



*University of Montana Center for Riverine Science and Stream Re-naturalization  
and Montana AWRA*  
7th Annual River Center Conference and 1<sup>st</sup> Joint Conference  
**“Waters that Cross Divides”**

**Field Trip Guide**

**Wednesday  
September 30, 2009**

Milltown Bluff and Clark Fork River (former Milltown Reservoir)

**Field Trip Leader:** Andrew Wilcox- The University of Montana

**Speakers:** Doug Martin (Montana Natural Resource Damage Program), David Schmetterling (Montana Fish Wildlife and Parks), Tony Berthelote (The University of Montana)

**Student Volunteers:** Elena Evans, Nick Hehemann, James Johnsen, Adam Johnson, Ivan Orsic, Andrea Stanley (all UM Geosciences)

**Field Trip Sponsors**

*Principal Sponsor*

The University of Montana  
National Science Foundation EPSCoR

*Gold Sponsor*

AMEC Geomatrix, Inc.  
Mountain Water Company  
Robert Peccia & Associates

*Supporter*

Envirocon, Herrera Environmental Consultants, UM Watershed Health Clinic

Color version of this field trip guide posted at: <http://www.umt.edu/rivercenter/conf.html>  
2009 AWRA/River Center Conference website: <http://water.montana.edu/awra/>

Greetings! This year's River Center Field Trip will take us to several stops in the vicinity of the former Milltown Dam site. The goals of the field trip are to exchange information and ideas about the dam removal, the scientific studies seeking to understand the effects of the removal on physical and biological processes, and the remediation and restoration efforts in the former reservoir. Although there will be a few short presentations, the emphasis of this outing is to provide an opportunity for participants to ask questions, share their thoughts, and of course see the site.

*Tentative Schedule (subject to change)*

**12:45 pm:** load buses, Holiday Inn Downtown

**1 pm:** depart Holiday Inn

On our way to stop #1, we will pass through Hellgate Canyon, just east of Missoula. The mountains to the north and south of the road are Mount Jumbo and Mount Sentinel, respectively. Both are composed of Precambrian Belt rock and show shorelines from Glacial Lake Missoula. After passing through East Missoula, we will cross the Clark Fork River over the Deer Creek Bridge. Just downstream of this bridge is the USGS Clark Fork River above Missoula gauging station, an important site for measurements of water discharge, sediment flux, and water quality downstream of Milltown. Some data from this station are shown below. At this point we are 2.5 river miles (4 km) downstream of the former Milltown Dam. The Clark Fork River is flowing at about 1,200 cfs (34 cms) at the time of the field trip. Next, we pass through a terrace known as Bandmann Flats (on the inside of the large horseshoe bend in the river visible on the Google Earth image) that is now home to the Canyon River Golf course and development.

**1:15 pm:** arrive at Stop #1, Milltown bluff

At this stop, we will walk down to the Milltown Bluff, which overlooks the former dam site and the remediation area in the former reservoir. Here we will receive a brief history of Milltown Dam and its removal and discuss some of the scientific studies surrounding the removal. Supporting images are provided on the following pages. **Be extremely careful at this site. The site has a sheer drop off on its northern edge. Do not approach the edge. Please be careful and watch out for others.**

**2:30 pm:** depart Stop #1

We will backtrack over the Deer Creek Bridge and then drive on Highway 200 along the north side of the river and eventually through Milltown. We will pass over the Blackfoot River; the pedestrian bridge just upstream is our final stop, time permitting.

**2:45-3 pm:** arrive Stop #2, Envirocon Remediation & Restoration Area, former Milltown Reservoir

At this stop, we will get an up-close look at the remediation and restoration efforts in the former reservoir. Refreshments will be provided here. **Proper footwear is mandatory in this area. This means closed-toe shoes, at a minimum, and ideally boots. Anyone wearing sandals will need to stay on the buses for this portion of the field trip, per Envirocon's rules. In addition, only authorized vehicles are allowed in this area, so all field trip participants for this portion will need to be on the schoolbuses (or one of the supplemental vans).**

**4:15 pm:** depart Stop #2

**4:20-4:50 pm:** Stop #3, Blackfoot River pedestrian bridge

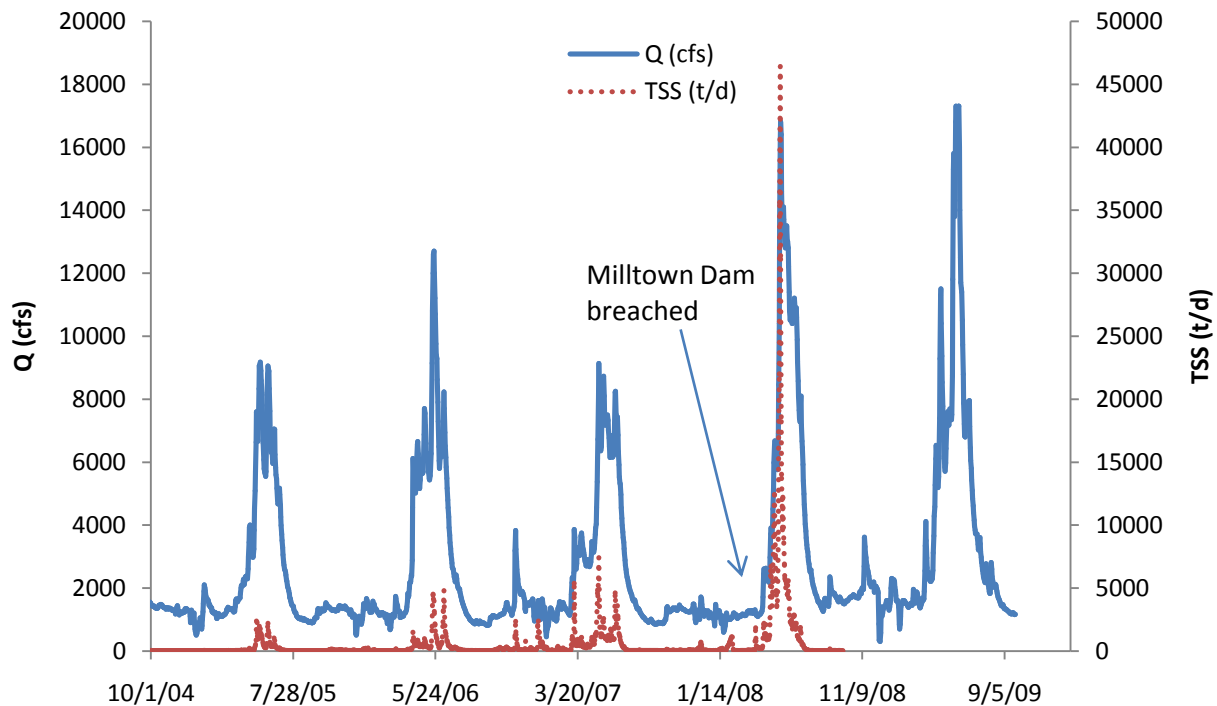
If time permits, Stop #3 will provide us an opportunity to view the geomorphic adjustment of the Blackfoot River to the dam removal and the exhumation of thousands of logs by river incision, and to learn about management issues associated with bridge abutments and the Stimson Mill.

**5 pm:** Return to Holiday Inn Downtown

Please be sure to attend the many talks and posters about topics related to the Milltown Dam removal at the conference the next couple days.



Overview of field trip area; yellow pins denote departure location (Holiday Inn) and three planned stops (Google Earth).



Flow (Q) and suspended sediment (TSS) data collected by USGS at Clark Fork above Missoula gauge, WY 2005-2009.



Milltown Dam during 1908 flood



Milltown Reservoir in 1935



June 2006, full pool (pre-drawdown)



August 2006, after Stage 1 drawdown (10-12 ft)



Summer 2007



November 2007 (bypass channel near completion)



March 28, 2008: Milltown Dam and Reservoir within hours of breaching of cofferdam

## Geomorphology studies- University of Montana

Our investigations have centered on several related questions:

- 1) What has been the extent and pattern of upstream erosion out of the Clark Fork and Blackfoot arms of Milltown Reservoir?
- 2) Where did that sediment go, how has it changed the downstream river, and how long will those changes last?

This work is motivated by goals of not only understanding this specific dam removal and river, but also of taking advantage of the dam removal as a natural experiment on how sediment pulses move through gravel-bed rivers that we hope will inform understanding of basic river processes and future dam removals.



Eroded surface in Milltown Reservoir, July 2008

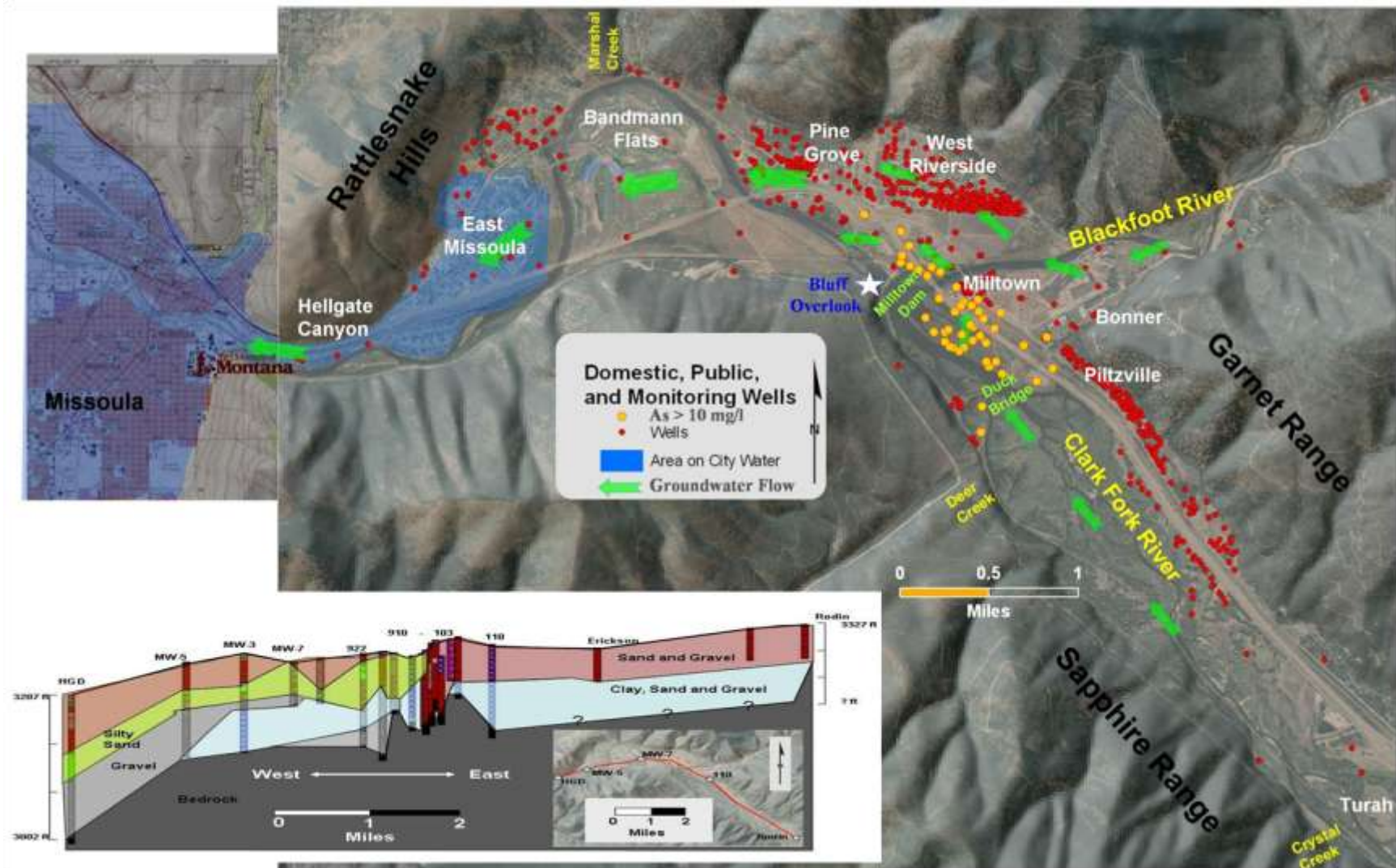


Infiltration of fine sediments into cobble-gravel interstices (downstream)



Aerial photo mosaic of Kelly Island (on the west side of Missoula, before the Clark Fork meets the Bitterroot River) produced by D. Brinkerhoff using 2008 photos. Thicker deposition areas have been observed in the Kelly Island reach and in more localized areas elsewhere.

Groundwater studies- Tony Berthelote, University of Montana. Electronic copies of technical documents are available at <http://www.epa.gov/region8/superfund/mt/milltown/>



Inset: Hydrostratigraphic cross section interpreted from well logs from the Turah Bridge area to Hellgate Canyon.

Restoration plans for Clark Fork River (The following images are courtesy of Matt Daniels, River Design Group, Inc.)



