National Biological Assessment and Criteria Workshop

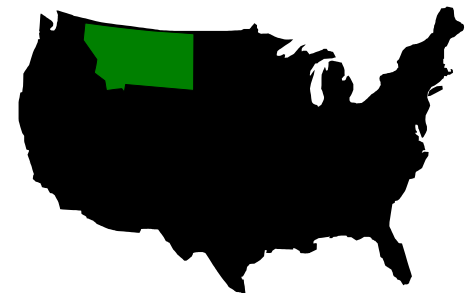Advancing State and Tribal Programs

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WET 101

Application of Wetland Bioassessment Protocols for Making Aquatic Life Beneficial Use-Support Determinations in Montana

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Wetland Bioassessments

- **Explain how Montana uses biological data to determine whether water quality standards are being achieved.**

- **Discuss how biological assessments are used within Montana's TMDL program.**

- **Discuss how Montana uses physical and chemical information (human disturbance gradient) to assess aquatic life uses.**

- **Provide an example of our assessment process for listing impaired waters (303(d) list).**

APPLICATION OF BIOASSESSMENTS

- **How are biological assessments used to determine if Montana's water quality standards are being achieved?**

Water Quality Standards

- **Clean Water Act** (Section 101(a))
  - *restore and maintain the chemical, physical and biological integrity of the Nation's waters.*

- **Designates beneficial uses for all surface water,** *including wetlands.*

- **Nondegradation**
  - *Existing uses of state waters must be maintained and protected*

Wetland Beneficial Uses

- **Aquatic Life Use Support**
  - *Waters are suitable for the growth and propagation of fish and associated aquatic life, waterfowl and furbearers.*

  - *Bioassessments are very useful for assessing aquatic life beneficial uses because they are a direct measure of the health of aquatic communities.*

Numeric Criteria

- **Chronic and acute aquatic life standards.**
- **Changes in pH, turbidity and temperature are limited.**
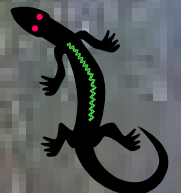
Narrative Criteria

- No increases are allowed above "*naturally occurring*" concentrations of sediment, settleable solids, floating solids, etc. which are *harmful, detrimental, or injurious to birds, fish or other wildlife*.

- Prohibition of *undesirable* aquatic life.

- *Pollution* resulting from non-point sources, including agriculture, construction, logging, and other practices must be minimized.

Naturally Occurring

- Refers to the chemical, physical and biological conditions or materials present from which man has no control, or from <u>developed</u> land where **"reasonable"** land, soil, and water conservation practices have been applied (17.30.602(18) ARM).

"**Reasonable**" Land, soil, and water Conservation Practices

- Means methods, measures or practices that protect existing and designated beneficial uses (17.30.602(23) ARM).

- Often determined by using reference condition

Reference Condition

- Reference condition is the *greatest potential* for a waterbody to support all of its beneficial uses given the *historical land use.*

- used to interpret narrative criteria and numeric criteria that limit how much a parameter can change from what would be naturally occurring.

Reference Condition
(Primary Approach)

- **Collecting baseline data from minimally impaired water bodies within the same region having similar geology, hydrology and morphology**

- **Evaluating historical data**

- **Using internal references or a paired watershed approach**
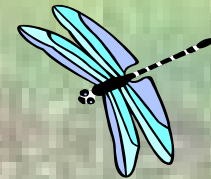
Reference Condition
(Secondary Approach)

- **Reviewing existing literature**

- **Expert Opinion**

- **Quantitative Models**

- **How are biological assessments being used by Montana's TMDL Program?**

What is a TMDL?
(Total Maximum Daily Load)

- **Technically**, a TMDL is the total amount of a pollutant, per day, (including a margin of safety) that a waterbody may receive from any source (point, non-point, or natural background) without exceeding the ***State water quality standards***.
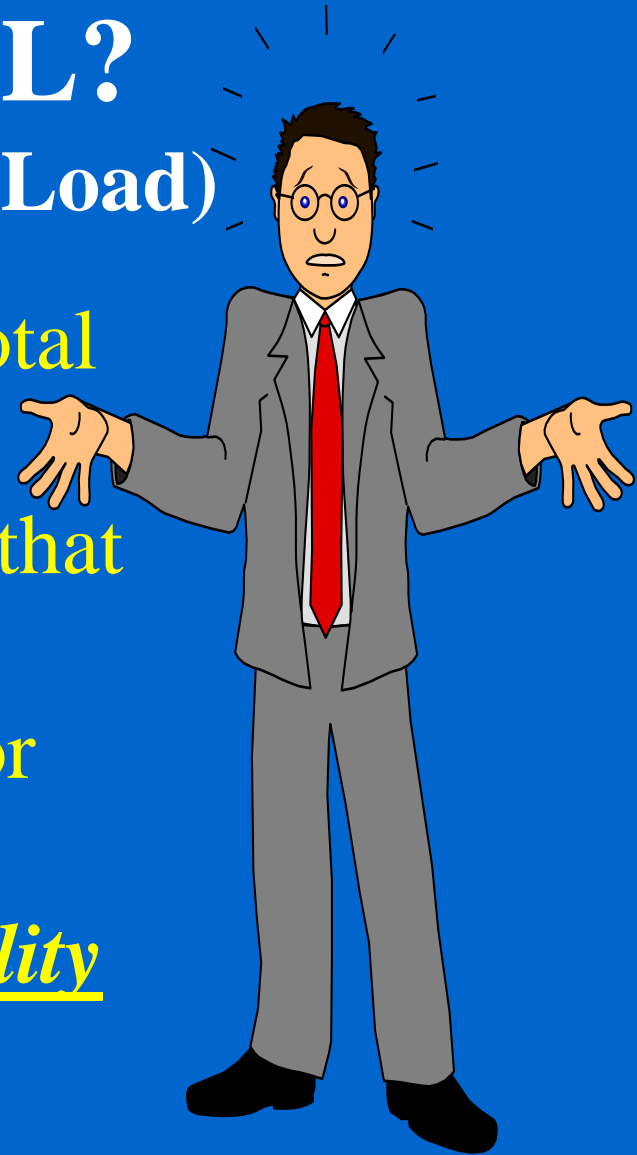
What is a TMDL?

Practically, a TMDL is a component of a water quality restoration plan that is developed to ***protect beneficial uses*** which has quantifiable goals or endpoints.

  – Must be linked to pollutants (e.g. nutrients)
  – May not be useful for restoring wetlands that have physical, habitat or hydrologic impairments (pollution)

Application of Biological Assessments in the TMDL Program

- **Detecting impairment**
  - Direct measure of aquatic life use
  - Interpretation of the biological data helps identify probable sources and causes of impairment

- **TMDL**
  - Establish targets or restoration goals
  - Effectiveness monitoring

303(d) List

- List of impaired waters that are not achieving State water quality standards and may require TMDLs

- There are currently eight wetlands on the 303(d) list.

- Biological data were used to assess aquatic life use support for 93% of the waters that have been placed on Montana's 303(d) list.

- **How are biological data considered when making Montana's 303(d) listing decisions and what is sufficient credible data?**

Sufficient Credible Data

"*….chemical, physical, or biological monitoring data,* alone or in combination with narrative information, that supports …... whether a water is achieving compliance with applicable water quality standards" (75-5-103(30) MCA)

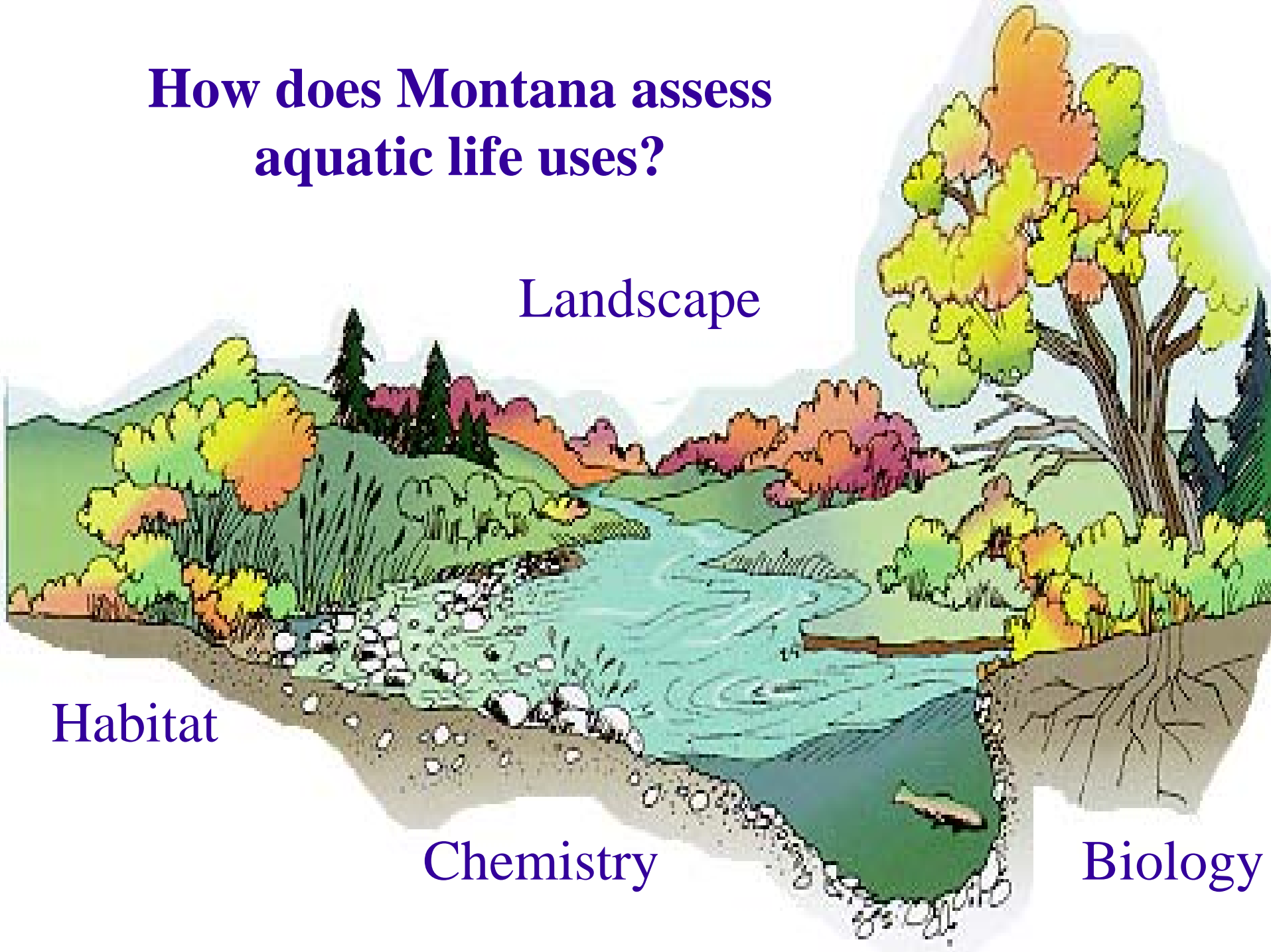….Must use all readily available data.

How does Montana assess aquatic life uses?

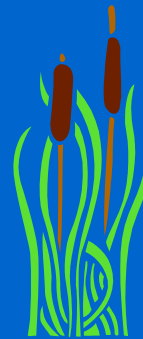Landscape

Habitat

Chemistry

Biology

Sufficient Credible Data Categories for making ALUS Determinations
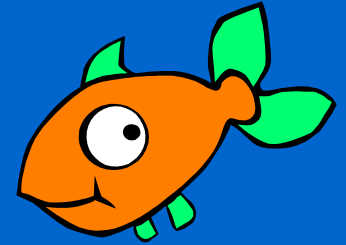
- Biology

- Physical/Habitat

- Chemistry (e.g., Toxins)

Biological Data Category

- Biocriteria
  - Fish
  - Macroinvertebrate
  - Algae
  - amphibians
  - vegetation
- Fish populations
- Wildlife populations

Chemistry Data Category

- Numeric Criteria
  - Acute and chronic aquatic life standards
  - Dissolved oxygen
  - changes in pH, turbidity and temperature

- Narrative Criteria (reference condition)
  - Nutrients (chlorophyll)
  - salinity
  - Clean and contaminated sediment
  - Bioaccumulation

Physical/Habitat Data Category

- Habitat
- Hydrology
- Geomorphology
- Landscape (sources)
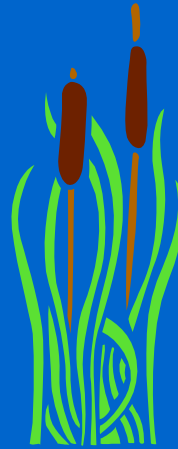
Landscape Data

- Percent land use/land cover
- Grazing intensity
- Fragmentation of riparian corridors
- Road density or number of stream crossings
- Number of irrigation withdrawals or miles of ditches

Functional Loss

Landscape - Physical Loss

Sufficient Credible Data

- **How does Montana decide when there is a sufficient amount of data and information to make an ALUS determination?**

Evaluate Data for:

- Technical Rigor of Methods

- Coverage /Quantity

- Quality

- Applicability to Present Conditions

Scoring Example: Biological Data

Score	Methods	Data Quantity	Data Quality	Data Currency
1	Visual observation; no reference	Limited	Unknown or low; no specialist	Data no relevant; may have been significant changes
2	1 group; use reference	Single time or single site	Low to moderate; some specialist guidance	Data older than ideal; likely still accurate
3	1 or more groups; use reference	Target sites; 1 season	Moderate; specialist makes assessment	Recent data
4	2 or more groups; use reference	Broad Coverage	High; all work done by specialist	Current data

Sufficient Credible Data for Making ALUS Determinations

- **All available data are evaluated.**
- **Data are usually required from *at least two data categories***
- **Minimum score of 6 required out of 12**
- **Data that scores 1 are not considered**
- **Assessments based on *reference condition* are generally scored higher.**

Beneficial Use Support

- **How does Montana make aquatic life use support determinations for 303(d) purposes?**

Assessment Process

- **Gather & Organize Data**

- **Evaluate Data Quantity & Quality**

- **Beneficial Use Support Determination**

Aquatic Life Use Support Determination

- **Overwhelming Evidence Test**

- **Independent Evidence Test**

- **Weight of Evidence Test**

Assessment Process (continued)

- **Use Support:**

  Full

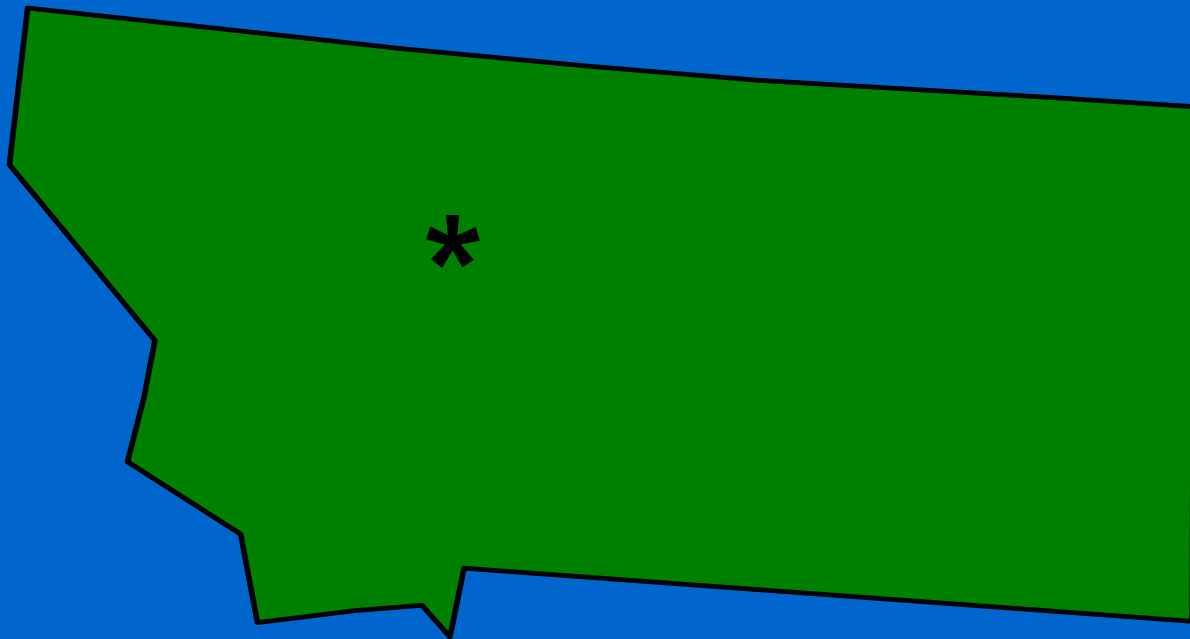 Threatened

  Partial

  Not Supporting

- **Application of Results**
  - 305(b) Statewide WQ Database
  - 303(d) Impaired Waters List

Case Study
Benton Lake National Wildlife Refuge

Benton Lake National Wildlife Refuge

- 5,600 acre saline marsh created by a glacier
- Established in 1929 to provide habitat for up to 100,000 ducks, 40,000 geese and 5000 swans
- Currently receives a large portion of its water from irrigation drainage
- The marsh is currently divided into separate units that are periodically flooded.
- Because there is no surface outlet, salts and contaminants are concentrated in the water.

Benton Lake National Wildlife Refuge
(Example of Sufficient Credible Data)

- **Chemistry** (Score 3 of 4)
  - **water column, sediment, and tissue data**
- **Physical/habitat** (Score 2 of 4)
  - **Visual habitat assessment with photo documentation and interpretations**
- **Biology** (Score 3 of 4)
  - **Macroinvertebrate and algae bioassessment**
  - **Substantial amount of waterfowl population data**
- **Total Score** = 8 (Sufficient Credible Data)

Benton Lake National Wildlife Refuge
(Example of Aquatic Life Use-Support Determination)

- **Chemistry**
  - **High nitrates in water column**
  - **High selenium in sediment and tissue**

- **Physical/Habitat/Landscape**
  - **Saline seeps were found within the watershed**
  - **intensive agriculture occurs within watershed**
  - **Water levels intensively managed to control salinity**
- **Biology**
  - **Algae biocriteria indicates moderate impairment**
  - **Macroinvertebrates indicate slight impairment**

Benton Lake NWR
303(d) listing

- **Weight-of-Evidence Test**
  - **Chemistry and biology data indicate impairment**
  - **Landscape information identifies probable sources**
- **Partial Support of Aquatic Life Use**
- **Probable Causes of Impairment**
  - salinity, nutrients (nitrogen), selenium, noxious algae
- **Probable sources of impairment**
  - agriculture

Summary

- **Biological assessments** directly measure impacts to the aquatic life communities.

- **Physical/habitat and chemistry assessments** directly measure impacts from landscape disturbances and often provide valuable information concerning the probable causes and sources of impairment.

Summary

- **Therefore, Montana DEQ is emphasizing a *holistic approach* for making ALUS determinations which usually entails consideration of data from *at least* two data categories.**