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# Appendix C. Socioeconomics

This appendix provides background on the analysis of socioeconomic conditions.

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# Analysis of Socioeconomic Effects

The socioeconomic analysis describes the impacts of the alternatives in terms of:

Employment – full time equivalent jobs by economic sector.

Income – wages associated with employment.

Payments to Counties – Counties' share of the revenues paid to BLM.

BLM budget – Money spent for BLM personnel, services, equipment, etc.

Contract costs – Money spent on contracting certain silvicultural costs.

Present net value – Sum of discounted revenues and costs associated with the timber sale program.

Employment, income and payments to counties were calculated at the County level, for each of the eighteen O&C Counties. BLM budgets and contract costs were calculated at the BLM District level. The present net value was calculated for the entire planning area.

## Process Overview

The OPTIONS model provided data about the volume and size of timber in each harvest unit, and the type of harvest (regeneration, partial cut, thinning). Historic BLM timber sale data were used to estimate species mix and log grade for each proposed harvest unit and values by grade and species. A stumpage value was estimated for each harvest unit, based on the volume and grade of timber, logging costs and average road costs. For the first decade, the estimated stumpage was reduced 3.5 percent based on an analysis of the market price impact of selling additional BLM timber. The adjusted estimated stumpage value formed the basis for calculating total BLM timber revenues and BLM payments to counties.

Harvest by county was allocated to specific manufacturing centers using the Western Oregon Model, described below. In addition, the Western Oregon Model projected the impact of additional BLM timber on the market price of timber, and the effect on private harvest levels. This model also projected the value of the products produced at each manufacturing center – data used in the county-level input output models.

County-level Input/Output (I/O) models were built for each of the O&C Counties, and calibrated to local economies based on field visits and additional research. Given the value of wood products production in each County, and the federal payments to each County, changes to employment and income were projected.

Changes to the BLM budget were estimated using a unit cost associated with timber harvest. Contractor costs were based on the amount and type of harvest specified by the OPTIONS model.



The present net value calculation is based on the stumpage values derived from the OPTIONS model for five decades, and the estimated cost of the BLM timber program.

Information about County budgets, how reliant each County is on BLM payments, and how each County spends the BLM payments was based on a survey of the 18 O&C Counties.

The following sections describe each of these processes in more detail. More complete descriptions can be found in the references.

## The Western Oregon Model

The Western Oregon Model was developed at Oregon State University by Darius Adams and Greg Latta. It is used to analyze questions about timber supply, public policies and how markets might respond to changes in fundamental factors.

The Western Oregon Model has five basic components: (i) inventory data describing private lands; (ii) assumptions about likely future silvicultural regimes to be applied to those lands; (iii) projections of future timber yields under the several regimes; (iv) assumptions about changes in timberland area through gains or losses to other uses or owners; and (v) a model that projects future harvests based on inventory and other assumptions, applies the management regimes, and updates the inventory over time.

### Inventory

The approach involved projecting and harvesting the plots in a simulation system designed to mimic actual growth and harvest. Inventories were brought to a common starting point (2003) using a harvest scheduling model that selected plots (condition classes in western Oregon) for harvest to maximize the present net worth of timber returns over the period from the inventory date to 2003. Simulated harvesting was constrained to mimic actual historical cut by year and owner at the county level. Cut by species group, period-to-period changes in harvest per acre, and the area partial cut were constrained at the half-state level (the finest scale for which historical data are available). In this process, tree lists from the original plots were updated using a version of the Forest Vegetation Simulator (Dixon 2003).

### Management Intensity Classes

A Management Intensity Class is a regime of silvicultural activities applied over the life of a stand. In this analysis, stands are classified as either: (i) “existing,” those that are part of the original inventory at the start of the projection, or (ii) “new,” those that are regenerated during the projection. There are seven Management Intensity Classes for existing stands and eight for new stands.



## Yield Projections

Yields for each Management Intensity Class in each stand were generated using one of three regional variants of the Forest Vegetation Simulator. It is assumed that, by ecoregion, the stems per acre and species composition in new naturally regenerated stands were the same as that derived from averages for all young stands from the Forest Inventory Analysis database.

## Land Area Changes

It is assumed that the general direction of past area trends will continue over the next 15 years but at reduced rates. The recent historical gain in western Oregon's private base was small, and a constant timberland area for that region is assumed.

## Market Model

Timber harvest is a measure of the processing activity on the supply side of the regional log market. A model of the western Oregon log market that explicitly recognizes the spatial dispersion of log processing facilities and the forested lands that supply logs was constructed. Demand is derived from lumber and plywood production and log exports, all of which are sensitive to the delivered price of logs. The supply of logs in the short term is based on private owners' decisions about harvest timing to optimize the value of their timber investments given stand growth and interest rates. In the longer term, it depends on management (silvicultural) investments because these are influenced by anticipated yield increments, management costs, interest rates, and price expectations.

Log processing is grouped into specific milling or processing centers in the region. Mills generate a demand for delivered logs at these centers, which varies with log price up to the point of capacity. Log demand would shift depending on product prices, technology, non-wood costs, and capacity. Capacity itself is not fixed but varies with product prices, equipment costs, depreciation, and interest rate. Potential sources of private log supply lie at various distances from the processing center and have varying cost characteristics depending on the types of forest management, logging conditions, haul distances, and the interest rate.

## Additional Assumptions

In the projections, assumptions about future prices of products and of labor and "other" variable inputs were derived from the 2005 Resource Planning Act Timber Assessment Update (U.S. Forest Service 2005, Timber Assessment Update)<sup>1</sup>.

<sup>1</sup> Draft available online at [www.fs.fed.us/pnw/about/programs/hnri/index.shtml](http://www.fs.fed.us/pnw/about/programs/hnri/index.shtml) ; last accessed Jan. 27, 2006.



Harvest from public lands is determined by policies within the respective managing agencies and generally is not sensitive to log price over the five-year time interval used in this analysis. Consequently, public log supply is treated as exogenous and it is assumed that it will remain constant at recent (2000–2002) average levels throughout the projection. Alternative scenarios of BLM timber harvest were constructed by varying the exogenous levels of BLM cut according to the conditions of the scenario.

Public harvest is set at the county level in the model and the costs of moving logs from public lands to mills estimated using an average haul distance from each county to each milling center.

## County level Input Output models

Input/output models (I/O) are automated process models that scale national-level economic relationships to fixed-structure county databases. Critical input/output data was abstracted from published source data and active field surveys. The general approach contains four analytical phases:

1. Collection of secondary economic indicator data for the county level from a combination of published and on-line data sources.

Those data sources form a large database for each separate county model. The data matrix is recalibrated from field survey data for key sectors such as wood products and major manufacturers. Data on unearned income, including transfer payments and property income comes from the U.S. Bureau of Economic Analysis' Regional Economic Information System database. Data on seasonal homes in the study area, population and household comes from the U.S. Census Bureau website and Portland State University. County-level wage rates are found in the Oregon Labor Market Information System (OLMIS).



2. Comparison of similar data from multiple sources (including cooperators and other BLM contractors) and refining it with our field calibration surveys.

We received primary source records of BLM harvests, budget allocations and practices as well as historical payments to counties<sup>2</sup>. BLM payments were put in context to all county budget sources.<sup>3</sup> We used secondary state historical data to establish the relative BLM harvest contribution.<sup>4</sup> Spatial log flows are proportioned based on an earlier flow survey.<sup>5</sup> For loggers, we gathered logger data<sup>6</sup>, found discrepancies in association estimates<sup>7</sup> and logger safety records<sup>8</sup>, so we augmented these estimates from federal proprietor data<sup>9</sup>. Industrial production data came from numerous surveys and models. These estimates were tested and augmented by ForestEcon, Inc. field surveys. We used two sources of log using mill location and activities<sup>10,11</sup>, which were later adjusted to compromise with other estimates.<sup>12</sup>

3. Conducting field surveys to gather detailed data on socio-economic conditions.

Field interviews are augmented by follow-up telephone surveys. In each county, Dr. Dan Green, regional economist, and Maryann Green, resource biologist, both of Economic Analysis Systems contacted county government leaders, wood products industry employers, and businessmen in leading or potentially sensitive economic sectors. Their objective was to test the accuracy of secondary data, add detail to quantitative descriptions of each county's total economy and selective precision for expected critical sectors and ensure that revised data are generally acknowledged as accurate and representative.

3. Analysis of data, including supplemental analyses mostly completed by other contractors and cooperators.

The Timber Assessment Market Model provided regional estimates of stumpage price and owner harvest substitution estimates.<sup>13</sup> These estimates are used to estimate alternative payments to counties.<sup>14</sup> The Western Oregon timber model runs generate new spatial log use, and wood products production patterns by BLM alternative.<sup>15</sup>

<sup>2</sup> BLM records, Association of O&C Counties Tabulation 10/5/2006, and USFS ASR payments to counties by national forest tabulation 12/22/2006

<sup>3</sup> Kevin Davis, Association of O&C Counties

<sup>4</sup> Gary Lettman, Oregon Department of Forestry forest economist

<sup>5</sup> Jason Brandt, Montana Bureau of Business and Economic Research

<sup>6</sup> Oregon Department of Labor

<sup>7</sup> Oregon Association of Loggers

<sup>8</sup> Oregon Dept of Logger Safety

<sup>9</sup> US Department of Commerce

<sup>10</sup> Oregon State University

<sup>11</sup> Ehinger, Paul. 2006. Western Oregon Wood Products Mill survey

<sup>12</sup> Western Oregon Model *ibid*

<sup>13</sup> Darius Adams, Oregon State University

<sup>14</sup> Mark Rassmussen, Mason, Bruce and Girard Inc.

<sup>15</sup> Greg Latta, Oregon State University



## Model Development Process

Dr. Green, our Economic Analysis Systems cooperator, uses a field survey calibration of county economic data bases and builds unique selective precision spreadsheet Input/Output model. The Economic Analysis Systems modeling process is based on a unique resource economy representation technique.<sup>16</sup> The methodology was developed for USDA-Forest Service spatially-sensitive community impact analyses where canned I/O models obscure or misrepresent impacts.

### Establish model geography and resolution

We chose a county level of resolution so that most O&C impacts would be captured. That required a set of 17 county models as we decided to represent counties where O&C lands were few, but that O&C operations had economic influences.

### Develop County-level databases

A database for each of the models is first assembled from published, on-line data sources, and survey data collected in 2006. The county databases included employment, wage and salary earnings, total industry output, unearned income, seasonal home spending, population, households, commuting patterns, wage rates, residency, employment status, tax rates, and savings and consumption rates (marginal and average propensity to consume locally).

### Construct preliminary county models

A preliminary county model for the model areas is constructed from the secondary data sources. Its content and structure are similar to that used by IMPLAN. Employment and earnings totals in the models are controlled to Regional Economic Information System totals for each county. Industrial output by industry for each of the county models was derived using employment/output ratios obtained from the respective county models. The Economic Analysis Systems approach used the “selective precision” approach.<sup>17</sup> With this approach, on-the-ground verification focuses on a select number of sectors that are expected to play a significant role in the analysis. Each of the county models is constructed using a combination of spreadsheet programs along with a mathematical software program, GAUSS<sup>18</sup>, which handles complex mathematical operations.

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<sup>16</sup> Robison, M. Henry. 1997. Community Input/Output Models for Rural Area Analysis. *Annals of Regional Science*. Vol 31(3) pp 325-351

<sup>17</sup> Richardson. 1972.

<sup>18</sup> Aptech Systems Software. GAUSS mathematical and statistical system



### **Calibrate County models**

In general, data and relationships for sectors that play an important role in the local economy and that are a key component of the economic base were adjusted with on-the-ground verified data as appropriate.

### **Modify export base in Key Economic Sectors**

Use of mechanical techniques typically results in local absorption of the output of a variety of local industries that export all of their output (i.e., an extreme case of underestimating exports). Export sales are adjusted based on survey data for all key sectors in the analysis (such as wood products) and other sectors such as agriculture that are principal components of the economic base.

### **Perform sensitivity analyses and adjustments**

Preliminary runs of the models using a range of input variables are undertaken to determine whether the model's projections of impacts were reasonable. This procedure focuses on the wood products sector of the county model. Multipliers from the model are also compared to multipliers developed by the U.S. Bureau of Economic Analysis Regional Input-Output Modeling multipliers and for IMPLAN models of the area and to a county model (Western Oregon).

## **Timber Assessment Market Model**

The Timber Assessment Market Model focuses on the solid wood products sector and also provides the linkage between products markets (solid wood and pulpwood) and the timber inventory. Since its inception in the late 1970s, the model has undergone a number of extensions and revisions designed to improve the realism of its projections and the utility of its output to resource analysts and policymakers.

The Timber Assessment Market Model is a special model of the solid wood and timber inventory elements of the United States forest products sector and of softwood lumber and OSB production in Canada. The Timber Assessment Market Model provides annual projections of volumes and prices in the solid wood products and sawtimber stumpage markets, and estimates of total timber harvest and inventory by geographic region for periods of up to 50 years.

The demand module for softwood solid wood products uses Spelter's diffusion analysis of demands for softwood lumber, softwood plywood, and oriented strand board/waferboard. The current wood products supply module assumes that product output is obtained in fixed proportions to log input (the product recovery factor linkage) but in variable proportions to all other factors, implying that logs are separable from other inputs in production. Given the assumptions of fixed log input-product output relations in the Timber Assessment Market Model, the derived demand for logs is simply the



product of recovery factors times output. The supply of wood to processing facilities is modeled as a mixture of price-sensitive relations, and exogenous flows describing the volumes of timber available for immediate harvest and the volumes of logs delivered to mills. The Timber Assessment Market Model also includes a program module that provides linkage to the ATLAS timber inventory system for the solid wood, paper and board, and fuelwood models.

### Survey of counties

To better understand County budgets, and the role that BLM payments play in those budgets, MB&G sent a questionnaire to each of the 18 O&C Counties. Follow up phone calls clarified unclear answers.

### County Budget Data for FY2005 – BLM Western Oregon Plan Revision

County: \_\_\_\_\_  
 Contact Person: \_\_\_\_\_  
 Phone: \_\_\_\_\_

**PART 1 – FISCAL YEAR 2005 BUDGET**

<b>County Expenditures</b> <i>(see following page for definition of categories)</i>	<b>Fiscal Year 2005</b>	
	Total Budget (including Discretionary Budget)	Discretionary Budget Only
Health & Community Services		
Public Safety		
Economic Dev., Natural Res. & Recreation		
Transportation & Land Use		
Other Community Services		
Debt Service		
Other (Specify): _____		
_____		
_____		
<b>Total Expenditures</b>		
 <b>County Revenues</b>		
State Transfers & Reimbursements		
Property Taxes		
Safety Net Payments associated with O&C Lands		
Safety Net Payments associated with USFS Lands		
Other Federal Grants & Payments		



Fees, Charges for Services		
City, Special District & Other County Payments & Reimbursements		
Interest Earnings		
Bonding or other borrowing		
Other (Specify):		
_____		
_____		
_____		
<b>Total Revenues</b>		

**PART 2 – HISTORIC COUNTY EXPENDITURES**

Fiscal Year	Total Budget (including Discretionary Budget)	Discretionary Budget Only
1985		
1990		
1995		
2000		
2001		
2002		
2003		
2004		
2005		

**Part 3 - Describe primary expenditures of discretionary funding**

Please describe in as much detail as possible the specific uses for discretionary funds in your County. Your responses to Part 1 above puts expenditures in general categories. It would be very helpful to have more detail about specific programs and projects supported by O&C and other discretionary funds in recent years. Please feel free to attach graphs, charts, or other descriptive budget documents that help explain how your County uses its discretionary funds.

## BLM Budget

To calculate changes to the BLM budget, the non-timber portion of each District’s budget was calculated from the FY 2006 budget data. The timber portion of the budget was calculated using a fixed rate of \$159/Mbf. This figure was based on historic budget information.



## Timber Program Costs

Timber program costs for the present net value calculation were based on historic BLM budget data as \$200/Mbf. This includes overhead at the District and State offices.

Expenditure Categories		
Health & Community Services	<ul style="list-style-type: none"> <li>• Aging Services</li> <li>• Alcohol &amp; Drug Addiction Services</li> <li>• Services for Children &amp; Families</li> <li>• Developmentally Disabled</li> <li>• Mental Health Services</li> <li>• Oregon Health Plan Services</li> </ul>	<ul style="list-style-type: none"> <li>• Veterans Services</li> <li>• Public Health Services</li> <li>• Environmental Health Services</li> <li>• Housing Services</li> <li>• Medical Examiner</li> <li>• Solid Waste Disposal/Recycling</li> </ul>
Public Safety	<ul style="list-style-type: none"> <li>• Trial Courts</li> <li>• District Attorney</li> <li>• County Jail</li> <li>• 911/Emergency Communications</li> <li>• Emergency Management</li> <li>• Homeland Security</li> </ul>	<ul style="list-style-type: none"> <li>• Community Corrections</li> <li>• Court Security</li> <li>• Juvenile Services</li> <li>• County Law Library</li> <li>• Sheriff Patrol</li> <li>• Animal Control</li> </ul>
Economic Development, Natural Resources and Recreation	<ul style="list-style-type: none"> <li>• Oregon Plan Implementation</li> <li>• State Forest Management</li> <li>• Federal Land Policy</li> <li>• Extension Services</li> <li>• Telecommunications</li> <li>• County Fair</li> </ul>	<ul style="list-style-type: none"> <li>• Watermaster</li> <li>• County Forests</li> <li>• County Library</li> <li>• County Parks</li> <li>• County Museums</li> </ul>
Transportation & Land Use	<ul style="list-style-type: none"> <li>• Highway &amp; Road Systems</li> <li>• Land Use Planning &amp; Coordination</li> <li>• Senior &amp; Disabled Transportation</li> <li>• Development Services</li> </ul>	<ul style="list-style-type: none"> <li>• Engineering</li> <li>• Building Permitting &amp; Inspections</li> <li>• Surveying</li> <li>• Capital Projects</li> </ul>
Other Community Services	<ul style="list-style-type: none"> <li>• Management &amp; Administration</li> <li>• Elections</li> <li>• Assessment &amp; taxation</li> <li>• Human Resources &amp; Employee Relations</li> </ul>	<ul style="list-style-type: none"> <li>• Property &amp; Facilities Management</li> <li>• Procurement</li> <li>• Recording Public Documents</li> </ul>