# Welcome!

- 1. Agenda
- 2. Volunteer Orientation



# Volunteer Monitoring Orientation

Jordan Fostvedt South Dakota Dept. of Agriculture and Natural Resources (SD DANR) Watershed Protection Program

Anne Lewis South Dakota Discovery Center

#### Number of Samples Collected by each SD DANR Project in the 2024 Field Season



# Data Goals

### High Quality Data

- All data is collected following correct standard operating procedures (SOP)
- All field samplers follow the appropriate quality assurance project plan (QAPP)

### **Unbiased Data**

- Routine ambient data
- Not targeting:
  - Conditions: rain, flow, drought, etc
  - Businesses or facilities

Routine Frequency

# Where does all this data go?



# Common Volunteer Goals



Take a scientific look at waterbodies close to home



#### Participate in citizen science



Learn about state monitoring methods



Meet minimum data requirements to determine impairment status

# Minimum Data Requirements

# Lakes

- 2 years of data over last 10 years
- At least 2 sampling events per year
- >10% exceedance results in impairment
  - Exceedance= over the standard
  - For single sample max only

## **Rivers and Streams**

- 20 samples over last 5 years
- >10% exceedance results in impairment
  - Exceedance= over the standard
  - For single sample max only

Volunteer Field Sampler Activities

## Lake Sampling

- Lake Shoreline
- Midlake- Requires a watercraft
- Stream and River Sampling

## Types of samples volunteers can collect...and what they tell you



#### A Bottle

- Alkalinity
- Total Suspended Solids- sediment
- Total Dissolved Solids- dissolved salts and minerals
- Lab Conductivity



#### B Bottle (Nutrients)

- Ammonia
- Nitrate
- Total Kjeldahl Nitrogen (organic)
- Total Phosphorus



#### C Bottle

- E.Coli- Indicator of fecal contamination
- Human health risk: can cause acute gastrointestinal problems



#### Microcystin

- Microcystin- a toxin produced by some harmful algal blooms
- Human health risk: cause skin irritation and rashes, may make people sick
- Lake sampling only



#### Chlorophyll-a Bottle

- Chlorophyll-a- provides an estimate for how much algae is in a lake
- Lake sampling only



#### Field Measurements

- Temperature
  - Stream sampling only
- Secchi Disk Depth- Measures water clarity
  - Lake sampling only

Parameters (mg/L) except where noted	(1) Domestic water supply	(2) Coldwater permanent fish life propagation	(3) Coldwater marginal fish life propagation	(4) Warmwater permanent fish life propagation	(5) Warmwater semipermanent fish life propagation	(6) Warmwater marginal fish life propagation	(7) <sup>4</sup> Immersion recreation	(8) <sup>4</sup> Limited- contact recreation	(9) Fish, wildlife, propegation, recreation & stock watering	(10) <sup>14</sup> Inigation	(11) Commerce and Industry
Alkalinity (CaCO <sub>3</sub> )									<2750 <sup>1</sup> /<1,313 <sup>2</sup>		
Barium	<1.0 <sup>2</sup>										
Chloride	<250 <sup>1</sup> /<438 <sup>2</sup>	<100 <sup>1</sup> /<175 <sup>2</sup>									
Coliform, total (per 100 mL)	<pre>&lt;5,000 (geomean): &lt;20,000</pre>										
Escherichia coll <sup>4</sup> (per 100mL)							<u>&lt;126<sup>6</sup>/</u> <u>&lt;</u> 235 <sup>2</sup>	<u>&lt;630</u> <sup>6</sup> / <u>&lt;</u> 1,178 <sup>2</sup>			
Microcystin <sup>4, 8, 9</sup>							<u>&lt;</u> 8	_≤8			
Cylindro- spermopsin <sup>4, 8, 9</sup>							<u>&lt;</u> 15	<u>≤</u> 15			
Conductivity (umhos/cm @ 25°C)									≤4,000 <sup>1</sup> / ≤7,000 <sup>2</sup>	<pre>&lt;2,500<sup>1</sup>/ &lt;4,375<sup>2</sup></pre>	
Fluoride	<4.0 <sup>2</sup>										
Hydrogen sulfide undisassociated		<u>&lt;0.002<sup>2</sup></u>	<u>&lt;</u> 0.002 <sup>2</sup>	<u>&lt;0.002<sup>2</sup></u>	<u>&lt;0.002<sup>2</sup></u>	<u>&lt;0.002<sup>2</sup></u>					
Nitrogen, total ammonia as N		<sup>5</sup> Equation- based standard <sup>2</sup>	<sup>5</sup> Equation- based standard <sup>2</sup>	<sup>5</sup> Equation- based standard <sup>2</sup>	<sup>5</sup> Equation- based standard	<sup>5</sup> Equation- based standard <sup>2</sup>					
Nitrogen, nitrates as N	<u>&lt;</u> 10.0 <sup>2</sup>								<50 <sup>1</sup> /<88 <sup>2</sup>		
Oxygen, dissolved <sup>2, 3</sup>		≥6.0 <sup>2</sup> ; ≥7.0 <sup>2</sup> (in spawning areas during spawning season)	≥5.0 <sup>2</sup>	≥5.0 <sup>2</sup> ; ≥6.0 <sup>2</sup> (in Big Stone & Traverse during Apr and May)	≥5.0 <sup>2</sup>	≥4.0 <sup>2</sup> Oct1- Apr30; ≥5.0 <sup>2</sup> May1-Sep30	≥5.0 <sup>2,4</sup>	≥5.0 <sup>2,4</sup>			
pH (standard units)	≥6.5-9.0	≥6.5 - <u>&lt;</u> 9.0 <sup>10</sup>	≥6.5 - <u>&lt;</u> 9.0 <sup>10</sup>	≥6.5 - <u>&lt;</u> 9.0 <sup>10</sup>	≥6.5 - <u>&lt;</u> 9.0 <sup>10</sup>	≥6.0 - <u>&lt;</u> 9.0 <sup>10</sup>			≥6.0 - <u>&lt;</u> 9.5 <sup>10</sup>		≥6.0 - ≤9.5 <sup>10</sup>
Sodium Adsorption Ratio <sup>7, 11</sup>										<u>&lt;</u> 10	
Solids, suspended <sup>7</sup>		<30 <sup>1</sup> /<53 <sup>2</sup>	<u>&lt;901/&lt;1582</u>	<u>&lt;90<sup>1</sup>/&lt;158<sup>2</sup></u>	<u>&lt;90<sup>1</sup>/&lt;158<sup>2</sup></u>	<150 <sup>1</sup> /<263 <sup>2</sup>					
Solids, total dissolved	<pre>&lt;1,000<sup>1</sup>/</pre> <1,750 <sup>2</sup>								<2,500 <sup>1</sup> / <4,375 <sup>2</sup>		<2,000 <sup>1</sup> / <3,500 <sup>2</sup>
Sulfate	<500 <sup>1</sup> /<875 <sup>2</sup>										
Temperature (°F)7		<u>&lt;</u> 65	<u>&lt;</u> 75	<u>&lt;</u> 80	<u>&lt;</u> 90	<u>&lt;</u> 90					
Total Petroleum	≤1.0 <sup>2</sup>								≤10 <sup>13</sup>		
Oil and Grease		1							≤10 <sup>13</sup>		

#### Table 2: Numeric Criteria Assigned to Beneficial Uses of Surface Waters of the State ARSD 74:51:01

<sup>1</sup> 30-day average as defined in ARSD 74:51:01:01(60);<sup>2</sup> daily maximum;<sup>3</sup>DO as measured anywhere in the water column of a non-stratified waterbody, or in the epilimnion of a stratified waterbody;

<sup>4</sup>May 1 through September 30;<sup>5</sup> Refer to Appendix A of Chapter 74:51:01; <sup>6</sup> Geometric mean as defined in ARSD 74:51:01:01(24) and 74:51:01:50-51; <sup>7</sup> Site specific standards exist; <sup>8</sup>Not to be exceeded in more than three 10-day assessment periods over the course of the recreation season; <sup>9</sup> Unit of measure ug/L; <sup>10</sup> See 74:51:01:07; <sup>11</sup> See 74:51:01:31; <sup>13</sup> See 74:51:01:31; <sup>13</sup> See 74:51:01:10. <sup>14</sup> April 1 through October 30. **For a complete list of WQS refer to ARSD 74:51**.

# E.Coli Water Quality Standards

#### (7) Immersion Recreation

#### (8) Limited Contact Recreation

Standard only applies during the recreation season- May 1<sup>st</sup>- September 30<sup>th</sup>

- Swimming, fully in the water
- Most lakes, some rivers & streams
- Single sample maximum
  - Any single sample
  - 235 cfu/100 mL
- 30-day geometric mean
  - Must have 5 samples collected on different days in 1 calendar month
  - 126 cfu/mpn

- Fishing, boating, paddling, not fully in the water
- Many rivers, streams
- Single sample maximum
  - Any single sample
  - 1,178 cfu/100 mL
- 30-day geometric mean
  - Must have 5 samples collected on different days in 1 calendar month
  - 630 cfu/mpn

Lake Sampling Activities

# Lake Shoreline Sampling



- Can be done at any public access point such as a boat ramp or swimming beach
  - Anywhere where people may be in the water
- C bottle- E.coli
- Microcystin



Harmful Algal Blooms (HABs) please report them to us Email <u>DANRMail@state.sd.us</u> or Call 605-773-3623

# Mid Lake Sampling

- Characterizing the whole lake
  - Sample collected from the middle of the lake
  - You will need a boat, kayak, or canoe
- A bottle
- B bottle- nutrients
- Chlorophyll-a bottle
- Secchi disk depth



# Stream Sampling Activities

# Stream Sampling

- Can be done from any public access point
  - Usually under bridges
  - If access is limited we can provide a van dorn or extension sampler
- A bottle
- B bottle- nutrients
- C bottle- E. coli
- Temperature



# Documentation

Standard Operating Procedures (SOP)

- Outlines procedures for all sampling activities
- Every volunteer will get a printed copy
- Also available online through the Volunteer webpage
  - <u>https://danr.sd.gov/Conservation/WatershedPro</u> <u>tection/VolunteerActivities.aspx</u>
  - You can save a PDF copy to your phone, so you always have the SOP available to reference

# Quality Assurance Project Plan (QAPP)

#### **Volunteer Activities**

- Signed copy of the QAPP- before sampling
- Quality Assurance/Quality Control sampling
- Use SD DANR standard operating procedures for volunteer monitors
- Field training
  - Saturday May 18<sup>th</sup> | Griffin Park | Pierre, SD
  - Required for first year samplers
  - Recommended for all samplers
- Training videos and quizzes
  - Required for all volunteer samplers
- 2-year sampling plan required

#### SD DANR and Lab Activities

- SD health lab, EnviroScience, Mid Continent Labs (Rapid City)
  - Use EPA approved lab methods
- Volunteer Monitoring Coordinator
  - Will help you develop a sampling plan
  - Quality assurance report every other year

# Quality Assurance/Quality Control (QA/QC sampling)

#### **Replicate Samples**

- 10% of your samples are replicates
- Identical to your normal sample
  - Fill two bottles at the same time
- Test's lab's precision results should be similar
- Needs its own datasheet

#### Blank Samples

- 10% of your samples
- Fill bottles with distilled/deionized water
- Tests sampler's technique and how well you rinse the sample botttles
- Lab shouldn't detect anything
- Important to rinse bottles on all samples, but especially blanks
- Needs its own datasheet

# Work with us to develop a Sampling Plan

- Based on your personal interests
  - What waterbody(s) are you interested in sampling?
    - Where would you like to sample them?
  - What would you like to learn about them?
    - What would you like to test for?
  - When would you like to sample?
    - Example Monthly May to Sept

- 2-year sample plan includes:
  - Stations: Locations where you collect samples
    - Must be entered into our database before sampling
  - Sampling frequency
  - What you will be testing for
  - QA/QC sampling requirements
  - Budget



# Stations

#### • Stations: locations where we collect samples

- Must be entered into our database before sampling
- Streams
  - Usually bridge crossings/public access points
- Lakes
  - Public access points
  - If you have a boat or kayak- the middle of the lake
- Example from Lake Poinsett Association:
- Mid-lake Grab sample at LPA3215
- Collect E. coli/Microcystin at LPA3215A, LPA3215B, LPA3215C, LPA3215D

## Datasheet and Labels

- Datasheets and labels provided by SD DANR
- Mailed to you
- Waterproof labels
  - Don't fall off or smudge
  - We recommend filling these out with fine-point sharpies

Agency Code		SUDAN	R water Qu	ality Data	1		Rev 05/21
Sample Date	Time	Prin	(Sign				
Source Water				Station ID			
Site Location							
Project					Project	ID	
Type of Sample	Replicate Grab Blank Composite	Integrated Vertic	ai Ri	Medium elative Depth	Water / Other	Bottom	Midwater
H2O Temp	C Sample Dep	pth F	Field Comments				
SPC	µmho/cm Total Dep	pth F	ł				
DO	mg/L Wit	sth F	t				
pH	SU Gage Sta	ge F	t				
Secchi	Meters Dischar	ge C	FS				
All Samples	must be packed in ice and c	hilled to 6 C					
A-1 Liter Alkalinity TSOL	D - 100 mL Filtered + pH<2 0.25 mL H2SO4	C - 100 mL Idex	N#2SO3 if so de: Use 250 mL bothe if rm* Total Col Coli*	irce is Chlorinated requesting multiple te iform Entercocci*	ada PFGE	Dissolved Metals - 250 mL Filtered + pH<2 +1.5 mL HND3	Recoverable Metals - 250 mL pH<2 -1.5 mL HN03
	R - 4L Cube	V-40mL 3 - 40 mL Amber Viels 0.5 mL HCL Zern Head Space	V1-40 mL 2 - 40 mL Ambar Vials 0.5 mL HCL Zero Head Space	V2-120 mL 120 mL Amber Bottle 1.5 mL H2SO4	V3-120 mL 120 mL Amber Bottle Filtered 1.5 mL H2SD4	Al Sb	
Свор	pH>10-0.4 mL NAOH	TPH Gas	I voc	🔲 тос	DOC	Ba Be	Ba
Hardness	H - Liter Glass Amber	Lab Comments				B Cd	B
Пĸ	pH<2 -2 mL HCL					Cr Cu	
Lab Cond	OG - Liter Glass Amber	1				Hg Pb	P P N
Fluoride	pH<2-2 mL HCL OII Grease					Se Se	
CI Fluoride HCO3 SO4	pH-2 - 2 mL HCL OII Grease Dissolved Metals - 100 mL ERend + pH-2 -0 5 mL HN02					Se Ag Ti U	Se Ag
CI Fluoride HCO3 SO4 B-1 Liter pHK2 -2 mL H2SO4	pH+2 -2 mL HCL ☐ Oil Grease Dissolved Metals - 100 mL Fitured + pH+2 -0.5 mL HNO3 ☐ Ca ☐ Na ☐ Mg ☐ Mn ☐ K ☐ Fe					Se Ag Ti U V Zn Mo	Se Ag Ti U V Zh
	pH+2 - 2 mL HCL ○ Oil Grease Dissolved Metals - 100 mL Fittered + pH+2 - 0.5 mL HNO3 ○ Ca ○ Na ○ Mg ○ Mn ○ K ○ Fe Recoverable Metals - 100 mL pH+2 - 0.5 mL HNO3	Relinquished By:			Date	Se Ag Ti U V Zn Silica	Se Ag Ti U Zn Mo
	pH+2 - 2 mL HCL ☐ Oil Grease Dissolved Metals - 100 mL Filtered + pH+2 - 0.5 mL HN03 ☐ Ca Na Mg Mn K Fe Recoverable Metals - 100 mL pH+2 - 0.5 mL HN03 ☐ Ca Na Mg	Relinquished By: Received By:			Date	Se Ag Ti U V Zn Mo Silica /Time	Se Ag Ti U V Zn Mo
	pH+2 - 2 mL HCL     OII Grease     Dissolved Metals -     100 mL     Fitned + pH+2 - 0.5 mL HN03     Ca Na Mg     Mn K Fe     Recoverable Metals - 100     mL     pH+2 - 0.5 mL HN03     Ca Na Mg     Mn Fe	Relinquished By: Received By: Relinquished By:			Date Date Date	Se Ag Ti U V Zn Silica	Se Ag Ti U Zn Mo
	pH+2 - 2 mL HCL     OII Grease     Dissolved Metals -     100 mL     Fitnerd + pH+2 - 0.5 mL HN03     Ca Na Mg     Mn K Fe     Recoverable Metals - 100     mL     pH+2 - 0.5 mL HN03     Ca Na Mg     Mn Fe      ter Fitnerd     S04 Fluoride	Relinquished By: Received By: Relinquished By: Received By: Relinquished By:			Date Date Date Date Date	Se Ag Ti U V Zn Silica /Time /Time /Time	Se 49 Ti U V Zh Mo







# Laboratory Analysis

### SD State Health Lab-Pierre

- Our primary laboratory
- Make arrangements for bottle shipments
  - Website request:
    - <u>https://doh.sd.gov/laborator</u> <u>y/environmental-</u> <u>testing/test-a-public-water-</u> <u>source/</u>
    - Fill out form ->
      - Mail form to: <u>SDPHLOrderForm@state.sd.us</u>
  - Call and request bottles:
    - Health Lab shipping and receiving:
      - 605-773-3368

SOUTH DAKOTA PUBLIC HEALTH LABORATORY Environmental Health Testing | Forensic Chemistry | Medical Microbiology SOUTH DAKOTA HEALTH SAMPLE BOTTLE ORDER FORM Please download this form, fill it out, and submit it to SDPHLOrderForm@state.sd.us Shipping Information Name Jordan Fostvedt Title Volunteer water gulity monitor Water System Rapid Creek Street Address 221 Mall Drive, Suite 201 Rapid City SD 57701 Mailing Address 221 Mall Drive, Suite 201 City Rapid City State SD Zip Code 57701 Work Phone Number 605.394.6653 FAX Number **EPA ID Number** Email Address jordan.fostvedt@state.sd.us Quantity of Sample Bottles Requested Bacteria – unchlorinated Bacteria - Chlorinated Nitrate Lead/Copper Other (specific test type) 3 C bottles-E.coli, 3 1 liter A bottles, 3 1 liter B bottles

### SD Health Lab Courier Service- 605-366-3299

- Health Lab shipping service
- Free!
- Will pick up your samples nearly everywhere in the state
- Call to schedule a pickup or better yet use routine pickup locations
  - Routine locations and phone # for scheduling pickup are listed in Volunteer Standard Operating Procedures
- Will ship your cooler back to you full of empty bottles

			counter	
City	Address/Location	Address	Departure	
			Time	
Webster	SD Game Fish & Parks office	603 E 8th Ave, Webster, SD 57274	5:00 PM	
Watertown	DANR field office	2001 9th Avenue SW, Suite 500	4:00 PM	
Aberdeen	St. Luke's Hospital	305 S State St, Aberdeen, SD 57401	3:30 PM	
Huron	Huron Regional Hospital - lab entrance on east side	172 4th St SE, Huron, SD 57350	5:00 PM	
Brookings	Brookings Regional Hospital	300 22nd Ave S, Brookings, SD 57006	4:00 PM	
Mitchell	Queen of Peace Hospital	1900 Grassland Drive, Mitchell, SD 57301	8:00 PM	
Yankton	Sacred Heart Hospital	501 Summit St, Yankton, SD 57078	3:30 PM	
Sioux Falls	SF Airport Business Aviation	43 N John Orr Drive, Sioux Falls, SD 57104	7:00 PM	

Courier



- Rapid City, SD
- For Black Hills area volunteers
- Pick up and drop off bottles in person
  - Open M-F 7am-5pm
- Have after hours drop box for coolers
  - Make sure there is enough ice too chill your samples overnight



- Microcystin analysis
- Stow, Ohio
- We will have your bottles shipped to you at beginning of sampling
- Ship microcystin samples using fedex

Resources Available for Volunteers

### Volunteer Website

- Provides Standard Operating Procedures and QAPP
- Training videos
- Important dates
- https://danr.sd.gov/Conservati on/WatershedProtection/Volun teerActivities.aspx

#### **Volunteer Water Quality Monitoring Program**

The South Dakota Volunteer Water Quality Monitoring Program provides technical assistance and coordination to groups and individuals engaging in volunteer water quality monitoring efforts. The program is jointly operated by South Dakota Department of Agriculture and Natural Resources and the South Dakota Discovery Center. SD DANR provides technical assistance and oversight for sample collection and project design. The SD Discovery Center provides outreach and training support, helps recruit volunteers and provides mini-grant funding opportunities through the Nonpoint Source Information and Education Project.

A mutual opportunity exists for water quality managers and citizens engaged in local watershed and water quality issues. SD DANR has a need for high quality monitoring data, while local citizens have expressed an interest in collecting water samples to learn about the condition of their local waters. By integrating the capacities of SD DANR and the SD Discovery Center to provide technical assistance, funding and coordination with the existing public interest, high quality data can be efficiently produced at little cost in taxpayer funds. It is costly for public environmental officials to travel throughout the state collecting water samples; it is less costly for local citizens to monitor waters near their homes.

#### **Program Goals**

Efficiently produce high quality, unbiased data that can be used for 303(d) assessments and Total Maximum Daily Load (TMDL) reports required by the Clean Water Act. Increase public interest and engagement in water quality and watershed health in South Dakota.

#### How do I become a volunteer water quality monitor?

To participate in the South Dakota Volunteer Water Quality Monitoring Program, contact SD DANR or the SD Discovery Center. Orientation for volunteer monitors will occur in early spring of 2022. Field Training for volunteer monitors will take place in early spring at locations most suitable to those attending. Dates for orientation and field training will be posted here when available. Orientation and field training are required for participation in the program.

#### **Volunteer Orientation**

Date: Thursday April 21st, 2022, 7:30pm-9:00pm Central Zoom Meeting Link: Volunteer Monitoring Orientation

#### **Volunteer Monitoring Program Resources**

 Standard Operating Procedures for Volunteer Monitors

 Volunteer Quality Assurance Project Plan

 Example QA/QC Report

 Volunteer Monitoring Training Videos

 E. coli Sampling Method for Lakes

 Measuring Secchi Disk Depth

 Collecting a Stream Sample

 Collecting a Replicate Sample from a Stream

 Collecting a Blank Sample from a Stream

 Sample Care, Shipping, and Packaging

To learn more about SD DANR's volunteer water quality monitoring program, scroll through the storymap below or view it in fullscreen here.



Information and Education Project and the SD DANR Watershed Protection Program.

### South Dakota Discovery Center

- Citizen Science Website
- https://www.sddiscovery.org/citizen\_science.p hp



#### **Citizen Science**

Explore your own backyard and your community to contribute to real scientific research!



DANR Water Quality Monitoring Access Portal



Ainsworth

WQMAP: Water Quality Monitoring Access Portal

- Access to SD DANR and volunteer data
- Public
- https://apps.sd.gov/NR92WQM AP/

### South Dakota Harmful Algal Blooms (HABS) map

- Publicly shared
- HABs notifications- Red Flag
  - Issued when a lake has a microcystin result over the 8 μ/L standard
- Microcystin and algal toxin results
- <u>https://sdbit.maps.arcgis.co</u> <u>m/apps/webappviewer/inde</u> <u>x.html?id=ec7a545532a24a3</u> <u>599a46cee428def48</u>



0.28

0.16

8/11/2020

8/11/2020

0.00

0.00

0.00

9/10/2020

0.19

0.00

0.22

0.33

7/23/2020

7/22/2020

Brant Lake

Lake

Cottonwood

8 features 0 selected

SWLAZZZ4302

SWLAZZZ5702

0.00

0.00

0.00

0.00

Before you start sampling...

#### ✓ Attend Volunteer Training

- May 18<sup>th</sup> | Pierre, SD | Griffin Park
- ✓ Regional trainings
- We need a signed QAPP from you
- ✓ Create sampling plan
  - ✓ Stations
  - What you would like to sample for
  - Sampling frequency and duration
  - We will send you your datasheets and labels

- Get bottles from SD Health Lab, Mid Continent Lab (Rapid City), EnviroScience (microcystin)
- Figure out your sample shipping
  - ✓ SD Health Lab courier
  - MidContinent- Deliver in person
  - EnviroScience- FedEx



# Contact Information

### Jordan Fostvedt

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### Anne Lewis

Email: annelewis@sd-discovery.org

# Sources

- Pictures:
  - <u>https://www.premierag.com/2023/04/the-life-of-an-applicator-at-premier-ag/</u>
  - <u>https://www.aces.edu/blog/topics/beef/stocking-rates-for-cow-calf-operations-in-alabama/</u>