**Initial Water Quality Results for the Suncook River after avulsion on May 15, 2006**

Prepared by:

Michelle L. Daley
Research Scientist
NH Water Resources Research Center (WRRC)
Department of Natural Resources
University of New Hampshire

June 20, 2006

## Introduction/Methods

On June 1 and June 2, 2006, several researchers from the Department of Natural Resources at the University of New Hampshire visited the Suncook River in Epsom, NH to collect samples for water quality analysis. The group consisted of Dr. Bill McDowell (Professor of Water Resources Management and Director of the NH WRRC), Dr. Kimberly Babbitt (Associate Professor of Wildlife Ecology), Michelle Daley (Research Scientist) and several graduate students. Eric Orff led the group to several sites along the Suncook River in both the old and new channels.

A total of 10 sites were sampled (Table 1) over the two day period to characterize water quality in four areas 1) the upstream/unimpacted reach 2) the new reach 3) the dewatering reach (West Branch and Mason Brook tributary) and 4) the downstream reach (Figure 1). A YSI 556 was used to determine pH, conductivity, specific conductivity, dissolved oxygen, percent dissolved oxygen and temperature at all sites. Samples were filtered in the field and brought back to the Water Quality Analysis Lab at UNH for analysis of Dissolved Organic Carbon, Dissolved Organic Nitrogen, Nitrate, Ammonia, Phosphate, Silica, Anions (Cl, $NO_3$-N, $SO_4$-S) and Cations (Na, Mg, Ca, K). Unfiltered samples were collected and analyzed for total suspended sediment (TSS).

Table 1. UNH Site ID, description of site location and collection date for water quality samples collected from the Suncook River in Epsom, NH.

| Site ID | Description | Date |
|---|---|---|
| Srt4 | Suncook at Rt 4 | 6/1/2006 |
| SNUp | Suncook New Reach - Upper Section | 6/1/2006 |
| SNMid | Suncook New Reach - Middle Section | 6/1/2006 |
| SNDn | Suncook New Reach - Downstream Section | 6/2/2006 |
| EB | Suncook New Reach back in orgional East Branch | 6/2/2006 |
| SDn | Suncook Downstream Behind Church | 6/2/2006 |
| SOUp | Old Suncook upstream of Dam, ponded and drying up | 6/1/2006 |
| WBUp | West Branch Upstream of Mason Brook | 6/2/2006 |
| MB | Mason Brook (tributary to West Branch) | 6/2/2006 |
| WBDn | West Branch - Downstream Section | 6/2/2006 |

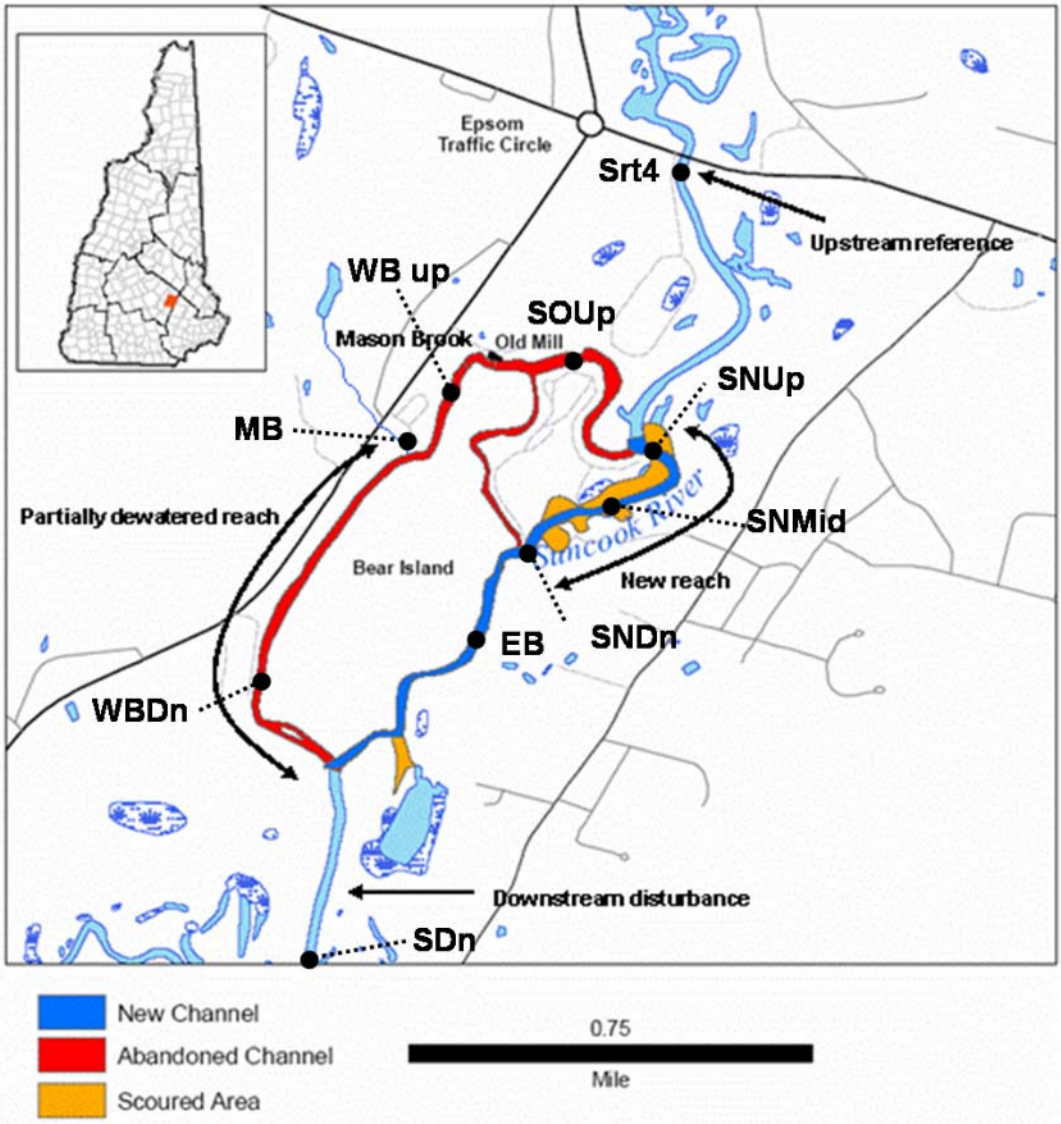


**Figure 1**. Location of UNH water quality sampling sites 6/1/06 and 6/2/06 (Mapping by New Hampshire Geological Survey, NHDES).

**Results to Date**

Currently, the only water quality results available are for TSS and parameters collected in the field. Results of further laboratory analysis will take a few weeks to complete. There was a minor rain event that occurred on the evening of 6/1/06 (in the middle of our sample collection period) and may complicate our comparison among sites. However, based on our initial results, we believe that this rain event had a minor impact on most parameters.

**pH**

pH was relatively consistent among our sample sites and all sites were below the New Hampshire Class B minimum standard of 6.5. Mason Brook had the lowest pH (Figure 2), but

this brook drains several wetlands which tend to have lower pH values due to the production of fulvic and humic acids. The rain event on 6/1/06 appears to play no role in the differences in pH values among sites.

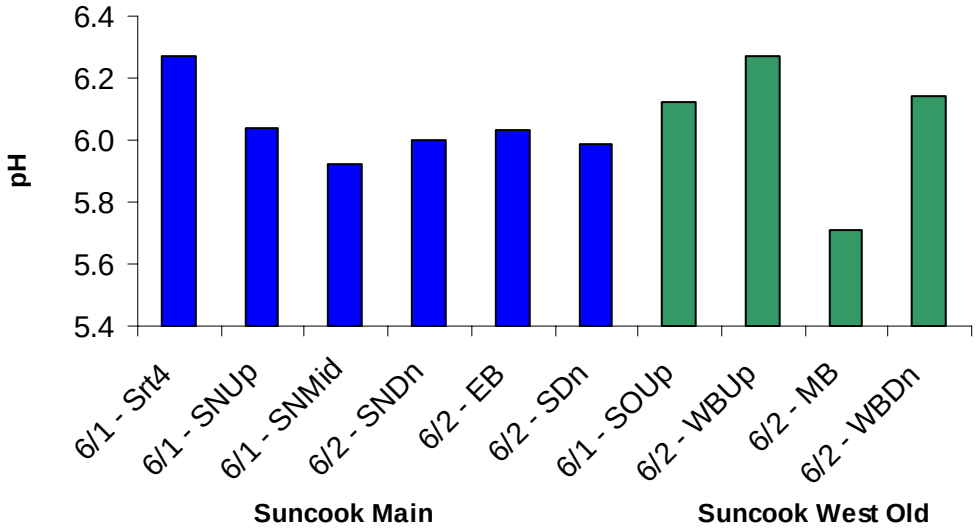


**Figure 2**. Graph showing pH among UNH sampling sites on 6/1/06 and 6/2/06. Sites in blue are located on the main/new channel of the Suncook River; sites in green are located along the old West Branch. All sites are arranged as upstream to downstream from left to right.

**Specific Conductivity**

Specific conductivity is lower in the main/new channel of the Suncook River than it is in the old West Branch (Figure 3). This indicates that the concentration of dissolved ions is lower in the main/new channel and is likely due to dilution/higher flow rates than the old West Branch which has a higher concentration of dissolved ions and lower flow rates. The rain event on 6/1/06 appears to play no role in the differences in specific conductivity among sites.

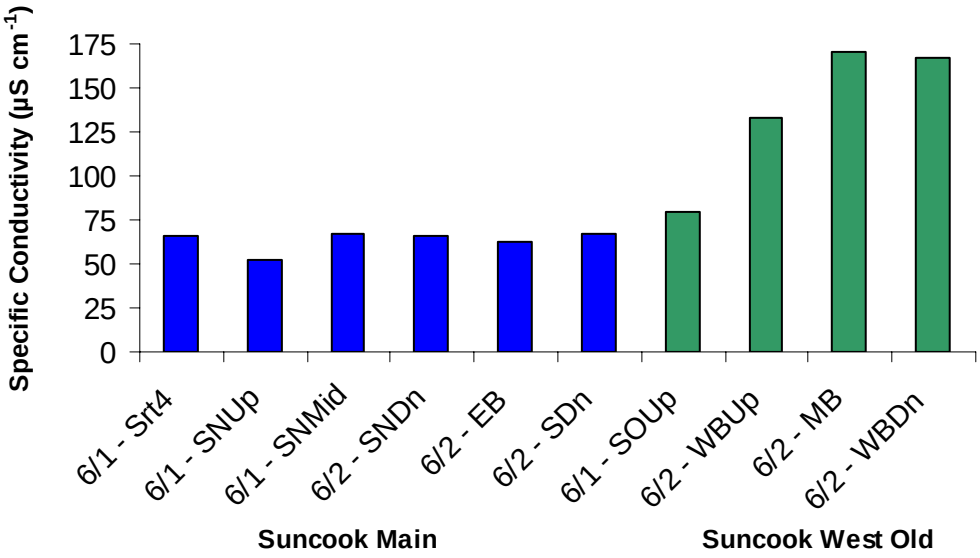


**Figure 3**. Graph showing specific conductivity among UNH sampling sites on 6/1/06 and 6/2/06. Sites in blue are located on the main/new channel of the Suncook River; sites in green are located along the old West Branch. All sites are arranged as upstream to downstream from left to right.

**Dissolved Oxygen**

Dissolved Oxygen (DO) was relatively consistent among our sample sites and all sites were well above the New Hampshire Class B standard of 5.0 mg/L (Figure 4).

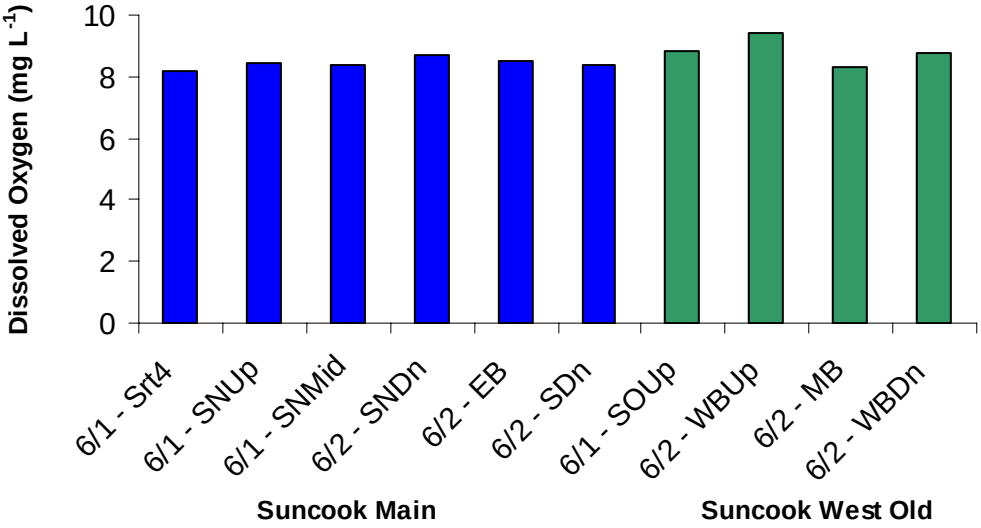


**Figure 4**. Graph showing dissolved oxygen among UNH sampling sites on 6/1/06 and 6/2/06. Sites in blue are located on the main/new channel of the Suncook River; sites in green are located along the old West Branch. All sites are arranged as upstream to downstream from left to right.

## Temperature

Temperature was relatively consistent among all sample sites (Figure 5). The rain event on 6/1/06 may have resulted in a slight decrease in temperature from 6/1/06 to 6/2/06.

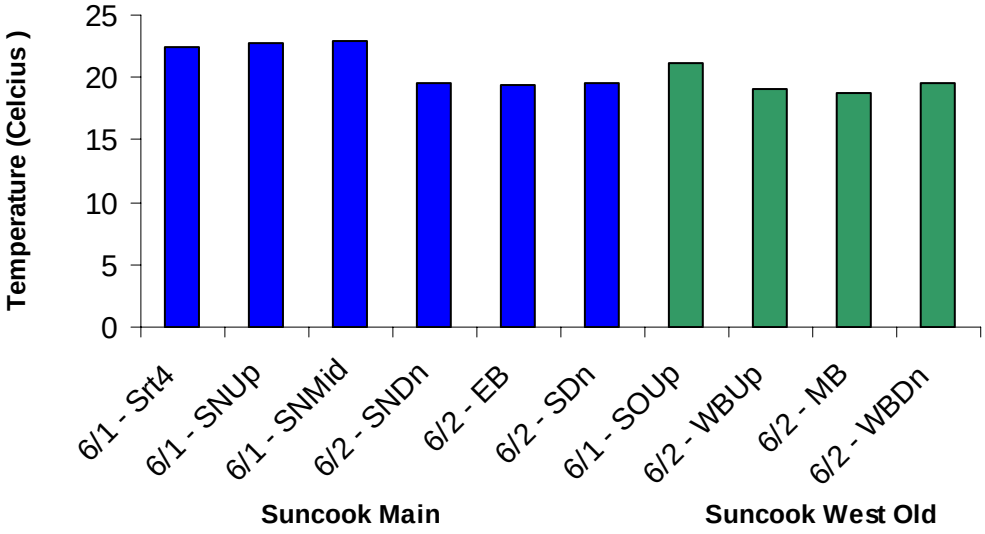


**Figure 5**. Graph showing temperature among UNH sampling sites on 6/1/06 and 6/2/06. Sites in blue are located on the main/new channel of the Suncook River; sites in green are located along the old West Branch. All sites are arranged as upstream to downstream from left to right.

## Total Suspended Sediment

Total suspended sediment (TSS) was much higher in the new channel than the upstream/unimpacted site and the old West Branch (Figure 6). Generally, TSS increases with distance downstream from the upper most section of the new channel to the site where the new channel is back in the original east bank, and then TSS decreases slightly at the very downstream site suggesting that sediments may be deposited in this downstream area. The rain event on the evening of 6/1/06 is probably responsible for the very large increase in TSS from SNMid to SNDn, but the overall trend of increasing TSS as you move downstream in the main/new channel is still evident despite the rain event. As a point of reference, the highest TSS we have measured in the Lamprey River at Packers falls since Oct. 2002 was 40 mg/L and during the May 2006 flood, the highest TSS recorded was about 10 mg/L. On 6/2/06, TSS reached almost 280 mg/L at EB and it is very likely that values much higher than this occurred earlier in the avulsion.

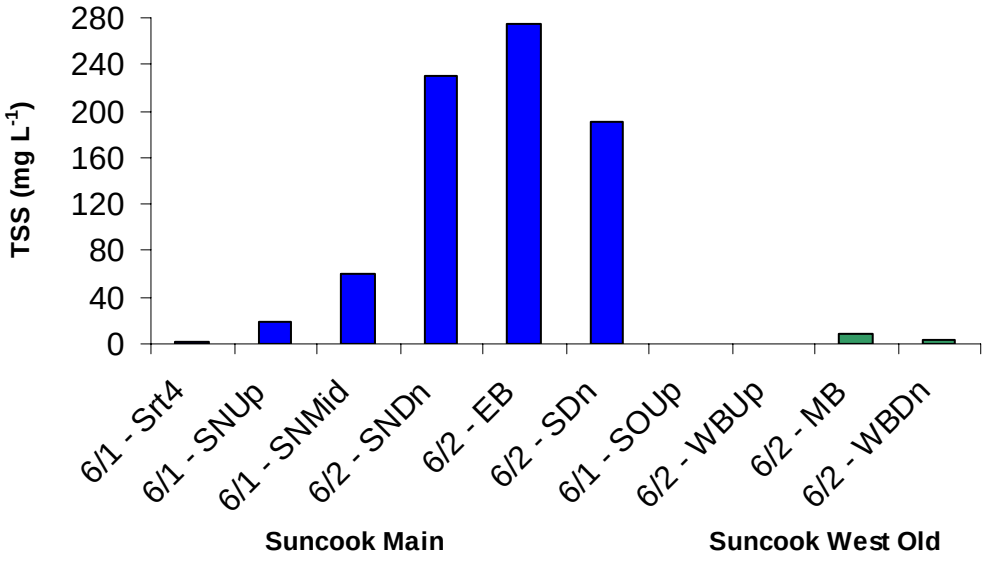


**Figure 6**. Graph showing total suspended sediment among UNH sampling sites on 6/1/06 and 6/2/06. Sites in blue are located on the main/new channel of the Suncook River; sites in green are located along the old West Branch. All sites are arranged as upstream to downstream from left to right.