How did we get to where we are???

Education . . .

Engineers / Biologists / Geomorpholigists


WASERO
CAT


DEERE
200LC
2004/01/26


KOBELCO
Dynamic
2004/01/26

Not quite as glamorous but certainly exciting

Working in the Wet

Is there a time and place?

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Yes - When it’s the Right Project

When:

- Diversion channels aren’t possible
- Riverbed and soil conditions allow it
- Type of construction is buildable in wet conditions
- When there is a level of comfort between the owner, designer, agency and contractor

Case Study Sites

- West Don River at Bayview
- Bronte Creek, Lowville

West Don River at Bayview

- 115m armourstone and boulder erosion work
- 35m high bank to traverse for access
- Slope re-grading and drainage work
- Planting, seed and mulch

** Approximately 100-150m³ of soil had previously washed away in a landslide due to creek erosion and water seepage*


DEERE

Monitoring Results

Pre- Construction Baseline

(following rain event) Feb. 18, 2011

Station	Turbidity (NTU)
D/S1 @ 2:00 pm	199
D/S 2 @ 2:20 pm	208
D/S 3 @ 2:35 pm	220

- Baseline data gathered prior to construction to characterize storm flow conditions
- Machine entry monitored closely by increasing frequency and number of samples taken.

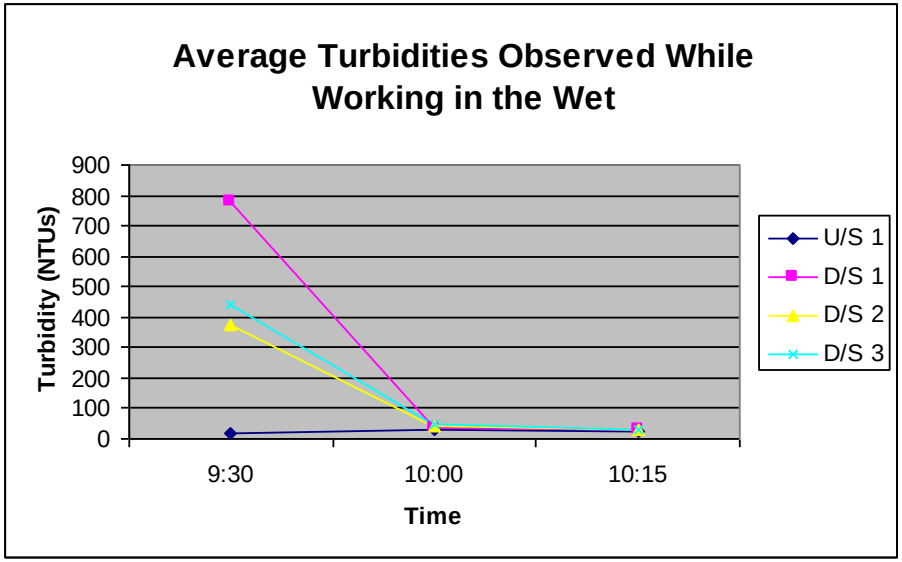
Machinery Entry (9:45am)

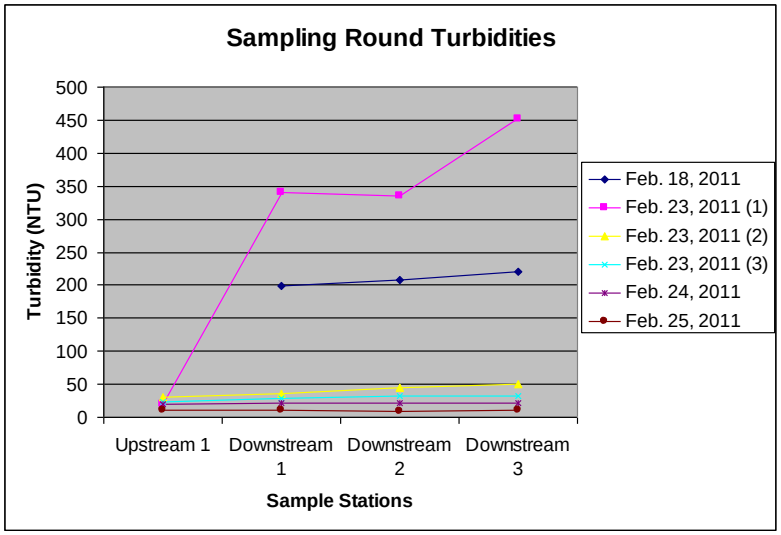
Feb. 23, 2011

Time	Station	Average NTU
9:30	U/S 1	21
10:00	D/S 1	780
10:15	D/S 2	374
10:24	D/S 3	443
10:50	U/S 1	28
11:15	D/S 1	36
11:25	D/S 2	45
11:35	D/S 3	50
12:15	U/S 1	23
12:30	D/S 1	29
12:40	D/S 2	32
12:50	D/S 3	32

Monitoring Results Con't

- Data to the right shows a spike in turbidity caused by initial entry, turbidities quickly receded while work continued in the wet
- Customized contingency plans in place if potentially long term exceedances are observed





- To the left, increased monitoring is shown at the time of entry, including subsequent follow-up monitoring events

Bronte Creek - Lowville

- 1000m of gravel/cobble bottom creek
- Work done on both sides of creek
- 7 major riffles
- 400m of brush mattress and vegetated round stone

Upstream section of Lowville Park – Spring 2010

Upstream section of Lowville Park – Fall 2011

Looking upstream from bridge toward island. Spring 2010

Looking upstream from bridge towards island – Fall 2011

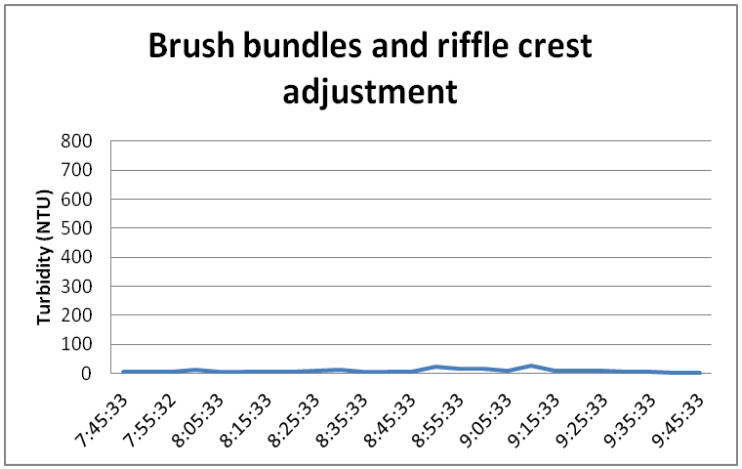

At downstream bridge in Lowville – Summer 2010

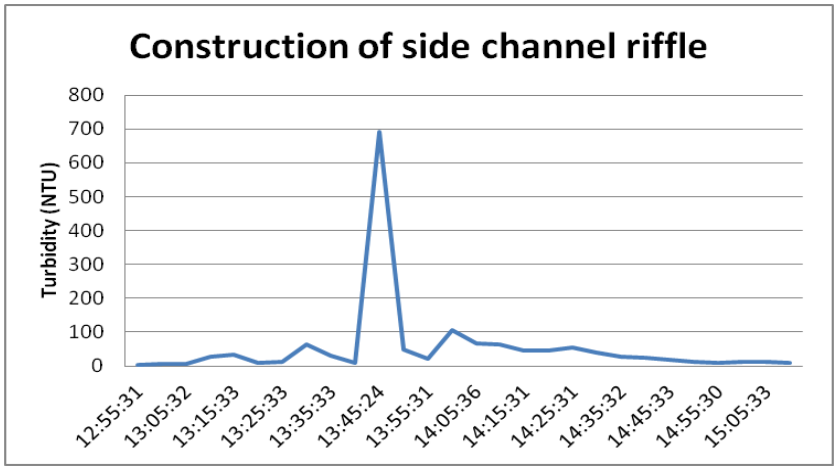

At downstream bridge in Lowville – Fall 2011

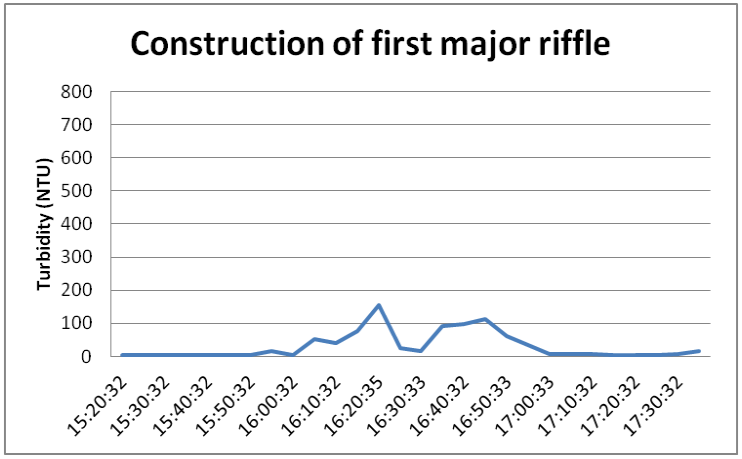

At downstream bridge in Lowville – Summer 2010

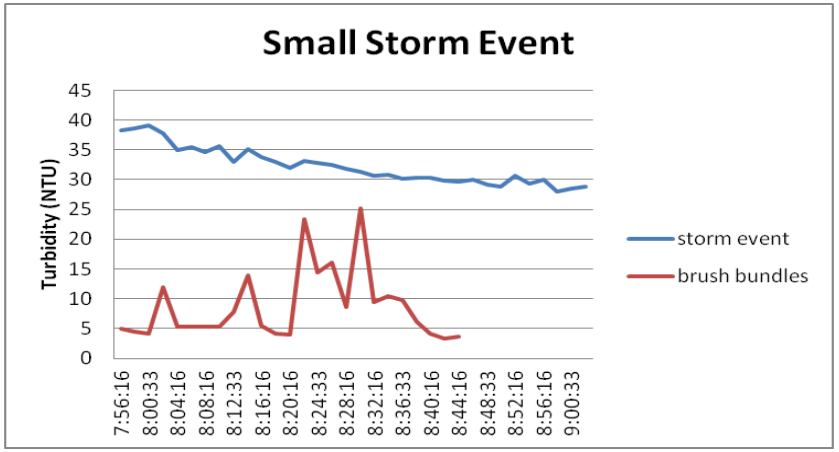
At downstream bridge in Lowville Park – Fall 2011

Monitoring Results – Bronte Creek

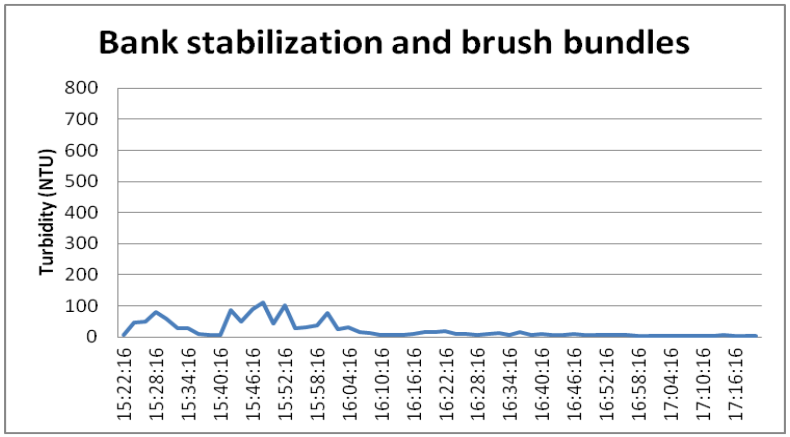


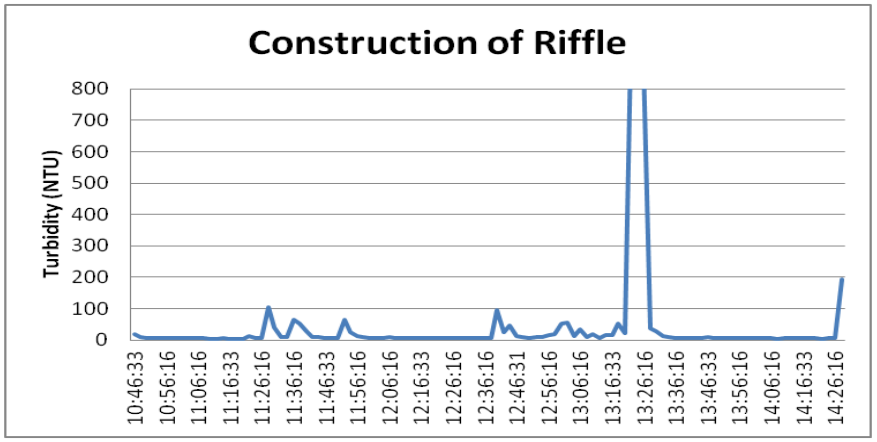


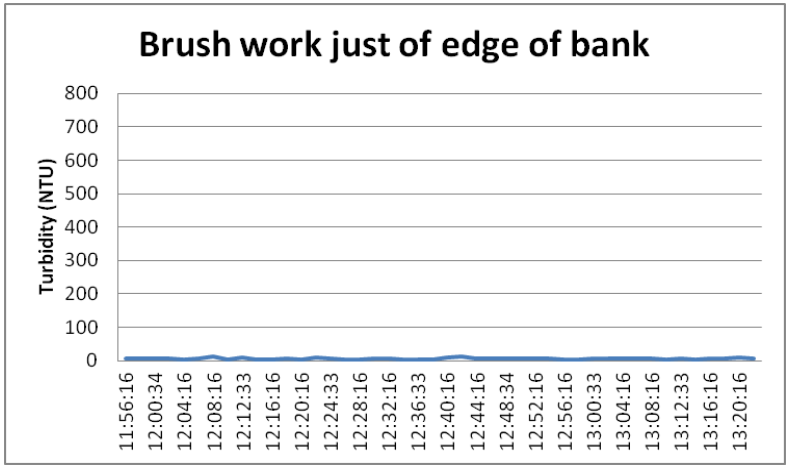


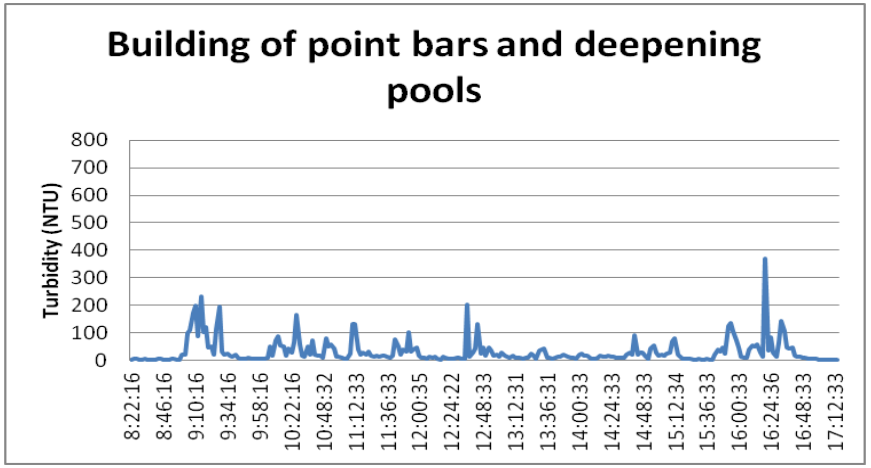


Monitoring Results – Bronte Creek – Con't









Pro’s & Con’s to Working in the Wet

Pro’s

- Work time in creek is greatly reduced, lessening the potential for a rain event
- No impact to the creek installing expensive cofferdams outside the work area
- No pumping of sediment laden water from behind cofferdams to dry up the work area
- Ongoing monitoring of erosion features installed in flowing water allows for minor adjustments and better results
- Substantial cost savings

Con’s

- Creates turbidity
- Work in the wet is difficult if filling the eroded area with soils is required
- The wrong equipment, contractor or operator can turn the work into a mess
- Poor optics to the general public
- Silt can be a problem if the site is improperly assessed

Summary

- Each site must be considered separately to determine if working in the wet is an option
- Contractors, agencies and consultants must agree on the risk
- Proper equipment and experienced personnel are a *must*

Thanks to…

- Jeff Hirvonen, Dillon Consulting
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