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EMAP
Great River Ecosystems

U.S. EPA Office of Research and Development

Environmental Monitoring and Assessment Program

Montana's Large River Monitoring Program

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Status

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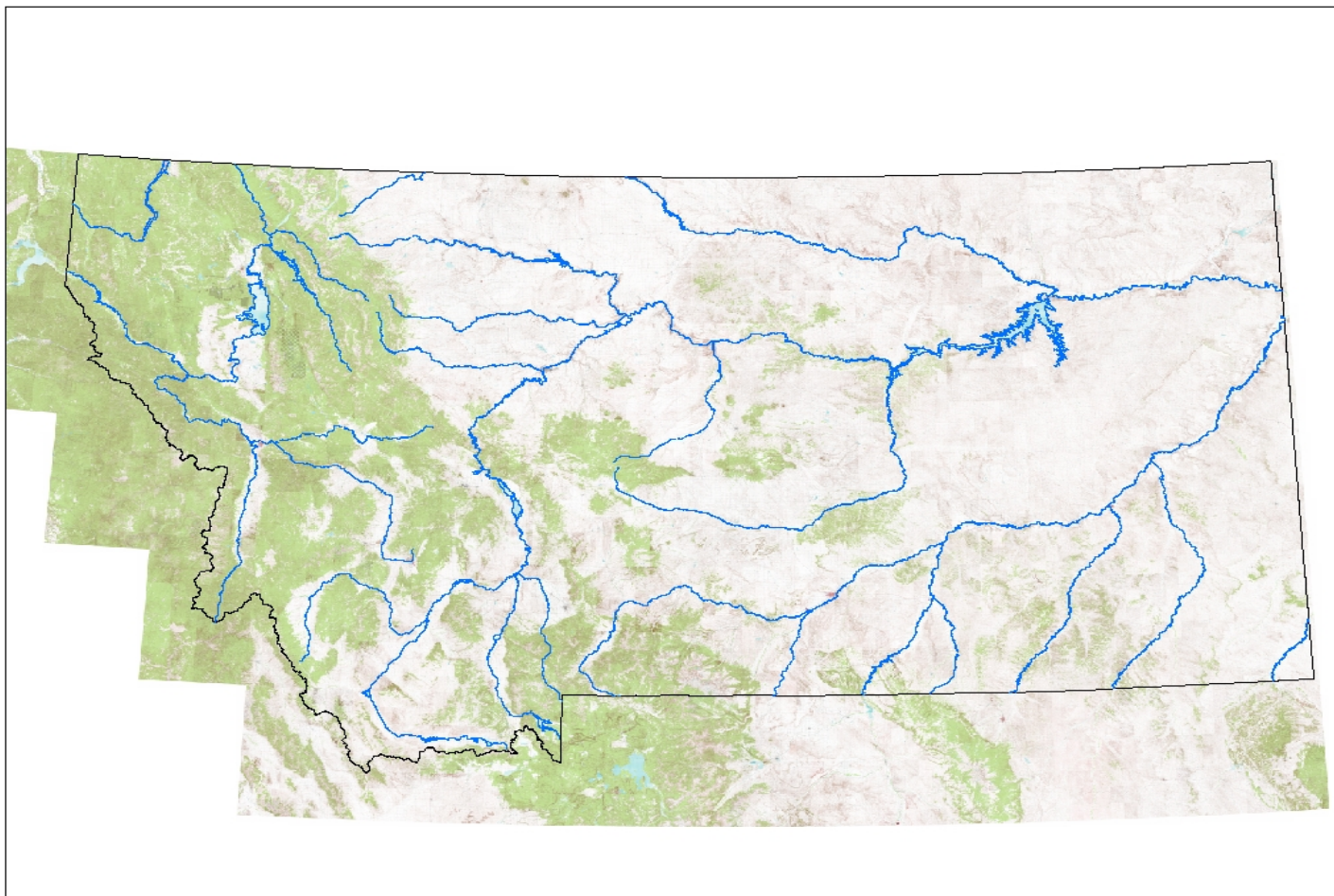
Clark Fork River

- 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 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

- 5th 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 (4th – 5th 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 4th-5th 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

Acknowledgements

- **DEQ Staff**
  - ☐ Rosie Sada
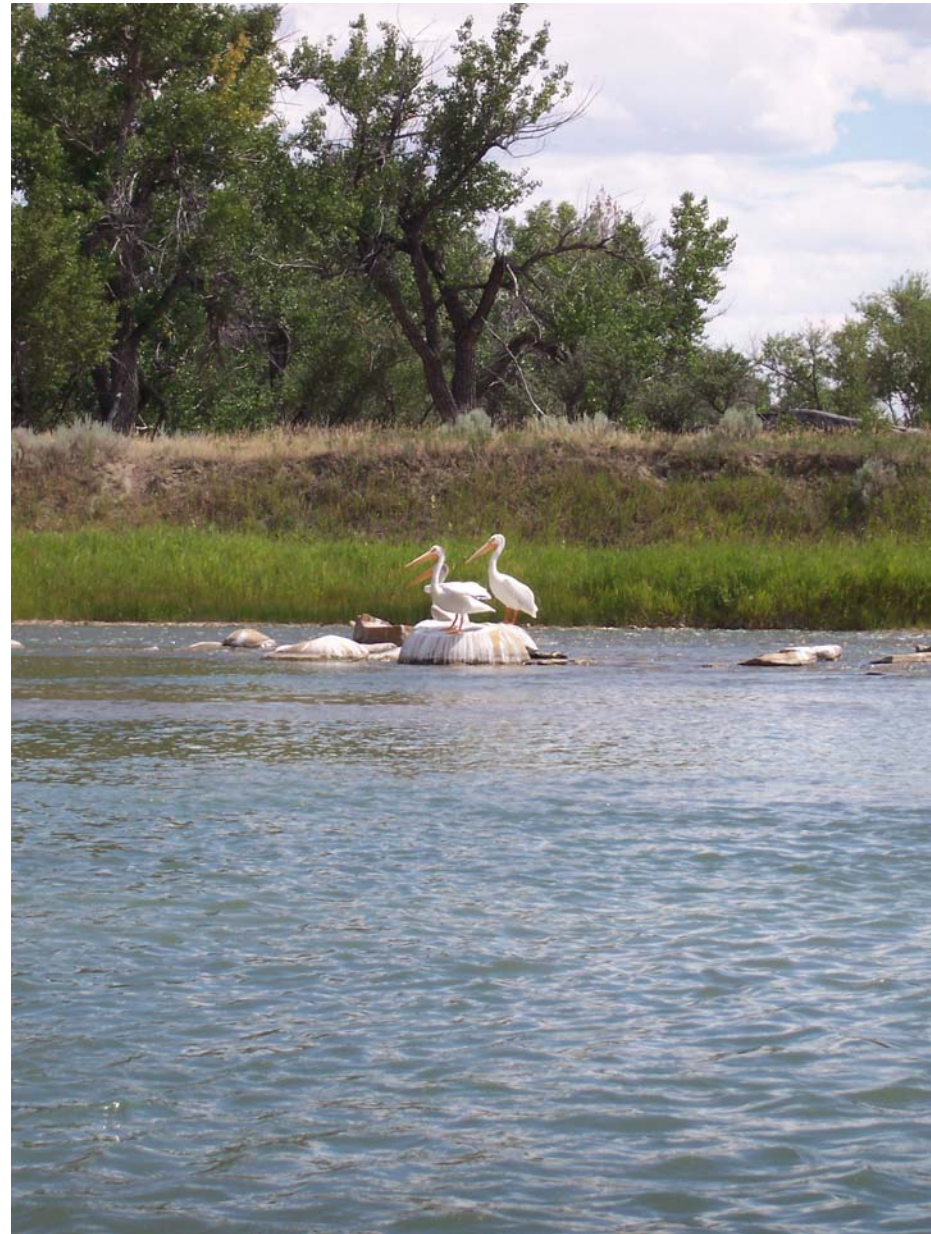 - ☐ Mike Suplee
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Questions?

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
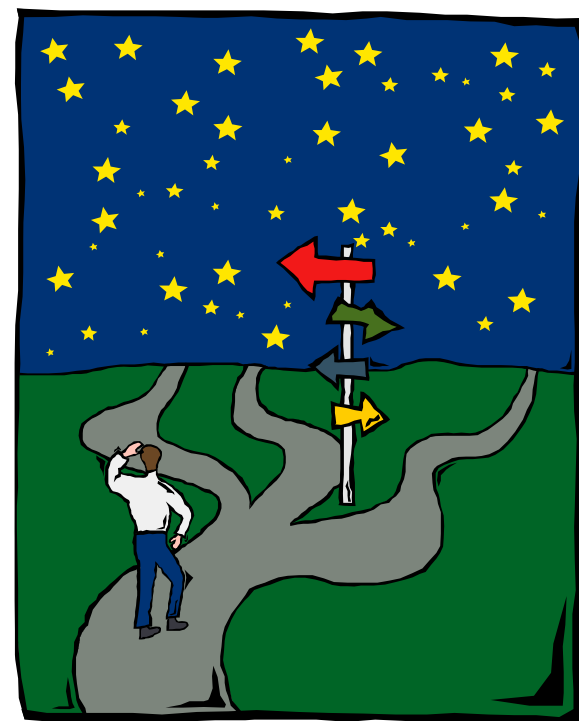
Large River Monitoring Strategy

- 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
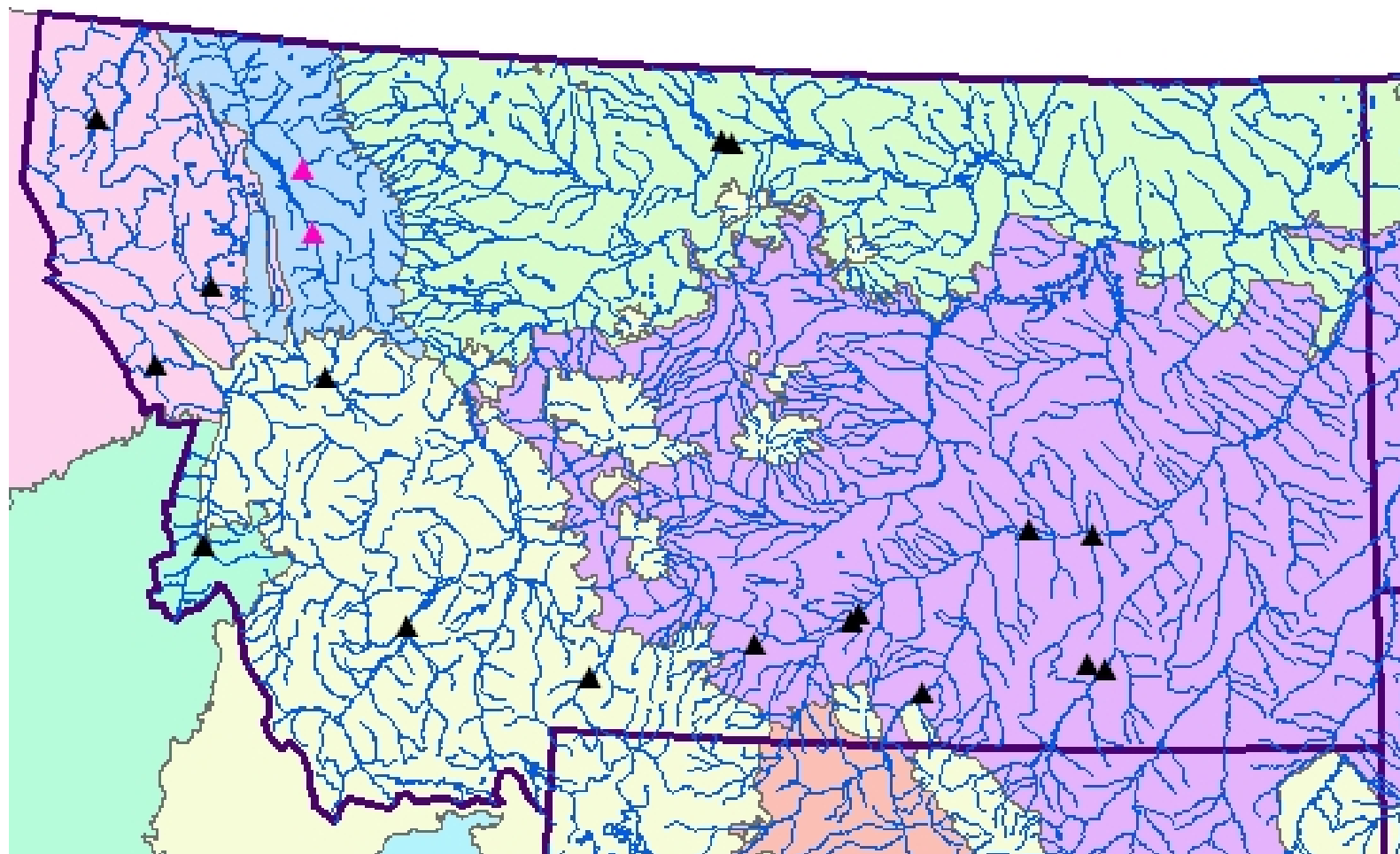 - Add other monitoring objectives

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

Figure 1
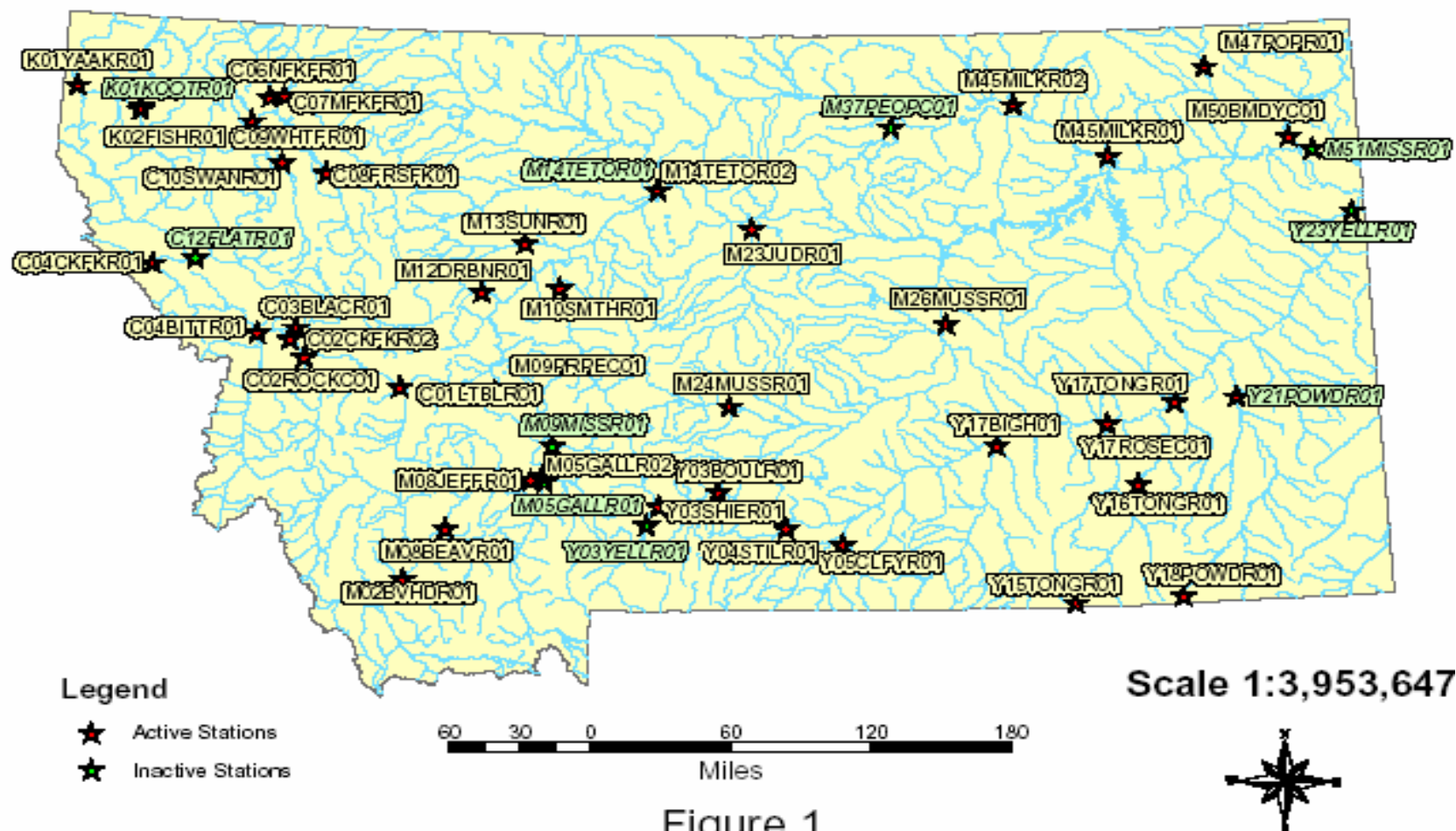
EMAP Sampling Locations

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