

Soil Conservation FRPA Effectiveness Evaluation

Introduction:

This document describes the approach for carrying out an effectiveness evaluation for soil conservation. It provides an overview of the sampling concepts, background information requirements, and field procedures. This document was prepared in preparation for pilot projects evaluating the effectiveness of FRPA soil conservation provisions, which will be carried out during the summer of 2004.

The objective of Soil Conservation Effectiveness Evaluation (EE) during the 2004 pilots is to evaluate how effective policy and related practices have been in conserving soil productivity and hydrologic function within cutblocks. Any apparent concerns regarding off-site or landscape effects are not the target of this exercise, but will be noted for future consideration.

The soil conservation provisions in FPC and FRPA recognize that it takes at least 20 years to understand soil disturbance effects. The focus of the policy and this exercise is on the use of soil disturbance observable on the ground (within 2 years of operations) as a proxy for longer-term effects. The underlying assumptions during policy development and this EE exercise is that the framework for soil disturbance (hazard ratings, disturbance types, cumulative limits) is being tested through validation (research), and is revised from time to time as new knowledge arises. Therefore, part of EE is to identify gaps or needs for validation (research), in addition to density gaps or needs related to policy implementation.

Effectiveness evaluation is not a compliance or enforcement exercise; however, if incidents of possible or apparent non-compliance are evident during the EE process, these will be identified for C&E consideration.

The document provides:

- (1) site selection and sampling concepts;
- (2) cutblock level soil conservation FRPA effectiveness evaluation questions and indicators, along with tables of criteria for office and field scoring of each indicator;
- (3) ancillary questions are included in the various tables to flag areas for follow-up related to possible C&E issues, information gaps (research), and off-site or landscape issues beyond the scope of this exercise.

Approach and Methodology

Site selection and sampling concepts:

Sampling design will be determined based on the provincial effectiveness evaluation program objectives relating to scope of the pilot program in 2004, provincial data summarization needs, financial resources available, as well as logistical considerations such as access etc. Sample blocks should be randomly selected from a list of all possible blocks available for sampling. This population can simply be all of the blocks harvested during a certain time period, but risk based (weighted) sampling, or stratification to address issues of concern, may also be involved. A “risk-based” approach, would see sensitive or high-risk sites receiving more attention. One needs to also consider an “extent”-based approach, where the sites are selected based on how much area is affected by various practices. The final sampling design will result from balancing the benefits of each approach.

Risk based sampling should consider the following factors for site selection:

- sites with high or very high hazard for soil degradation
- sites with summer skidding
- sites that were salvage harvested
- sites with partial cutting
- sites with ridged or hummocky terrain or catenas with mixes of distinctly different soil types.
- small cutblocks
- steep slopes
- “sensitive soils”
- drier or wetter ecosystems
- specific prescribed practices meeting higher disturbance guidelines (eg, stump removal or other aggressive site preparation is prevalent in the area)

The method and indicators presented here are suitable for use for one to two years after harvesting operations are completed. Other indicators that could be assessed after a longer time have not been included here, but are essential for providing a linkage between soil disturbance at the time of operations and actual, long-term damage (e.g. direct measures of forest productivity such as site index) – the are the subject of validation monitoring (research).

The sampling program, and planning, should also consider the need for consistency in field measurements. Ideally, field data collection at every site will be carried out by the same crew, with additional expertise being drawn in as required.

Background data needs (office):

After the list of blocks to be sampled has been compiled, but before collecting field data, background information needs to be collected and evaluated for each cutblock. An office checklist should be used to record the information. Things to do during the office phase include:

- Review of the operational plan
- Review post harvest inspection, if any
- Obtain copies of cruise data, and preliminary Site Plan data collection cards used to evaluate the methods for delineating standards units
- Review air photos, if available

Reconnaissance data collection (reviewing air photos):

For most sites, we anticipate that use of recent air photos will be the most effective way to gain overview information needed to carry out the field component of the effectiveness evaluation. An overview could also be obtained by other means, including viewing the block from a high vantage point, or simply flying over the block and taking photos.

For recently harvested blocks, areas of concentrated soil disturbance are readily visible on overview or formal air photos, provided they are taken at a scale large enough scale for the disturbance and soil conditions present. They may not need to be ortho-photos, although that would be ideal so areas and distances could be estimated more accurately. The desire for high quality photos should be balanced against the costs of collecting the required information (to the required precision) by measuring on the ground.

Based on the photo reconnaissance, it is expected that preliminary estimates could be made of

Area of the block in Unrehabilitated (“permanent”) access

Area of the block in Concentrated disturbance

Area of the block in landslides

Green tree and woody debris retention

Erosion concerns,

Drainage alteration

Air photos are considered essential for reviewing partially cut areas (due to forest cover obscuring overview assessments of site disturbance from vantage points on the ground).

Field data collection:

The main purpose of the field data collection phase is to:

- confirm estimates of access, soil disturbance, landslides, green tree retention, and woody debris retention obtained from the air photo reconnaissance,
- evaluate sites where drainage or erosion may be of concern
- evaluate dispersed soil disturbance and the effectiveness of rehabilitation treatments, and
- to better evaluate factors which may have affected the results observed.

Field method:

Plan to walk a transect through the block, plan to cross all sensitive areas, SUs, and stop at major features and points of concern, including:

- (a) typical roads and landings (check length / width to confirm area estimates),
- (b) rehabilitated structures,
- (c) unrehabilitated structures that may have been constructed through materials unsuitable for rehabilitation,
- (d) landslides,
- (e) active erosion,
- (f) areas with altered drainage,
- (g) areas of concentrated soil disturbance (obtain more accurate estimates of area and extent of disturbance if needed),
- (f) other areas of interest.

Representative areas should also be visited within each standards unit for evaluation of woody debris retention (transect survey), green tree retention, and dispersed soil disturbance.

List of Indicators for In-Block Disturbance:**1. Un-rehabilitated access structures:**

Cutblock/Standards Units Objective: Permanent access minimized based on-site conditions

Effectiveness questions: Does unrehabilitated access cover the least reasonable area of productive soils?

Indicator: Percent of the cutblock area occupied by unproductive soil as a result of access construction

Value: Percent

Method: Table 1. Estimating lost soil productivity due to access construction.

2. Erosion and landslides in-block

Cutblock/Standards Units Objectives: To minimize landslides and erosion to reduce the effects of these events on soil productivity

Effectiveness questions:

- Have slope failures or the risk of slope failures been increased?
- Has erosion or the risk of erosion been increased?

Indicators:

- Areas with reduced productivity due to slope failure
- Areas outside of the road prism with increased risk of slope failure
- Rills or gullies initiated from structures

Value: Area Affected (m²)

Method: Table 2. Estimating in-block area affected or potentially affected by landslides, drainage diversion or significant erosion from roads, landings or trails.

3. Natural Drainage Patterns

Cutblock/Standards Units Objectives: Protection of natural surface drainage patterns

Effectiveness questions: Have forestry operations in the NAR been accomplished with minimum disturbance to surface drainage?

Indicator: Percent of the cutblock area that suffers, or is at risk of suffering, reduced productivity or disrupted ecosystem function as a result of disrupted natural drainage in the NAR

Values: Percent of Standards Unit

Method: Table 3. Estimating percent of the NAR area affected by disturbance to natural drainage patterns as a result of forestry operations.

4. Detrimental Soil Disturbance in the NAR

Cutblock/Standards Units Objective: Limiting cumulative effects of soil disturbance in the net area to be reforested (NAR)

Effectiveness question: Does detrimental soil disturbance cover the least reasonable area of productive soils in the NAR?

Indicators:

- Proportion of the NAR affected by dispersed soil disturbance in the NAR
- Amount of machine traffic on sensitive soils

Value: Percent of block??

Methods:

- Table 4. Calculating percent of the cutblock area affected by concentrated and dispersed soil disturbance in a cutblock NAR.
- Table 4a. Summary of dispersed disturbance categories in the NAR.

5. Soil Biology

Cutblock/Standards Units Objectives: Maintain elements of mature forest soil biological properties

Effectiveness questions:

- Have refugia for mature forest soil organisms and processes are retained?
- Has habitat been retained and recruited for dead wood- occupying soil organisms?
- Has forest floor been retained?

Indicators:

- Extent to which mature green trees have been retained
- The amount and diversity of woody debris
- The extent to which forest floor is retained

Value

- Characteristics of green trees retained
- Characteristics of woody debris
- Forest floor displacement

Methods:

- Table 5a. Estimating refugia for mature forest soil organisms
- Table 5b. Estimating amount and diversity of habitat for dead wood-occupying soil biota
- Table 4aa, forest floor displacement is included in NAR disturbance assessment.

