Bulletin – Modelling Visuals in TSR III

December 12,2003

Timber Supply Analysts:

This bulletin provides an update to the "Procedures for Factoring Visual Resources into Timber Supply Analyses" (the Procedures), released under the joint signature of Forest Practices Branch and Timber Supply Branch in March of 1998. (The Procedures are often referenced as the "grey book".) Since the Forest and Range Planning Act will change the requirements related to visual quality management, a full re-write of the procedures is not warranted at this time. However, as the third round of Timber Supply Reviews is beginning, it is timely to incorporate recent visual resource management research findings. The 1998 procedures are still generally applicable. However, research has produced a more accurate way of modelling the visual quality of clearcuts and has also examined the benefits of Retention Cutting. This bulletin has been prepared to convey two new procedures that enhance modelling of visual management in timber supply analysis: plan-to-perspective ratios (P2P) in clearcuts, and modeling of visual management under Retention Cutting. The remainder of this bulletin consists of a rewrite of the Procedures section 4a reflecting the new approaches.

4a.) ESTABLISH A PERCENT VISIBLE DISTURBANCE FIGURE FOR EACH VISUAL AREA UNDER CLEAR-CUT OR RETENTION HARVESTING SYSTEM

Forest cover requirements used in timber supply modelling apply to plan (map) area, while visual impact assessments and operational approvals use perspective area. Therefore, a P2P ratio must be assumed when developing visual management constraints for timber supply analysis.

There are two methods for determining a maximum disturbance value for visual polygons where clearcutting is the principle silvicultural system. Method 1 is to continue with past practice; that is, use table 3 from the Procedures to derive a planimetric number for modelling purposes. The numbers in this table assume an average P2P of 2:1.

Method 2 involves explicitly converting perspective percent alteration for each VQO, which are determined through operational approvals, to plan denudation values using slope-specific P2P ratios.

Method 2 entails a little more work than Method 1, but more accurately represents current management as it uses operational approvals to influence modelling decisions.

Method 2

Step 1 Ensure slope is included in the file to be used for the analysis.

Step 2

Obtain the *perspective percent* alteration numbers being approved for each visual quality class (this could be the lower–middle–upper end of the range) specified in the VIA guidebook, either from district staff or by sampling a number of Visual Impact Assessment (VIA) packages, See Table 3 below.

Table 3 Predicting visual quality objectives based on percent alteration only (for clearcut and seed-tree silvicultural systems).

VQO	Permissible % Alteration in Perspective View
Preservation	**0**
Retention	**0–1.5**
Partial Retention	**1.6–7.0**
Modification	**7.1–18.0**
Maximum Modification	**18.1–30.0**

Note: These percentages apply to the visible green portion of the landscape in perspective view. Rock, snow and ice patches are excluded from the calculation.

Step 3

To determine available denudation in plan (map view) the perspective number must be converted by an area-weighted P2P value for each slope class.

Table 4 shows P2P ratios by slope class, based on research undertaken on behalf of Forest Practices Branch.

Table 4 presents the predicted P2P ratios for absolute slope classes. The table shows that for steep slopes above 70%, what we see in perspective is very close to what we would get in plan view for modelling purposes (i.e. P2P ration close to 1:1).

Table 4. Predicted P2P ratios (with 95% confidence limits) for slopes 0% - 70% for all visual designs.

Slope	0%	10%	20%	30%	40%	50%	60%	70+%
P2P	4.68	3.77	3.04	2.45	1.98	1.60	1.29	1.04

Various options are available in terms of spatial scale for developing and applying P2P. These include: a TSA-wide average P2P based on area by slope class; an average P2P for each visual unit (group) used in the analysis; or a P2P ratio for an intermediate scale, for example, a landscape unit.

Area-weighted P2P is to be calculated by carrying out a slope analysis. To determine the most appropriate P2P, first determine how many hectares of each slope class exist in each visual unit. This process can be automated by having a GIS specialist plot out a detailed slope class map for each visual zone using the TRIM topographic data. Add up total hectares of each slope class within all visual areas, and derive an area-weighted P2P.

For example say that there are 5,000 ha @ 20% slope (P2P 3.04), 2,000 ha @ 30% slope (P2P 2.45) and 3,000 ha @ 40% Slope (P2P 1.98).

Formula: $\frac{(5{,}000 \times 3.04) + (2{,}000 \times 2.45) + (3{,}000 \times 1.98)}{10{,}000} = 2.6$

This area-weighted P2P value would apply to the unit with the given slope class composition. What this ratio is saying is that, on average in the topography we are working in, for every 1 hectare we see disturbed in perspective view, 2.6 hectares can be disturbed in plan view. This number is then multiplied by the percent alteration in step two to derive a planimetric number for modelling purposes.

For example, if a PR zone is being managed to 7% visibly altered in perspective view, the plan value is 18.2% (P2P of 2.6 multiplied by 7%).

A recent pilot project in the Fraser TSA, with steep topography, found that the forest cover requirements were very close for methods 1 and 2. However, it is anticipated that in more rolling interior topography where P2P ratios are higher, method 2 will lead to higher allowable disturbance percentages, and hence less timber supply constraints from visual management.

Modeling of visual management under Retention Cutting

The following is a new section, which deals with Retention Cutting, which was not addressed in the 1998 Procedures.

Research completed in 2002 examined whether there was a site or stand variable or combination of variables that could predict the visual quality resulting from Retention Cutting. (See the brochure: Predicting the Visual Impacts of Retention Cutting. Copies are available from Forest Practice Branch or on the web at http://www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Rec035.htm.) The single best indicator was found to be percent alteration (same as clearcutting). The addition of visual design and volume removed improved the predicability of visual quality. Good visual design and retention of more volume in the block meant that a given VQO could be achieved with greater harvesting-related alteration. However, this was true for the Partial Retention category only. See table 5 below.

Table 5. Predicted probability that a randomly selected block will be classified as Modification.

	Volume removed					
	75%		85%		95%	
Alteration (%)	Good Design	Med/Poor Design	Good Design	Med/Poor Design	Good Design	Med/Poor Design
0	0.00	0.00	0.00	0.00	0.00	0.37
1	0.00	0.00	0.00	0.01	0.02	0.71
2	0.00	0.00	0.00	0.04	0.08	0.91
3	0.00	0.00	0.00	0.14	0.26	0.98
4	0.00	0.00	0.01	0.40	0.60	0.99
5	0.00	0.01	0.02	0.74	0.86	1.00
6	0.00	0.04	0.09	0.92	0.96	1.00
7	0.00	0.16	0.29	0.98	0.99	1.00
8	0.01	0.44	0.63	1.00	1.00	1.00
9	0.03	0.77	0.88	1.00	1.00	1.00
10	0.10	0.93	0.97	1.00	1.00	1.00
11	0.33	0.98	0.99	1.00	1.00	1.00
12	0.67	1.00	1.00	1.00	1.00	1.00
13	0.89	1.00	1.00	1.00	1.00	1.00
14	0.97	1.00	1.00	1.00	1.00	1.00
15	0.99	1.00	1.00	1.00	1.00	1.00
Alteration Threshold	11.5%	8.2%	7.6%	4.3%	3.7%	0.4%

Shaded area denotes 60% or greater probability of Modification

Shaded area denotes greater probability of Partial Retention

The results of the study suggest that for the most part retention cutting should be modelled very much the same as clear-cutting. (This is especially true for openings that retain 25% or less volume.) There do not appear to be any benefits to timber supply of employing retention cutting systems in visual management areas, except in areas subject to the Partial Retention objective, and where at least 25% of the volume is left in an opening. This has the effect of increasing the size of an opening in perspective view from 7% under a clear-cut regime to 11% using retention. More work is required to determine if in practice the increased allowable percent alteration offsets the 25% volume left behind.

From a numerical point of view, if we take 11% from the above situation, and multiply it by a P2P of 2 we get 22% that could be visibly altered in plan view. Under this scenario, if visual management constraints were the only consideration, and assuming a 20-year visual green-up period, 88% could be removed from the area over an 80-year period. However, given the Retention Cutting regime, the maximum that can be removed is 75%, since 25% is retained. Under a clearcutting system with a partial retention objective (maximum alteration of 15%) and a visual green-up age of 20-years, 60% could be taken over an 80-year period. Under this scenario, there is in fact a benefit to using retention system to achieve a Partial Retention VQO.