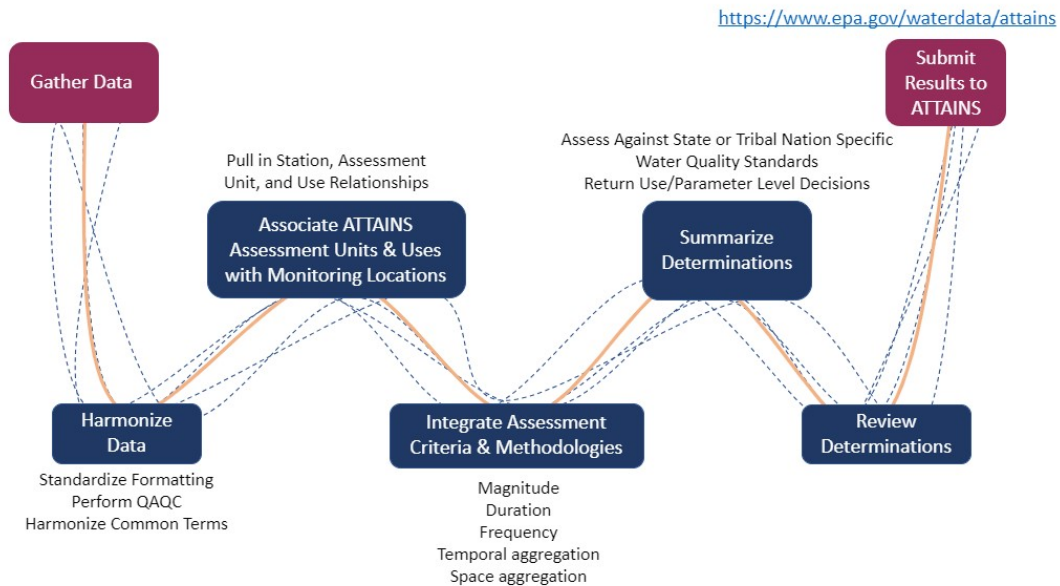**Assessment Methodologies Document – Template**

Please work with your EPA regional tribal coordinator on your Assessment Methodology Document requirements. This template is designed to assist you with developing and documenting your assessment methodologies – but you are not required to use it and your EPA regional tribal coordinator may have different expectations for your methodology's documentation. This example template is an evolution of the ATTAINS Big 4 Template that some tribes in the ATTAINS program used during the first pilot. We recommend including enough detail in your documentation so that someone else in the tribe could perform the assessment in your absence.

https://www.epa.gov/waterdata/attains

Data

1. **Where do you store and retrieve your tribal data from to perform assessments (locally from spreadsheets on your computers or paper documents from the field, from the Water Quality eXchange/Water Quality Portal, or another online repository)?**

2. **Do you look at data from other organizations?**
   a. If yes:
      i. Where do you get the data from?

      ii. Which organizations?

Uses and Assessment Units

3. **What uses do you assess?**

Note: Uses are required to be entered in ATTAINS.

4. **What kind of Assessment Units do you use? (Check all that apply)**
   a. Monitoring location only ☐
      i. By selecting monitoring location only, you are saying the decision made on the water applies only to that specific point on the water body. This is a common practice for existing tribal assessment reports. If you choose this option, you will not need to create GIS to accompany your data.
   b. A segment/length of the stream ☐
      i. By selecting a segment/length of stream, you are saying the monitoring location(s) sampled applies to the entire stream length you have designated. This requires prior knowledge/data of the segment's water quality (i.e., water is homogenous throughout the reach). This will require you to create a GIS layer identifying which stretch of stream you have designated for each Assessment Unit.
   c. An area such as a lake/reservoir/impoundment or HUC ☐
      i. By selecting a lake/reservoir/impoundment or HUC as your Assessment Unit, you are saying the decision applies to the entire waterbody/watershed. Which means all waters in that area are given the same decision. This requires prior knowledge/data of the water quality in that area (i.e., water is homogenous throughout the waterbody/watershed). This will require you to create a GIS layer identifying the lake/reservoir/impoundment or HUC areas you have designated for each Assessment Unit.

5. **Fill out the table:**

Note: Water Quality Portal (WQP) monitoring location ID's are required for ATTAINS tribal assessment unit submissions. You are required to enter your Assessment Units directly into ATTAINS via the web user interface or the ATTAINS AU batch upload template.

Assessment Unit ID	WQP Monitoring Location ID (one or multiple)	Designated Uses	Waterbody Type (Stream/River/Lake)

6. **Are data combined from all monitoring locations within an Assessment Unit before analysis, or is each monitoring location assessed separately? This question is only relevant if you have**

multiple monitoring locations within a single Assessment Unit (if each monitoring location is its own Assessment Unit, then this question does not apply to you).

Note: How you combine data from monitoring locations within an Assessment Unit may impact the overall assessment decision. Your method may vary based on data availability, parameter (e.g., toxicity), waterbody type, and other related assessment criteria/methods.

Criteria/Thresholds and Methodologies

7. **What water quality parameters are you monitoring for each use, and what criteria or thresholds apply to each parameter and use combination?**

Note: If your tribe has EPA approved water quality standards, some of these questions are already answered in your standards documentation as well. For water quality standards documentation guidance see: https://www.epa.gov/wqs-tech/water-quality-standards-tools-tribes.

Parameter	Criteria or Threshold Value and Unit	Use	Type
Escherichia coli	450 col/mL SSM	Primary Contact	Criteria

Clarification about when to use the term "criteria" in ATTAINS vs. when to use "threshold".

- Threshold: This is reserved for use by tribes and states that <u>DO NOT have EPA-approved WQS</u> for the assessed parameter. If you use an EPA-approved WQS for assessment but the WQS is not yours, but from another neighboring state/tribe or is from EPA or other literature, then you should use "threshold" in ATTAINS. Tribally approved criteria should be documented in ATTAINS as "thresholds" unless they are EPA approved.
- Criteria: This is reserved for use by states or tribes that <u>have EPA-approved WQS</u> for the assessed parameter. In addition, due to a white paper in Oklahoma allowing the state to list waters using tribal assessments, tribes in Oklahoma using the state's EPA-approved WQS can also use criteria. More information about the Oklahoma white paper can be found here: http://www.owrb.ok.gov/quality/standards/pdf_standards/StateofOklahomaDataSharingGuidance.pdf. This is because if an assessment turns into a listing either by the state in the case of Oklahoma tribes or by the tribe if they acquired TAS for 303(d), the decision should be based on EPA-approved WQS.

<u>Data availability</u>

8. **How many results do you require to make a determination on your use?**

   a. Example: In your monitoring strategy, you told your project officer that you wanted to sample each parameter a certain amount of times. That sampling frequency should align with what you are assessing for. For example: If you want to sample every month, all year long for basic probe parameters, you would likely want at least 10 samples to make

a decision using those parameters. Basic parameters such as pH, DO, temp, etc., fluctuate very often in a water which is why you might want to sample them more often to have confidence that there is or is not an issue in the water. Whereas parameters such as *E. coli*, you may sample less often and only at times where people would be in the water. A 1 time *E. coli* exceedance could be more significant to human health even if it is only found to exceed once or twice, where a pH exceeding once is within the margin of expectation and will not necessarily kill aquatic life unless it persists. Which is why we sample it more often. So in summary, you will want the number of samples needed for an assessment to have a connection to your monitoring strategy where you have already determined how much information you want to have to make a decision on your use for the water.

Parameter	# of samples for assessment

b. What if you do not have enough samples to make a decision? You wanted to have 10 samples but due to drought ended up with 9. But you have a 10% exceedance rule for that parameter and 3 out of 9 samples are not meeting your threshold. What do you do? Technically, even if you had 10 samples because you have 3 exceedances, you would exceed the threshold. So you could still make a decision that the water is not meeting the threshold. What do you want to do?

9. **How many sites need to be sampled per stream reach and per lake?**

Time period of assessments (assessment window)

10. **How many years are typically considered for the assessment (e.g., grant cycle year, 5 previous years, 10 previous years, etc.)?**

11. **Which assessment methodologies are used and for which parameters?**

Example: 1 pH value exceedance may not indicate a problem whereas 1 *E. coli* exceedance may indicate a problem. In this section, document how you will apply your criteria and/or thresholds to the data to make a decision. For some parameters such as water quality indications, you may want to consider a 10% flexibility for exceedances. For more toxic parameters you may want to implement a method where the sample should never exceed a criteria or threshold magnitude value or should not exceed the value more than 1 or 2 times in a year.

Choosing appropriate methods for each parameter and use may depend on the following:

- Seasonality
- Region – warm and cold water
- Toxicity
- Exposure (acute or chronic)
- Depth
- Data availability: Number and frequency of samples
- Salinity (salt or fresh)
- Hardness/pH/T dependent criteria
  - E.g., Aluminum (Al), Cadmium (Cd), Chromium (Cr) III, Copper (Cu), Lead (Pb), Manganese (Mn), Nickel (Ni), Silver (Ag), Zinc (Zn)

a. Fill out the table below. Enter n/a if you do not use the method.

Methodology	Do you use this method (Y/N)? If yes, what specific parameters?
Hardness equation(s): hardness-dependent dissolved metals criteria may be calculated from the following: CMC (dissolved) = exp{mA [*ln*(hardness)]+ bA} (CF) CCC (dissolved) = exp{mC [*ln*(hardness)]+ bC} (CF) 1/ CMC: Criterion Maximum Concentration 2/ CCC: Criterion Continuous Concentration See: Appendix B - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent	
***n*-day geometric mean** The geometric mean is defined as the *n*th root of the product of *n* numbers, i.e., for a set of numbers $x_1, x_2, ..., x_n$, the geometric mean is defined as: $$\left(\prod_{i=1}^{n} x_i\right)^{\frac{1}{n}} = \sqrt[n]{x_1 x_2 \cdots x_n}$$	*e.g., e coli*
Rolling average Compare the rolling average to the numerical criteria	

Arithmetic mean Compare the arithmetic mean to the numerical criteria (n-day mean, n-day mean maximum or mean minimum, n-hour mean)	
Upper/ lower limit or range These are simple exceedances of a defined upper or lower bound or range	*e.g., DO, bacteria*
Binomial test to determine the number excursions allowed (for example, 10% exceedance) based on discrete data sample size	
***n*-percentile assessed against the numerical standard** (upper/ lower limit or range) For example, the 10th percentile must not exceed the numerical criteria. Colorado example, "the waterbody is considered impaired if the DO is below the standard more than 15% of the time. Dissolved oxygen (DO) is evaluated by comparing the 15 percentile DO value to the DO standard value for the designated use (e.g., 7 mg/l)".	

Sediments/Flow

12. **Do you have sediment-based standards (not turbidity)?**

13. **Do you have flow-based standards?**

14. **Do you have criteria specific for mixing or low-flow zones? If yes, please provide details.**

Seasonal/geospatial criteria

15. **Do you have seasonal criteria? If yes, please list the parameters that you use seasonal criteria for.**

16. **Do you have regional criteria (e.g. warm and cold water trout or salmon)?**

17. **Do you have criteria that is applied differently depending on where measurements are taken within a waterbody (i.e. depth profiles)?**

<u>Nutrients</u>

18. How are your nutrient standards assessed (e.g. annual mean or the 90th percentile)?

      a. Do you calculate total nitrogen? If yes, how? For example, do you only use raw values reported in total or do you calculate from constituent parts?

19. Do you use dissolved values for total criteria if total is not available?

20. Do you include a speciation conversion in your methodology? If yes, provide examples.

<u>Pathogens</u>

21. How are your pathogens standards assessed (e.g., geomean)?

<u>Time series trend analyses</u>

22. Do you use continuous data or time series trend analyses in your assessments?

Note: Time series trend analyses generally require a standard amount of time between samples and a method for determining statistical significance of the trend (increasing, decreasing, or remaining constant over time). What statistical test and time intervals do you use (month, year, season, week, or another defined period)?

<u>Other</u>

_23._ What if measurement or sample results are very close to the threshold/criterion?

24. What analytical approaches (graphs, exceedance reports, etc.) will be used to interpret the data?

25. What programs and tools (Excel, R, Python, Access, AWQMS - Ambient Water Quality Monitoring System, etc.) are used to perform analyses?

26. Do you use other methods not yet covered by these questions? Please describe.