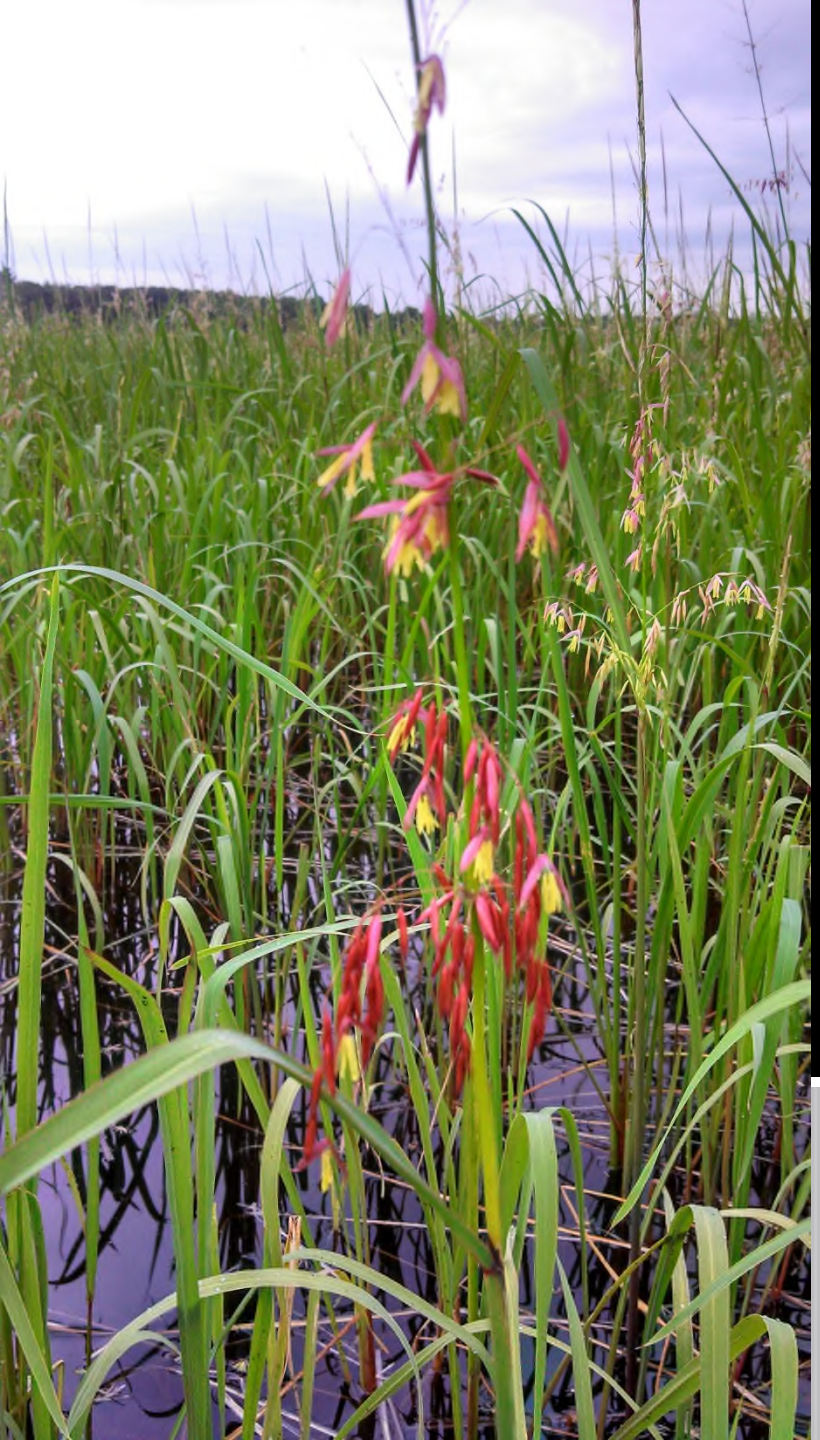


EPA Region 5 Tribal Wild Rice Water Quality Case Study

AWQMS

Ambient Water Quality Monitoring System

goldsystems

INNOVATION THROUGH TECHNOLOGY

11th National Monitoring Conference
Denver, Colorado
March 25 – 29, 2019

Project Partners

(Non-Tribal)

- EPA National Environmental Information Exchange Network
- Gold Systems, Inc.

© Larry Allain

1854 Treaty Authority
Bad River Band of Lake Superior Chippewa
Bois Fort/Nett Lake Band of Chippewa Indians
Fond du Lac Band of Lake Superior Chippewa
Forest County Potawatomi Community
Grand Portage Band of LSC
Hannahville Indian Community
Ho Chunk Nation of Wisconsin
Keweenaw Bay Indian Community (KBIC)
Lac Courtes de Oreilles Band
Lac du Flambeau Band of LSC
Lac Vieux Desert Band of LSC
Little River Band of Ottawa Indians
Little Traverse Bay Band of Odawa Indians
Lower Sioux Indian Community
Menominee Indian Tribe of Wisconsin
Mille Lacs Band of Ojibwe
Nottawaseppi Huron Band of the Potawatomi
Oneida Nation
Prairie Island Indian Community
Red Cliff Band of Lake Superior Chippewa
Red Lake Band of Chippewa
Sault Ste. Marie Tribe of Chippewa Indians
Sokaogon Chippewa Community
St. Croix Chippewa Indians of Wisconsin
Upper Sioux Community

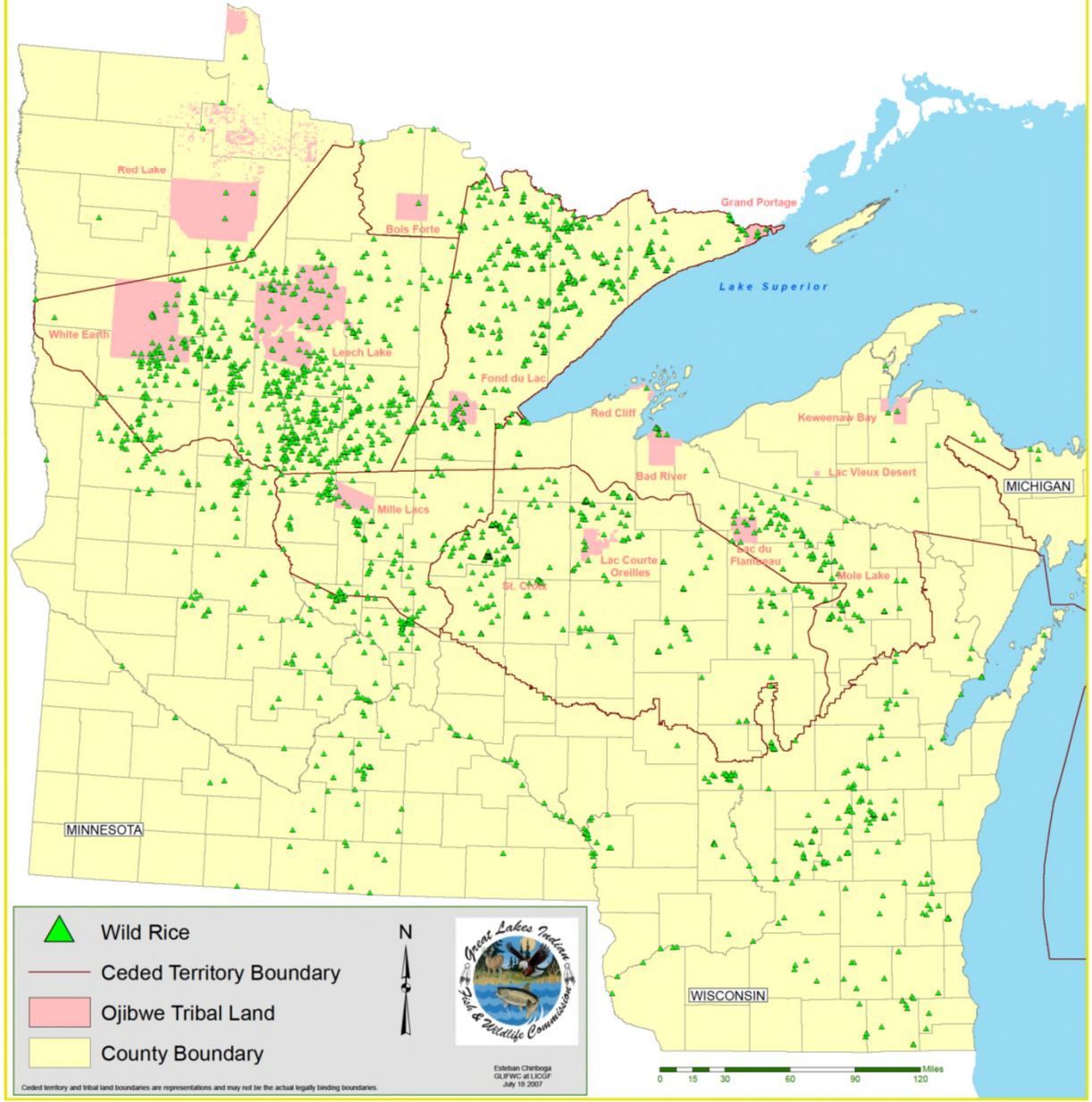
Project Goals

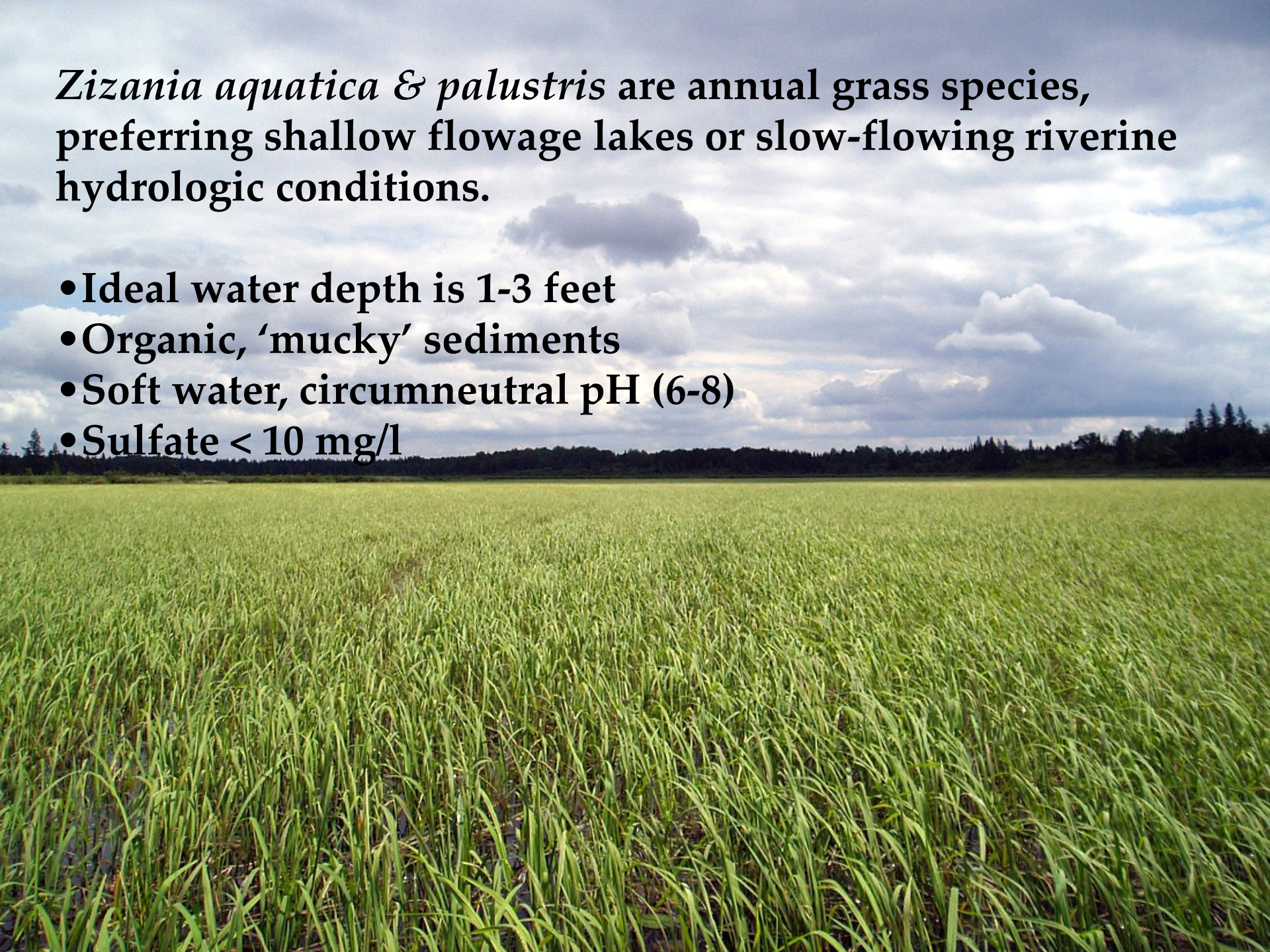
- Single on-line information system
- Provide water quality data to the EPA's Water Quality Exchange (WQX)
- Provide insight into how EPA could better model such vegetation production data.

Natural By-Products

- Data ends up in the National WQP
- Consistent tools
- Consistency in methods
- Consistency in recording data
- Ability to do analysis across the region

Wild Rice in the Western Great Lakes Region





Zizania aquatica & palustris **are annual grass species, preferring shallow flowage lakes or slow-flowing riverine hydrologic conditions.**

- **Ideal water depth is 1-3 feet**
- **Organic, 'mucky' sediments**
- **Soft water, circumneutral pH (6-8)**
- **Sulfate < 10 mg/l**

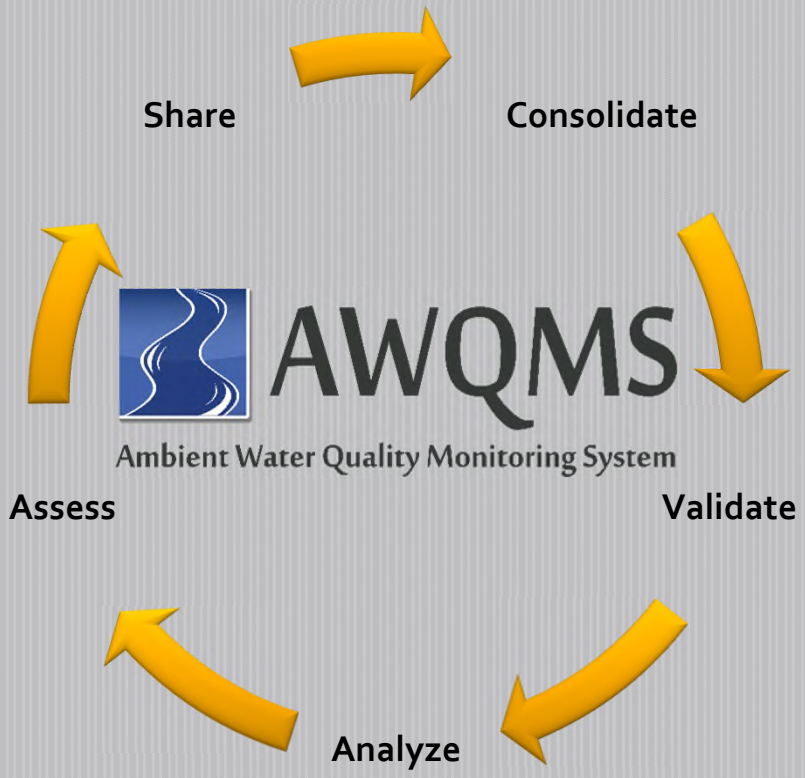
Wild rice waters are *wetlands;*
highly productive biodiversity 'hotspots'

Our Path to Success

- Adopted and enhanced the Ambient Water Quality Monitoring System (AWQMS)
- Provided proper training
  - WQX exchange network flow
  - Use of AWQMS

What is AWQMS?

- A water quality sample and observations information system.
  - Web based
  - Each tribe manages own data
  - Each user has own login
  - Batch Import / Manual Entry
  - Data Validations & QC
  - Data Analysis Tools
  - Submits data to EPA / WQX



Our Path to Success

- Assist tribes to:
  - Import & Enter Data into AWQMS
  - Flow data to WQX via the Exchange Network
  - Configure and use AWQMS QC Thresholds

Our Path to Success

- Gap Analysis:

FDLEP NEIEN GRANT AWQMS Wild Rice Gap Analysis

Introduction

In accordance with contract item 1 for grant goals 4A and 4G, this document is intended to document the 'gap' between the WQX standard and the data being collected for the Wild Rice Data Sharing project and to assist with the preparation of a recommendations document for EPA describing the changes that should be made to the WQX standard to support wild rice-related water quality and wetlands data.

The existing AWQMS system has excellent support for collection and analysis of chemistry and basic field observations. However, as of the beginning of the Wild Rice project, no organization has yet attempted to import or enter vegetation stand counts and other related individual stalk measurements such as what is needed for wild rice and similar studies. It is anticipated that changes both in system configuration and in software capability will be needed in order to allow for importing and manual entry of vegetation stand count data. Additionally, it is anticipated that changes will be needed to support the analysis of such data.

Approach

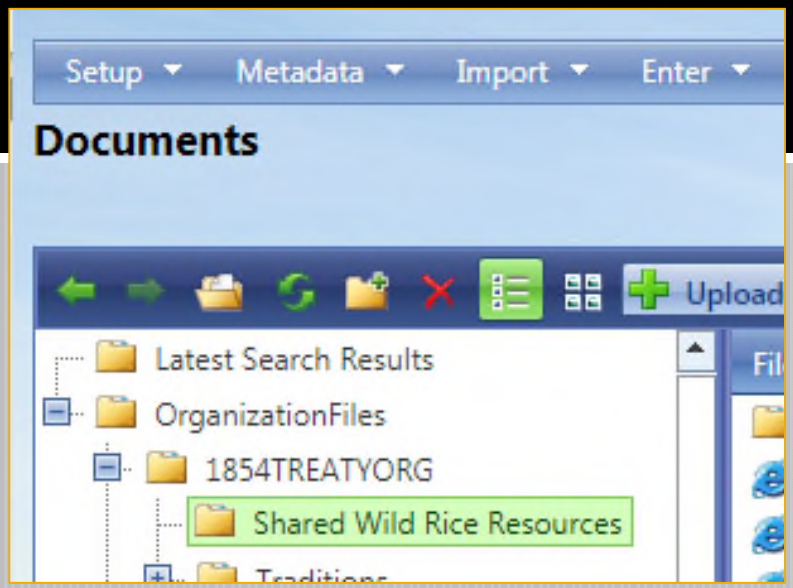
An initial project kickoff meeting with associated analysis sessions was held. These included discussions of how we might be able to have some level of AWQMS integration with the GIS tools the tribes will be using. We then clarified regarding some of the requirements/analysis from the initial kickoff analysis sessions and reviewed example data files provided by the Fond du Lac Environmental Program. Initial evaluation of the files determined that there shouldn't be major problems with importing such files into AWQMS.

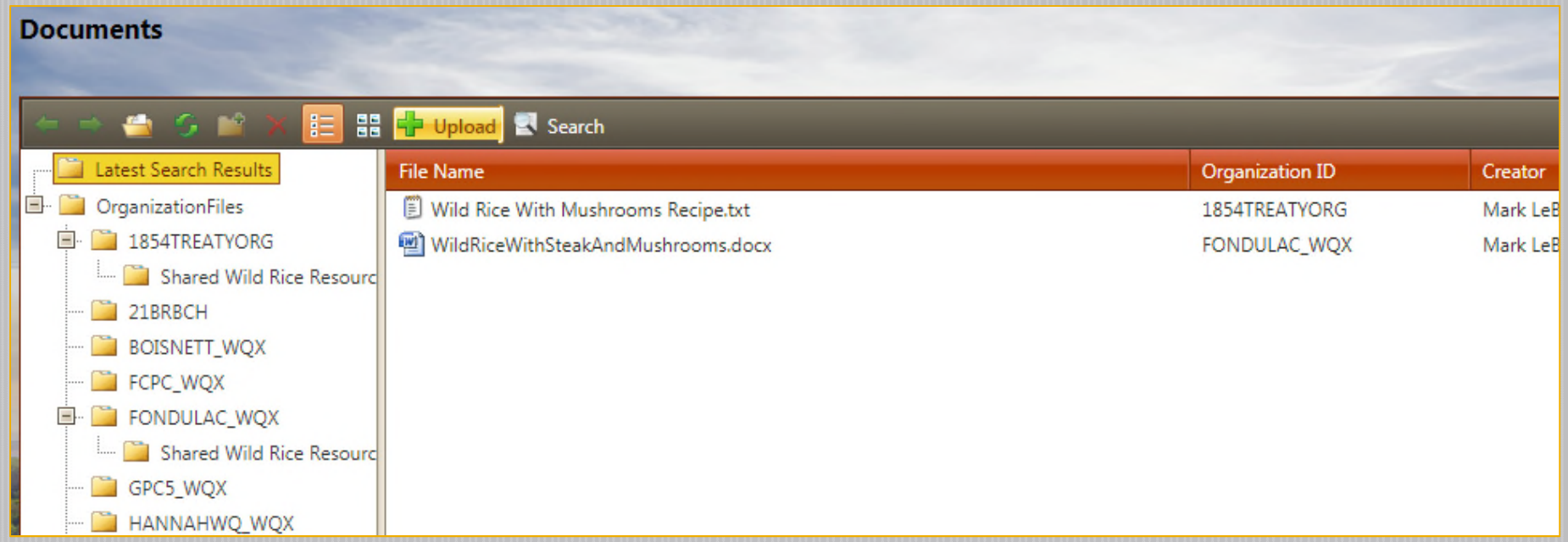
We contacted Shannon Kesner, Fond du Lac Wetland Specialist, regarding a wetlands database she has developed in MS Access. After reviewing the database and discussing what appears to be a fairly

Our Path to Success

- Tweaks/Modifications EXAMPLES:
  - Coordinated new characteristics w/WQX (e.g. Number of stalks per sample plant)
  - Ability to capture the quadrat and specific coordinates where the activity occurred
  - Report/Analyze data by Media, Biological Intent, Taxon, quadrat

Added Online Shared Resources Library Capability





Added Online Shared Resources Library Capability

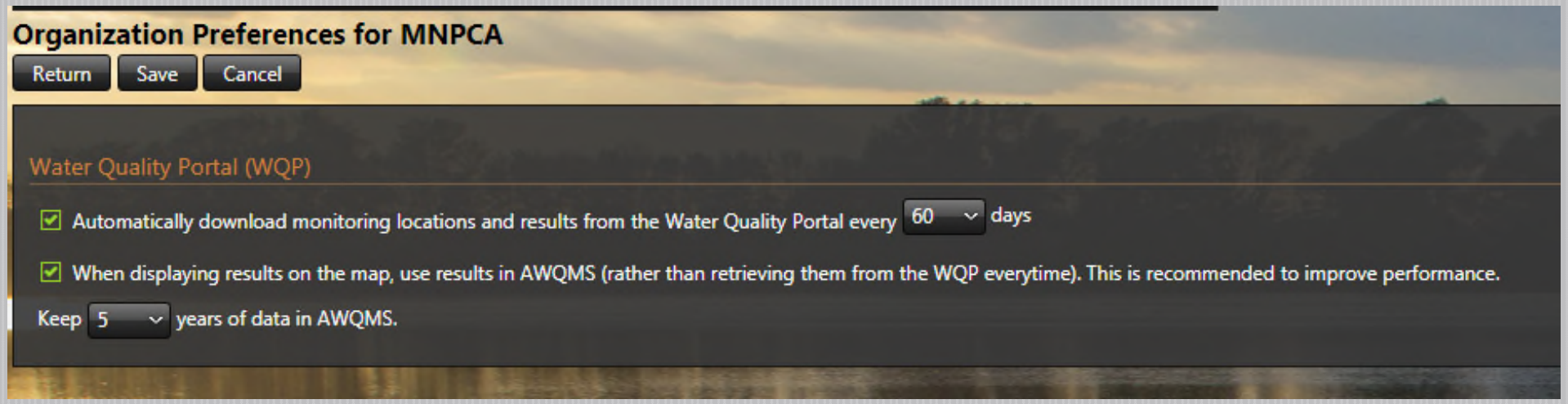
Region 5 AWQMS Tribal Consortium Wild Rice Data Sharing Participant Online Shared Resources Library Standard Operating Procedure

Introduction

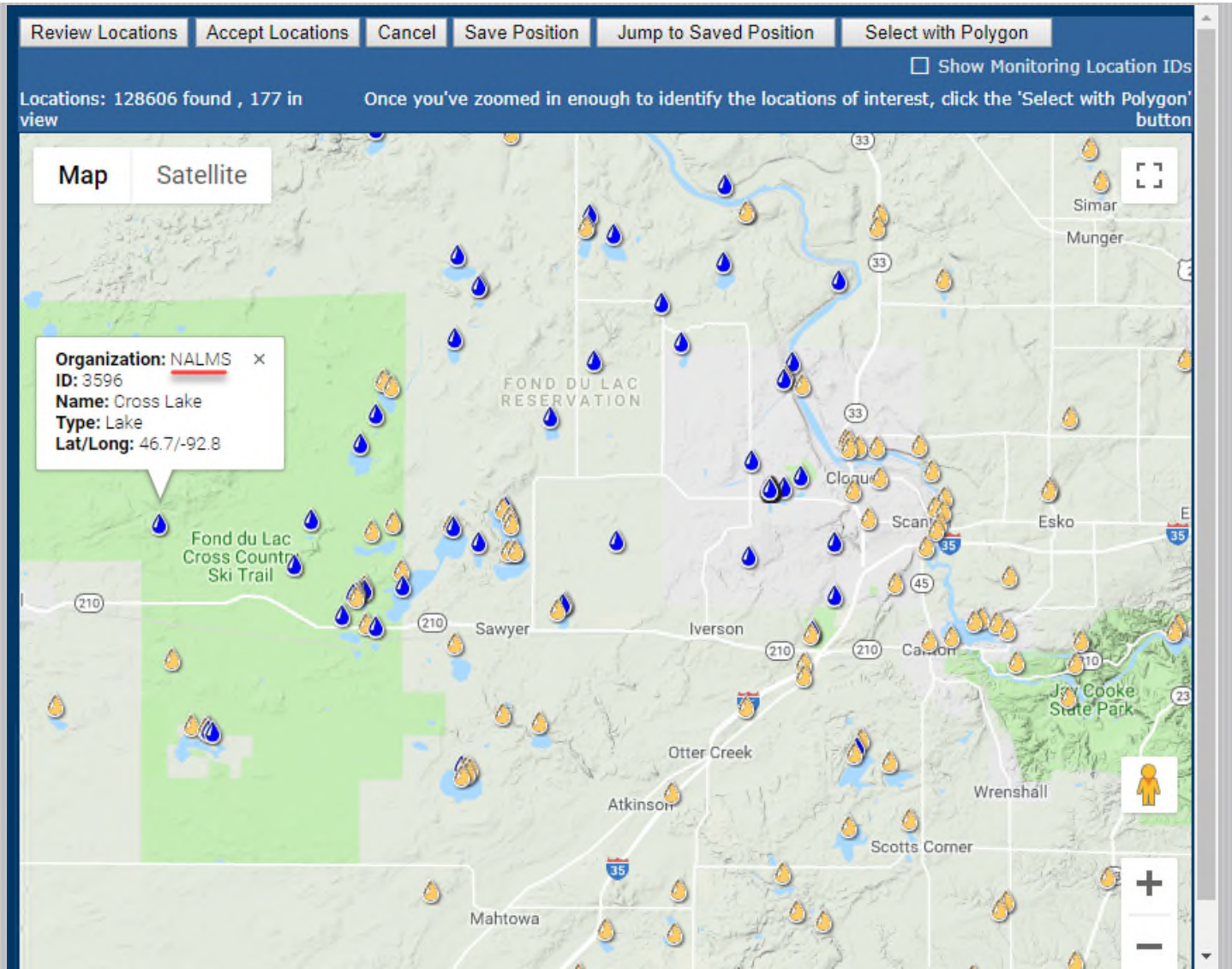
The Region 5 AWQMS Tribal Consortium wild rice data sharing participants have needed an online library for storing and sharing electronic documents and other electronic media files; including references with links to available resources available from other web sites. AWQMS version 6.5 includes a new documents management feature that the consortium can leverage to achieve this goal. Examples might include but are not limited to:

- PDF files of peer reviewed literature;
- The Wild Rice Monitoring Handbook;
- QAPPS and other technical documents;
- Links to public radio podcasts about wild rice;
- Other online resources, such as YouTube videos

Include Surrounding Agencies' Data



Include Surrounding Agencies' Data



Wild Rice Monitoring Field Guide & Handbook

Minnesota Sea Grant

Sea Grant Minnesota

Home | About | News & Events | Projects & Funding | Climate Change | Publications | Contacts

Aquaculture | Aquatic Invasive Species | Coastal Communities | Fish | Lake Superior | Maritime Transportation | Recreation | Water Quality

Coastal Communities & Land Use:

- Overview
- Articles
- Publications
- Audio
- Videos
- Events

Topic Highlights:

- Green Infrastructure
- Hypothermia
- Rip Currents
- Stormwater
- Maintaining Roadside Ditches
- **Wild Rice Monitoring**
- Harmful Algal Blooms

By the Numbers:

2018 National Sea Grant Coastal Economy

Contact:

Jesse Schomberg
Coastal Communitie
Land Use Specialist

Wild Rice Monitoring *Field Guide* and *Handbook*

To assess trends in wild rice abundance and distribution around the Lake Superior basin, it is important to be consistent in the way data is collected. The information within the *Wild Rice Monitoring Field Guide* and *Handbook* provides resource managers with the methods and rationale to estimate a water body's annual wild rice biomass, density, and productivity.

The methods described in the *Wild Rice*

Wild Rice Monitoring Field Guide
Wild Rice Monitoring Handbook
Resources from the Field Guide
Publication Links
Related Content

Wild Rice Monitoring *Field Guide* and *Handbook*

To assess trends in wild rice abundance and distribution around the Lake Superior basin, it is important to be consistent in the way data is collected. The information within the *Wild Rice Monitoring Field Guide* and *Handbook* provides resource managers with the methods and rationale to estimate a water body's annual wild rice biomass, density, and productivity.

The methods described in the *Wild Rice Monitoring Handbook* and *Field Guide* have been designed to respect Native American, First Nation, and like-minded peoples' views on the sacred nature of wild rice.

Wild Rice Monitoring Field Guide
Wild Rice Monitoring Handbook
Resources from the Field Guide
Publication Links
Related Content

Resources from the Field Guide

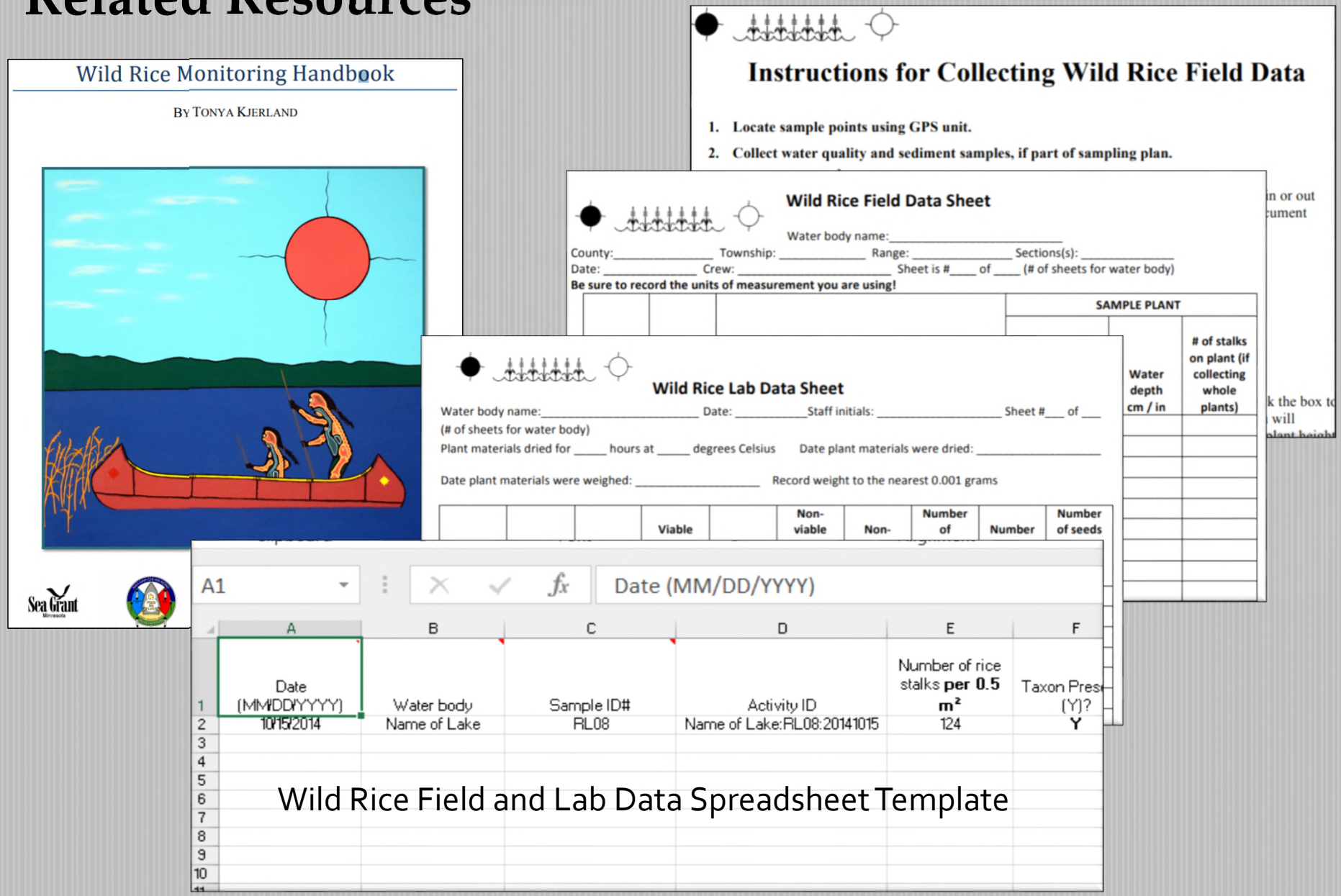
- Instructions for Collecting Wild Rice Field Data: PDF
- Wild Rice Field Data Sheet: DOC | PDF
- Wild Rice Lab Data Sheet: DOC | PDF
- Spreadsheet for Field and Lab Data: XLSX

Publication Links

- Field Guide: Download PDF | Order Hard Copy
- Handbook: Download PDF | Order Hard Copy

Tonya Kjerland

Wild Rice Monitoring Handbook
Related Resources



Wild Rice Field and Lab Data Spreadsheet Template

AWQMS Pre-Mapped Import Configuration

A1 | Date (MM/DD/YYYY)

	A	B	C	D	E	F
1	Date (MM/DD/YYYY)	Water body	Sample ID#	Activity ID	Number of rice stalks **per 0.5 m²**	Taxon Pres (Y)?
2	10/15/2014	Name of Lake	RL08	Name of Lake:RL08:20141015	124	Y
3						
4						
5						
6						
7						
8						
9						
10						

Wild Rice Field and Lab Data Spreadsheet Template

Ambient Water Quality Monitoring System

Log Out (43 min.)

Setup | Metadata | Import | Enter | Review | Batch | Analyze | Publish | Admin | Help

Import Configuration

Return | Save | Save As | Save To File | Cancel | Delete | Change User Rights | Options | Show Columns as Numbers

Type: Results & Activities Import
Owner: Joshua Beaulaurier
Name:* Wild Rice Field and Lab Data - Little River
Description: For importing properly formatted Wild Rice Field and Lab Data Spreadsheet(s)
File Type:* Microsoft Excel (xlsx)
Worksheet(s) to Import: 1st (note: the "1st" worksheet is the left-most tab of the Excel Workbook)
This is a template (shared with all users)

Generated Values (not in your import file):

Entity	Entity #	Element	Value	Format
Organization	All	Organization ID	LRBOI_WQX	
Activity	All	Activity Type	Field Msr/Obs	
Activity	All	Activity Media Name	Biological	
Activity Project	All	Project ID	Wild Rice Shared Project	
Activity	All	Assemblage Sampled Name	Aquatic Vegetation	
Activity	All	Sample Collection Method ID	WildRice Field Guide	
Result	All	Result Status ID	Final	
Result	All	Result Value Type	Actual	
Activity	All	Equipment ID	Miscellaneous (Other)	

Header-Row Columns (a single value here applies to each regular row of your import file):

Column	Row	Entity	Entity #	Element	Format	Translations
	1	(Ignore Row)				

Regular Columns (starting at row 2 of your import file)

Column	Entity	Entity #	Element	Format	When Column...	Then Use These Values	Translations
A	Activity	1	Activity Start Date	M/DD/YYYY			0
B	Activity	1	Monitoring Location ID				0
C	Activity	1	Sampling Component/Qualifier				0
D	Activity	1	Activity ID				0

Batch Data Import from Spreadsheet Template

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Date	Water body name	Site ID#	Number of rice stalks per 1/2 square meter	Other vegetation present	Plant height (cm)	Water depth (cm)	Number of tillers	Wild rice plant collected (y/n)	Animals, birds, pathogens, pests (y/n)	Brown spot fungi (0, low, high)	Comments	Crew member
2	9/30/2014	Mud Lake	M10a	5	watershield	6.38		1			low		KJH
3	9/30/2014	Mud Lake	M10b	2	watershield	170.18	91.44	1	y		low	wild rice plant	AC
4	9/30/2014	Mud Lake	M11a	61		6.28		1			low		KJH
5	9/30/2014	Mud Lake	M11b	57		193.04	101.6		y		low	wild rice plant	AC
6	9/30/2014	Mud Lake	M12a	6	watershield, v	4.6					med		KJH
7	9/30/2014	Mud Lake	M12b	11	watershield	139.7	81.28		y		low	wild rice plant	AC
8	9/30/2014	Mud Lake	M133a	8		6.6		1			low		KJH
9	9/30/2014	Mud Lake	M133b	1		166.37	106.68		y		low	wild rice plant	AC
10	9/30/2014	Mud Lake	M135a	29		5.88		1			low		KJH
11	9/30/2014	Mud Lake	M135b	0	water lily		76.2		n/a				AC
12	9/30/2014	Mud Lake	M136a	49		6.2		2			low		KJH
13	9/30/2014	Mud Lake	M136b	59		181.61	64.77		y		low		AC
14	9/30/2014	Mud Lake	M137a	1		4.28					med		KJH
15	9/30/2014	Mud Lake	M137b	6		114.3	43.18		y		low	wild rice plant	AC
16	9/30/2014	Mud Lake	M138a	1	bulrush, wate	3.74					med		KJH
17	9/30/2014	Mud Lake	M138b	7	bulrush, wate	96.52	40.64		y		low	wild rice plant	AC
18	9/30/2014	Mud Lake	M139a	2	bulrush	2.66		1			low		KJH
19	9/30/2014	Mud Lake	M139b	0	bulrush, water lily		281.94		n/a				AC

Dataset Details

Return | Delete

Migration Successful!

The final step in this process has completed. The data from this dataset is now available throughout AWQMS.

Dataset Information:

Type: Continuous Results Import
Import Configuration: Continuous - Temp/DO
Organization ID: DEMOORG_MARK
Status: Migrated

Migrate Event

Start Time: 08-20-2018 09:04:41 AM
End Time: 08-20-2018 09:05:27 AM
Event Log:

Message Type	Count	Event Log
Message	4	View Log

Import Event

Start Time: 08-20-2018 09:00:08 AM
End Time: 08-20-2018 09:01:16 AM
File Name: Example_DO_Temp.csv
Event Log: View all validation errors and warnings

Message Type	Total	Resolved	Event Log	Resolution
Message	6	6	View Log	N/A

AWQMS Pre-Mapped Manual Data Entry Form

Wild Rice Field Data Sheet

Water body name:_____

County:_____ Township: _____ Range: _____ Sections(s): _____

Date: _____ Crew: _____ Sheet is #____ of ____ (# of sheets for water body)

Be sure to record the units of measurement you are using!

Sample ID#	# of rice stalks within 0.5 m^2 quadrat	Other vegetation present	SAMPLE PLANT		
			Height ☐ Above water ☐ Total	Water depth	# of stalks on plant (if collecting whole

Data Entry - Marks Copy Wild Rice Field and Lab Data

Return | Save | Add New | Attach File | Cancel | Delete | View Configuration

Activity

QC Checking is in place for this organization.
Review QC Parameters and Thresholds
Change Organization Preferences

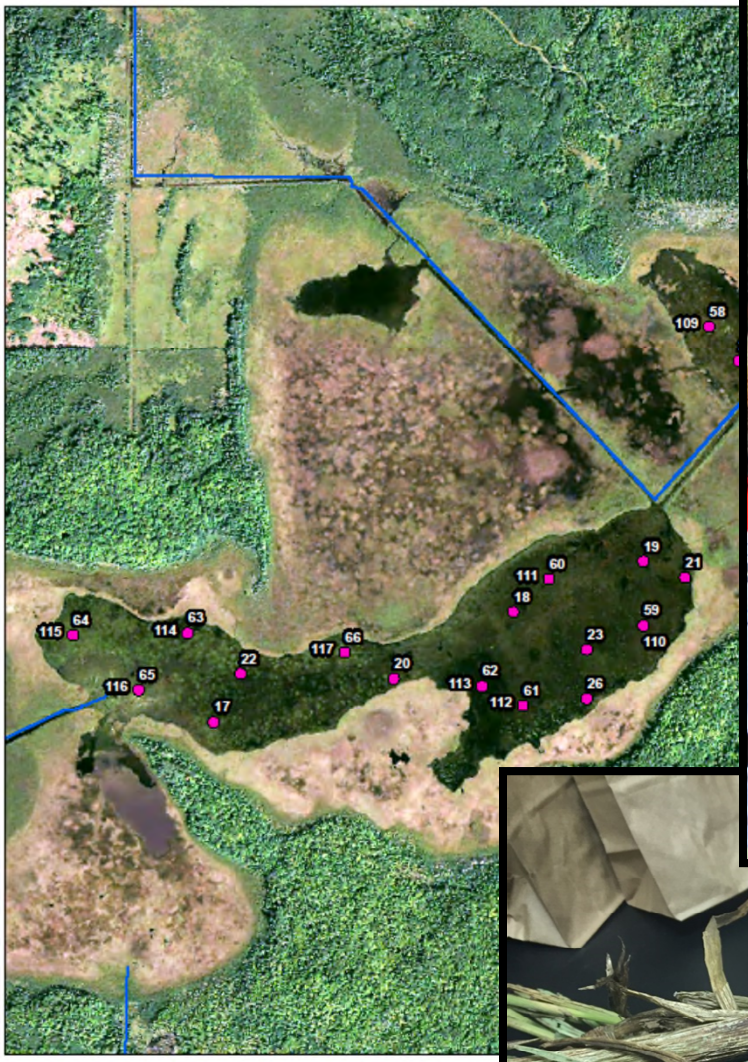
Organization ID	WQXTEST
Activity Type	Field Msr/Obs
Activity Media Name	Biological
Activity Start Time Zone	CST
Project ID	Wild Rice Shared Project
Assemblage Sampled Name	Aquatic Vegetation
Equipment ID	Visual Sighting
Sample Collection Method ID	WildRice Field Guide
Monitoring Location ID	
Activity ID	EXAMPLE ACT ID: ML:DATE:TIME:TYPE
Activity Start Date	
Activity Start Time	
Activity Comment	Enter comments from "Presence of animals, birds, pathogens, or pests" here.
Sampling Component/Quadrat	
Sampling Place In Series	

Results

Data Entry		Generated		Translate To		
Characteristic Name (translation)	Result Value	Result Status ID	Result Value Type	Characteristic Name	Result Unit	
(a) Number of Rice Stalks per 1/2 m squared		Final	Actual	Grid count	count	Number of Rice Stalks per
(b) Other Vegetation Present		Final	Actual	General observation (text)	None	Other Vegetation Present (
(c) Plant Height (Above Water)		Final	Actual	Plant height (Above water)	cm	Plant Height (Above Water)
(e) Water Depth		Final	Actual	Depth, bottom	cm	Water Depth
(f) Number of Stalks Per Sample Plant		Final	Actual	Number of stalks per sample plant	count	Number of Stalks Per Samp
(h) Weather Conditions		Final	Actual	Weather comments (text)	None	Weather Conditions: Recon
(j) Brown Spot Fungi (Low/Med/High)		Final	Actual	Shoot weight	None	If brown spot fungal infecti
(k) Plant Height (Total)		Final	Actual	Height	None	Plant Height (Total)
(l) Presence of animals, birds, pathogens, or pests		Final	Actual	Taxon Present (Y/N) (choice list)	None	If (Y) is selected, enter any
(l) Shoot Weight		Final	Actual	Shoot weight	g	Shoot Weight
(m) Root Weight		Final	Actual	Root weight	g	Root Weight

Our Path to Success

- Additional Training and Coordination:
  - Ensuring each tribe has the handbook, field guide and related tools
  - Using the standard field sheet
  - Using the standard Excel sheet
  - Using the pre-mapped AWQMS data entry form
  - Using the pre-mapped AWQMS batch import configuration


109
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61
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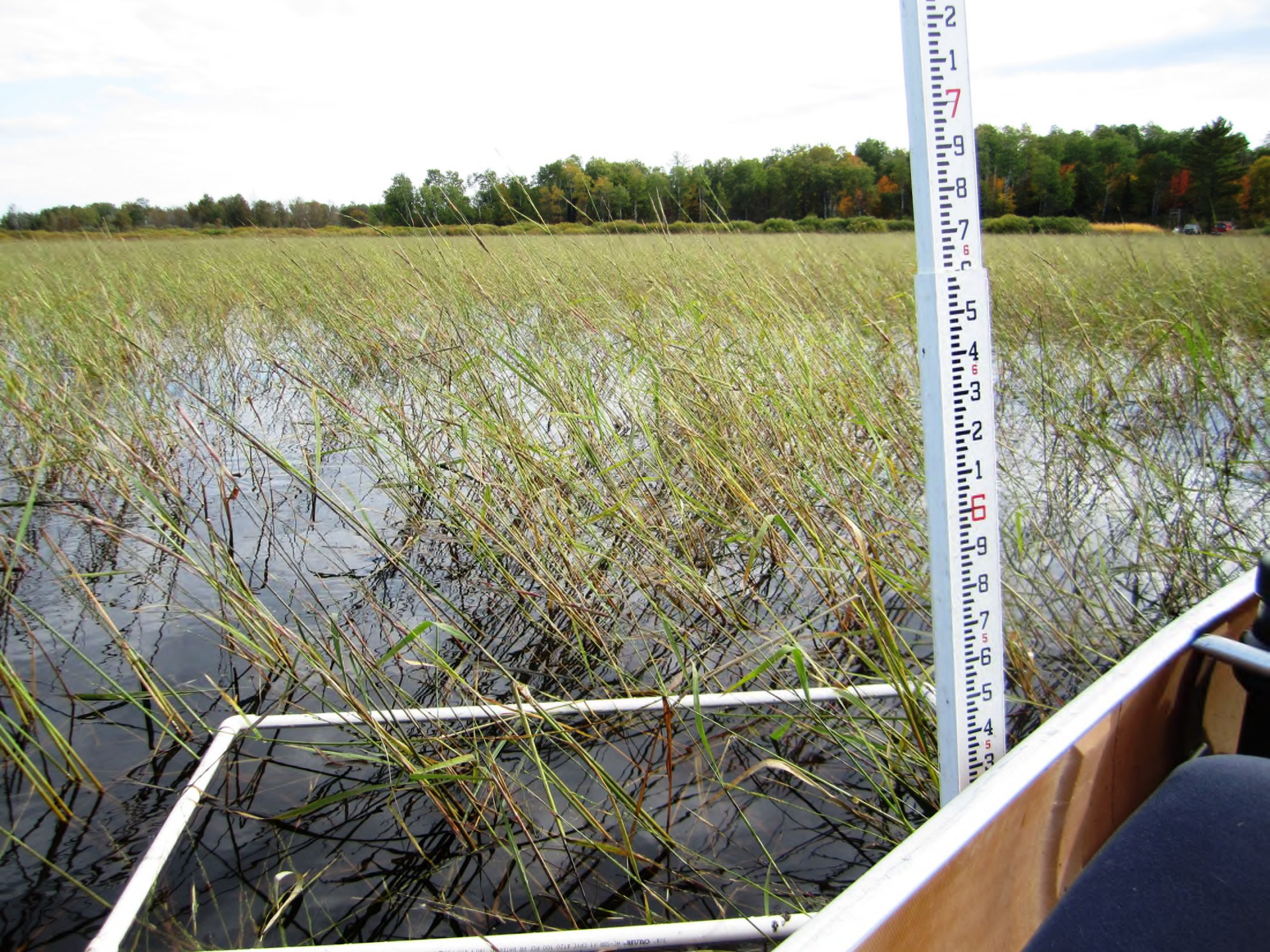
17



Fond du Lac
Perch Lake
South
5-18-06
Fond du Lac
Perch Lake
North
5-18-06
Era Laboratories, Inc.
FdL
Perch Lake North
5-18-06 9:45 NS
FdL
Perch Lake South
5-18-06 10:35 NS

D61 =CONCATENATE(B61,":",C61,":",TEXT(A61,"yymmdd"))

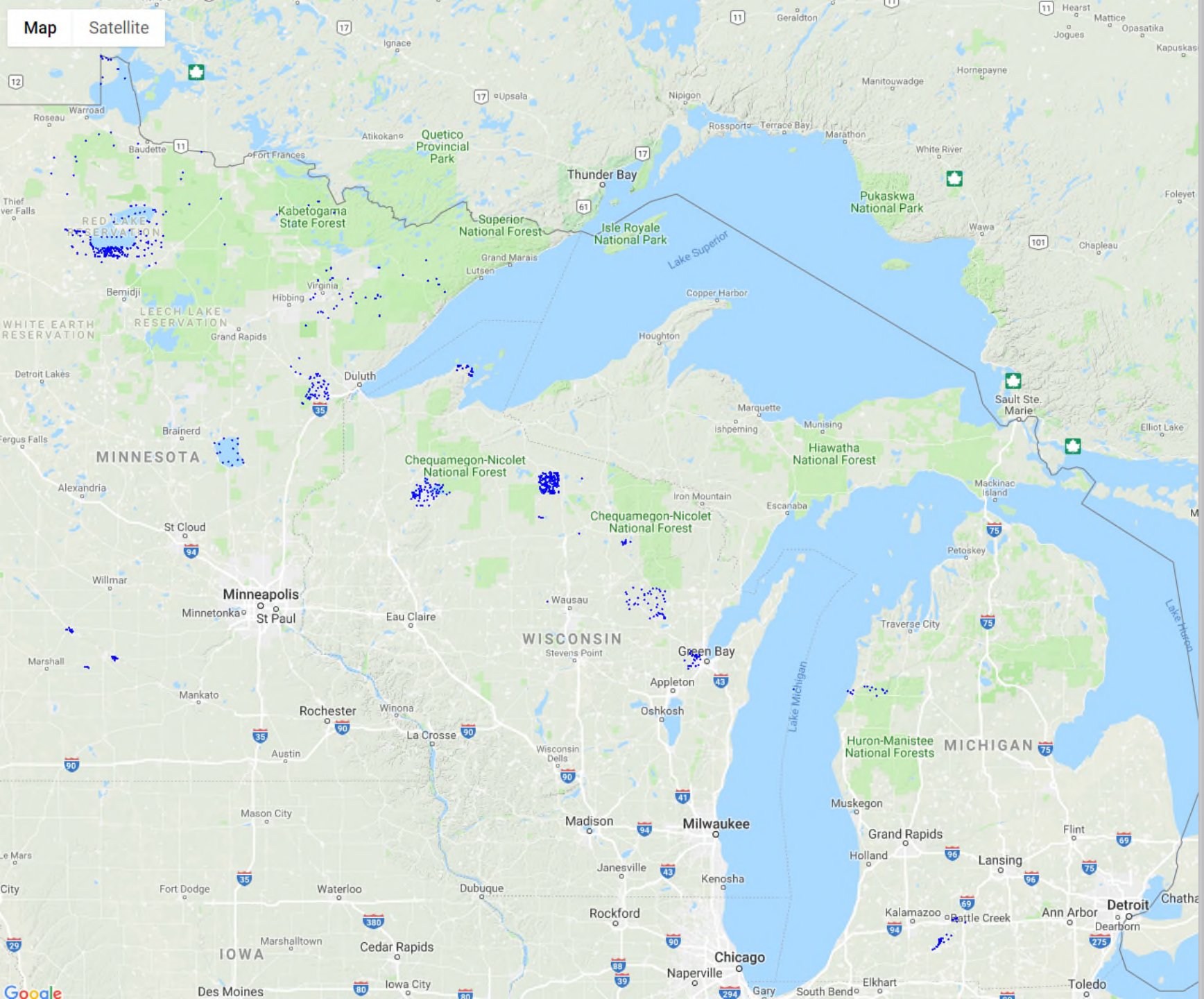
1	A Date (MM/DD/YYYY)	B Water body	C Sample ID#	D Activity ID	E Number of rice stalks per 0.5 m^2	F Taxon Present 1 (Y)?	G Other vegetation 1	H Taxon Present 2 (Y)?	I Other vegetation 2	J Taxon Present 3 (Y)?	K Other vegetation 3	L Taxon Present 4 (Y)?	M Other vegetation 4	N Plant Height-TOTAL (cm)	O Plant Height-ABOVE Water (cm)	P Water depth (cm)	Q Number of stalks on sample plant	Br sp fu dis
115	9/22/2015	Miller (Mud) Lake	M136	Miller (Mud) Lake:M136:150922	5	Y	white water lily	N		N		N		143.8656		79.248	1	
116	9/22/2015	Miller (Mud) Lake	M137A	Miller (Mud) Lake:M137A:150922	9	N		N		N		N			45	63.5		
117	9/22/2015	Miller (Mud) Lake	M137	Miller (Mud) Lake:M137:150922	3	Y	bulrush	N		N		N		121.92		63.5	2	
118	9/22/2015	Miller (Mud) Lake	M138	Miller (Mud) Lake:M138:150922	7	N		N		N		N		137.16		71.12	1	
119	9/22/2015	Miller (Mud) Lake	M138A	Miller (Mud) Lake:M138A:150922	17	N		N		N		N			66	71.12		
120	9/22/2015	Miller (Mud) Lake	M139	Miller (Mud) Lake:M139:150922	3	N		N		N		N		152.4		55.88	2	
121	9/22/2015	Miller (Mud) Lake	M139A	Miller (Mud) Lake:M139A:150922	12	Y	watershield	Y	bulrush	N		N			90	55.88		
122	9/22/2015	Miller (Mud) Lake	M14	Miller (Mud) Lake:M14:150922	3	N		N		N		N		129.54		91.44	1	
123	9/22/2015	Miller (Mud) Lake	M14A	Miller (Mud) Lake:M14A:150922	0	Y	watershield	Y	water lily	N		N			0	91.44		
124	9/22/2015	Miller (Mud) Lake	M141	Miller (Mud) Lake:M141:150922	12	N		N		N		N		112.776		70.104	2	
125	9/22/2015	Miller (Mud) Lake	M141A	Miller (Mud) Lake:M141A:150922	32	N		N		N		N			55.2	70.104		
126	9/22/2015	Miller (Mud) Lake	M15	Miller (Mud) Lake:M15:150922	49	Y	watershield	N		N		N		139.5984		70.104	1	
127	9/22/2015	Miller (Mud) Lake	M15A	Miller (Mud) Lake:M15A:150922	24	Y	watershield	N		N		N			54	70.104		
128	9/22/2015	Miller (Mud) Lake	M16	Miller (Mud) Lake:M16:150922	15	N		N		N		N		174.3456		70.104	3	
129	9/22/2015	Miller (Mud) Lake	M16A	Miller (Mud) Lake:M16A:150922	3	N		N		N		N			32	70.104		
130	9/22/2015	Miller (Mud) Lake	M17	Miller (Mud) Lake:M17:150922	11	Y	watershield	Y	water lily	N		N		109.1184		76.2	1	
131	9/22/2015	Miller (Mud) Lake	M17A	Miller (Mud) Lake:M17A:150922	43	Y	water lily	N		N		N			67.1	76.2		
132	9/25/2015	Perch Lake (South Basin)	P119	Perch Lake (South Basin) :P119:15	20	Y	lesser duckweed	Y	water lily	N		N		160.02		66.04	2	
133	9/25/2015	Perch Lake (South Basin)	P119A	Perch Lake (South Basin) :P119A:1	30	Y	water lily	N		N		N			50.8	68.58		
134	9/25/2015	Perch Lake (South Basin)	P120	Perch Lake (South Basin) :P120:15	2	Y	water lily	N		N		N		172.72		33.02	2	
135	9/25/2015	Perch Lake (South Basin)	P120A	Perch Lake (South Basin) :P120A:1	5	Y	water lily	Y	Coontail	N		N			58.42	71.12		
136	9/25/2015	Perch Lake (South Basin)	P121	Perch Lake (South Basin) :P121:15	20	Y	Pickerelweed	N		N		N		111.76		40.64	2	
137	9/25/2015	Perch Lake (South Basin)	P121A	Perch Lake (South Basin) :P121A:1	13	Y	Pickerelweed	N		N		N			48.26	58.42		
138	9/25/2015	Perch Lake (South Basin)	P122	Perch Lake (South Basin) :P122:15	34	N		N		N		N		121.92		71.12	1	
139	9/25/2015	Perch Lake (South Basin)	P122A	Perch Lake (South Basin) :P122A:1	38	N		N		N		N			68.58	71.12		
140	9/25/2015	Perch Lake (South Basin)	P123	Perch Lake (South Basin) :P123:15	42	N		N		N		N		129.54		81.28	1	

Main | Metadata | USE | Sheet4 | Problem site

Ready 100%

Desktop 3:45 PM 2/2/2016

Organization ID	Organization Name	Total Activities	Total Results	Last WQX Submission
1854TREATYORG	1854 Treaty Authority	4,615	22,640	10-15-2018
21BRBCH	Bad River Band of Lake Superior Chippewa			
BOISNETT_WQX	Bois Forte/Nett Lake Band of Chippewa Indians	2,661	9,616	01-30-2018
FONDULAC_WQX	Fond du Lac Band of Chippewa (MN)	29,853	247,560	08-25-2018
FCPOTAWATOMI_WQX	Forest County Potawatomi Community	7,610	46,091	
21GPBCH	Grand Portage	1,557	1,557	
GPC5_WQX	Grand Portage Reservation	43,219	43,374	01-14-2015
HANNAHWQ_WQX	Hannahville Indian Community			
HO_CHUNK_WQX	Ho-Chunk Nation of Wisconsin	1,834	17,704	
KBICNRD_WQX	Keweenaw Bay Indian Community (KBIC)	438	8,195	
LCOWIS_WQX	Lac Courte Oreilles	18,938	85,822	09-27-2017
LDFWATER2007	Lac Du Flambeau Band of Lake Superior Chippewa Indians Water Program	14,860	32,414	03-07-2018
STORLVD_WQX	Lac Vieux Desert Band of Lake Superior Chippewa	1,161	7,052	
LRBOI_WQX	Little River Band of Ottawa Indians	4,793	22,733	10-07-2015
LTBBWATR_WQX	Little Traverse Bay Bands of Odawa Indians			
LSIOUX_WQX	Lower Sioux Indian Community	352	3,544	03-03-2017
MENOM_WQX	MENOMINEE INDIAN TRIBE OF WISCONSIN (Wisconson)	7,732	37,868	10-03-2018
MLBO_DNR_WQX	Mille Lacs Band of Ojibwe DNR/Environment	340	2,712	03-15-2018
NOTTAWHURON_WQX	Nottawaseppi Huron Band of the Potawatomi	299	2,042	03-30-2017
ONEIDA_WQX	Oneida Nation	2,046	12,116	10-16-2018
PIIC_WQX	Prairie Island Indian Community	1,475	15,050	
REDCLIFF_WQX	Red Cliff Band of Lake Superior Chippewa (WI)	864	5,055	06-20-2018
REDLAKE_WQX	Red Lake DNR	50,193	318,012	02-14-2018
SAULTSTEMARIE	Sault Ste. Marie Tribe of Chippewa Indians	590	3,731	
SOKAOGON_WQX	Sokaogon Chippewa Community	1,128	40,240	03-30-2017
STCROIX_WQX	St. Croix Chippewa Indians of Wisconsin			
USIOUX_WQX	Upper Sioux Community	6,906	24,956	03-04-2018
		203,464	1,010,084	


Map
Satellite
Ignace
Geraldton
Hearst
Mattice
Opasatika
Jogues
Kapuskasi
Hornepayne
Manitouwadge
Upsala
Nipigon
Rossport
Terrace Bay
Marathon
White River
Roseau
Warroad
Baudette
Fort Frances
Atikokan
Quetico Provincial Park
Thunder Bay
Pukaskwa National Park
Foleyet
Thief River Falls
RED LAKE RESERVATION
Kabetogama State Forest
Superior National Forest
Isle Royale National Park
Lake Superior
Wawa
Chapleau
Grand Marais
Lutsen
Bemidji
Virginia
Hibbing
LEECH LAKE RESERVATION
WHITE EARTH RESERVATION
Grand Rapids
Copper Harbor
Houghton
Detroit Lakes
Duluth
Sault Ste. Marie
Marquette
Ishpeming
Munising
Elliot Lake
Fergus Falls
Brainerd
MINNESOTA
Chequamegon-Nicolet National Forest
Hiawatha National Forest
Alexandria
Mackinac Island
Iron Mountain
Escanaba
Chequamegon-Nicolet National Forest
St Cloud
Petoskey
Willmar
Minneapolis
Minnetonka
St Paul
Wausau
Eau Claire
Traverse City
Lake Huron
WISCONSIN
Stevens Point
Green Bay
Marshall
Appleton
Mankato
Oshkosh
Rochester
Winona
La Crosse
Lake Michigan
Huron-Manistee National Forests
MICHIGAN
Austin
Wisconsin Dells
Mason City
Muskegon
Madison
Milwaukee
Grand Rapids
Flint
Holland
Lansing
Janesville
Kenosha
Fort Dodge
Waterloo
Dubuque
Rockford
Kalamazoo
Battle Creek
Ann Arbor
Detroit
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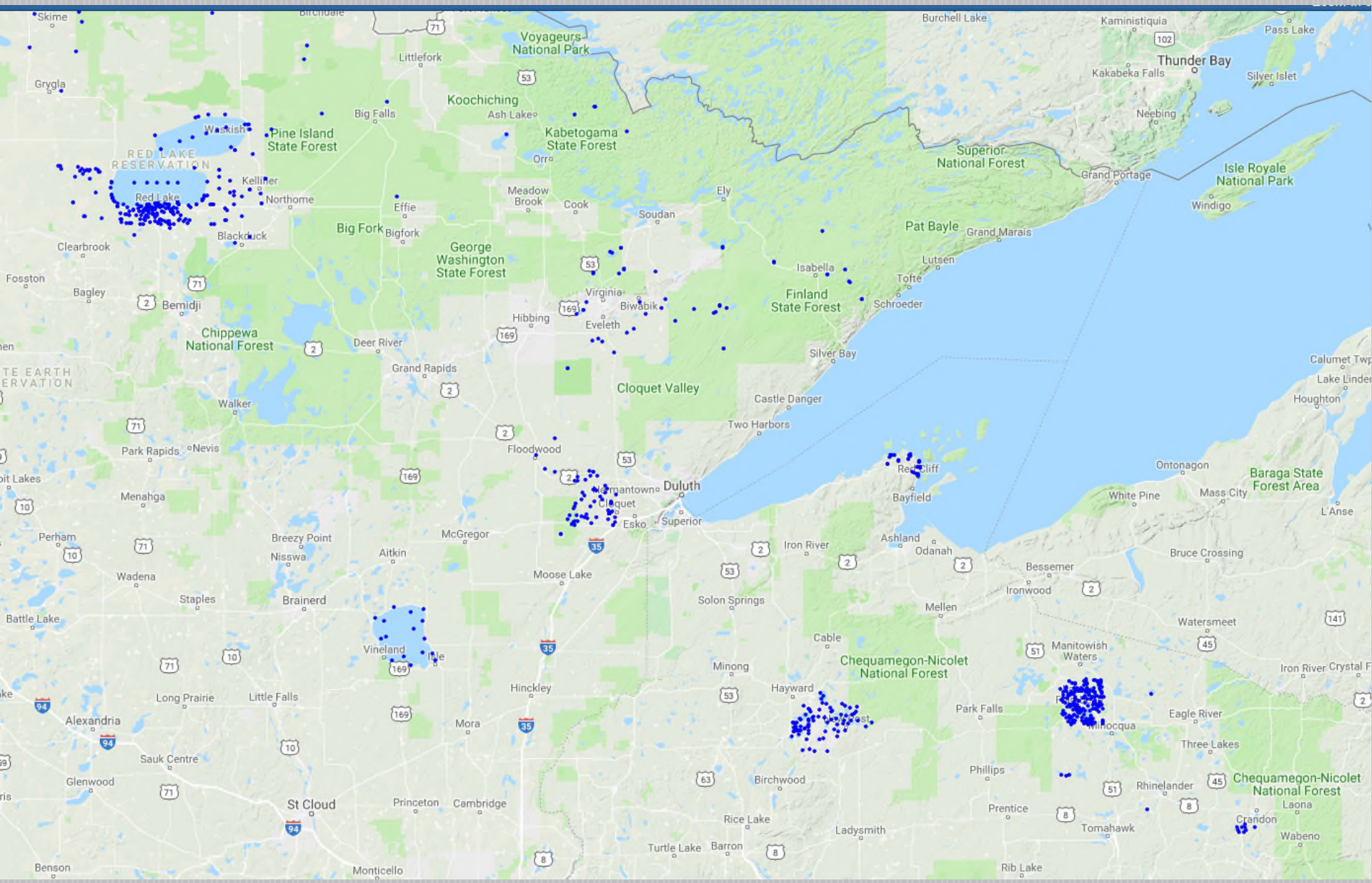
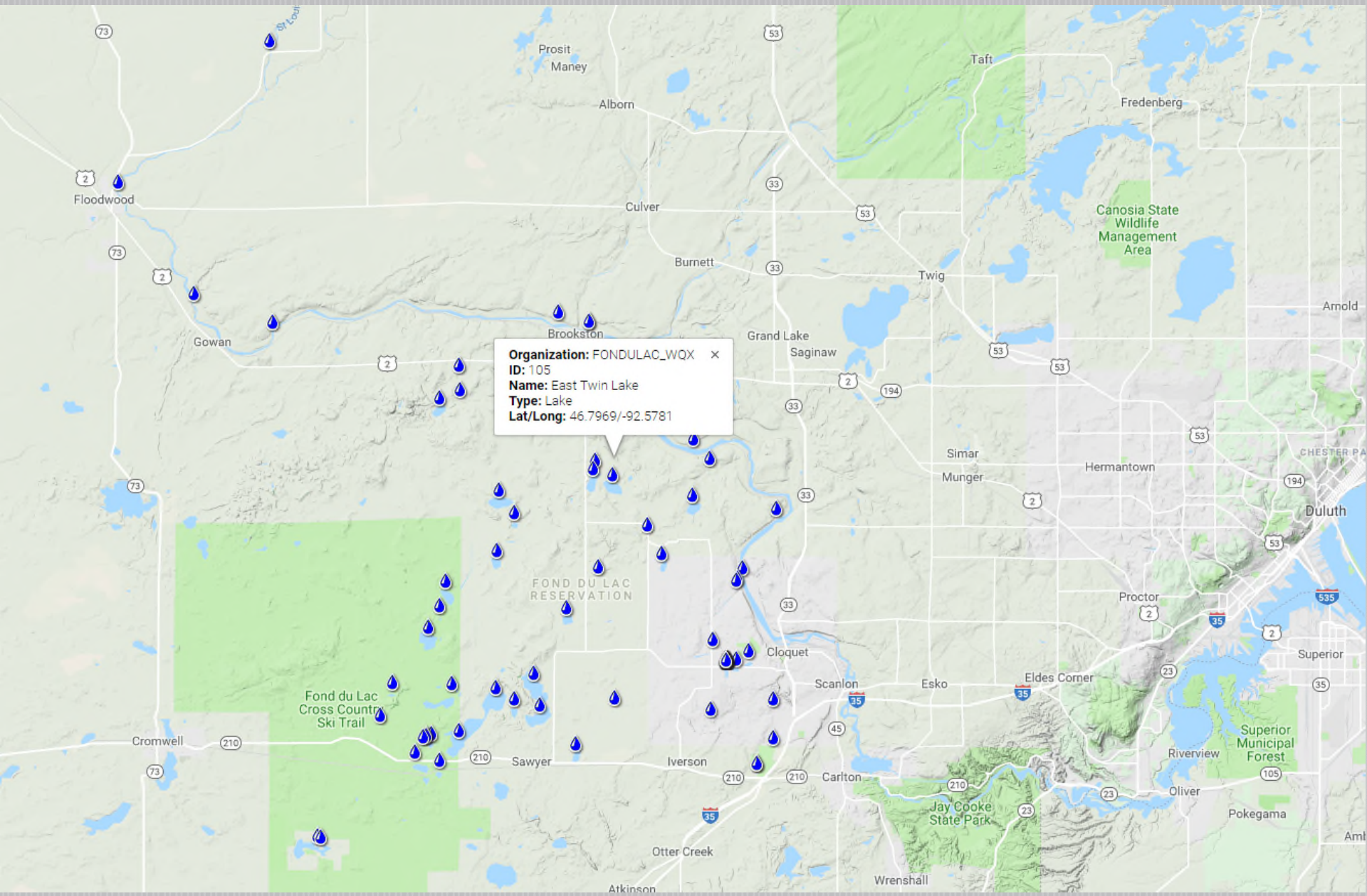
Iowa City
Gary
South Bend
Elkhart
Toledo
Google


Voyageurs National Park
Littlefork
Koochiching
Ash Lake
Big Falls
Kabetogama State Forest
Pine Island State Forest
Waskish
RED LAKE RESERVATION
Red Lake
Kelliher
Northome
Effie
Big Fork
Bigfork
Blackduck
Clearbrook
Fosston
Bagley
Bemidji
Chippewa National Forest
Deer River
Grand Rapids
Walker
Park Rapids
Nevis
Menahga
Perham
Wadena
Staples
Battle Lake
Breezy Point
Nisswa
Brainerd
Aitkin
McGregor
Moose Lake
Vineland
Hinckley
Mora
Long Prairie
Little Falls
Alexandria
Sauk Centre
Glenwood
St Cloud
Princeton
Cambridge
Benson
Monticello
Meadow Brook
Cook
Soudan
Ely
George Washington State Forest
Virginia
Biwabik
Hibbing
Eveleth
Cloquet Valley
Floodwood
Duluth
Superior
Esko
Cloquet
Finland State Forest
Isabella
Tofte
Schroeder
Lutsen
Pat Bayle
Grand Marais
Superior National Forest
Grand Portage
Isle Royale National Park
Windigo
Silver Bay
Castle Danger
Two Harbors
Burchell Lake
Kaministiquia
Pass Lake
Thunder Bay
Kakabeka Falls
Silver Islet
Neebing
Calumet Twp
Lake Linden
Houghton
Ontonagon
Baraga State Forest Area
White Pine
Mass City
L'Anse
Bruce Crossing
Ashland
Odanah
Bayfield
Iron River
Bessemer
Ironwood
Mellen
Solon Springs
Cable
Minong
Hayward
Chequamegon-Nicolet National Forest
Manitowish Waters
Watersmeet
Iron River
Crystal F
Park Falls
Eagle River
Three Lakes
Phillips
Birchwood
Rice Lake
Ladysmith
Turtle Lake
Barron
Prentice
Tomahawk
Rhinelander
Laona
Crandon
Wabeno
Rib Lake


Organization: FONDULAC_WQX
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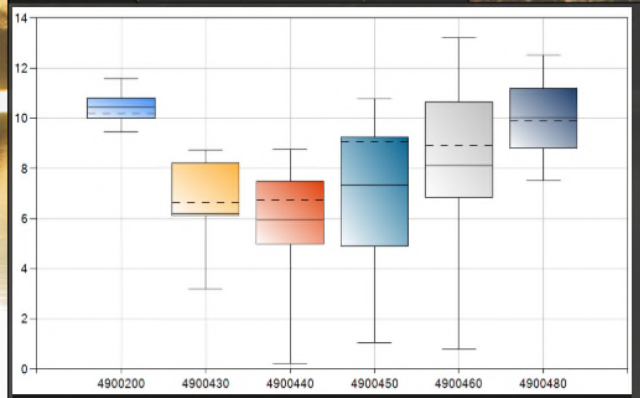
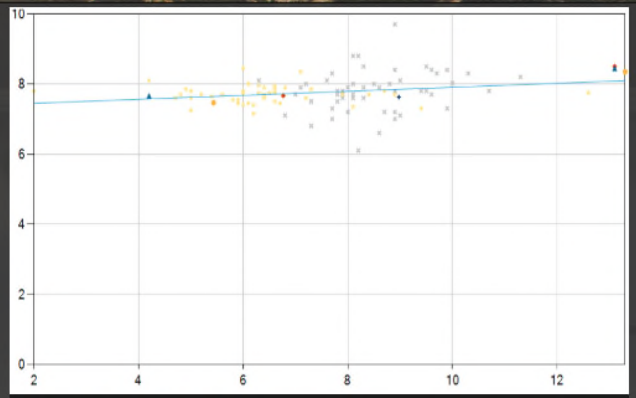
Name: East Twin Lake
Type: Lake
Lat/Long: 46.7969/-92.5781
Prosit
Maney
Alborn
Taft
Fredenberg
Floodwood
Culver
Canosia State Wildlife Management Area
Burnett
Twig
Arnold
Gowan
Brookston
Grand Lake
Saginaw
Simar
Munger
Hermantown
Duluth
FOND DU LAC RESERVATION
Proctor
Cloquet
Superior
Scanlon
Esko
Eldes Corner
Fond du Lac Cross Country Ski Trail
Cromwell
Sawyer
Iverson
Carlton
Riverview
Superior Municipal Forest
Oliver
Jay Cooke State Park
Pokegama
Otter Creek
Wrenshall
Atkinson

Data Analysis

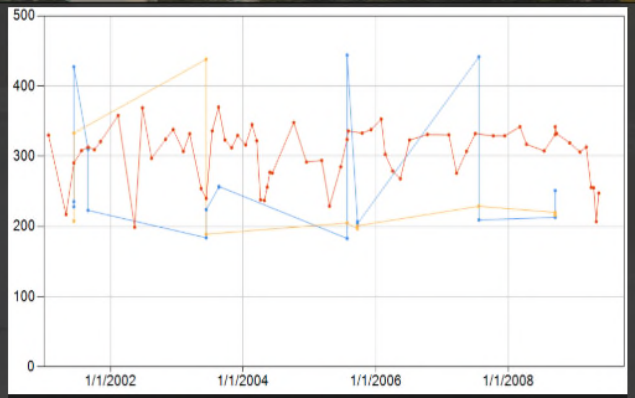
Graphs | Maps | Reports | Exports



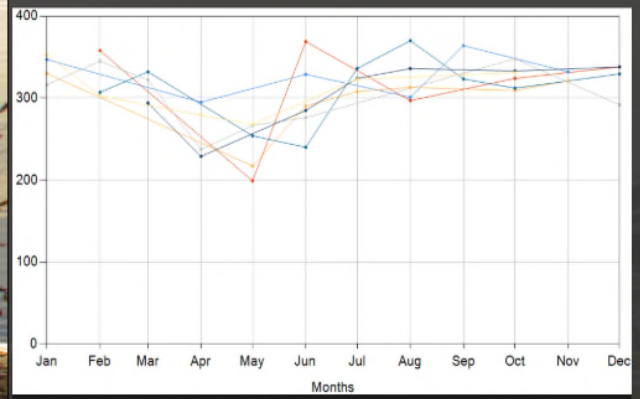
Box and Whiskers Plot



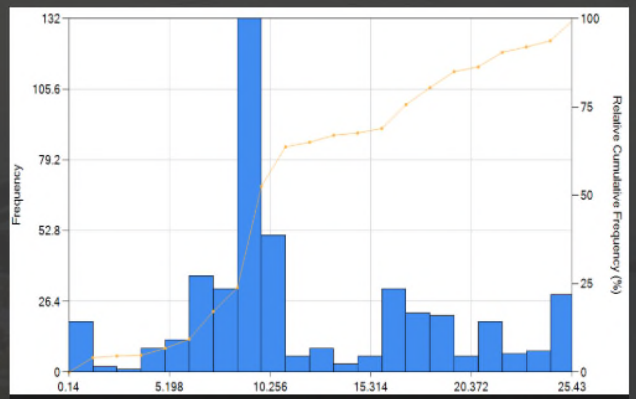
Bivariate Scatter Plot



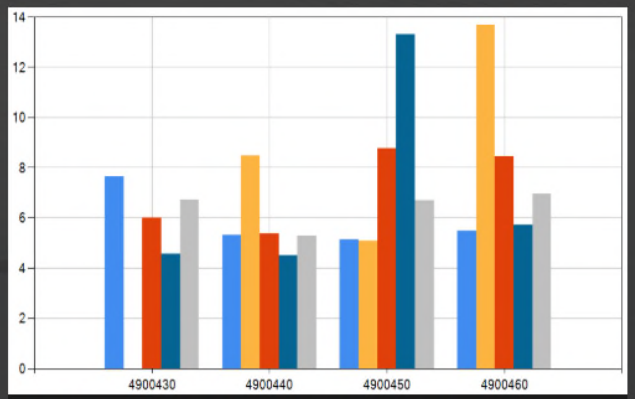
Single Parameter Line Graph



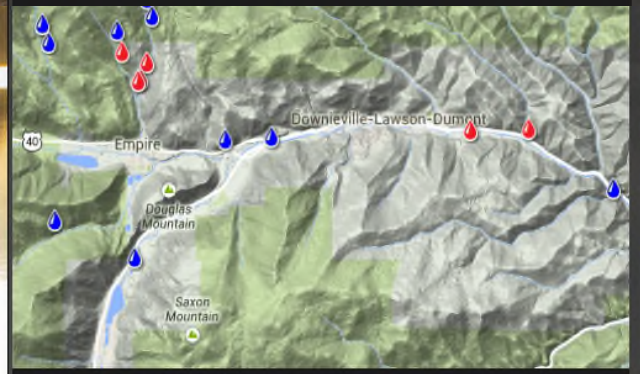
Single Parameter Yearly Comparison Line Graph



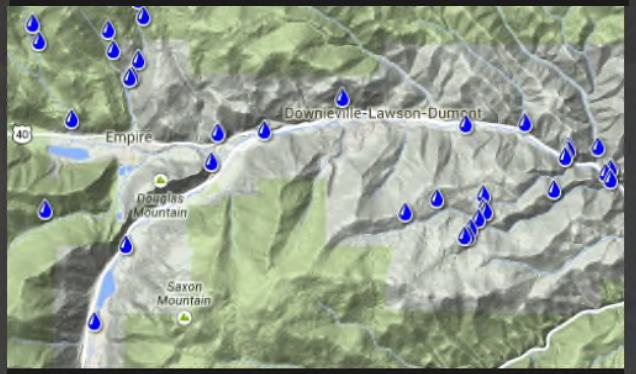
Single Parameter Cumulative Frequency Graph



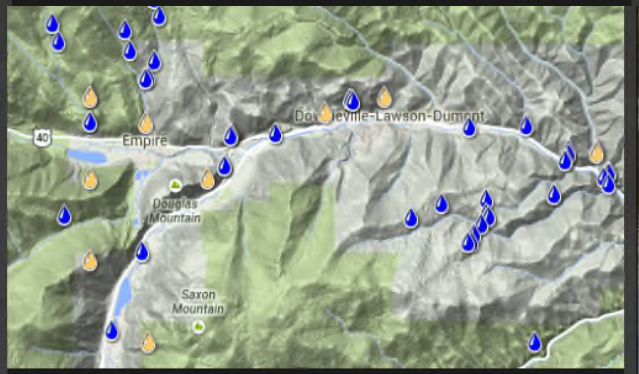
Single Parameter Mean Value Bar Graph



Exceedance Locations



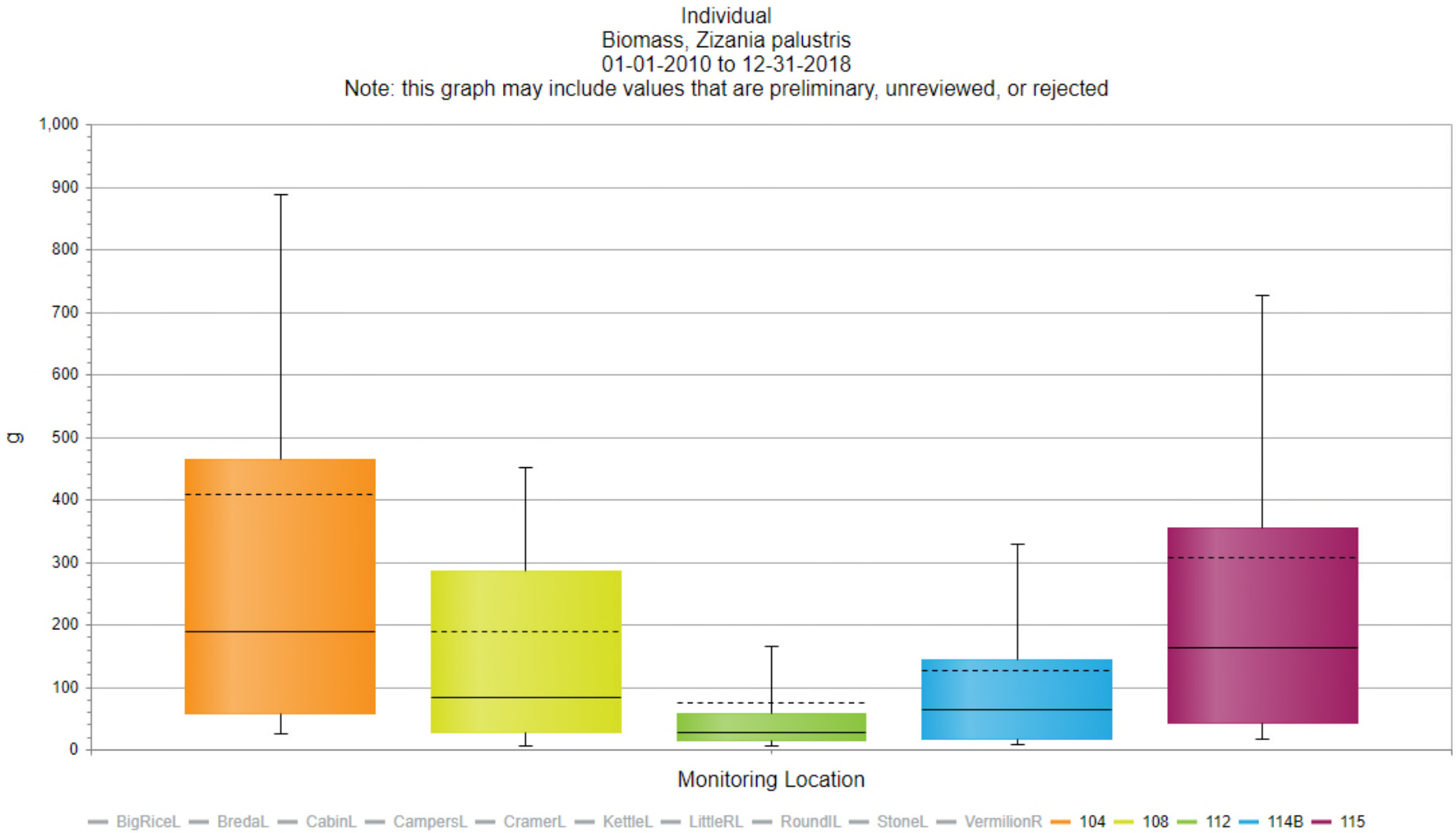
Filtered Locations



Integrated Locations (AWQMS & WQP)

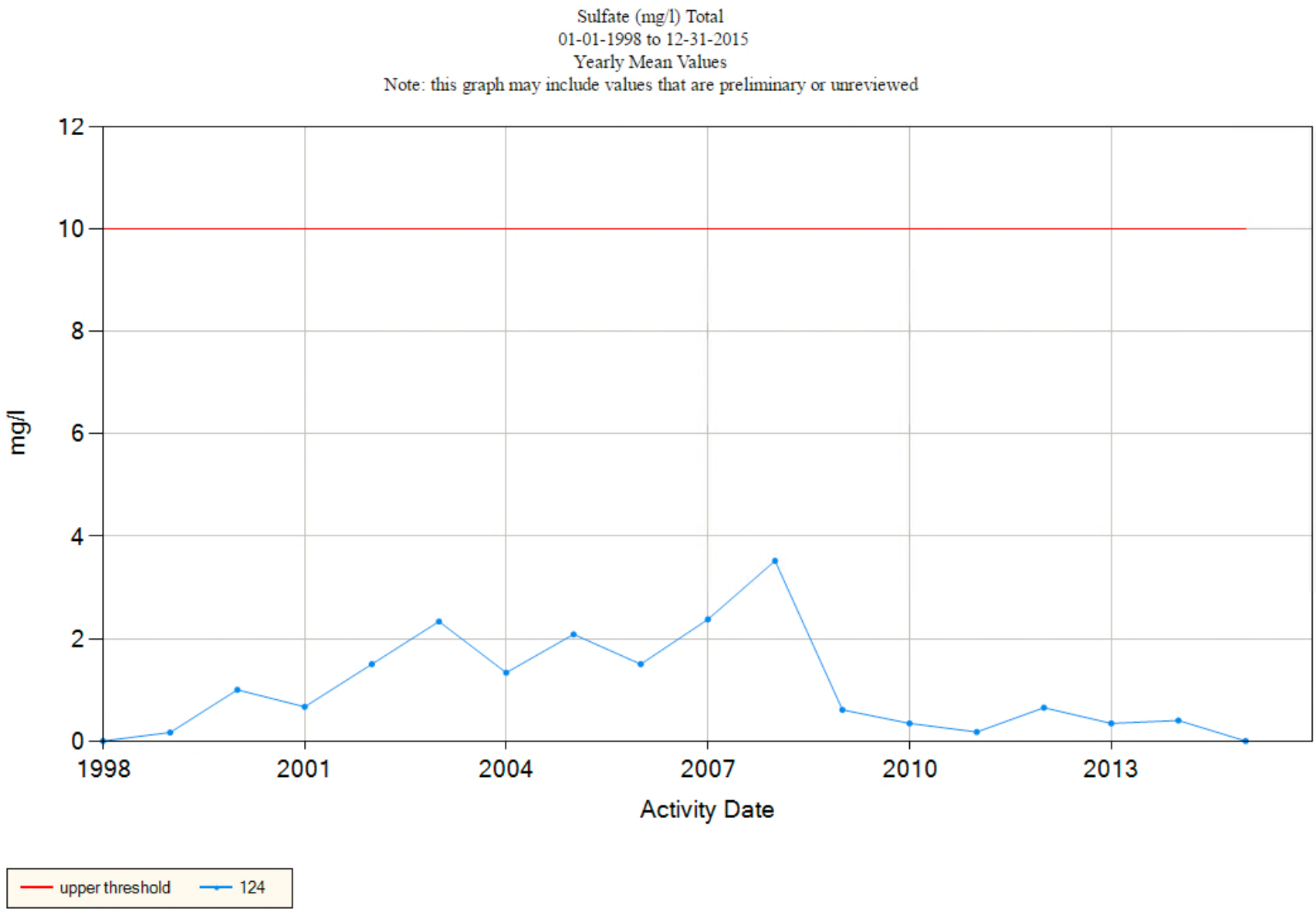
Box and Whiskers Plot

Color Scheme: Default | Change Header Text | Save as PDF | Save as Image | Export Data To Excel | Help



Mean value is denoted by a dotted line. Median is denoted by a solid line.

Single Parameter Line Graph



Continuing Success

- The participating tribes continue to benefit:
  - Many new features and enhancements funded by other AWQMS community members
  - New and updated user materials posted to www.awqms.org
  - Increased, improved sharing with surrounding tribes and EPA partners

Miigwech!

Thank You! Q & A

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