TABLE B-7 (Continued)
SUMMARY OF TIMBER HARVEST PRESCRIPTIONS AVAILABLE TO FORPLAN (Version applied to alternatives)

Additional prescriptions

Riparian	All timber prescriptions will be available as above, plus uneven-aged management, as in visual resources (Lodgepole pine - Uneven-aged management entry every four decades)
Visual Resource	Ponderosa pine - Uneven-aged management, entry every three decades. Mixed Conifer - Uneven-aged management, entry every two decades Lodgepole pine - Same as above (timber).
Low site	Uneven-aged management, entry every four decades

Acronyms and symbols

FH = Final Harvest, SW = Shelterwood; OSR = Overstory Removal, PCT = Precommercial Thin; CT = Commercial Thin; CC = Clearcut, SE = Selection (uneven-age), <35% only
* = Prescriptions used for updating for harvests in the 1980-89 period

F. DEVELOPMENT OF YIELD COEFFICIENTS

1. Timber

Timber yield coefficients were developed from a Forest timber inventory completed in 1980 The inventory data were processed in a computer model called Stand Prognosis for Managed and Regenerated Yield Tables and, at the Regional Office for the existing situation, Empirical Yield Tables These models predict yields over time for each timber strata, based on existing volume, age, growth rates, and specific management activities Other yield tables were also developed using the above data and applying professional knowledge or accepted statistical methodology to get desired results again for Managed and Regenerated Yield Tables (1920 letter, August 13, 1982 Processing Criteria - Empirical and Managed Yield Tables; 1920 letter, August 15, 1982, Malheur National Forest Timber Management Yield Tables; 1920 letter, June 4, 1985, Managed Yield Tables, Uneven-aged Management - Visuals, 1920 letter, September 28, 1984, Timber Yield Tables <20 ft^3/ac/yr (low site).) All of these coefficients were adjusted to give net values for timber production (1920 letter, May 28, 1982, Adjustment to Yield Tables), with the exception of low-site and empirical yield tables which were net values to start with. Further adjustments were also made to fit these yield coefficients into the FORPLAN computer model (Notes, Error in FORPLAN "Free-Form" Timber Yield Tables used for Overstory Removals (OSR), December 11, 1985) These tables were adjusted to the year 1987, on the assumption that that year would be the mid-point of the first decade of the plan.

Resulting from public comments prompting changes to the Final Environmental Impact Statement, new yield tables were developed for uneven-aged management (2410 letter, June 9, 1988, Managed and Regenerated Yield Tables - Uneven-aged/multistory) These tables were then used in FORPLAN analysis for application in the general forest management areas.

In the course of revising the FORPLAN model to represent seven watersheds, some timber yield tables were changed in such a way as to reduce the size of the model without changing the total timber output. In essence, it is assumed that instead of the affected acres being harvested every fourth decade on a rotating basis, each acre is harvested every decade but produces only one fourth of the volume This results in the harvest acres being overstated in FORPLAN reports, and corrections are necessary outside FORPLAN to account for this Six tables are formulated in this way, affecting low site, uneven-aged riparian, and uneven-aged visuals. For further information see "Modeling Riparian Zone Harvests with FORPLAN" (Peterson, August 1988)

Another result of the FORPLAN model revision is that the inventory is updated to 1990 conditions (see Section III B.4) Therefore, the yields in the first decade are those applicable to the year 1997 for the Alternatives. For the Benchmarks, the corresponding year remains 1987.

2. Range

Range outputs were calculated in FORPLAN with some manual adjustments outside the model. Four levels of range management intensity were defined: A, B, C, and D These are commonly referred to as range strategies or levels, and represent increasingly intense management levels.

A- No grazing
B- Minimum level management
C- Management with subdivided pastures
D- Nonstructural treatments (seed, burn, etc.)

FORPLAN used strategies C and D only, and adjustments for A were calculated manually. Level B was not used.

For each combination of land class, condition class, and range strategy, estimates were made of the total herbage output in pounds per acre and the livestock utilization efficiency These were based on the literature and the professional judgment of range specialists. From these were calculated the potential livestock animal unit month capability values and coefficients. Details of the methods used are given in the process paper "Range Prescriptions and Yield Tables" (Quinn, 1982). The principal data source used was "Plant Communities of the Blue Mountains in Eastern Oregon and Southeastern Washington" (Hall, 1973) This data is based on good range conditions, and adjustments were made for other conditions (fair, poor, very poor) as described in a meeting documentation note "AUM data and results from No Action run - Assumptions for determining livestock AUM yields for all FORPLAN data sets" (January 13, 1986). See also process papers "Validation of collapsing the Range IDs in the FORPLAN model" (March 1988), and "Changes to AUM basis" (2/19/86)

In riparian areas, it was assumed that utilization would be at a level of 45 percent in all alternatives except the No Action, where 70 percent was assumed consistent with recent past practice. The FORPLAN yield tables were based on 55 percent utilization in riparian areas, and subsequent adjustments to 45 percent were made outside FORPLAN. See process paper "AUM output calculations from FORPLAN results in Paradox" (Lindley, 2/2/90)

3. Roads

Analysis of transportation within FORPLAN is limited to reconstruction and construction of local roads. For analysis purposes the Forest has been divided into four distinct levels based upon the adequacy of the existing transportation system. The roading levels are defined as follows:

Level I - Areas in which roads were constructed in the period from Fiscal Year 1978 through FY 1982.

Level II- Areas in which the road system was constructed prior to Fiscal Year 1978.

Unroaded- Areas larger than one section in size that are more than 800 feet from any existing road

All road- Areas other than timbered areas in which roads will be constructed to access timber. This includes areas such as low-site or range land.

The acres assigned to each level are listed below:

Level I	191,642
Level II	351,360
Unroaded	88,236
All road	233,574
Total	864,813

Road activities within the FORPLAN model are dependent upon timber harvest activities selected by the model. The following categories are used

- First final harvest entry
  This applies to the first entry of a two-stage shelterwood harvest (regeneration cut), and to clearcuts

- Later final harvest entry
  This applies to the second entry of a two-stage shelterwood harvest (overwood removal cut)

- First commercial entry.
  This applies to the first commercial entry in a manageable stand. This entry would either be a commercial thin, selection harvest, overstory removal, or a combination of commercial thin and overstory removal

- Later commercial entry
  This applies to later, nonregeneration entries into a manageable stand.

Analysis of actual timber sale areas has shown that, on average, a road density of about 3 5 miles per section is needed for timber harvest activities Some areas will have more miles per section due to previous logging methods that differ from the methods used today. It is anticipated that these roads will close naturally over time, however, some roads will be closed administratively. Reconstruction miles are based upon historical data and vary depending upon the harvest method.

Yield coefficients used for modeling purposes are displayed in Table B-8, which follows Units are miles of local road per section

TABLE B-8
ROADING YIELD COEFFICIENTS
(Miles of Local Road Per Section)

Final Harvests (No Thins) Entry	Construction	Reconstruction
Level I		
First final harvest entry	0 24	1.46
Later final harvest entry		1.10
Level II		
First final harvest entry	1.22	1.83
Later final harvest entry		0 98
Unroaded		
First final harvest entry	3.05	0.61
Later final harvest entry		1 83
Commercial Thins Followed by Harvest		
Level I		
First commercial entry	0 24	1.46
Later commercial entry		1.10
First final harvest entry		0.98
Later final harvest entry		0.85
Level II		
First commercial entry	1.22	1.83
Later commercial entry		0.98
First final harvest entry		0.92
Later final harvest entry		0.85
Unroaded		
First commercial entry	3.05	0.61
Later commercial entry		1.83
First final harvest entry		1.40
Later final harvest entry		0 85
All Road		
First commercial entry	1 98	1.83
Later commercial entry		1.04

Note· Yields for regenerated stands are the same as existing prescriptions.

The costs for road construction and reconstruction used in the model are based upon the actual costs incurred in Fiscal Year 1984 and Fiscal Year 1985 Costs from earlier years were not used due to the change in road standards in Fiscal Year 1983 The Fiscal Year 1984 and Fiscal Year 1985 costs were converted to Fiscal Year 1982 dollars The costs used for road construction and reconstruction are displayed in Section IV, Table B-11 The costs incurred by timber purchasers for road maintenance and commodity haul are accounted for in the total logging costs

4. Sediment

Sediment yield tables were developed for selected analysis area identifiers and different levels of management emphasis and intensity levels Examples of the analysis area identifiers used are roading adequacy levels 1 and 2, unroaded, all roading levels, ponderosa pine, mixed conifer, lodgepole pine and two land classes (0-35% slope and 36%+ slopes) Examples of management emphasis and intensities are minimum level management, final harvest only, and commercial thin.

The yield tables were generated from (1) the Modified Universal Soil Loss Equation (MUSLE), (2) known sediment yields from Bear Creek on the Ochoco National Forest, (3) sediment yields published on the John Day Basin Study, and (4) professional judgment Professional judgment based on experience on the Malheur National Forest was used to validate the sediment rates computed from Modified Universal Soil Loss Equation and other data

The Modified Universal Soil Loss Equation is a model which considers the major factors affecting sedimentation Those factors include a rainfall/snowmelt erosion energy factor (R), a soil erodibility coefficient (K), a length of slope factor (L), a slope steepness factor (S), a ground cover factor (Vm), and a sediment delivery coefficient (Dc) Estimates of each component were made to simulate the condition of the Malheur National Forest

It is important to note that the sediment index figures are not absolute estimates of erosion or sedimentation. They can only be used to compare alternatives on a relative scale For example, if Alternative B-Modified produces 855 tons/acre in the first decade and Alternative I produces 807 tons/acre, the only valid conclusion is that Alternative B-Modified has the potential to produce approximately 6 percent more sediment than Alternative I.

5. Water Yield

Average total annual water yield tables for FORPLAN runs were generated by analyzing different vegetative ecotypes (ponderosa pine, mixed conifer, low-site ponderosa pine/mixed conifer, grass dominated, fir/sedge and mesic shrub, moist/dry meadow, and juniper/sage), slopes (greater than or less than 35 percent), whether areas were roaded or unroaded, and type of harvest (commercial thinning, minimum level management, clearcut, shelterwoods, and final harvest) occurring on those lands available for commercial harvest activities

The water yields calculated by this procedure for the benchmark runs for the Analysis of the Management Situation showed no significant differences between runs. The water outputs for the alternative cases for the Draft Environmental Impact Statement were based on the benchmarks, since the output position in FORPLAN occupied by water was required for another purpose.

6. Cover Yields

Scheduled output tables for cover were built into the FORPLAN Model based on working group and condition class from the 1980 timber inventory, and were derived from the Stand Prognosis Cover Extension Program. Cover outputs vary in response to timber stand manipulation, growth occurring in both manipulated and undisturbed stands, and time. Detailed information is documented in "Modeling Thermal Cover on The Malheur National Forest (May 1988) and "Process for modeling Habitat Effectiveness Index in forest wide applications on the Malheur National Forest" (Peterson, May 1989) Four classes of cover are defined (ranging from satisfactory to low marginal) and may be combined into composites which are convenient for evaluation and for the definition of constraints. For each cover class or composite represented in FORPLAN, a scheduled output is assigned, with it's own set of yield tables. The yield coefficients (usually 0 or 1), when multiplied by the acres applied to, give the acres of cover class or composite, which are used to measure outputs or to set constraints on The most useful combinations are satisfactory cover (COVER1), satisfactory plus the best marginal cover (COVER1 + COVER2), and total cover (COVER1 + COVER2 + COVER3 + COVER4).

It is necessary to "overmodel" the cover constraints, especially for satisfactory cover, which means that the constraints in FORPLAN must be set higher than the minimum standards in order to produce consistently the desired value on the ground. The reasons for this are explained in "Modeling Elk cover and minimum volume constraints" (Peterson, 2/6/90). Other modifications to yield coefficients to assure model feasibility are described in "Negative Cover Yield Coefficients" (Lindley, 10/17/89)

G. ANALYSIS DONE OUTSIDE FORPLAN

The analysis process outside FORPLAN consisted of some analysis completely independent of the FORPLAN model and some analysis processes that were dependent upon FORPLAN outputs

1. Analysis Independent of FORPLAN

Analysis processes that were conducted independently (i.e , not modeled in FORPLAN) include the following

a. Recreation

Areas of the Forest were assigned to different recreation classes using the classifications and procedures given in the Recreation Opportunity Spectrum Users Guide. Only four classes (Primitive, Sem'-Primitive Non-Motorized, Semi-Primitive Motorized, and Roaded Natural) of the six in the Recreation Opportunity Spectrum Users Guide were applicable, plus the additional classification of Roaded Modified.

Recreation capacity was calculated using the approach described in the Recreation Opportunity Spectrum Users Guide The procedures are documented in "Dispersed Recreation Capacity Calculations" (E. Cole, September 27, 1982)

b. Wildlife

Wildlife habitat capability in terms of numbers of animals and/or acres of habitat was calculated outside FORPLAN

Resulting from public and other agency response to the elk modeling approach used in the Draft EIS and inconsistency with other Forests in the Blue Mountains, changes have been made related to elk modeling for inclusion with the Final Environmental Impact Statement For the Draft Environmental Impact Statement, the Forest had developed an elk numbers model based on forage availability in response to creation of transitory forage by timber harvest activities. For inclusion with the FEIS, a Habitat Effectiveness Model for elk was developed using the latest