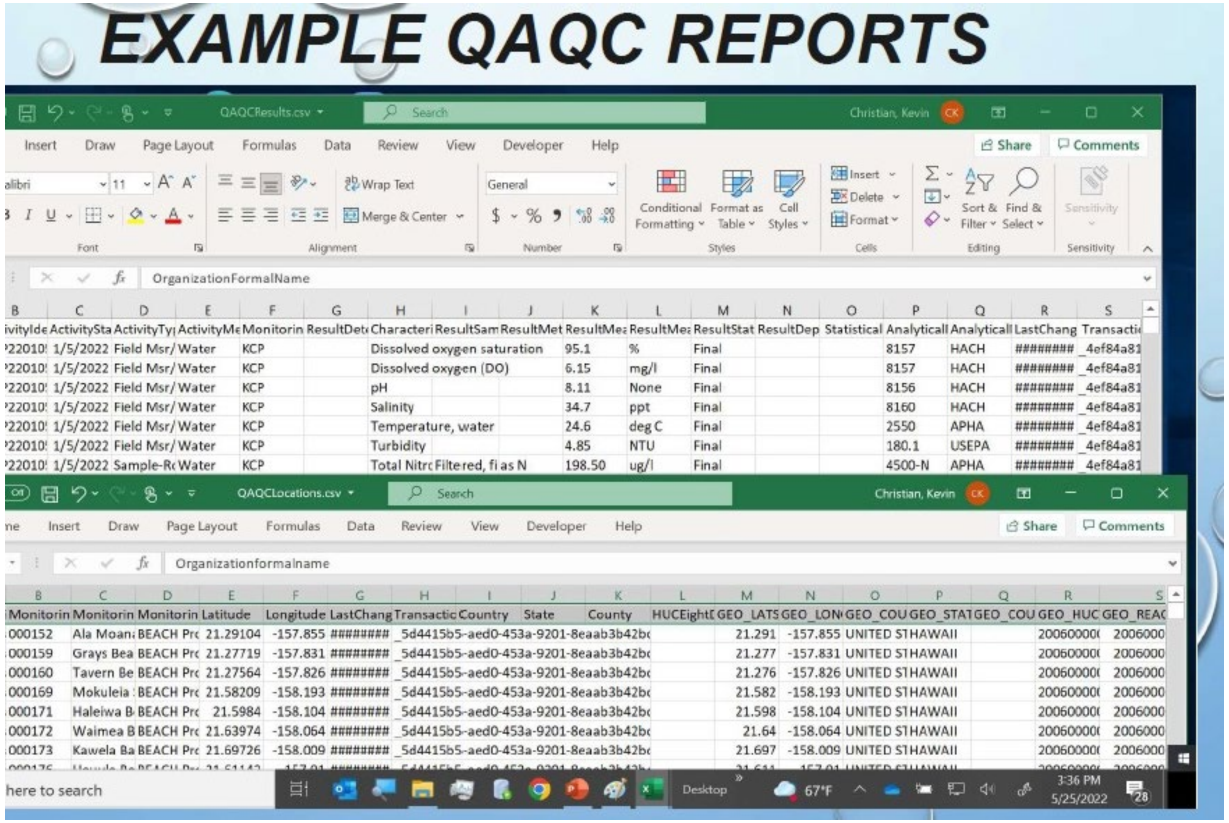
- WQX Web
  - Sign up for account – https://cdx.epa.gov/
  - Requires less technical expertise and manual steps to upload
  - Allows you to submit data by uploading excel, .csv, or .txt files
  - Download Web Template Files and data rules
  - Find FAQs
- Custom submission application using WQX XML schema through Exchange Network Nodes or Node Clients
  - Allows you to submit data using coded files (.xml)
  - Custom WQX XML submission applications can be more efficient for organizations with larger databases and a need for automated submissions from internal databases
- WQX Domain Values (data fields/metadata available)
- Group or 1-on-1 WQX trainings available (wqx@epa.gov)

WQX hierarchy and terminology

- Organizations
  - All information is unique only to the organization
- User accounts
  - Multiple user accounts with different roles can be associated with an Organization
- Projects
  - Why you sampled
- Monitoring Locations
  - Where you sampled
- Activities and Results
  - Raw data referencing Orgs, Projects, & Monitoring Locations



WQX QAQC Service



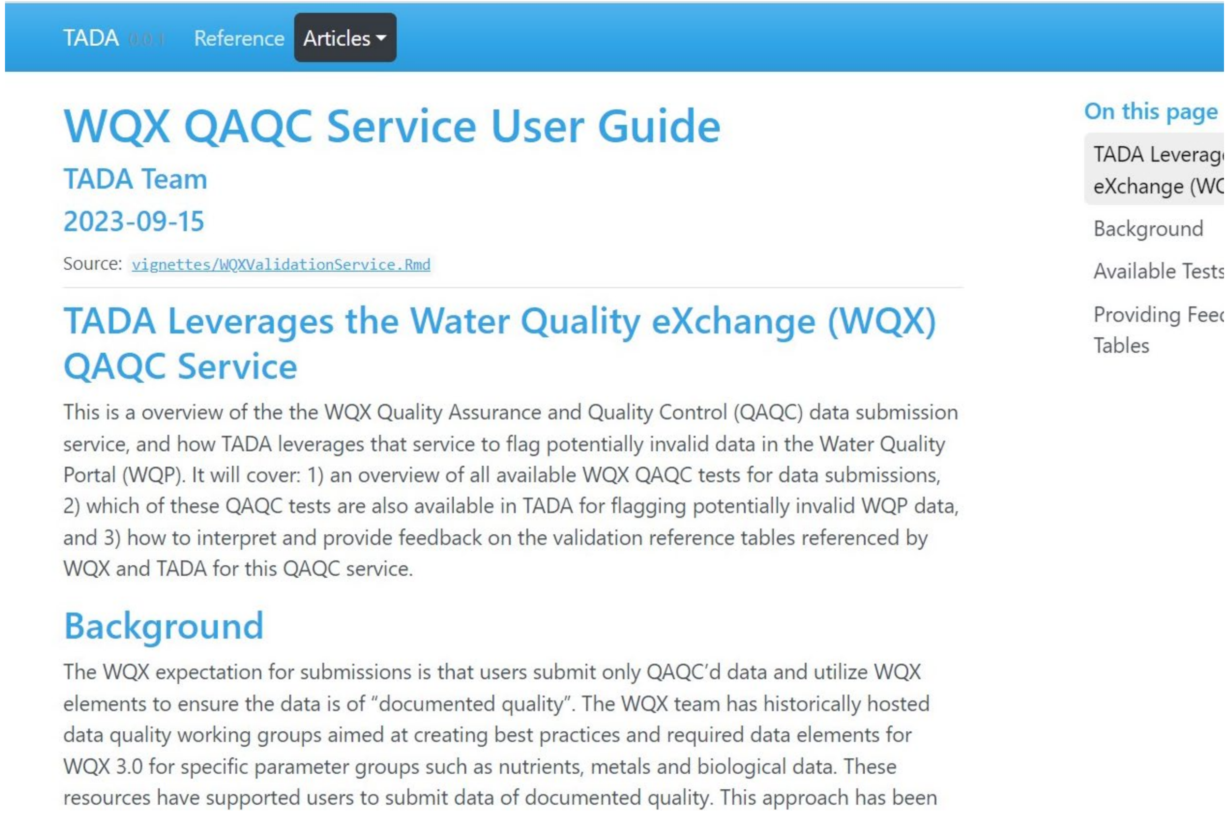
EXAMPLE QAQC REPORTS

OrganizationFormalName

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
ivityIde	ActivitySta	ActivityTy	ActivityMe	Monitorin	ResultDete	Characteri	ResultSam	ResultMet	ResultMea	ResultMea	ResultStat	ResultDep	Statistical	AnalyticalI	AnalyticalI	LastChang	Transactic
'22010!	1/5/2022	Field Msr/	Water	KCP		Dissolved oxygen saturation			95.1	%	Final			8157	HACH	########	_4ef84a81
'22010!	1/5/2022	Field Msr/	Water	KCP		Dissolved oxygen (DO)			6.15	mg/l	Final			8157	HACH	########	_4ef84a81
'22010!	1/5/2022	Field Msr/	Water	KCP		pH			8.11	None	Final			8156	HACH	########	_4ef84a81
'22010!	1/5/2022	Field Msr/	Water	KCP		Salinity			34.7	ppt	Final			8160	HACH	########	_4ef84a81
'22010!	1/5/2022	Field Msr/	Water	KCP		Temperature, water			24.6	deg C	Final			2550	APHA	########	_4ef84a81
'22010!	1/5/2022	Field Msr/	Water	KCP		Turbidity			4.85	NTU	Final			180.1	USEPA	########	_4ef84a81
'22010!	1/5/2022	Sample-R	Water	KCP		Total Nitrc	Filtered, fi	as N	198.50	ug/l	Final			4500-N	APHA	########	_4ef84a81

Organizationformalname

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Monitorin	Monitorin	Monitorin	Latitude	Longitude	LastChang	Transactic	Country	State	County	HUCEight[	GEO_LATS	GEO_LON	GEO_COU	GEO_STAT	GEO_COU	GEO_HUC	GEO_REAC
000152	Ala Moan:	BEACH Prc	21.29104	-157.855	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.291	-157.855	UNITED ST	HAWAII		20060000(	2006000
000159	Grays Bea	BEACH Prc	21.27719	-157.831	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.277	-157.831	UNITED ST	HAWAII		20060000(	2006000
000160	Tavern Be	BEACH Prc	21.27564	-157.826	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.276	-157.826	UNITED ST	HAWAII		20060000(	2006000
000169	Mokuleia :	BEACH Prc	21.58209	-158.193	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.582	-158.193	UNITED ST	HAWAII		20060000(	2006000
000171	Haleiwa B	BEACH Prc	21.5984	-158.104	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.598	-158.104	UNITED ST	HAWAII		20060000(	2006000
000172	Waimea B	BEACH Prc	21.63974	-158.064	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.64	-158.064	UNITED ST	HAWAII		20060000(	2006000
000173	Kawela Ba	BEACH Prc	21.69726	-158.009	########	_5d4415b5-aed0-453a-9201-8eaab3b42bc					21.697	-158.009	UNITED ST	HAWAII		20060000(	2006000



WQX QAQC Service User Guide

TADA Team

2023-09-15

Source: `vignettes/WQXValidationService.Rmd`

TADA Leverages the Water Quality eXchange (WQX) QAQC Service

This is a overview of the the WQX Quality Assurance and Quality Control (QAQC) data submission service, and how TADA leverages that service to flag potentially invalid data in the Water Quality Portal (WQP). It will cover: 1) an overview of all available WQX QAQC tests for data submissions, 2) which of these QAQC tests are also available in TADA for flagging potentially invalid WQP data, and 3) how to interpret and provide feedback on the validation reference tables referenced by WQX and TADA for this QAQC service.

Background

The WQX expectation for submissions is that users submit only QAQC'd data and utilize WQX elements to ensure the data is of “documented quality”. The WQX team has historically hosted data quality working groups aimed at creating best practices and required data elements for WQX 3.0 for specific parameter groups such as nutrients, metals and biological data. These resources have supported users to submit data of documented quality. This approach has been

Water Quality Portal (WQP)

NATIONAL WATER QUALITY MONITORING COUNCIL

EPA United States Environmental Protection Agency

USGS science for a changing world

WQX WATER QUALITY EXCHANGE

dataRetrieval USGS R

Water quality monitoring data is foundational to being able to answer important questions

- Is my water safe?
- Is there enough?

Format is the same for everyone who wants to share data

- Water quality monitoring and data management is complicated
- Standardized, electronic data is more valuable than data in file cabinets (reusable, sharable, discoverable, interoperable, and includes important metadata)

Usable data translates to knowledge, public awareness, and action

- Reuse adds value!
- Supports CWA assessments and other water quality research
- Serves as the backbone for water data tools like HMW

What data exists in the WQP?

WQX was modeled around the science, which does not change as much as IT software does, that’s why it works

- Nutrients, metals, and biological data workgroups have made a lot of progress on best practices
- New WQX QAQC service for data submissions was deployed in spring 2022

Characteristic/unit combos with the most data

CharacteristicName	Unit	RowCount
Temperature, water	deg C	52859842
Dissolved oxygen (DO)	ug/l	11488857
pH	None	10306125
Specific conductance	uS/cm	8356335
Salinity	ug/kg	5055589
Count	count	4024377
Conductivity	uS/cm	3570617
Turbidity	NTU	3465425
Temperature, air	deg C	3436615
Dissolved oxygen saturation	%	2988042
Inorganic nitrogen (nitrate and nitrite)	ug/l	2868888
Total suspended solids	ug/l	2843607
Phosphorus	ug/l	2551290
Depth, Secchi disk depth	in	2027629
Depth	in	2002344
Kjeldahl nitrogen	ug/l	1987872
Orthophosphate	ug/l	1823127
Count	%	1683594
Organic carbon	ug/l	1655437
Chloride	ug/l	1549265

8/9/21

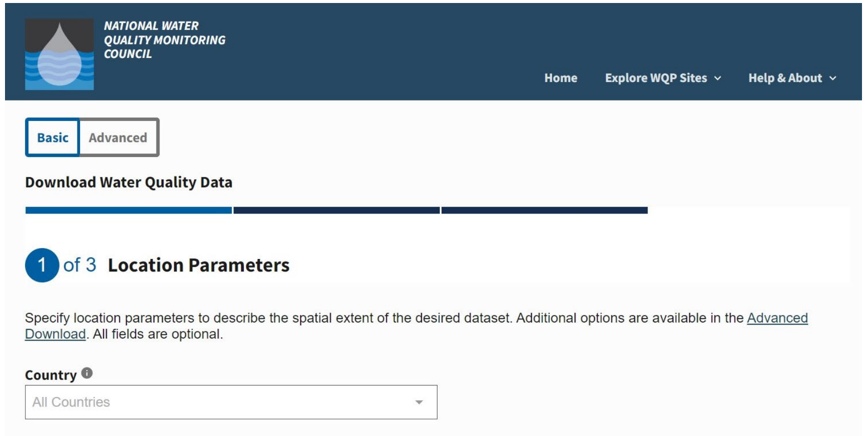
Retrieving WQP data from the WQP

WQP Web Interface: https://www.waterqualitydata.us/

- [WQP Demo on How to Download Data (2015)]()
- [WQP Demo on How to Download Data (2019)]()

How's My Waterway

TADA

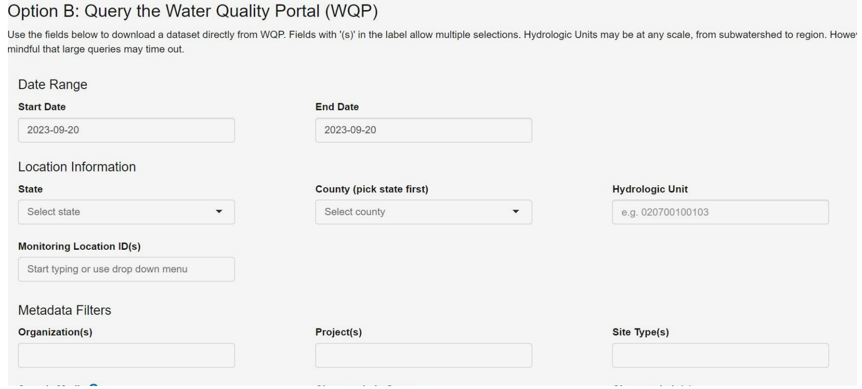


Download Water Quality Data

1 of 3 Location Parameters

Specify location parameters to describe the spatial extent of the desired dataset. Additional options are available in the Advanced Download. All fields are optional.

Country: All Countries



Option B: Query the Water Quality Portal (WQP)

Use the fields below to download a dataset directly from WQP. Fields with '(s)' in the label allow multiple selections. Hydrologic Units may be at any scale, from subwatershed to region. Howe mindful that large queries may time out.

Date Range

Start Date: 2023-09-20

End Date: 2023-09-20

Location Information

State: Select state

County (pick state first): Select county

Hydrologic Unit: e.g. 020700100103

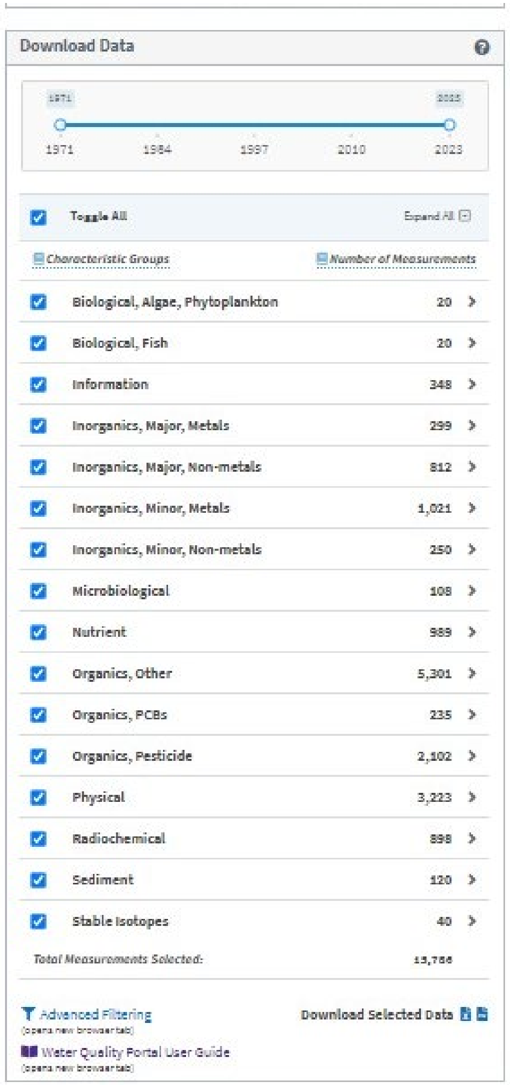
Monitoring Location ID(s): Start typing or use drop down menu

Metadata Filters

Organization(s):

Project(s):

Site Type(s):



Download Data

☑ Toggle All

	Characteristic Groups	Number of Measurements
☑	Biological, Algae, Phytoplankton	20
☑	Biological, Fish	20
☑	Information	348
☑	Inorganics, Major, Metals	299
☑	Inorganics, Major, Non-metals	812
☑	Inorganics, Minor, Metals	1,021
☑	Inorganics, Minor, Non-metals	250
☑	Microbiological	108
☑	Nutrient	989
☑	Organics, Other	5,301
☑	Organics, PCBs	235
☑	Organics, Pesticide	2,102
☑	Physical	3,223
☑	Radiochemical	898
☑	Sediment	120
☑	Stable Isotopes	40
	Total Measurements Selected:	15,786

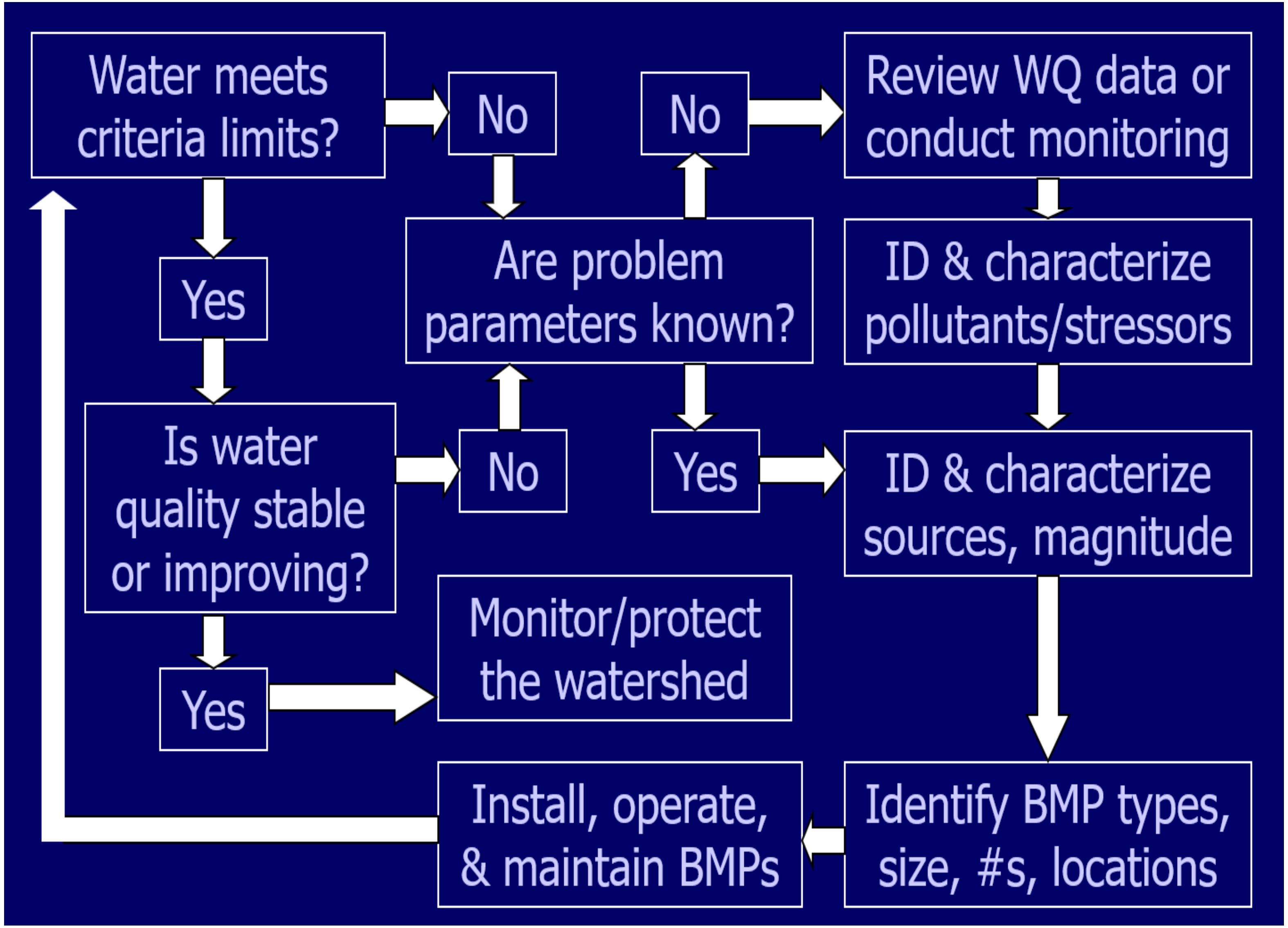
Advanced Filtering (opens new browser tab)

Download Selected Data

Water Quality Portal User Guide (opens new browser tab)

Screening/Flagging Data

- Determine data credibility
- Ensure appropriate data quality
- Potential screening criteria
  - Parameters and methods used
  - Range checks



Water meets criteria limits?

No

No

Review WQ data or conduct monitoring

Yes

Are problem parameters known?

ID & characterize pollutants/stressors

Is water quality stable or improving?

No

Yes

ID & characterize sources, magnitude

Monitor/protect the watershed

Yes

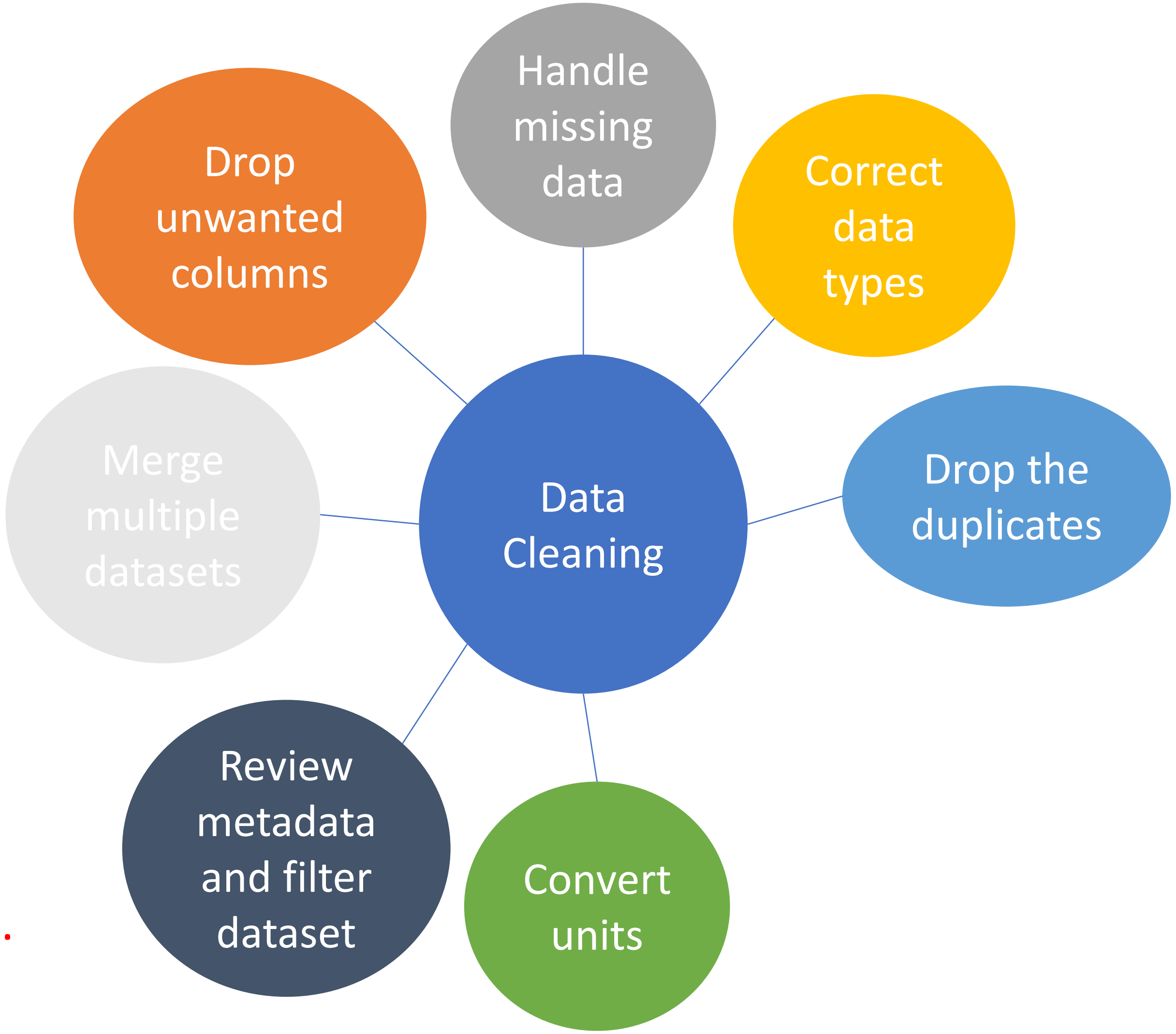
Install, operate, & maintain BMPs

Identify BMP types, size, #s, locations

Data cleaning - breadth

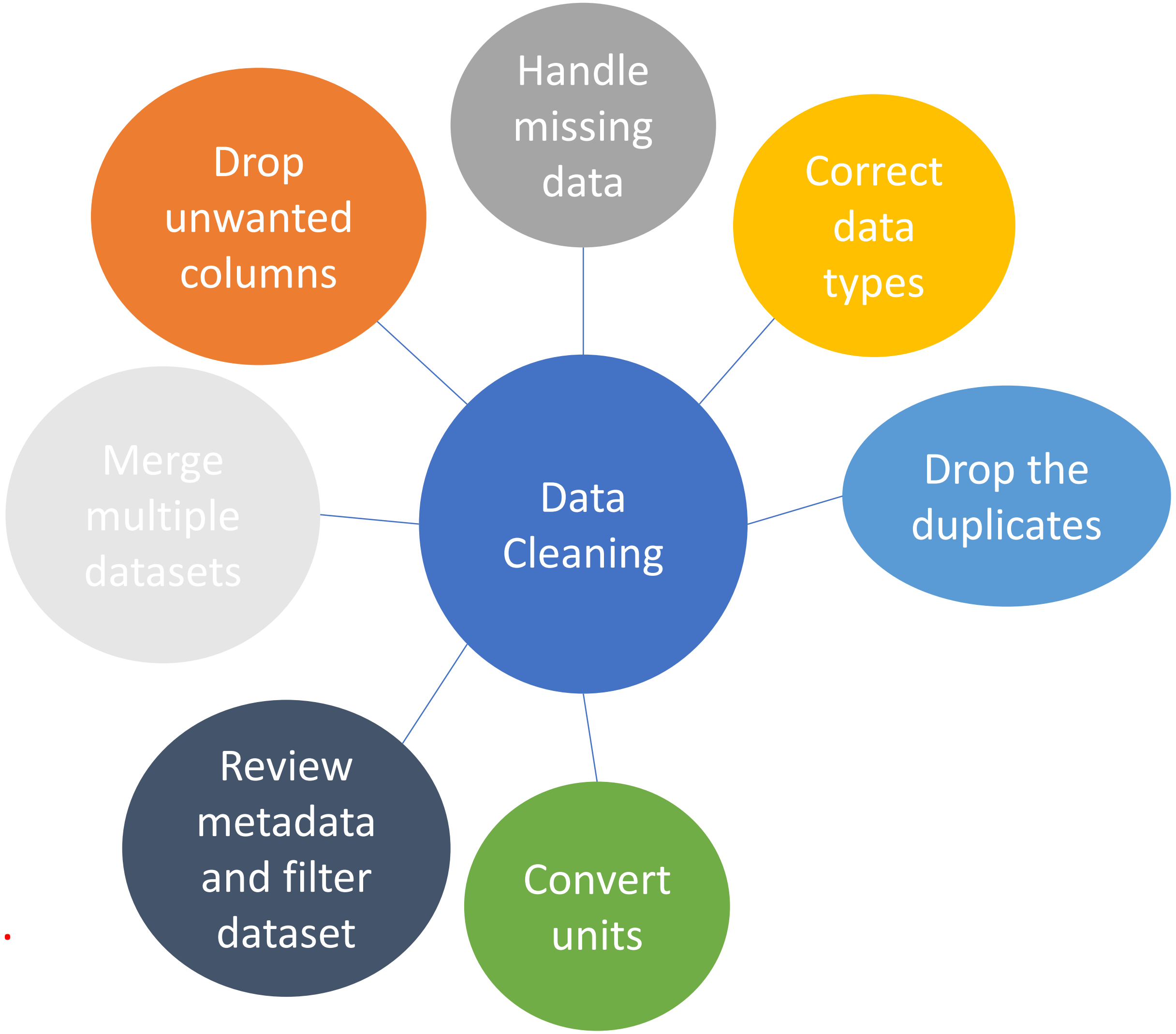
- Join multiple WQP profiles if needed
- Review metadata & Filter
    - Filter by media type and waterbody type, etc.
- Unit conversions
- Synonym checks
- Duplicates

Which of these we need to do depends on the dataset…



Data cleaning - breadth

- Correct data types (numeric or categorical), address symbols in results
- Speciation considerations
- Check if monitoring equipment /methods changed over time
- Quality checks
    - Outlier detection
    - Location accuracy

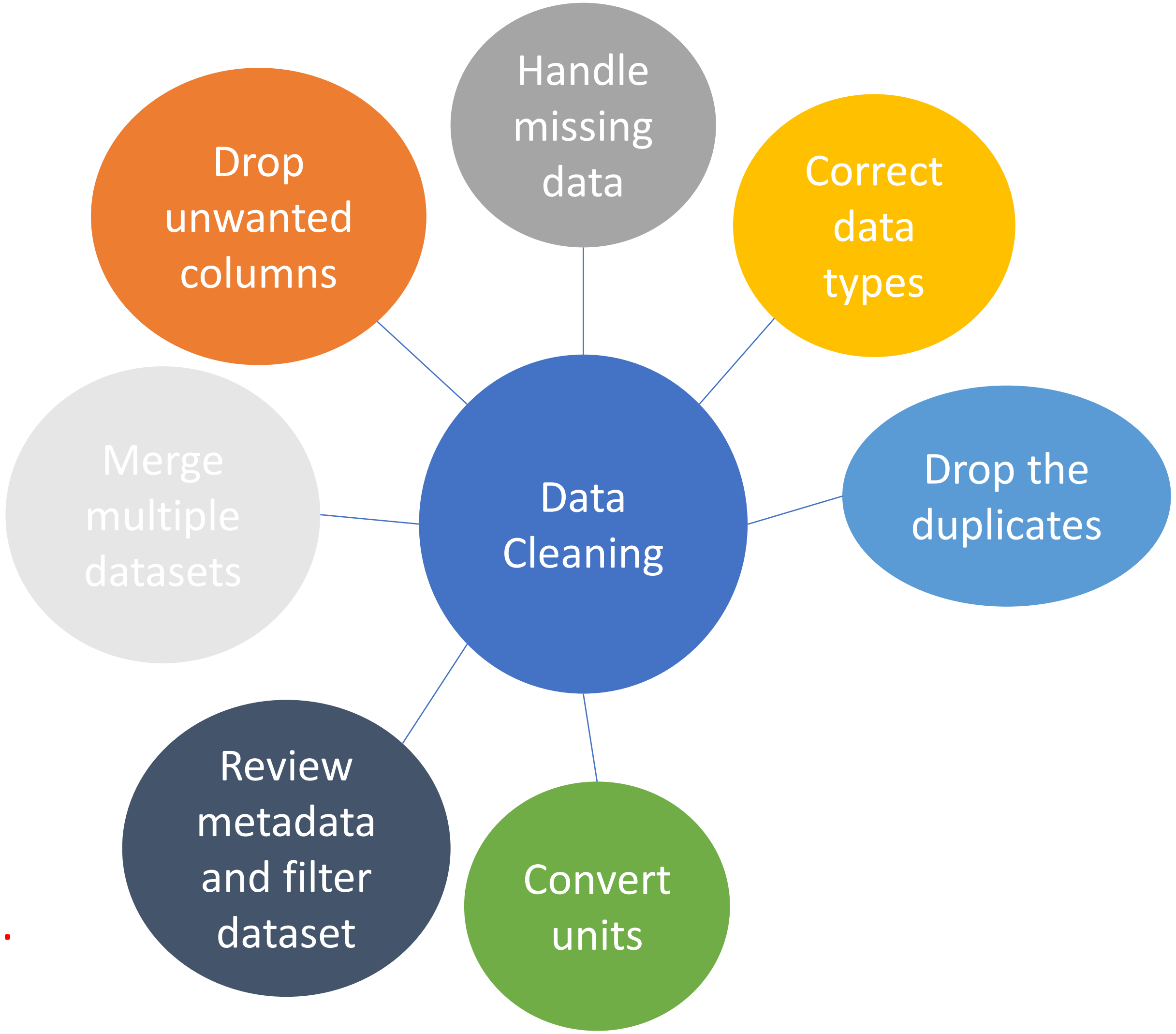


Which of these we need to do depends on the dataset…

Data cleaning - breadth

- Staff changes may impact the way metadata is reported (sometimes things get into different WQX fields by accident)
- Different organizations may list data differently in WQP even though WQX tries to prevent that

Which of these we need to do depends on the dataset…



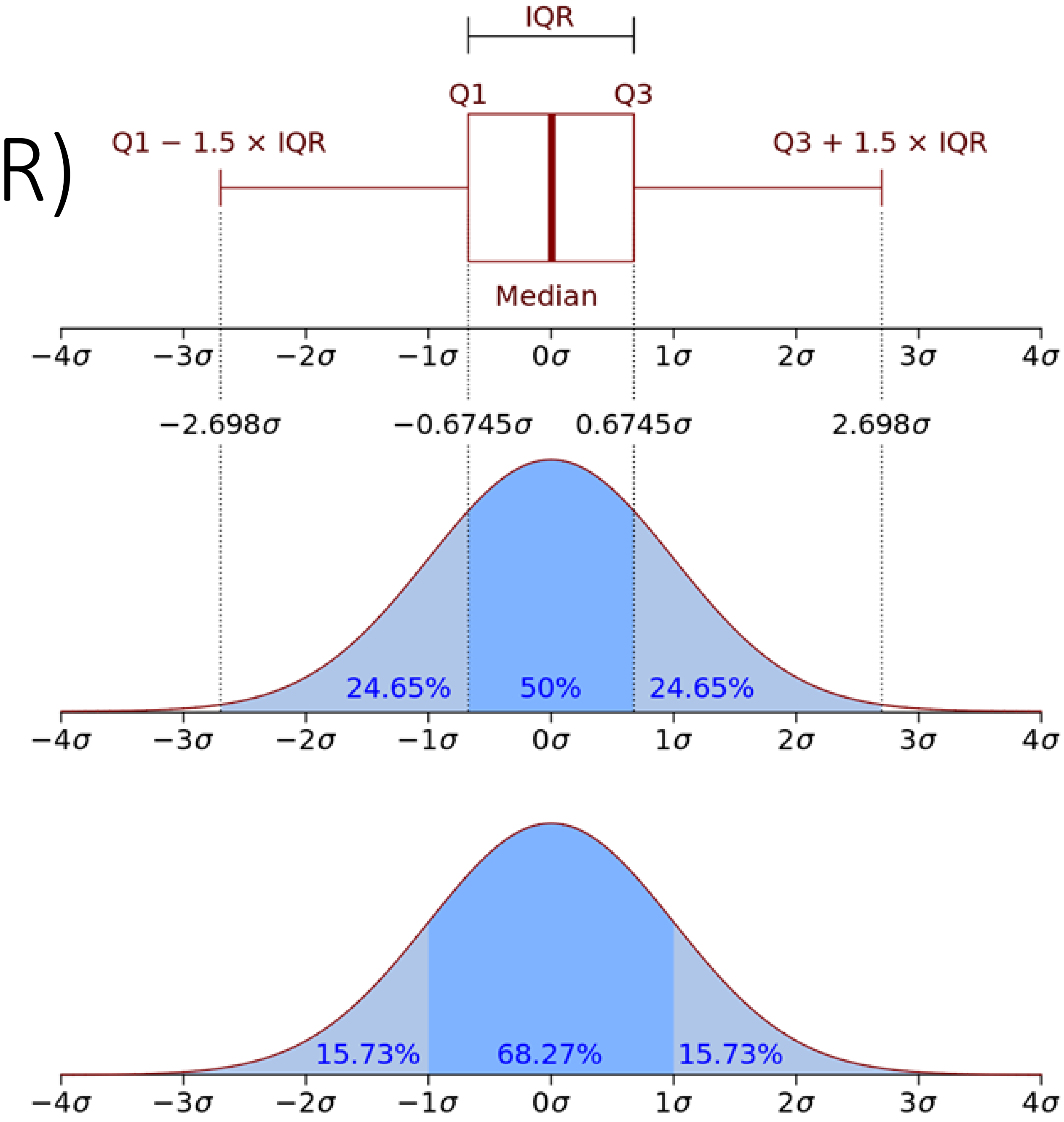
Non-detections

- Set Non-Detections equal to the Limit of Detection
- Set Non-Detections equal to the 1/2 times the Limit of Detection
- Set = 1/x detection limit (you define x)
- Assign values to Non-Detections using the Kaplan-Meier method

Interquartile Range (IQR)

- Method to identify data that are different than approximately 99% of the data available for the assessed parameter
  - Upper Outlier = 75th Percentile + 1.5 * (75th percentile - 25th percentile)
  - Lower Outlier = 25th Percentile - 1.5 * (75th percentile - 25th percentile)

- May want to flag data that falls above or below the upper or lower value



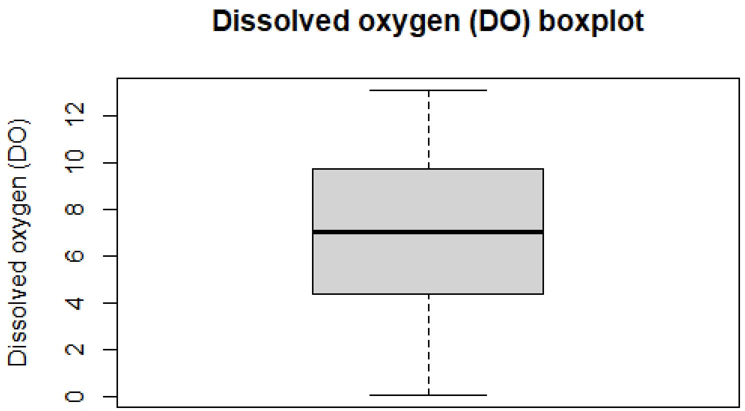
Data Screening Considerations: Parameter v. Methods

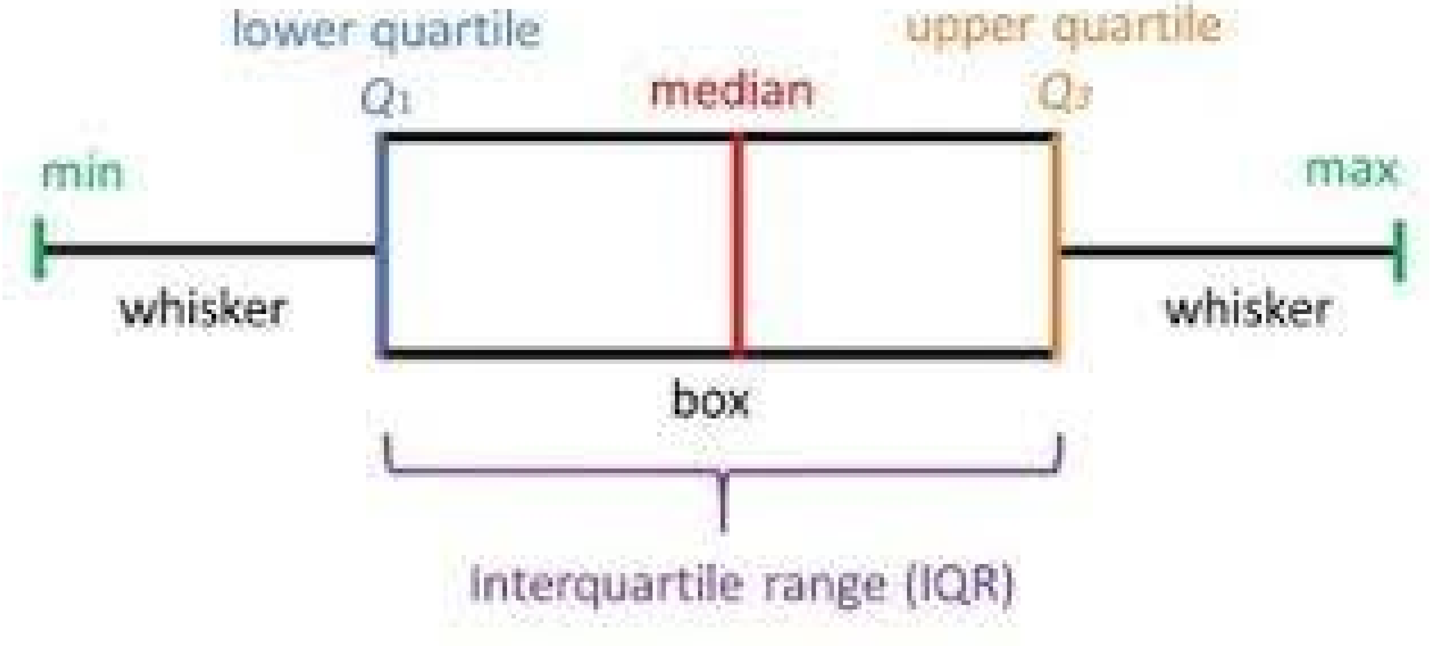
- Parameters can have many forms (total nitrogen, total Kjeldahl nitrogen, nitrate, nitrite)
- Essential to specify the chemical form of the parameter
- An analytical method is the procedure for determining the amount/concentration of the parameter
  - Several analytical methods can apply to a parameter
  - Essential to specify which analytical method is used
  - Limits of detection are also important to consider. Specifically, when the water quality standard is near the detection limit.

Data Screening Considerations: Range Checks

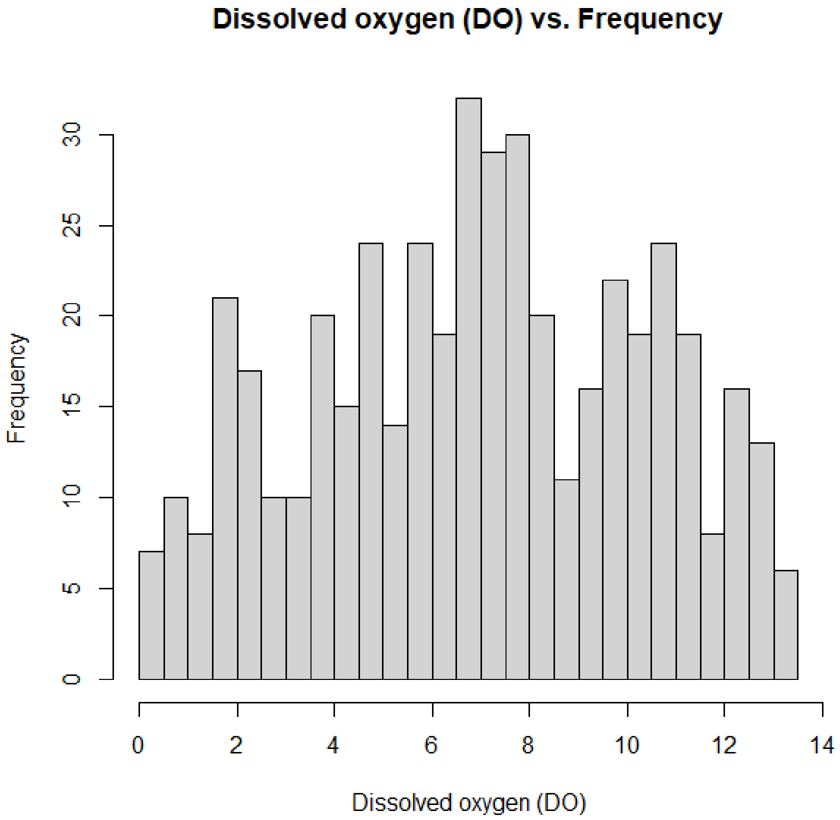
- Identify the range of possible concentrations for each parameter based on:
  - Site
  - Historical data
  - Recent watershed changes
- Values outside of that range may be in error
  - Investigate upstream/upland conditions before discarding data
  - Check to see if the collection method requires field blanks and make sure they are all below the limit of detection (indicates whether sample is contaminated or not)

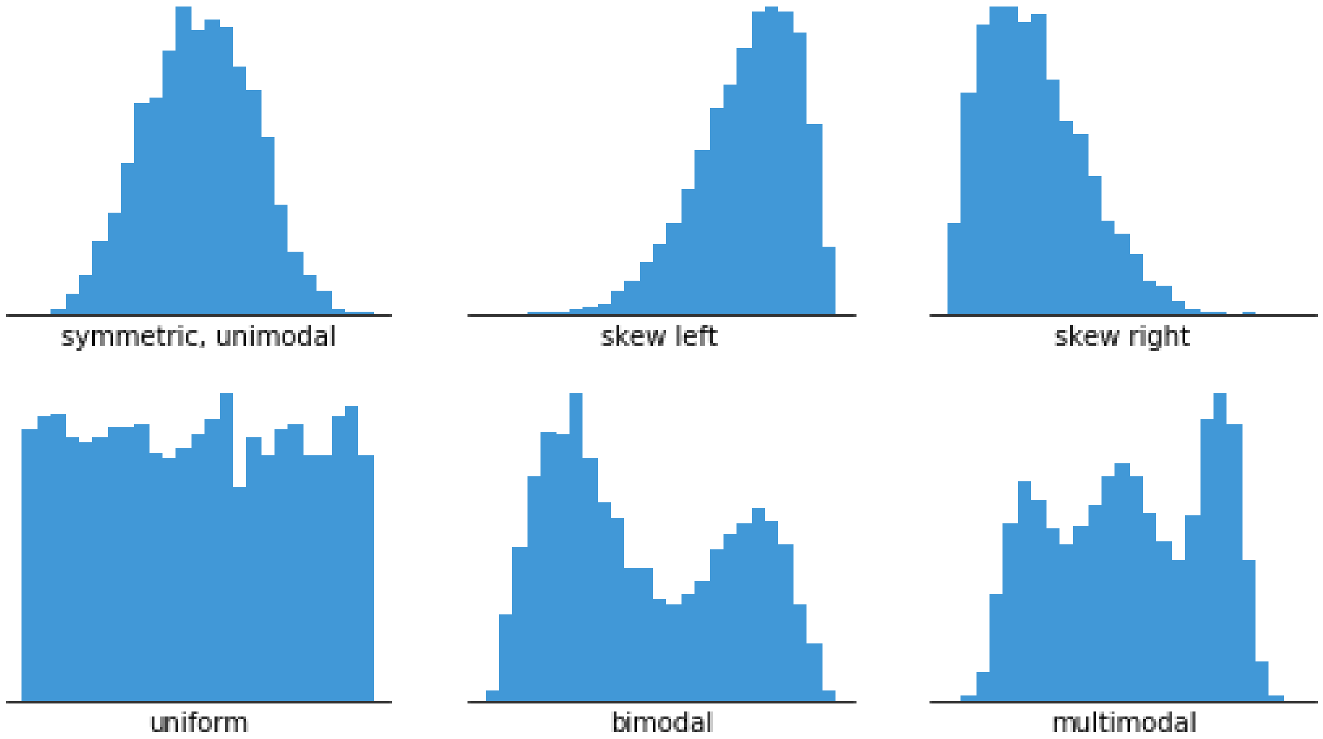
Data Screening Considerations: Box plot





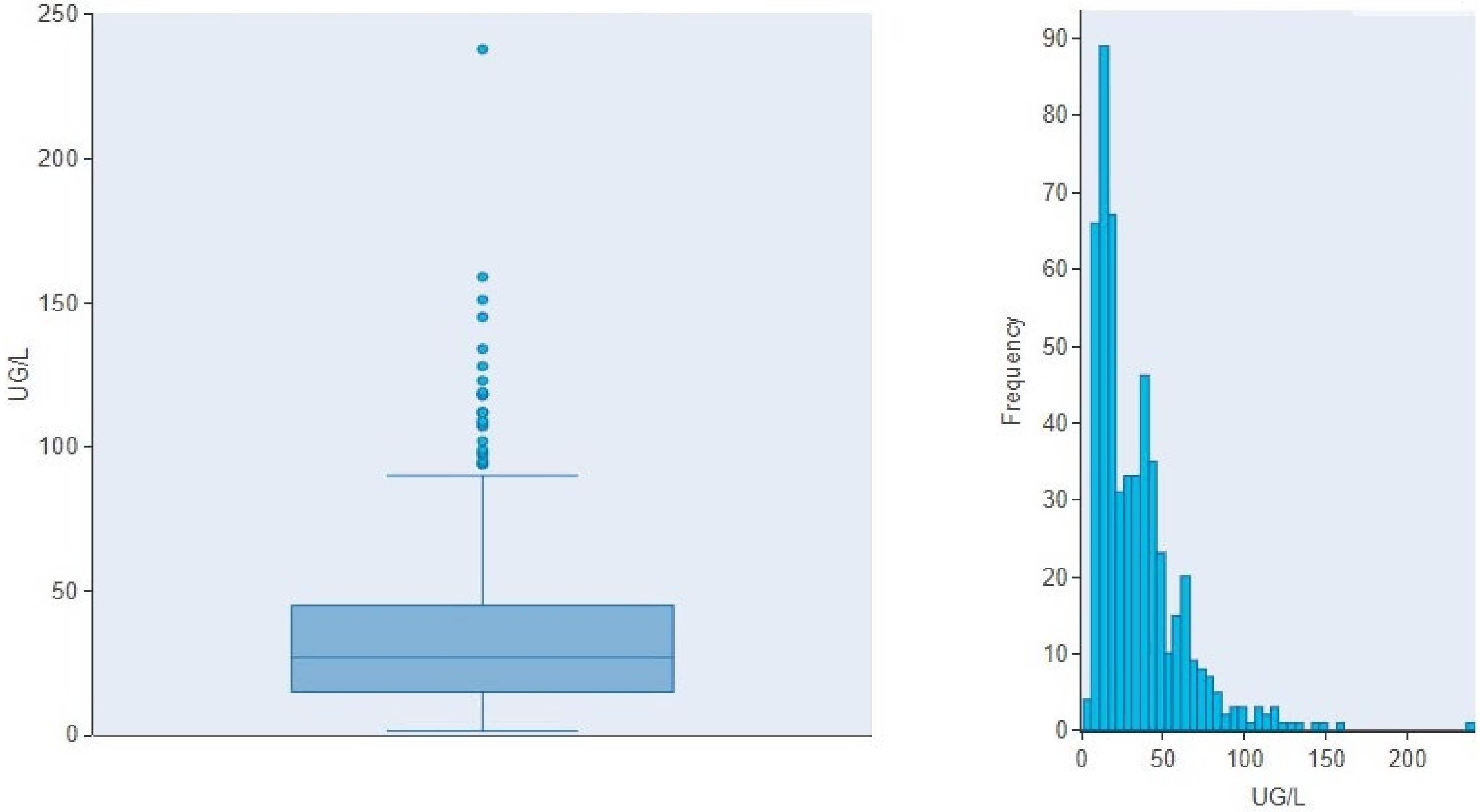
Data Screening Considerations: Histogram



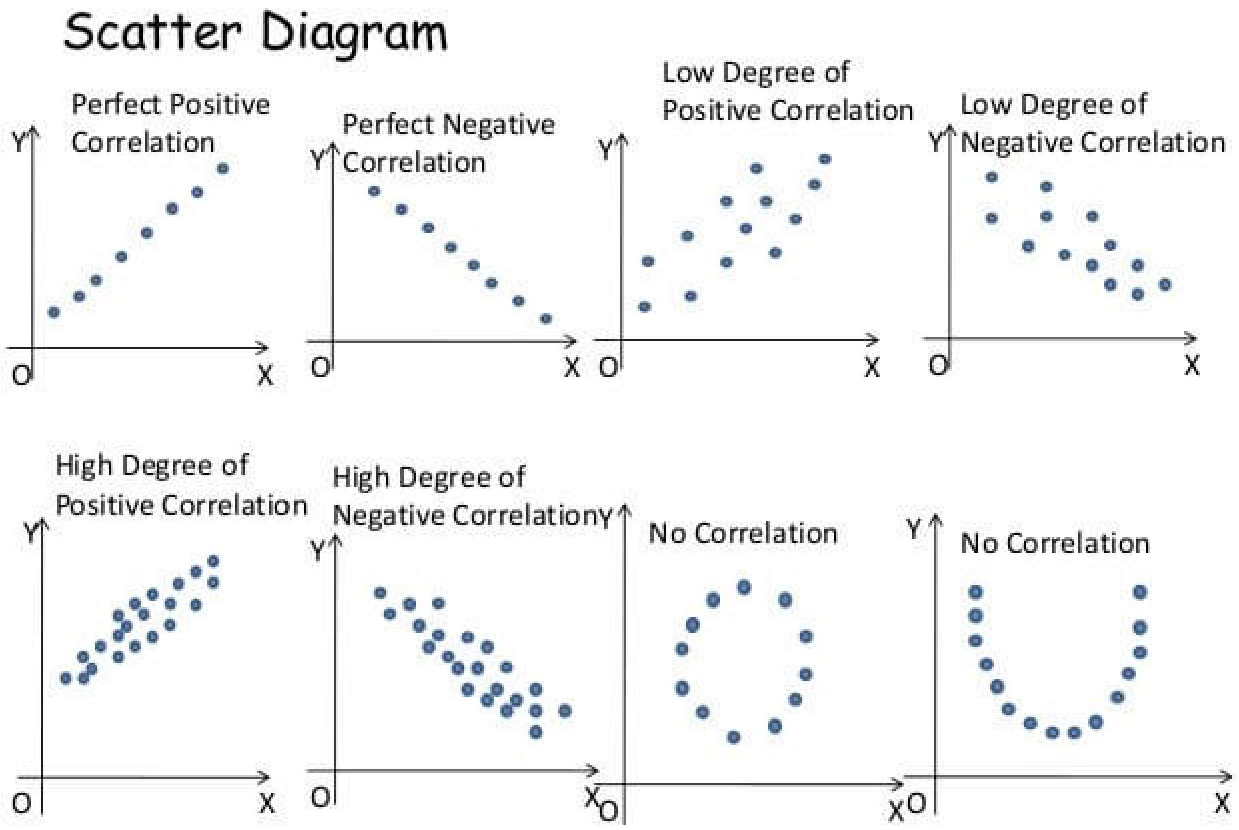


How is the data distributed?

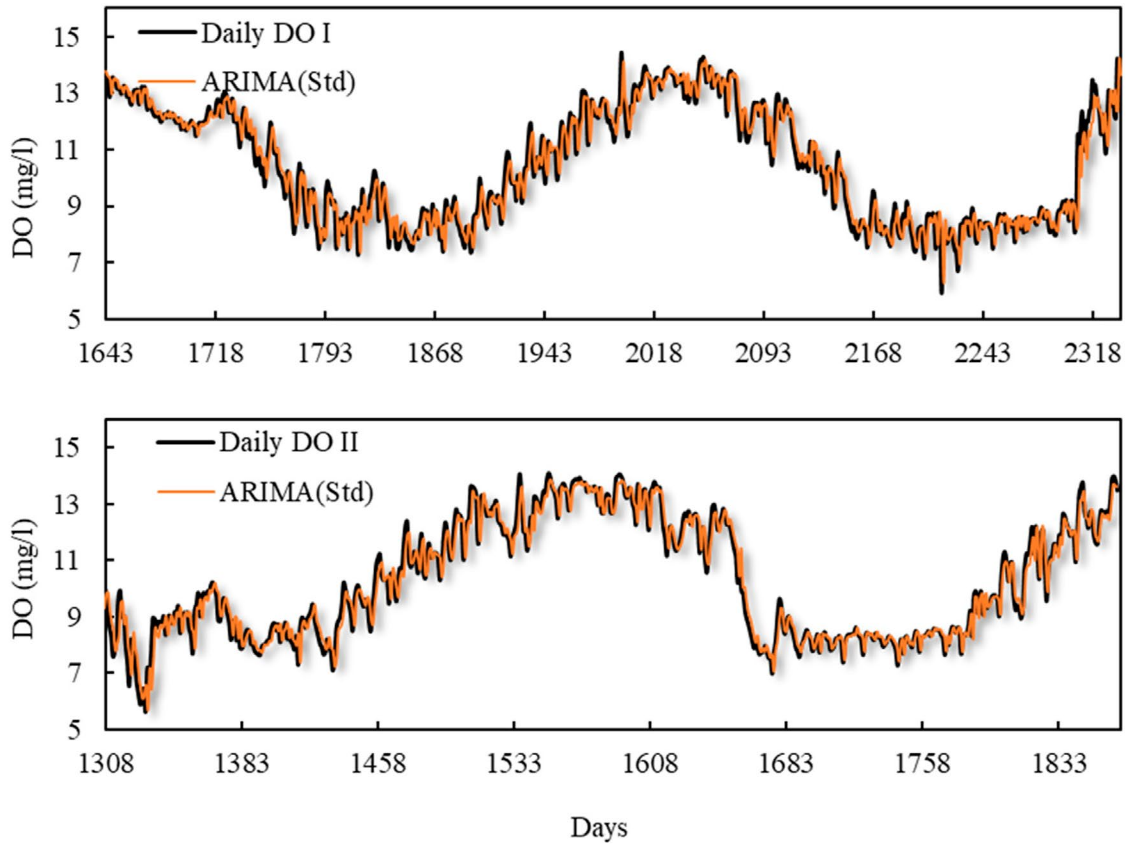
Total Phosphorus_as P_ug/L

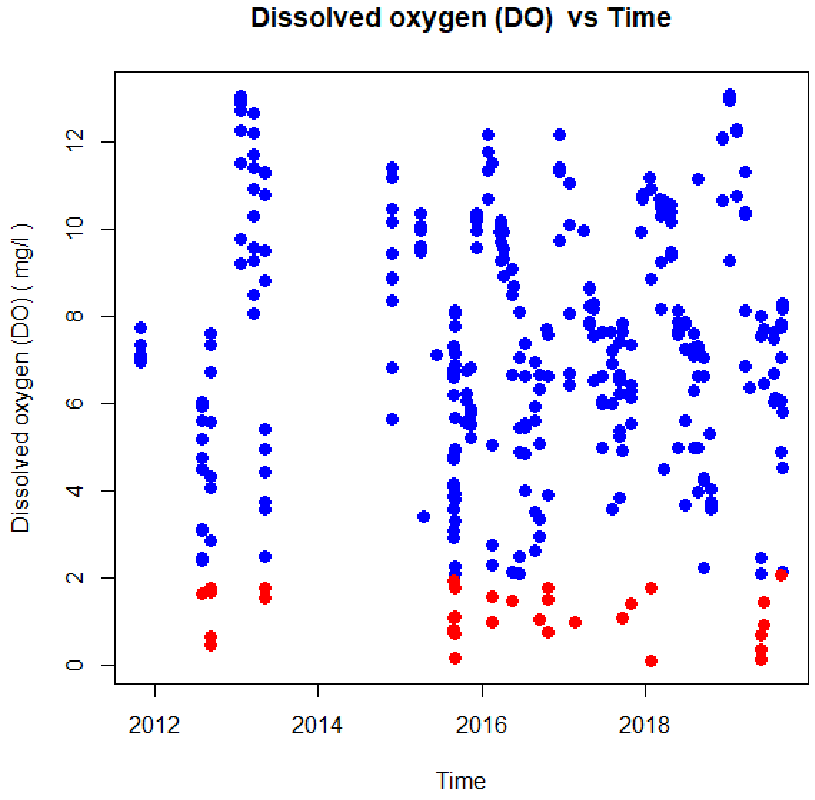


Data Screening Considerations: Scatter Plots

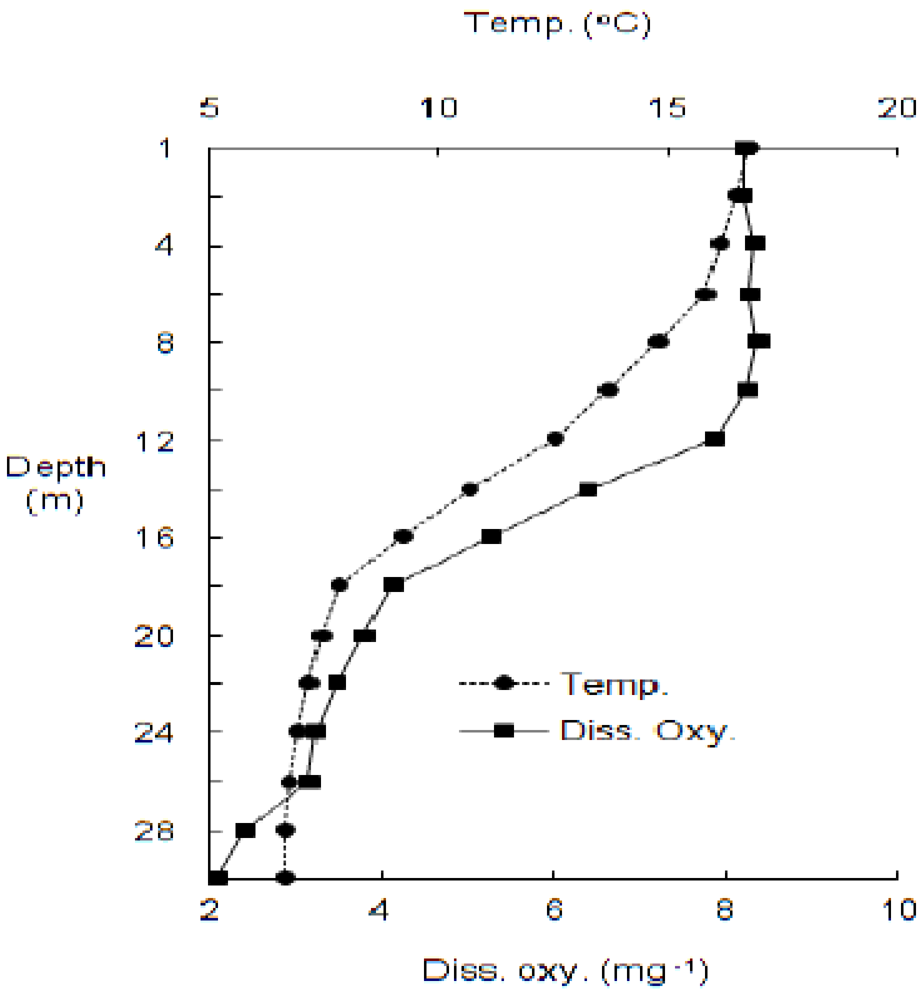


Time series – type of Scatter plot



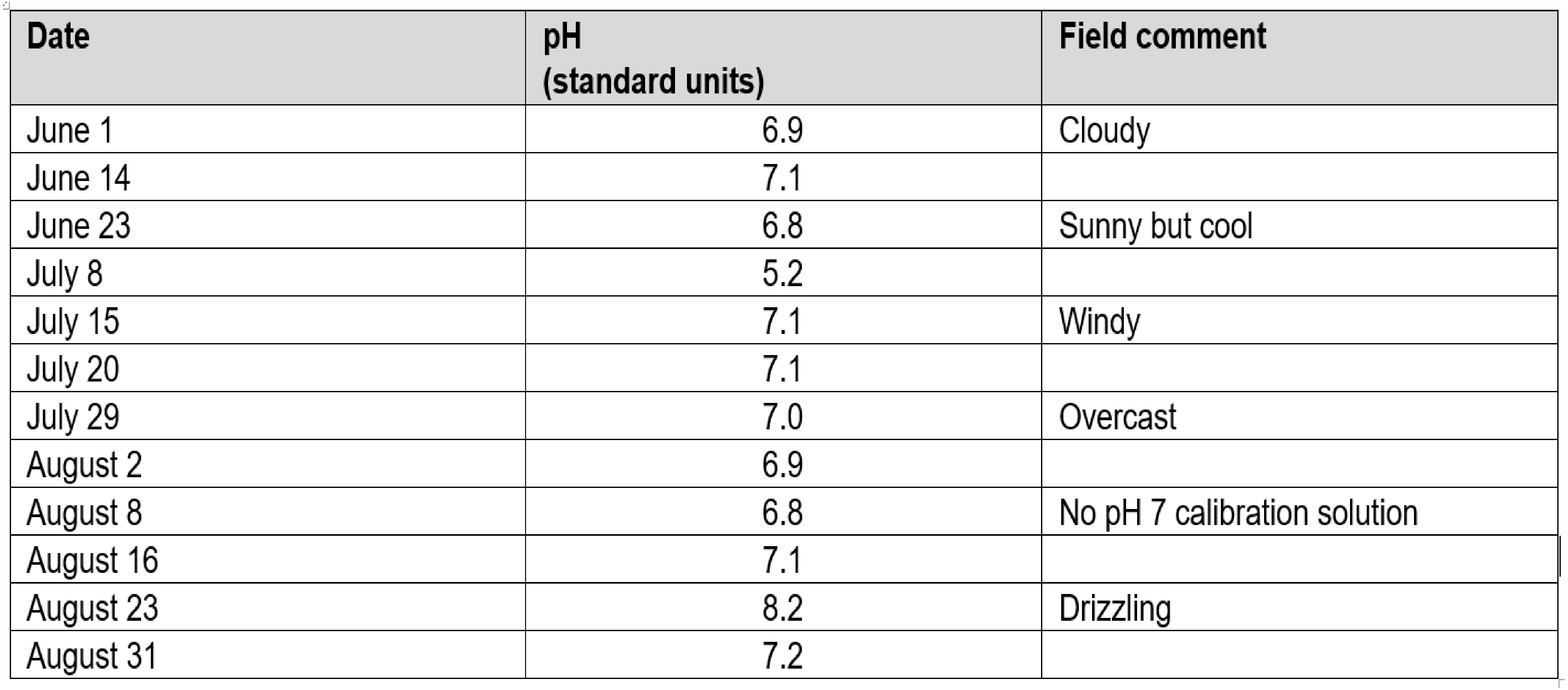


Depth profile - type of Scatter plot



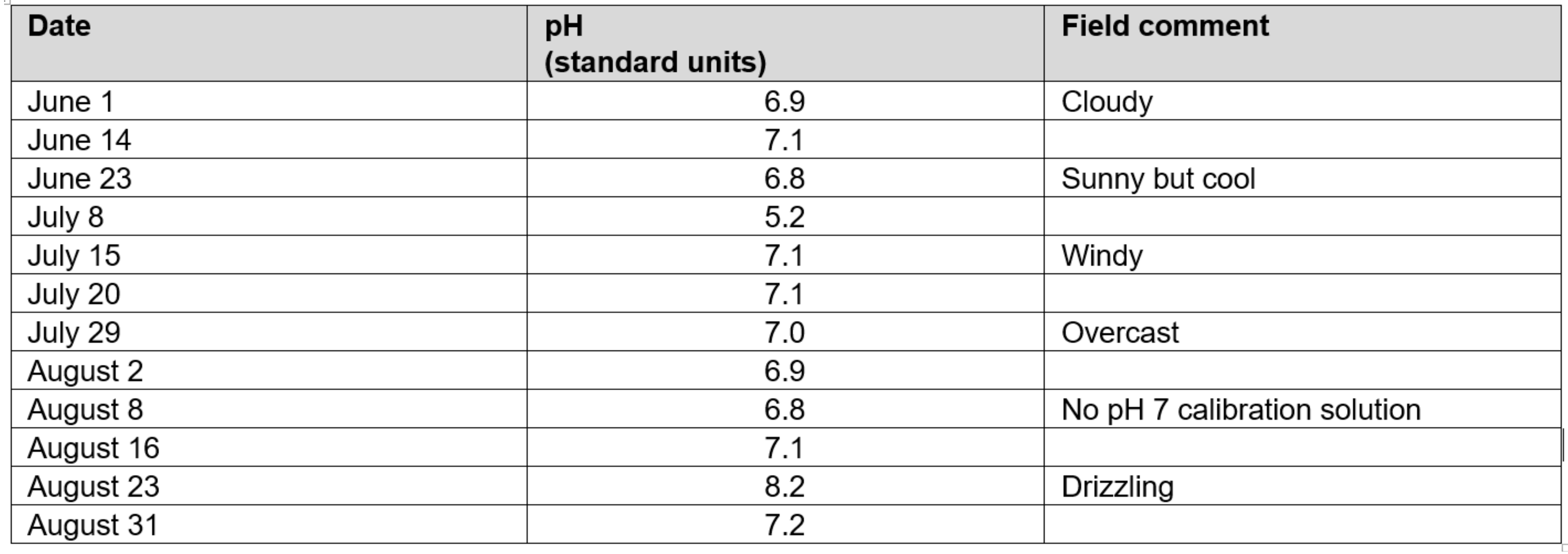
Exercise: Data Screening

Which datapoints need further review?

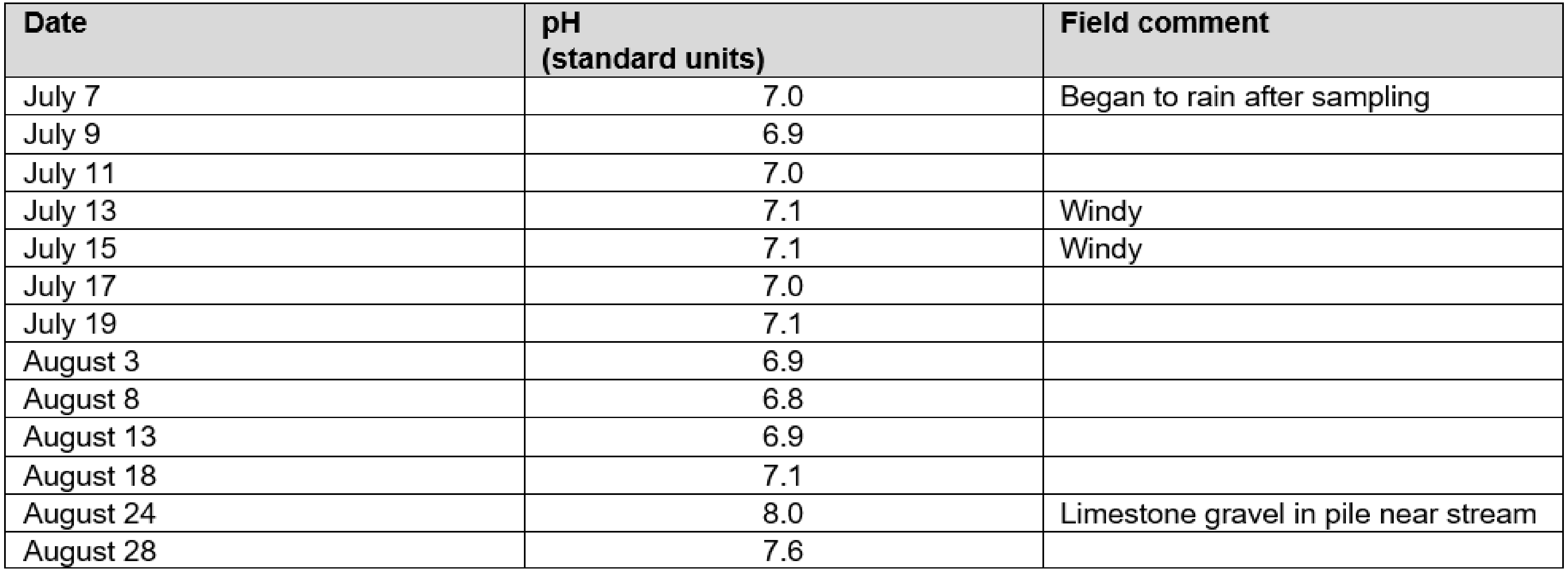


Date	pH (standard units)	Field comment
June 1	6.9	Cloudy
June 14	7.1	
June 23	6.8	Sunny but cool
July 8	5.2	
July 15	7.1	Windy
July 20	7.1	
July 29	7.0	Overcast
August 2	6.9	
August 8	6.8	No pH 7 calibration solution
August 16	7.1	
August 23	8.2	Drizzling
August 31	7.2	

Which datapoints still need further review?

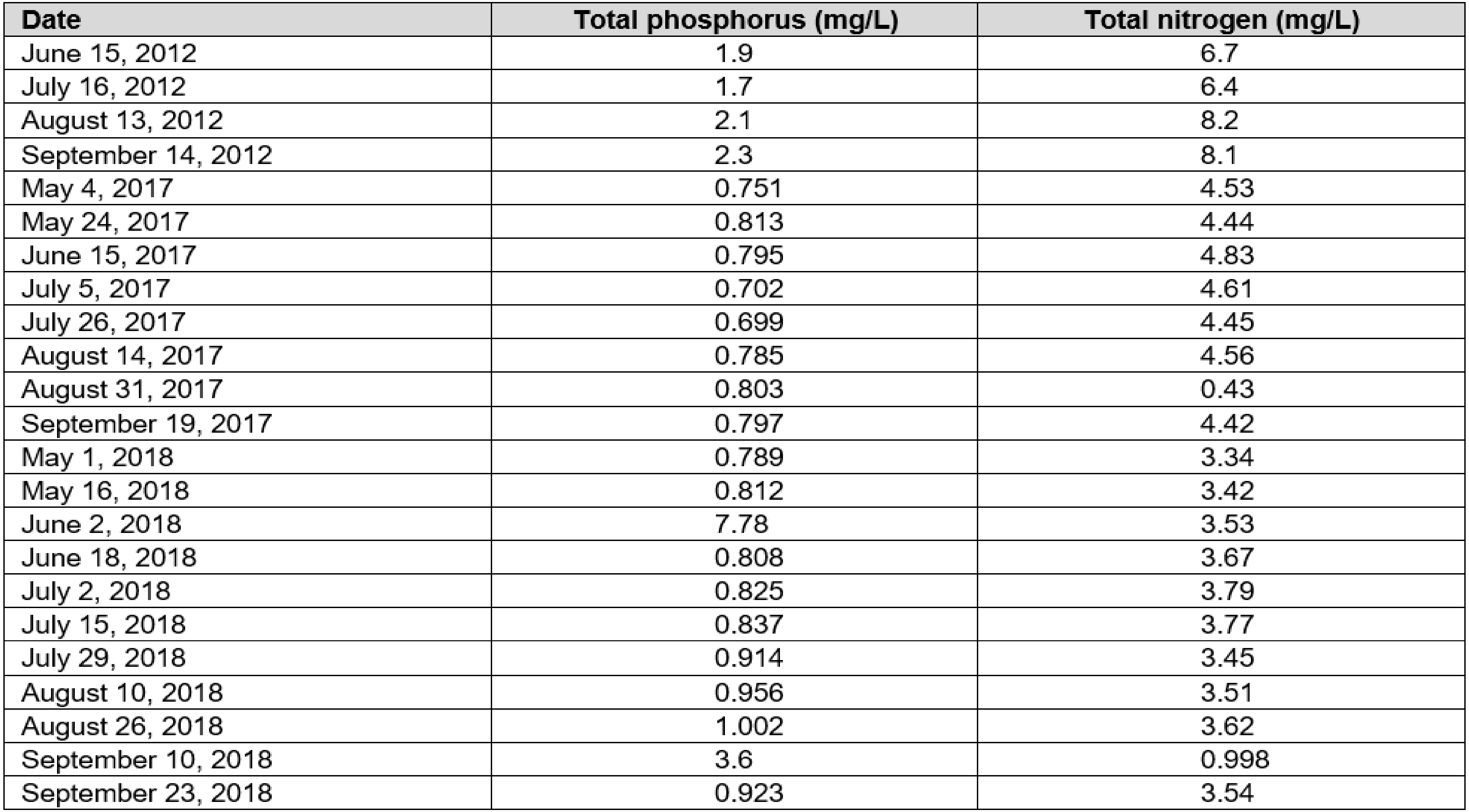


Date	pH (standard units)	Field comment
June 1	6.9	Cloudy
June 14	7.1	
June 23	6.8	Sunny but cool
July 8	5.2	
July 15	7.1	Windy
July 20	7.1	
July 29	7.0	Overcast
August 2	6.9	
August 8	6.8	No pH 7 calibration solution
August 16	7.1	
August 23	8.2	Drizzling
August 31	7.2	



Date	pH (standard units)	Field comment
July 7	7.0	Began to rain after sampling
July 9	6.9	
July 11	7.0	
July 13	7.1	Windy
July 15	7.1	Windy
July 17	7.0	
July 19	7.1	
August 3	6.9	
August 8	6.8	
August 13	6.9	
August 18	7.1	
August 24	8.0	Limestone gravel in pile near stream
August 28	7.6	

Which datapoints need further review?

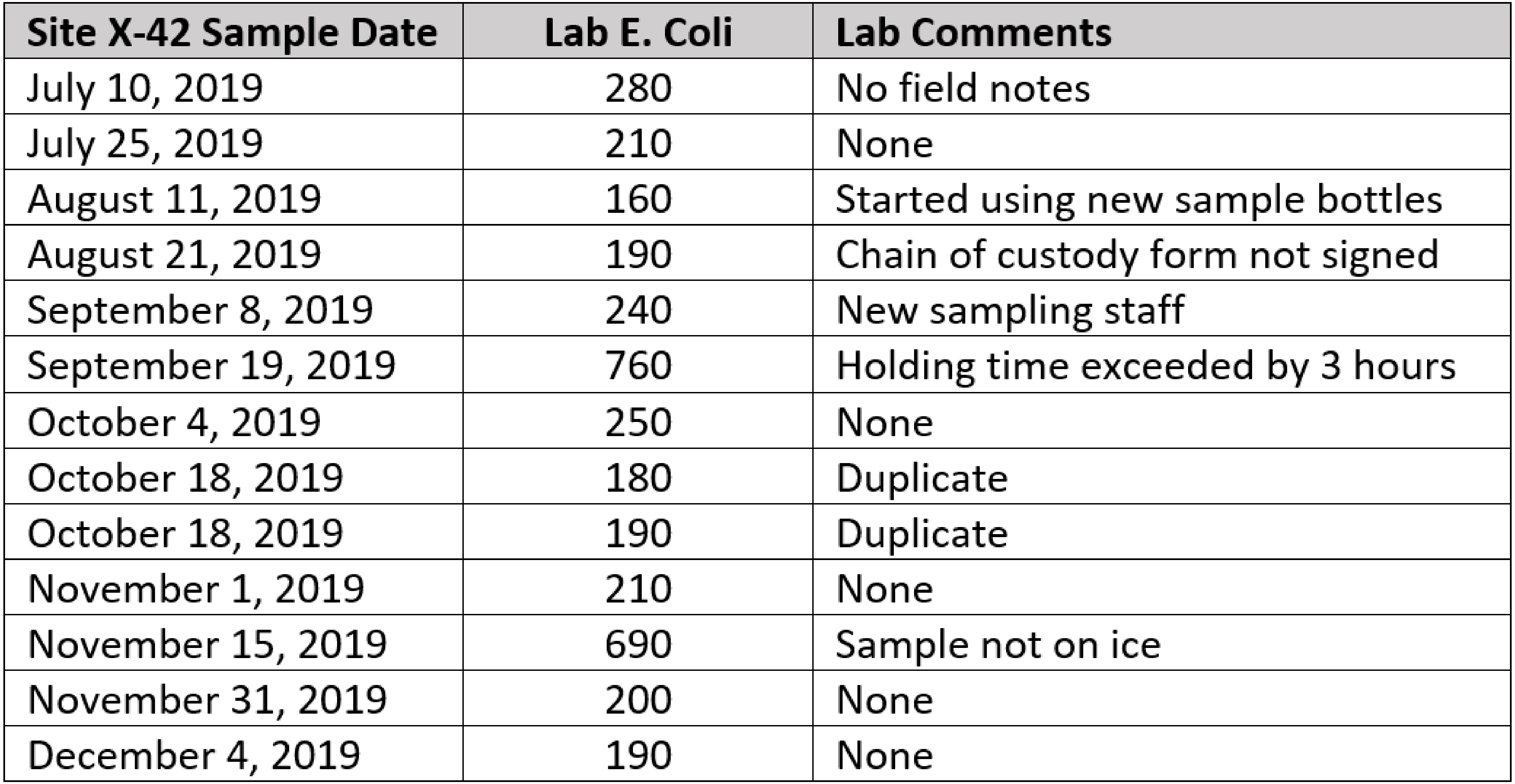


Date	Total phosphorus (mg/L)	Total nitrogen (mg/L)
June 15, 2012	1.9	6.7
July 16, 2012	1.7	6.4
August 13, 2012	2.1	8.2
September 14, 2012	2.3	8.1
May 4, 2017	0.751	4.53
May 24, 2017	0.813	4.44
June 15, 2017	0.795	4.83
July 5, 2017	0.702	4.61
July 26, 2017	0.699	4.45
August 14, 2017	0.785	4.56
August 31, 2017	0.803	0.43
September 19, 2017	0.797	4.42
May 1, 2018	0.789	3.34
May 16, 2018	0.812	3.42
June 2, 2018	7.78	3.53
June 18, 2018	0.808	3.67
July 2, 2018	0.825	3.79
July 15, 2018	0.837	3.77
July 29, 2018	0.914	3.45
August 10, 2018	0.956	3.51
August 26, 2018	1.002	3.62
September 10, 2018	3.6	0.998
September 23, 2018	0.923	3.54

Which datapoints need further review?

Date	Turbidity (NTU)	Field Comments
July 10, 2019	10	Slight drizzle
July 25, 2019	12	Light rain
August 11, 2019	9	Clear
August 21, 2019	29	Rain in the morning; bankfull flow
September 8, 2019	10	None
September 19, 2019	11	None
October 4, 2019	16	Cattle in field near stream
October 18, 2019	22	Banks appear to be trampled
November 1, 2019	26	None
November 15, 2019	28	Cattle in field near stream
November 31, 2019	26	None
December 4, 2019	23	None

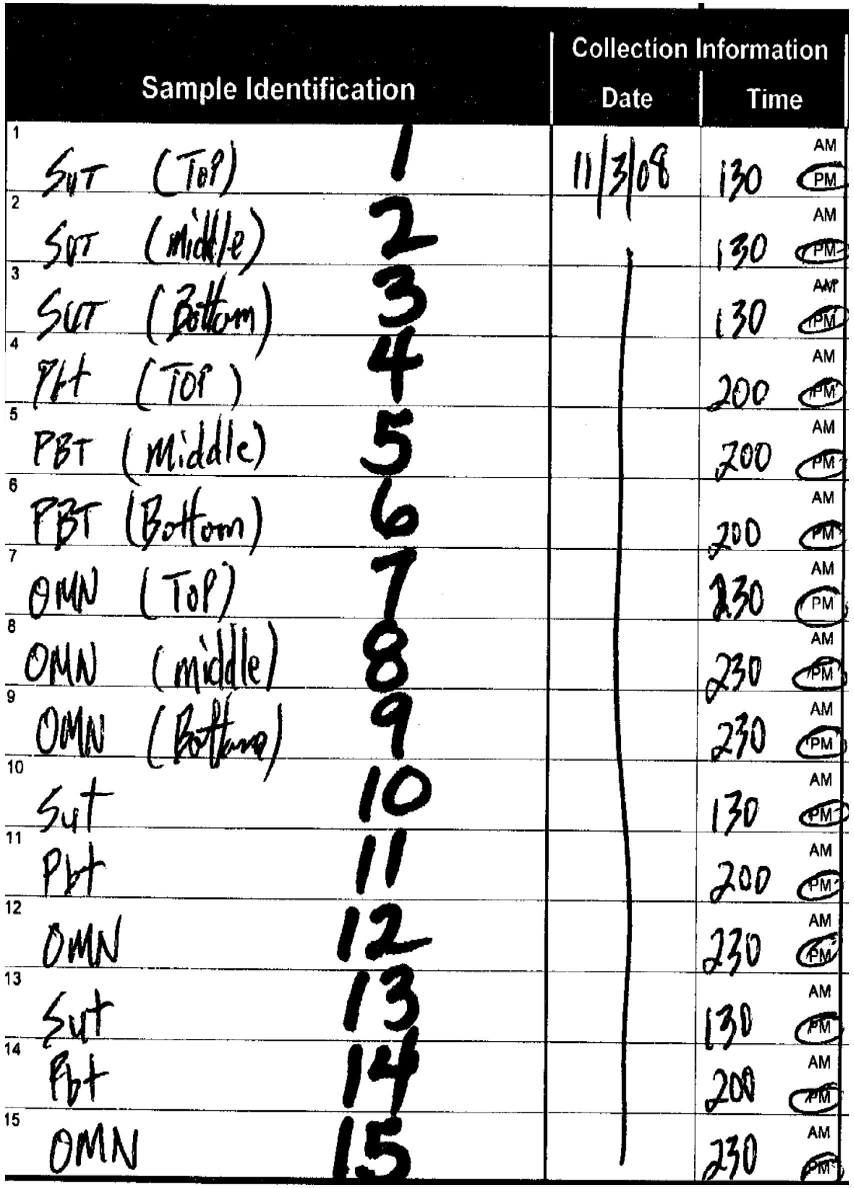
Which datapoints need further review?



Site X-42 Sample Date	Lab E. Coli	Lab Comments
July 10, 2019	280	No field notes
July 25, 2019	210	None
August 11, 2019	160	Started using new sample bottles
August 21, 2019	190	Chain of custody form not signed
September 8, 2019	240	New sampling staff
September 19, 2019	760	Holding time exceeded by 3 hours
October 4, 2019	250	None
October 18, 2019	180	Duplicate
October 18, 2019	190	Duplicate
November 1, 2019	210	None
November 15, 2019	690	Sample not on ice
November 31, 2019	200	None
December 4, 2019	190	None

Organizing Your Data for Analyses

- Entering your data on a spreadsheet GREATLY simplifies the analysis
    - It also helps to protect and preserve your data
- Clean up your data by:
    - Making sure everything is consistent, such as dates, parameter names, site designations, etc.
    - Checking for commas vs. decimal points
    - Looking for letters within numbers
- Keep data organized via:
    - Filename protocols with dates, controls on data entry, periodic reviews



	Sample Identification		Collection Information	
			Date	Time
1	SUT (Top)	1	11/3/08	130 AM [✓ PM]
2	SUT (middle)	2		130 AM [✓ PM]
3	SUT (Bottom)	3		130 AM [✓ PM]
4	Pbt (TOP)	4		200 AM [✓ PM]
5	PBT (Middle)	5		200 AM [✓ PM]
6	PBT (Bottom)	6		200 AM [✓ PM]
7	OMN (Top)	7		230 AM [✓ PM]
8	OMN (middle)	8		230 AM [✓ PM]
9	OMN (Bottom)	9		230 AM [✓ PM]
10	Sut	10		130 AM [✓ PM]
11	Pbt	11		200 AM [✓ PM]
12	OMN	12		230 AM [✓ PM]
13	Sut	13		130 AM [✓ PM]
14	Pbt	14		200 AM [✓ PM]
15	OMN	15		230 AM [✓ PM]

Bottom Line in Assessing Data Quality

- Identify the data being considered for use
  - Tribal (primary)
  - Non-tribal (secondary)
- Collect information on how the data was produced (sample collection, analysis, reporting procedures)
- Review data quality guidance used in producing the data (QAPP, DQOs/DQIs)
- Screen the data for obvious problems
  - Poor documentation of procedures
  - Values below detection limits, significant outliers, etc.
- Evaluate the usefulness of the data
- Document justifications for data use / non-use

Data Quality Scenario 1:

- Watershed group collects biweekly chemistry samples
  - June through September
  - Purpose: evaluation of effects on macroinvertebrate health during summer low-flow critical conditions
- An upper Midwest Tribe wants to use data set to estimate annual pollutant loading
- Discussion: Is this watershed data representative of the conditions the tribe wants to evaluate for their water quality assessment? Why or why not?
- *(HINT: When might pollutant loading be highest and when is it lowest and what data did you capture?)*

Data Quality Scenario 2

- Watershed group worked with trained volunteers to collect water quality data
  - Used field test kits
  - Purpose: To determine the concentration of a specific pollutant to the nearest milligram per liter
- Tribe’s data is analyzed in a lab to the nearest microgram/liter
- Discussion: How might the tribe use both datasets for the water quality assessment? What additional information might be needed?

Key Take-Aways

- Identify all existing and readily available data for the assessment
  - Parameters collected by the tribe through its monitoring program
  - Other relevant data and information about tribal waters or watershed
- Use online data tools and work with other local data partners
- QAPPs and DQOs are foundational to assessing data quality
- Evaluate all existing and readily available data for the water quality assessment
  - Review for quality through QAPP review and data screening
  - Use only data of adequate quality after review and screening