Montana’s Large River Monitoring Program

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Status

- Montana Large Rivers:
  - Clark Fork
  - Flathead
  - Kootenai
  - Yellowstone
  - Milk
  - Marias
  - Missouri

- Range from “almost wadeable” to “almost Great”

- Dams are found on all systems except the Yellowstone.

- A number of different large river monitoring efforts already occurring in Montana.
Montana’s Large Rivers
Clark Fork River

- Roughly 6th order; 490.5 miles
- Tri State Water Quality Council conducts trends analysis monitoring
- Long-term (>20 year) biological monitoring at 5-7 sites
- Targeted design focused on major tributaries
- Analyzed data based on voluntary nutrient reduction targets
- FERC license monitoring at licensed dams
Yellowstone River

- Roughly 6th order; (616 miles)
- No comprehensive monitoring plan, beyond NAWQA, exists for the Yellowstone
- NAWQA sampled 4 sites along the mainstem Yellowstone River (1999-2001) and 11 mainstem sites in 2000.
  - Followed NAWQA protocols.
  - Analyzed periphyton and macroinvertebrate data using taxa richness and autecological attributes
Missouri River

- 5th - 7th order; (~1,000 mi.)
- PPL (under FERC license) conducts routine sampling on the Upper Missouri (macros, periphyton / chl-a, fish, water chem)
  - Modified kick net
  - Data analyzed for trends and to assess biological condition
- Fort Peck Tribes sampled sites in the lower Missouri using EMAP design and methods
Statewide Efforts

- **DEQ’s Fixed Station Monitoring Network**
  - *Monitoring Objective:* Baseline and Trends Analysis
  - 42 sites sampled statewide; majority sites are wadeable, ~10 non-wadeable (4th-6th order)
  - Sampled for biology, chemistry, and pathogens

- **EPA’S EMAP Program**
  - 18 non-wadeable sites were sampled between 2000-2004
  - Data analyzed as part of the EMAP-West assessment

- **Montana Fish Wildlife and Parks**
  - Collects fish data throughout the state
  - Project / species specific
Activities to Date

- The majority of large river monitoring activities in Montana have been coordinated by local groups with DEQ involvement.
- Each program employs slightly different sampling protocols, has unique monitoring objectives, and approaches to data interpretation vary widely.
- DEQ has interpreted available data from large rivers to make impairment determinations for its Integrated Report:
  - Aquatic life use support decisions were based on fisheries information, ESA issues, metals exceedences.
Recent DEQ Large River Efforts

- EPA and DEQ are required, per Consent Decree, to monitor and assess all waters lacking sufficient and credible data (Appendix B 2004 DEQ IR)
  - Large river segments from the Milk, Marias, Yellowstone, and Missouri are included on this list.
  - The monitoring objective was to assess beneficial uses to make impairment determinations
Status

Therefore, the following large river activities occurred in 2005:

- DEQ hired a contractor to compile data for the Yellowstone and Missouri
- EPA sampled the Milk, Marias, Clark Fork, and parts of the Missouri
- DEQ and EPA are collaborating on a comprehensive long-term large river monitoring strategy for the State
Sampling Approach

- Prior to sampling, DEQ and EPA staff evaluated the primary pollutants of concern: nutrients, sediment, and metals.

- Protocols:
  - Selected EMAP macroinvertebrate SOPs
  - Periphyton were not collected due to uncertainties associated with data interpretation. Benthic and/or water column chl-a was collected.
  - Fish data was obtained from MT FWP where available.
  - Water chemistry included nutrients, TSS, and metals.

- Sampling design was shaped by input from stakeholders and targeted major major tributaries.
Reference Site Selection

- DEQ completed a reference stream project in 2005. A few large river (5th order) sites were included in the reference database.

- EPA used BPJ to identify candidate reference reaches per river (stakeholder input, review of aerial photos).

- The questions remain...
  - can we define reference for large rivers?
  - does reference mean the same thing in a large river as in wadeable streams?
Sampling Vessels

- Sampled by
  - Boat
  - Canoe
  - Inner Tube
Marias River

- Difficult to access in mid-sections
- One dam along river
- Little human influence in middle sections (light grazing, water withdrawals)
- Badlands, naturally highly-erosive soils
- Riffles present
Marias River

- 5<sup>th</sup> order stream
- EPA sampled 15 sites along the entire Marias River (170.5 miles) in July 2005
- Canoed 60 river miles; access other sites from car
- Sampling locations bracketed major tributaries
- Identified possible reference reaches in the field
Milk River

- “Sucking muck” bottom
- Entire river is influenced by large scale water diversions, withdrawals, and hydromodifications
- Ranged from incised narrow channel to wide deep channel
- Moderate human disturbance
Milk River

- 5th order stream
- EPA sampled approx. 20 sites (476 miles) along the entire Milk River in Montana in August 2005
- Very little habitat for macroinvertebrate colonization
- Low gradient, low velocity
Missouri

- Sampled 7 sites in 42 miles of the Missouri
- One segment located upstream of dam and included a large “backwater” area
- 2nd segment located downstream of a different dam
- Challenge of reference or “natural”
Data Analysis for 2005 Sampling

- **Nutrient Criteria:**
  - DEQ has preliminary reference-based nutrient criteria for the streams (4\textsuperscript{th} - 5\textsuperscript{th} order)
  - Designing a plan for large rivers that will focus on exceedences of DO / diel variations / modeling

- **Macroinvertebrate Analysis Models:**
  - DEQ has macroinvertebrate tools that may be suitable for the 4\textsuperscript{th}-5\textsuperscript{th} order rivers
  - There is no current method for analyzing bug data for larger rivers such as Yellowstone and the Missouri

- **Sediment (and Temperature) Impacts**
  - Challenge of considering reasonable dam operation
Developing a Long-Term Large River Monitoring Strategy

**Goal:** Evaluate beneficial uses and potential stressors; determine how the data will be analyzed

- Metals
- Nutrients
- Aquatic Life Use Support
  - Macroinvertebrates
  - Periphyton
  - Fish
- Temperature
- Sediment
Proposed Approach

- Develop a series of “white papers”
  - Link certain indicators to an existing standard
    - Nutrients (DO, pH)
  - Evaluate approaches used to date for determining “natural” or reference
    - literature values
    - reference reach
    - modeling “natural” vs. degree of disturbance
- Recommend an approach per indicator for data interpretation
- Test concepts in one basin
Next Steps

- Obtain feedback and suggestions on this approach
- Draft white paper for an individual stressor within next 2 months
- Hope to have draft white papers for all stressors within 6 - 12 months
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Questions?
What’s Been Done to Date?

- DEQ’s Fixed Station Monitoring Network
- Clark Fork River Monitoring (Tri State Monitoring Council)
- NAWQA Monitoring on the Yellowstone
- Limited watershed group / conservation district efforts on the Milk and Marias
- PPL sampling on the Missouri
- Fort Peck Tribe’s sampling on the Missouri
- EMAP non-wadeable sampling statewide
Technical Issues Considered

- Defining “Reference” for large rivers
- Selecting sampling protocols
- Data analysis for pollutants of concern and beneficial uses (nutrients, sediment, temp, habitat, pesticides, aquatic life [fish, bugs, periphyton], pathogens)
- Choosing a sampling design: targeted / random
Large River Monitoring Strategy

- DEQ and EPA, with technical support from TetraTech, are developing a large river monitoring plan for Montana.

- **Original goal:** Design a large river monitoring network to assess aquatic life and other beneficial uses for impairment determinations.
  - Can we determine cause (e.g., nutrients, temp, etc.)?
  - Look for opportunities
  - Use available monitoring programs to meet objective
  - Add other monitoring objectives
Products - Remove?

- Development of a large river monitoring strategy can be text added to the 2006 Integrated Report
- Fulfills a current gap in the comprehensive monitoring strategy submitted to EPA
- Guides the approach to interpreting the data and ensures that the necessary data is collected
Fixed Station Network

Legend
- ★ Active Stations
- ★★ Inactive Stations

Scale 1:3,953,647

Figure 1
EMAP Sampling Locations
Objectives

- Highlight the status of large river monitoring in Montana
- Review existing approaches
- Highlight several technical issues
- Outline proposed plan for building a large river monitoring program for MT DEQ
Missouri - fix

- 6th order river
- EPA sampled 7 sites in 2 segments of the Missouri in August / September 2005
- Sites were located downstream of major tributaries and to bracket the entire reach
Narrative Standards

- The challenge lies in interpretation of narrative standards.
- For each parameter, a white paper will be developed that
  - Describes the current approach to interpreting “natural” (e.g.,
    - reference reach
    - modeling natural vs. degree of disturbance
    - literature values
  - Recommend an approach per parameter