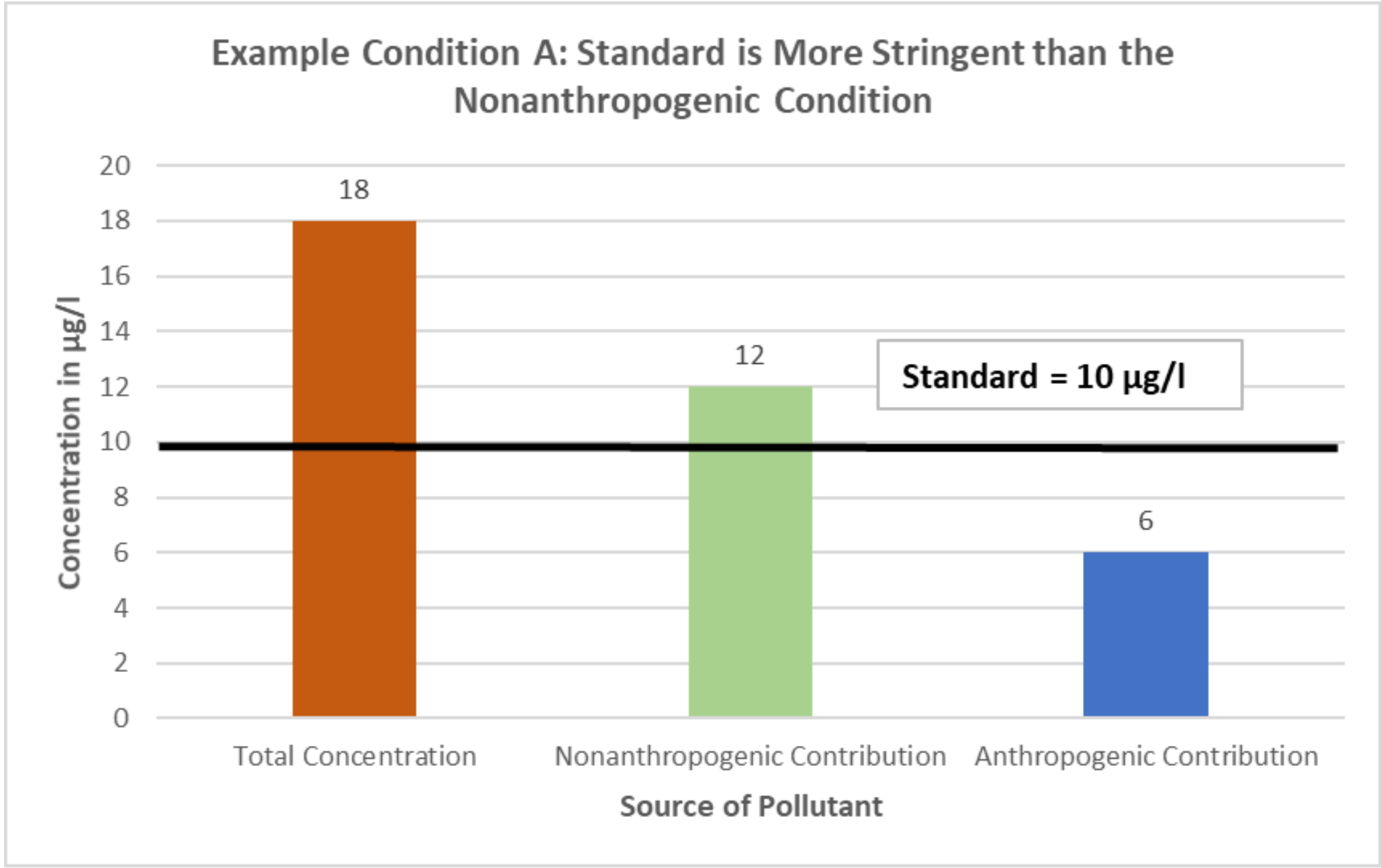
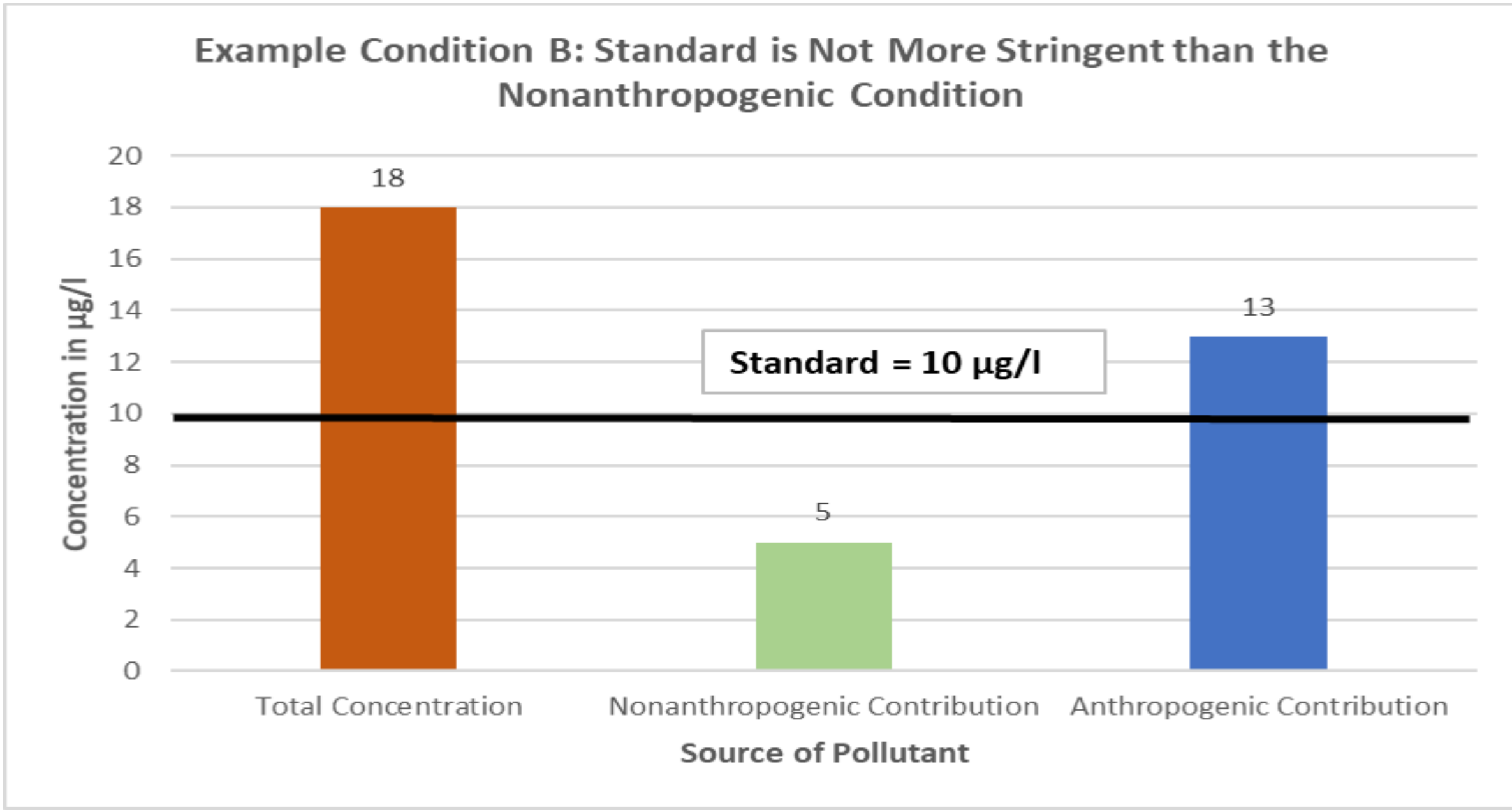
SB325 WorkGroup May 8, 2020 Agenda

- Introductions
- Meeting purpose and objective
- Presentation of Draft Nonanthropogenic Standard Guidance for External Entities – Dean Yashan
- Nonanthropogenic Example – Yellowstone
- Questions and Discussion

SB325- codified into rule as MCA 75-5-222

- Part 1: DEQ may not apply a water quality standard to a waterbody that is more stringent than the non-anthropogenic condition of the water body.
  - ✓Technical support documents for Demonstration of Natural, and Non-anthropogenic Standards
  - ✓Board has initiated rule-making for Non-anthropogenic Standards for arsenic in segments of the Yellowstone River
  - ✓Guidance document for external entities interested in pursuing NAS
- Part 2: If pollution upstream of a discharger is due to anthropogenic sources, a variance from standards may be appropriate under certain conditions.
  - ✓Board adopted rules for the process of applying for a variance under the listed conditions in statue/rule (ARM 17.30.661) (April 2018)


Example Condition A: Standard is More Stringent than the Nonanthropogenic Condition
Concentration in µg/l
20
18
16
14
12
10
8
6
4
2
0
18
12
6
Standard = 10 µg/l
Total Concentration
Nonanthropogenic Contribution
Anthropogenic Contribution
Source of Pollutant


Example Condition B: Standard is Not More Stringent than the Nonanthropogenic Condition
Concentration in µg/l
20
18
16
14
12
10
8
6
4
2
0
18
5
13
Standard = 10 µg/l
Total Concentration
Nonanthropogenic Contribution
Anthropogenic Contribution
Source of Pollutant

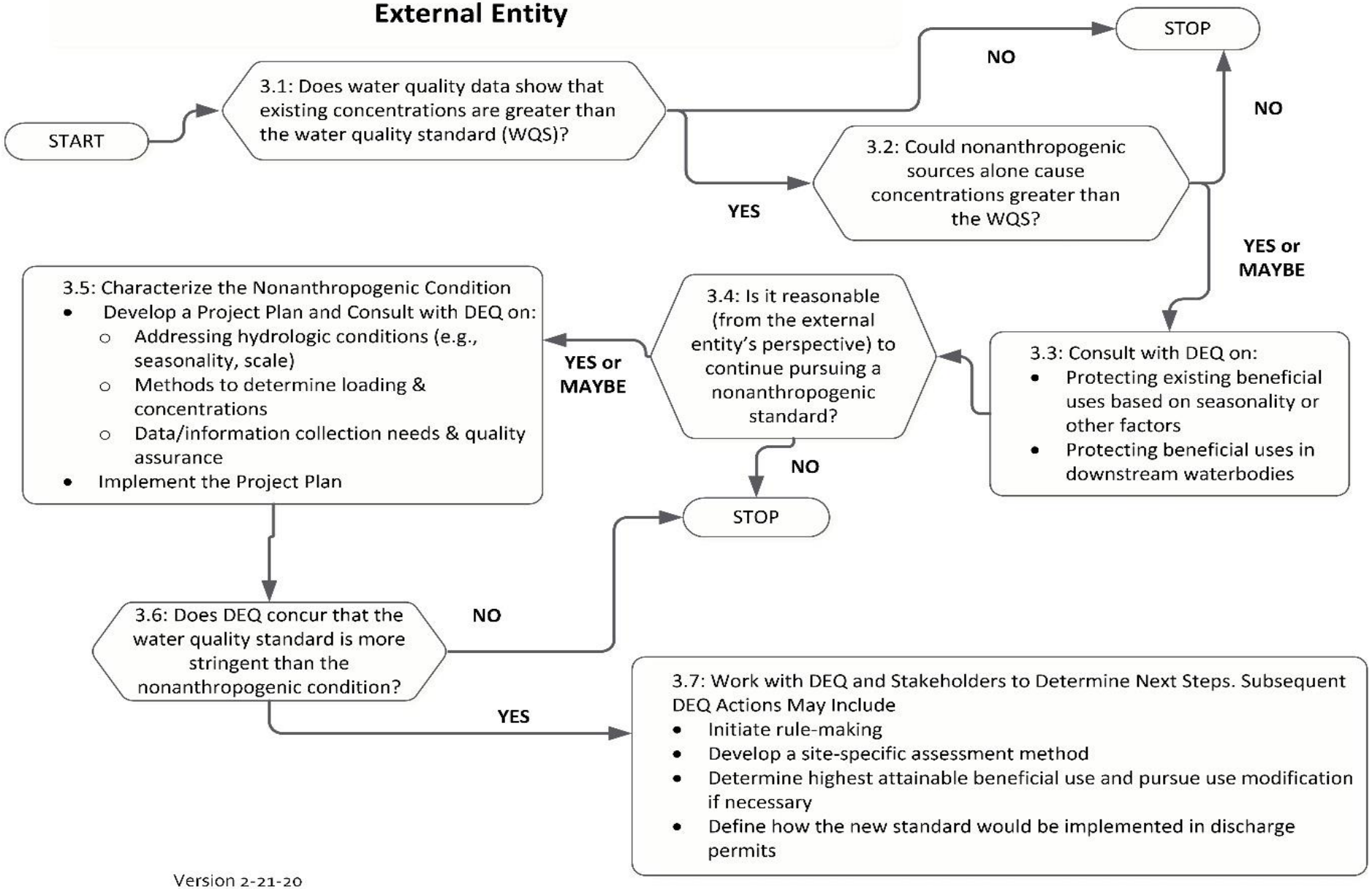
Guidance for an External Entity Interested in Pursuing a Change to a Water Quality Standard Based on Nonanthropogenic Conditions

Dean Yashan

DEQ Water Quality Standards and Modeling Section

May 8, 2020

Figure 1: Nonanthropogenic Standard Process Diagram for An External Entity



Version 2-21-20

3.1 Water Quality Data Comparison to the Existing Standard

- Data Considerations:
  - Appropriate spatial and temporal representation (seasonality, locations, timing, sample independence)
  - Seasonal and hydrological variability.
  - Statistical approach for comparison to the water quality standard.
  - Application of quality assurance and quality control procedures

DEQ suggests that if there are water quality data gaps, the external entity should develop a sampling and analysis plan (SAP) consistent with DEQ recommendations for water quality data collection.

NOTE: In some situations, DEQ may have already determined that the standard is not met for one or more pollutants of concern.

3.2 Initial Evaluation of Potential Nonanthropogenic Conditions

There should be information to suggest that nonanthropogenic sources alone could be causing concentrations to be greater than the standard.

Considerations:

- Previous source assessment work (DEQ or others)
- What constitutes an anthropogenic vs. nonanthropogenic sources
- Reference data applicability
- Watershed scale applicability
- Pollutant fate and transport

  For example, a pollutant source may be nonanthropogenic in a one waterbody, but flow transfer from that waterbody for irrigation may result in what has now become an anthropogenic influence on another waterbody.

This step is intended as an initial screening. A more detailed analysis of nonanthropogenic conditions is covered in **Step 3.5**.

3.3 Consult with DEQ on Beneficial Use Protection Considerations

3.3.1 Protecting Existing Waterbody Uses

- What might be the highest attainable use based on potential nonanthropogenic conditions in the waterbody? Ultimately, some uses, such as aquatic life, could be limited because of the nonanthropogenic influences on water quality, resulting in a use subcategory such as iron tolerant aquatic life.
- Must consider seasonal and/or hydrologic use influences (e.g., fish spawning, irrigation).

3.3 Consult with DEQ on Beneficial Use Protection Considerations

3.3.2 Protecting Beneficial Uses in Downstream Waterbodies

The following can help an external entity evaluate how downstream beneficial use protection requirements could influence their operation:

a. Potential discharge effects on water quality and beneficial uses in a downstream waterbody.
b. Downstream waterbodies currently not meeting a water quality standard for the pollutant(s) being evaluated.
c. Total Daily Maximum Load (TMDLs) requirements, whether for a completed TMDL or one under development.

Note that the purpose of Steps 3.3.1 and 3.3.2 is not for DEQ to make the final determination on either topic. However, these steps can help an external entity evaluate whether or not to move forward with nonanthropogenic standard work.

3.4 External Entity Determination to Continue

Based on the information from **Step 3.1** through **Step 3.3**, the external entity may want to examine the anticipated cost benefits of a nonanthropogenic standard prior to moving to **Step 3.5** since **Step 3.5** could involve a significant expenditure of resources. Considerations might include:

- The extent to which existing water quality is above the water quality standard
- The extent to which nonanthropogenic sources are likely contributing to elevated concentrations and the effort that will be required to demonstrate this extent. Watershed size could greatly influence the effort required to demonstrate the nonanthropogenic condition.
- Potential seasonal or downstream beneficial use protection requirements.

3.5 Characterize the Nonanthropogenic Condition

Completion of this step will result in quantitatively defining the extent of nonanthropogenic influence on pollutant concentrations. This is also referred to as the demonstration of the nonanthropogenic condition.

DEQ recommends that the external entity develop a comprehensive project plan, in consultation with DEQ, to help guide this work. The project planning process should involve the following:

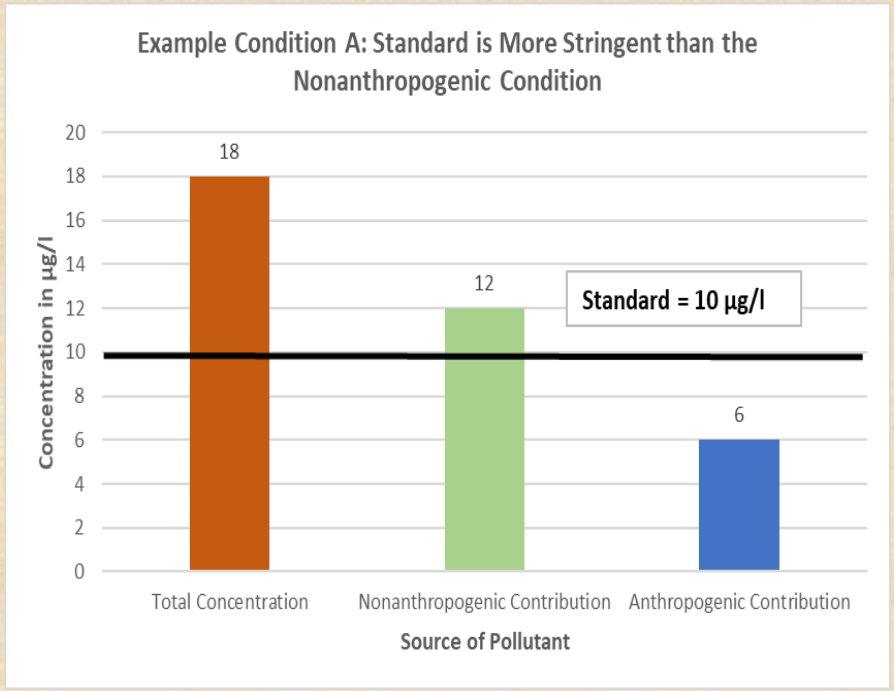
- Define the hydrologic region (e.g., seasonality, total watershed scale).
- Develop an inventory of likely non-anthropogenic and anthropogenic loading sources and pollutant transport mechanisms.
- Identify models or combination of models and associated assumptions for loading analysis.
- Compile existing data, identify data gaps, develop sampling plans to fill data gaps.
- Define and justify use of reference data/sites.
- A timeline for implementing the plan.

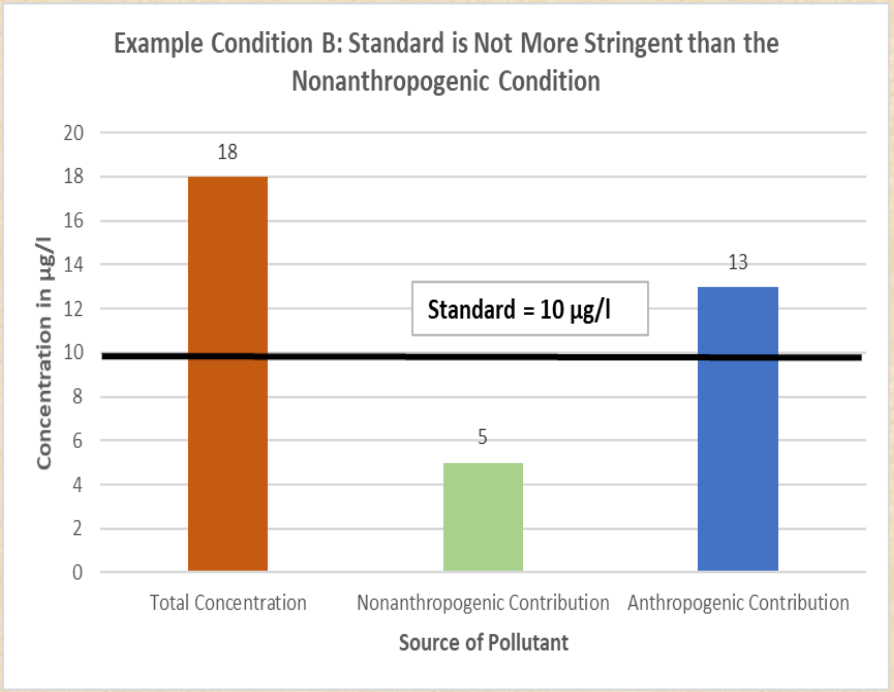
It is important to consult with DEQ on multiple aspects of the above components, such as:

- Applicability of data based on quality assurance and sampling dates.
- Development of sampling plans (SAPs) that define field data collection and analytical methods.
- Modeling approaches and associated quality controls.
- Modeling assumptions and information sources.

Step 3.6

If DEQ concurs that the results show the water quality standard as being more stringent than the nonanthropogenic condition, then the external entity may want to pursue nonanthropogenic standard development consistent with **Step 3.7**.





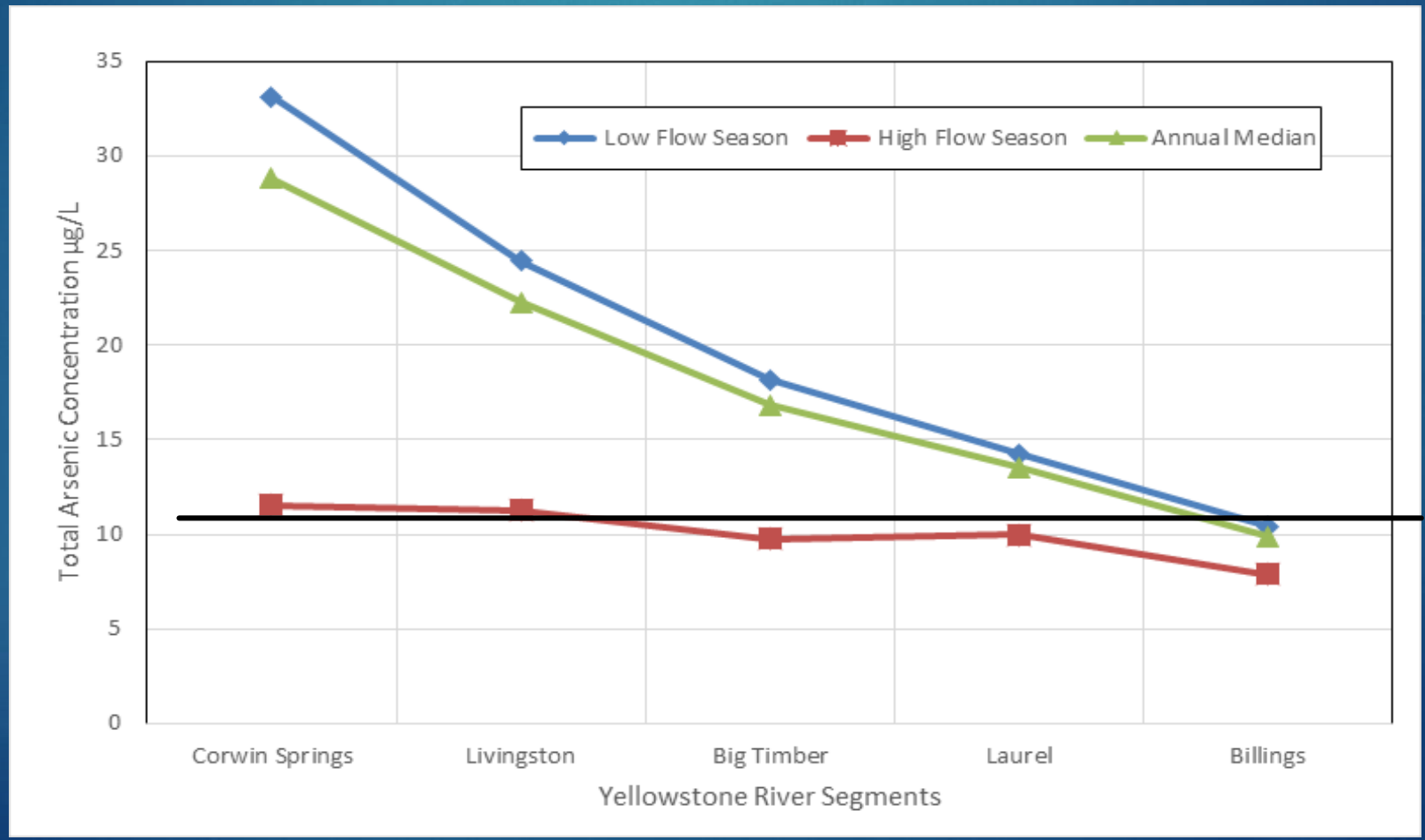
3.7 Work with DEQ and Stakeholders on Next Steps

This part of the process represents a transition to rule making activities where DEQ will take on much of the work for completing the rulemaking. Subsequent DEQ actions may include:

- Determining the nonanthropogenic concentration(s) to be recommended as the new water quality standard(s). The value(s) will be based on the results from **Step 3.5** and further consideration of beneficial use support requirements discussed in **Step 3.3**.
- Defining an assessment process that DEQ will use to make beneficial use support determinations through time.
- Providing details on how the new standard will be addressed in Montana Pollutant Discharge Elimination System (MPDES) permits.
- Initiation of rule-making through the Board of Environmental Review.
- Consultation with EPA and other stakeholders.
- Obtaining EPA approval on the final rule package for Clean Water Act purposes.

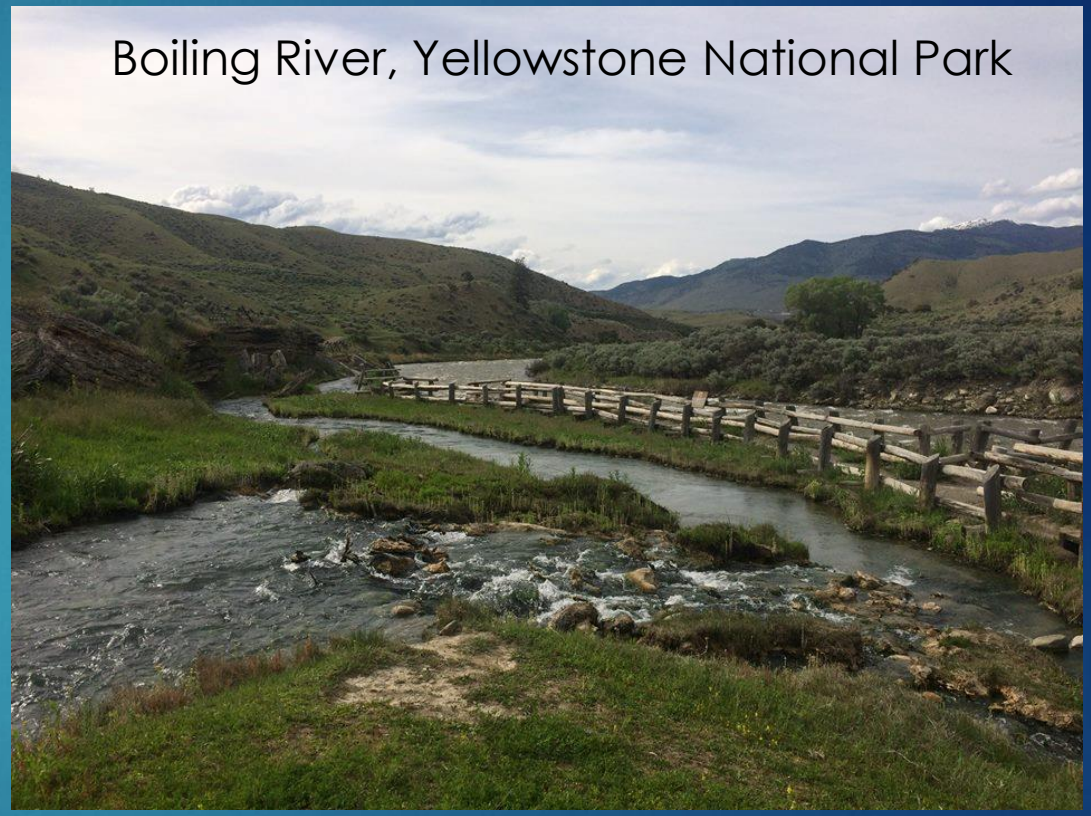
Example: Arsenic Conditions in the Yellowstone River

- Human health standard (surface, groundwater) = **10 µg/L**
- Aquatic Life standard = 340 µg/L (acute), 150 µg/L (chronic)



Main Arsenic Source:

Geothermal Features in Yellowstone National Park



Boiling River, Yellowstone National Park

560 µg/L total arsenic, August 2015

The Boiling River flows into the Gardner River

85 µg/L, Gardner River at the mouth of the Yellowstone River, August 2015

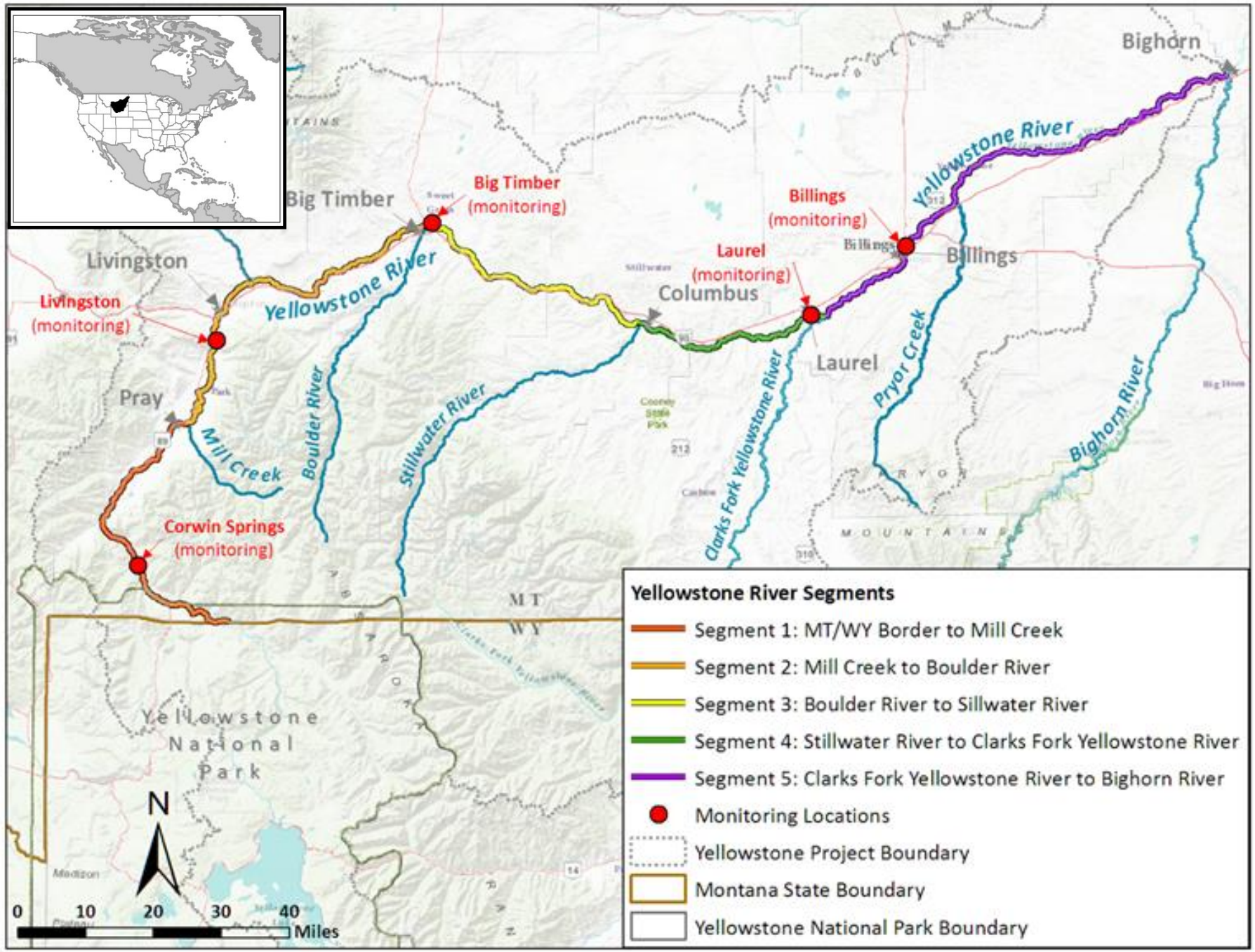
Question – What is the Extent of Anthropogenic (Human Caused) Arsenic Sources Throughout the Watershed?

Demonstration of Nonanthropogenic Arsenic Levels in the Yellowstone River

Demonstration of Nonanthropogenic Arsenic Levels: Yellowstone River, Montana

September 2019

Prepared by:
Water Quality Standards & Modeling Section Montana Department of Environmental Quality Water Quality Planning Bureau
1520 E. Sixth Avenue


Big Timber
Big Timber (monitoring)
Livingston
Livingston (monitoring)
Pray
Corwin Springs (monitoring)
Columbus
Laurel (monitoring)
Billings (monitoring)
Billings
Laurel
Bighorn
Yellowstone River
Boulder River
Stillwater River
Mill Creek
Clarks Fork Yellowstone River
Pryor Creek
Bighorn River
MT
WY
Yellowstone National Park
N
0 10 20 30 40
Miles
Yellowstone River Segments
Segment 1: MT/WY Border to Mill Creek
Segment 2: Mill Creek to Boulder River
Segment 3: Boulder River to Sillwater River
Segment 4: Stillwater River to Clarks Fork Yellowstone River
Segment 5: Clarks Fork Yellowstone River to Bighorn River
Monitoring Locations
Yellowstone Project Boundary
Montana State Boundary
Yellowstone National Park Boundary

Mass Balance Model: The Basics

- Account for all major arsenic sources; **total arsenic load (TAL)**
  - Load from Yellowstone National Park
  - Point source loads along the river
  - Ground water loads along the river
  - Non-point source runoff loads along the river
  - Tributary loads (if not accounted for in previous loads)

Nonanthropogenic Arsenic Loads

Table 5-1: Nonanthropogenic Seasonal Arsenic Load Percentages, by Segment

Yellowstone River Segment				Yellowstone River Sampling Location	Proportion of Arsenic Load that is Nonanthropogenic [1]	
#	Beginning	End [2]	Length (miles)		High Flow Season [3]	Low Flow Season [3]
1	Montana/Wyoming Border	Mill Creek near Pray	45	Corwin Springs	99.0%	97.0%
2	Mill Creek	Boulder River at Big Timber	54	Livingston	98.9%	96.9%
3	Boulder River	Stillwater River near Columbus	37	Big Timber	98.9%	96.5%
4	Stillwater River	Clarks Fork of the Yellowstone River at Laurel	27	Laurel	98.9%	95.6%
5	Clarks Fork of the Yellowstone River	Bighorn River at Bighorn	73	Billings	98.7%	95.6%

[1] Based on the median of the LOADEST-modeled daily loads (See Appendix C).
[2] Each segment ends immediately before the confluence with the referenced tributary.
[3] High Flow season for the Yellowstone River was determined to be May – July, and the Low Flow Season was determined to be August - April.

DEQ estimates 7.5% cumulative model error across the study region (YNP to Bighorn River).

Identifying the Nonanthropogenic Arsenic Standards for the Yellowstone River

Considerations

- Magnitude, Frequency and Duration
- Discharge Permit Requirements
- Use Support Assessment Approach

DEQ
Montana Department
of Environmental Quality

Questions?