

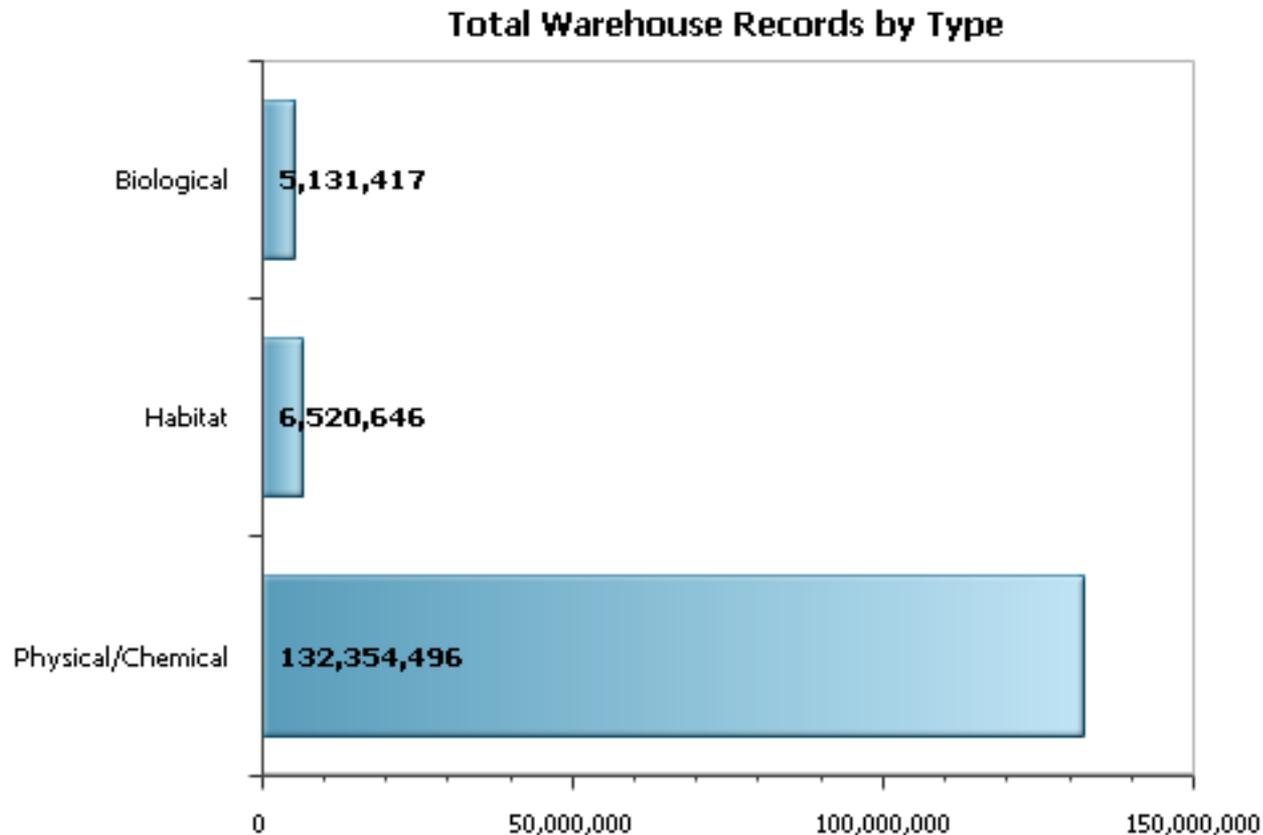
Entering Biological Data into WQX

STORET User Call
December 19, 2013

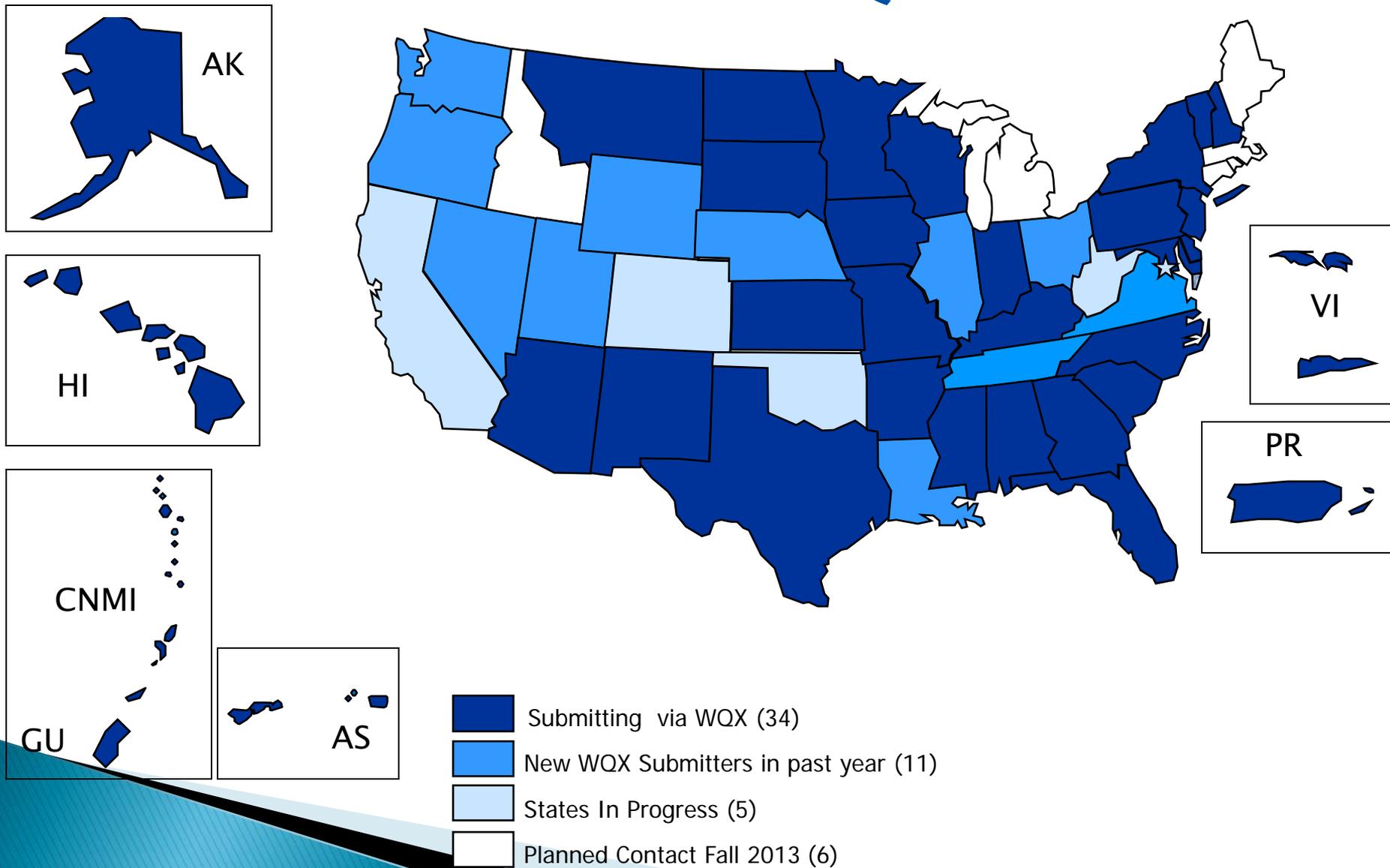
Agenda

- ▶ Overview of data in STORET
 - ▶ Biological data with WQX
 - ▶ Next Steps
- 

Results in STORET



Status of State *Chemical* Water Monitoring Results Submitted via WQX in STORET



Update of State Chemical Data Flows

- ▶ We have 45 states and territories using WQX to flow ambient water quality data to EPA
 - ▶ In the past year, we have assisted 11 of those states to become new WQX data flows – IL, LA, NE, NV, OH, OR, TN, UT, VA, WA, WY
 - ▶ We are currently working with 5 states who are near to flowing water data via WQX – CA, CO, DC, OK, WV
 - ▶ There are 6 states which we plan to contact this Fall to assess the status of their data flow and work with them to flow data via WQX – CT, ID, MA, ME, MI, RI
- 

Update of State Biological Data Flows

- ▶ Review data from the 11 states using WQX to flow biological data to EPA
 - ▶ Engage with 11 states to understand their data flow and discuss ways to increase the amount of data
 - ▶ Identify other states who are interested in flowing biological data
 - ▶ Conduct Biological Data Webinar to explain the template and promote the data flow
- 



WQP

Water Quality Portal National Results Coverage

[WQP Home](#) [Download Data](#) [How to use the WQP](#) **[National Results Coverage](#)** [About the WQP](#)

DISPLAY OPTIONS

Display by:

- State
- County
- HUC 8

Date:

- Last 12 months
- Last 5 years
- All

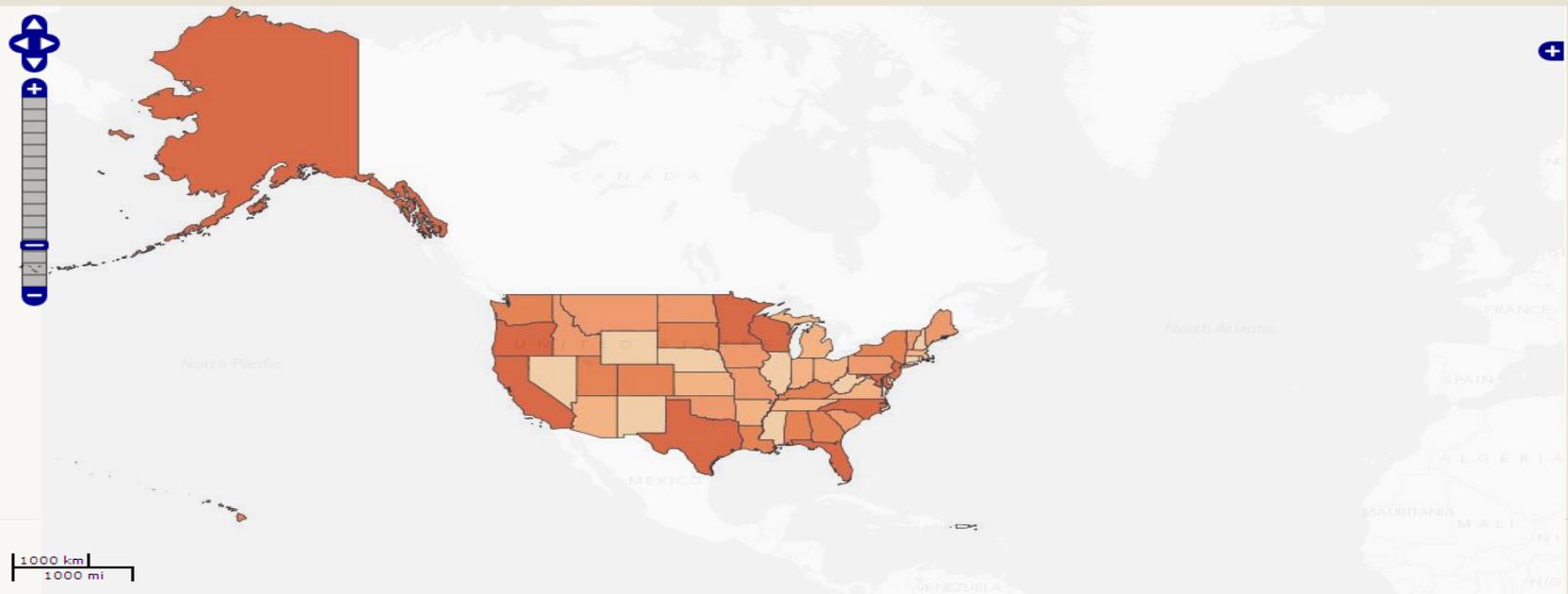
Source:

- EPA Storet
- NWIS
- All

MAP LEGEND

Number of all discrete samples

- 0
- 11416 - 145971
- 145972 - 220189
- 220190 - 341566
- 341567 - 742255
- 742256 - 7153289



Water Quality Portal

WQP Home Download Data How to use the WQP National Results Coverage About

LOCATION

Country: [select](#)
State: [select](#)
County: [select](#)

Point location: ?

Within: miles from:
Lat: Long:

Bound

SITE PARAMETERS

Site Type: [select](#)
Organization ID: [select](#)
Site ID: ?
HUC: ?

SAMPLING PARAMETERS

Sample Media:
Characteristic Group:
Characteristics:
Parameter Code: (NWIS ONLY)
Date range: from to

Select Characteristic Group

For help, go to the [User's Guide](#)

Check the box to select all items

- Biological
- Habitat STORET only
- Information NWIS only
- Inorganics, Major, Metals
- Inorganics, Major, Non-metals
- Inorganics, Minor, Metals
- Inorganics, Minor, Non-metals
- Microbiological
- Not Assigned STORET only
- Nutrient
- Organics, Other
- Organics, PCBs
- Organics, Pesticide
- Physical
- Radiochemical
- Sediment NWIS only
- Stable Isotopes

Ok

DOWNLOAD

Select database: All databases USGS NWIS only EPA STORET only
Select data: Sites only Sample results only

Download tabular data:

File format:

- Comma-separated
- Tab-separated
- MS EXCEL (Excel 2003 and earlier versions have a limit of 65,536 rows. If your download exceeds this limit, only the first 65,536 rows will open.)

Download map data:

File format:

- KML (Keyhole Markup Language - this is Sites only)

DOWNLOAD

Show sites on map

Show RESTlike queries ?

Work with Water Quality Portal team (USGS) on adding Biological Data output to Portal

Biological Data in WQX

Biological Data in WQX

- ▶ There are three entities (i.e. types of records) that can hold biological data:
 - **Results:**
 - The measurements, counts, or lab results relating to a particular species
 - **Metrics:**
 - The individual values and scores that make up a biological assessment
 - **Indexes:**
 - The overall biological assessment score

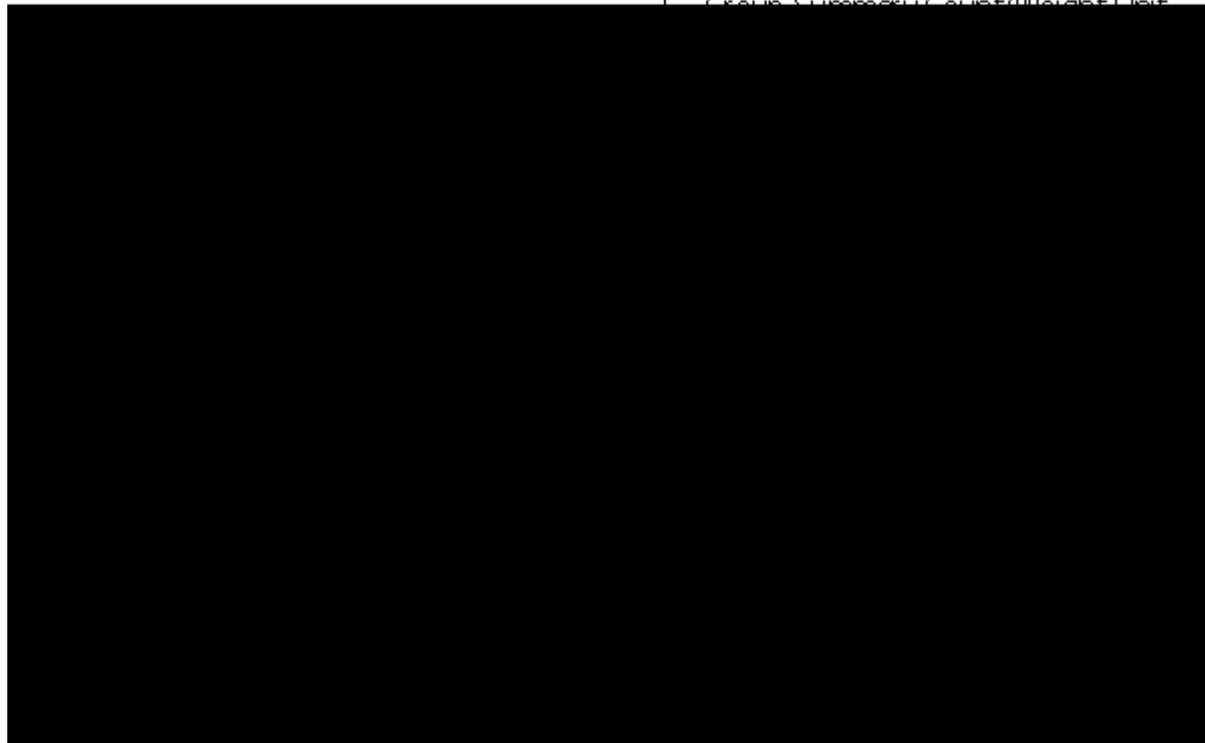
Data Flow



- ▶ In general terms...
 - Results are used to calculate Metric Values and Scores
 - Metric Scores are used to calculate an overall Index Score.
- ▶ There are relationships between all of these entities in WQX (so they can be linked to each other).

How These Entities are Related

Result
Biological Intent
Subject Taxonomic Name
Sample Tissue Anatomy
Biological Individual ID
Group Summary Count/Weight Value
Group Summary Count/Weight Unit



Activities

- ▶ Results and Metrics must relate to an Activity
- ▶ The Activity provides information about when, where, and how the biological samples were collected, as well as the Assemblage Sampled.
- ▶ Each Activity must include an Activity ID, which is completely unique within your organization.
 - e.g. “BEARRV23–2013/05/04–FISH2”

Activity Examples

	Activity 1	Activity 2
Activity ID	BEARRV23-2013/05/04-FISH2	BEARLK17-2013/05/04-PZ
Activity Type	Sample-Routine	Sample-Integrated Vertical Profile
Media	Tissue	Biological
Activity Start Date	5/4/2013	5/4/2013
Assemblage Sampled	Fish/Nekton	Phytoplankton/Zooplankton
Sample Collection Method ID	GRE:Fish	GRE:Diatoms
Sample Collection Equipment	Backpack Electroshock	Pump/Bailer
Monitoring Location ID	BEARRV23	BEARLK17
Project ID	TRIB-2013	LAKES-2013

Results

- ▶ You indicate than an Activity contains biological Results by setting the Activity Media to "Biological" or "Tissue".
 - ▶ Then you provide a Biological Intent (on each Result) to indicate the type of biological result being provided.
 - ▶ When the Activity Media is "Tissue" then the Biological Intent must also be "Tissue"
- 

Biological Data Types

- ▶ Biological
 - Population Census
 - Species Density
 - Frequency Class
 - Group Summary
 - Individual
 - Tissue
 - Toxicity
 - ▶ Metrics
 - ▶ Index
- 

WQX Web Biological Data Template

- ▶ The Biological and Metric- Index Templates assist in formatting biological and habitat metrics and indices data.

	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	
	Sample Collection Method ID	Sample Collection Equipment Name	Sample Collection Equipment Comment	Characteristic Name	Result Detection Condition	Result Value	Result Unit	Result Sample Fraction	Result Status ID	Result Value Type	Biological Intent	Subject Taxonomic Name	Sam
1													
2	GRE:BEN-Kick	D-Frame Net		Count		2	count		Final	Actual	Population Census	Dicranota	
3	GRE:BEN-Kick	D-Frame Net		Count		11	count		Final	Actual	Population Census	Baetis	
4	GRE:BEN-Kick	D-Frame Net		Count		15	count		Final	Actual	Population Census	Hydropsychidae	
5	GRE:BEN-Kick	D-Frame Net		Count		1	count		Final	Actual	Frequency Class	Cheumatopsyche	
6	GRE:BEN-Kick	D-Frame Net		Count		1	count		Final	Actual	Frequency Class	Chironomini	
7	FISH:Elec:Tow:A	Tow Net		Length, Total (Fish)		350	mm		Final	Actual	Individual	Prosopium spilonotus	
8	FISH:Elec:Tow:A	Tow Net		Weight		408	g		Final	Actual	Individual	Prosopium spilonotus	
9	FISH:Elec:Tow:A	Tow Net		Fish Anomalies - Tumors		4	count		Final	Actual	Group Summary	Prosopium spilonotus	
10	FISH:Elec:Tow:A	Tow Net		Count		6	count		Final	Actual	Frequency Class	Prosopium spilonotus	
11	FISH:Elec:Tow:A	Tow Net		Mercury		0.2	mg/kg	Total	Final	Actual	Toxicity	Prosopium spilonotus	Whole
12	FISH:Elec:Tow:A	Tow Net		Lead		450	mg/kg	Total	Final	Actual	Tissue	Prosopium spilonotus	Whole
13													
14													



Biological Intent – Population Census

- ▶ “Population Census”
 - for providing the “Count” or “Total Sample Weight” of a particular species found in a sample or collection event.

	Result 1	Result 2
Biological Intent	Population Census	Population Census
Taxonomic Name	Salmo trutta	Moxostoma erythrurum
Characteristic	Count	Total Sample Weight
Result Value	231	9728
Result Unit	count	g
Value Type	Actual	Actual

Biological Intent – Species Density

- ▶ “Species Density” (new)
 - for providing the “Density” or “Relative Density” of a particular species found in a sample.

	Result 1	Result 2
Biological Intent	Species Density	Species Density
Taxonomic Name	Cheumatopsyche	Anabaena
Characteristic	Relative Density	Density
Result Value	43.7	20.9
Result Unit	%	#/l
Value Type	Calculated	Actual

Biological Intent – Frequency Class

- ▶ “Frequency Class”
 - for providing the "Count" of a particular species that fall within a particular frequency class.
 - A frequency class is defined with one or more Frequency Class Descriptors and, in some cases, a Lower and Upper Bound.

Types of Frequency Class Descriptors

Biological Abnormality	Lifestage	Measured Characteristic	Sex
Deformities	Adult	Age	Female
Emaciated	Budded	Diameter	Hermaphrodite
Eroded Fins	Egg	Girth	Indeterminate
Fungus	Gravid	Height	Male
Hybrid	Juvenile	Length	
Lesions	Larva	Length, Fork (Fish)	
Other	Nymph.	Temperature, Tissue	
Parasites	Pupa	Weight	
Total Abnormalities	Seedling	Width	
Tumors	Subadult		

You can combine descriptors, if needed, to define a frequency class.
For example: Adult Male, Adult Female, etc.

Frequency Class Examples

Measured Characteristics

	Result 1	Result 2	Result 3
Biological Intent	Frequency Class	Frequency Class	Frequency Class
Taxonomic Name	Catostomus commersoni	Catostomus commersoni	Catostomus commersoni
Characteristic	Count	Count	Count
Result Value	7	3	1
Result Unit	count	count	count
Value Type	Actual	Actual	Actual
Frequency Class Descriptor	Length	Length	Length
Frequency Class Descriptor			
Frequency Class Lower Bound	0	20	40
Frequency Class Upper Bound	20	40	60
Frequency Class Unit	cm	cm	cm

Frequency Class Examples

Life Stage & Sex

	Result 1	Result 2
Biological Intent	Frequency Class	Frequency Class
Taxonomic Name	Catostomus commersoni	Notemigonus crysoleucas
Characteristic	Count	Count
Result Value	4	7
Result Unit	count	count
Value Type	Actual	Actual
Frequency Class Descriptor	Adult	Adult
Frequency Class Descriptor	Male	Female
Frequency Class Lower Bound		
Frequency Class Upper Bound		
Frequency Class Unit		

Biological Intent – Group Summary

- ▶ “Group Summary”
 - For providing summary information about a particular species that was collected.
 - Generally a Statistical Base Code is provided (e.g. Maximum, Minimum, Mean).
 - Also, a Group Summary Count (or Weight) must be provided.

Group Summary Examples

	Result 1	Result 2
Biological Intent	Group Summary	Group Summary
Taxonomic Name	Catostomus commersoni	Notemigonus crysoleucas
Statistical Base Code	Mean	Maximum
Characteristic	Weight	Length, Fork (Fish)
Result Value	7.9	1.3
Result Unit	g	cm
Value Type	Actual	Actual
Group Summary Count/Weight	178.5	12
Group Summary Count/Weight Unit	g	count

Biological Intent – Individual

▶ “Individual”

- For reporting measurements from a single individual.
- A Biological Individual ID (e.g. #1, #2, ...) is provided with each Result to identify which individual.
 - That way a suite of measurements (e.g. length, weight, girth) can be linked to each specific individual in the group.

Individual Examples

	Result 1	Result 2
Biological Intent	Individual	Individual
Biological Individual ID	1	2
Taxonomic Name	Micropterus salmoides	Micropterus salmoides
Characteristic	Length, Fork (Fish)	Length, Fork (Fish)
Result Value	4.7	3.2
Result Unit	cm	cm
Value Type	Actual	Actual

Biological Intent – Tissue

- ▶ “Tissue”
 - For reporting lab results on a tissue sample.
 - “Sample Tissue Anatomy Name” must be provided to identify the body part from which the tissue sample was taken.

Tissue Examples

	Result 1	Result 2
Biological Intent	Tissue	Tissue
Biological Individual ID	1	2
Sample Tissue Anatomy	Muscle/Muscle Tissue	Fish Fillet, Homog., Skin On
Taxonomic Name	Selar crumenophthalmus	Micropterus salmoides
Characteristic	Arsenic	2,4-Dinitrotoluene
Sample Fraction	Total	
Result Value	2500	
Result Unit	ug/kg	
Value Type	Actual	Actual
Detection Condition		Not Detected
Detection/Quantitation Limit Type		Method Detection Level
Detection/Quantitation Limit Value		111
Detection/Quantitation Limit Unit		ug/kg
Analytical Method ID	ICP-AES SOLIDS	1625(T)
Analytical Method Context	HI301H_WQX	USEPA

Biological Intent – Toxicity

▶ “Toxicity”

- For reporting the results of toxicity testing on a species.

	Result 1	Result 2
Biological Intent	Toxicity	Toxicity
Taxonomic Name	Pimephales promelas	Ceriodaphnia dubia
Characteristic	Survival	Reproduction
Result Value	38.5	10
Result Unit	%	count
Value Type	Calculated	Calculated
Analytical Method ID	1000.0	1002.0
Analytical Method Context	USEPA	USEPA

Metrics

- ▶ A Metric must be linked to an Activity.
 - The Activity can be the same one that was used for the Biological Results, or it can be a new one (with its own Activity ID)
- ▶ A Metric may be linked to an Index
 - If you are using a product like WQX Web, this means your Indexes must be loaded before your Metrics
- ▶ A Metric has a “Score” (which is required) and a “Value” (which is optional).

Metric Type

- ▶ Each Metric has a “Metric Type” which identifies what is being measured/scored.
 - "Metric Type" is equivalent to a “Characteristic” on a Result.
 - ▶ A Metric Type has an ID and a Context to uniquely identify it.
 - ▶ If the Context is the same as the Organization ID (for your file) then the Metric Type ID can be any value that your organization chooses to create.
 - Otherwise...
- 

Metric Data

This is a set of Metric Types that are provided under the “USEPA” Context

ID
% Burrower Taxa
% Chironomid Taxa
% Clinger Taxa
% Ephemeroptera Taxa
% EPT Individuals
% EPT Taxa
% Individuals in top 3 taxa
% Individuals in top 5 taxa
% Non-Insect Individuals
% Non-Insect Taxa

ID
% Tolerant Individuals
Clinger Taxa Richness
Ephemeroptera Taxa Richness
EPT Taxa Richness
Intolerant Richness
Scraper Richness
Shannon Diversity
Shredder Richness
Total Taxa Richness

Metric Examples

	Metric 1	Metric 2
Metric Type ID*	2000-DE-%Clingers	Total Taxa Richness
Metric Type Context	21DELAWQ_WQX	USEPA
Metric Score	6	4.482758
Metric Value	59	26
Metric Value Unit	%	count
Index ID		BEARRV23-2013/05/04-FISH2

* Metric Type meta-data can also include citations and documentation on the formula and scale (e.g. 1-100) for the score

Indexes

- ▶ An Index is the parent of many Metrics
 - Although, technically, it can stand alone.
- ▶ An Index does not relate to an Activity
 - so the “when, where, and how” is part of the Index record
- ▶ An Index has a “Score”, but does not have a “Value”.

Index Type

- ▶ Each Index has an “Index Type” which identifies what is being scored.
 - “Index Type” is equivalent to a “Characteristic” on a Result.
- ▶ An Index Type has an ID and a Context
 - However, there isn’t a “USEPA” Context, so WQX Web don’t use the Context to uniquely identify an Index Type. It just uses ID.
- ▶ The Index Type ID can be any value that your organization chooses to create.

Index Examples

	Metric 1	Metric 2
Monitoring Location ID	VERDE_RIVER_164	BEARRV23
Index Calculated Date	06/05/2001	05/04/2013
Index ID	30841	BEARRV23-2013/05/04-FISH2
Index Type ID*	IBI	Stream Fish Index
Index Type Context	21ARIZ_WQX	IDEQ_WQX
Index Score	75.0369517	82.65292

* Index Type meta-data can also include citations and documentation on the scale (e.g. 1-100) for the score

Questions

