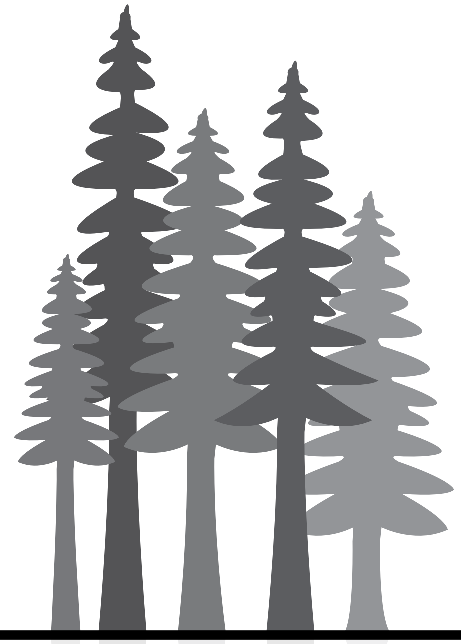
Appendix E
Timber



This appendix provides background on the analysis of timber valuation effects and the process for completing a 10-year scenario to verify the practicality of harvest scheduling the OPTIONS modeling results.

In this appendix:

Timber Valuation

The estimate of the value of harvest produced by the different alternatives must take into account the volume and quality of the timber offered and the cost of harvest and transportation. The estimate of stumpage was completed for the analysis of the effects of the alternatives for the first 10 years. As the alternatives are projected forward beyond the first 10 years, changes would be expected in the receipt levels as the mix of sizes, quality, and tree species changes in response to the harvest of different stand types, growth of other stands, and the application of silvicultural practices.

Stumpage and receipts were calculated in the following manner:

Stumpage = Pond value – harvest and transportation costs.

- Pond value will be a weighted pond value inclusive of both the species mix and grade of logs anticipated from the different levels and types of harvest.
- Harvest and transportation costs will be an average by harvest type for each district. Receipts will be the sum of all stumpage prices multiplied by the corresponding log volumes.

Analytical Assumptions

The following analytical assumptions were used in the analysis:

1. Prices and costs were calculated in constant dollars, set at 2005.
2. Costs, species composition, recovery and grade were developed using an historical reconstruction approach with a variety of base periods.
3. Costs were developed for each district by two harvest types, thinning and regeneration harvest. Sales were selected from a base period of 1996 through 2006. The first year of the forest plan (1995) was not used due to expected bias, since watershed analysis had not yet been completed on the majority of BLM-administered lands and no road construction could be undertaken in Riparian Reserves until the completion of watershed analysis for individual watersheds.
4. Sales that were actually offered were included as provided by the districts, in response to a data query. Sales where data was incomplete were excluded.
5. Sales were included regardless of whether or not they were actually awarded, implemented, or litigated. Volume-weighted averages by thinning and regeneration harvest were developed for each district to obtain a “standing tree to mill” cost including cutting, yarding, road construction, transportation, maintenance, miscellaneous and other costs used in the standard BLM appraisal methods. All costs were expressed in dollars per thousand board feet (MBF) for 16-foot short-log, Scribner scale. Costs varied considerably by district with the cost of hauling logs to the mills one of the more highly variable. Costs for thinnings were generally higher than for regeneration harvest.
6. Costs for thinning were used in the analysis for the thinning, uneven-age harvest, and partial harvest treatments described in Alternative 3.
7. A base size of approximately 1,100 million board feet was included to estimate costs, with a total cost of over $390 million in 2005 dollars.

Species Composition

Commercially valuable species compositions for the analysis were developed for each district, using an historical reconstruction technique. Volumes and percentages of volume by species were developed using the period 1990 through 2006 (in part) as the base period.

Analysis of the data in the species data base of TSIS (Timber Sale Information System), which is the BLM accounting and record keeping system for timber sales, indicates a high level of similarity of species between districts with the exception of the Klamath Falls Resource Area.

Douglas-fir is the dominant commercial species with all districts having a harvest percentage of Douglas-fir by volume at or near 80 percent. Stratifying the base period into pre-Northwest Forest Plan, (1990-1995), early Northwest Forest Plan (1996-2000), and current Northwest Forest Plan era (2001-2006) yields only minor changes in species composition of sales. This species percentage composition has remained generally constant despite a substantial change in the harvest types and ages harvested over these three periods.

No formal sampling method was used to select a sample of sales. Sales with missing or incomplete information were excluded. Some sales from the base period had been archived from TSIS, and were not included, as information was not available. Emphasis was placed on including large sales, as well as those from pre-Northwest Forest Plan years. Sales of less than one million board feet and those consisting of primarily fire salvage were excluded.

Log Quality

Log quality was estimated using historical reconstruction of log grades weighted by volume. Few sales were available in older forest types across the districts for the Northwest Forest Plan era, so sales from 1985-1990 were used to develop estimates for harvest of older timber, with the exception of the Coos Bay District, where no records for this time could be located. For the Coos Bay District, the base period of 1970-1975 was used.

Sales were included when the data was available, complete and legible. Sales of less than one million board feet were excluded, as were certain salvage sales where species bias was likely. With the exception of the Klamath Falls Resource Area, 150-300+ MMBF were included in the reconstruction base for each district.

District cruiser estimates were used for grade breaks in thinnings where the price differences between lower sawlog grades are low.

Four types of forest stands were used to estimate quality by percent of volume:

1. **Thinning stands.** These were typically commercial thinning or density management treatments designed to remove/prevent suppression mortality and improve stand composition, vigor or value. Cruiser estimates of sawlog grade percentages were used for these stands, in particular the DF-4 sawlog.
2. **Regeneration or clearcut treatment in young stands.** These are typically stands less than 80-100 years of age depending on site quality. A modest number of pre-Northwest Forest Plan stands were available for this estimation, and some Northwest Forest Plan regeneration harvests fall within this category.
3. **Mature stands.** These are generally older than 80-100 years, typically dominated by one species, and generally of higher overall density. These stands correspond to the mature structural stage.
4. **Structurally complex.** These stands are typically older than 150-200 years and correspond to the structurally complex structural stage.

A more complete description of these structural stages is contained in *Appendix B - Forest Structure and Spatial Pattern.*

For each district, average percentages by log grade for each of these structural classes were prepared for Douglas-fir, ponderosa pine, white fir, and sugar pine. Other species were estimated using a camp run method with no grade differentiation. Analysis of the data indicates that higher log grades in other than these four species are rare.

The sales used as a basis were classified by structural stage class (described above) using a combination of local knowledge, species composition, average log size in board feet, and average number of Douglas-fir trees per acre. Typically, stands with more than 100 trees per acre and an average log volume of less than 100 board feet would be in the "young" stand classification. The "structurally complex" class would contain stands with less than 40 trees/acre of the dominant species and average log volume generally greater than 200 board feet. The "mature" stand class would be between these figures. These levels differ by district based on differences in site productivity. Volume-weighted percentages of grades were then developed by structural classes and by district.

Preparation of Weighted Pond Values

Species composition were assumed to be similar for both regeneration harvest and thinning harvest.

Species were consolidated into commonly used groups for which prices were available. For example, true firs and hemlocks were consolidated into "white wood."

For Douglas-fir, sugar pine, white fir, and ponderosa pine, prices were a weighted average by grade for the stand categories of young, mature, and structurally complex.

Prices for species and grades, where applicable, were averaged levels for calendar year 2005 for commonly priced groups, using data obtained from Log Lines Log Price Reporting Service (published monthly) P.O. Box 2215, Mount Vernon, WA 98273, loglines@fidalgo.net)."

Weighted pond values for each district were then prepared for young, mature and structurally complex stand classes using the pricing groups, grade weighted prices for Douglas-fir, sugar pine, white fir, and ponderosa pine, and consolidated percentages for grouped species such as true firs and hemlocks with their associated camp run prices. Log volumes and prices published in Log Lines are based on 32-foot long-log volumes. The BLM volumes are expressed in 16-foot short-log, Scribner scale. Conversion factors used to adjust prices to 16-foot short-log were 0.8 for sawlog grades and 0.85 for peeler grades.

The above matrix of weighted pond values were held in 2005 dollars for the 10-year estimate of stumpage, receipts, and costs.

Preparation of Stumpage and Receipt Estimation

For each district, each harvest type and each stand structural stage matrix was prepared, which subtracted harvesting costs from weighted pond values. Thinning costs were used for the partial harvest in Alternative 3 due to the anticipated difficulties associated with this type of harvest in mature and structurally complex stands.

After a matrix of stumpage values for the various treatments and stand categories was prepared, anticipated receipts were calculated by multiplying the stumpage value per thousand board feet by the corresponding harvest level by structural stage to obtain a total expected price for the 10 years.

No correction for the "delay" in harvest after sale was made. After a sale is sold and executed, a delay in sale receipts will normally occur since receipts are not generated until harvest occurs. This may be immediately after execution, or may be delayed depending on seasonal requirements, sale specifications such as required construction, or market conditions. Similarly, no delay was assumed for litigation of individual sales.

Ten-Year Scenario Quality Check

The ten-year scenario was used to verify the practicality of the harvest scheduling as modeled and to assist in estimating the effects of harvest on other resources through estimates of road construction and acres harvested by harvesting method.

The ten-year scenario was a simulation to serve as a single scenario for how harvest scheduling could occur in the first decade. There are a large number of possible scenarios that could occur in the first decade in terms of both harvest locations and harvest types. This single scenario was used to estimate and compare the effects of the alternatives and is only intended to be representative of the implementation of the plan for the first decade. It is not intended to be used to predict or decide locations of actual harvest units.

Methodology

After harvest units were modeled by OPTIONS as harvested in the first 10 years, the locations and harvest types were mapped with accompanying tables of information. These maps were distributed to the districts for analysis. District planners and others familiar with harvest unit design and road systems developed road locations and harvest methods for the selected units. These designs were captured in a Geographic Information System mapping database and assembled for analysis.

The OPTIONS model selected units for harvest based on a Western Oregon Plan Revisions identification (WOPR ID) number. These WOPR ID units are polygons in the Geographic Information System database. They are typically subdivisions of the Forest Operations Inventory polygons, and are formed by the intersection and overlay of a variety of Geographic Information System layers or themes such as roads, streams, etc. (See *Appendix R - Vegetative Modeling* for further information.)

Planners examined the sampled WOPR ID units (see below) as these ID units were formed into logical larger harvest units where the WOPR ID units are contiguous. Planners then used a variety of Geographic Information System themes (such as elevation contours, streams, ownership boundaries, etc. and local knowledge) to locate and document existing roads and to estimate the new road construction needed for access, location of landings to be constructed, and the harvest method (ground-based, cable/skyline, or helicopter) to be used.

After these Geographic Information System themes were completed, the layers were assembled and overlain to perform analysis at a variety of scales.

Sampling

Since the ten-year scenario was a simulation, these methods provided an estimate of miles of new road construction, acres of ground-based harvest, and number of new stream crossings.

In order to develop the estimates in a reasonable time and with a reasonable level of effort, a sampling method was developed to select a portion of the simulated units for analysis.

Sections where harvest occurred within the ten-year scenario were sampled at a 1 in 3 random sample. Results from this sampling were developed as ratios such as miles of new road construction per million board feet for both thinning and regeneration harvest. These ratios were then expanded to the entire population to yield estimates of the amount for the entire harvest over the next 10 years.

Sampling a particular township, range, and section was not stratified. That is, all sections where at least one WOPR ID unit was harvested had an equal chance of being sampled independent of the size of harvest within that section and independent of the acres of BLM-administered land within that section.

Although units were selected by section, examination of the results show that many metrics, such as acres sampled or volume sampled, were within a few percent of the expected values of 33 percent. Actual expansion was based on the sampled volume level.

The ratios developed were split by district, alternative, harvest type (thinning/regeneration harvest), and road type (temporary/permanent and surfaced/natural). These ratios were then expanded to estimate the total miles of road by road and harvest type, the acres disturbed from construction, etc. After these ratios were developed, they were prorated to other units for expansion.

For the PRMP, road ratios and harvesting system percentages that were developed for No Action Alternative, Alternative 1, Alternative 2, Alternative 3, and a set of potential mitigations for Alternative 2 were averaged using volume weighting. These averaged ratios were used to project the expected harvesting system and road construction levels for the PRMP. These previous alternatives provided an extensive array of sampled harvest units, and no further improvement in estimation was expected by additional sampling.