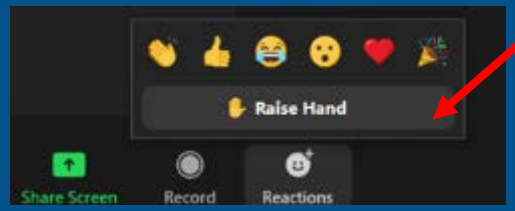
Nutrient Work Group Technical Subcommittee Session Six

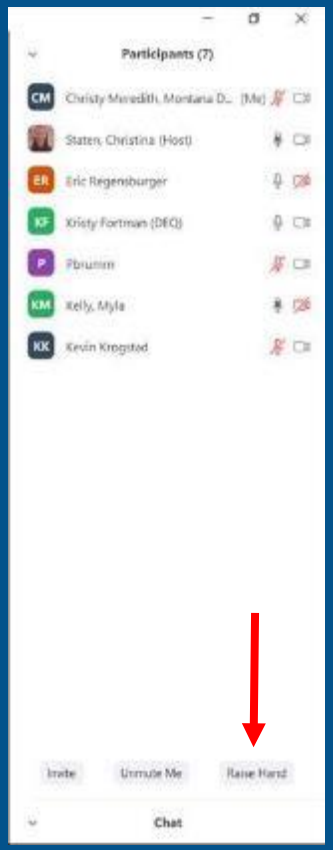
August 10, 2021

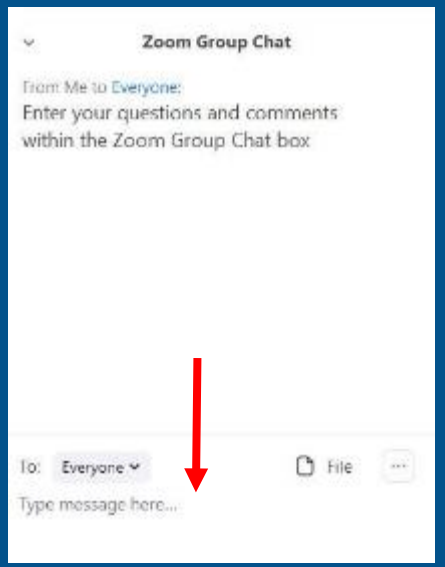
DEQ MONTANA

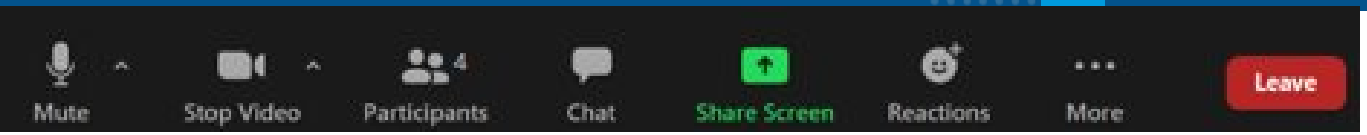
Welcome!

- Please keep your microphone muted until called on
- TSC Members may participate during discussions
- Please reserve public comment until the end
- *6 unmutes your phone
- State your name and affiliation before providing your comment
- Enter questions in the chat box at any time
- Turning off your video feed provides better bandwidth
- Please sign-in to the chat box with name and affiliation









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Agenda

Meeting Goal:

1. Respond to feedback on proposed response variables & thresholds. 2. Continue discussion of response variables & thresholds, with details on collection timeframes, frequency, etc.

1:30 p.m. Welcome

1:35 p.m. Introductions

1:40 p.m. Summary of feedback DEQ received on its proposed response variables & thresholds

2:05 p.m. Western Montana wadeable streams (algal biomass measures)

- Data collection timeframe, frequency of collection

2:25 p.m. Eastern Montana wadeable streams (DO, DO delta)

- Data collection timeframe, instream equipment maintenance needs
- Overview of large-scale factors which influence DO delta (2013-2017 study)

2:45 p.m. Relative change in response variables upstream and downstream of the point source

3:05 p.m. The additional response variables: How they might be used

3:15 p.m. Data and monitoring resources overview

3:25 pm: Public comment

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Introductions

Facilitator

- John Bernard

DEQ Staff

- Michael Suplee, Water Quality Science Specialist
- Rainie DeVaney, Discharge Permitting Section Supervisor
- Amy Steinmetz, Water Quality Division Administrator
- Jon Kenning, Water Protection Bureau Chief
- Galen Steffens, Water Quality Planning Bureau Chief
- Myla Kelly, WQ Standards & Modeling Section Supervisor
- Kristy Fortman, Watershed Protection Section Supervisor
- Darrin Kron, WQ Monitoring & Assessment Section Supervisor

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Introductions

Nutrient Work Group Technical Subcommittee Members

Interest Group	Representative	Substitute
Point Source Discharger: Large Municipal Systems (>1 MGD)	Dave Clark	
Point Source Discharger: Middle-Sized Mechanical Systems (<1 MGD)	Vacant	
Point Source Discharger: Small Municipal Systems with Lagoons	Rika Lashley	Amy Deitchler
Point Source Discharger: Non-POTW	Shane Lacasse	
Municipalities	Amanda McInnis	Kelly Lynch
Mining	Matt Wolfe	
Farming-Oriented Agriculture	John Youngberg	
Livestock-Oriented Agriculture	Jay Bodner	
Conservation Organization - Local	Kristin Gardner	
Conservation Organization – Regional	Sarah Zuzulock	Stephanie Bonucci
Conservation Organization – Statewide	Sarah Zuzulock	Stephanie Bonucci
Environmental Advocacy Organization	Guy Alsentzer or Sarah Zuzulock	
Water or Fishing-Based Recreation	Guy Alsentzer or Sarah Zuzulock	
Federal Land Management Agencies	Andy Efta	
Federal Regulatory Agencies	Tina Laidlaw or Erik Makus	
State Land Management Agencies	Jeff Schmalenberg	
Water Quality Districts / County Planning Departments	Pete Schade	
Soil & Water Conservation Districts – West of the CD	Samantha Tappenbeck	
Soil & Water Conservation Districts – East of the CD	Dan Rostad	
Wastewater Engineering Firms	Coralynn Revis	
Timber Industry	Julia Altemus	

Ground Rules

- Speak one at a time—refrain from interrupting others.
- Wait to be recognized by the facilitator before speaking.
- Facilitator will call on people who have not yet spoken before calling on someone a second time for a given subject.
- Share the oxygen—ensure that all members who wish to have an opportunity to speak are afforded a chance to do so.
- Be respectful towards all participants.
- Listen to other points of view and try to understand other interests.
- Share information openly, promptly and respectfully.
- If requested to do so, hold questions to the end of each presentation.
- Remain flexible and open-minded, and actively participate in meetings.

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Feedback from TSC on Response Variables and Thresholds: Discussion

For Western and Eastern Montana Wadeable Streams and Medium Rivers

For Large Rivers

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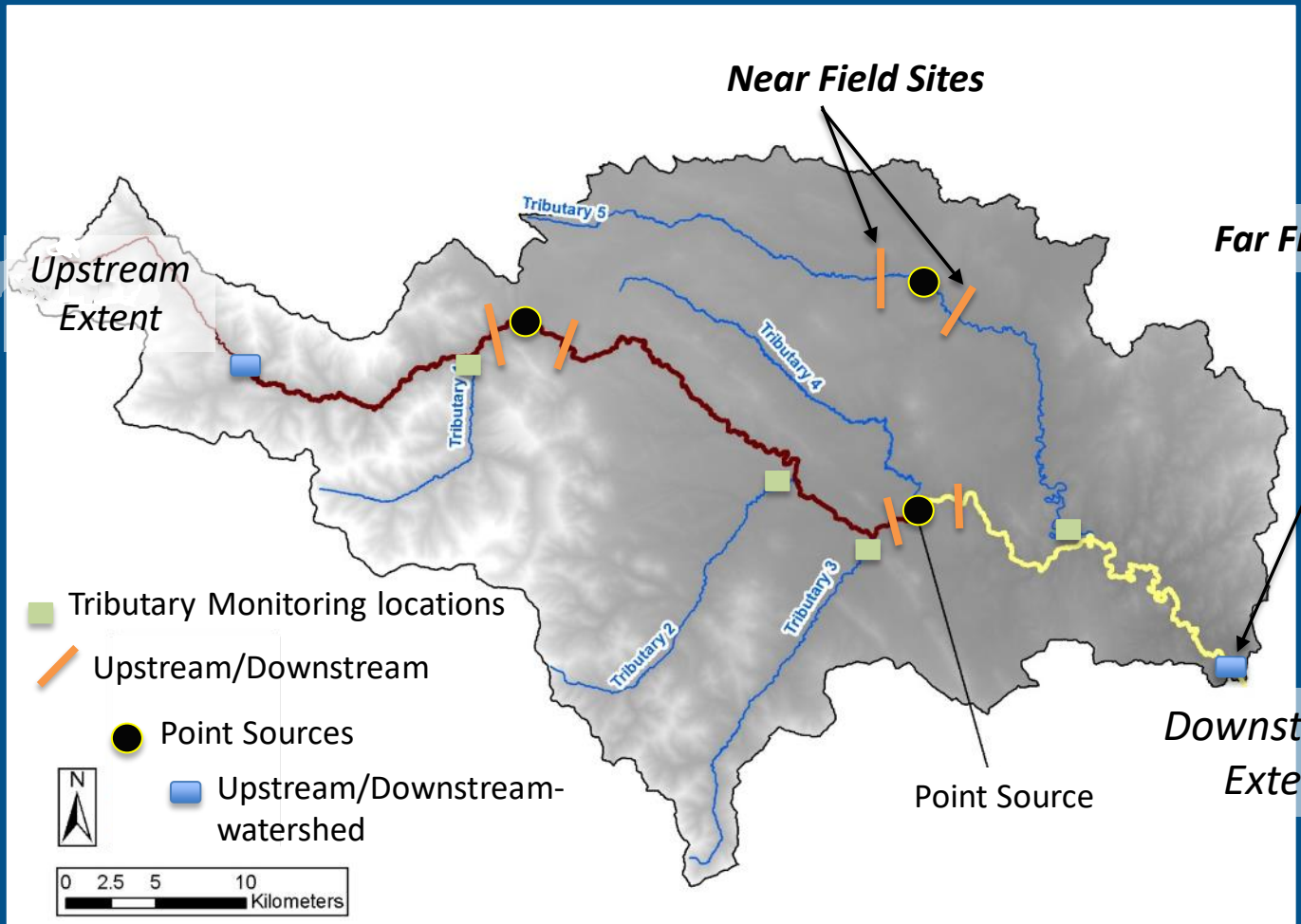
Example Watershed with Multiple MPDES Permittees



Note: This map demonstrates monitoring locations upstream and downstream of point sources. The locations shown are for illustrative purposes only. In addition to upstream and downstream, monitoring downstream of the confluence would be required to demonstrate cumulative effects.

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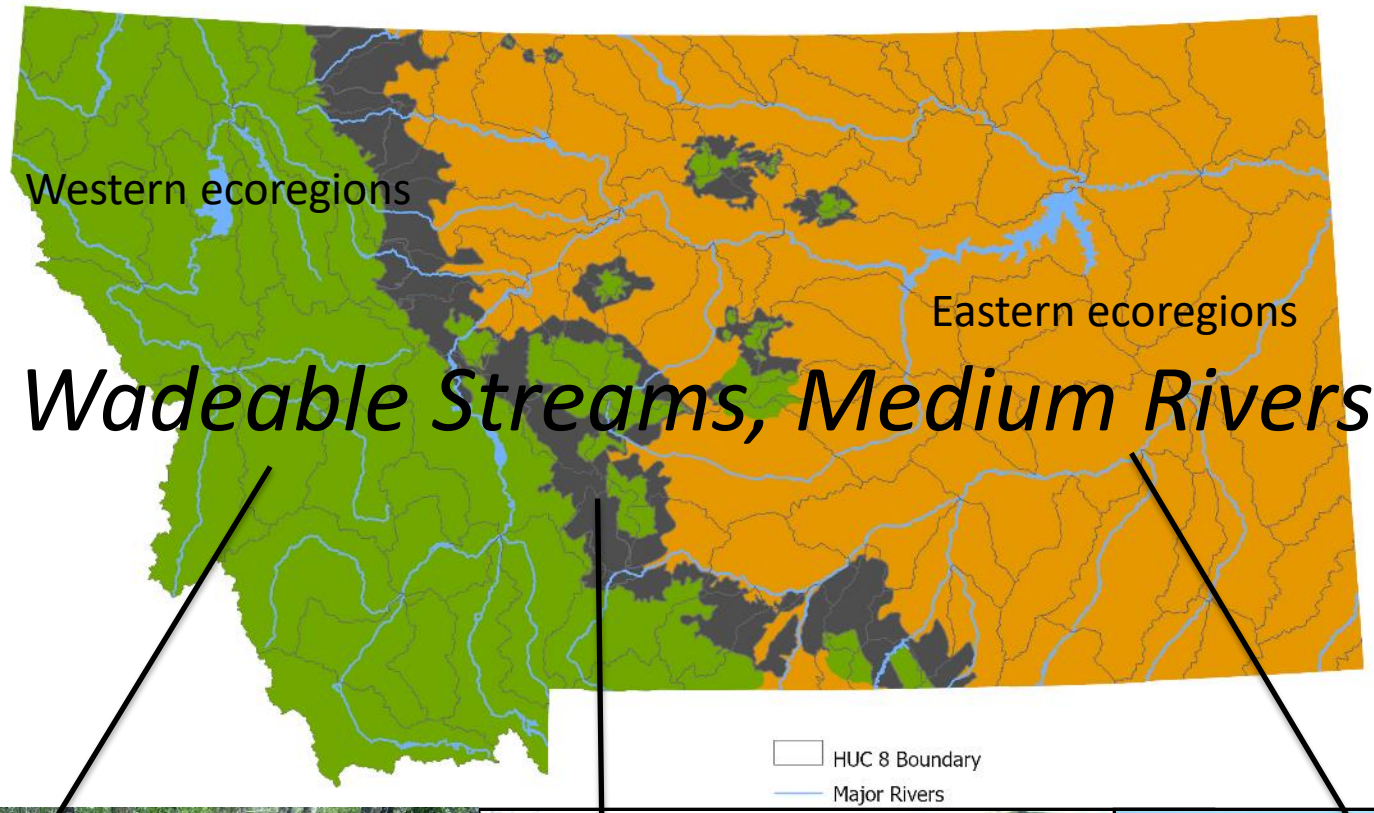
HUC 8 Watersheds and Ecoregions



Wadeable Streams, Medium Rivers

Data Collection Index Periods ("Growing Season")

Start and Ending Dates for Three Seasons (Winter, Runoff and Growing), by Level III Ecoregion.

Ecoregion Name	Start of Winter	End of Winter	Start of Runoff	End of Runoff	Start of Growing Season	End of Growing Season
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Idaho Batholith	Oct.1	April 14	April 15	June 30	July 1	Sept. 30
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Northwestern Glaciated Plains	Oct.1	March 14	March 15	June 15	June 16	Sept. 30
Northwestern Great Plains	Oct.1	Feb. 29	March 1	June 30	July 1	Sept. 30
Wyoming Basin	Oct.1	April 14	April 15	June 30	July 1	Sept. 30

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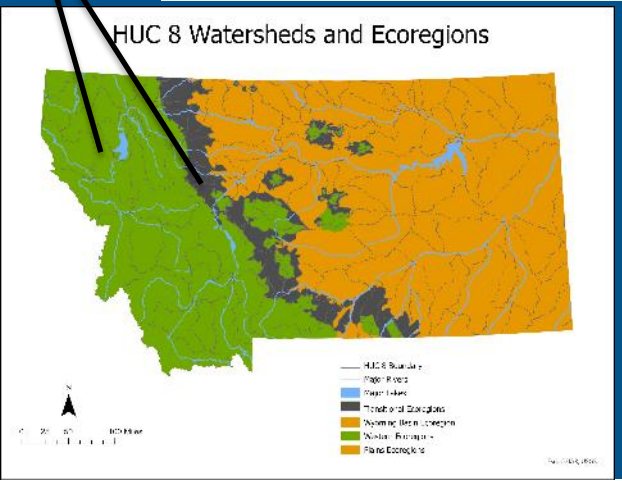
Chlorophyll *a* Thresholds for Western MT

Entity	Benthic Chla (mg Chl*a* /m^2) Threshold	Use Protected/Instream Value
MT's Clark Fork River (2002)	<100-150	Aquatic Life. Summer mean (100), maximum (150), ARM 17.30.631
MT: Recreational Threshold (2009)	<150	Recreational use
MT: Dissolved oxygen in lower-gradient western streams (2014)	<125	Salmonid fishes and assocaited aquatic life
Utah DEQ (2019)	<125	Recreational use
Ohio EPA (2015)	<182-320	Trophic Condition Status per Stream Nutrient Assessment Procedure. Chla threshold dependent on other WQ variables.
British Columbia (BCMOE 2001)	50-100	50 (aesthetics/recreation) 100 (undesireable aquatic life changes)
New Zealand Periphyton Guidelines (2000)	<120 filamentous, <200 diatoms	Trout habitat and Angling
New Zealand National Policy Statement (2017)	<200	A maximum value reflecting periodic short-duration blooms from moderate enrichment



Western Montana Reference Sites (2001-2019)	
Descriptive Statistic	**mg Chl*a* /m^2**
25th percentile:	4
50 percentile:	7
75th percentile:	19
90th percentile:	48
Average:	21
Min:	0
Max:	591

DEQ recommendation: 125 mg Chl*a*/m^2

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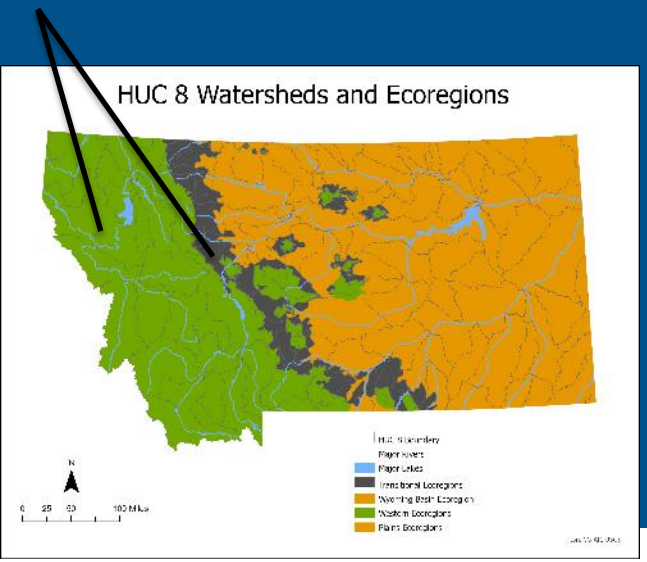
Ash Free Dry Weight (AFDW) Thresholds for Western Montana

Entity	AFDW (g/m^2) Threshold	Use Protected/Instream Value
MT: Assessment Method (2016)	35	Recreation, salmonid fishes and associated aquatic life uses
Utah DEQ (2019)	49	Recreational use
New Zealand Periphyton Guidelines (2000)	35	Aesthetics/recreation and trout habitat and angling



Western Montana Reference Sites (2013-2019)	
Descriptive Statistic	**grams AFDW/m^2**
25th percentile:	0.4
50 percentile:	2
75th percentile:	5
90th percentile:	11
Average:	7
Min:	0
Max:	262

~~DEQ recommendation: 35 mg Chl*a*/m^2~~

Errata: DEQ recommendation:

35 g AFDW/m^2

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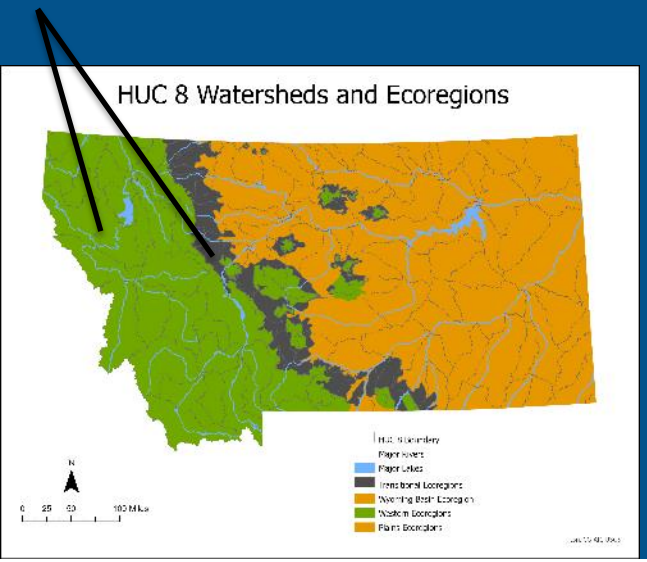
% Bottom Cover Thresholds for Western Montana

Entity	% Bottom Cover	Use Protected/Instream Value
Utah DEQ (2019)	<33%	Aquatic life
Main DEP (2021)	<18-35%	Nuisance algae cover threshold; varies by stream class
West Virginia DEP (2012)	<25%	recreational acceptance
Virginia CBF (2021)	*in development*	recreational acceptance
New Zealand Periphyton Guidelines (2000)	<60% (microalgae) <30% (filamentous)	Aesthetics/recreation and trout habitat and angling



Draft DEQ recommendation: 30% cover by filamentous algae

Example DEQ Standardized Visual Assessment Form

Categories include % bottom cover, length of filaments

Site Visit Code: _____

Date: 7/12/2021

Transect Letter: D				
AQUATIC PLANT VISUAL ASSESSMENT FORM	0 = Absent (0%) 1 = Sparse (< 10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	G = Green GLB=Green/light brown LB= Light brown BR = Brown/reddish DBB =Dark brown/black	Gr = Growing M = Mature D = Decaying	Thin = < 0.5 mm thick Medium = 0.5-3 mm thick Thick = > 3 mm thick Short = < 2 cm long Long = >2 cm long
	Actual Cover in channel (circle one)	Predominant Color	Condition	Microalgae: Thickness (Thin, Medium or Thick) and/or Measured Thickness (mm). Filamentous Algae: Length (Short or Long) and/or Measured Length (cm).
Microalgae	0 (1) 2 3 4	GLB	M	THIN
Filamentous Algae	0 1 (2) 3 4	GLB	M	LONG
Chara	0 (1) 2 3 4	GLB	M	
Macrophytes (list below)	0 1 2 3 (4)	G	M	
Moss	0 (1) 2 3 4	G	Gr	

COMMENTS

Sage produced contain very common, water speedwell N. water hillfoil

Transect Letter: E				
AQUATIC PLANT VISUAL ASSESSMENT FORM	0 = Absent (0%) 1 = Sparse (< 10%) 2 = Moderate (10-40%) 3 = Heavy (40-75%) 4 = Very Heavy (>75%)	G = Green GLB=Green/light brown LB= Light brown BR = Brown/reddish DBB =Dark brown/black	Gr = Growing M = Mature D = Decaying	Thin = < 0.5 mm thick Medium = 0.5-3 mm thick Thick = > 3 mm thick Short = < 2 cm long Long = >2 cm long
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Microalgae	0 (1) 2 3 4	G	Gr	THIN
Filamentous Algae	0 (1) 2 3 4	GLB	M	LONG

*Note: photo does not correspond to the form's data.

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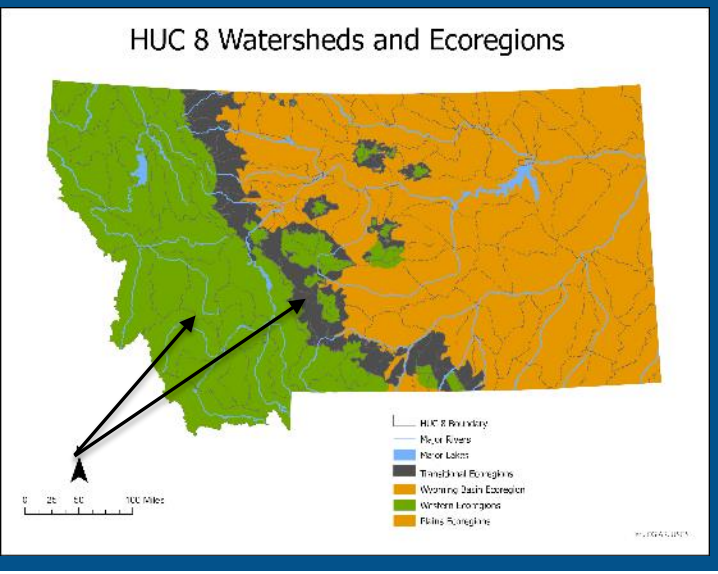
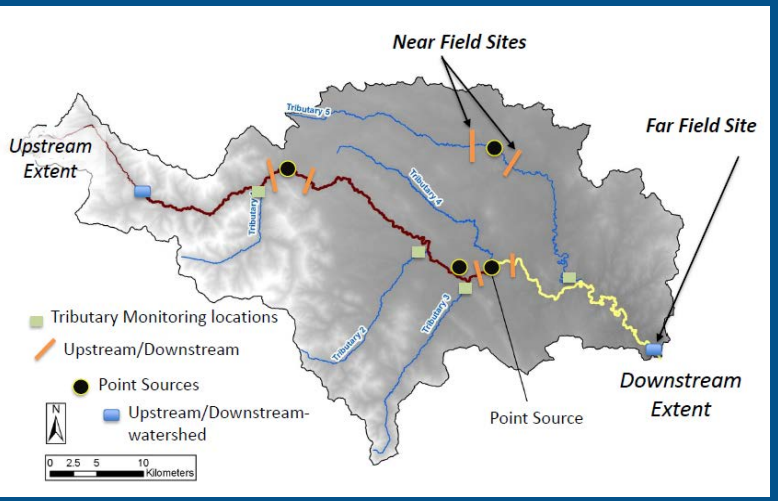
Western MT: Sample Types and Frequency





Near Field Sites

- Benthic Chla, AFDW, and TP, TN concentrations: *At least twice annually during the index period, with at least six weeks between each sampling event*

- Visual Assessment of % Bottom Cover: *At least monthly during the index period; two events must pair with the Chla/AFDW sampling.*

Far Field Sites

- TP, TN Concentrations: *At least twice annually during the index period, with at least six weeks between each sampling event. DEQ is considering if response variables should be required*

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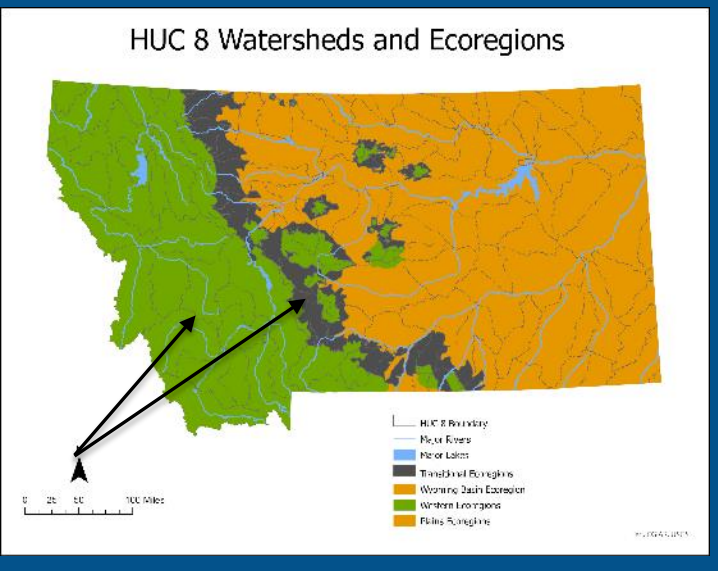
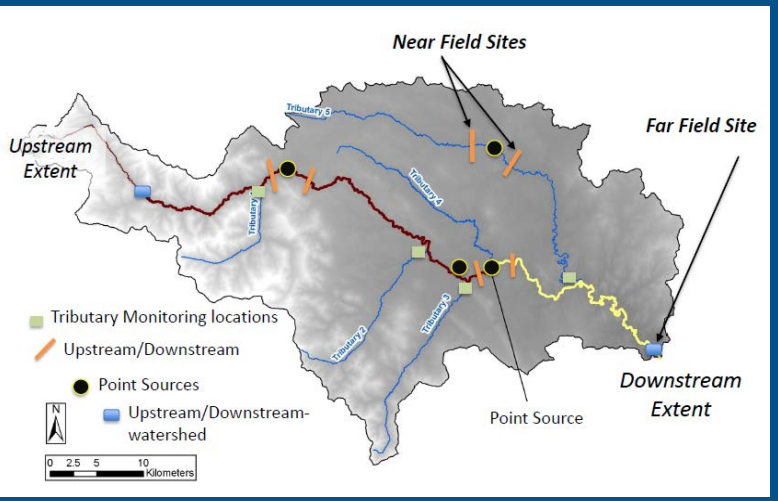
Western MT: Sample Types and Frequency



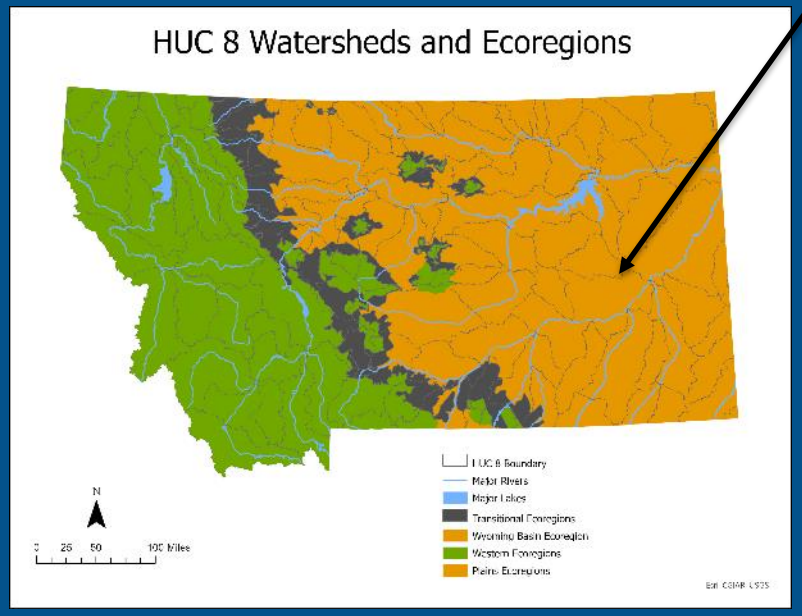


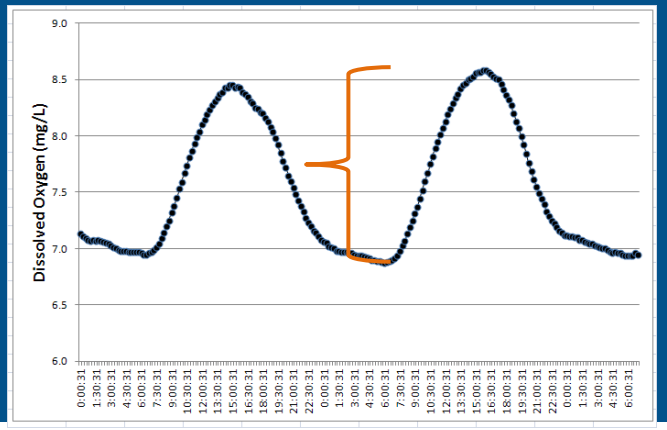
Tributaries

- TP, TN Concentrations: *At least twice annually during the index period, with at least six weeks between each sampling event.*

Technical Subcommittee Discussion and Feedback

Eastern Montana Wadeable Streams





Dissolved Oxygen Delta:
Daily High minus Daily Low

(DO standards will also apply, per DEQ-7, DO assessment SOP)

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Data Collection Index Periods ("Growing Season")

Start and Ending Dates for Three Seasons (Winter, Runoff and Growing), by Level III Ecoregion.

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Wyoming Basin	Oct.1	April 14	April 15	June 30	July 1	Sept. 30

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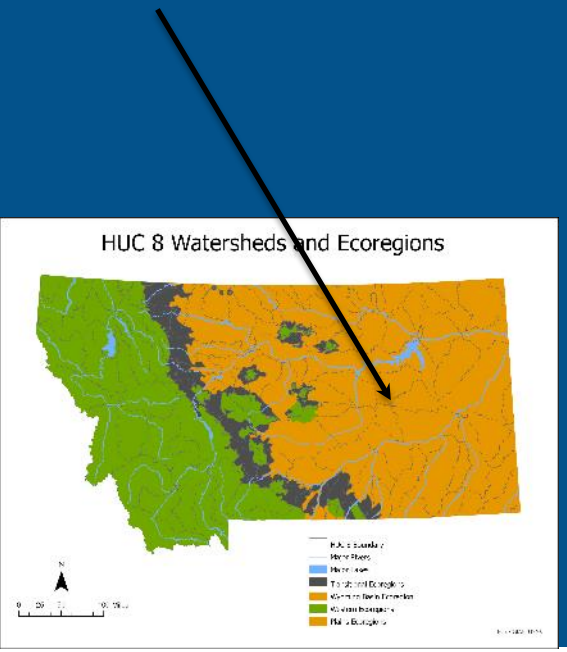
DO Delta Thresholds for Eastern Montana

Entity	Dissolved Oxygen Delta	Use Protected/Instream Value
MT: Assessment Method (2016)	5.3	Non-salmonid fishes and associated aquatic life
Minnesota PCA (2015)	3-4.5	Aquatic life; vary by region (4.5 similar to E. MT ecoregions)
Ohio EPA (2015)	6.5	Trophic Condition Status, per Stream Nutrient Assessment Procedure



Eastern Montana Reference Sites (2008-2010)
90% of the daily DO deltas <5.3 mg/L. Highest value was 6.6 mg/L in a site with abundant macrophytes

Draft DEQ recommendation: 5.3 mg/L

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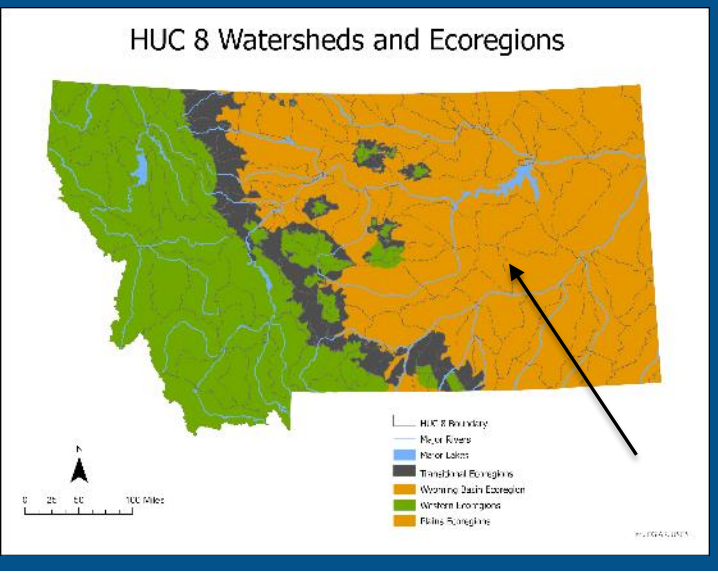
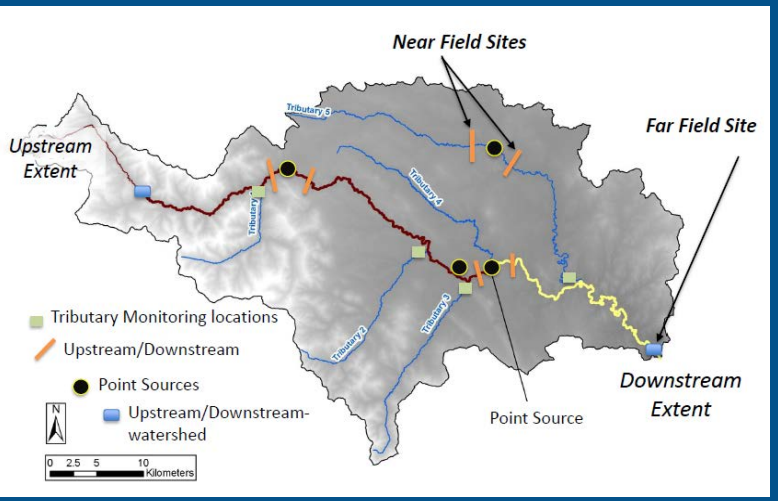
Eastern MT: Sample Types and Frequency





Near Field Sites

- Dissolved Oxygen, DO Delta, Temperature: *Instruments must be deployed annually for a minimum of 30 continuous days with at least 21 days collected in August.*

- TP, TN Concentrations: *At least twice annually during the index period, with at least 30 days between each sampling event.*

Far Field Sites

- TP, TN Concentrations: *At least twice annually during the index period, with at least 30 days between each sampling event. DEQ is considering if response variable should also be required*

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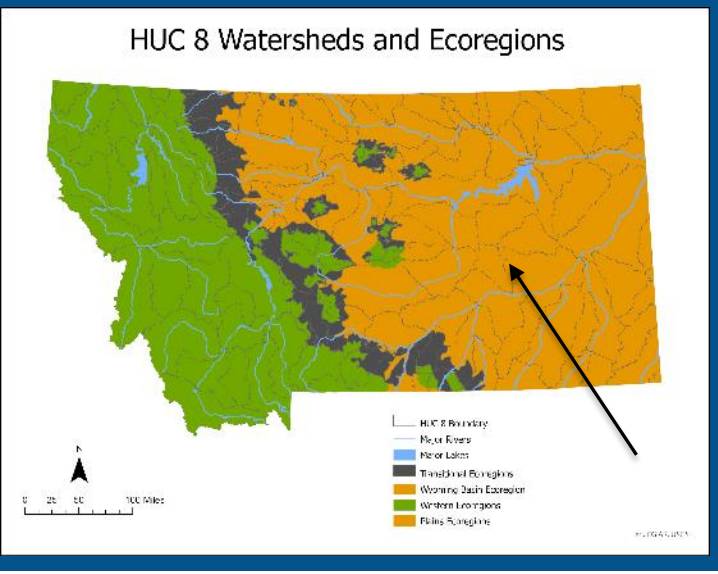
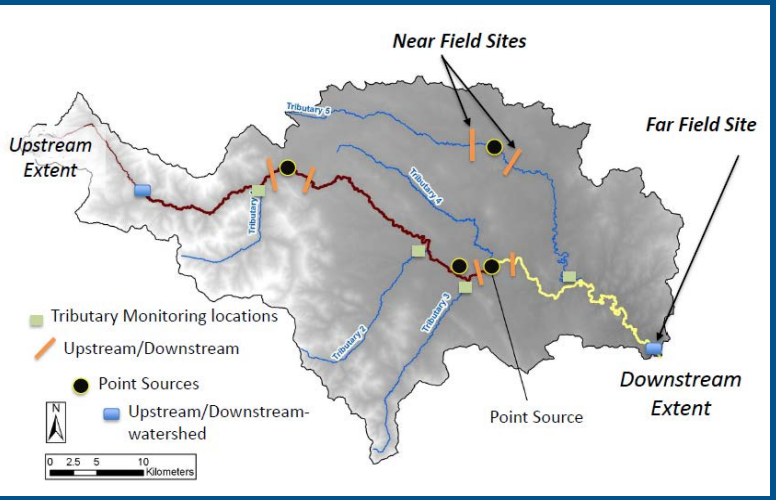
Eastern MT: Sample Types and Frequency



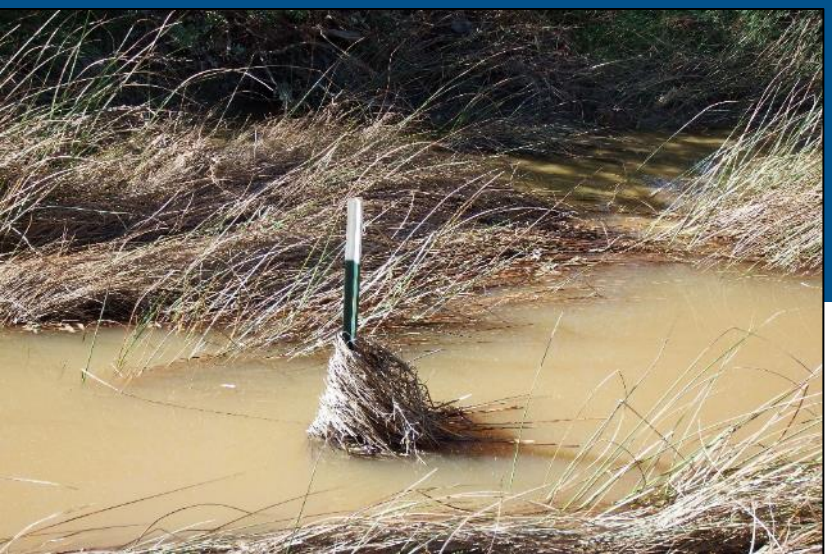


Tributaries

- TP, TN Concentrations: *At least twice annually during the index period, with at least 30 days between each sampling event.*

Instrument Maintenance

- Copper mesh keeps algae growth off the sensor for up to a month
  - Prevents interference with data
- Drifting algae and aquatic plants can smother instruments
  - Should be checked periodically during deployment (weekly ideal)



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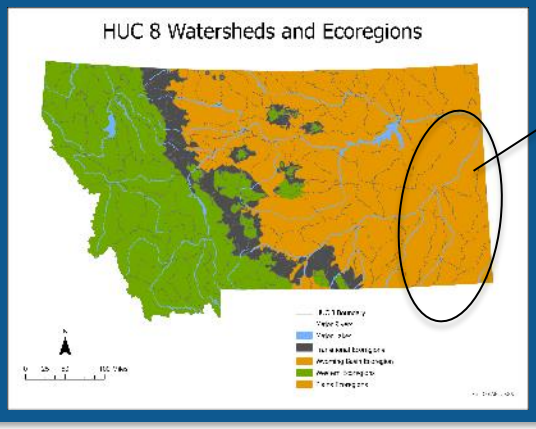
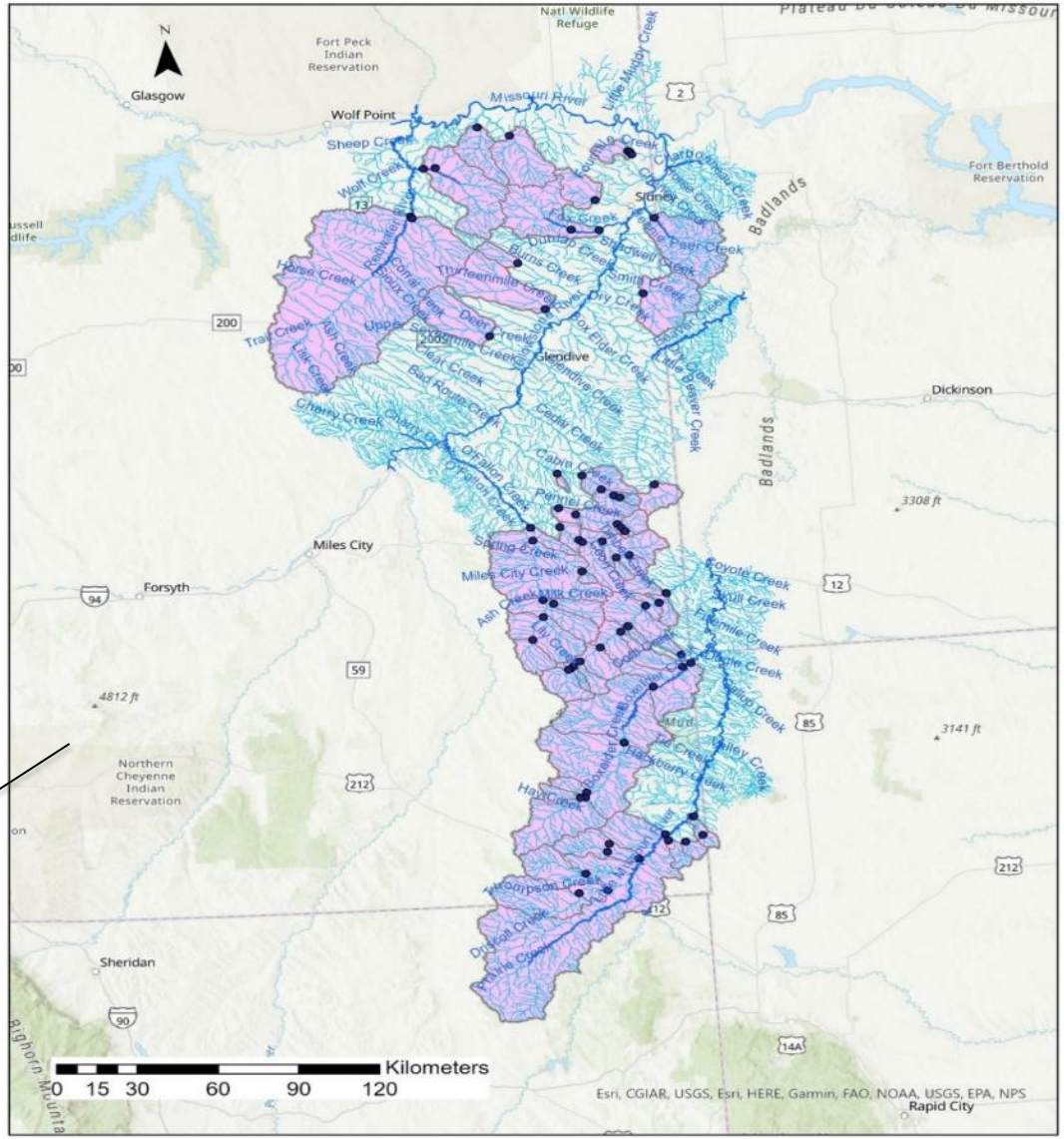
Technical Subcommittee Discussion and Feedback

Factors Affecting DO Delta in Prairie Streams

2013-2017 DEQ Study
GLEC* assisted DEQ with analyses

- 78 unique sites
- DO delta measured from one to five years in summer/fall





*Great Lakes Environmental Center, Inc., Traverse City, MI

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We Examined these Variables that Might Affect DO Delta

Land Use/Cover
- % area within watershed by type (19 types)
- Compiled for whole watershed, 5 km radius (from sampling point), 1 km radius

Petroleum-Based Well
- Count by age (actual, before/on-after 1990) or type within watershed
- Type= oil, gas, oil & gas

Topographic Slope
- Median, mean, variance, or maximum value (tangent) by watershed

Drought
- NOAA Palmer Indexes (Z-index, PMDI, PHDI)
  - By month by climate division → integrated to watershed
- National Drought Monitoring Center (% area, consecutive weeks)
  - By week by county → integrated to watershed

Factors
1. Stream category (site count)
   - Perennial (25), intermittent (41), ephemeral (1), wetland type (6)
2. Drainage area (numeric)
3. Comparison (reference) site – yes/no

Water Chemistry
- Nutrients (concentration only)
  - TP, SRP
  - TN (measured), NO23, NH34
  - Conductivity, temp (both instantaneous and continuous), pH
- Events: 2013-2017 (various frequencies by site)
  - 73 sites – every site not sampled each year – some sites have data for 5 years, others 4,3,2,1 year

Aquatic Plants – Periphyton (diatoms)
- % relative abundance, impairment probability (metric)
- End sample result or average begin/end sample
- Events: 2013-2017 (various frequencies by site)
  - 73 sites – same frequency as Water Chemistry – if turbid no sample taken

Aquatic Plants – Aquatic Visual Assessment
- Microalgae (diatoms and all "short" attached algae), filamentous algae, macrophyte, moss
- Cover (numerical), color, condition, and thickness (numerical)
- Events: 2013-2017 (various frequencies by site)
  - 73 sites – same frequency as Water Chemistry – if turbid no sample taken

Aquatic Plants – Plant Species
- Categorical – presence/absence by species
  - Algae/macrophyte
- Events: 1 time sample only
  - 73 sites – same frequency as Aquatic Visual Assessment – if turbid no sample taken

Factor (Indicator)

Predictor – Stressor or Mitigator

Dual – Predictor/Response

Response

Dissolved Oxygen
- Multiple week sampling
  - Minimum: average/max
  - Variance of time series
  - Delta:
    - average/max
    - #days delta above threshold (mg/L)
      - 3.5 (Heiskary MN)
      - 5.3 (Suplee MT)
      - 6.5 (Miltner OH)
- Events: 2013-2017 (various frequencies by site)
  - 73 sites – every site not sampled each year – some sites have data for 5 years, others 4,3,2,1 year

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Major Findings and Implications

- Recommended using average weekly DO Delta
- Drought cycles tend to have higher DO Delta, wet cycles lower
- Watersheds with higher % land use have higher DO delta
- Findings allow DO delta thresholds to be considered in light of other environmental factors that co-occur

Updated procedures regarding use of DO delta should come later this year

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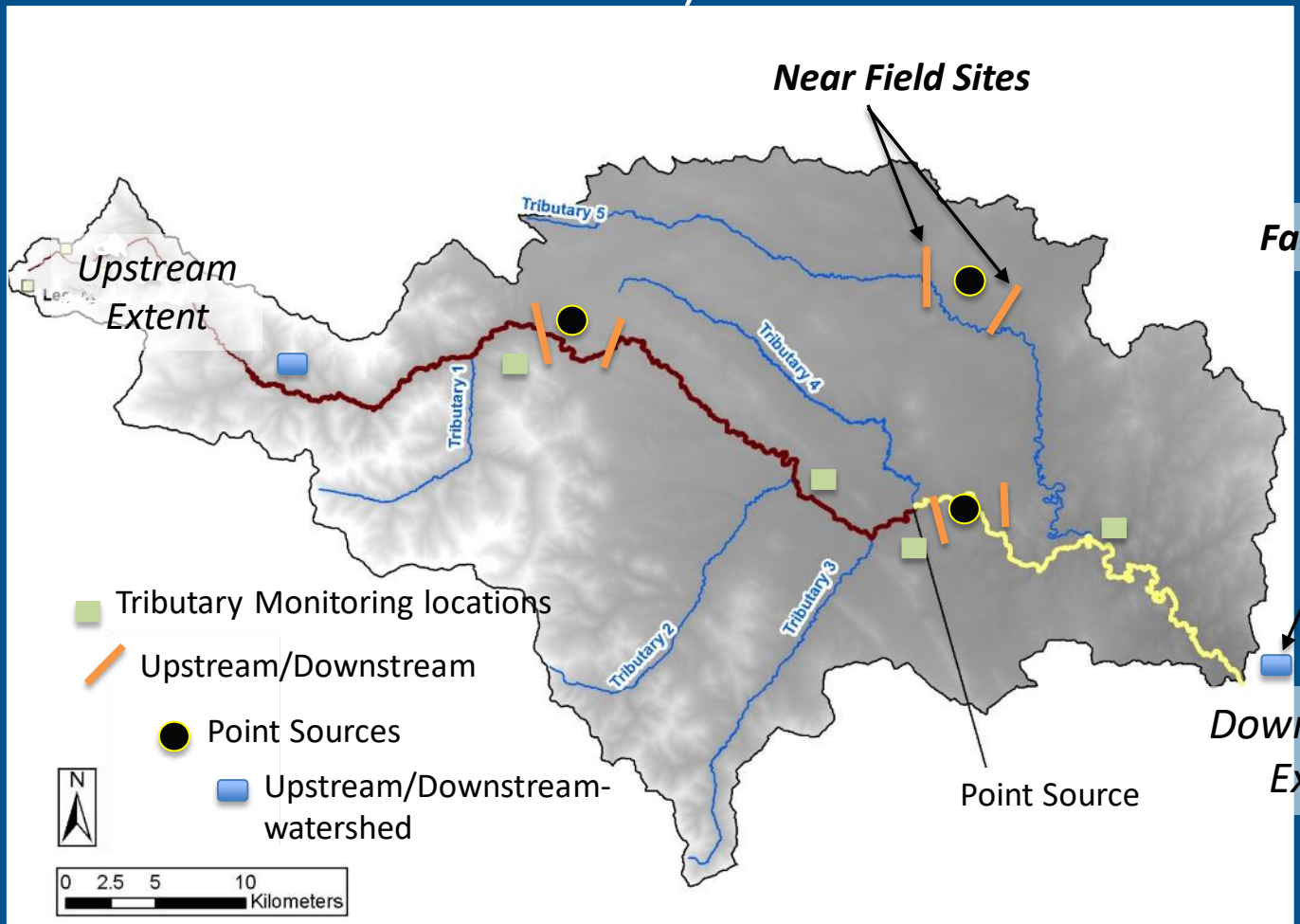
Technical Subcommittee Discussion and Feedback

Relative Change: Up- and Downstream of Point Source (Near Field Sites)



Note: This map demonstrates monitoring locations upstream and downstream of point sources. The locations shown are for illustrative purposes only. In addition to upstream and downstream, monitoring downstream of the confluence would be required to demonstrate cumulative effects.

DEQ MONTANA

Relative Change Data Will Provide New Insights on the Effect of a Point Source

Two Scenarios, for Illustration

Scenario 1: Mixed results, minimal effect from point source. Little relative difference, and fairly variable (sometimes algae is lower below the facility, sometimes higher). Both upstream and downstream sites meet threshold of 125 mg Chla/m^2.

Benthic Chlorophyll *a* (mg/m^2)			
Sampling Event	Upstream	Downstream	Difference
July 15, 2022	60	115	55
August 15, 2022	55	54	-1
July 15, 2023	90	91	1
August 15, 2023	95	110	15
July 15, 2024	30	75	45
August 15, 2024	35	20	-15
July 15, 2025	49	49	0
August 15, 2025	70	60	-10
July 15, 2026	10	50	40
August 15, 2026	20	20	0
5-Year Average:	**51.4**	**64.4**	**13**

Scenario 2: Large effect from the point source. Algae is high below the facility and routinely exceeds the 125 mg Chla/m^2 threshold. Upstream, the river consistently meets the threshold. The problem can be clearly linked to the point source.

Benthic Chlorophyll *a* (mg/m^2)			
Sampling Event	Upstream	Downstream	Difference
July 15, 2022	60	115	55
August 15, 2022	55	300	245
July 15, 2023	30	250	220
August 15, 2023	35	115	80
July 15, 2024	30	125	95
August 15, 2024	35	140	105
July 15, 2025	49	250	201
August 15, 2025	25	275	250
July 15, 2026	10	155	145
August 15, 2026	20	155	135
5-Year Average:	**34.9**	**188**	**153.1**

DEQ is still working out the details of how all the data will be considered and assessed collectively

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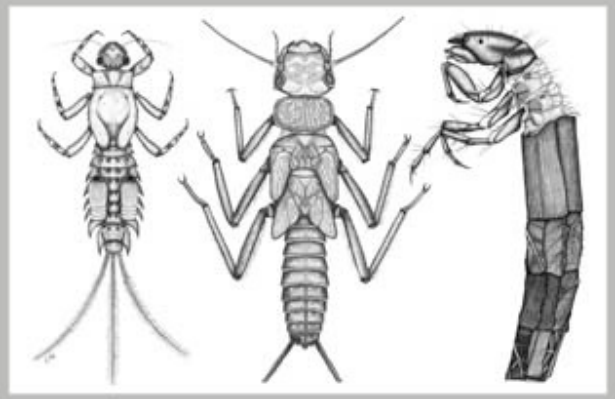
Technical Subcommittee Discussion and Feedback

Additional Response Variables

For Western and Eastern Montana Wadeable Streams and Medium Rivers

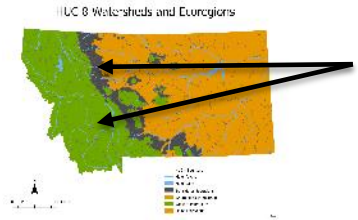
Western MT Wadeable Streams & Medium Rivers: Additional Response Variable



- Macroinvertebrates
  - Hilsenoff Biotic Index (HBI)

    At near-field sites, DEQ proposes that no specific metric threshold will apply, because other environmental factors affect insect populations. Instead, DEQ will consider the relative HBI change u/s vs. d/s.

  - Data will be used to support algae data results
  - Sampling Frequency: At a minimum, once per annual index period, corresponding to one of the other sampling events



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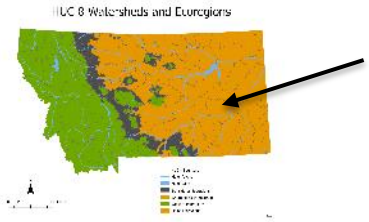
Eastern MT Wadeable Streams & Medium Rivers: Additional Response Variable

- Biochemical Oxygen Demand (BOD5)

  For near-field sites, DEQ proposes that no specific threshold apply, as our knowledge of natural BOD5 levels in prairie streams is limited. Instead, examine relative change in BOD u/s vs. d/s.

  - Data will be used to support DO delta results
  - Sampling Frequency: At a minimum, once per year during September or October (Note: October is after the index period).



Technical Subcommittee Discussion and Feedback

As Time Allows

Data and Monitoring Resources Overview

Water Quality Planning Bureau Monitoring

Collect water quality data from state waters

- Ambient data representing current conditions
- Streams, rivers, lakes/reservoirs, wetlands
- Many types of data (chemical, biological, physical)

Implement monitoring projects each field season

- Monitoring objectives vary across programs
- Project areas vary from year to year

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Water Quality Planning Bureau Monitoring

Use three main approaches
- Internal
- Partnerships
- Volunteer Monitoring

Apply similar data quality requirements
Data can be applied to multiple uses
- Similar field methods, analytical methods

Apply Similar data management approach
- Data is stored in the same location and format (EQuIS)
- Data is publicly available

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Internal Monitoring

Each WQPB section monitors for several objectives:

Standards and Modeling	Standards Development
	Reference Conditions
Monitoring and Assessment	Beneficial Use Assessment
	Trend Analysis
Watershed Protection	TMDL Source Assessment
	Restoration Project Effectiveness

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Monitoring Partnerships

Opportunities	Similar Objectives
	Local
	Willing and Able
Benefits	Cost Savings
	Data Sharing
Approaches	Contracts, Joint Funding Agmts
	Cooperative Sampling Planning

Examples: State/federal agencies; water quality districts; municipalities; watershed groups; conservation districts

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Volunteer Monitoring Support Program

Financial Support	Lab Analysis Costs
	Direct Contracts
Technical Support	Sampling and Analysis Planning
	Training
Material Support	Equipment
	Supplies

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Types of Data

Chemical parameters

- Water and benthic sediment
- Nutrients, metals, organics, other

Biological samples

- Algae (chlorophyll-a, AFDW)
- Periphyton (taxa)
- Macroinvertebrates (taxa)

Field parameters

- Instantaneous or continuous measurements
- Dissolved oxygen, pH, specific conductivity, temperature

Discharge

Physical/sediment

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Data Summary

Last 5 years (2016 – 2020)

Total number of result values* in database

- Internal monitoring projects: **175,985**
- Volunteer monitoring projects: **32,284**

* includes both analytes and field measurements

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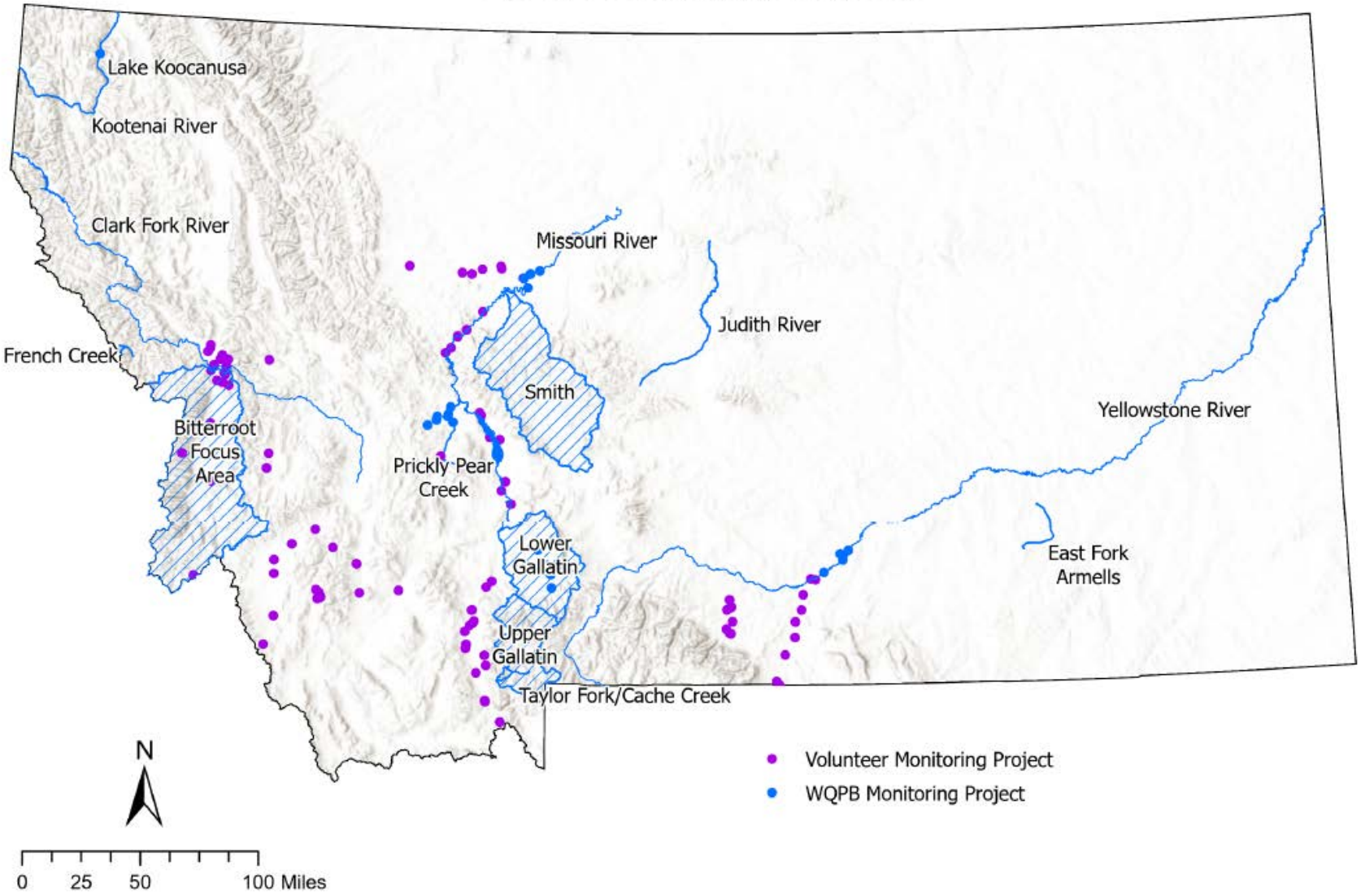
2021 Monitoring Projects



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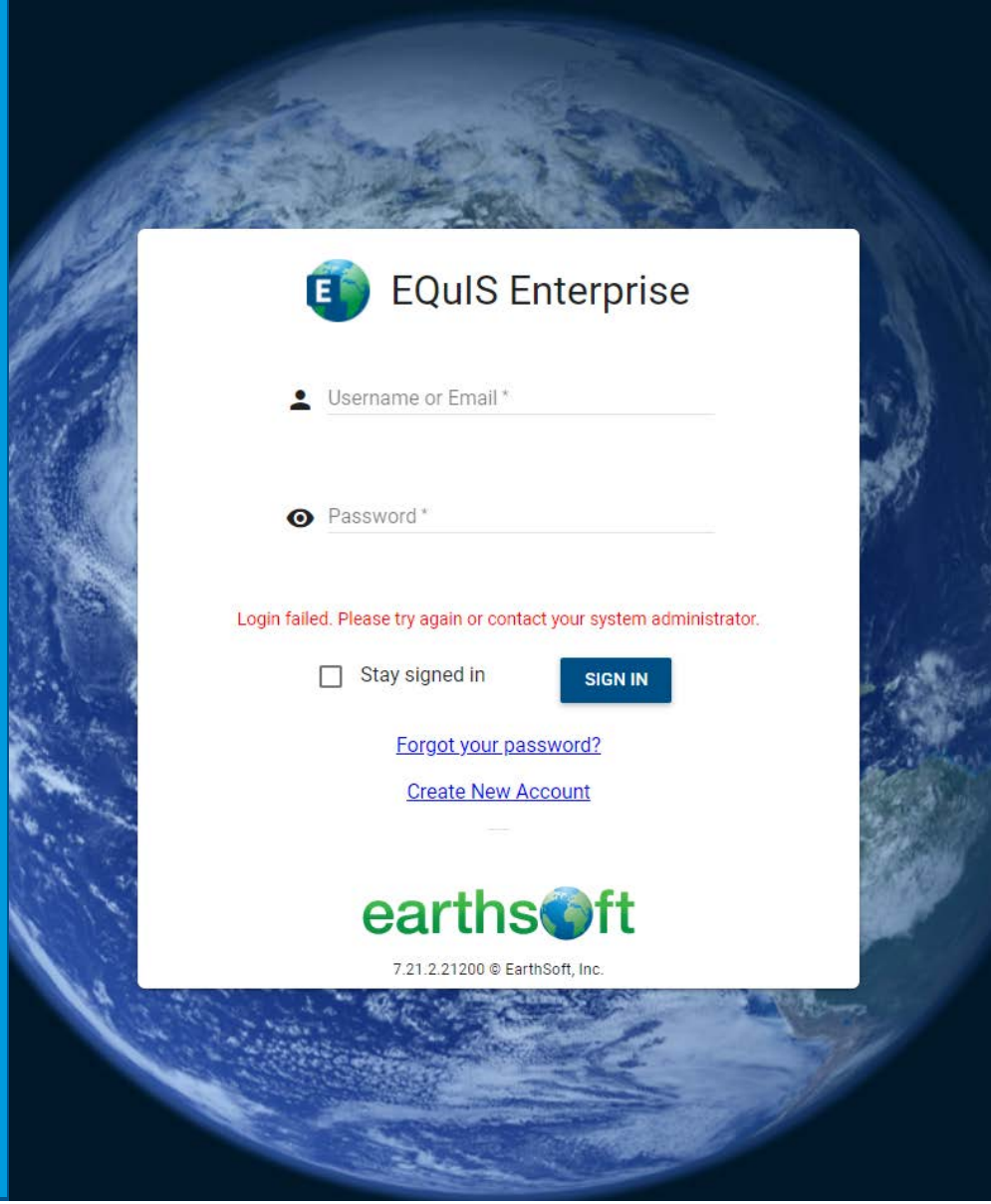
Accessing Data: EQuIS

DEQ's primary database for ambient water quality data

- Result values
- Metadata (e.g., station name, lat/long, method, reporting limit)
- Internal DEQ and external (partners, VM) data submittal
- **Not publicly available via EQuIS**
- **Data is uploaded weekly from EQuIS to National Water Quality Portal**



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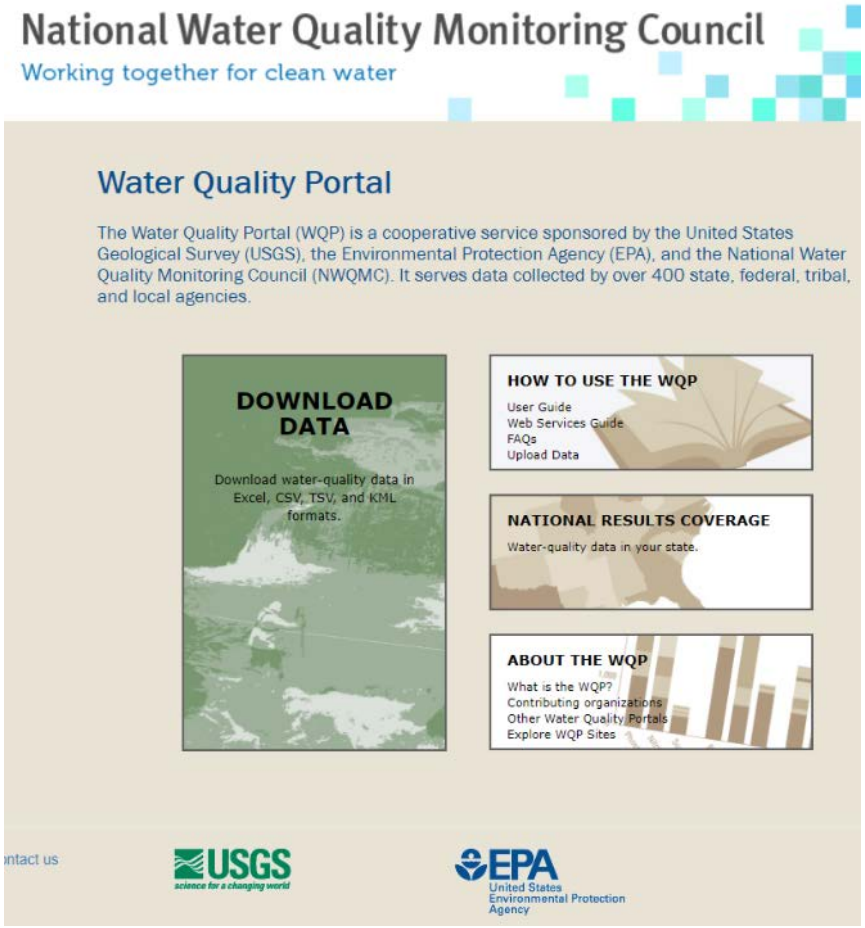
Accessing Data: National Water Quality Portal

- Combines EPA's STORET and USGS's NWIS databases
- Contains data from EPA, USGS, states, tribes, watershed groups, other federal agencies, volunteer groups, and universities
- Includes most DEQ ambient water quality data
- **Publicly available**



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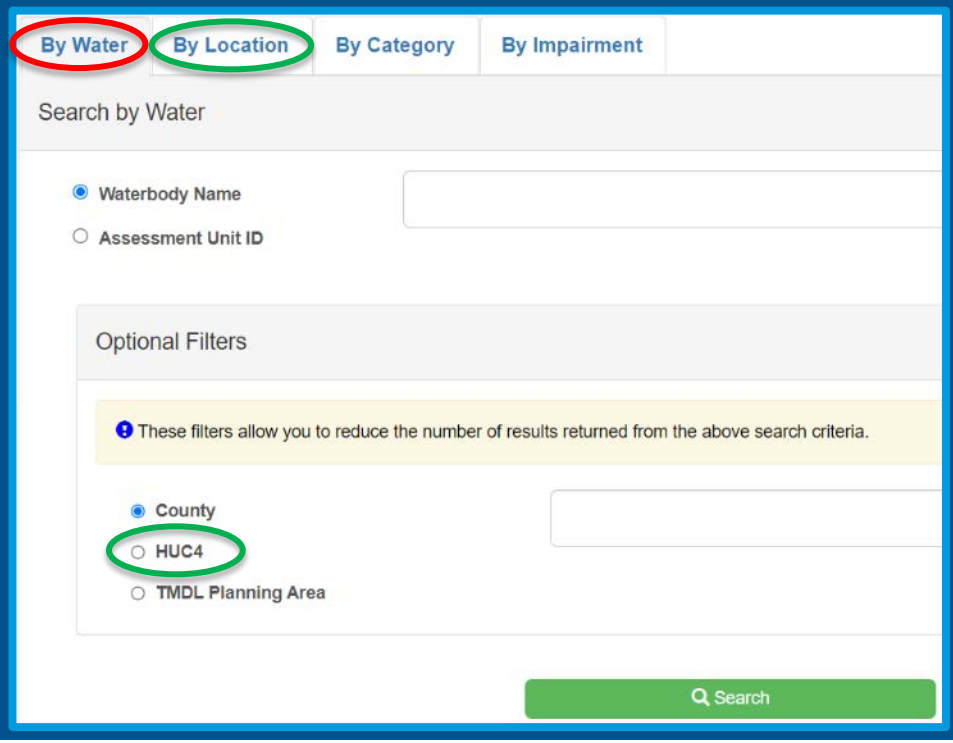
Accessing Data: Water Quality Assessments

Clean Water Act Information Center (CWAIC)

Here you will find information about the quality of Montana's rivers, streams, and lakes in relation to Montana's Water Quality assessments. These assessments are derived from available statewide water monitoring data and information. The Clean Water Act Information Center also provides access to Montana's Water Quality Reports and List of Impaired Surface Waters, as well as online search and mapping tools.

Search Water Quality Assessment Information

https://deq.mt.gov/water/resources



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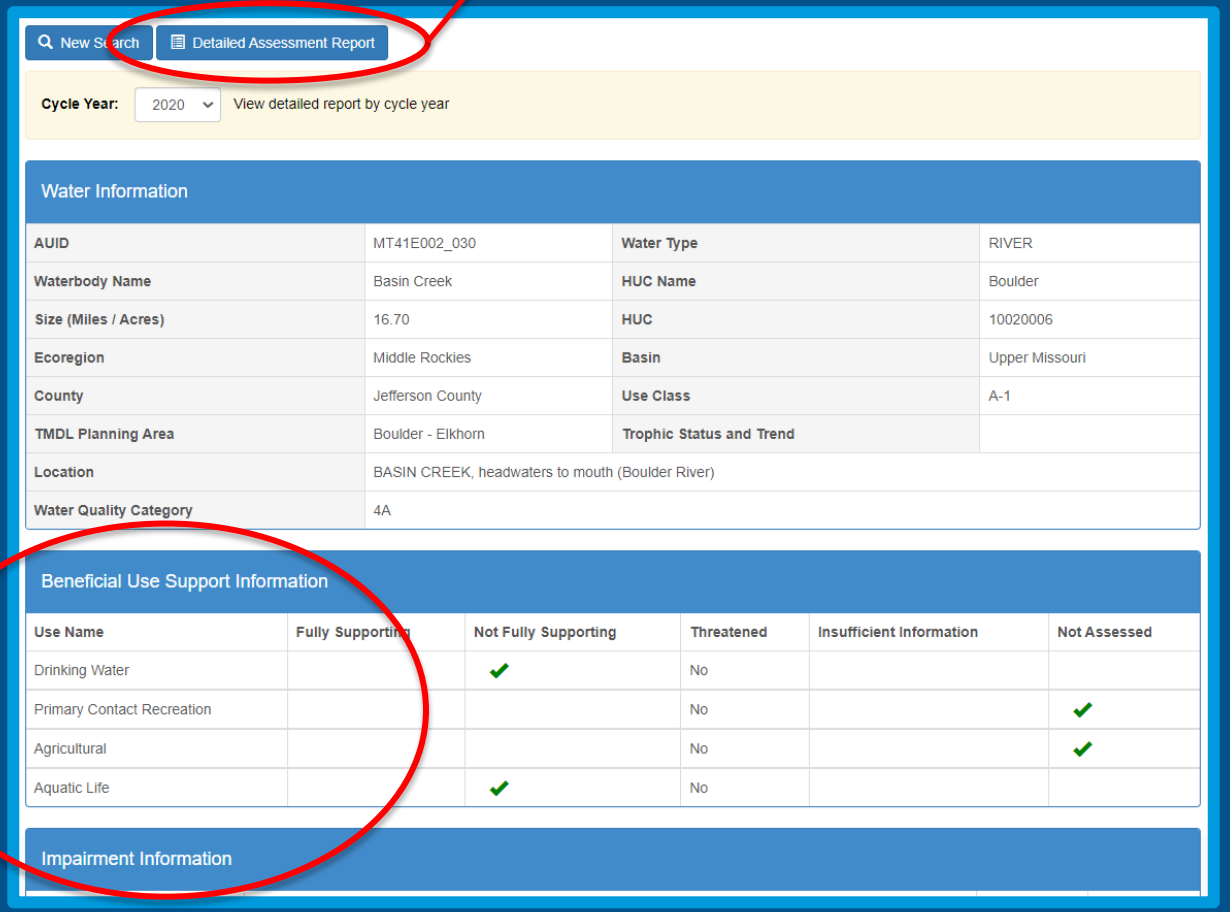
Accessing Data: Water Quality Assessments

CWAIC, continued…

Detailed assessment record

Summary of assessment findings



New Search | Detailed Assessment Report

Cycle Year: 2020 View detailed report by cycle year

Water Information

AUID	MT41E002_030	Water Type	RIVER
Waterbody Name	Basin Creek	HUC Name	Boulder
Size (Miles / Acres)	16.70	HUC	10020006
Ecoregion	Middle Rockies	Basin	Upper Missouri
County	Jefferson County	Use Class	A-1
TMDL Planning Area	Boulder - Elkhorn	Trophic Status and Trend	
Location	BASIN CREEK, headwaters to mouth (Boulder River)		
Water Quality Category	4A		

Beneficial Use Support Information

Use Name	Fully Supporting	Not Fully Supporting	Threatened	Insufficient Information	Not Assessed
Drinking Water		✔	No		
Primary Contact Recreation			No		✔
Agricultural			No		✔
Aquatic Life		✔	No		

Impairment Information

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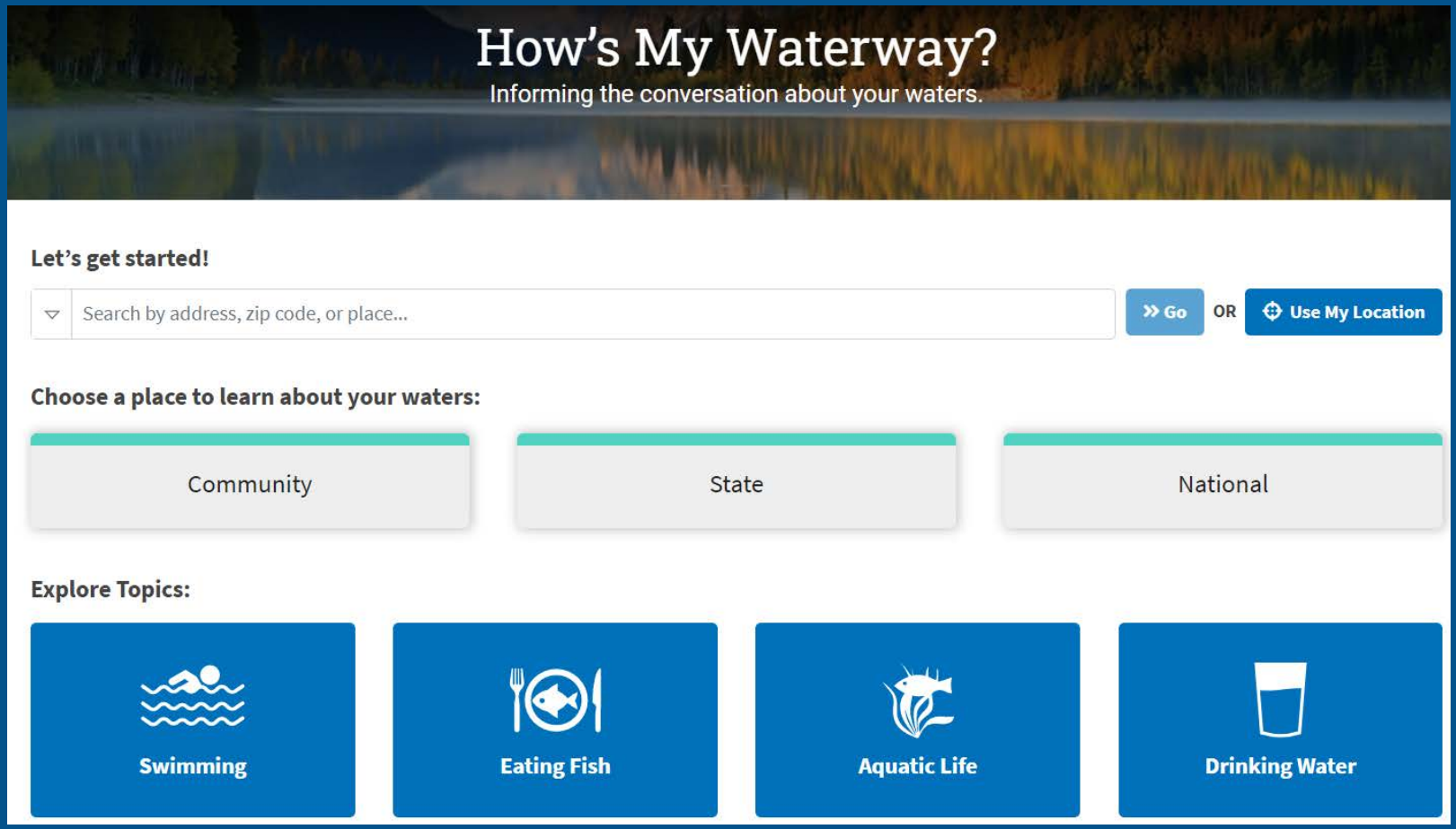
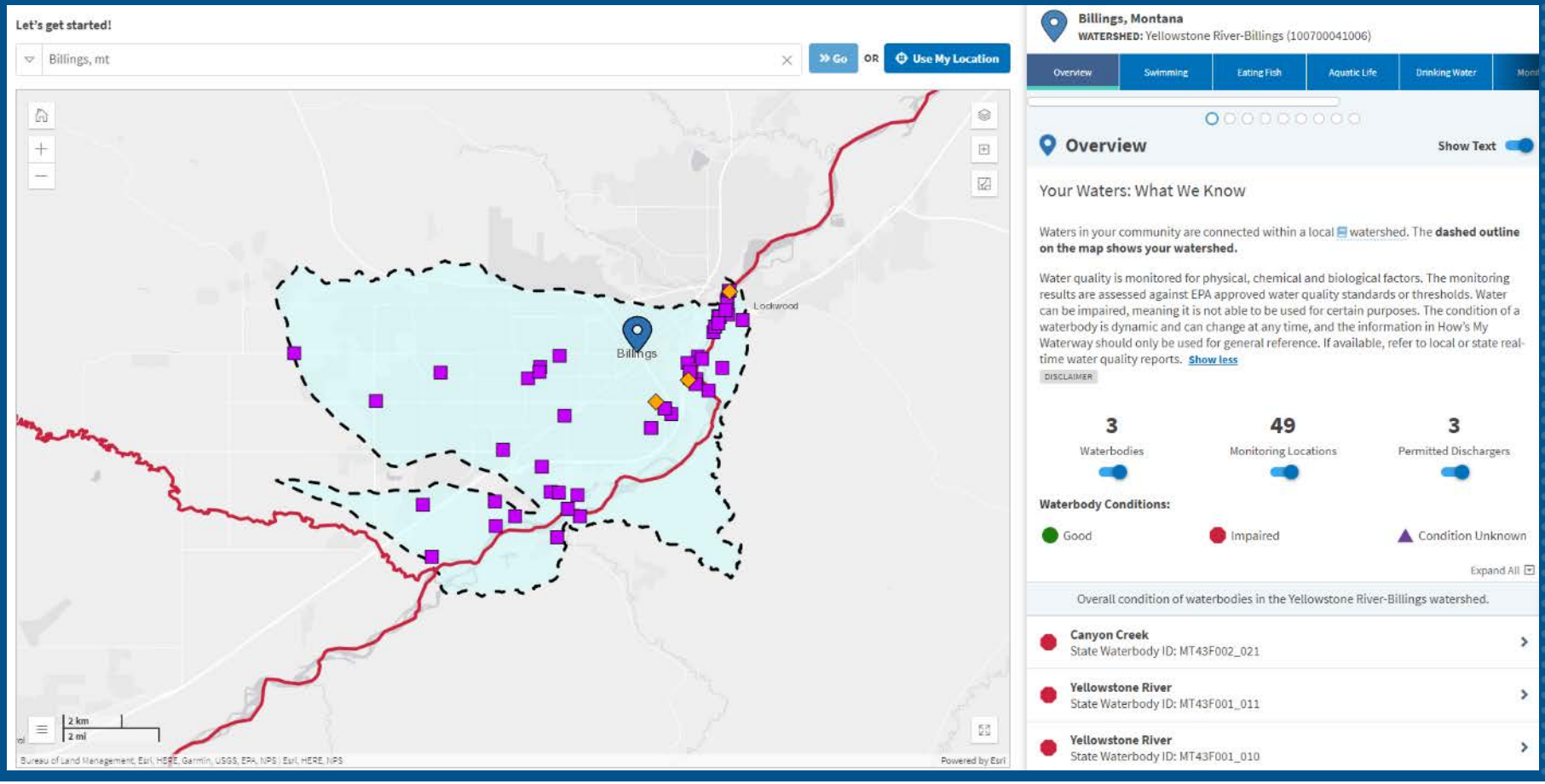
Accessing Data: EPA's How's My Waterway?



Accessing Data: EPA's How's My Waterway?



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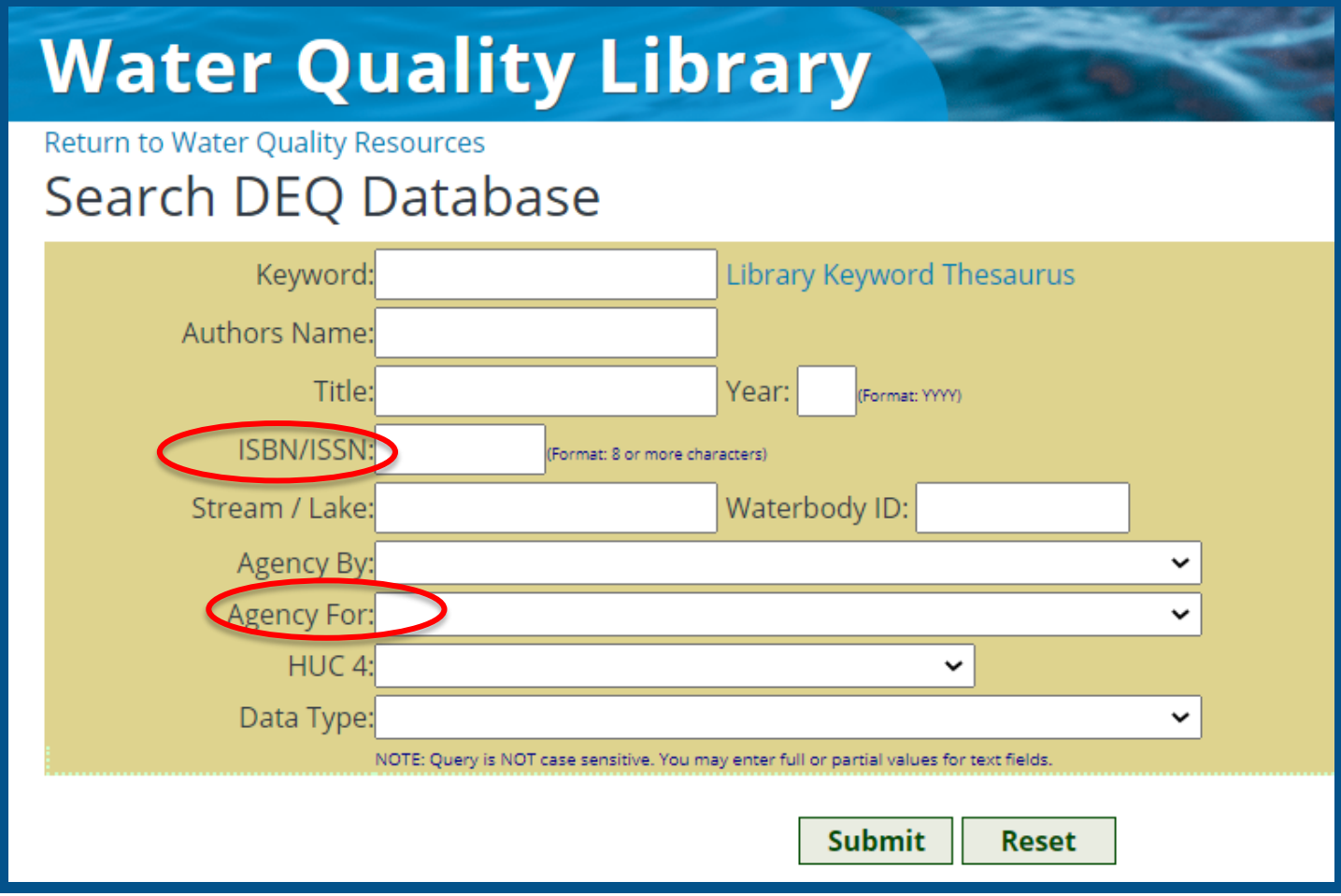
Accessing Data: Reports and Information



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Other Monitoring Resources

Other resources that may be available for those developing Adaptive Management Plans:

- Standard Operating Procedures (SOPs) for field methods
- Training
- Equipment Support

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Public Comment & Close of Meeting

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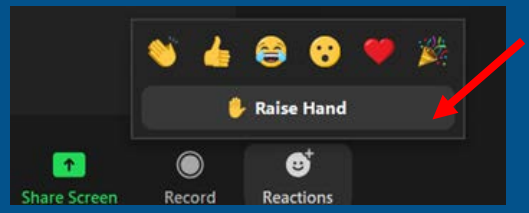
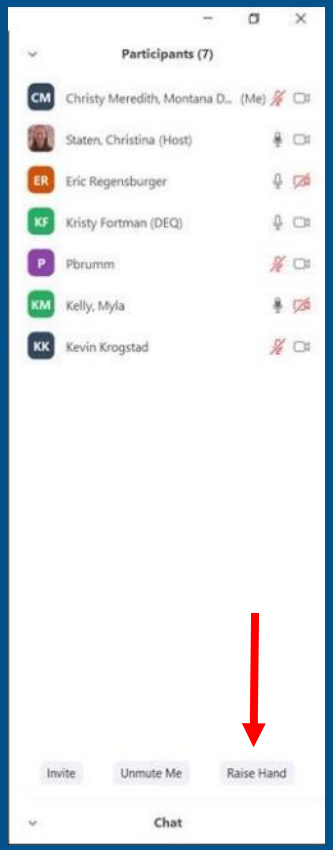
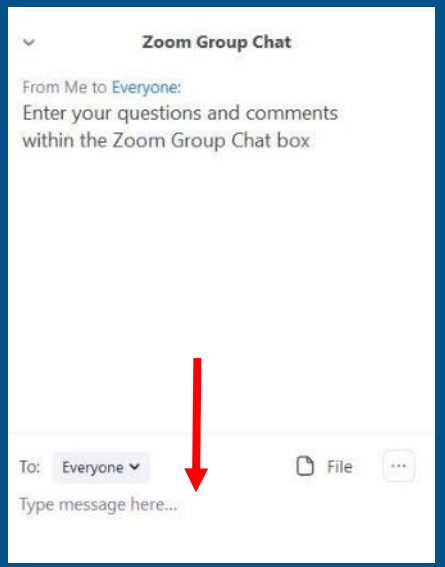
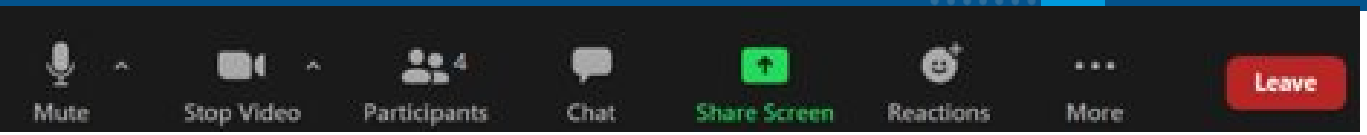
Questions/ Comments

- Raise hand or type questions into the chat
- Please keep your microphone muted until called on
- If calling by phone, press*6 to unmute
- State your name and affiliation before providing your comment









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Next Meetings

- Next Technical Subcommittee

  Sept. 7, 2021, 1:30 – 3:30 PM

  Topic: Details for identifying point source long-term nutrient targets

- Nutrient Work Group Session 4

  Aug. 25, 2021, 9-11 AM

Thanks for Joining Us

Contact:
Mike Suplee, MSuplee@mt.gov
Rainie Devaney, RDevaney@mt.gov

To submit comments or questions

Submit Comments or Questions

http://deq.mt.gov/water/resources

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