

## **Water Quality Effectiveness Evaluation**

### **How to establish a fine sediment delivery rating for wind-thrown trees within riparian leave strip.**

#### **Where to sample**

One of the “forest disturbed sites” (that will be chosen for WQ evaluation during the initial selection process) is a riparian area within or adjacent to the cutblock that has been used to locate the sites to be selected. This will be the only location where riparian windthrow will be evaluated as it is the only site where the forestry disturbance will be directly related to the harvesting of the stand chosen for evaluation. Other riparian areas crossed by the road accessing the block are not to be sampled as their condition is not directly related to the cutblock being evaluated.

#### **How to Sample**

When the evaluator determines that there is a riparian leave strip within or adjacent to the cutblock, he or she must evaluate it. For the great majority of cases, the evaluation is very simple. A simple observation made at distance can usually determine whether there has been significant new blow down within the riparian leave strip. If there is not, the evaluation is complete. The site is recorded by noting that there is no significant blowdown on the WQ Field Card #2 and assigned a 0 or very low fine sediment delivery rating (Using Table 8). The evaluator then travels to the next site chosen for evaluation, usually a stream crossing within the block or on a road accessing the block.

If significant, new windthrow is observed within the cutblock being evaluated, the evaluator must observe the full length of the riparian zone that was affected by the harvesting of the cutblock and determine how many trees fell in close enough proximity to the stream to affect sediment delivery. This evaluation differs from a traditional riparian evaluation as the only characteristic of concern is fine sediment delivery- not fish habitat, so shading, leaf drop and other factors related to crown cover are not considered. The evaluation can usually be done at a distance. It is rarely necessary to walk the full length of the riparian zone. The evaluator must first determine if the trees that have fallen are close enough to the stream so that they generate sediment that can actually reach the stream. The root wads/ scour pits that can actually affect water quality have to be either in or immediately adjacent to the wetted width of the stream during storm flows. This may differ from other riparian assessments but more truly reflects the effect of windthrow on water quality.<sup>1</sup>

If no windthrown root wads are in or immediately adjacent to the stream, the WQ impact of the windthrown trees is again zero and the evaluator has completed the assessment. A 0 or very low rating can be assigned to the riparian area.

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<sup>1</sup> From Table 4 of the WQ protocol it is readily apparent that a very small disturbed area cannot generate enough surface flow to transport loose sediments within root wad or root wad pit any distance.

If the evaluator finds that there are windthrown tree root wads in or adjacent to the stream channel, the total number need to be counted and a few of these must be inspected to determine the average surface area of the upturned root wad (which will be the same as the disturbed ground from which the wad had been uprooted) and the portion of fines within the disturbed soil.

Once this is done, let us say that the evaluator counted 7 windthrown tree root wads within or adjacent to the stream channel within the riparian leave strip. He has noted that the average surface area of the pit exposed is 1 square meter and the texture is fine. From WQ Table 5, he determines that the portion of fines = 1.

The WQ Protocol assigns the value of 0.1 m as the average depth of erosion expected. What this value means is that between the root wad, with soil clinging to it and eroding by rainfall erosion and the root wad pit that is at least occasionally scoured by the stream, the total depth of eroded material will be 10 cm or 0.1 meter.

The calculation is performed as follows:

$7 \text{ root wads adjacent or in creek} \times 1 \text{ m}^2 \text{ per root wad} \times 1 \text{ (portion of fines in soil material)} \times 0.1 \text{ m} = 0.7 \text{ m}^3$  of fines incorporated into stream water. Using Table 8 0.7 m<sup>3</sup> is rated as a Low fine sediment contribution.

Note that the greater the number of trees uprooted within the stream channel, the larger the upturned root wads and the finer the texture of the riparian soil, the larger the amount of fine sediment generated.

Results of the riparian sites evaluated over the last three years indicate that riparian windthrow usually is not a major source of fine sediment compared to other forestry related disturbances. Again as with all other volumes generated by the WQEE methodology, the numbers are order of magnitude assessments and are meant to help those interested in water quality to prioritize various sorts of impacts.

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