

Nutrient Offset Trading Workgroup

April 16, 2026

Preliminaries

- Agenda
- Roll Call
- Approve March 17, 2026 meeting minutes and share any post-meeting thoughts or ideas



Agenda

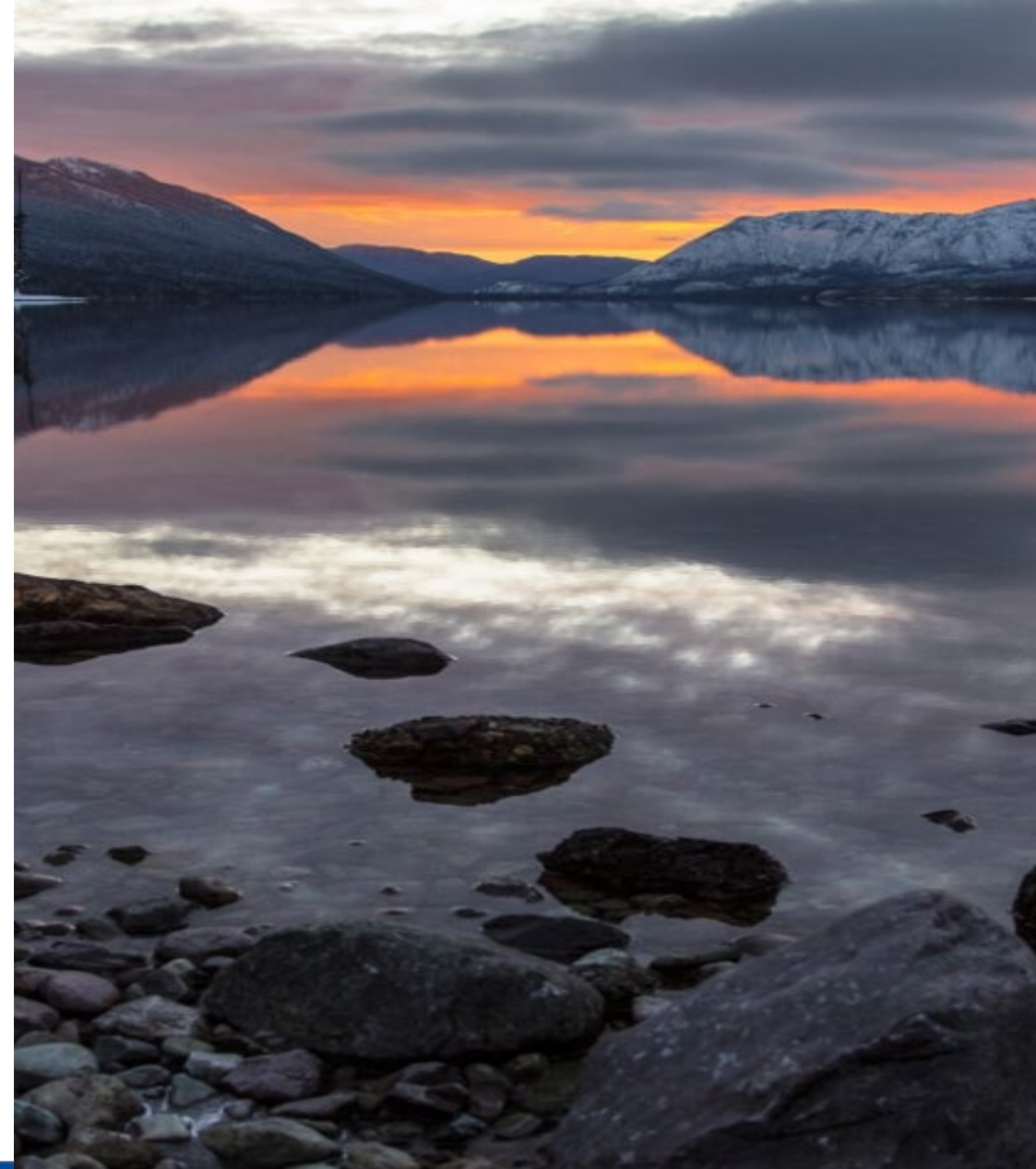
- Discussion Topics
 - DEQ-13 Proposed Updates Review
 - Topics to revisit from March 17th
 - Wetland Monitoring (Greg Bryce)
 - Process Diagram
 - Offset Ratios
 - Example Credit Scenarios
- Strategy for Next Meeting
- General + Public Comment



DEQ-13 Proposed Updates Review



Topics to Revisit from March 17th



Wetland Monitoring



IN-SITU STUDY OF GROUNDWATER NITROGEN ATTENUATION IN WETLAND SEDIMENT

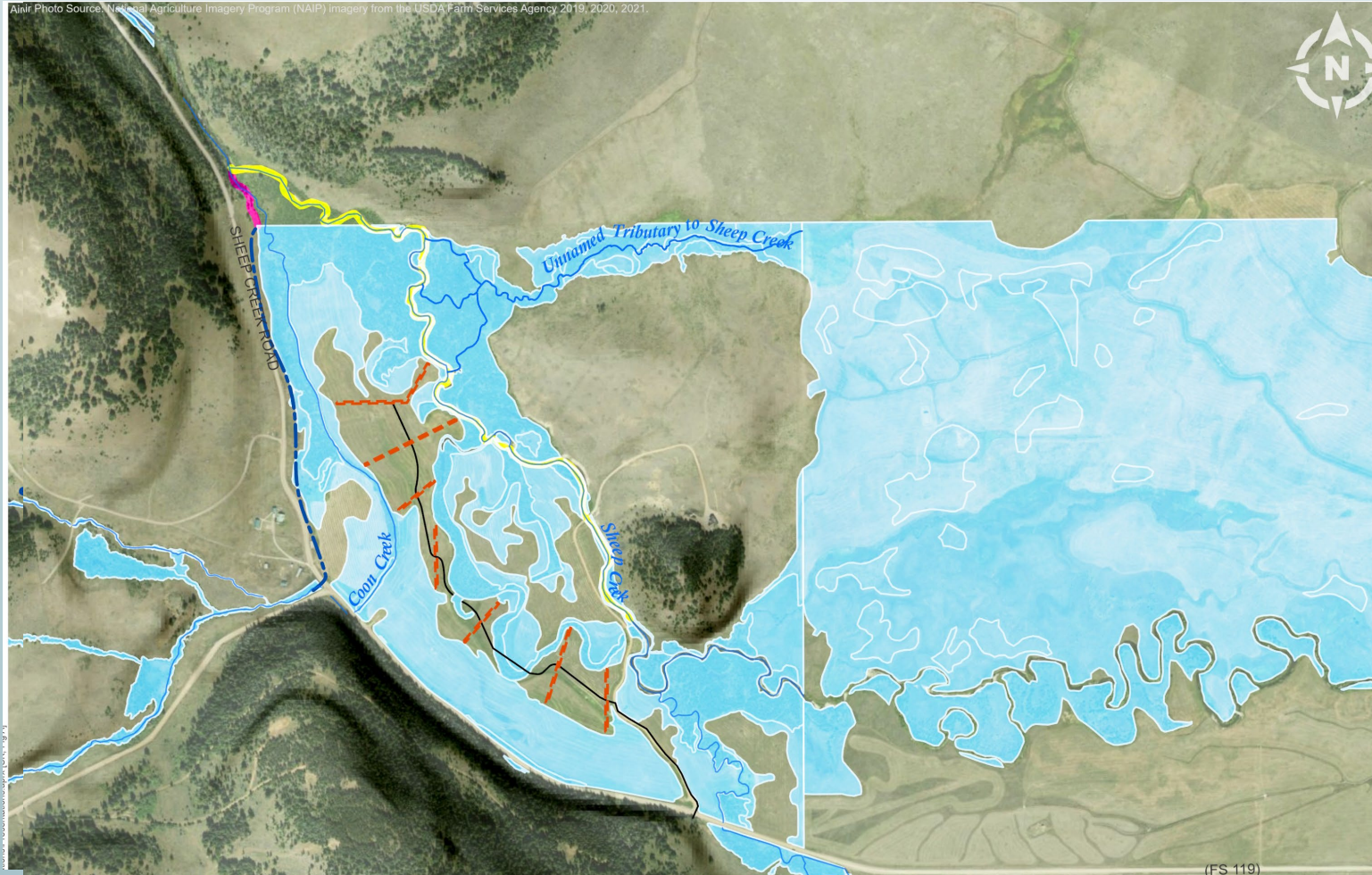
Presented by Greg Bryce | April 16, 2026



Hydrometrics, Inc.

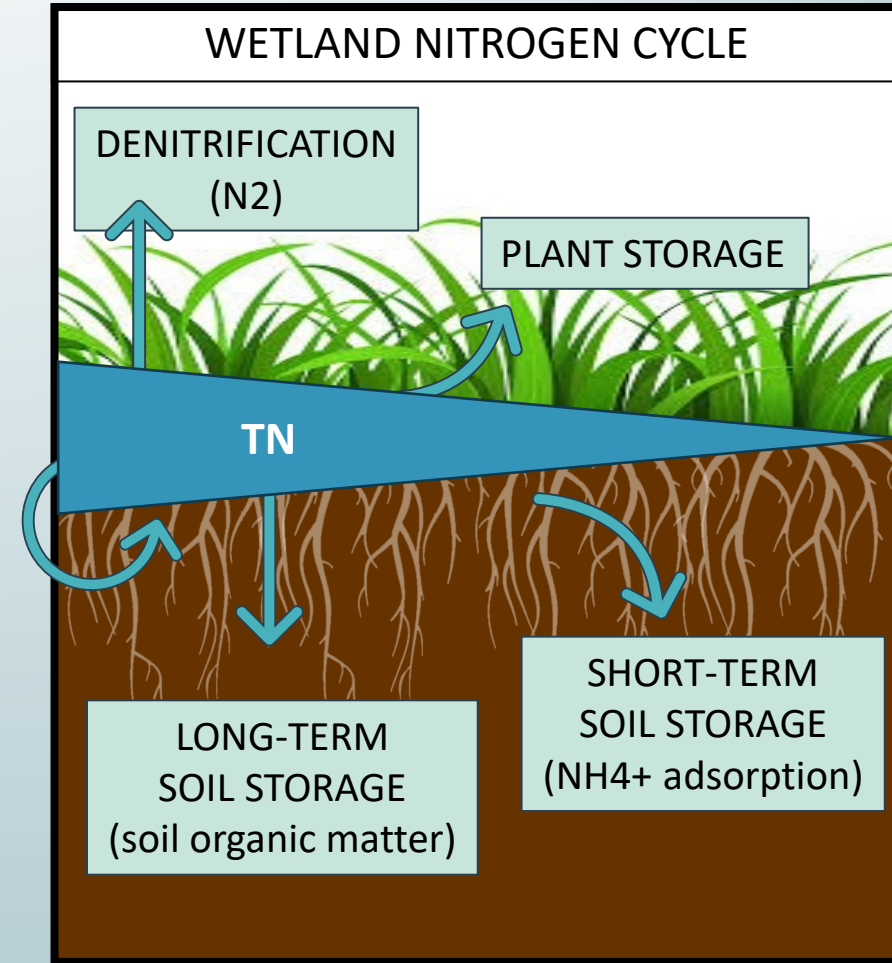


Hydrogeologic Setting



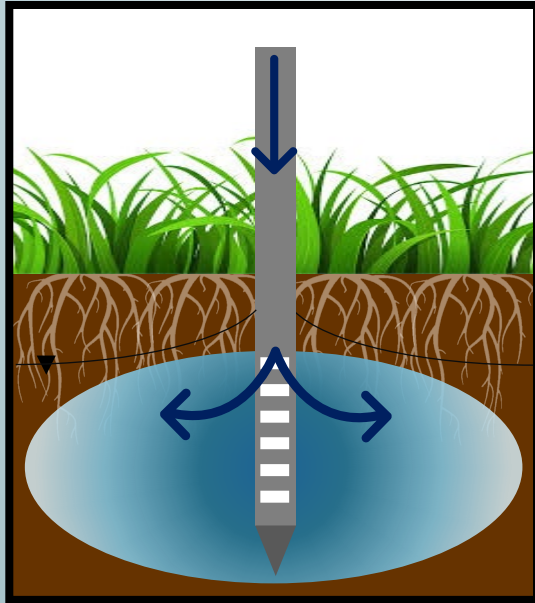
ACCOUNTING FOR NATURAL ATTENUATION

Do the wetlands along Sheep Creek decrease total N concentrations in groundwater during the growing season?

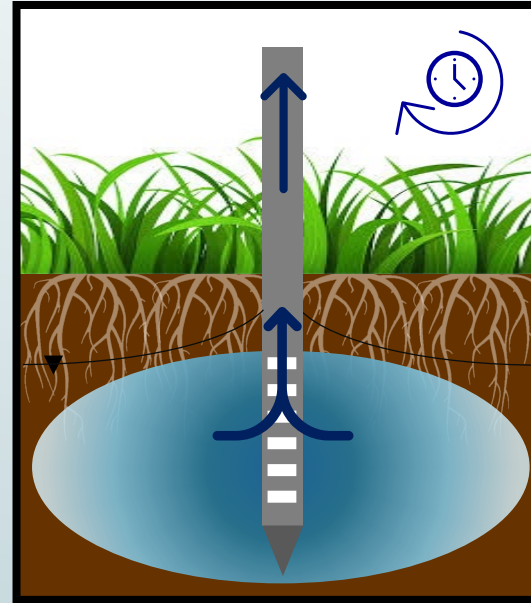


METHODS: HOW TO EVALUATE NITROGEN ATTENUATION

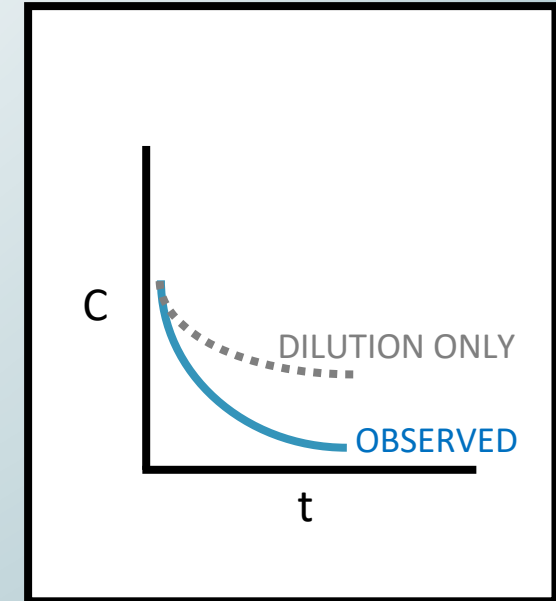
Push-pull tests were conducted to evaluate in-situ nitrogen attenuation rates



INJECTION
“push”



EXTRACTION
“pull”



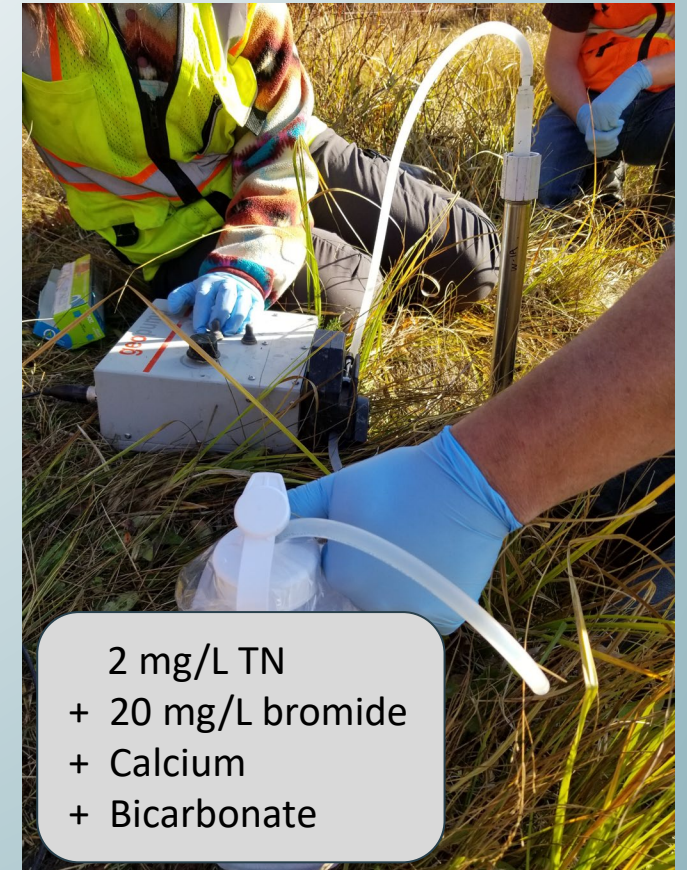
CALCULATE
ATTENUATION RATE

The injection solution contained nitrogen and a nonreactive tracer (bromide).

The nonreactive tracer accounts for dilution.

METHODS: HOW TO EVALUATE NITROGEN ATTENUATION

Push-pull tests were conducted during the last week of September

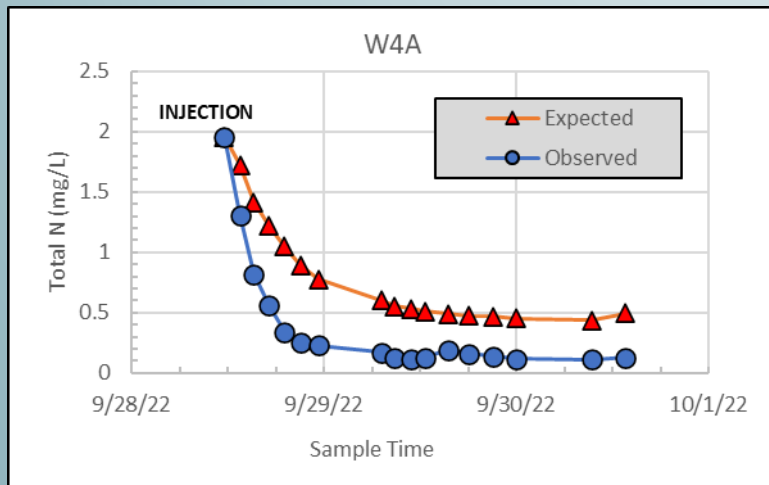


2 mg/L TN
+ 20 mg/L bromide
+ Calcium
+ Bicarbonate

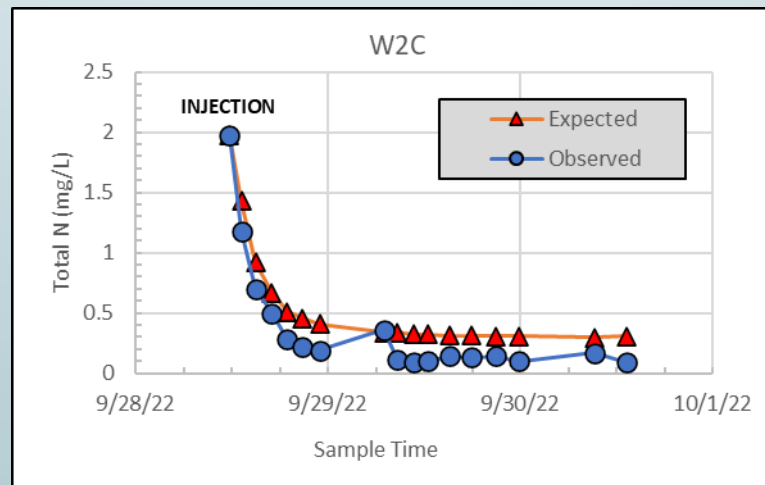
RESULTS: DILUTION OR REMOVAL?

Data indicates that nitrogen removal is occurring because observed concentrations were lower than expected due to dilution

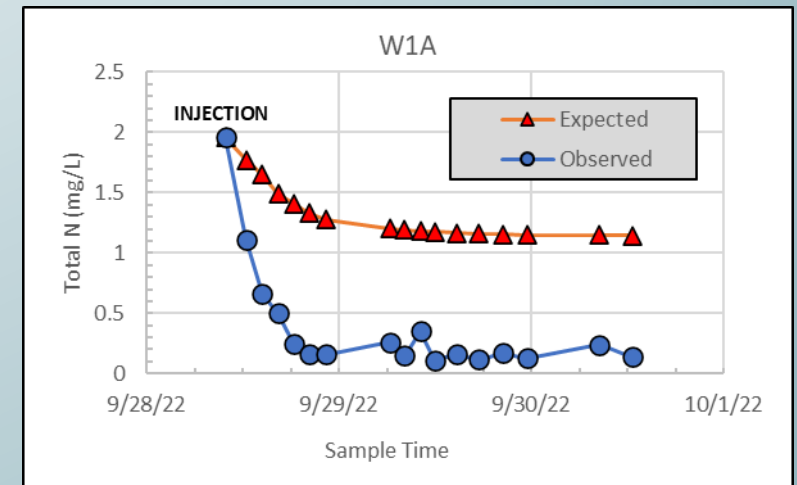
	BACKGROUND	INJECTION	NOTES
Total N (mg/L)	0.1 – 1.14	2	<ul style="list-style-type: none"> Injected TN was 2-10X > ambient Range likely due to agricultural use, i.e. cows grazing during test
Bromide (mg/L)	<0.05	20	



MIN



AVERAGE ATTENUATION

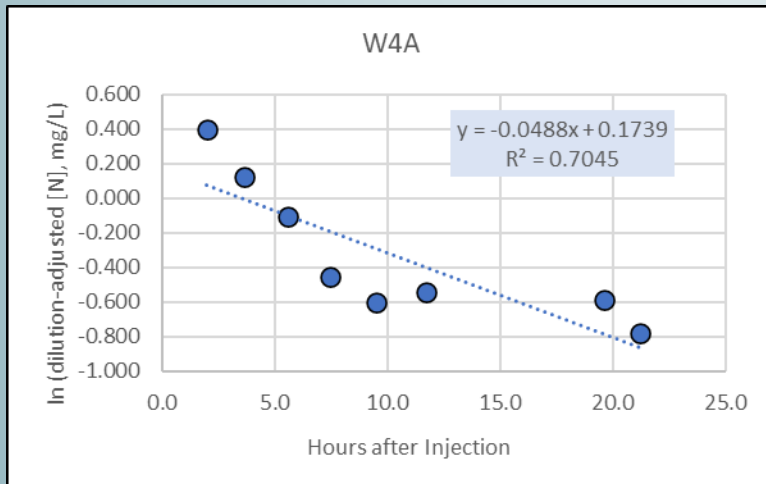


MAX

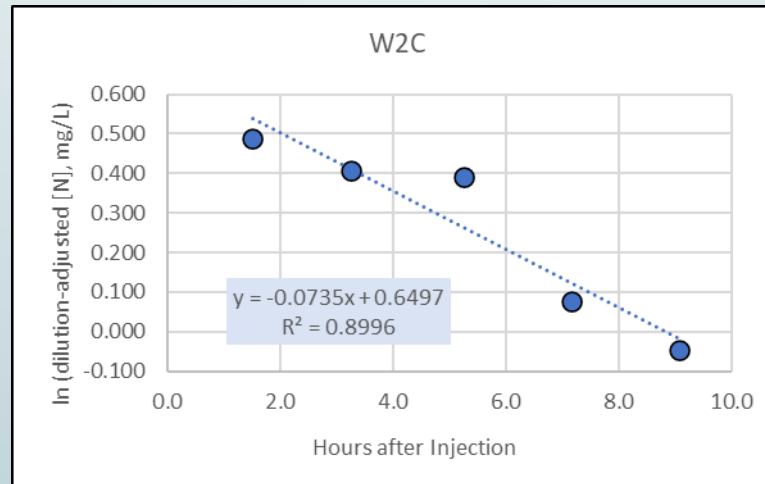
RESULTS: CALCULATE REMOVAL RATE CONSTANT

The rate of decrease in the dilution-adjusted TN concentration over time was analyzed to determine a first-order rate constant for the TN removal process.

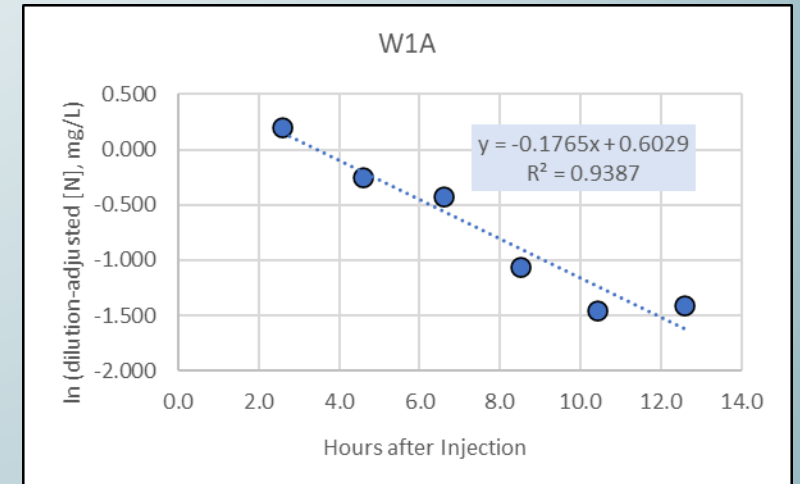
The rate constant is equivalent to the slope of the linear trend line.



MIN



AVERAGE ATTENUATION RATE

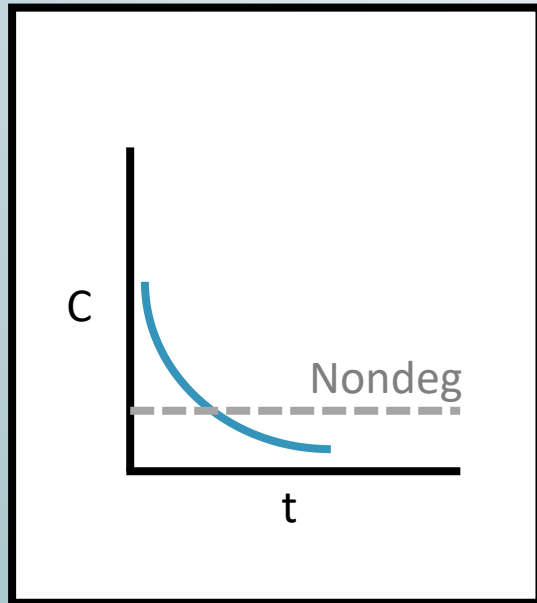


MAX

RESULTS: APPLY RATE CONSTANT TO WETLAND SYSTEM

Apply first-order kinetic rate to the Sheep Creek wetland system to determine residence time and migration distance required to meet nondeg standard

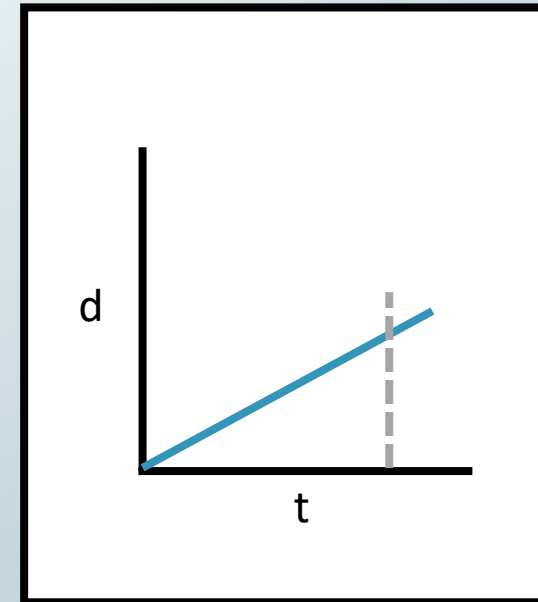
RESIDENCE TIME



$$t = 23 - 42 \text{ hours}$$

Residence time sufficient to reach nondeg

MIGRATION DISTANCE

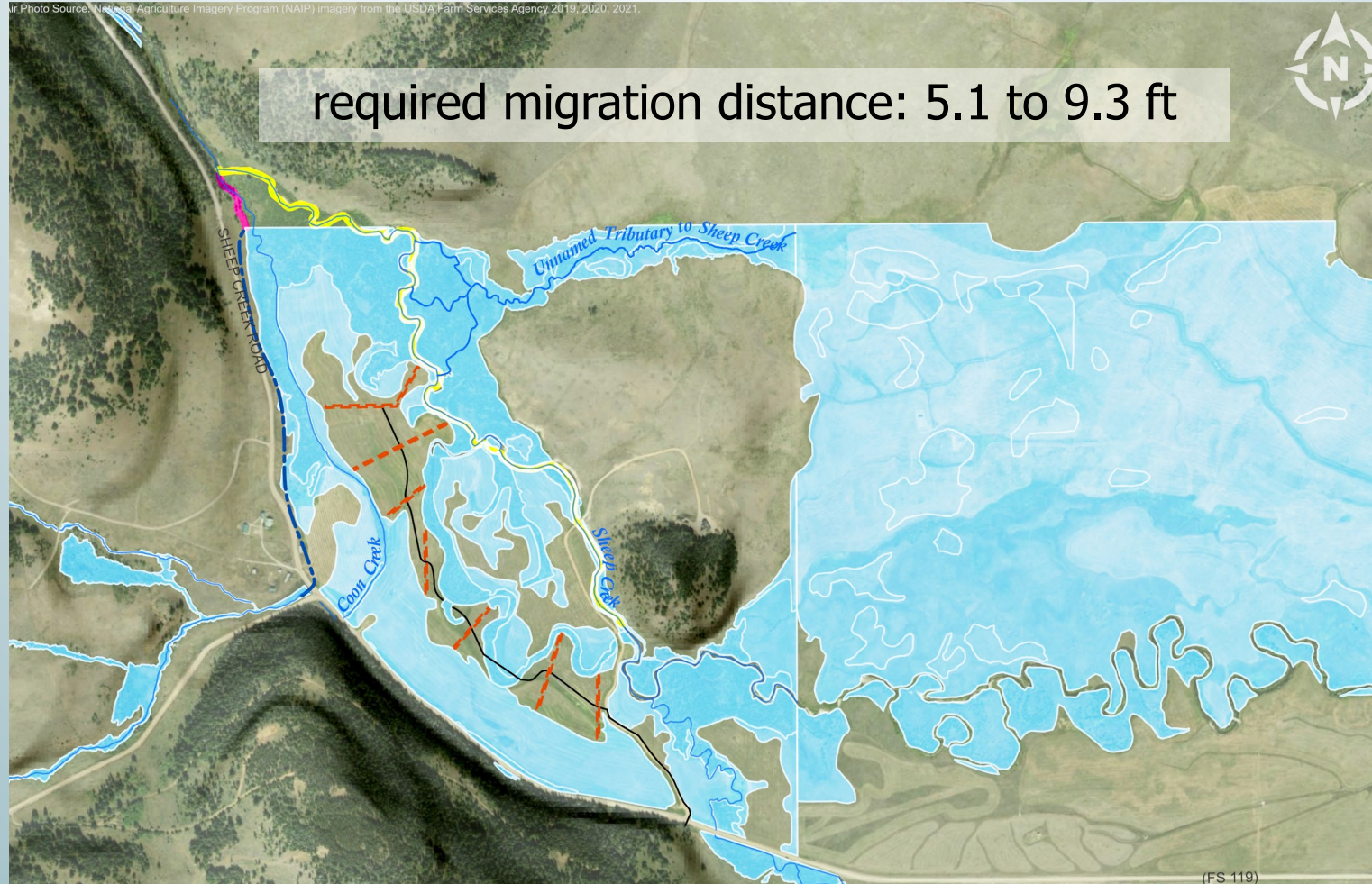


$$d = 5.1 - 9.3 \text{ ft}$$

Migration distance to reach nondeg

ARE THE WETLANDS A VIABLE TREATMENT OPTION?

Yes! The TN concentration can be expected to decrease to the nondegradation limit while migrating from the UIGs through the expansive wetland sediments.



DISCUSSION

Nitrogen removal rates under actual UIG discharge conditions are anticipated to be similar to or higher than those observed during this investigation

- Similar TN attenuation can be expected during operations
 - In situ testing methods in the UIG area
 - Injection solution water quality similar to anticipated discharge
- Study performed in the last week of September, when attenuation is expected to be low
 - Cold temps inhibit denitrification & plant uptake
 - Higher removal rates anticipated during early summer conditions
- Analysis assumes no credit for the reduction TN due to to dilution with groundwater
- **CONCLUSION:** This study shows that, when accounting for nitrogen attenuation in the wetlands, the nitrogen in the discharge water would be sufficiently attenuated to meet the nondeg criteria prior to entering surface water

QUESTIONS?

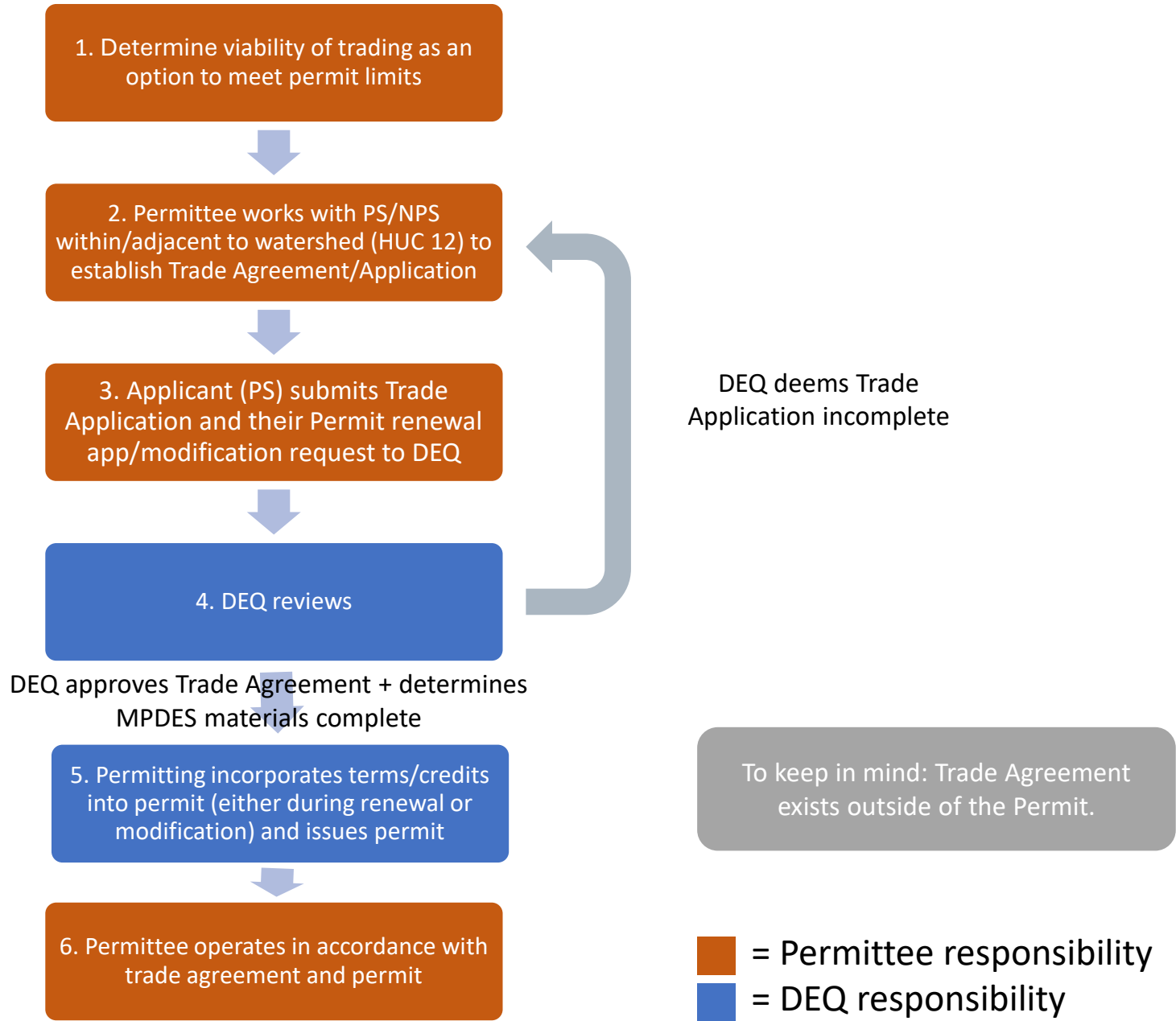


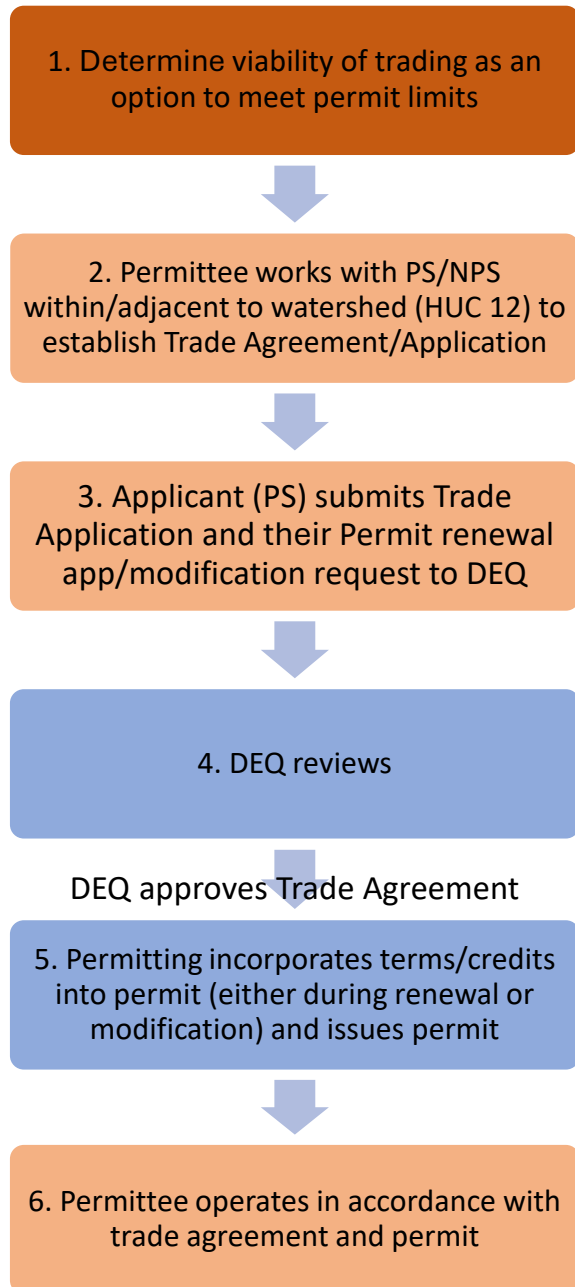
Process Flow



Acronyms

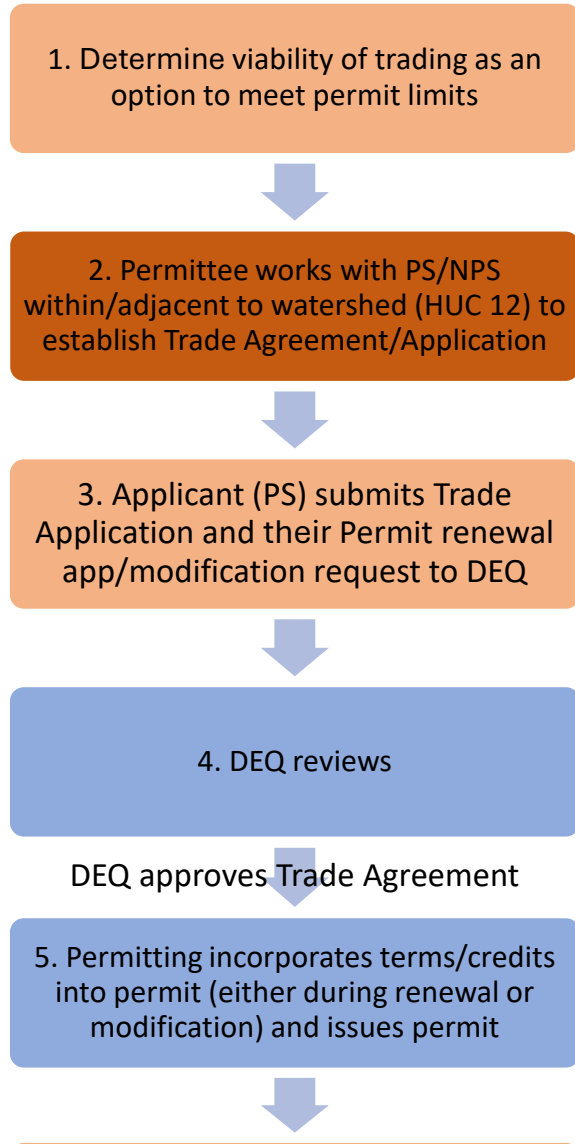
- PS = Point Source
- NPS = Nonpoint Source





1. Determining viability

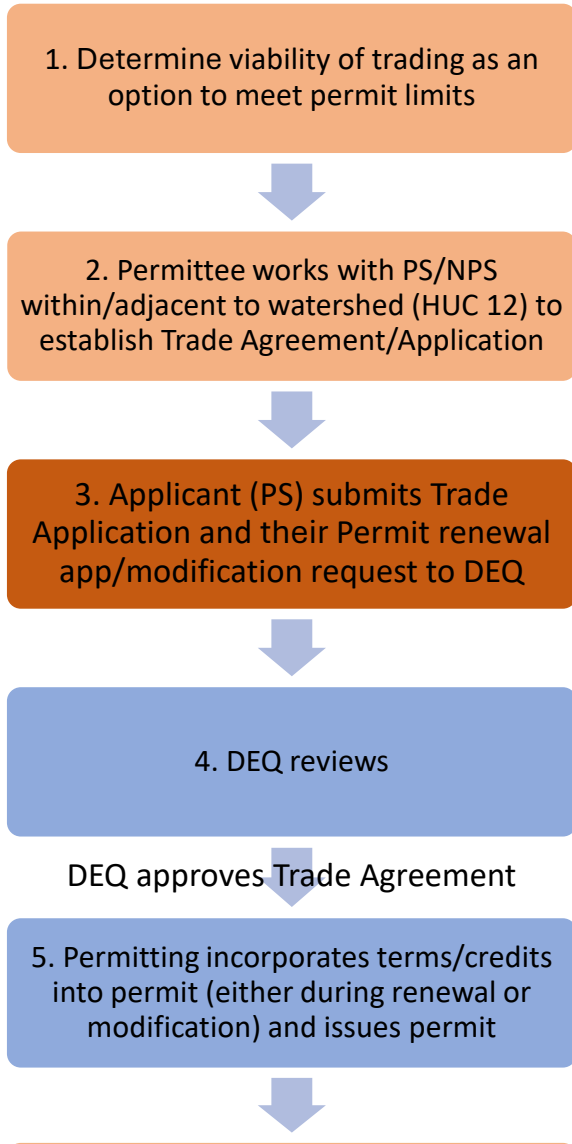
- Are there potential trading partners in/adjacent to my HUC12?
→ Discussion point, 3/17
- Is the potential trading partner (credit generator) meeting baseline?
→ Discussion point (today's agenda item)
- TMDL Revision Status
→ Discussion point (today's agenda item)
- Would potential trading partners generate enough credits?
 - Eligible BMPs + Quantification Methods
→ Discussion point, 3/17
 - Offset ratios
→ Discussion point (today's agenda item)
- Funding
→ Discussion point, 3/17



2. Develop Trade Agreement

- PS proposing the trade submits information about the proposed trading arrangement, such as:
 - Time period for the trading arrangement;
 - No. of credits to be exchanged each year;
 - How the number of credits was determined;
 - Source of credits;
 - General contractual arrangements;
 - Timeline for credit generation and use;
 - (See Circular 13 Section V 3 for full list)

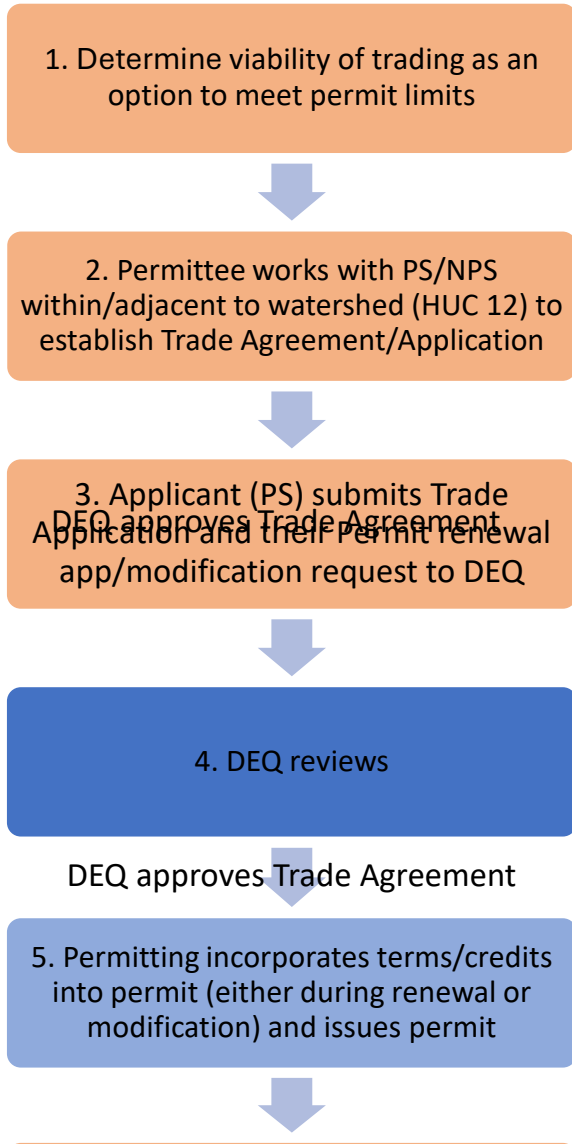
3. Applicant submits Trade Application (and MPDES materials)



- Timing

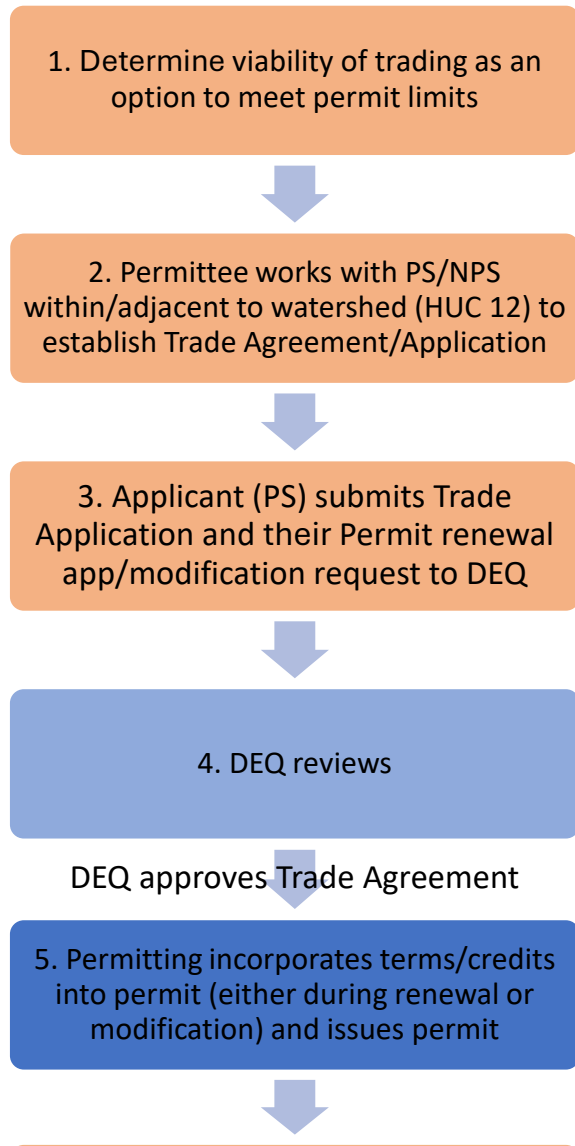
- Discussion point

- Concurrently? Separately?
 - Trade agreement must be approved before it can be incorporated into the permit



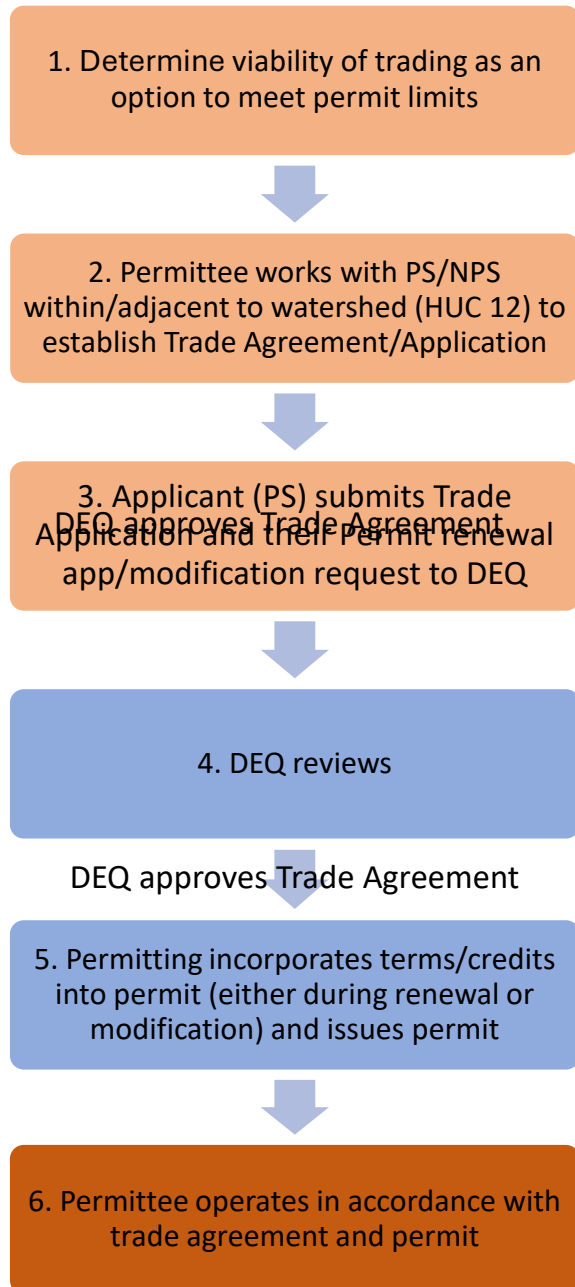
4. DEQ reviews

- DEQ evaluates the trade application based on the requirements described in Circular-13
- DEQ may approve the application, approve with conditions, or deny the application



5. Permitting Incorporates the Trade into the Permit

- Approved trade will be included in draft MPDES permit. Trade Agreement will be part of Public Notice package.
- What incorporated terms might look like:
 - Monitoring/Reporting/Recordkeeping Reqs
→ *Discussion point, 3/17*
 - Special Conditions
 - Compliance Schedules
 - Special studies
 - Provisional requirements for failed trades
 - Nondegradation/Antibacksliding language
- DEQ approval not final until MPDES permit is issued incorporating the trade.

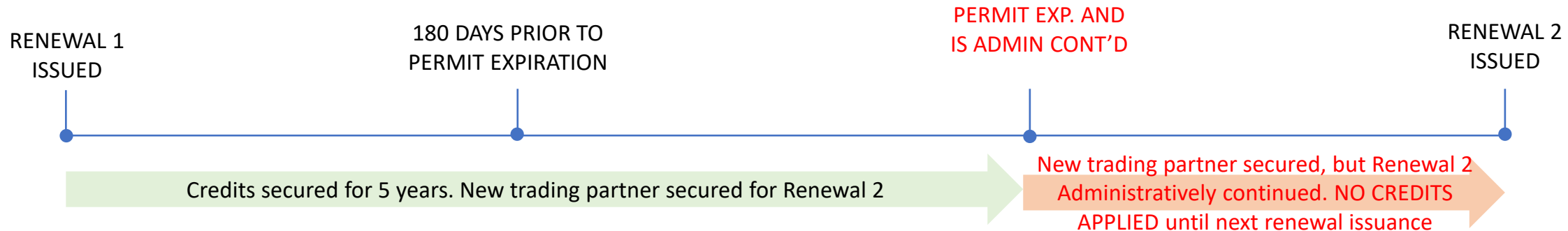


6. Permittee operates in accordance with Trade Agreement and Permit

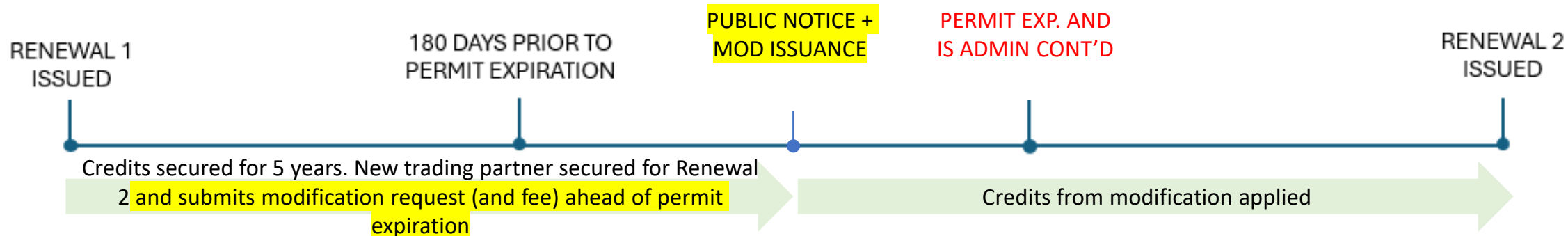
- Sequencing of credits and permit issuance/renewal
 - Discussion point
 - Administrative continuation
 - Billings MT0022586 Permit

Hypothetical Renewal Timelines

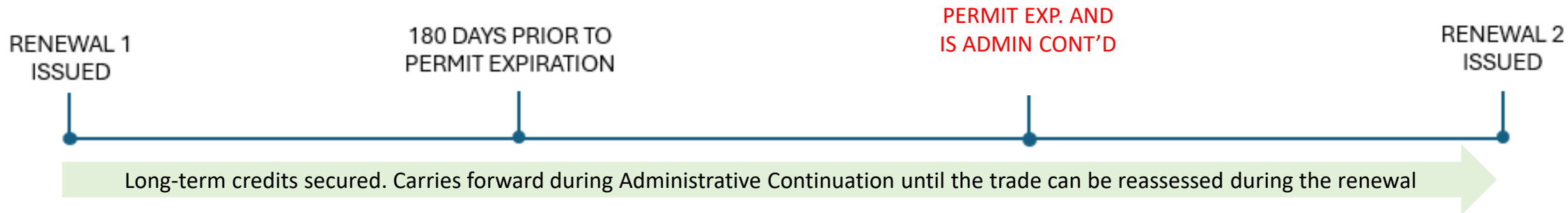
Scenario 1 – Credits obtained for 5 years



Scenario 2 – Credits obtained for 5 years + MOD submitted prior to permit expiration



Scenario 3 – Long-term credits obtained



Billings MT0022586 Example

Final Effluent Limits – Outfall 003				
Parameter	Units	Average Monthly Limit ¹	Average Weekly Limit ¹	Maximum Daily Limit ¹
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	mg/L	25	40	--
	lb/day	5,421	8,674	--
CBOD ₅ Removal	%	85	--	--
Total Suspended Solids (TSS)	mg/L	30	45	--
	lb/day	6,505	9,758	--
TSS Removal	%	85	--	--
<i>E. coli</i> Bacteria ²	No. /100 mL	126	252	--
<i>E. coli</i> Bacteria ³	No. /100 mL	630	1,260	--
Total Residual Chlorine (TRC) ⁴	ug/L	32	44	--
Oil and grease	mg/L	--	--	10
Ammonia as N ⁵	mg/L	4	5.5	--
Total Nitrogen as N ⁶	lb/day	2,513	--	--
Total Nitrogen as N ⁷	lb/day	2,517	--	--
Total Phosphorus as P ⁶	lb/day	343	--	--
pH	s.u.	Between 6.0 and 9.0		
Acute Whole Effluent Toxicity (WET)	% effluent	--	--	>100 %

Footnotes:

- See Definition section at end of permit for explanation of terms.
- This limit applies during the period April 1 through October 31.
- This limit applies during the period November 1 through March 31.
- Effective when chlorine is used at the facility. Sampling must occur during and seven days after chlorine is used at the facility. Sampling of the effluent with an analytical result less than 100 ug/L TRC is considered in compliance with the TRC effluent limit. If chlorine is not used during a reporting period, write "not chlorinating" in the comment section of the Discharge Monitoring Report (DMR) form.
- Effective June 1, 2019.
- Beginning August 1, 2019 through October 31, 2019 and continuing August 1 through October 31 thereafter.
- Updated TN load limit including documented increased flow from Lockwood to the Billings WWTP of at least 0.025 mgd (Four pounds of TN is credited for each 0.025 mgd of increased flow from Lockwood.)

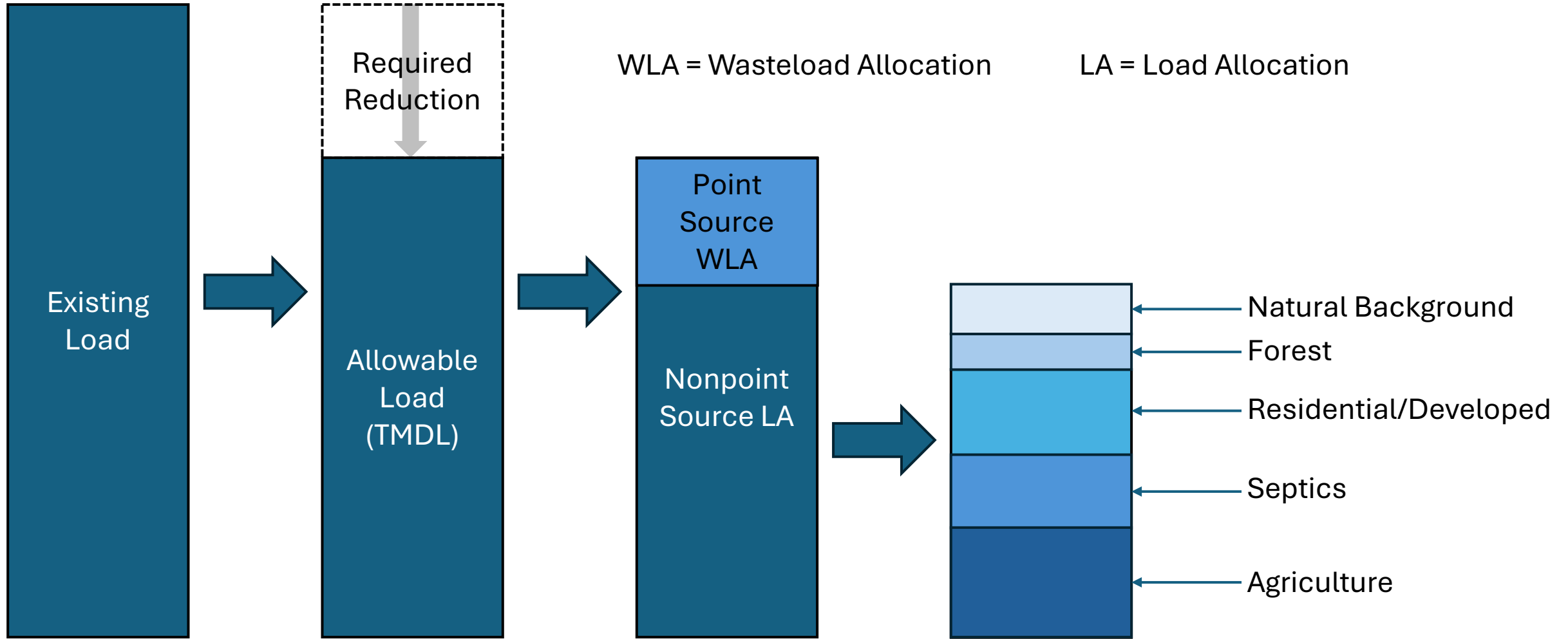
DEQ proposes to increase the Interim Waste Load allocations (IWLA) for TN, based on the expected increase in Lockwood connections to the Billings WWTP, following the schedule in Table 7 below. For every additional 0.05 mgd of annual average wastewater flow from Lockwood, the TN average monthly effluent limit will be increased by 8.0 lb/day. Effluent limits for the final year of the permit cycle may only be modified for a minimum increase of 0.05 mgd average annual wastewater from the Lockwood connections (approximately 250 single family homes). Modified effluent limits will not take effect until DEQ has reviewed and provided written approval of the additional wastewater flow. The permittee must submit the request for modified permit limits and documentation of new connections by December 31st of each year (using the average annual flow of the previous 12 months). DEQ's written approval shall include the modified effluent limits. Approved effluent limits will take effect retroactively to January 1st of the year in which the modification is made.



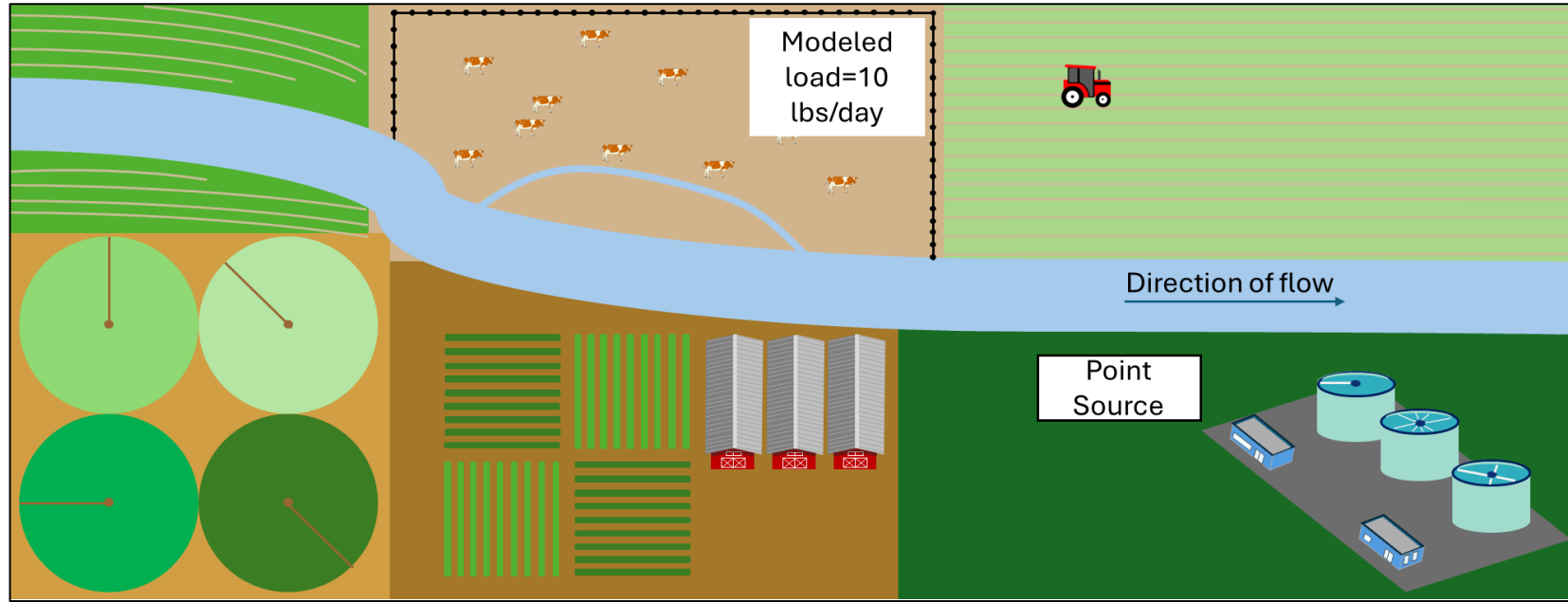
Baseline without a TMDL

- Points Sources Baseline
 - WQBEL
- Nonpoint Sources Baseline
 - Level of pollutant load associated with existing land uses and management practices that comply with applicable state, local, or tribal regulations

Baseline with a TMDL



Baseline with a TMDL (Cont'd)



- The TMDL allocates a 10% reduction to all agriculture sources
- A point source conducts a series of fencing exclusion projects on a grazing field
 - Models show a total reduction of **6 lbs/day**
- Nonpoint source needs to meet the load allocation = $10\% * 10 \text{ lbs/day} = 1 \text{ lb/day}$

Available load for trading after meeting LA = $6 \text{ lbs/day} - 1 \text{ lb/day} = 5 \text{ lbs/day}$

Total Credit Generated = $5 \text{ lbs/day} * 0.8 = 4 \text{ lbs/day}$

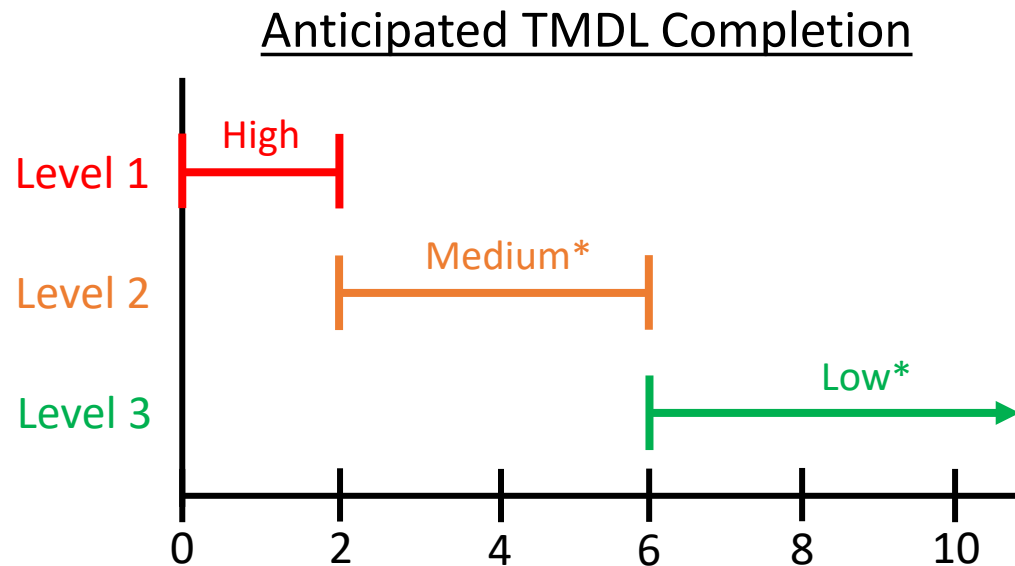
TMDL Revision Status

- TMDL revisions are prioritized just like TMDL development
 - Montana TMDL Prioritization Framework



Priority Levels

- Based on:
 - 75-5-702 (7) – (9), MCA
 - Montana TMDL Prioritization Framework document
 - Statewide TMDL Advisory Group (STAG)



*WQ planning activities and other TMDL development support may be in progress

Priority Factors with Greatest Influence

- New individual permit application
- Potential implementation
 - Public interest/support
 - Technology/resources
 - Actions or voluntary programs in place
- Program coordination
 - State policies/priorities
 - Immediate programmatic needs

Priority Factors with Greatest Influence

- Resource value
 - High-quality resource in an early stage of degradation
 - Recreational/economic/aesthetic importance
- Magnitude of potential impact to use*
 - Impacts to human health and aquatic life

*Unless there are unique circumstances, this factor will be considered inherently equivalent for all watershed projects and all waterbodies.

Priority Factors with Medium Influence

- Impairment characteristics
 - Pollutant characteristics and the severity and magnitude of WQ standard noncompliance
- Exception for sediment, temperature, and metals TMDLs in warm water streams
- Court determinations
 - Court orders/decisions relating to WQ

Priority Factors with Lowest Influence

- General waterbody characteristics*
 - Beneficial uses
 - Natural factors over which humans have no control are contributing to any impairment
 - Size of the waterbody not achieving standards

*Unless there are unique circumstances, these factors will be considered inherently equivalent for all watershed projects and all waterbodies.

TMDL Revision Status

- There will be an upcoming Statewide TMDL Advisory Group (STAG) meeting June 3, 2026
- Municipalities can assist in TMDL revisions (third-party TMDL revision)
 - Propose new targets



Delivery Ratios

(a) Delivery Ratios - Delivery ratios apply discount factors to compensate for a pollutant's travel over land or in water (or both) and may be applied to point, as well as, nonpoint sources. Delivery ratios generally account for attenuation (i.e., the rate at which nutrients are reduced through natural processes, such as hydrolysis, oxidation, and biodegradation, on their way to the mainstem of the waterbody). The ratio may vary depending on the location of the source. Generally, the greater the distance the pollutant has to travel, the greater the pollutant loss will be. This ratio would work to equalize a trade between a source in the headwaters and one near the mainstem. This ratio is often referred to as the "location ratio." Delivery ratios will be based upon information from applicable and accepted data sources as reviewed and approved by DEQ. Delivery ratios may incorporate time-variable credits to account for delays between implementation of a load reduction (e.g. connecting a Wastewater Soil Disposal System (WSDS) to a permitted wastewater treatment plant) and the time that load reduction is actually realized in the receiving water.

Propose to replace with:

the offset or trading credit must be 100% of a reduction from point source discharges; 80% of a reduction from an up-gradient, nonpoint source discharge; or 50% of a reduction from a down-gradient, nonpoint source discharge.

Uncertainty Ratios

(b) Uncertainty Ratios - Uncertainty ratios are intended to account for variation in the expected reliability and efficiency of the source or type of reduction being applied toward credit for another. They are calibrated to create a margin of safety or otherwise attempt to ensure that the credited practice provides a minimum level of reductions to ensure water quality is improved as a result of the trade, even if actual reduction efficiencies and units removed are on the low end of an expected range. In some instances, uncertainty ratios will not be employed because they are already accounted for in quantification methods used in delivery ratios.

Discussion

- Should clarity be added to this section, like “Delivery Ratios”
- How uncertainty ratios have been applied in existing trades
- Purpose driven section titles
- Tiered approach

Example Nutrient Load Reductions from Riparian Fencing

Pre-project



Post-project



Variables needed from pre- and post-project conditions:

- # & type of livestock
- Days on pasture
- Contributing fraction of pasture to stream

Animal Type	Daily N Production	Daily P Production
Beef Cow (in confinement)	0.42 lb/day	0.097 lb/day
Calf (450 lb -750 lb, confined)	0.29 lb/day	0.055 lb/day
Dairy Cow (lactating; 75 lb/day milk production)	0.97 lb/day	0.17 lb/day
Dry Cow	0.50 lb/day	0.07 lb/day
Heifer	0.26 lb/day	0.04 lb/day
Horse (sedentary)	0.20 lb/day	0.029 lb/day
Horse (exercised)	0.34 lb/day	0.073 lb/day
Sheep (90 lb animal)	0.041 lb/day	0.0063 lb/day
Sow (gestating)	0.071 lb/day	0.020 lb/day
Sow (lactating)	0.19 lb/day	0.055 lb/day
Boar	0.061 lb/day	0.021 lb/day

Example Nutrient Load Reductions from Riparian Fencing

Pre-project



Post-project



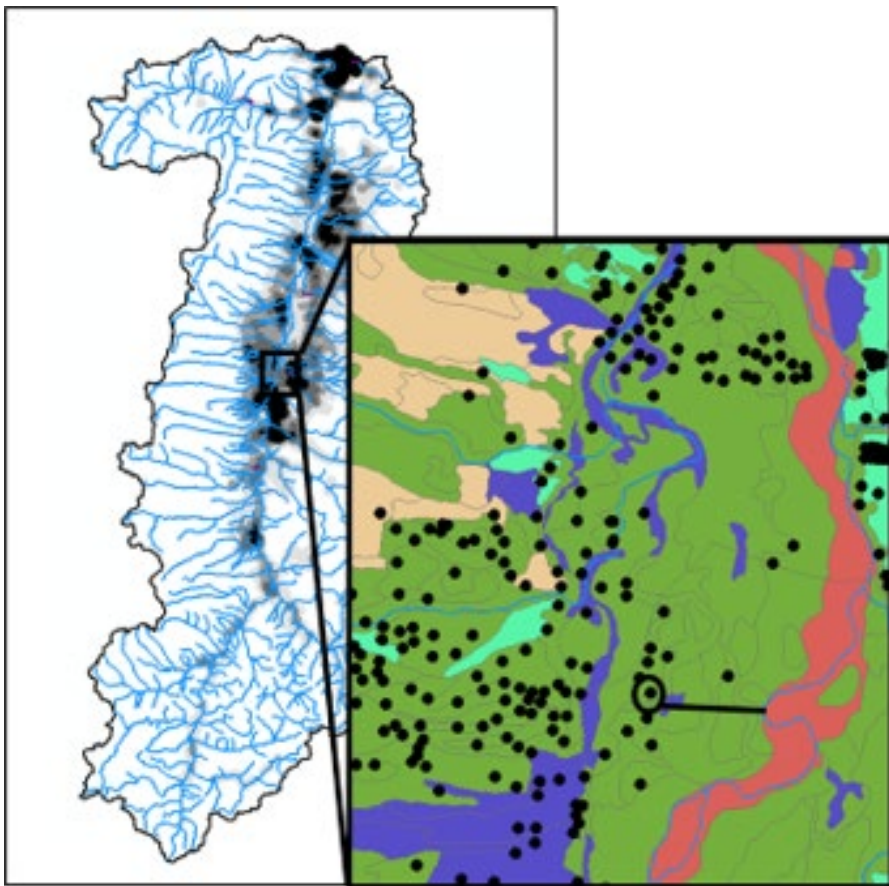
Nutrient load = (# animals) x (days on pasture) x (daily N/P production) x (contributing fraction of pasture) x (uptake/volatilization/decomposition factor 0.15/0.85)

Example Scenario	Example Feet of Stream	Example # of Cows (Heifers)	Nitrogen Reduction (lbs/growing season)	Phosphorous Reduction (lbs/growing season)
1	10	1	4	3.1
2	100	10	35	31
3	1000	100	351	306
4	1000	100	332	289

Scenarios 1-3 assume livestock are completely excluded from the riparian pasture.

Scenario 4 assumes high density, short duration (e.g., 5 days) grazing in the riparian pasture

Example Nutrient Load Reductions from Septic Systems



Nutrient load reductions from hooking in septic systems are dependent on these conditions specific to each system:

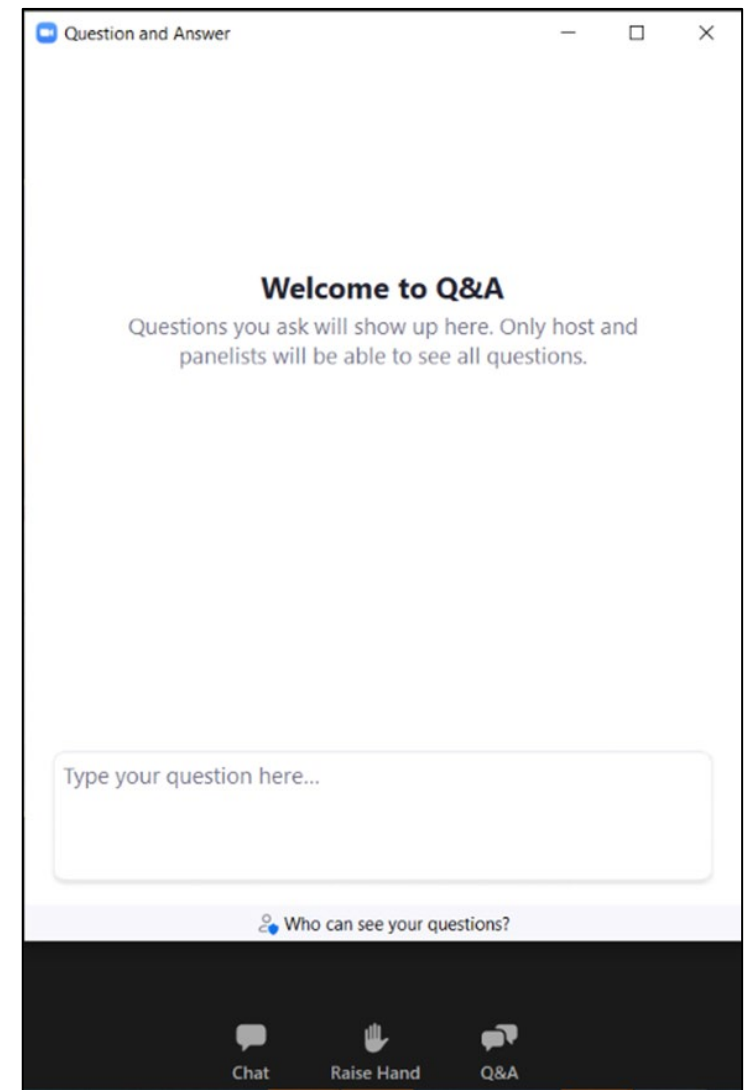
- Distance to nearest surface water
- Soil type at the drain field
- Soil type at the nearest surface water
- Effluent limit in permit

Example Scenario	Example # of Conventional Septic Systems	Example Distance to Surface Water (ft)	Nitrogen Reduction (lbs/day)	Phosphorus Reduction (lbs/day)
1	50	100-500	2.5	.25
2	500	100-500	25	2.7
3	5000	100-500	251	26
4	5000	500-5,000	209	0

All scenarios assume hydric soils groups B, and the permit effluent limit has not yet been factored in.

Questions/ Comments

- Raise hand (*9 if on the phone) or type questions into the Q&A
- DEQ will unmute you if you wish to provide your comment orally
- If calling by phone, press*6 to unmute
- State your name and affiliation before providing your comment



Unmute



Chat



Raise Hand



Q&A

Leave

Connect with us!

- **Kyle Milke**
- *Water Quality Scientist*
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- (406) 444-6491



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[DEQ Nutrient Trading/Offset Work Group website](#)