

**REGIONAL ECONOMIC IMPACT MODELS FOR THE LOWER SNAKE  
RIVER JUVENILE SALMON MIGRATION FEASIBILITY STUDY**

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# **REGIONAL ECONOMIC IMPACT MODELS FOR THE LOWER SNAKE RIVER JUVENILE SALMON MIGRATION FEASIBILITY STUDY**

## **EXECUTIVE SUMMARY**

### **1.0 Introduction**

Regional economic analysis is concerned with changes in the local economy that would be created by the Alternatives. Inflows or outflows of money to or from the local economy cause local business activity to change by a multiple of the original change. This process, known as the multiplier effect, occurs because an influx of funds is spent and re-spent in the local economy as expanding sectors hire labor and buy other inputs from local suppliers to create added output.

For example, consider an aluminum plant whose products are sold mainly to customers outside the region. The receipt of increased aluminum export sales dollars allows expansion of production and provides increased income to employees who spend some of their income in the region. The plant operation also requires many inputs and equipment which can often be purchased locally. These local purchases created by the plant's increased exports cause local industry to expand to meet the new demand for inputs thus creating new jobs and sales in many other sectors. Conversely, if aluminum export sales decline, this multiplier process works in reverse and the total negative impact on the local economy is much greater than the initial loss of export sales.

The regional economic analysis examines how local and State economies would be affected by the proposed Alternatives. The baseline Alternative, A-1, depicts existing conditions. The other alternatives evaluated as part of this feasibility study are alternatives A-2a – maximum transport of juvenile salmon, A-2c – major system improvements, and A-3 – dam breaching. In many cases, only alternative A-3 (dam breaching) creates economic changes sufficiently large to warrant impact measurement. DREW study teams measure the direct economic effects associated with the proposed Alternatives for each industry and by affected resource type. The regional economic analysis is based on these DREW study team estimates.

## **1.1 Input-Output Methodology**

The secondary economic effects are measured using an input-output model. Input-output is an accounting system that includes all the industries in a study region. The input-output accounts measure the interdependence among industries and workers in an economy. The greater the interdependence among industry sectors the larger the multiplier effect on the economy (and jobs) if a local industry makes sales to persons or firms outside the region or to government. The input-output technique is a model of sales flows among industries and government agencies that is based on historical purchase patterns for each industry and for consumers. The input-output model simultaneously considers the interdependent spending changes among industries in the region who provide goods as inputs (the indirect effects), and households in the region who provide labor and management services to directly and indirectly affected industries (the induced effects).

Sales to final demand is the portion of an industries' sales that is for export (from the defined study region), sales to government, or to create new physical investment. Sales to final demand are an important measure because they are the driving force that supports the economy. Exports, sales to government, or sales for investment (i.e. new physical capital or addition to inventory) are the only sources of new spending for a regional economy. In this analysis, the primary changes in final demand sales are sales to Federal government and exports. Sales to final demand have a multiplier effect on the economic activity of a region because the expanding sector buys local labor and other inputs from local suppliers to create added output. Local suppliers must increase their purchases, spreading the expansion throughout the economy.

## **1.2 The Alternatives Create Secondary Economic Effects**

Each Alternative has positive or negative changes in sales to final demand (including changes in government spending, changes in output of affected industries, and physical investments by private enterprise) which create indirect and induced changes in business sales, employment, and personal income in the study regions. These economic changes are shown by input-output multipliers that are applied to the change in sales to final demand to calculate the cumulative economic effects throughout the economy of a region. The secondary impacts for

some industries are mainly local while other industries' impacts would occur at locations throughout the Pacific Northwest.

Economic changes created by the Alternatives can be "short run" or "long run." Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

### **1.2.1 Limitations of the Analysis**

Regional economic effects are measured in this analysis using input-output models with industry spending coefficients estimated from national data (synthesized) rather than from local survey. Some valid criticisms have been directed at synthesized input-output as opposed to survey based input-output. First, the synthesized industry spending coefficients are based on a national industry spending calibration which may not apply to the specific region under study. However, an input-output model, unlike many other economic models, is constrained and consistent. The model is a double entry book keeping system of accounts so that total sales must equal total purchases in each sector and for the economy (including imports and exports from the study region). A 90-industry input-output model (as used in this study) is equivalent to a sales maximizing linear program with 90 constraint equations that limit the outcomes. These built-in constraints limit most input-output models' business sales multipliers (direct, indirect, and induced effects) to lie between 1.5 and 3.00 regardless of the underlying data source. Recent IMPLAN models, which use much more refined data than earlier models, are within plus or minus ten percent of the multipliers that would be found using survey data in place of national averages. This conclusion is based on experience with constructing about 30 direct survey input-output models. Furthermore, IMPLAN contains known sources of error which have been adjusted.

A limitation of input-output is that it is a picture of the economy at a point in time (based on historical ratios) rather than a dynamic structure of changing relationships. When prices or costs change in response to public policy changes, consumers and producers respond by substituting among final goods, substituting among inputs to production, migrating among

regions, and shutting down businesses that are no longer profitable. To evaluate these sorts of changes, economists must first use supply and demand models to estimate the direct effects that are then used to drive the input-output model. When supply and demand models are unavailable, accurate projections may be impossible.

### **1.2.2 Measures of Economic Change**

Three economic measures are important for each input-output model, i.e., each State, region or subregion. Total business sales by sector is the estimated gross receipts (except for the trade sectors where it is the margin or value added by the trade sector). Business sales are the driving force for an economy. The second measure is estimated employment by sector. Jobs are usually viewed as the single most important outcome of increased business sales and the greatest concern when economic growth falters. The third measure is personal income. Personal income (household sales in the input-output tables) is wages, salaries, social insurance, and profit received by individuals.

### **1.3 Geographic Definitions of the Study Regions**

Eight input-output models were constructed to analyze possible changes in sales to final demand created by the Alternatives. The models include: State of Washington, State of Oregon, State of Idaho, State of Montana, the Upriver Subregion, the Reservoir Subregion, the Downriver Subregion, and the Lower Snake River Region which is the Upriver, Reservoir, and Downriver Subregions combined. The counties that comprise the three Lower Snake River Subregions are identified in Table 1.

**Table 1  
REGIONAL ECONOMIC ANALYSIS STUDY AREA BY STATE AND COUNTY**

----- Lower Snake River Region -----

<b>Downriver Subregion</b>	<b>Reservoir Subregion</b>	<b>Upriver Subregion</b>
<p><b>Oregon</b> Gilliam Hood River Morrow Sherman Umatilla Wasco</p> <p><b>Washington</b> Benton Franklin Klickitat Skamania</p>	<p><b>Washington</b> Adams Asotin Columbia Garfield Walla Walla Whitman</p>	<p><b>Idaho</b> Clearwater Custer Idaho Latah Lemhi Lewis Nez Perce Valley</p> <p><b>Oregon</b> Wallowa</p>

The subregion models are applied to cases where impacts are localized. For example, Alternative A-3 (breaching) would reduce irrigated agriculture only in the Reservoir Subregion and that would create negative economic effects on the Reservoir and Downriver Subregions. Conversely, electric rate increases caused by Alternative A-3 would impact several States. The multiplier effects tend to be smaller for the Subregions than for States because the subregions have a greater dependence on imported goods. Thus, using a State model to analyze local impacts would obscure the location of the impact and overstate the impact.

The geographic definition of the subregion models separated the lower Snake River into three components. The Downriver Subregion defines a region that would be the terminus of barge transport under Alternative A-3 (breaching). The Reservoir Subregion defines a region in eastern Washington that would lose barge transport and gain free-flowing river recreation under

Alternative A-3 (breaching). The Upriver Subregion defines a region in central Idaho and NE Oregon that would lose barge transport and gain free-flowing river recreation and increased fishing opportunities under Alternative A-3 (breaching).

#### **1.4 Potential Business Failures with Breaching**

Increases in costs for electric power and transportation, decreases in the availability of irrigated farm output, and removal of the reservoirs and locks could cause significant cost increases for energy and transport intensive industries or in industries requiring reservoirs or inputs from agriculture. In some cases, cost increases could be large enough to cause affected plants or firms to shut down or to relocate to another region. Substantial proprietary information about each firm or plant, such as the cost and profit structure, would be required to allow prediction of those businesses that would close or relocate. It would also be necessary to forecast market prices for the potentially affected products into the future. These types of information are not publicly available and, therefore, it was not possible to analyze potential plant closings.

Industries that might have business failures under the breaching alternative include: water transport services (barge marine cargo, cruise ships, and marinas, requiring reservoirs and locks), primary aluminum manufacturing (electricity-intensive), paper manufacturing (transport-intensive), grain production (transport-intensive), and food processing (dependent on fruit and vegetable inputs from irrigated agriculture).

Table 2 shows the amount of direct employment in industries with potential business failures with breaching by Subregion or State. Primary aluminum production is located in the Downriver Subregion and throughout the Pacific Northwest. Breaching would cause power costs to rise for aluminum plants in Washington, Oregon, and Idaho. Food processing impacted by breaching is in the Downriver and Reservoir Subregions. Paper manufacturing that would be most affected by breaching is in the Upriver Subregion. Grain farms located in the Upriver Subregion and the eastern part of the Reservoir Subregion would be most affected by breaching. Water transport impacted by breaching, consisting of marinas, jet boats, cruise ships, and marine cargo, is mainly in the Upriver Subregion.

The estimated direct employment shown in Table 2 excludes the multiplier effect that

would occur with business closures. For example, if one primary aluminum plant with 580 employees closed, aluminum exports from the Downriver Subregion would fall by an estimated - \$145.00 million (IMPLAN). However, the estimated direct, indirect, and induced effects on jobs in the Downriver Subregion would total -1,400 jobs. The direct employment loss of -580 jobs would be in the aluminum plant while the secondary effect on employment would create employment losses of -820 jobs distributed across many sectors of the economy.

**Table 2**  
**ESTIMATED DIRECT EMPLOYMENT IN INDUSTRIES**  
**THAT HAVE POTENTIAL BUSINESS FAILURES**  
**WITH DAM BREACHING, AND TOTALS FOR STATES, 1994**

Geographic Area	Primary Aluminum Mfg.	Food Processing (can/freeze)	Paper Mfg.	Grain Farms	Water Transport
Upriver Subregion	0	0	1,778	1,646	134
Reservoir Subregion	0	1,917	545	3,488	24
Downriver Subregion	1,159	5,388	100	6,180	27
<b>TOTAL, LOWER SNAKE RIVER REGION</b>	1,159	7,305	2,423	11,314	185
State of Washington	5,300	21,705	11,579	10,893	9,495
State of Oregon	930	13,265	5,234	7,828	2,195
State of Idaho	30	9,275	1,780	8,668	300

SOURCE: IMPLAN, 1994.

## 1.5 Economic Impacts by Resource Category

This section shows the direct, indirect, and induced regional economic effects of the proposed Alternatives by resource category. Employment changes projected by the 1994 IMPLAN model are divided by 1.07 to adjust for inflation when using final demand changes of the Alternatives that are in 1998 dollars. The IMPLAN model projects employment on the basis of jobs per dollar of sales in 1994. Thus, without this adjustment, inflation would cause projected changes in jobs to be overstated. All impacts are shown in 1998 dollars.

### 1.5.1 Electric Power Effects

#### 1.5.1.1 Economic Effects of Potential Rate Increases

Alternative A-3 (breaching) would terminate hydroelectric generation at the four Corps dams on the lower Snake River leading to a need for replacement power generation. The capital costs for constructing the new power plants and the increased operating costs for these plants would lead to increased electricity bills to ratepayers.

The geographic regions and distribution of increases in electric bills might be determined by Federal legislation and cannot be known in advance. The method of collecting the increased electric bill is also unknown. If the increased electric bill was paid by electric rate increases, that would cause customer substitution out of electricity and increase the demand for natural gas, propane, fuel oil, and insulation. Over time, more efficient household, commercial, and industrial electric appliances, machines, and processes would be substituted for electricity use. The long run demand for electricity has been shown to be sensitive to price increases. As a result, increasing the price per kWh consumed would reduce the amount of electricity that needed to be produced and increase the demand for substitute products. However, if the increased electric bill was paid by an increased fixed monthly charge, the substitution effects would be minimal because few customers would be willing to give up their electricity connection (except for those firms and farms that shut down or leave the region).

Electric bill increases would reduce net income for industries and reduce disposable income for households in the region.<sup>1</sup> The extent to which business firms would leave the region or reduce output and employment in reaction to reduced net income is unknown. Some industries may be able to pass part of the increased electric bill on to their customers while others, such as agriculture, cannot do this because of intense national or global competition. Increased electric bills paid by residential consumers, farmers, and business owners would reduce their disposable income, leading to reduced consumer spending for other goods and services.

The economic impact of increased electricity bills on the aluminum sector is unknown because information is not available to predict the effects of increased operating costs on production and employment. However, the aluminum processing sector could be severely

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<sup>1</sup> It is assumed that increased rates paid on electricity consumed by the Federal government would be borne by taxpayers throughout the U.S. so that impacts in the Pacific Northwest would be minimal (DREW Hydropower Impact Study Team(1999)).

impacted. Based on their share of current electricity use, aluminum plants in Washington would have an increase in their annual electricity bill of \$26.00 million, while plants in Oregon would have an increase of \$12.88 million, and plants in Montana would have an increase of \$4.58 million (see Table 3).

#### 1.5.1.2 Impacts on Residential and Farm Incomes Under Alternative A-3 (Breaching)

Increased electric bills to residential and farm irrigation customers are assumed to be paid by households and create a reduction in disposable income to households. The cost to individual households would rise by one to six dollars depending on how many ratepayers were subject to the rate increase. The direct, indirect, and induced economic effects of reduced household income in the States of Washington, Oregon, Idaho, and Montana are estimated using input-output models for these four States. Alternative A-3 (breaching) is the only alternative that would create a significant change in household electricity bills. Table 3 shows the projected increase of electricity bills for residential and farm irrigation customers based on current consumption patterns (DREW Hydroelectric Impact Study Team (1999)).

Increased electric power bills paid by residential and farm households would cause household personal income to fall by -\$57.32 million in Washington. Using the Washington input-output multipliers; business sales in the State would fall by -\$134.56 million, Washington employment would fall by -743 jobs, and personal income would fall by an added -\$21.06 million (personal income down -\$78.39 million throughout the State).

Increased electric power bills paid by households would cause household personal income to fall by -\$32.00 million in Oregon. Using the Oregon input-output multipliers; business sales in the State would fall by -\$80.52 million, Oregon employment would fall by -507 jobs, and personal income would fall by an added -\$13.81 million (personal income down -\$45.81 million throughout the State).

Increased electric power bills paid by households would cause household personal income to fall by -\$16.32 million in Idaho. Using the Idaho input-output multipliers; business sales in the State would fall by -\$37.10 million, Idaho employment would fall by -248 jobs, and personal income would fall by an added -\$5.90 million (personal income down -\$22.22 million

throughout the State).

Increased electric power bills paid by households would cause household personal income to fall by -\$2.50 million in Montana. Using the Montana input-output multipliers; business sales in the State would fall by -\$5.26 million, Montana employment would fall by -36 jobs, and personal income would fall by an added -\$0.61 million (personal income down -\$3.11 million throughout the State).

**Table 3**  
**ANNUAL ELECTRICITY EXPENDITURE INCREASES CAUSED BY ALTERNATIVE**  
**A-3 (BREACHING) BY STATE AND SECTOR, 1998**  
**(Million Dollars)<sup>1/</sup>**

Sector	State							Total
	Wash.	Ore.	Idaho	Mont.	Cal.	Nev.	Wyom.	
Commercial	39.45	24.88	8.49	1.78	0.45	0.07	0.14	72.56
Industrial <sup>2/</sup>	35.24	22.35	12.44	5.10	0.22	1.08	0.27	76.70
Irrigation	3.39	1.74	4.06	0.12	0.18	0.01	0.01	9.51
Residential	53.94	30.26	12.26	2.38	0.71	0.82	0.41	100.78
Aluminum	26.00	12.88	0.00	4.58	0.00	0.00	0.00	43.46
Federal	2.67	0.00	0.00	0.00	0.00	0.00	0.00	2.67
<b>Total</b>	160.69	92.11	37.25	13.96	1.56	1.98	0.83	308.38

1/ Electricity spending increases are distributed to sectors based on the existing spending shares.

2/ Excluding aluminum which is shown in a separate row below.

SOURCE: DREW Hydropower Impact Study Team (1999).

### 1.5.1.3 Impacts on Local Owners of Commercial and Industrial Firms Under Alternative A-3 (Breaching)

Although the effects on the viability and operating levels of electricity-intensive firms and plants are unknown, the effect on the personal income of in-State owners of many small commercial and industrial firms can be estimated (primary aluminum is excluded because it is not a locally owned small business). Data in Table 3 show the projected increase of electricity bills for commercial and industrial firms. Based on unpublished payroll data, a rough estimate of in-State ownership for commercial and industrial firms is 50 percent and 30 percent respectively (precise estimates would require knowledge of electricity consumption by many individual firms and industries). Thus, the commercial row of Table 3 was multiplied times 0.5 and the industrial row times 0.3 to find the increased electricity bills paid by in-State owners if Alternative A-3 (breaching) was selected. These estimates of increased electricity bills to local owners of commercial and industrial establishments are treated as reductions of their spendable personal income.

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$30.30 million in Washington. Using the Washington input-output multipliers; business sales in the State would fall by -\$71.13 million, Washington employment would fall by -393 jobs, and personal income would fall by an added -\$11.13 million (personal income down -\$41.43 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$19.15 million in Oregon. Using the Oregon input-output multipliers; business sales in the State would fall by -\$48.18 million, Oregon employment would fall by -303 jobs, and personal income would fall by an added -\$8.26 million (personal income down -\$27.41 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$7.79 million in Idaho. Using the Idaho input-output multipliers; business sales in the State would fall by -\$17.71 million, Idaho employment would fall by -118 jobs, and personal income would fall by an added -\$2.82 million (personal income down -\$10.61 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$2.43 million in Montana. Using the Montana input-output multipliers; business sales in the State would fall by -\$5.11 million, Montana employment would fall by -34 jobs, and personal income would fall by an added -\$0.60 million (personal income down -\$3.09 million throughout the State).

The impacts shown above are for the “middle” estimate of the change in electric bills. The effects of the “low” estimate can be found by dividing the results shown above by 1.284. The effects of the “high” estimate can be found by multiplying the results shown above by 1.241 (DREW Hydropower Impact Study Team (1999)).

#### 1.5.1.4 Reduced Sales, Employment and Personal Income for Hydroelectric Operation and Maintenance

Alternative A-3 results in shut down of hydroelectric generation at the four lower Snake River dams. Reduction or termination of operation and maintenance costs (the plants require security and preservation services after shut down) would create negative direct, indirect, and induced economic impacts on the region. These impacts are included in the Avoided Cost section of the report.

#### 1.5.1.5 Direct, Indirect, and Induced Economic Effects of Power Plant Construction

It is assumed that six new power plants would be constructed to replace the lower Snake River dam power output. Two of the six plants are needed to support system reliability.

A total of three new combined-cycle plants would be constructed in the Downriver Subregion. The first two plants would be constructed in 2007 and go on line in 2008. The first two plants are expected to be constructed in Hermiston and Tri-Cities. It is estimated that a third plant would be built in 2008 in Tri-Cities. Three more plants would be constructed in the Puget Sound region. A fourth plant would be built in 2009, a fifth plant in 2010, and a sixth plant in 2016 (DREW Hydropower Impact Study Team (1999)).

Each 250 mw gas-fired combined-cycle steam electric plant was assumed to take one year to construct. The plant construction costs of  $(\$601,000/\text{MW})(250 \text{ MW}) = \$150.00$  million are

proposed to occur during the years 2007 (2 plants), 2008, 2009, 2010, and 2016 (DREW Hydropower Impact Study Team (1999)).

The Downriver Subregion utility construction multipliers are 2.2159, 0.00001987, and 0.6989 for sales, employment, and personal income respectively. Thus, the business sales created by the one-year construction projects for each plant would be \$332.40 million. The total one-year employment effect for each plant would be 2,786 jobs. The household sector would have an increase of \$104.80 million in personal income.

It is assumed that these sales, employment, and personal income impacts would be doubled in the year 2007, in the Downriver Subregion, because two plants would be built simultaneously. A single plant would be built in the Downriver Subregion in 2008. The remaining three combined-cycle plants would be built somewhere in the Puget Sound area outside the Lower Snake River Subregion. Similar construction impacts can be expected in the Puget Sound area.

#### 1.5.1.6 Direct, Indirect, and Induced Economic Effects of Power Plant Operation

According to BPA power system modeling, once new combined-cycle plants are constructed, they will operate at 90 percent of their design capacity. The operating costs of the new plants were estimated at \$13.61/MWh. The annual operating cost of each combined-cycle plant is  $(250\text{MW})(0.90)(8760 \text{ hours per year})(\$13.61/\text{MWh}) = \$26.80$  million per year. Thus, the six new plants will create operation spending of  $(6)(\$26.80 \text{ million}) = \$160.80$  million per year. The increase in annual final demand purchases of the \$160.80 million required to operate the six new power plants was split 21% to labor (households) and labor-intensive services, and 79% to the natural gas production, transmission, and distribution sector based on information on combined-cycle plants (DREW Hydropower Impact Study Team (1999)).

Annual spending increases in the Lower Snake River Subregion to operate the plants would be  $(\$26.8 \text{ million})(2) = \$53.60$  million per year in 2008 and \$80.40 million per year in 2009 and thereafter. Annual spending increases in the Puget Sound region would be \$26.8 million per year in 2010, \$53.60 million per year in 2011, and \$80.40 million per year in 2017 and thereafter. Prior to the construction of the new gas-fired steam electric plants, the shortfall of

power generated in the region would require electricity imports to the region. It is assumed that these temporary electricity imports do not create any measurable changes in spending or employment within the study region.

The Downriver Subregion is likely to be most impacted by the operation of the new combined-cycle power plants, however the Reservoir Subregion could also be impacted. Thus, the Lower Snake River Model was used to estimate impacts. The sales multiplier for labor is 2.3695, the employment multiplier is .00001597, and the personal income multiplier is 0.3692.

Labor and labor-intensive services, which make up 21 percent of total operating costs, for the first two plants receives  $(\$26.80 \text{ million})(2)(.21) = \$11.26 \text{ million}$ . Thus, operation labor and labor-intensive services for the first two plants would create some \$26.70 million of direct, indirect and induced spending per year in the region. Operation labor and labor-intensive maintenance services for the first two plants would create some 168 jobs in the region, starting in 2008. Operation labor and labor-intensive maintenance services for the first two plants would create some \$4.16 million of personal income (direct, indirect, and induced) in the Downriver Subregion, starting in 2008. Adding the third plant would increase the total impacts by 1.5 times to \$40.05 million in sales, 252 jobs, and \$6.24 million in personal income starting in 2009 and thereafter. The remaining three combined-cycle power plants would add to the impacts in a similar manner in the Puget Sound area in 2010, 2011 and 2017.

The major input to the combined-cycle generating plant is natural gas and that accounts for  $(\$26.80 \text{ million})(2)(.79) = \$42.34 \text{ million}$  per year of purchases from the gas distribution sector for the first two combined-cycle generating plants. The multipliers for business sales, employment, and personal income are 1.584, 0.0000105194, and 0.2730 respectively. Thus, the total (direct, indirect, and induced) added business sales in the region created by the first two plant's gas purchases would be \$67.10 million per year. The added employment from gas purchases to operate the first two plants would be 416 jobs. The added personal income from gas purchases to operate the first two plants (direct, indirect, and induced) would be \$11.56 million per year. Adding the third, equal sized, plant would increase the impacts by 1.5 times to \$100.65 million in business sales, 624 jobs, and \$17.34 million in personal income starting in the year 2009 and thereafter. The remaining three combined-cycle power plants would add to business

sales, income, and employment in a similar manner in the Puget Sound area in 2010, 2011 and 2017.

#### 1.5.1.7 Direct, Indirect, and Induced Economic Effects of Transmission Line Construction Under Alternative A-3 (Breaching)

A total construction expenditure to modify electricity transmission lines of \$177.00 to \$271.00 million would occur over a two year period during the breaching process. A new transmission line from Spokane to Tri-Cities accounts for \$100.00 to \$150.00 million of the expense. The remainder of the spending is for projects in the Downriver Subregion. It is assumed that the impacts all occur in the Downriver Subregion. The Downriver Subregion utility construction multipliers are 2.2159, 0.00001987, and 0.6989 for business sales, employment, and personal income respectively. The annual spending of \$88.50 to \$135.50 million to modify power lines results in \$196.10 to \$300.30 million in business sales, 1,643 to 2,516 jobs and \$61.90 to \$94.70 million of personal income.

#### 1.5.1.8 Direct, Indirect, and Induced Economic Effects of New Transmission Line Operation and Maintenance

Spending to operate and maintain new electricity transmission lines of approximately \$0.85 million is assumed to occur annually. It is assumed that the spending would occur somewhere in the Lower Snake River Region. The Lower Snake River Region electric utility multipliers are 1.9634, 0.00001052, and 0.4095 for business sales, employment, and personal income respectively. The \$0.85 million spent to operate and maintain power lines would result in \$1.67 million of business sales, 8 jobs and \$0.35 million of personal income.

### **1.5.2 Changes in Sportfishing, Recreation, and Tourism Expenditures**

Fishing trips and recreation and tourism trips by non-residents create new spending flows in the regions where the visit occurs. Thus, sportfishing, recreation, and tourism by non-residents are exports which stimulate the local economy. Alternative A-3 (breaching) has two effects which increase exports; (1) the total number of trips per year to the fishing and recreation

sites increases, and (2) the share of trips made by non-residents increases. Both effects tend to increase the level of fishing and recreation exports (DREW Recreation Impact Study Team (1999)).

Alternative A-3 (breaching) is expected to increase steelhead and salmon runs in all three subregions, and along the coastal areas of the Pacific Northwest (DREW Anadromous Fish Study Team (1999)). However, breaching reduces or eliminates some species of fish currently available on the four lower Snake River reservoirs. The number of fishing trips made to these areas is expected to increase in response to the increased fishing opportunities. However, the increase in fishing trips is severely limited by the projected increases in non-protected fish.

Alternative A-3 (breaching) reinstates some 130 miles of free-flowing Snake River that is suitable for rafting, kayaking and other river-based activities. The Corps would construct campgrounds and other facilities as needed. Thus, the only potential constraint on water-based recreation would be congestion on the river. Expansion of recreation trips is expected to occur along the free-flowing Snake River in the Reservoir Subregion based on contingent behavior survey (DREW Recreation Impact Study Team (1999)). The contingent behavior surveys measured consumer intentions to visit the sportfishing and river recreation sites with and without Alternative A-3 (breaching).

Changes in spending on sportfishing and recreation trips with Alternative A-3 (breaching) are based on surveys of current sportfishing and recreation visitation for the Reservoir and Upriver Subregions, Corps visitation data, and the contingent behavior surveys of recreationist intentions (DREW Recreation Impact Study Team (1999)).

#### 1.5.2.1 Sportfishing Impacts in the Upriver Subregion

The following table (Table 4) shows the sportfishing effects of breaching on business sales, employment, and personal income in central Idaho and northeast Oregon. The two A-2 alternatives would not create significant upstream fishing effects. The impacts shown are based on the increased fish availability with Alternative A-3 (breaching) projected by PATH and the DREW Anadromous Fish Study Team (1999).

**Table 4**  
**ANNUAL ECONOMIC EFFECTS OF FISHING IN THE**  
**UPRIVER SUBREGION FOR ALTERNATIVE A-3 (BREACHING)<sup>1/2/</sup>**

Year	Increase in Business Sales (\$ Million per Year)	Increase in Jobs	Increase in Personal Income (\$ Million per Year)
0	6.15	92	1.73
5	4.40	66	1.24
10	28.74	432	8.10
15	20.98	312	5.85
20	24.57	369	6.92
25	25.70	386	7.24
30 to 100	26.74 to 28.43	402 to 427	7.56 to 8.01

1/ The increase in fishing trips is constrained by the supply of fish projected by PATH and the DREW Anadromous Fish Study Team (1999).

2/ A single point estimate of increased fish availability was provided by the DREW Anadromous Fish Study Team (1999).

SOURCE: DREW Recreation Impact Study Team (1999).

#### 1.5.2.2 Sportfishing Impacts in the Reservoir Subregion

The following table (Table 5) shows the sportfishing effects of breaching on business sales, employment, and personal income in the Reservoir Subregion. The two A-2 alternatives did not create significant fishing effects. The impacts shown are based on PATH and the DREW Anadromous Fish Study Team (1999) projected fish availability. Fishing trips are constrained below the DREW Recreation Workgroup contingent behavior low forecast of fishing demand by the limited availability of fish projected by PATH and the DREW Anadromous Fish Study Team (1999).

The following table (Table 6) shows the recreation effects of breaching on business sales, employment, and personal income in the Reservoir Subregion. The two A-2 alternatives did not create significant recreation effects. The impacts shown are based on the DREW Recreation Workgroup contingent behavior “middle level” forecast. Limitation of

**Table 5**  
**ANNUAL ECONOMIC EFFECTS OF FISHING IN THE**  
**RESERVOIR SUBREGION FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million per Year)	Increase in Jobs	Increase in Personal Income (\$ Million per Year)
0	3.4	36	0.86
5	2.79	29	0.71
10	4.72	50	1.2
15	5.44	57	1.39
20	7.1	75	1.81
25	8.77	92	2.23
30 to 100	8.99 to 9.47	93 to 99	2.29 to 2.41

1/ Fishing trips are constrained below both the “middle” and “low” DREW Recreation Impact Study Team (1999) contingent behavior forecasts of fishing demand due to the limited availability of fish projected by PATH and the DREW Anadromous Fish Study Team (1999).  
 SOURCE: DREW Recreation Impact Study Team (1999).

**Table 6**  
**ANNUAL ECONOMIC EFFECTS OF RIVER RECREATION IN THE RESERVOIR**  
**SUBREGION MIDDLE FORECAST FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million per Year)	Increase in Jobs	Increase in Personal Income (\$ Million per Year)
0	35.95	456	9.65
5	49.84	631	13.37
10	73.14	927	19.63
20 to 100	77.28	980	20.74

1/ The “middle” forecast is based on the DREW Recreation Impact Study Team (1999) contingent behavior survey for recreation visits with breaching.  
 SOURCE: DREW Recreation Impact Study Team (1999).

recreation facilities and river congestion do not affect the “middle” forecast impact estimates.

### 1.5.3 Economic Impacts in the Transportation Sector with Alternative A-3 (Breaching)

#### 1.5.3.1 Impacts of New Construction for Rail Transport

New railroad hopper cars costing \$14.00 to \$26.85 million would be required. The place of construction unknown. It was assumed that the rail car construction would occur outside the Pacific Northwest study region.

Construction of tidewater railroad track for car storage is projected to cost between \$1.99 and \$4.05 million. This construction is located near ocean ports. It was assumed that the rail car storage is located in Oregon. The IMPLAN new road construction sector for Oregon was used to model impacts of railroad construction. The road construction sector is also other heavy construction which includes railroad construction. The Oregon multipliers were 2.3809, 0.00002085, and 0.6072, for business sales, employment, and personal income, respectively. The range of effects of rail car storage construction in Oregon would be \$ 4.74 to \$9.64 million in business sales. The effect on employment would be 41 to 84 jobs. The effect on personal income would be \$1.21 to \$2.46 million. It is assumed that the rail car storage construction is completed within one year.

New mainline railroad track upgrades of \$14.00 to \$24.00 million would be required somewhere in the Lower Snake River Region. Short-line railroad upgrades are estimated at \$19.90 to \$23.80 million. Thus, total rail construction would be \$33.90 to \$47.80 million. The new road construction sector was used to model impacts of railroad construction. The IMPLAN road construction sector is also other heavy construction which includes railroad construction. Lower Snake River Region multipliers are 2.5584, 0.00002283, and 0.68325 for business sales, employment, and personal income. The range of effects of railroad track construction on business sales would be \$86.73 to \$122.29 million. The range of employment effects would be 723 to 1,020 jobs. The range of personal income effects would be \$23.16 to \$32.66 million. It is assumed that railroad track improvements would have to be completed rapidly (within a year) to meet the increased hopper car traffic.

### 1.5.3.2 Impacts of New Construction for Road Transport

Road construction costs of \$84.10 to \$100.70 million are one-time costs for intersection and road improvements in the Lower Snake River Region. These estimates are for Washington only. The IMPLAN new road construction sector for the Lower Snake River model again is used to estimate the impacts of road construction. The range of effects on business sales would be \$215.16 to \$257.63 million. The range of employment effects would be 1,794 to 2,149 jobs. The range of personal income effects would be \$57.46 to \$68.80 million. Road and intersection improvements would have to be completed rapidly (within a year) to accommodate the increased heavy truck traffic. Note: Road construction impacts outside Washington in central Idaho and NE Oregon are unknown.

### 1.5.3.3 Impacts of New Construction for Transport-Related Facilities

Country grain elevators are estimated to have \$14.00 to \$16.90 million in new construction and river elevators are estimated to have \$58.70 to \$335.40 million in new construction. Total elevator construction would be between \$72.70 million and \$352.30 million. The Lower Snake River Region new industrial buildings sector is used to model impacts of grain elevator construction. The multipliers are 2.7916, 0.000029297, and 0.9366 for business sales, employment, and personal income respectively. The range of effects on business sales would be \$202.95 to \$983.48 million. The range of effects on employment would be 1,991 to 9,646 jobs. The range of effects on personal income would be \$6.75 to \$329.96 million. (Note: the most likely impacts were set at 1.2 times the average impacts for transport related facilities by the DREW Transportation Study Team (1999).) Grain elevator improvements would have to be completed rapidly (within a year) to accommodate the increased use of rail and truck in place of barge transport.

### 1.5.3.4 Impacts of Breaching on Industries Using or Replacing Barge Transport

The effects of increased transport cost for Alternative A-3 (breaching) in the Upriver and Reservoir Subregions are complex. On the one hand, the trucking/warehousing sector could decline because grains and other products currently trucked to the ports in Lewiston/Clarkston

from locations in Idaho, Montana, and North Dakota are terminated. However, trucking to rail terminals and ports located near Tri-Cities might increase.

The effect on rail transport also is not clear cut. Rail transport is more labor-intensive than barge so that a shift of transport mode from barge to rail implies slightly increased transport employment in the Upriver and Reservoir Subregions. However, that simplistic outcome has an implicit assumption that demand for transport is unaffected by price which is unlikely to be valid.

When transport prices increase, because barge transport is not available, several reactions can occur. First, a “substitution effect” can cause a search for alternate carriers or alternate routes to minimize the impact of increased transport costs. Lacking alternate carriers, routes for some products, may shift away from the west coast and the Upriver Subregion. Second, the “output effect” of increased transport costs can cause producers to reduce their outputs because they become less competitive on national and world markets when their cost of production increases. A third effect is the “stages of production” effect. Export of raw materials is promoted by low cost transportation. Bulk materials are less likely to be shipped if cost per ton is increased. The decision is either to, (a) stop producing the bulk materials, or (b) increase the stages of production so that the materials shipped out have a higher value per ton. The latter option implies that more processed goods would be shipped out of the region and fewer bulk materials. Local value added (and employment) within the Upriver Subregion could rise. Total quantity shipped might fall and yet the total value shipped might rise if more processing of raw materials was conducted in the Upriver Subregion.

Given these possible long run adjustments to increased transport costs, it is unclear how much transport volume might fall over time if barging was eliminated. No studies exist to project the possible changes in shipping volume. Thus, it is impossible to model the direct, indirect, and induced effects in the industries using the transport sector or in the transport sector itself created by dam breaching. The price sensitivity of transport demand depends upon the impacts on and the unknown reactions by the sectors that utilize the transport services. The demand for transport depends upon the changes induced in the sectors utilizing transport, but these sectors have not been studied.

#### 1.5.3.5 Cruise Ship Effects of Alternative A-3 (Breaching)

Existing cruise ships cannot operate in the swift and shallow waters of a free-flowing Snake River. However, it is likely that some of the cruise ship employment and retail sales to passengers would shift to the Downriver Subregion if the Snake River was unavailable with breaching.

Direct non-payroll purchases by the cruise ship sector in the Upriver Subregion are estimated at \$2.64 million per year (DREW transportation Impact Study Team (1999)). Cruise ship companies purchase engine fuel, jet boat services, laundry services, water supplies, and docking. The largest purchases are for prepaid jet boat tours and fuel which account for about 46 and 45 percent of direct purchases. The multipliers for the mix of direct purchases made by cruise ship companies are 2.181 for business sales, 0.0000228 for employment, and 0.5240 for personal income. Similar multiplier calculations were carried out for the cruise ship payroll in the Upriver Subregion. Thus, the direct, indirect, and induced effects of Alternative A-3 (breaching) on the cruise ship sector in the Upriver Subregion include -\$7.96 million in annual business sales, -76 lost jobs, and -\$2.11 million lost personal income per year from direct purchases and payroll by cruise ship companies in the Upriver Subregion.<sup>2</sup>

About 21,315 passengers are estimated to travel to the Upriver Subregion by cruise ship (DREW Transportation Impact Study Team (1999)). The annual loss of retail sales to cruise ship passengers in the Upper Subregion might be about -\$1.21 million. (Assuming that the average spending per passenger in Lewiston is \$57, DREW Regional Impact Study Team (1999)). Lost retail sales then would reduce total business sales by -\$0.43 million, employment by -7 jobs and personal income by -\$0.14 million in the Upriver Subregion.

Total cruise ship impacts include the effects of lost sales to cruise ship companies, lost cruise ship payroll, and lost retail sales to passengers. Total direct, indirect, and induced losses in the Upriver Subregion are estimated at -\$8.39 million per year in business sales, -83 jobs and -\$2.25 million per year in personal income.

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<sup>2</sup> The total impact estimate also includes the effects of direct cruise ship employment and payroll in the Upriver Subregion based on confidential reports (DREW Regional Impact Study Team (1999)).

## **1.5.4 Water Supply Effects of Alternative A-3 (Breaching)**

### **1.5.4.1 Shut Down of Irrigation**

Irrigated agricultural output near Ice Harbor Dam would decline with breaching. The lost production is in the Reservoir Subregion but reduced farm spending would also occur in the Downriver Subregion. Therefore, the Lower Snake River Region multipliers were used. The maximum direct value of production lost is estimated at -\$75.87 million per year. This assumes that all 37,000 irrigated acres are shut down.

The maximum loss of annual business sales (direct, indirect, and induced) was estimated at -\$232.26 million with breaching (DREW Regional Impact Study team (1999)). The maximum direct, indirect, and induced employment loss from reduction in irrigated lands was estimated to be -2,256 jobs. The maximum loss of personal income was estimated at -\$79.19 million per year.

About 21 percent of the irrigated land might support the development of alternative water supplies to replace the lost irrigation water. If fruit orchards and vineyards production continued on 7,735 of the 37,000 acres, the direct value of production lost would be -\$38.37 million (DREW Regional Impact Study Team (1999)). In that case, (direct, indirect, and induced) annual business sales would fall by -\$119.43 million, jobs would decline by -901, and personal income would fall by -\$42.07 million per year with breaching.

### **1.5.4.2 Pump Station Modifications**

There are eight existing municipal and industrial pump stations along the lower Snake River, all located on the Lower Granite reservoir. Water withdrawn from these stations is used for municipal water system backup, golf course irrigation, industrial process water for paper production, concrete aggregate washing, and park irrigation. Under Alternative A-3 (breaching), the river elevation would fall to its natural level and these pumping stations would require modification to maintain current water supplies (DREW Water Supply Study Team (1999)).

Modification of municipal and industrial pump stations was estimated to cost between \$11.51 million and \$55.20 million (DREW Water Supply Study Team (1999)). The wide range

of costs reflects uncertainty about required modifications to the Potlatch Corporation system (DREW Water Supply Study Team (1999)). The direct, indirect, and induced economic effects for industrial pump station modification were estimated using the Upriver Subregion utility construction multiplier. These were assumed to be one-year impacts. A range of \$25.14 to \$120.56 million increase in total business sales would be created in the Upriver Subregion by construction to modify industrial pump stations and related facilities on Lower Granite Reservoir. Employment effects would range from an increase of 292 to 1,397 jobs in the Upriver Subregion. Total personal income effects would range from an increase of \$7.73 to \$37.10 million in the Upriver Subregion.

#### 1.5.4.3 Construction Expenditures to Modify Private Wells

Approximately 209 functioning wells are presently located within one mile of the lower Snake River. About 95 of these wells are expected to required modification if dam breaching were to occur (DREW Water Supply Study Team (1999)).

Construction spending in the Reservoir Subregion to modify private wells was estimated at \$56.45 million (DREW Water Supply Team (1999)). About 22 percent of the wells were in the Downriver Subregion (Franklin County) and the rest were in the Reservoir Subregion. The impact of construction expenditures to modify private wells was estimated using the maintenance-and-repair-not-elsewhere-classified sales multiplier. Well modification in the Reservoir Subregion would result in a \$107.76 million increase in business sales. Employment in the Reservoir Subregion would increase by 916 jobs. Personal income in the Reservoir Subregion would increase by \$29.52 million. These are assumed to be one-year impacts. Well modification in the Downriver Subregion would result in a \$30.40 million increase in business sales. Employment in the Downriver Subregion would increase by 259 jobs. Personal income in the Downriver Subregion would increase by \$8.33 million. These are assumed to be one-year impacts.

#### 1.5.5 Implementation Expenditure Effects

Implementation of the selected alternative would require modifications to the operation

and physical structure of the four lower Snake River dams, hydroelectric plants, and reservoirs. Implementation activities proposed under each alternative include new construction or destruction spending, and spending on mitigation.

The following three tables (Tables 7-9) summarize the implementation effects of breaching the four dams based on spreadsheets provided by the DREW Implementation Study Team (1999). Direct, indirect, and induced effects are shown for business sales, employment, and personal income by Alternative and over time.

**Table 7**  
**SHORT TERM ECONOMIC EFFECTS OF IMPLEMENTATION**  
**ON BUSINESS SALES (\$ Million per Year)<sup>1/</sup>**

Year	Alternative A-2a	Alternative a-2c	Alternative A-3 (Breaching)
2001	-1.89	-1.48	11.03
2002	-7.36	-4.39	-8.92
2003	-4.63 or -6.94	11.72 or 9.41	22.95 or 20.63
2004	1.64 or -5.15	33.05 or 26.26	111.28 or 104.48
2005	0	28.41	202.27
2006	0	14.96	198.54
2007	0	0	169.37
2008	0	0	47.02
2009	0	0	24.71

1/ Two sets of baseline data definitions were used for the years 2003 and 2004 by the DREW Implementation Study Team (1999).

**Table 8**  
**SHORT TERM ECONOMIC EFFECTS OF**  
**IMPLEMENTATION ON EMPLOYMENT (Jobs)<sup>1/</sup>**

Year	Alternative A-2a	Alternative a-2c	Alternative A-3 (Breaching)
2001	-28	-22	164
2002	-110	-67	-132
2003	69 or -103	176 or 140	343 or 308
2004	24 or -77	495 or 392	1,664 or 1,564
2005	0	426	3,025
2006	0	223	2,970
2007	0	0	2,532
2008	0	0	704
2009	0	0	369

1/ Two sets of baseline data definitions were used for the years 2003 and 2004 by the DREW Implementation Study Team (1999).

**Table 9**  
**SHORT TERM ECONOMIC EFFECTS OF IMPLEMENTATION**  
**ON PERSONAL INCOME (\$ Million per Year)<sup>1/</sup>**

Year	Alternative A-2a	Alternative a-2c	Alternative A-3 (Breaching)
2001	-0.76	-0.6	4.52
2002	-3.01	-1.8	-3.66
2003	-1.89 or -2.84	4.79 or 3.85	9.41 or 8.46
2004	0.67 or -2.11	13.51 or 10.74	45.62 or 42.84
2005	0	11.62	82.93
2006	0	6.12	81.4
2007	0	0	69.44
2008	0	0	19.28
2009	0	0	10.13

1/ Two sets of baseline data definitions were used for the years 2003 and 2004 by the DREW Implementation Study Team (1999).

### **1.5.6 Avoided Cost Expenditure Effects (Changes in Corps Operating Spending)**

The two A-2 alternatives result in relatively small modifications to Corps spending. Alternative A-3 (dam breaching) results in much reduced spending because of the shut down of electric generation operations, dam operations, and lock operations.

The following three tables (Tables 10-12) summarize the effects of the changes in operating costs for the two A-2 alternatives. The effects are shown for business sales, employment, and personal income by Alternative and over time. These effects would occur primarily in the Reservoir Subregion.

**Table 10**  
**ANNUAL ECONOMIC EFFECT OF AVOIDED COSTS**  
**ON BUSINESS SALES, 1998 (\$ Million per Year)**

Year	Alternative A-2a	Alternative A-2c
2001 to 2026	-4.09	2.18
2027 to 2100	0	1.26

**Table 11**  
**ANNUAL ECONOMIC EFFECT OF AVOIDED COSTS ON EMPLOYMENT (Jobs)**

Year	Alternative A-2a	Alternative A-2c
2001 to 2026	-83	44
2027 to 2100	0	25

**Table 12**  
**ECONOMIC EFFECT OF AVOIDED COSTS ON**  
**PERSONAL INCOME, 1998 (\$ Million per Year)**

Year	Alternative A-2a	Alternative A-2c
2001 to 2026	-2.36	1.26
2027 to 2100	0	0.73

Table 13 summarizes the effects of the reduced Corps operating costs for the A-3 (breaching) alternative. The effects are shown for business sales, employment, and personal income by Alternative and over time. These effects would primarily occur in the Lower Snake River Region.

**Table 13**  
**ANNUAL ECONOMIC EFFECTS OF AVOIDED COSTS ON BUSINESS SALES,**  
**JOBS AND PERSONAL INCOME FOR ALTERNATIVE A-3 (BREACHING)**

<b>Year</b>	<b>Change in Business Sales, 1998 (\$ Million per Year)</b>	<b>Change in Employment (Jobs)</b>	<b>Change in Personal Income, 1998 (\$ Million per Year)</b>
2001	-6.67	-135	-3.85
2002	-6.67	-135	-3.85
2003	-6.67	-135	-3.85
2004	-7.08	-143	-4.09
2005	-6.05	-122	-3.5
2006	-27.97	-565	-16.16
2007 to 2100	-59.04 to -81.72	-1,193 to -1,651	-34.11 to -47.22

## 1.6 Summary of Effects of Alternative A-3 (Breaching) by State and by Subregion

### 1.6.1 Effects of Alternative A-3 (Breaching) in the Pacific Northwest Outside the Subregions

Several impact categories occur either throughout the Pacific Northwest, throughout a State, or in an area of a State outside the Subregions.

Increased electric power bills would cause business sales, employment, and personal income to fall in the States of Washington, Oregon, Idaho, and Montana, as shown below in Table 14.

**Table 14**  
**ANNUAL IMPACTS OF INCREASED ELECTRIC POWER BILLS, BY STATE <sup>1/</sup>**

	Washington	Oregon	Idaho	Montana
<b>Business Sales</b> (\$ million per year)	-205.69	-128.70	-54.81	-10.37
<b>Employment (jobs)</b>	-1,136	-810	-366	-70
<b>Personal Income</b> (\$ million per year)	-119.82	-73.22	-32.83	-6.20

1/ This table excludes the impacts of plant shut down or business failures caused by increased electric bills.

Three combined cycle electric power plants would be built in the Puget Sound region of Washington. Construction of each of these plants would occur in different years and would create about \$332.40 million in business sales, 2,786 jobs, and \$104.80 million in personal income in the State of Washington over three one year periods.

Operation and maintenance of the three combined cycle power plants would add \$140.70 million in business sales, 876 jobs, and \$23.58 million in personal income to Puget Sound region of the Washington State economy. (This is in addition to the three new power plants located in the Downriver Subregion of Oregon and Washington.)

Construction of tidewater rail car storage in Oregon is projected to cost about \$3.02 million and create \$7.19 million in sales, 63 jobs, and \$1.84 million in personal income. These construction impacts would only last one year.

### **1.6.2 Effects by Subregion for Alternative A-3 (Breaching)**

Summary data are shown in Tables 15-20 for business sales, employment, and personal income. The tables show midpoints when only lower and upper bounds were available from DREW Study Teams. Averages are shown when the effects vary by year over a number of years. The average for the implementation category was calculated over a nine year period (a short run impact). The averages for recreation/tourism nonangler and recreation/tourism angler, and avoided costs were calculated over a 100 year period (long run impacts).

**Table 15**  
**ALTERNATIVE A-3, SHORT TERM IMPACTS**  
**ON BUSINESS SALES BY SUBREGION, 1998 (\$ Million per Year)<sup>2/</sup>**

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Power Plant Construction Spending	0.00	0.00	664.80 3/	664.80 3/
Electric Power - Transmission Line Construction Spending	0.00	0.00	248.20	248.20
Transport - Rail Construction Spending	1/	1/	1/	104.51
Transport - Road Construction Spending	1/	1/	1/	236.40
Transport - Facilities Construction Spending	1/	1/	1/	711.86
Transport - Tidewater Rail Car Storage Construction Spending	3/	3/	3/	3/
Water Supply - Well Modification Spending	0.00	107.76	30.40	138.16
Water Supply - Pump Modification Spending	72.85	0.00	0.00	72.85
Implementation - Dam Breaching Spending	17.29	34.59	34.59	86.47
Net Change				
Total Business Sales	7,964.66	6,744.85	19,717.96	34,427.47
Percent Net Change				

1/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

**Table 16**  
**ALTERNATIVE A-3, LONG TERM IMPACTS**  
**ON BUSINESS SALES BY SUBREGION, 1998 (\$ Million per Year)**<sup>1/2/</sup>

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Increased Electric Bills Cause Reduced Spending by Owners of Industrial and Commercial Business	3/	3/	3/	3/
Electric Power - Increased Electric Bills Cause Reduced Spending by Residential and Farm Households	3/	3/	3/	3/
Electric Power - Operation and Maintenance Spending on Replacement Power Plants	0.00	0.00	140.70	140.70
Electric Power - Operation and Maintenance Spending on New Transmission Lines	0.00	0.00	1.67	1.67
Recreation/Tourism - Increased Nonangler Spending	4/	4/	4/	73.64
Recreation/Tourism - Increased Angler Spending	24.90	8.07		
Transport - Reduced Cruise Ship Operations	-8.39	0.00	0.00	-8.39
Water Supply - Water to Irrigated Farms is Shut Down	0.00	-123.09	-52.76	-175.85
Avoided Costs - Reduced Corps Spending	-6.54	-52.34	-6.54	-65.42
Net Change				
Total Business Sales	7,964.66	6,744.85	19,717.96	34,427.47
Percentage Change				

1/ This table excludes the impacts of plant shut down or business failures caused by increased electric bills.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

4/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

**Table 17**  
**ALTERNATIVE A-3, SHORT TERM IMPACTS**  
**ON EMPLOYMENT BY SUBREGION (Jobs)<sup>2/</sup>**

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Power Plant Construction Spending	0	0	5,572 3/	5,572 3/
Electric Power - Transmission Line Construction Spending	0	0	2,080	2,080
Transport - Rail Construction Spending	1/	1/	1/	872
Transport - Road Construction Spending	1/	1/	1/	1,972
Transport - Facilities Construction Spending	1/	1/	1/	6,982
Transport - Tidewater Rail Car Storage Construction	3/	3/	3/	3/
Water Supply - Well Modification Spending	0	916	259	1,175
Water Supply - Pump Modification Spending	844	0	0	844
Implementation - Dam Breaching Spending	259	517	517	1,293
Net Change				
Total Employment	74,935	66,203	178,544	319,682
Percent Net Change				

1/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

**Table 18**  
**ALTERNATIVE A-3, LONG TERM IMPACTS**  
**ON EMPLOYMENT BY SUBREGION (Jobs) <sup>1/2/</sup>**

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Increased Electric Bills Cause Reduced Spending by Owners of Industrial and Commercial Business	3/	3/	3/	3/
Electric Power - Increased Electric Bills Cause Reduced Spending by Residential and Farm Households	3/	3/	3/	3/
Electric Power - Operation and Maintenance Spending on Replacement Power Plants	0	0	876	876
Electric Power - Operation and Maintenance Spending on New Transmission Lines	0	0	8	8
Recreation/Tourism - Increased Nonangler Spending	4/	4/	4/	934
Recreation/Tourism - Increased Angler Spending	374	85		
Transport - Reduced Cruise Ship Operations	-83	0	0	-83
Water Supply - Water to Irrigated Farms is Shut Down	0	-1,105	-474	-1,579
Avoided Costs - Reduced Corps Spending	-133	-1,060	-133	-1,326
Net Change				
Total Employment	74,935	66,203	178,544	319,682
Percentage Change				

1/ This table excludes the impacts of plant shut down or business failures caused by increased electric bills.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

4/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

**Table 19**  
**ALTERNATIVE A-3, SHORT TERM IMPACTS**  
**ON PERSONAL INCOME BY SUBREGION, 1998 (\$ Million per Year)<sup>2/</sup>**

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Power Plant Construction Spending	0.00	0.00	209.60 3/	209.60 3/
Electric Power - Transmission Line Construction Spending	0.00	0.00	78.30	78.30
Transport - Rail Construction Spending	1/	1/	1/	27.91
Transport - Road Construction Spending	1/	1/	1/	63.13
Transport - Facilities Construction Spending	1/	1/	1/	202.03
Transport - Tidewater Rail Car Storage Construction Spending	3/	3/	3/	3/
Water Supply - Well Modification Spending	0.00	29.52	8.33	37.85
Water Supply - Pump Modification Spending	22.40	0.00	0.00	22.40
Implementation - Dam Breaching Spending	7.09	14.18	14.18	35.45
Net Change				
Total Personal Income	2,108.38	2,218.18	5,992.24	10,318.80
Percent Net Change				

1/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

**Table 20**  
**ALTERNATIVE A-3, LONG TERM IMPACTS**  
**ON PERSONAL INCOME BY SUBREGION, 1998 (\$ Million per Year) <sup>1/2/</sup>**

Impact Category	Upriver Subregion	Reservoir Subregion	Downriver Subregion	Total, Lower Snake River Region
Electric Power - Increased Electric Bills Cause Reduced Spending by Owners of Industrial and Commercial Business	3/	3/	3/	3/
Electric Power - Increased Electric Bills Cause Reduced Spending by Residential and Farm Households	3/	3/	3/	3/
Electric Power - Operation and Maintenance Spending on Replacement Power Plants	0.00	0.00	23.58	23.58
Electric Power - Operation and Maintenance Spending on New Transmission Lines	0.00	0.00	0.35	0.35
Recreation/Tourism - Increased Nonangler Spending	4/	4/	4/	19.76
Recreation/Tourism - Increased Angler Spending	91.42	2.33		
Transport - Reduced Cruise Ship Operations	-2.25	0.00	0.00	-2.25
Water Supply - Water to Irrigated Farms is Shut Down	0.00	-41.05	-17.59	-58.64
Avoided Costs - Reduced Corps Spending	-3.79	-30.33	-3.79	-37.91
Net Change				
Total Personal Income	2,108.38	2,218.18	5,992.24	10,318.80
Percentage Change				

1/ This table excludes the impacts of plant shut down or business failures caused by increased electric bills.

2/ Economic changes created by the Alternatives can be “short run” or “long run.” Short run is used in this report to describe the effects of construction or other temporary spending that lasts for less than 10 years. In contrast, long run effects are permanent and continue for the 100 year period analyzed in this study.

3/ See Section 1.6.1 for State impact projections.

4/ These effects occur in the Lower Snake River Region but it is not known how they will be distributed among the subregions.

## **1.7 Unresolved Issues in the Estimates of Economic Change Created by the Alternatives**

The regional economic analysis depends upon information from the DREW Study Teams as the basis for estimating economic impacts. Thus, most of the unresolved issues listed by the other DREW Study Teams also limit the regional economic analysis. Space limitations prevent a review of those issues here.

Several types of missing data precluded doing an impact analysis or, at best, a hypothetical example was provided. For example, the effect of increased shipping costs because of breaching on industry output and employment for firms that use barges for shipping was not studied. Thus, changes in outputs and employment in the wood products, grain production, and other sectors are unknown. The extent to which irrigated agriculture will shut down under breaching is unknown. Also, the effect of reductions in irrigated agriculture under breaching on the food processing sector are unknown. Economic effects on Indian tribes under breaching are unknown. The required road investments outside Washington under breaching are unknown. The future increases in spending for road and railroad maintenance are unknown. The future distribution of electricity rate increases caused by breaching across regions, industries, or consumers is unknown. The possibility of business failures because of increased electric rates with breaching is unknown. The possibility of shut down of cruise ship operations on the Columbia River with breaching is unknown.

## **RISK AND UNCERTAINTY**

Risk and uncertainty are two different concepts. Risk is a known probability distribution of possible events while with uncertainty only the existence or definitions of possible events are known. The economic impact analysis is subject to both problems.

Risk is inherent in any economic modelling procedure because model calibration is based upon historical data analyzed through some statistical procedure (a mean or a ratio is a statistic having a probability distribution). The economic impact analysis technique used in this report is input-output using “synthesized” coefficients. The input-output technique is a simultaneous linear model of sales flows among industries (and government agencies). The calibration is based upon historical purchase patterns for each industry. Changes in sales to final demand drive the input-output model to create a new vector of sales, employment, and personal income (among other things) for each industry.

Several valid criticisms have been directed at synthesized input-output. First, the industry spending calibrations are based on national averages which may not apply to the specific region under study. However, an input-output model, unlike many other economic models, is constrained and consistent. The model is a double entry book keeping system of accounts so that total sales must equal total purchases in each sector and for the economy (including imports and exports from the study region). A 90-industry input-output model is equivalent to a sales maximizing linear program with 90 constraint equations that limit the outcomes. For this reason, no matter what the region or data source, most input-output models have sales multipliers (direct, indirect, and induced effects) that lie between 1.5 and 3.00. The experience of AEI (having had funded research to construct some 20 direct survey models) is that recent IMPLAN models, which use much more refined data than earlier models, are within plus or minus ten percent of the multipliers that would be found using survey data in place of national averages. Furthermore, IMPLAN contains known sources of error which have been adjusted for as discussed in Chapter Two of this report.

A second valid criticism of input-output is that it is a picture of the economy at a point in time rather than a dynamic structure of changing relationships. While this criticism is valid, there is no model (economic or otherwise) that can make accurate predictions of future change in

technology, prices, trade patterns, or consumer tastes and preferences. Thus, input-output is no more likely to suffer from this problem than any other model.

Uncertainty also is present in economic impact analyses because the model is “driven” by exogenous estimates of changes in sales to final demand (exports, investment, certain components of government spending). AEI was funded only to develop the input-output models and take data on changes in sales to final demand from the various Study Teams to create projections over 100 years. Most of the data on changes in final demand was received within a few days of the finalization of this report. Thus, AEI had no time or funding to consider on the accuracy of the changes in final demand used to drive the input-output model. Questions concerning the accuracy and risk and uncertainty of these outputs from Study Teams must be directed at the Study Teams who have the expertise to respond concerning their data. What is known is that any error in the data received from the Study Teams would be multiplied when the direct, indirect, and induced effects are calculated using input-output.

Certain types of error are obvious and are documented throughout the report. The data for fishing and other outdoor recreation projections were based on a now obsolete PATH analysis and a since improved salmon life-cycle analysis (among other problems). Thus, the comparisons of outcomes in the recreation section are no longer relevant.

Several types of missing data precluded doing any kind of impact analysis or, at best, a hypothetical example was provided. For example, the effect of increased shipping costs because of breaching on industry output and employment for firms that use barges for shipping was not studied. Thus, changes in outputs and employment in the wood products, grain producer, and other sectors are unknown. Also, the effect of reductions in irrigated agriculture under breaching on the food processing sector are unknown. Economic effects on Indian Tribes under breaching are unknown. The required road investments outside Washington under breaching are unknown. Increased spending for road maintenance is unknown. The future distribution of electricity rate increases caused by breaching across regions, industries, or consumers is unknown.

In summary, the input-output models will contain errors due to use of national averages, aggregation error, and other problems discussed in Chapter Two. However, the major errors are in the changes in final demand used to drive the input-output models. Time constraints forced

the concurrent analysis of engineering for dam breaching or other alternatives, biological analysis of salmon survival, and the resultant direct economic effects. This situation resulted in some unexpected outcomes for which quick answers were not available. Errors result from the omission of studies on the output effects of shipping cost increases (especially for grain producers and wood products), lack of relevant historical economic data to analyze (as in the Tribal impacts), or no known basis to forecast future events (such as the political decisions on who pays for the electricity cost increases caused by breaching).

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## **SECTION 1 STUDY PURPOSE AND METHODOLOGY**

## **1.1 DESCRIPTION OF THE STUDY**

The Report is divided in four Sections. Section 1 describes the study region, the economic impact analysis methods, the geographic coverage of the input-output models used to make estimates of the direct, indirect, and induced economic and employment effects, and the central economic issues to be discussed. Section 2 describes the economic input-output models used for the projections and explains the adjustments made to the synthesized input-output models to increase their accuracy for the tasks required of them, it includes a display of the estimated multipliers for the subregions and States. Section 3 depicts the historical economic and demographic trends in the states and counties primarily impacted by the alternatives. Section 4 shows the estimated direct, indirect, and induced economic effects of the alternatives.

### **1.1.1 Methodology**

The economic impact analysis is defined as the changes in direct, indirect, and induced spending, employment or other economic effects created by the several alternatives under consideration (which include breaching). The focus of the report is on regional economic development (RED). The economic impact analysis is defined to exclude changes in national income and national economic development (NED). The study does not discuss direct changes in costs of production, direct changes in net income, or direct changes in value added, unless these changes have been projected by a study team. The IMPLAN input-output transactions-among-sectors tables used for this analysis contain rows that show net income on an industry basis. However, these amounts are based on national averages and are not intended to depict the situation for any particular firm.

### **1.1.2 Data Sources**

The focus of this study is the construction and use of sufficient economic models to accurately measure the economic effects of the various alternatives (including breaching). The synthesized input-output technique has been selected as the most practical and viable method of analysis, given existing time and money constraints. The input-output models, as with any models, require the input of initial changes (in spending) created by a particular alternative before

the total economic consequences of that alternative can be projected. Various DREW study teams are the source for the initial changes that drive the input-output model. Thus, this report develops the required input-output models and takes the output from the various DREW study teams in order to create estimates of the economic consequences of the various alternatives. Sector impacts for which data are not provided cannot be analyzed to find the indirect and induced economic impacts.

## **1.2 INTRODUCTION**

### **1.2.1 Purpose of Study**

The purpose of the study is to estimate the regional economic impacts of the proposed alternatives. This study has developed economic multipliers, based on economic input-output relationships, for regions potentially affected by the breaching. The input-output multipliers were used to estimate economic changes caused by the alternatives, in personal income, sales, and employment. For Alternative A-3 (breaching), short term economic impacts involve new spending to breach the dams, and a loss of economic activity during the time required for dam breaching, environmental rehabilitation, and for recreation spending to redevelop.

Longer term changes would occur in the elimination of irrigation water supplies for agriculture, increased reliance on trucking and rail transport in industries such as grain production and wood processing, changes in recreational boating and cruise ship traffic, elimination of Corps spending for the operation of dams, reservoirs, power plants and locks, improved Tribal, recreational, and commercial salmon and steelhead fishing, construction of replacement power plants, and possible increases in electricity rates. Use of the multipliers to measure economic impacts require knowledge of the dollar amounts and timing of direct spending changes in each industry or consumer sector created by the various alternatives.

### **1.2.2 IMPLAN**

The input-output database selected was IMPLAN (Alward and Palmer 1981; Taylor, Winter, Alward, Siverts 1992) because it allows the user to see and adjust the underlying calibrations, to select input-output data by county or groups of counties, and it is affordable.

IMPLAN was originally developed at the USDA Forest Service Rocky Mountain Forest and Range Experiment Station in Fort Collins, Colorado. IMPLAN data for all counties in the states of Washington, Oregon, Idaho, and Montana were acquired for this study (MIG, Inc., Stillwater MN). At the starting date of this study, the most current IMPLAN input-output data industry sector spending totals were for the year 1994 but the spending distribution calibrations (which determine the size of the multipliers) were from the most recent national input-output model which was calibrated for 1987.

IMPLAN has over 500 industry sectors available at the national level. However, many sectors do not exist at the county level. The number of sectors was reduced in order to make the input-output analysis viable for presentation and to eliminate irrelevant detail. Industry sector aggregation was accomplished using the Micro IMPLAN program and then the data were transferred to another computer program, (IMS, Agricultural Enterprises, Inc. 1992), for editing and analysis. Industry sectors defined for the impact analysis are representative of the economies of the subregions and States affected by the alternatives. Industry sectors that would be directly or indirectly affected by the alternatives are of primary concern. Sector definitions are shown in Appendix I.

The IMPLAN spending calibrations and total outputs were modified for selected sectors, and the total leakage of profits from the local economy were reduced to account for local ownership. Local payroll and local jobs were analyzed to account for commuting. As discussed later, most of the commuting was within the study area and these jobs should not be excluded. Thus, rather than adjust the multipliers downward, forecasted changes were reallocated to the appropriate geographic areas.<sup>3</sup>

### **1.2.3 Information Requirements for the Economic Impact Analysis**

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<sup>3</sup> The methodology for correcting systemic errors in the IMPLAN input-output database is discussed in :“Adapting Synthesized Input-Output Models for Small Natural Resource-Based Regions: A Case Study” (McKean, et al. 1998). The adjustment methodology has previously been applied in the Pacific Northwest in analyses of endangered species protection impacts (McKean and Johnson 1994; McKean, Loomis, Brown, and Greber 1992; McKean and Walsh 1991) for the U.S. Fish and Wildlife Service.

Implementation of the multiplier analysis required three types of information. The first type was used to revise the IMPLAN industry spending calibration for certain sectors known to be inappropriate for the study region. Spending calibrations also were adjusted for flaws in the IMPLAN methodology (including understated profit retention within the local economy and thus understated local income). The second type of information was used to cross-check the baseline industry size, employment, and spending distribution for key sectors. The third type of information showed the changes in the amount and distribution of spending by sectors affected by the alternatives (the direct effects). Some of the most critical information, including the direct effects of the alternatives, resulted from research by the DREW study teams. Data provided by the study teams were essential to “drive” the input-output model economic impact projections.

#### 1.2.3.1 Revising Industry Spending Distributions

Spending distributions for certain industries in the IMPLAN database were modified to represent the local economies. In particular the local electricity generation sector was changed. The original IMPLAN power sector data were from the national input-output model and represented an input purchase mix for the entire U.S. Large purchases of coal, gas, and other fuels were shown. The power plant spending distribution for some Lower Snake River subregions was replaced with one that is virtually all hydroelectric. Other subregion and State input-output models required replacement of the electric generation sector spending profiles to represent the appropriate the fuel mix (*Electrical World*, annual). Information was obtained from a UDI/McGraw-Hill power plant datafile (UDI/McGraw-Hill 1993) that details power production expenses for 98 percent of the installed national utility-owned steam-electric capacity. The UDI database includes investor-owned, municipal, other public, and cooperative utilities. The fuel inputs to UDI covered power plants include coal, gas, oil, nuclear, geothermal, wood, and refuse. Spending distributions for hydroelectric power plants were obtained from the Corps.

The IMPLAN calibration for the water transport sector also required modification. Spending distributions were provided by the Corps for current operations of the Lower Snake River dam and reservoir system including spending for operation of the locks, dredging, port facilities, and other transportation services. Representative spending distributions were obtained

for tugboat operators. The Corps was the source for these data also.

The outdoor recreation sector was a special case. The national economic accounts do not define an industry sector for outdoor recreation, and none is included in IMPLAN. Spending distributions were constructed for fishing and for other water-based recreation from direct survey. Outdoor recreation activity (and sales by various types of retail establishments, lodging, other services, etc.) in the study region were found to be strongly dependent on the Lower Snake River. Existing spending amounts and patterns in the study region by outdoor recreationists using the Lower Snake River were estimated by mail survey (AEI, University of Idaho, and Normandeau Associates 1998a, 1998b, 1998c). The estimates for each river-based economic activity in the region made up the current or baseline economic conditions that would change after one of the alternatives, such as breaching, was implemented.

### **Local Retention of Business Profits**

Another modification of the IMPLAN database involved recalibrating the expenditure distributions for every industry to incorporate some local retention of business profits. The conventional IMPLAN data incorrectly allowed all profits to “leak” from the local economy as if all firms were totally owned by persons residing outside the study area. Local ownership ratios calculated from the Form ES-202 Unemployment Insurance Address Files show this assumption to be very inaccurate (see Appendix II - Appendix VII). The unwarranted profit leakage caused the unadjusted IMPLAN model to understate the multiplier effects of changes in business activity in the study area because domestic spending flows were understated. Data on local ownership and firm size, from the confidential Form ES-202 Unemployment Insurance Address Files for counties in the states Washington, Oregon, and Idaho, were used to make the profit flow adjustments for each industry sector. The Form ES-202 data files show monthly employment for three months, quarterly payroll, address with zip code, fips county code, and the detailed four digit standard industrial classification code (SIC code) for each firm that has workers covered by unemployment insurance.

### **The Effects of Commuting Patterns**

The IMPLAN economic input-output model estimates multipliers and forecasts employment and business activity under the (false) assumption that workers always reside in the region where they are employed. The validity of this assumption depends partly on the particular geographic definition of the study areas. Therefore, commuting patterns were examined for each subregion. Journey-to-work data (1990 *Census* on CDROM) were used to estimate commuting by sector.

The presence of significant amounts of commuting creates two possible errors in the input-output forecasts. First, the changes in employment predicted by the model occur partly outside of the study area. Thus, direct employment effects can be overstated. A second issue created by commuting to work from outside a study area concerns the size of the estimated spending (and employment) multipliers. Spending by workers is a very important part of the multiplier effect. If workers live well outside the study area they could also do some of their spending outside the area.

Journey-to-Work data revealed that most commuting was within the study region and should be counted as a local impact. Rather than reducing the size of the multipliers to account for commuting; the forecasted employment changes are reallocated from a particular subregion to adjoining subregions or nearby counties using Journey-to-Work data.

#### 1.2.3.2 Benchmark Baseline Data

The IMPLAN estimates of sales, payroll, and employment by industry were cross-checked against other data.<sup>4</sup> Important data sources to benchmark IMPLAN data included: State departments of employment and State departments of revenue, State agricultural statistics (Washington Agricultural Statistics Service, annual; Oregon Agricultural Statistics Service, annual; Idaho Agricultural Statistics Service, annual; Montana Agricultural Statistics Service, annual; and many Cooperative Extension or Experiment Station Bulletins from University of Idaho, Washington State University and Oregon State University), timber harvest, mill, and export statistics (Washington State Department of Natural Resources, U.S. Department of

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<sup>4</sup> The 1994 IMPLAN sales and employment data are shown in Appendix XV.

Agriculture, Forest Service, Debra D. Warren), the Yellow Pages on CDROM (American Business Information, Inc. 1997), and phone listings on CDROM by Pro CD, Inc.

#### 1.2.3.3 Estimate the Direct Effects of the Alternatives

The third type of information used for the impact analysis was the changes in dollar amounts of direct spending, classified by industry, created by each aspect of the alternatives. The timing of the direct spending changes also were estimated as closely as possible. Estimated direct spending change allowed using the input-output multipliers to measure the cumulative economic changes in the affected economies that would be created by the alternatives.

The DREW study teams are the primary source for estimates of the direct effects that are used to drive the input-output model. Thus, this report develops the required input-output models and takes the output from the various study teams in order to create estimates of the economic consequences of the alternatives.

#### **1.2.4 Basis for Geographical Definitions of the Input-Output Models**

Eight economic input-output models were constructed for the regional economic analysis. Input-output models were built for the States of Washington, Oregon, Idaho, and Montana. Three subregion models were built that would encompass the affected region above the Lower Snake River reservoirs, surrounding the reservoirs, and downstream from the reservoirs. The Lower Snake River model combines the three subregion models to form a model that includes all the counties surrounding the reservoirs.

Impacts of the alternatives can have a wide geographic effect. For example, recreational fishing could be improved as far upstream as the Hells Canyon dam and on all tributaries to the Snake River that enter the Snake River downstream from Hells Canyon dam. A recent study (1996) by the Idaho Fish and Wildlife Foundation stated, “Although there has been no general salmon fishing season in Idaho since the 1970's, during the seven years prior to the completion of Ice Harbor dam in 1962 the average chinook salmon catch in Idaho was 23,000 fish annually.” The Idaho Fish and Wildlife Foundation study referenced the Idaho Department of Fish and Game for the salmon catch statistic. Many streams in Idaho and Oregon, upriver from the four

reservoirs, might have improved fishing. Spending, particularly in the other retail, gas station/auto service, lodging, and restaurant sectors could be stimulated in these areas. The Idaho Fish and Wildlife Foundation study asserts, “Restoring chinook salmon to fishable populations in the Snake Drainage would allow boat anglers considerable fishing opportunity in the mainstem Snake, Clearwater, and Salmon Rivers, similar to the very popular salmon fishery in the Hanford reach of the Columbia River. ... With added boat angling opportunities, the overall salmon fishery effort could equal or exceed that of steelhead.”

Removal of the reservoirs will negatively affect waterborne commerce upstream from the reservoirs because river transportation including conventional barging<sup>5</sup>, cruise ships, and recreational travel in propeller driven boats, will be greatly reduced. Certain industry sectors that depend upon river transport, including barge shipping services, docking facilities, grain elevators, marinas and moorage, and port facilities along the river, will be reduced or eliminated.<sup>6</sup> Other industry sectors, more distant from the river, in eastern Washington and Oregon, parts of Idaho, and Montana may experience increased shipping costs for fuels, fertilizers, forest products, and fabricated metal products that are now transported upriver on barges. Increased costs of shipping exports downriver could impact wood and paper products manufacturers, grain producers, vegetable producers, and other exporters of low value per ton, high volume materials in eastern Washington, eastern Oregon, and parts of Idaho and Montana (See Tables 4-1 and 4-2 in Section Four). Reduced competition in the transportation sector also could result in higher railroad and trucking rates over the long run. Substitute transport sectors would benefit from increased demand if barging is eliminated above the towns of Richland, Kennewick, and Pasco. Sales and employment increases in rail and trucking are indicated for the economic impact analysis.

Information from the outdoor recreation spending surveys on the four reservoirs shows that counties adjoining the Lower Snake River benefit the most from spending by reservoir sportfishers and recreationists. Many recreationists spend where they live and spend near the

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<sup>5</sup> Shallow draft barges may be a possibility.

<sup>6</sup> Economic impact analysis can help identify sectors with possible stranded investment but does not attempt valuation of capital losses.

recreation site. In many cases both the residence and the recreation site is in a county that adjoins the reservoirs. Thus, all of the adjoining counties were included in the subregions.

A second consideration for defining the subregions was the possible changes in costs of grain transport. Telephone conversations with an agricultural extension economist at the University of Idaho supported an effective impact area that extends 50 to 100 miles north and south from the Lower Snake River. This suggested that including only counties adjacent to the river in the subregion input-output models would be sufficient to capture most local grain transport impacts. Examination of the Form ES-202 data (1991) for grain and field bean wholesale (grain elevators included) showed that the area on both sides of the Lower Snake River is blanketed with grain elevators served by railroads (see Appendix X). Grain elevators in Washington are located in many small towns located as close as 20 miles from the Lower Snake River. Grain elevators served by railroads also exist in the same towns where river-transport elevators exist. For example, water-transport elevators with railroad service are located at Clarkston/Lewiston and Kennewick/Pasco/Richland/Burbank. Nine ports are located on the four reservoirs. All nine ports have grain terminals (see Table C-3 in U.S. Army Corps of Engineers, North Pacific Division, 1995, Columbia River System Operation Review, Final Environmental Impact Statement, Appendix O, Economic and Social Impact). Local railroad shipping rates are said to match the river barge rates and therefore distance trucked (and quality of road) will generally determine whether barge or rail are used. Both positive and negative direct impacts of Alternative A-3 (breaching) would occur in Clarkston/Lewiston when the river-transport elevator(s) shut down.<sup>7</sup> The railroad-based elevators in Clarkston/Lewiston would see increased demand, which might offset the decline of water-based elevators. Positive economic impacts could occur at river-transport elevators in Kennewick/Richland/Pasco/Burbank because they would become the terminus of the river transport system. Because railroad-based elevators are located nearby water-transport elevators in Clarkston/ Lewiston and Kennewick/Richland/Pasco/Burbank, there should be little change in total trucking distances (and spending) by grain farmers. However, over the longer run, rail and truck shipping rates may

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<sup>7</sup> Elevators without railroad access might continue to be used for grain storage.

rise without the competition from water transport.

#### 1.2.4.1 The Upriver Subregion

The counties in Oregon, Washington, and Idaho for the impact subregion above the reservoirs include the town of Lewiston to show the current economic benefits of reservoir recreation and transport to their economies that would be lost. Conversely, the impact subregion below the reservoirs include the towns of Kennewick, Richland, and Pasco to show the benefit to their economies if they became the terminus for river transport. The Upriver Subregion includes counties in Idaho and Oregon that will benefit from spending by recreationists attracted by improved fishing on the Snake River between the reservoir reach and Hells Canyon Dam, and Snake River tributaries that join the Snake River above the reservoirs and downstream of Hells Canyon dam. (Revisions of Corps water storage management, due to the alternatives, might affect upstream reservoir operations and change farm irrigation and water-based recreation conditions on the upstream reservoirs. The changed upstream reservoir operations were analyzed by the Bureau of Reclamation.) The Upriver Subregion was not expanded sufficiently to capture the possible impacts of increased shipping costs to Montana or south Idaho. Including such a large, diverse economy in the subregion would nullify its purpose to measure unique local impacts in the most heavily affected area. For example, the structure of the greater Boise area economy would totally dominate a subregion input-output calibration. The state input-output models for Montana and Idaho were constructed to measure impacts far upriver from the reservoirs.

#### 1.2.4.2 The Reservoir Subregion

Counties to include in the impact study subregion surrounding the reservoirs include adjoining counties that would experience a loss of major reservoir recreation activity and increases in natural river recreation. The Reservoir Subregion would have major changes in the species of fish available and in the types of water-based recreation activity if the reservoirs become a free flowing river. Changes in the amounts and types of purchases by river recreationists as compared to the existing reservoir recreationists were determined from our user

surveys. Survey data were collected both on the reservoirs and upriver to contrast the amounts and types of recreation spending on the reservoirs and the free flowing Snake River.

Another economic effect is the spending to maintain irrigation water to the farms in the Reservoir Subregion, or the effect on farm output if water supplies are not maintained. Community water supplies must be maintained. The Reservoir Subregion extends north and south of the reservoirs in Washington far enough to include counties that could be significantly affected by increased shipping costs for imports and exports as well as by changed tourism/recreation spending. However, the subregions must be strictly limited in size or they will not provide the necessary local detail to measure impacts on those nearby counties that are most strongly affected. The state input-output models for Washington, Oregon, and Idaho are used to aggregate economic effects that could have wide geographic distribution but are much less severe.

#### 1.2.4.3 The Downriver Subregion

The downstream impact study subregion includes Kennewick, Richland, and Pasco to show the benefit to their economies if they became the terminus for river transport, as mentioned above. Downstream impacts could include increased outdoor recreation caused by improved fishing quality on the Columbia river and its tributaries below the Snake River reservoirs. Spending, particularly in tourism and outdoor recreation, would be stimulated. Benefits to Tribal economies from fishing downriver could benefit. The DREW Tribal Circumstances Study Team was the source for information on economic effects of the alternatives on the Tribes. Coastal and ocean economic impacts were the responsibility of another task order and were not included in this study.<sup>8</sup>

The downstream study subregion excludes huge metropolitan areas in Oregon or Washington (such as the Portland/Vancouver area) because the spending model would then be totally dominated by large firms in the metropolitan counties and would not provide any useful information on the impacts to small communities and businesses along the river. Some of the

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<sup>8</sup> Anadromous Fish Economic Analysis, Lower Snake River Juvenile Migration Feasibility Study, by Hans Radtke, Shannon Davis, and Rebecca Johnson.

river-based firms (tow boats, barging etc.) that could be affected by Alternative A-3 (breaching) are located in Portland (identified from the Form ES-202 data files).<sup>9</sup> The firms located downriver were included in the coastal and ocean impacts that were analyzed in a separate study. AEI worked closely with the coast and ocean impact research group to ensure full coverage without double counting impacts.

The economies of all three of the Snake River subregions (defined in the following section) can be affected by the multi-year Corps activity and contractor activity in the A-3 (breaching) alternative, associated environmental actions, and park and recreation facility modification. All three subregions would be affected by a large reduction in the Corps and other agency operations, government contracting, and purchases for operation of dams, power plants, locks, and fish and wildlife rehabilitation. Avoided costs make up some of the most important negative economic effects of Alternative A-3 (breaching). Impacts in all the subregions and nearby States could occur from increases in power production costs when the dams are replaced with gas-fired generating plants. However, the geographical extent of any rate increases (decreases) and the types of electric customers affected has not been determined at the time of this report.

### **1.2.5 Counties in the Three Subregions**

Note that a regional input-output model consisting of the sum of the three subregions was also constructed. Thus, the counties listed below for the three subregions make up the Lower Snake River Region area definition.

The region upriver from the Lower Snake River reservoirs was defined to include counties that would benefit from improved sportfishing for anadromous fish. The Upriver Subregion could also experience increased shipping costs for grain, peas and lentils, logs, wood, concrete and petroleum that have been transported by river (see the technical reports by the

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<sup>9</sup> The following SIC industries were searched for Oregon and Washington: finfish, fish hatcheries, water freight transport nec, ferries, water transport of passengers nec, marine cargo handling, towing and tugboat services, marinas, and water transportation services not elsewhere classified.

DREW Transportation Impact Study Team).

All counties in the Upriver Subregion are in the States of Idaho and Oregon. The Idaho counties in the Upriver Subregion include: Clearwater, Custer, Idaho, Latah, Lemhi, Lewis, Nez Perce, and Valley. The Upriver Subregion also includes Wallowa County in Oregon. The loss of the reservoir and port in Lewiston would affect both business and recreation. Some firms in this subregion have trucked produce to and from the reservoirs to use barges and other water transport that could be removed by Alternative A-3 (breaching). Shipping costs for grain, peas and lentils, logs, wood, concrete and petroleum that have been transported by river could increase in the region. The Upriver Subregion includes, and is larger than, the area of Idaho that was studied in the recent report (1996) by the Idaho Fish and Wildlife Foundation.<sup>10</sup> This area of Idaho had important sportfishing activity for salmon prior to the construction of the four dams and reservoirs that are the subject of the breaching analysis (as reported by Idaho Department of Fish and Game). Lewiston, Idaho is the first upstream community in this subregion.

The Reservoir Subregion was defined to include counties in the State of Washington that are adjacent to the Lower Snake River reservoirs but upstream from the new terminus of river transport. Thus, Richland/Kennewick/Pasco (i.e., Benton and Franklin Counties) were excluded from this subregion. Clarkston, Washington is the community at the upriver bound of the Reservoir Subregion. This subregion would experience the loss of ports and water transport as it currently exists. Shipping costs for products such as grain, peas and lentils, logs, containers, wood, concrete, and fertilizer could increase. The Reservoir Subregion would have reduced opportunities for reservoir fishing and reservoir-based outdoor recreation. The subregion would gain increased opportunities for salmon and steelhead fishing and for river-based outdoor recreation. The Washington counties included in this subregion are: Walla Walla, Columbia, Garfield and Asotin Counties that are south of the reservoirs and Adams and Whitman Counties north of the reservoirs. No counties in Idaho or Oregon are

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<sup>10</sup> The study included two regions of central Idaho, one for the upper Salmon River in Custer and Lemhi counties, and the other for the area from Lewiston south to Riggins and south east as far as Elk City.

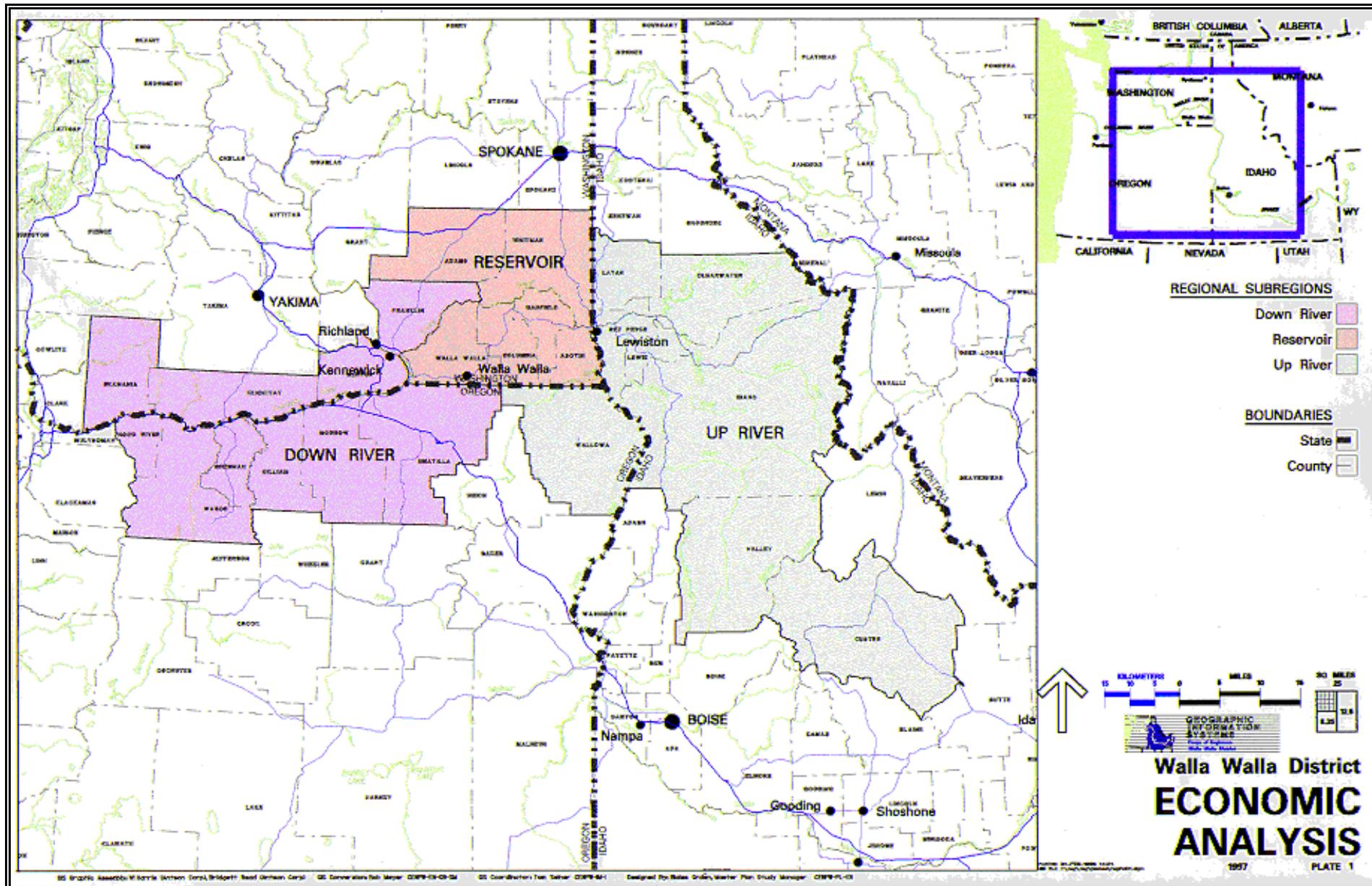


Figure 1-1 THE THREE SUBREGIONS

included in the Reservoir Subregion.

The Downriver Subregion includes the terminus of river transport, Kennewick/Richland/Pasco, i.e., Franklin and Benton Counties in Washington, as well as Klickitat and Skamania Counties in Washington. Counties in the State of Oregon include Umatilla, Morrow, Gilliam, Sherman, Wasco, and Hood River. Extending the subregion further downriver is avoided because it would include the Portland, Oregon/Vancouver, Washington urban area that would completely dominate the calibration of the input-output multipliers. The purpose of the subregion is to estimate impacts in smaller communities that would not be accurately represented by the Portland area economic structure. As discussed above, the coastal area impact analysis is the subject of another research project. The Downriver Subregion might experience some increased river transport activity at its upper terminus but total activity could decline as upriver industries shift to railroad shipping. Sportfishing, and Tribal fishing activity in the Downriver Region are expected to increase as a result of Alternative A-3 (breaching).

### **1.3 THE ECONOMIC INPUT-OUTPUT METHODOLOGY**

The economy of any region is driven partly by the new monies received from exporting goods or services from the region (another important factor is increased or decreased productivity which must be provided externally to the model). Exports, and other sales to final demand, such as state and federal government payments, create jobs in the region.

The eight input-output models built for this study can be used to allocate the current part and full-time jobs in the study regions in 1994<sup>11</sup> according to the types of exports which created them. Without sales to final demand (primarily exports from the region and government spending) these jobs would cease to exist. The question is, what would happen to employment in a region if exports or government purchases of a given product were eliminated? Exports of natural resource-based products, such as grain and wood, the attraction of anglers and other recreationists from outside the region, or government spending to operate the reservoir, dams, locks, hydroelectric power plants, and recreation sites are all examples of sales to final demand

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<sup>11</sup> The year 1994 is the latest date for which input-output data were available.

that create employment in the study regions. The input-output model is used to estimate the direct, indirect, and induced change in jobs when some or all of the sales to final demand created by the reservoirs are modified or eliminated. Direct jobs are defined as employment required within a given industry to create a given level of output, indirect jobs are the employment created in local industries that supply the required inputs to that given industry or to suppliers to the industry, and induced jobs are jobs created to supply inputs to the labor used directly or indirectly by the given industry.

For example, in the three combined subregions surrounding the reservoirs, the sawmill sector has 3,675 direct employees (estimated in IMPLAN 1994) but the sawmill sector creates 12,509 part and full-time jobs directly and indirectly through its exports. The jobs created by sawmill exports in logging, trucking, and all the other sectors that provide inputs to sawmills or to their suppliers and workers is the difference between total jobs and direct jobs or  $12,509 - 3,675 = 8,834$  indirect and induced jobs.

Other examples of employment created by major exporters in the Lower Snake River Region are shown below. Total employment in the region is 322,212 part and full-time jobs<sup>12</sup>. Exports by the unprocessed food grains sector create 13,094 jobs directly and indirectly. Exports of unprocessed feed grains create an additional 5,971 jobs directly and indirectly. Exports by the unprocessed vegetable sector create 7,251 jobs directly and indirectly. Exports by canning and freezing (part of food processing) account for some 21,804 jobs directly and indirectly. Exports by paper mills create 9,506 jobs directly and indirectly. Exports by meat products create 5,145 jobs directly and indirectly. Exports by primary aluminum create 3,275 jobs directly and indirectly. Exports by wholesale trade create 6,040 jobs directly and indirectly. Exports by finance, insurance, and real estate create 2,217 jobs directly and indirectly. Note that jobs in any given sector exist partly because of demands by other sectors which themselves exist because of exports. If all exports and other sales to final demand (including pensions, profits, interest income, retirement income, and income transfers) fell to zero, employment would cease to exist in the region .

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<sup>12</sup> The sum of the employment in the three subregion models is 319,709.

Listing the sectors in order of total jobs created from exports indicates which sectors are classified as "basic" and which are "service". For example, sectors like personal services, agricultural services, and health services provide local services which are essential for the functioning of the economy. Agricultural services, for example, is not a "basic" sector because it has very small sales to exports. Clearly, the presence of agricultural services is important for the exports of the livestock and crop sectors. Furthermore, some economic activities provide intrinsic values, such as life style, culture, or an environment which benefits all who live in a region. The value of health facilities and educational opportunities, and the availability of a wide range of other services for example, far outweighs their employment contribution.

### **1.3.1 Economic Multipliers**

The term "multiplier effect" is often used by economists and has various meanings. In this report it refers to multipliers that increase economic effects of various activities within the region. Each dollar exported (sold to markets outside the region) by any sector stimulates additional economic activity in the form of output, jobs, and income. The additional activity or multiplier effect is substantial and needs to be included in every economic analysis. The study of the Lower Snake River economy indicated that certain sectors had a higher multiplier or a larger effect on the economy than others for every dollar of exports.

The employment multipliers were relatively large for sectors such as protection services, agricultural services, other livestock, other retail trade, and other government. These sectors tend to be more labor intensive than other sectors, or they spend a larger share of their revenues on local products and services. However, none of these sectors is a major exporter.

### **1.3.2 Measuring Economic Impacts for the Alternatives**

The economic impact of the alternatives on the industry sectors and labor in the study regions and states were estimated using the corresponding input-output models. Each Task Group scenario shows the economic impacts of a reduction or increase in sales to final demand in sectors affected by a particular aspect of the alternatives. The economic impact scenarios are shown in Section 4 of this report.

## 1.4 OVERVIEW OF INPUT-OUTPUT

Input-Output comprises both a well defined system of economic accounts and a tool of general equilibrium analysis for economic forecasting. Input-output data are useful both as a consistent descriptor of an economy and all its component parts, and as a tool of economic analysis. (The I-O model is said to be consistent because it tracks both sales and purchases among all sectors of the economy in a manner similar to double entry bookkeeping).

The transactions-among-sectors table depicts the economic structure and interdependencies among industries and agencies of a local economy. The table shows who the major customers are for each industry and what the major input needs are for each industry. Two other tables are distributions derived from the transactions-among-sectors table. The direct input requirement coefficients represent the technology and trade patterns for each industry. These are the direct or initial input requirements for an industry to expand production. The sales distribution coefficients show the same transactions data in terms of percentages of total output sold to the industries in the economy. Thus, the major sources of demand to each industry can be discerned.

The focus of input-output analysis is the cumulative interdependent nature of expansion or contraction of an economy. The total requirements coefficients table shows the direct, indirect and induced, i.e., total input requirements from each industry when a given industry expands.

The total requirements coefficients table also implies that without positive gross sales to final demand, i.e., positive industry exports, investment or government spending, the exchange economy would not exist. This component of I-O analysis examines the backward linkages among sectors, i.e., the increased input requirements when exogenous final demand increases. Forward linked effects could also be studied, where creation of a new supply of inputs allows dependent industries to be created or to expand. Supply driven analysis with the I-O framework depends critically on the assumptions made concerning the strength of the forward links.<sup>13</sup>

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<sup>13</sup> For example, the provision of new water supplies in Wyoming did not stimulate very much business activity but in Arizona and Colorado provision of added water supplies did stimulate the economy. Such applications require added information beyond that contained in

Business multipliers are calculated by adding column elements of the total requirements table to show the total spending created in the local economy when a given industry expands sales to final demand. In a similar fashion, summing the column elements of resource requirements multiplier matrices shows the total resource demands that are created when any given industry expands. Resources analyzed in this fashion may include both physical and monetary variables - workers, personal income, water use, imports, savings, or any input which rises proportionately with industry production. For example, an imports requirements multiplier may show that when a particular industry expands sales to exports, the stimulus to the economy may result in total imports rising almost as much as the initial increase of exports. Expanding this industry would not improve the balance of trade. Bottlenecks to expansion for any industry can be identified from the total requirements table or the total resource requirements tables by checking across the rows for each industry to see if large direct, indirect, and induced requirements exist for critical industry inputs, such as energy, water, skilled labor, or other scarce resources.

Constrained optimization of a particular economic goal, such as maximum trade surplus to create growth of wealth, maximum growth of regional product, payroll, or employment, is possible by combining I-O models and linear programming. The linear program can include both physical resource and monetary technical constraints which affect the optimal mix of high growth industries.

Input-output is most often used to create economic forecasts and impact analyses when growth is caused by changes of industry exports and/or investment and government spending. The I-O forecast generates a new transactions-among-sectors table for the economy showing the interindustry spending that is required to support the new sales to final demand. A different formulation of the same I-O data can also be used to calculate the inflationary impacts on each local processing sector caused by changes in prices on primary inputs. For example, changes in import prices (such as energy), create direct and indirect cost effects throughout the economy.

New technology or entire new industries can be simulated with the I-O model through the

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the I-O model.

use of "phantom sectors." If the new sector sells its output entirely to final demand one can build in a new column in the transactions-among-sectors table showing the purchases distribution with total purchases set to a nominal amount (say \$1,000) with matching sales to final demand. To see the effect of the new industry on other sectors and on the total economy, simply expand the exogenous final demand sales for the phantom sector.

The emergency preparedness planning for a nation or region is facilitated through the use of I-O tables which show the critical inputs directly and indirectly needed to maintain essential services for a society and for an economy. The effects of a catastrophe can be mitigated if plans based partly on I-O total requirements coefficients are in place. These examples of I-O applications show that the I-O technique is adaptable to a wide range of economic issues and questions.

### 1.5 THE ALGEBRA OF INPUT-OUTPUT

Designate the variables in a condensed 2 industry model as follows: I-O Transactions

**Table 1-1**  
**TRANSACTIONS-AMONG-SECTORS**

Z	Z12	F1	X1
Z21	Z22	F2	X2
P1	P2		
X1	X2		

The first 2 columns show spending and saving by the 2 local industries, and the first 2 rows show sales by the 2 local industries; thus, the table is similar to double entry bookkeeping.

The Z's are transactions by business within the local economy. The Z's are simultaneously dependent variables since change in output by one industry requires local purchases creating changes in output by the other local industries. This creates feedback effects

on the first industry's sales. This is because the  $Z_{ij}$  flows are both demanded and supplied by local business.

The  $P$ 's are final payments, which are leakages of spending from the local economy to saving, taxes, or imports (imports are sales made by industries outside the local economy). The  $P$ 's are not simultaneous since they are purchased by local business but not produced by local business.

The  $X$ 's are total spending plus saving (column sums) or total sales (row sums) for each local industry. Column sums equal row sums since the column for an industry lists all the ways an industry can use its money and the row lists all the ways it can receive money (i.e., sales to other local industry or to government and exports).

The  $F$ 's are independent variables which are assumed to drive the economy (just as in the Keynesian national income model and in the economic base model). The  $F$ 's include industry sales to federal government, investment, and exports.  $F$  stands for sales to final demand. Note that the Keynesian national income model includes only the household sector and final demands and excludes the local business sector shown by the  $Z$ 's. Thus, the I-O model describes and predicts spending and sales by business which the Keynesian model ignores.

In order to make a forecast with the input-output model (or a Keynesian model or an economic base model) one must first project changes in final demands (called "basic" sales in the economic base model) and then resolve the model using the new level of final demands. The input-output model projects the entire transactions-among-sectors table while the other models simply project total national or regional product.

The coefficients for calibrating the input-output model are estimated simply by converting all entries in the transactions-among-sectors table into fractions of the column sums. Thus, each column of the direct input coefficient table is a spending distribution for the industry listed at the column head. These coefficients are average propensities to spend for each industry.

The direct input coefficients are shown below for the local business portion of the table.

a11 a12 <----- Direct Input Requirement Coefficients

a21 a22

The calculation of the  $a$ 's is as follows:

$$a_{11} = Z_{11}/X_1 \quad a_{12} = Z_{12}/X_2 \quad a_{21} = Z_{21}/X_1 \quad a_{22} = Z_{22}/X_2$$

The average propensities allow for a solution to the input-output model. Note that there are 4 simultaneous variables (the  $Z_{ij}$ 's) in the example model. One can write only 2 equations for the model as shown below.

$$Z_{11} + Z_{12} + F_1 = X_1$$

$$Z_{21} + Z_{22} + F_2 = X_2$$

These balance equations say that total sales by local industry consist of sales to itself, to the other local industry, and to final demands. With 2 equations and 4 simultaneous unknowns the model cannot be solved. However, if the  $a_{ij}$ 's are taken as constants that are fixed over the time period of the forecast, then the model can be solved. Substitution of the  $a_{ij}$ 's reduces the model to only 2 unknowns ( $X_1$  and  $X_2$ ) and 2 equations.

For example the first equation would be

$$a_{11} X_1 + a_{12} X_2 + F_1 = X_1$$

and the second equation would be

$$a_{21} X_1 + a_{22} X_2 + F_2 = X_2.$$

These 2 equations can be solved for  $X_1$  and  $X_2$  as a function of  $F_1$  and  $F_2$ . The projection of the input-output transactions-among-sectors table involves replacing the  $F$ 's with new values which are expected to exist in the future and solving for the  $X$ 's. The cells in the new transactions-among-sectors table are created by using the  $a_{ij}$ 's times the new  $X$ 's (column sums). Typically there are 30 to 250 local industries in a model thus the number of simultaneous variables can run from  $(30)^2$  to  $(250)^2$ . A microcomputer is often used to solve for "multipliers" and to make I-O forecasts.

## **SECTION 2 CONSTRUCTION OF ECONOMIC MODELS**

## 2.1 RECALIBRATION OF THE IMPLAN INPUT-OUTPUT MODEL

### 2.1.1 Introduction

Synthesized input-output (I-O) models are often used where funding and/or time prohibit a survey based I-O. Several synthesized I-O data bases are available: RIMS multipliers (Bureau of Economic Analysis), IMPLAN data base (IMPLAN Group, Inc.) with accompanying microcomputer program (Alward and Palmer 1981; Taylor, Winter, Alward, and Siverts 1992) and data bases from private companies. Noting versatility, auxiliary information and the program interface, the IMPLAN database was selected over other synthesized I-O data bases. Specifically, IMPLAN is amenable to adjustment and recalibration for a specific region and IMPLAN microcomputer program allows county data selection and modification. Although IMPLAN is more adaptable and complete than alternative synthesized I-O programs, data are not always sufficiently accurate for certain applications.

The goal was to create conventional type II multiplier analyses of the study region utilizing synthesized I-O transactions-among-sectors data. Type II multipliers are more appropriate than Type III for recreation and resource-based regional analysis. Type III multipliers simulate the induced effect (household spending) by projecting household formation based on the direct and indirect job impacts. The number of new households is multiplied by average household income to determine the amount of income to recirculate as induced effects. The resulting type III multipliers are biased upward for tourism, farming, forestry, and other sectors that have below average income and many part time jobs. (See, *National Economic Impacts of CE Recreation Visitor Spending: An Update for 1996*, by Daniel J. Stynes, Wen-Huei Chang, and Dennis B. Propst, Internet 1/16/98.)

Type II multipliers close the model with respect to households who are assumed to have constant and homogeneous of degree one income elasticities of demand (expenditures on each input rise by the same percentage as income). The 1994 IMPLAN does not calculate type II multipliers and the household sector is lacking final payments and final demands.<sup>14</sup> Personal income was used as household total receipts and the balancing residual, after subtracting

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<sup>14</sup> The new windows version of IMPLAN does calculate type II multipliers.

intermediate processing sales or purchases, was put into final demand and final payments respectively.

Synthesized models trade off survey-based I-O accuracy for much less expense and timely response. Without adjustment, synthesized models may be more appropriate for large urban areas over applications to small rural areas. Natural resource extraction, energy sectors, and agriculture, present unique data problems requiring extra attention. Neglect of profit retention by locally owned firms tends to understate spending and employment multipliers created by synthesized input-output models. Conversely, the assumption that payments to labor are all paid to resident workers can cause an overstatement of both the multiplier effects and predicted employment changes. Failure to account for imports of labor services can cause both multipliers and employment forecasts to be overstated.

### **2.1.2 Synthesized I-O Data Problems**

Applications of IMPLAN to agricultural and resource impact studies reveal some major weaknesses common to synthesized I-O models: (1) non-survey production data, (2) misallocation of proprietor and property income, (3) erroneous agricultural output, and (4) erroneous regional purchase coefficients. These problems and practical solutions are discussed below.

#### **2.1.2.1 Non-Survey Production Data Problem**

Any synthesized I-O data base introduces errors in using national I-O accounts to represent a particular region. Direct use of the spending distributions of the U.S. input-output model overstate domestic purchases because competitive imports are not shown as a leakage. Thus, multipliers created with unadjusted U.S. calibration would be too high. This problem can be partially overcome by increasing the disaggregation of sectors so that industry composition effects are reduced. Attempts to increase the level of disaggregation lead to the use of very inaccurate county data, such as the *Census* report, *County Business Patterns* (CBP). CBP is based upon a small survey conducted each year over a very short period of time so that both sampling and seasonality errors can be huge. In addition to the calibration error discussed above,

county-level I-O suffers from data gaps. Federal and State survey data are subject to disclosure laws, including the *Census of Agriculture*, *Census CBP*, Form ES-202 state reports of covered employment and payroll, and Bureau of Economic Analysis REIS data. Disclosure laws at the federal and state level prevent publishing of survey data where numbers could be traced back to individual firms. Disclosure suppression creates major gaps in all non-survey data for county level data, especially in rural counties.

An example of the aggregation problem in the lower Snake River study region is the electricity generation sector. The U.S. input-output tables, and thus IMPLAN, include only a single sector for electric power generation. Aggregation error in the electric generation sector is extreme. Hydroelectric, coal fired, gas fired, oil fired, solar, geothermal, and other power plants are included in one sector. Thus, any power generation sector spending pattern created by IMPLAN contains purchases from many fuel sources in the proportions appropriate for the entire U.S. Local industry expenditure and sales data must be substituted into the synthesized input-output data base to correct such errors.

#### 2.1.2.2 Misallocation of Proprietor and Property Income

A critical part of the calibration of an I-O model separates local spending from leakages out of the local economy. IMPLAN separates value added into; (1) employee compensation, (2) proprietor income, (3) other property income, and (4) indirect business taxes. Only employee compensation is retained in the local economy. Exclusion of proprietor income and other property type income from local income significantly understates endogenous spending. Misallocation of income results in understated Type II multiplier effects for sectors where local ownership of enterprises is large. Synthesized models cannot rely on the national I-O calibration to separate local proprietor income from payments to nonresident stockholders or to absentee owners, because leakages are much larger at the county level than the national level. It is common to assume that a variable is exogenous if the required calibration to make it endogenous is unknown. Thus, synthesized I-O data are likely to understate multipliers because of a lack of specific information on profit leakages.

The Lower Snake River input-output models were adjusted to reduce the misallocation of

local incomes. Part of proprietor and other property income were shifted back into the processing quadrant using the confidential Quarterly Unemployment Insurance Address File computer tape, (data collected by the state on Form ES-202). Appendices II-VIII show the percentage of local ownership by sector, based on zip codes, used to allocate payroll as paid by local versus out-of-county firm for the seven input-output models that have this adjustment.<sup>15</sup> Because most sectors in the study region are composed of firms that are locally owned, the unwarranted profit leakages implied by the IMPLAN data are large.

### 2.1.2.3 Erroneous Regional Purchase Coefficient Adjustments

The IMPLAN I-O model for a county is constructed by finding output (sales dollars) for each sector. Sales estimates are based primarily on reported payroll data (BEA) by county and ratios of national sales to payroll by sector. Calibration of the spending flows is based first on the national spending relationships, but these relationships generally lead to imbalances at the county level. If any given local industry fails to produce enough to satisfy local needs, the calibration is changed to allow imports to rise as required to satisfy local demand. If excess local production exists for an industry, the calibration is adjusted so that sectors exports are increased. This is the "supply-demand-pool" methodology. The "regional purchase coefficient" adjustment is meant to allow for exports of goods that are imported. This condition may disappear after the supply-demand-pool adjustments are made and the adjustment is an attempt to reconstruct some "cross hauling" into the model. Unfortunately, the IMPLAN adjustment can result in very peculiar results in some regions. In any event; it is extremely unlikely that the IMPLAN adjustment for cross hauling, based upon regression analysis of limited urban data, can be appropriate for small rural counties in the U.S. The IMPLAN program allows easy modification of the adjustments if alternative calibrations are available (Taylor and Fletcher 1993). The IMPLAN regional purchase coefficient adjustment was eliminated in this analysis. Theoretically, the expected effect is small increase in the size of the estimated multipliers. Practically, some unexplainable variations in multipliers across regions are removed.

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<sup>15</sup> Data were not available to adjust the State of Montana input-output model.

#### 2.1.2.4 The Effect of Commuting

The IMPLAN economic input-output model estimates multipliers, employment, and business activity under the assumption that workers will reside in the area where they are employed. In many cases this assumption is approximately true. However, for this study a significant part of the work force lives outside the impact subregions.

The presence of commuting creates two possible errors in the input-output forecasts. First, the changes in employment predicted by the model occur partly outside of the study regions. In some cases, Journey-to-Work data show which industries are likely to have commuters. For example, the information shown in Table 2-1 can be used to find the percentage of jobs for each industry in Nez Perce County that depend upon commuters from Asotin County. In some counties however, the Journey-to-Work data do not show commuters by industry. Projected total employment changes for a study region could be reduced by the percent that the Journey-to-Work data show are likely to commute into the area.

A second issue created by commuting to work from outside a study region concerns the size of the estimated spending multipliers. Spending by workers is a very important part of the multiplier effect (Type II multipliers include households as endogenous). If workers live outside the study region they could also do most of their spending outside the region. The multipliers can be adjusted downward to account for commuting by reallocating part of industry wage payments from local households to imports. Where detailed Journey-to-Work (1990 *Census*) data are available, the local payroll for each industry can be adjusted downward by the fraction that is “leaked” to non-local workers. Payments to nonresident workers are properly shown as an import by each industry that employs commuters.

The journey-to-work data for the three subregions shown in Appendix IX have been adjusted to exclude commuting to counties within a given subregion. Commuting between subregions is not excluded from the Journey-to-Work data shown in Appendix IX.

The data in Appendix IX reveal that much of the commuting into a given subregion is from adjacent counties such as between Benton County and Yakima County along the Yakima River corridor. This means that part of the employment and spending impacts projected by the

IMPLAN-based subregion multipliers would occur in neighboring counties. In some instances, the neighboring counties are in the adjoining subregion, as evidenced by

**Table 2-1**  
**COMMUTING FROM ASOTIN COUNTY TO**  
**NEZ PERCE COUNTY, BY SECTOR, 1990**

Industry	Commuters
Self-Employed	166
Farm	9
Agriculture	26
Construction	85
Manufacturing	943
Transport/Communication/Public Utility	128
Wholesale & Retail Trade	875
Finance/Insurance/Real Estate	161
Services	625
Federal Government	24
State & Local Government	243
<b>TOTAL</b>	<b>3,285</b>

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work - File* on CDROM, August 1997 (based on 1990 *Census*).

commuting between Kennewick, Richland, Pasco in the Downriver Subregion and Walla Walla in the Reservoir Subregion; between Lewiston in the Upriver Subregion and Clarkston in the Reservoir Subregion; and between Moscow in the Upriver Subregion and Pullman in the Reservoir Subregion. Construction commuting in the subregions can be from more distant counties, such as from the Seattle (King County) area.

### **Commuting in The Upriver Subregion**

Disclosure restrictions on the Journey-to-Work data for central Idaho resulted in very limited information for most counties. Thus, analysis of commuting by industry was not attempted for the Upriver Subregion. Journey-to-Work data (1990 *Census*) show that about 9.6 percent of the work force in central Idaho and northeast Oregon lived outside the region in 1990. Table 2-1 shows commuting in 1990 from Asotin County, Washington to Nez Perce County, for major industry groups. Table 2-2 shows commuting for each county in the Upriver Subregion. About 69 percent of commuting to central Idaho was into Nez Perce County, mainly (93 percent) from Asotin County, Washington. Many workers in the Lewiston, Idaho area live in Clarkston, Washington.

No data exist to describe where commuters spend their incomes. Commuters who live in a major city, such as Spokane, are likely to make major purchases where they live. However, in the case of Nez Perce County, many of the commuters (3,285 out of 5,129) live in Asotin County, Washington and work close by in Nez Perce County, Idaho. The commuters are likely to shop in Lewiston where they work, and which is very close to where they live, rather than in Clarkston, where they live. The relative size of the trade sectors in

**Table 2-2**  
**COMMUTING BY COUNTY IN THE**  
**SNAKE RIVER UPRIVER SUBREGION**

County/State	Commuters Into the Subregion	Total Jobs	Percent Commuters Into the Subregion
Clearwater, Idaho	0	3,387	0.00%
Custer, Idaho	52	2,092	2.50%
Idaho, Idaho	80	5,563	1.40%
Latah, Idaho	804	13,302	6.00%
Lemhi, Idaho	35	2,970	1.20%
Lewis, Idaho	24	1,383	1.70%
Nez Perce, Idaho	3,532	18,691	18.90%
Valley, Idaho	546	2,977	18.30%
Wallowa, Oregon	56	3,270	1.70%
TOTAL	5,129	53,635	9.60%

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work File* on CDROM, Aug. 1997 (based on 1990 *Census*); State of Oregon, Employment Department; Idaho Department of Labor.

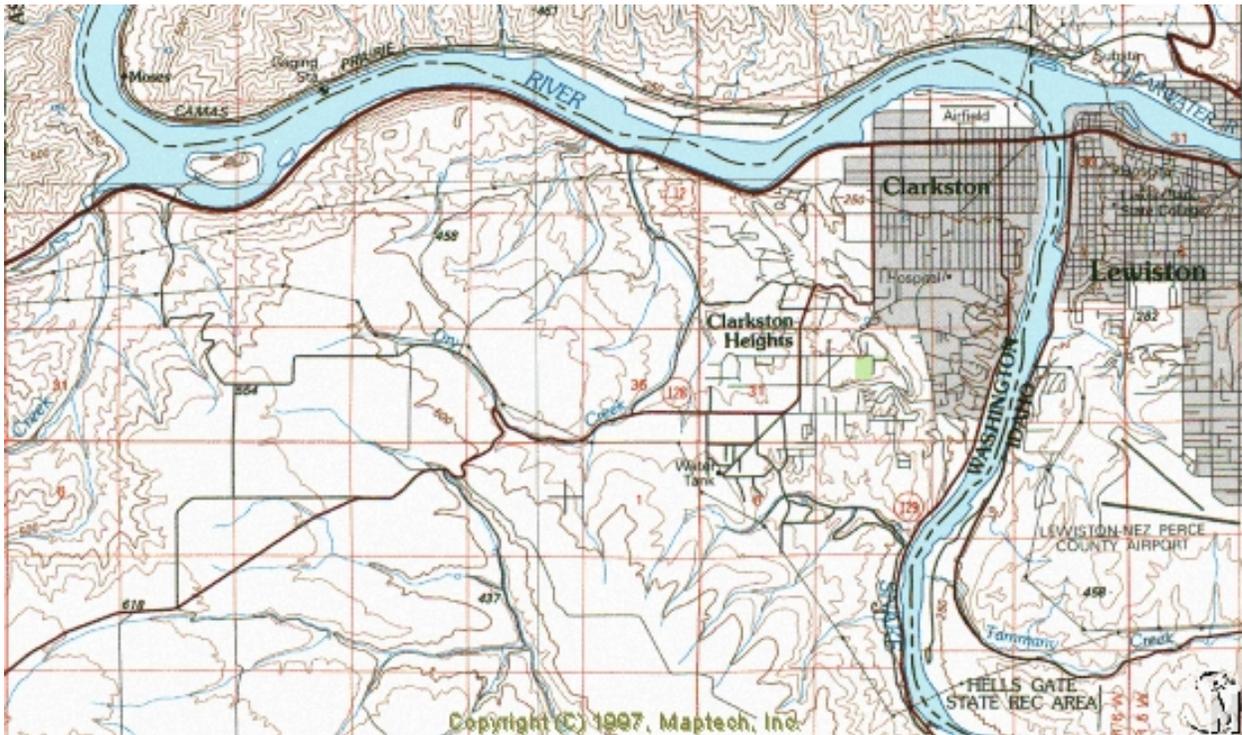
the two counties provides further insight to the shopping patterns of these commuters.

Information on retail trade for counties is available from *USA Counties 1996*, U.S. Department of Commerce, Economics and Statistics Administration, Bureau of the Census (CDROM). In 1992, Nez Perce County had 286 retail establishments with payroll and another 184 retail establishments without hired employees. In contrast, Asotin County had only 89 retail establishments with payroll and 85 establishments without payroll. Annual payroll in retail trade was \$42,455,000 in Nez Perce County in 1992 compared to only \$10,874,000 in Asotin County. The contrast is greater for certain types of trade. For example, in 1992, Asotin County had seven auto dealers with payroll while Nez Perce had 21 dealers with payroll. Nez Perce County had 18 gasoline service stations with payroll while Asotin County had only four. In 1987, food store sales in Nez Perce County were four times as large as in Asotin County. (Data could not be published for food stores in Asotin County for 1992 because too few stores existed to avoid

violating confidentiality laws).

In summary, Lewiston is the major trade center for both Nez Perce and Asotin Counties. Spending in Nez Perce County, Idaho by commuters who live in Clarkston would be only slightly diminished compared to workers who reside in Lewiston. The effect on the input-output multipliers is not be nearly as large as might appear from the 9.56 percent commuter share of the Upriver Subregion work force.

Furthermore, spending that is made in Asotin County by commuters is likely to stimulate Nez Perce County businesses that supply inputs to Asotin County firms. For example, in 1992, Nez Perce County had 88 wholesale establishments while Asotin County had only 16. Interdependence among firms in the two towns further reinforces the multiplier effects on Nez Perce County. Overstatement of the central Idaho and northeast Oregon economic multipliers because of commuting is likely to be very small. At most, the adjustment for commuting would imply a three percent payroll reduction. About 32 percent of commuters to central Idaho (making up 2.8 percent of the Upriver Subregion work force) are from places other than Asotin County and a only small part of the spending by workers commuting from Asotin County is made outside Nez Perce County. Thus, some  $2/3$  of the commuter spending remains in the Upriver Subregion. Central Idaho (Lewiston) has the dominant central business district for the Upriver Subregion.



**Figure 2-1 LEWISTON IDAHO AND CLARKSTON WASHINGTON**

An adjustment to local payroll in the Upriver Subregion input-output model was not made. The small spillover created by commuting is mainly in Clarkston which is in the Reservoir Subregion. These spillover impacts within the study area should not be ignored. Therefore, when calculating economic impacts one could allocate 3 percent of the estimated spending and employment impacts in the Upriver Subregion to the Reservoir Subregion.

**Table 2-3  
COMMUTING BY COUNTY IN THE  
RESERVOIR SUBREGION**

County/State	Commuters Into the Subregion	Total Jobs	Percent Commuters Into the Subregion
Adams, Washington	836	6,910	12.1%
Asotin, Washington	989	8,900	11.1%
Columbia, Washington	65	1,300	5.0%
Garfield, Washington	28	1,030	2.7%
Walla Walla, Washington	3,433	22,080	15.6%
Whitman, Washington	2,091	17,150	12.2%
TOTAL	7,442	57,370	13.0%

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work File* on CDROM, Aug. 1997 (based on 1990 *Census*); State of Oregon, Employment Department; Idaho Department of Labor.

### **Commuting in The Reservoir Subregion**

Journey-to-Work data show that nearly 13 percent of the work force in the Reservoir Subregion lived outside the region in 1990. Thus, projections of employment by the input-output model may include about 13 percent commuters. Table 2-3 shows commuting in 1990 for each county in the Reservoir Subregion. About 89 percent of the commuting is from either the Upriver Subregion or the Downriver Subregion. Most of the remaining commuting is from the adjoining Yakima River Valley region. These commuter spillovers

**Table 2-4**  
**ESTIMATED COMMUTING SHARES INTO THE RESERVOIR**  
**SUBREGION, BY SECTOR, 1990**

Industry	Commuter Share Within Sector
Farm	10.0%
Agricultural Services	4.1%
Construction	12.1%
Manufacturing	29.7%
Transport/Communication/Public Utility	14.1%
Wholesale & Retail Trade	9.4%
Finance/Insurance/Real Estate	2.2%
Services	9.7%
All Government	9.0%

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work File* on CDROM, Aug. 1997 (based on 1990 *Census*).

are important regional impacts and should not be ignored. Journey-to-Work data by sector are available for about 90 percent of the reported commuting. Thus, payments to workers in the other subregions and adjoining counties can be estimated by sector. Table 2-4 shows the estimated commuter share of employment in each major sector in the Reservoir Subregion. These percentages are applied to distribute estimated economic impacts for the Reservoir Subregion to adjoining subregions.

**Table 2-5**  
**ESTIMATED COMMUTING SHARES INTO THE DOWNRIVER**  
**SUBREGION, BY SECTOR, 1990**

Industry	Commuter Share Within Sector
Farm	5.6%
Agricultural Services	0.9%
Construction	4.3%
Manufacturing	7.5%
Transport/Communication/Public Utility	9.7%
Wholesale & Retail Trade	2.3%
Finance/Insurance/Real Estate	0.3%
Services	2.2%
All Government	4.7%

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work File* on CDROM, Aug. 1997 (based on 1990 *Census*).

### **Commuting in The Downriver Subregion**

Table 2-5 shows the estimated commuter share of employment in each major sector in the Downriver Subregion. These relatively small percentages are applied to distribute estimated economic impacts for the Downriver Subregion to areas outside the Downriver Subregion.

Journey-to-Work data show that only about 4.9 percent of the work force in the Downriver Subregion lived outside the region in 1990. Table 2-6 shows commuting in 1990 for each county in the Downriver Subregion. Projections of employment change by the input-output model may include about 4.9 percent commuters. Journey-to-Work data by sector are

**Table 2-6**  
**COMMUTING BY COUNTY IN THE**  
**SNAKE RIVER DOWNRIVER SUBREGION**

County/State	Commuters Into the Subregion	Total Jobs	Percent Commuters Into the Subregion
Benton, Washington	3,100	57,000	5.44%
Franklin, Washington	1,333	17,200	7.75%
Gilliam, Oregon	33	870	3.79%
Hood River, Oregon	410	8,460	4.85%
Klickitat, Washington	135	6,960	1.94%
Morrow, Oregon	26	3,540	0.73%
Sherman, Oregon	12	860	1.40%
Skamania, Washington	265	3,520	7.53%
Umatilla, Oregon	1,141	27,300	4.18%
Wasco, Oregon	213	10,200	2.09%
TOTAL	6,668	135,910	4.91%

SOURCE: Bureau of Economic Analysis, REIS, U.S. Dept. of Commerce, *Journey-to-Work File* on CDROM, Aug. 1997 (based on 1990 *Census*); State of Oregon, Employment Department; Idaho Department of Labor.

available for about 75 percent of the reported commuting. Thus, payments to workers outside the Downriver Subregion can be estimated by sector. Major sources of commuting into the Downriver Subregion include the Reservoir Subregion and the adjoining Yakima County area. Benton County received over 46 percent of the commuters in the Downriver Subregion. Most of the Benton County commuters came from the Yakima River valley area which adjoins Benton County on the west. Small amounts of commuting into the Downriver Subregion also occur from adjoining Oregon counties and counties throughout the Pacific Northwest.

## **2.2 ESTIMATED MULTIPLIERS FOR SUBREGIONS AND STATES**

Each sector or industry creates a unique multiplier effect on the economy when it has a change in sales to final demand. Sales multipliers show the direct, indirect, and induced changes

in total sales for each dollar of change in sales to final demand (exports, government or investment). Employment multipliers show the direct, indirect, and induced changes in jobs for a one dollar change in sales to final demand (exports, government or investment).<sup>16</sup> Personal income multipliers show the direct, indirect, and induced changes in total personal income for each dollar of change in sales to final demand (exports, government or investment). Tables 2-7 - 2-30 show the multipliers that were used to estimate the impacts of the alternatives discussed in Chapter Four.

### 2.2.1 Multiplier Definitions<sup>17</sup>

**THE SALES MULTIPLIER:** This multiplier is the direct, indirect, and induced changes in sales throughout the economy for a change of one dollar of sales to final demand by a sector. Sales to final demand include sales to any sector that is not a part of the interdependent sectors in the economy under study. Sales to final demand include exports, new investment, and purchases by most federal government agencies that are exogenous in the models. The multipliers only pertain to backward linked effects.

Suppose, for example that the aluminum manufacturing sector increases its export sales (sales of goods that leave the Lower Snake River Subregion). The multiplier effect accounts for all the sectors (including households) that supply inputs to aluminum manufacturing (direct effects) and sectors (including households) that provided inputs to the sectors that provided the direct inputs to aluminum manufacturers (the indirect effects). The multiplier is Type II, i.e.,

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<sup>16</sup> NOTE: The multipliers on the trade sectors are very large. For example, the personal income multiplier on some of the trade sectors approaches one. Changes in sales to final demand must be margined prior to application of any multiplier. The Implan input-output models, as are most input-output models, are calibrated to expect trade margins not total trade sales. A trade margin of 15 percent (.15) must be applied to the change in all retail sales to final demand or the impacts will be greatly overstated.

<sup>17</sup> Input-output multipliers can be defined in various ways. The multipliers used in this report are always based on the effect throughout the economy or on a particular part of the economy (personal income of households ) of a change in sales to final demand.

households endogenous, which means that workers are treated just like any other industry and are assumed to expand, as needed, to supply inputs directly or indirectly to sectors that increase sales to final demand. For example, if exports of aluminum increase by \$1 Million and the sales multiplier is 2.7, then total sales among all sectors (including the personal income of households) will increase by \$2.7 million dollars.

**THE EMPLOYMENT MULTIPLIER:** This multiplier is defined exactly as the sales multiplier is defined above except that it is calibrated in jobs instead of dollars. It is assumed that each industry has a unique direct employment requirement that is proportional to that industry's sales. These "direct employment coefficients" are used to convert dollars of sales into jobs in each industry. Jobs is a small number compared to sales dollars so employment multipliers are small fractions. For example, if the employment multiplier for wood products manufacturing is 0.00002, then a \$1 million increase in sales to final demand by the wood products manufacturing sector will cause employment throughout the economy to rise by  $(\$1,000,000)(0.00002) = 20$  added jobs.

**THE PERSONAL INCOME MULTIPLIER:** This multiplier is defined exactly as the sales multiplier defined above except that it is calibrated in dollars of payments to households instead of dollars of all types of sales. It is assumed that each industry has a unique direct household payment requirement that is proportional to that industry's sales. These "direct household spending coefficients" are used to convert dollars of sales into dollars of personal income paid to households in each industry. For example, if the personal income multiplier for construction of utilities is 0.49, then a \$1 million increase in sales to final demand (new investment) by the construction of utilities sector will cause personal income throughout the economy to rise by  $(\$1,000,000)(0.49) = \$490,000$  of added personal income.

**Table 2-7**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**DOWNRIVER SUBREGION 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 33)	2.2488	ELECTRIC ( 44)	2.1582
CATTLE ( 55)	2.0834	ELECTRONIC ( 85)	1.7713
MEAT ANIMA ( 67)	1.9632	VEHICLES ( 73)	1.9295
LVSTK NEC ( 29)	2.2619	AIRCRAFT ( 15)	2.3818
FOOD GRAIN ( 10)	2.5007	BOATS ( 39)	2.2068
FEED GRAIN ( 8)	2.5467	INSTRUMENT ( 72)	1.9306
HAY/PASTUR ( 6)	2.6359	RAILROADS ( 30)	2.2613
OTHER CROP ( 2)	2.8832	TRANS NEC ( 32)	2.2512
FRUIT/NUTS ( 5)	2.7349	TRUCK WH ( 18)	2.3604
VEGETABLES ( 3)	2.8824	WATER TRAN ( 83)	1.7921
OIL CROPS ( 12)	2.4394	AIR TRAN ( 80)	1.8600
FORESTRY ( 48)	2.1220	PIPELINES ( 89)	1.6382
NURSERY LA ( 36)	2.2289	TELEPHONE ( 74)	1.9281
FISHING ( 7)	2.5775	RADIO TV ( 62)	2.0228
AG SERVICE ( 17)	2.3705	ELECT UTIL ( 86)	1.7434
METAL MINE ( 25)	2.3119	GAS UTIL ( 91)	1.4314
MINES NEC ( 40)	2.1878	WATER/SANI ( 34)	2.2426
COAL MINES ( 92)	1.4038	WHOLESALE ( 47)	2.1396
SAND & GRV ( 26)	2.3067	BLD MATERI ( 20)	2.3546
NEW RESI ( 28)	2.2692	DEPT STORE ( 31)	2.2547
NEW INDUST ( 19)	2.3601	GROCERIES ( 35)	2.2295
NEW UTILI ( 37)	2.2159	AUTO DLRS ( 23)	2.3372
NEW ROADS ( 56)	2.0543	APPAREL ( 41)	2.1864
NEW FARM ( 76)	1.9024	FURNITURE ( 24)	2.3142
NEW EXTRAC ( 13)	2.4116	RESTAURANT ( 42)	2.1721
NEW GOVT ( 70)	1.9518	RETAIL NEC ( 45)	2.1562
RESI MAINT ( 38)	2.2078	F-I-R-E ( 65)	1.9693
MAINT NEC ( 59)	2.0315	LODGING ( 50)	2.1094
MEAT PROC ( 82)	1.7997	PERS SERV ( 46)	2.1452
DAIRY PROD ( 90)	1.5292	BUS SERV ( 49)	2.1215
CAN/FREEZE ( 57)	2.0439	DATA PROC ( 51)	2.1067
FOODS NEC ( 75)	1.9101	DETECTIVE ( 11)	2.4808
GRAIN PROD ( 84)	1.7910	AUTO SERV ( 61)	2.0297
TEXTILES ( 71)	1.9467	REPAIR SER ( 53)	2.1020
LOGGING ( 88)	1.7278	AMUSEMENTS ( 54)	2.0961
SAWMILLS ( 16)	2.3766	HEALTH SER ( 27)	2.2822
WOOD PROD ( 52)	2.1057	PROF SERV ( 43)	2.1664
MFG NEC ( 58)	2.0359	EDUCATION ( 22)	2.3462
PAPER PROD ( 87)	1.7390	SOC SERV ( 14)	2.3910
PRINT/PUBL ( 64)	2.0058	ASSOCIATNS ( 9)	2.5016
CHEMICALS ( 77)	1.8945	S & L GOVT ( 21)	2.3525
RUBBER PRO ( 63)	2.0128	GOV ELECTR ( 78)	1.8911
CLAY PRODS ( 79)	1.8857	POSTAL SER ( 4)	2.7788
PRI METALS ( 81)	1.8168	GOVT NEC ( 1)	2.9547
ALUMINUM ( 66)	1.9666	HOUSEHOLDS ( 69)	1.9547
FAB METLAS ( 68)	1.9560		
MACHINERY ( 60)	2.0298		

**Table 2-8**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**DOWNRIVER SUBREGION 1994**

NAME (RANK) MULTIPLIER	MACHINERY ( 59) .16176422E-04
DAIRY/POUL ( 64) .A-04	ELECTRIC ( 61) .15477564E-04
CATTLE ( 47) .19001756E-04	ELECTRONIC ( 75) .11737274E-04
MEAT ANIMA ( 6) .52508291E-04	VEHICLES ( 68) .14234582E-04
LVSTK NEC ( 4) .57348687E-04	AIRCRAFT ( 62) .15324082E-04
FOOD GRAIN ( 24) .32715667E-04	BOATS ( 52) .17760201E-04
FEED GRAIN ( 36) .22595890E-04	INSTRUMENT ( 70) .13558250E-04
HAY/PASTUR ( 5) .54254186E-04	RAILROADS ( 57) .16285117E-04
OTHER CROP ( 21) .35057808E-04	TRANS NEC ( 20) .36526679E-04
FRUIT/NUTS ( 16) .38244427E-04	TRUCK WH ( 34) .23667673E-04
VEGETABLES ( 42) .20961528E-04	WATER TRAN ( 78) .10799202E-04
OIL CROPS ( 23) .33505919E-04	AIR TRAN ( 56) .16486778E-04
FORESTRY ( 32) .24956737E-04	PIPELINES ( 88) .72883213E-05
NURSERY LA ( 18) .37605296E-04	TELEPHONE ( 79) .10570704E-04
FISHING ( 41) .21163522E-04	RADIO TV ( 50) .18097071E-04
AG SERVICE ( 2) .63589308E-04	ELECT UTIL ( 86) .80113659E-05
METAL MINE ( 63) .15038514E-04	GAS UTIL ( 92) .46401815E-05
MINES NEC ( 53) .17485519E-04	WATER/SANI ( 71) .13440523E-04
COAL MINES ( 91) .55468790E-05	WHOLESALE ( 45) .20246807E-04
SAND & GRV ( 49) .18923747E-04	BLD MATERI ( 25) .32062115E-04
NEW RESI ( 37) .22593897E-04	DEPT STORE ( 14) .38627026E-04
NEW INDUST ( 35) .23531687E-04	GROCERIES ( 13) .39317762E-04
NEW UTILI ( 46) .19866698E-04	AUTO DLRS ( 29) .26336209E-04
NEW ROADS ( 55) .16772745E-04	APPAREL ( 11) .39994233E-04
NEW FARM ( 76) .11273591E-04	FURNITURE ( 22) .34207576E-04
NEW EXTRAC ( 27) .27043810E-04	RESTAURANT ( 17) .37780879E-04
NEW GOVT ( 84) .97044367E-05	RETAIL NEC ( 3) .57934194E-04
RESI MAINT ( 39) .21669166E-04	F-I-R-E ( 73) .12045855E-04
MAINT NEC ( 54) .17262382E-04	LODGING ( 26) .31521617E-04
MEAT PROC ( 87) .77662053E-05	PERS SERV ( 8) .43357588E-04
DAIRY PROD ( 89) .72461389E-05	BUS SERV ( 12) .39435501E-04
CAN/FREEZE ( 65) .14801367E-04	DATA PROC ( 44) .20335592E-04
FOODS NEC ( 74) .12012978E-04	DETECTIVE ( 1) .67946632E-04
GRAIN PROD ( 90) .59180315E-05	AUTO SERV ( 38) .22403390E-04
TEXTILES ( 43) .20954130E-04	REPAIR SER ( 33) .24375689E-04
LOGGING ( 83) .98371002E-05	AMUSEMENTS ( 10) .40136358E-04
SAWMILLS ( 67) .14471577E-04	HEALTH SER ( 28) .26728627E-04
WOOD PROD ( 69) .14004623E-04	PROF SERV ( 40) .21326978E-04
MFG NEC ( 51) .17867123E-04	EDUCATION ( 15) .38411570E-04
PAPER PROD ( 72) .12468920E-04	SOC SERV ( 9) .41413001E-04
PRINT/PUBL ( 31) .25307945E-04	ASSOCIATNS ( 19) .37511669E-04
CHEMICALS ( 80) .10049068E-04	S & L GOVT ( 58) .16202215E-04
RUBBER PRO ( 48) .18938677E-04	GOV ELECTR ( 81) .99151021E-05
CLAY PRODS ( 60) .15603022E-04	POSTAL SER ( 30) .25481324E-04
PRI METALS ( 82) .98779101E-05	GOVT NEC ( 7) .44310840E-04
ALUMINUM ( 85) .96608337E-05	HOUSEHOLDS ( 77) .11174538E-04
FAB METLAS ( 66) .14549843E-04	

**Table 2-9**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**DOWNRIVER SUBREGION 1994**

NAME (RANK) MULTIPLIER	MULTIPLIER
DAIRY/POUL ( 26)	.70514220E+00
CATTLE ( 50)	.55598563E+00
MEAT ANIMA ( 61)	.47579175E+00
LVSTK NEC ( 22)	.73450071E+00
FOOD GRAIN ( 11)	.82112420E+00
FEED GRAIN ( 8)	.90988177E+00
HAY/PASTUR ( 4)	.97677720E+00
OTHER CROP ( 2)	.11898111E+01
FRUIT/NUTS ( 7)	.94287395E+00
VEGETABLES ( 3)	.11694971E+01
OIL CROPS ( 18)	.74938142E+00
FORESTRY ( 69)	.42552164E+00
NURSERY LA ( 33)	.65084887E+00
FISHING ( 5)	.96325189E+00
AG SERVICE ( 16)	.78410369E+00
METAL MINE ( 29)	.68350035E+00
MINES NEC ( 37)	.61761200E+00
COAL MINES ( 92)	.13083446E+00
SAND & GRV ( 19)	.74724150E+00
NEW RESI ( 31)	.66291416E+00
NEW INDUST ( 12)	.81002712E+00
NEW UTILI ( 27)	.69893497E+00
NEW ROADS ( 52)	.55132926E+00
NEW FARM ( 74)	.39786562E+00
NEW EXTRAC ( 9)	.89443105E+00
NEW GOVT ( 81)	.34566617E+00
RESI MAINT ( 36)	.61893708E+00
MAINT NEC ( 51)	.55405229E+00
MEAT PROC ( 88)	.25802588E+00
DAIRY PROD ( 91)	.20683394E+00
CAN/FREEZE ( 67)	.43794978E+00
FOODS NEC ( 66)	.44493860E+00
GRAIN PROD ( 86)	.30589452E+00
TEXTILES ( 58)	.50813562E+00
LOGGING ( 78)	.38146287E+00
SAWMILLS ( 60)	.49061176E+00
WOOD PROD ( 72)	.41340059E+00
MFG NEC ( 62)	.47375426E+00
PAPER PROD ( 80)	.35477677E+00
PRINT/PUBL ( 44)	.57525921E+00
CHEMICALS ( 70)	.42547473E+00
RUBBER PRO ( 73)	.40117249E+00
CLAY PRODS ( 71)	.42464358E+00
PRI METALS ( 76)	.39189577E+00
ALUMINUM ( 75)	.39520454E+00
FAB METLAS ( 59)	.49698269E+00
MACHINERY ( 53)	.54748988E+00
ELECTRIC ( 41)	.59591627E+00
ELECTRONIC ( 84)	.33671466E+00
VEHICLES ( 65)	.45273846E+00
AIRCRAFT ( 14)	.79270828E+00
BOATS ( 28)	.69306898E+00
INSTRUMENT ( 64)	.45940083E+00
RAILROADS ( 47)	.55974859E+00
TRANS NEC ( 39)	.61038470E+00
TRUCK WH ( 48)	.55781937E+00
WATER TRAN ( 85)	.32812747E+00
AIR TRAN ( 82)	.34041825E+00
PIPELINES ( 89)	.22281404E+00
TELEPHONE ( 79)	.37608793E+00
RADIO TV ( 68)	.42947423E+00
ELECT UTIL ( 83)	.33887377E+00
GAS UTIL ( 90)	.20846581E+00
WATER/SANI ( 56)	.51979160E+00
WHOLESALE ( 45)	.57037550E+00
BLD MATERI ( 15)	.78591567E+00
DEPT STORE ( 25)	.71061975E+00
GROCERIES ( 24)	.71474749E+00
AUTO DLRS ( 20)	.74215233E+00
APPAREL ( 38)	.61650127E+00
FURNITURE ( 21)	.74070030E+00
RESTAURANT ( 46)	.56938899E+00
RETAIL NEC ( 32)	.65362269E+00
F-I-R-E ( 63)	.47196636E+00
LODGING ( 49)	.55781925E+00
PERS SERV ( 42)	.59490085E+00
BUS SERV ( 35)	.62672150E+00
DATA PROC ( 43)	.58241993E+00
DETECTIVE ( 10)	.87855107E+00
AUTO SERV ( 57)	.50867295E+00
REPAIR SER ( 40)	.60892195E+00
AMUSEMENTS ( 55)	.52763432E+00
HEALTH SER ( 23)	.72302926E+00
PROF SERV ( 34)	.64168495E+00
EDUCATION ( 30)	.67053866E+00
SOC SERV ( 17)	.76959193E+00
ASSOCIATNS ( 13)	.79932028E+00
S & L GOVT ( 54)	.54296762E+00
GOV ELECTR ( 77)	.38152051E+00
POSTAL SER ( 6)	.95985401E+00
GOVT NEC ( 1)	.12613817E+01
HOUSEHOLDS ( 87)	.26138130E+00

**Table 2-10**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**RESERVOIR SUBREGION 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 74)	1.8931	MACHINERY ( 72)	1.9186
CATTLE ( 64)	1.9910	COMPUTERS ( 55)	2.0800
MEAT ANIMA ( 82)	1.8018	ELECTRIC ( 85)	1.7383
LVSTK NEC ( 62)	1.9992	ELECTRONIC ( 49)	2.1433
FOOD GRAIN ( 35)	2.2251	VEHICLES ( 81)	1.8044
FEED GRAIN ( 48)	2.1578	BOAT BLD ( 57)	2.0604
HAY/PASTUR ( 10)	2.4919	INSTRUMENT ( 39)	2.1934
CROPS NEC ( 2)	2.8616	RAILROADS ( 46)	2.1600
FRUIT/NUTS ( 21)	2.3469	TRANS NEC ( 26)	2.3026
VEGETABLES ( 4)	2.7318	TRUCK/WH ( 8)	2.5368
OIL CROPS ( 38)	2.1943	WATER TRAN ( 87)	1.7155
FORESTRY ( 58)	2.0479	AIR TRAN ( 76)	1.8859
NURSERY LA ( 40)	2.1906	TELEPHONE ( 78)	1.8355
FISHING ( 92)	1.3463	RADIO TV ( 56)	2.0713
AG SERVICE ( 13)	2.4670	ELECTRIC ( 52)	2.1002
METAL MINE ( 70)	1.9239	GAS DIST ( 83)	1.7905
MINES NEC ( 59)	2.0460	WATER/SANI ( 63)	1.9956
SAND & GRA ( 69)	1.9529	WHOLESALE ( 45)	2.1618
NEW RESIDE ( 14)	2.4334	BLD MAT ( 17)	2.4067
NEW INDUST ( 11)	2.4761	DEPT STORE ( 41)	2.1866
NEW UTIL ( 16)	2.4143	GROCERIES ( 33)	2.2390
NEW ROADS ( 34)	2.2321	AUTO DLRS ( 20)	2.3594
NEW FARM ( 77)	1.8652	APPAREL ( 51)	2.1266
NEW EXTRAC ( 6)	2.6706	FURNITURE ( 22)	2.3348
NEW GOVT ( 73)	1.8979	RESTAURANT ( 43)	2.1771
RESI MAINT ( 9)	2.4957	RETAIL NEC ( 30)	2.2601
MAINT NEC ( 27)	2.2892	F-I-R-E ( 66)	1.9805
MEAT PROC ( 5)	2.7154	LODGING ( 47)	2.1593
DIARY PROD ( 80)	1.8258	PERS SERV ( 12)	2.4750
CAN/FREEZE ( 61)	2.0150	BUS SERV ( 36)	2.2116
FOODS NEC ( 89)	1.5657	DATA PROC ( 15)	2.4215
GRAIN PROD ( 75)	1.8927	DETECTIVE ( 7)	2.6659
TEXTILES ( 53)	2.0964	AUTO SERV ( 32)	2.2503
LOGGING ( 88)	1.6999	REPAIR SER ( 25)	2.3160
SAWMILLS ( 44)	2.1655	AMUSEMENTS ( 37)	2.2090
WOOD PROD ( 24)	2.3263	HEALTH SER ( 31)	2.2576
MFG NEC ( 79)	1.8349	PROF SERV ( 71)	1.9207
PAPER MILL ( 68)	1.9574	EDUCATION ( 23)	2.3302
PAPER PROD ( 86)	1.7243	SOC SERV ( 18)	2.3699
PRINT/PUBL ( 50)	2.1316	ASSOCIATNS ( 19)	2.3682
CHEMICALS ( 28)	2.2818	S & L GOVT ( 29)	2.2679
REFINING ( 67)	1.9731	POSTAL SER ( 3)	2.7863
RUBBER PRO ( 54)	2.0915	FED ELECTR ( 84)	1.7899
CLAY PROD ( 60)	2.0290	GOVT NEC ( 1)	2.9841
PRIM METAL ( 42)	2.1776	HOUSEHOLDS ( 65)	1.9849
FAB METALS ( 90)	1.5570		

**Table 2-11**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**RESERVOIR SUBREGION 1994**

NAME (RANK) MULTIPLIER	FAB METALS ( 90) .77571440E-05
DAIRY/POUL ( 84) .98938190E-05	MACHINERY ( 64) .14079346E-04
CATTLE ( 59) .15679503E-04	COMPUTERS ( 72) .12059772E-04
MEAT ANIMA ( 68) .13807738E-04	ELECTRIC ( 73) .11902404E-04
LVSTK NEC ( 28) .27183947E-04	ELECTRONIC ( 22) .31552700E-04
FOOD GRAIN ( 40) .21605305E-04	VEHICLES ( 67) .13839337E-04
FEED GRAIN ( 62) .15007249E-04	BOAT BLD ( 49) .17833177E-04
HAY/PASTUR ( 15) .35554483E-04	INSTRUMENT ( 57) .16098711E-04
CROPS NEC ( 23) .31076917E-04	RAILROADS ( 56) .16341352E-04
FRUIT/NUTS ( 44) .20247651E-04	TRANS NEC ( 14) .36723653E-04
VEGETABLES ( 54) .16643644E-04	TRUCK/WH ( 31) .26657483E-04
OIL CROPS ( 43) .20374566E-04	WATER TRAN ( 74) .11826428E-04
FORESTRY ( 58) .16003061E-04	AIR TRAN ( 50) .17628876E-04
NURSERY LA ( 16) .35440971E-04	TELEPHONE ( 80) .10509090E-04
FISHING ( 76) .11040772E-04	RADIO TV ( 46) .19555764E-04
AG SERVICE ( 2) .59353657E-04	ELECTRIC ( 83) .10422205E-04
METAL MINE ( 75) .11171189E-04	GAS DIST ( 91) .66901639E-05
MINES NEC ( 51) .16877670E-04	WATER/SANI ( 63) .14137826E-04
SAND & GRA ( 47) .19154835E-04	WHOLESALE ( 42) .21314092E-04
NEW RESIDE ( 32) .25767058E-04	BLD MAT ( 20) .33038519E-04
NEW INDUST ( 30) .26867736E-04	DEPT STORE ( 11) .38423390E-04
NEW UTIL ( 38) .23427636E-04	GROCERIES ( 10) .38560775E-04
NEW ROADS ( 48) .19080551E-04	AUTO DLRS ( 27) .27920427E-04
NEW FARM ( 82) .10498089E-04	APPAREL ( 13) .37628597E-04
NEW EXTRAC ( 24) .29509642E-04	FURNITURE ( 19) .33677337E-04
NEW GOVT ( 86) .94155321E-05	RESTAURANT ( 8) .39241644E-04
RESI MAINT ( 33) .25235686E-04	RETAIL NEC ( 3) .55226981E-04
MAINT NEC ( 45) .20120018E-04	F-I-R-E ( 70) .12668573E-04
MEAT PROC ( 61) .15448393E-04	LODGING ( 17) .35383768E-04
DIARY PROD ( 87) .85212041E-05	PERS SERV ( 4) .50591872E-04
CAN/FREEZE ( 66) .14007199E-04	BUS SERV ( 18) .34295590E-04
FOODS NEC ( 88) .81854014E-05	DATA PROC ( 36) .24123001E-04
GRAIN PROD ( 85) .95595160E-05	DETECTIVE ( 1) .16375555E-03
TEXTILES ( 21) .31662628E-04	AUTO SERV ( 34) .24989553E-04
LOGGING ( 81) .10506957E-04	REPAIR SER ( 26) .28239267E-04
SAWMILLS ( 69) .13582239E-04	AMUSEMENTS ( 7) .40849365E-04
WOOD PROD ( 37) .23793029E-04	HEALTH SER ( 25) .28799937E-04
MFG NEC ( 53) .16716673E-04	PROF SERV ( 35) .24763975E-04
PAPER MILL ( 78) .10813649E-04	EDUCATION ( 12) .37975511E-04
PAPER PROD ( 77) .10929278E-04	SOC SERV ( 5) .47767284E-04
PRINT/PUBL ( 39) .21753516E-04	ASSOCIATNS ( 9) .38768041E-04
CHEMICALS ( 65) .14079187E-04	S & L GOVT ( 60) .15631527E-04
REFINING ( 79) .10705985E-04	POSTAL SER ( 29) .26944970E-04
RUBBER PRO ( 55) .16593745E-04	FED ELECTR ( 89) .80758655E-05
CLAY PROD ( 52) .16867902E-04	GOVT NEC ( 6) .46668643E-04
PRIM METAL ( 41) .21584294E-04	HOUSEHOLDS ( 71) .12192124E-04

**Table 2-12**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**RESERVOIR SUBREGION 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 62)	.48053446E+00	MACHINERY ( 63)	.47490460E+00
CATTLE ( 64)	.45796263E+00	COMPUTERS ( 53)	.55772609E+00
MEAT ANIMA ( 85)	.32524934E+00	ELECTRIC ( 82)	.34351194E+00
LVSTK NEC ( 52)	.56156045E+00	ELECTRONIC ( 26)	.72255790E+00
FOOD GRAIN ( 45)	.59890032E+00	VEHICLES ( 72)	.40490335E+00
FEED GRAIN ( 43)	.60297376E+00	BOAT BLD ( 48)	.58236873E+00
HAY/PASTUR ( 8)	.86823279E+00	INSTRUMENT ( 33)	.66263461E+00
CROPS NEC ( 2)	.11809363E+01	RAILROADS ( 55)	.54894435E+00
FRUIT/NUTS ( 22)	.73151803E+00	TRANS NEC ( 40)	.62783611E+00
VEGETABLES ( 4)	.10469400E+01	TRUCK/WH ( 36)	.65081286E+00
OIL CROPS ( 41)	.61485636E+00	WATER TRAN ( 88)	.26853073E+00
FORESTRY ( 61)	.48142630E+00	AIR TRAN ( 79)	.37367311E+00
NURSERY LA ( 34)	.66165596E+00	TELEPHONE ( 80)	.35681444E+00
FISHING ( 91)	.18384399E+00	RADIO TV ( 65)	.45532876E+00
AG SERVICE ( 9)	.86197925E+00	ELECTRIC ( 46)	.59648257E+00
METAL MINE ( 77)	.38125867E+00	GAS DIST ( 69)	.41700140E+00
MINES NEC ( 54)	.55421644E+00	WATER/SANI ( 70)	.41159931E+00
SAND & GRA ( 57)	.53291124E+00	WHOLESALE ( 47)	.58704168E+00
NEW RESIDE ( 15)	.78286141E+00	BLD MAT ( 10)	.83218867E+00
NEW INDUST ( 7)	.89215952E+00	DEPT STORE ( 30)	.68178403E+00
NEW UTIL ( 11)	.83195877E+00	GROCERIES ( 21)	.73213756E+00
NEW ROADS ( 37)	.64016777E+00	AUTO DLRS ( 16)	.77386916E+00
NEW FARM ( 74)	.39212275E+00	APPAREL ( 44)	.60038340E+00
NEW EXTRAC ( 3)	.10654429E+01	FURNITURE ( 17)	.76935190E+00
NEW GOVT ( 83)	.33283117E+00	RESTAURANT ( 49)	.57736814E+00
RESI MAINT ( 14)	.81172067E+00	RETAIL NEC ( 20)	.73335987E+00
MAINT NEC ( 23)	.72890472E+00	F-I-R-E ( 59)	.50491905E+00
MEAT PROC ( 73)	.40413433E+00	LODGING ( 42)	.61243439E+00
DIARY PROD ( 81)	.34586325E+00	PERS SERV ( 13)	.82730758E+00
CAN/FREEZE ( 71)	.40702304E+00	BUS SERV ( 28)	.69109565E+00
FOODS NEC ( 90)	.25096476E+00	DATA PROC ( 12)	.83034152E+00
GRAIN PROD ( 84)	.33135381E+00	DETECTIVE ( 5)	.99163628E+00
TEXTILES ( 39)	.63362741E+00	AUTO SERV ( 31)	.67812043E+00
LOGGING ( 78)	.37804601E+00	REPAIR SER ( 19)	.74142158E+00
SAWMILLS ( 67)	.43803874E+00	AMUSEMENTS ( 51)	.56742209E+00
WOOD PROD ( 38)	.63505977E+00	HEALTH SER ( 25)	.72307372E+00
MFG NEC ( 76)	.38311097E+00	PROF SERV ( 60)	.49243343E+00
PAPER MILL ( 66)	.45254704E+00	EDUCATION ( 27)	.70407110E+00
PAPER PROD ( 75)	.39040053E+00	SOC SERV ( 18)	.74166334E+00
PRINT/PUBL ( 35)	.65373743E+00	ASSOCIATNS ( 24)	.72664225E+00
CHEMICALS ( 29)	.68359894E+00	S & L GOVT ( 56)	.54613006E+00
REFINING ( 68)	.42709002E+00	POSTAL SER ( 6)	.96327007E+00
RUBBER PRO ( 50)	.56769753E+00	FED ELECTR ( 86)	.31872270E+00
CLAY PROD ( 58)	.52875209E+00	GOVT NEC ( 1)	.12810696E+01
PRIM METAL ( 32)	.66395628E+00	HOUSEHOLDS ( 87)	.28162536E+00
FAB METALS ( 89)	.25821698E+00		

**Table 2-13**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**UPRIVER SUBREGION 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 17)	2.6808	MACHINES ( 62)	2.2011
CATTLE ( 15)	2.6900	ELECTRIC ( 85)	1.6688
MEAT ANIMA ( 39)	2.4498	AIRCRAFT ( 81)	1.8345
LVSTK NEC ( 10)	2.8254	BOAT BLD ( 49)	2.3473
FOOD GRAIN ( 30)	2.5270	TRANS EQUI ( 75)	1.8885
FEED GRAIN ( 23)	2.5885	INSTRUMENT ( 51)	2.3040
HAY/PASTUR ( 7)	3.0030	RAILROADS ( 37)	2.4702
CROPS NEC ( 2)	3.1534	TRANSP NEC ( 24)	2.5841
FRUIT/NUTS ( 6)	3.0241	TRUCK/WH ( 5)	3.0280
VEGETABLES ( 3)	3.0785	WATER TRAN ( 76)	1.8812
FORESTRY ( 9)	2.8579	AIR TRAN ( 67)	2.0556
NURSERY/LA ( 13)	2.7437	TELEPHONE ( 58)	2.2315
FISHING ( 11)	2.8123	RADIO/TV ( 53)	2.2838
AG SERVICE ( 12)	2.7579	ELECTRIC ( 40)	2.4442
METAL MINE ( 70)	2.0087	WATER/SANI ( 59)	2.2311
MINES NEC ( 31)	2.5142	WHOLESALE ( 44)	2.4263
SAND/GRVL ( 79)	1.8586	BLDG MATER ( 18)	2.6806
NEW RESIDE ( 16)	2.6899	DEPT STORE ( 48)	2.3523
NEW INDUST ( 54)	2.2804	GROCERIES ( 35)	2.4966
NEW UTILIT ( 63)	2.1841	AUTO DLRS ( 25)	2.5660
NEW ROADS ( 68)	2.0445	APPAREL ( 27)	2.5370
NEW FARM ( 77)	1.8677	FURNITURE ( 19)	2.6644
NEW EXTRAC ( 42)	2.4376	RESTAURANT ( 52)	2.2990
NEW GOVT ( 82)	1.8062	RETAIL NEC ( 22)	2.6389
RESI MAINT ( 21)	2.6429	F-I-R-E ( 66)	2.1459
MAINT NEC ( 46)	2.3951	LODGING ( 36)	2.4807
MEAT PROC ( 41)	2.4376	PERS SERV ( 50)	2.3283
DAIRY PROC ( 80)	1.8494	BUS SERV ( 14)	2.7362
FOODS NEC ( 20)	2.6530	DATA PROC ( 29)	2.5326
FEED PROC ( 84)	1.7621	DETECTIVE ( 8)	2.9476
MFG NEC ( 83)	1.7779	AUTO SERV ( 28)	2.5342
LOGGING ( 78)	1.8654	REPAIR SER ( 32)	2.5133
SAWMILLS ( 34)	2.5031	AMUSEMENTS ( 47)	2.3822
WOOD PROD ( 45)	2.3982	HEALTH SER ( 43)	2.4299
PAPER MILL ( 73)	1.9633	PROF SERV ( 55)	2.2513
PAPER PROD ( 72)	1.9876	EDUCATION ( 61)	2.2143
PRINT/PUBL ( 69)	2.0115	SOC SERV ( 26)	2.5567
CHEMICALS ( 56)	2.2499	ASSOCIATNS ( 33)	2.5126
REFINING ( 64)	2.1746	S & L GOVT ( 38)	2.4654
RUBBER PRO ( 57)	2.2425	POSTAL SER ( 4)	3.0749
CLAY PRODS ( 65)	2.1699	GOVT NEC ( 1)	3.2273
PRIM METAL ( 71)	1.9879	HOUSEHOLDS ( 60)	2.2273
FAB METALS ( 74)	1.8945		

**Table 2-14**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**UPRIVER SUBREGION 1994**

NAME (RANK) MULTIPLIER	MACHINES ( 58) .19979338E-04
DAIRY/POUL ( 61) .18401672E-04	ELECTRIC ( 80) .12625862E-04
CATTLE ( 45) .26429825E-04	AIRCRAFT ( 69) .15814361E-04
MEAT ANIMA ( 17) .41821299E-04	BOAT BLD ( 54) .20693073E-04
LVSTK NEC ( 19) .40523923E-04	TRANS EQUI ( 75) .14051089E-04
FOOD GRAIN ( 39) .28835177E-04	INSTRUMENT ( 59) .19119450E-04
FEED GRAIN ( 49) .24135230E-04	RAILROADS ( 55) .20640662E-04
HAY/PASTUR ( 15) .42553591E-04	TRANSP NEC ( 20) .40115039E-04
CROPS NEC ( 24) .38475544E-04	TRUCK/WH ( 29) .33409407E-04
FRUIT/NUTS ( 38) .30600975E-04	WATER TRAN ( 76) .13841345E-04
VEGETABLES ( 50) .23978293E-04	AIR TRAN ( 53) .20746409E-04
FORESTRY ( 30) .33192468E-04	TELEPHONE ( 73) .14881983E-04
NURSERY/LA ( 6) .55077959E-04	RADIO/TV ( 48) .24262397E-04
FISHING ( 22) .39155431E-04	ELECTRIC ( 68) .15946547E-04
AG SERVICE ( 3) .64405845E-04	WATER/SANI ( 62) .18224333E-04
METAL MINE ( 78) .13521350E-04	WHOLESALE ( 44) .26664571E-04
MINES NEC ( 63) .18018101E-04	BLDG MATER ( 23) .39130224E-04
SAND/GRVL ( 71) .15530777E-04	DEPT STORE ( 16) .42551426E-04
NEW RESIDE ( 31) .32950258E-04	GROCERIES ( 11) .46130859E-04
NEW INDUST ( 34) .31593056E-04	AUTO DLRS ( 28) .34089517E-04
NEW UTILIT ( 42) .27078862E-04	APPAREL ( 9) .50977873E-04
NEW ROADS ( 52) .21152022E-04	FURNITURE ( 21) .39849649E-04
NEW FARM ( 79) .13078830E-04	RESTAURANT ( 13) .44318633E-04
NEW EXTRAC ( 27) .34396217E-04	RETAIL NEC ( 2) .69871057E-04
NEW GOVT ( 84) .10186049E-04	F-I-R-E ( 67) .16235126E-04
RESI MAINT ( 36) .31477051E-04	LODGING ( 14) .43757191E-04
MAINT NEC ( 47) .24955969E-04	PERS SERV ( 5) .56393015E-04
MEAT PROC ( 60) .18821622E-04	BUS SERV ( 7) .54088883E-04
DAIRY PROC ( 85) .89280329E-05	DATA PROC ( 40) .28833527E-04
FOODS NEC ( 26) .35144498E-04	DETECTIVE ( 1) .72522744E-04
FEED PROC ( 82) .11611329E-04	AUTO SERV ( 37) .31096220E-04
MFG NEC ( 41) .28642748E-04	REPAIR SER ( 25) .36361504E-04
LOGGING ( 81) .11669476E-04	AMUSEMENTS ( 12) .44389388E-04
SAWMILLS ( 64) .16971520E-04	HEALTH SER ( 33) .32105225E-04
WOOD PROD ( 65) .16822838E-04	PROF SERV ( 35) .31528882E-04
PAPER MILL ( 83) .10762495E-04	EDUCATION ( 10) .47804377E-04
PAPER PROD ( 74) .14615961E-04	SOC SERV ( 8) .53852120E-04
PRINT/PUBL ( 43) .26829208E-04	ASSOCIATNS ( 18) .41763433E-04
CHEMICALS ( 70) .15813401E-04	S & L GOVT ( 56) .20637148E-04
REFINING ( 77) .13562414E-04	POSTAL SER ( 32) .32513679E-04
RUBBER PRO ( 46) .25000594E-04	GOVT NEC ( 4) .56803416E-04
CLAY PRODS ( 57) .19998286E-04	HOUSEHOLDS ( 66) .16814032E-04
PRIM METAL ( 51) .23719784E-04	
FAB METALS ( 72) .15364494E-04	

**Table 2-15**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**UPRIVER SUBREGION 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 12)	.97189766E+00	MACHINES ( 53)	.61727232E+00
CATTLE ( 15)	.94967216E+00	ELECTRIC ( 82)	.31035131E+00
MEAT ANIMA ( 45)	.69428581E+00	AIRCRAFT ( 76)	.39118633E+00
LVSTK NEC ( 7)	.10871156E+01	BOAT BLD ( 43)	.70077413E+00
FOOD GRAIN ( 38)	.75106674E+00	TRANS EQUI ( 75)	.41532058E+00
FEED GRAIN ( 24)	.85465622E+00	INSTRUMENT ( 44)	.69908959E+00
HAY/PASTUR ( 3)	.11940137E+01	RAILROADS ( 49)	.65148407E+00
CROPS NEC ( 2)	.13087301E+01	TRANSP NEC ( 33)	.79362530E+00
FRUIT/NUTS ( 5)	.11225954E+01	TRUCK/WH ( 23)	.85521239E+00
VEGETABLES ( 4)	.11709763E+01	WATER TRAN ( 83)	.29493022E+00
FORESTRY ( 26)	.84694785E+00	AIR TRAN ( 73)	.44096908E+00
NURSERY/LA ( 13)	.95627898E+00	TELEPHONE ( 62)	.54040211E+00
FISHING ( 9)	.10573308E+01	RADIO/TV ( 64)	.52450365E+00
AG SERVICE ( 11)	.98623961E+00	ELECTRIC ( 37)	.75217080E+00
METAL MINE ( 72)	.44852588E+00	WATER/SANI ( 70)	.45590979E+00
MINES NEC ( 27)	.83319402E+00	WHOLESALE ( 42)	.71255386E+00
SAND/GRVL ( 71)	.45200405E+00	BLDG MATER ( 14)	.95530123E+00
NEW RESIDE ( 21)	.86276531E+00	DEPT STORE ( 39)	.74527282E+00
NEW INDUST ( 40)	.73287719E+00	GROCERIES ( 25)	.85059977E+00
NEW UTILIT ( 46)	.67195129E+00	AUTO DLRS ( 22)	.85701144E+00
NEW ROADS ( 66)	.51499766E+00	APPAREL ( 30)	.81651390E+00
NEW FARM ( 80)	.35049900E+00	FURNITURE ( 16)	.92860514E+00
NEW EXTRAC ( 19)	.86799341E+00	RESTAURANT ( 50)	.63261950E+00
NEW GOVT ( 84)	.28564385E+00	RETAIL NEC ( 18)	.92571318E+00
RESI MAINT ( 28)	.82809472E+00	F-I-R-E ( 58)	.56182992E+00
MAINT NEC ( 41)	.72927952E+00	LODGING ( 36)	.76433069E+00
MEAT PROC ( 60)	.55075496E+00	PERS SERV ( 48)	.65439177E+00
DAIRY PROC ( 85)	.28157091E+00	BUS SERV ( 10)	.98717833E+00
FOODS NEC ( 17)	.92693245E+00	DATA PROC ( 20)	.86794794E+00
FEED PROC ( 81)	.32155195E+00	DETECTIVE ( 6)	.11215870E+01
MFG NEC ( 77)	.38126519E+00	AUTO SERV ( 32)	.80632561E+00
LOGGING ( 69)	.45743948E+00	REPAIR SER ( 31)	.81642830E+00
SAWMILLS ( 56)	.57382011E+00	AMUSEMENTS ( 52)	.62337506E+00
WOOD PROD ( 55)	.58288455E+00	HEALTH SER ( 34)	.79074931E+00
PAPER MILL ( 78)	.38106441E+00	PROF SERV ( 47)	.67004907E+00
PAPER PROD ( 68)	.50454283E+00	EDUCATION ( 59)	.55995888E+00
PRINT/PUBL ( 61)	.54398972E+00	SOC SERV ( 29)	.82215422E+00
CHEMICALS ( 54)	.60990548E+00	ASSOCIATNS ( 35)	.78343594E+00
REFINING ( 65)	.52304667E+00	S & L GOVT ( 57)	.57039076E+00
RUBBER PRO ( 51)	.62628973E+00	POSTAL SER ( 8)	.10582111E+01
CLAY PRODS ( 63)	.53789514E+00	GOVT NEC ( 1)	.13665693E+01
PRIM METAL ( 67)	.51075220E+00	HOUSEHOLDS ( 79)	.36656919E+00
FAB METALS ( 74)	.42808256E+00		

**Table 2-16**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**LOWER SNAKE RIVER REGION 1994**  
**(3 SUBREGIONS COMBINED)**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 3)	3.3062	FAB METALS ( 84)	2.1514
CATTLE ( 4)	3.2906	MACHINERY ( 74)	2.3081
MEAT ANIM ( 13)	2.9312	COMPUTERS ( 91)	2.0252
LVSTK NEC ( 5)	3.2376	ELECT GOOD ( 90)	2.0496
FOOD GRAIN ( 18)	2.8340	ELECTRONIC ( 88)	2.0830
FEED GRAIN ( 11)	2.9841	VEHICLES ( 72)	2.3425
HAY ( 8)	3.0861	AIRCRAFT ( 40)	2.5709
OTHER CROP ( 2)	3.3335	MARINE EQU ( 45)	2.5336
FRUIT/NUTS ( 10)	3.0085	INSTRUMENT ( 77)	2.2466
VEGETABLES ( 6)	3.2371	RAILROADS ( 37)	2.6016
OIL CROPS ( 33)	2.6349	OTHER TRAN ( 50)	2.4942
FORESTRY ( 46)	2.5247	TRUCK/WARE ( 23)	2.7298
NURS/LNDSC ( 48)	2.5004	WATER TRAN ( 89)	2.0619
FISHING ( 9)	3.0175	AIR TRANSP ( 86)	2.1262
AG SERVICE ( 28)	2.6759	PIPELINES ( 93)	1.7980
METAL MINE ( 79)	2.2397	TELEPHONE ( 80)	2.2180
OTHER MINE ( 44)	2.5411	RADIO/TV ( 78)	2.2455
COAL MINE ( 95)	1.5546	ELECTRICIT ( 92)	1.9634
SAND & GRA ( 85)	2.1362	GAS ( 94)	1.5840
NEW RESI B ( 24)	2.7274	WATER/SANI ( 49)	2.4964
NEW IND & ( 20)	2.7916	WHOLESALE ( 60)	2.4446
NEW UTIL ( 32)	2.6396	BLDG & GAR ( 26)	2.6820
NEW ROADS ( 42)	2.5584	DEPT STORE ( 54)	2.4764
NEW FARM ( 64)	2.3968	GROCERIES ( 52)	2.4879
NEW EXTRAC ( 21)	2.7634	AUTO DLRS ( 34)	2.6336
NEW GOVT ( 47)	2.5215	APPAREL ( 56)	2.4643
MAINT RESI ( 38)	2.5936	FURNITURE ( 27)	2.6805
MAINT NEC ( 59)	2.4475	RESTAURANT ( 36)	2.6034
MEAT PROC ( 16)	2.9063	RETAIL NEC ( 57)	2.4606
DAIRY PROD ( 41)	2.5675	F-I-R-E ( 82)	2.2047
CAN/FREEZE ( 51)	2.4932	LODGING ( 63)	2.4079
OTHER FOOD ( 61)	2.4403	PER SERVIC ( 53)	2.4840
GRAIN PROC ( 12)	2.9514	BUS SERVIC ( 71)	2.3442
TEXTILES ( 73)	2.3196	DATA PROCE ( 75)	2.3046
LOGGING ( 15)	2.9203	DETECTIVE ( 25)	2.7262
SAWMILLS ( 14)	2.9309	AUTO SERVI ( 70)	2.3489
WOOD PRODU ( 35)	2.6283	REPAIR SER ( 58)	2.4542
MFG NEC ( 76)	2.2741	AMUSEMENTS ( 65)	2.3927
PAPER MILL ( 67)	2.3773	HEALTH SER ( 43)	2.5556
PAPER PROD ( 17)	2.9044	PROF SERVI ( 62)	2.4241
PRINT/PUBL ( 39)	2.5751	EDUCATION ( 31)	2.6620
CHEMICALS ( 81)	2.2059	SOC SERVIC ( 22)	2.7614
REFINING ( 55)	2.4749	ASSOCIATNS ( 19)	2.8267
RUBBER PRO ( 69)	2.3561	S & L GOVT ( 29)	2.6749
CLAY PROD ( 66)	2.3778	GOV ELECTR ( 87)	2.1052
PRIM METAL ( 83)	2.1592	POSTAL SER ( 7)	3.1707
PRI ALUMIN ( 30)	2.6731	GOVT NEC ( 1)	3.3693
		HOUSEHOLDS ( 68)	2.3695

**Table 2-17**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**LOWER SNAKE RIVER REGION 1994**  
**(3 SUBREGIONS COMBINED)**

NAME (RANK) MULTIPLIER	FAB METALS ( 81)	.14888109E-04
DAIRY/POUL ( 45)	MACHINERY ( 67)	.18428394E-04
CATTLE ( 30)	COMPUTERS ( 90)	.12477346E-04
MEAT ANIM ( 17)	ELECT GOOD ( 76)	.15714912E-04
LVSTK NEC ( 4)	ELECTRONIC ( 78)	.15549744E-04
FOOD GRAIN ( 26)	VEHICLES ( 69)	.17846969E-04
FEED GRAIN ( 43)	AIRCRAFT ( 64)	.19175590E-04
HAY ( 7)	MARINE EQU ( 52)	.21340275E-04
OTHER CROP ( 21)	INSTRUMENT ( 72)	.16930218E-04
FRUIT/NUTS ( 20)	RAILROADS ( 58)	.20125537E-04
VEGETABLES ( 47)	OTHER TRAN ( 19)	.39282673E-04
OIL CROPS ( 32)	TRUCK/WARE ( 35)	.28440367E-04
FORESTRY ( 37)	WATER TRAN ( 83)	.14556996E-04
NURS/LNDSC ( 10)	AIR TRANSP ( 54)	.20429961E-04
FISHING ( 40)	PIPELINES ( 93)	.91296679E-05
AG SERVICE ( 2)	TELEPHONE ( 87)	.13454029E-04
METAL MINE ( 85)	RADIO/TV ( 51)	.21490076E-04
OTHER MINE ( 57)	ELECTRICIT ( 92)	.10519376E-04
COAL MINE ( 94)	GAS ( 95)	.60242755E-05
SAND & GRA ( 70)	WATER/SANI ( 71)	.17115082E-04
NEW RESI B ( 36)	WHOLESALE ( 46)	.24355297E-04
NEW IND & ( 33)	BLDG & GAR ( 24)	.36346559E-04
NEW UTIL ( 42)	DEPT STORE ( 16)	.41584768E-04
NEW ROADS ( 49)	GROCERIES ( 13)	.42580828E-04
NEW FARM ( 74)	AUTO DLRS ( 28)	.30654468E-04
NEW EXTRAC ( 25)	APPAREL ( 9)	.44403110E-04
NEW GOVT ( 77)	FURNITURE ( 22)	.37959442E-04
MAINT RESI ( 38)	RESTAURANT ( 12)	.43014250E-04
MAINT NEC ( 50)	RETAIL NEC ( 3)	.61732244E-04
MEAT PROC ( 63)	F-I-R-E ( 80)	.14944088E-04
DAIRY PROD ( 84)	LODGING ( 23)	.37364702E-04
CAN/FREEZE ( 65)	PER SERVIC ( 6)	.50332954E-04
OTHER FOOD ( 73)	BUS SERVIC ( 18)	.40962743E-04
GRAIN PROC ( 59)	DATA PROCE ( 48)	.22983355E-04
TEXTILES ( 41)	DETECTIVE ( 1)	.72182083E-04
LOGGING ( 56)	AUTO SERVI ( 39)	.26639011E-04
SAWMILLS ( 62)	REPAIR SER ( 31)	.29970983E-04
WOOD PRODU ( 66)	AMUSEMENTS ( 11)	.43296390E-04
MFG NEC ( 53)	HEALTH SER ( 27)	.31011641E-04
PAPER MILL ( 89)	PROF SERVI ( 44)	.24758836E-04
PAPER PROD ( 68)	EDUCATION ( 15)	.42224929E-04
PRINT/PUBL ( 34)	SOC SERVIC ( 8)	.49037902E-04
CHEMICALS ( 88)	ASSOCIATNS ( 14)	.42326159E-04
REFINING ( 79)	S & L GOVT ( 60)	.19937670E-04
RUBBER PRO ( 61)	GOV ELECTR ( 91)	.12250873E-04
CLAY PROD ( 55)	POSTAL SER ( 29)	.30475903E-04
PRIM METAL ( 86)	GOVT NEC ( 5)	.51221083E-04
PRI ALUMIN ( 82)	HOUSEHOLDS ( 75)	.15972273E-04

**Table 2-18**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**LOWER SNAKE RIVER REGION 1994**  
**(3 SUBREGIONS COMBINED)**

NAME (RANK) MULTIPLIER	MULTIPLIER	NAME (RANK) MULTIPLIER	MULTIPLIER
DAIRY/POUL ( 10)	.95565373E+00	FAB METALS ( 82)	.46488923E+00
CATTLE ( 14)	.88507980E+00	MACHINERY ( 58)	.58416545E+00
MEAT ANIM ( 33)	.71765536E+00	COMPUTERS ( 88)	.42663252E+00
LVSTK NEC ( 8)	.99102205E+00	ELECT GOOD ( 85)	.43864873E+00
FOOD GRAIN ( 22)	.81693178E+00	ELECTRONIC ( 87)	.43153504E+00
FEED GRAIN ( 11)	.93781352E+00	VEHICLES ( 71)	.54331642E+00
HAY ( 4)	.11248372E+01	AIRCRAFT ( 37)	.70523751E+00
OTHER CROP ( 2)	.13155355E+01	MARINE EQU ( 30)	.74181956E+00
FRUIT/NUTS ( 9)	.98946238E+00	INSTRUMENT ( 63)	.55866832E+00
VEGETABLES ( 3)	.12258719E+01	RAILROADS ( 47)	.64934647E+00
OIL CROPS ( 28)	.75355697E+00	OTHER TRAN ( 48)	.64866602E+00
FORESTRY ( 76)	.50291544E+00	TRUCK/WARE ( 44)	.66262704E+00
NURS/LNDSC ( 35)	.70880747E+00	WATER TRAN ( 92)	.35344908E+00
FISHING ( 5)	.10807848E+01	AIR TRANSP ( 90)	.40308529E+00
AG SERVICE ( 19)	.84746963E+00	PIPELINES ( 94)	.26414126E+00
METAL MINE ( 80)	.47544751E+00	TELEPHONE ( 84)	.44500747E+00
OTHER MINE ( 32)	.72390574E+00	RADIO/TV ( 81)	.46999773E+00
COAL MINE ( 95)	.16877225E+00	ELECTRICIT ( 89)	.40951097E+00
SAND & GRA ( 73)	.53313887E+00	GAS ( 93)	.27301884E+00
NEW RESI B ( 23)	.79232675E+00	WATER/SANI ( 61)	.56578481E+00
NEW IND & ( 12)	.93663716E+00	WHOLESALE ( 46)	.65089166E+00
NEW UTIL ( 20)	.83287227E+00	BLDG & GAR ( 15)	.88368315E+00
NEW ROADS ( 41)	.68324822E+00	DEPT STORE ( 27)	.75435299E+00
NEW FARM ( 75)	.51372331E+00	GROCERIES ( 25)	.78110856E+00
NEW EXTRAC ( 7)	.10003903E+01	AUTO DLRS ( 21)	.82360750E+00
NEW GOVT ( 78)	.48587084E+00	APPAREL ( 39)	.69782966E+00
MAINT RESI ( 31)	.73516089E+00	FURNITURE ( 16)	.86369532E+00
MAINT NEC ( 43)	.67053163E+00	RESTAURANT ( 45)	.65635014E+00
MEAT PROC ( 67)	.54521054E+00	RETAIL NEC ( 29)	.75142640E+00
DAIRY PROD ( 70)	.54358858E+00	F-I-R-E ( 72)	.54117894E+00
CAN/FREEZE ( 66)	.54589260E+00	LODGING ( 49)	.64583838E+00
OTHER FOOD ( 62)	.55950540E+00	PER SERVIC ( 40)	.69455004E+00
GRAIN PROC ( 59)	.57935137E+00	BUS SERVIC ( 42)	.67946088E+00
TEXTILES ( 57)	.59283501E+00	DATA PROCE ( 51)	.63060737E+00
LOGGING ( 50)	.63564003E+00	DETECTIVE ( 13)	.91636133E+00
SAWMILLS ( 55)	.60450196E+00	AUTO SERVI ( 52)	.62766439E+00
WOOD PRODU ( 68)	.54425120E+00	REPAIR SER ( 34)	.71120882E+00
MFG NEC ( 74)	.52241653E+00	AMUSEMENTS ( 56)	.59518844E+00
PAPER MILL ( 83)	.45827192E+00	HEALTH SER ( 24)	.79027361E+00
PAPER PROD ( 53)	.62047654E+00	PROF SERVI ( 36)	.70602208E+00
PRINT/PUBL ( 38)	.69843513E+00	EDUCATION ( 26)	.75795680E+00
CHEMICALS ( 77)	.49566478E+00	SOC SERVIC ( 18)	.84877950E+00
REFINING ( 64)	.55241710E+00	ASSOCIATNS ( 17)	.86195016E+00
RUBBER PRO ( 60)	.57898772E+00	S & L GOVT ( 54)	.61992508E+00
CLAY PROD ( 69)	.54403448E+00	GOV ELECTR ( 86)	.43559444E+00
PRIM METAL ( 79)	.47962368E+00	POSTAL SER ( 6)	.10530679E+01
PRI ALUMIN ( 65)	.54867274E+00	GOVT NEC ( 1)	.13689710E+01
		HOUSEHOLDS ( 91)	.36915213E+00

**Table 2-19**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF WASHINGTON 1994**

NAME (RANK)	MULTIPLIER	SEC ALUMIN ( 93)	1.9216
DAIRY/POUL ( 56)	2.3539	FAB METALS ( 84)	2.1292
CATTLE ( 63)	2.3181	MACHINERY ( 70)	2.2602
MEAT ANIM ( 90)	2.0047	COMPUTERS ( 86)	2.1167
LVSTK NEC ( 45)	2.5203	ELECT GOOD ( 80)	2.1599
FOOD GRAIN ( 19)	2.7284	ELECTRONIC ( 82)	2.1407
FEED GRAIN ( 25)	2.6756	VEHICLES ( 96)	1.8343
HAY ( 5)	3.0523	AIRCRAFT ( 78)	2.1915
OTHER CROP ( 4)	3.2324	AIR PARTS ( 74)	2.2397
FRUIT/NUTS ( 6)	3.0354	MARINE MFG ( 67)	2.2838
VEGETABLES ( 3)	3.2386	INSTRUMENT ( 72)	2.2441
OIL CROPS ( 16)	2.7700	RAILROADS ( 22)	2.7001
FORESTRY ( 27)	2.6698	OTHER TRAN ( 36)	2.5882
NURS/LNDSC ( 14)	2.7932	TRUCK/WARE ( 15)	2.7791
FISHING ( 60)	2.3266	WATER TRAN ( 61)	2.3238
AG SERVICE ( 18)	2.7287	AIR TRANSP ( 68)	2.2677
METAL MINE ( 59)	2.3372	PIPE LINES ( 97)	1.8307
OTHER MINE ( 52)	2.4182	TELEPHONE ( 83)	2.1406
COAL MINE ( 81)	2.1581	RADIO/TV ( 17)	2.7365
GAS EXTRAC ( 71)	2.2580	ELECTRICIT ( 89)	2.0079
SAND & GRA ( 23)	2.6866	GAS ( 98)	1.6670
NEW RESI B ( 12)	2.8059	WATER/SANI ( 42)	2.5246
NEW IND & ( 11)	2.8085	WHOLESALE ( 37)	2.5865
NEW UTIL ( 51)	2.4641	BLDG & GAR ( 29)	2.6520
NEW ROADS ( 66)	2.2961	DEPT STORE ( 46)	2.5147
NEW FARM ( 55)	2.3740	GROCERIES ( 43)	2.5226
NEW EXTRAC ( 24)	2.6862	AUTO DLRS ( 31)	2.6305
NEW GOVT ( 75)	2.2313	APPAREL ( 47)	2.4952
MAINT RESI ( 21)	2.7118	FURNITURE ( 30)	2.6346
MAINT NEC ( 48)	2.4856	RESTAURANT ( 34)	2.6040
MEAT PROC ( 20)	2.7123	RETAIL NEC ( 44)	2.5205
DAIRY PROD ( 54)	2.3747	F-I-R-E ( 79)	2.1846
CAN/FREEZE ( 76)	2.2123	LODGING ( 50)	2.4648
OTHER FOOD ( 91)	2.0024	PER SERVIC ( 33)	2.6209
GRAIN PROC ( 92)	1.9840	BUS SERVIC ( 40)	2.5751
TEXTILES ( 88)	2.0273	DATA PROCE ( 49)	2.4676
LOGGING ( 94)	1.9135	DETECTIVE ( 7)	2.9794
SAWMILLS ( 35)	2.6013	AUTO SERVI ( 38)	2.5814
WOOD PRODU ( 39)	2.5779	REPAIR SER ( 41)	2.5286
MFG NEC ( 73)	2.2423	AMUSEMENTS ( 26)	2.6709
PAPER MILL ( 69)	2.2644	HEALTH SER ( 28)	2.6597
PAPER PROD ( 95)	1.8921	PROF SERVI ( 32)	2.6240
PRINT/PUBL ( 65)	2.3019	EDUCATION ( 13)	2.7976
CHEMICALS ( 85)	2.1208	SOC SERVIC ( 10)	2.8582
REFINING ( 99)	1.3722	ASSOCIATNS ( 9)	2.8877
RUBBER PRO ( 64)	2.3077	S & L GOVT ( 8)	2.9653
CLAY PRODU ( 58)	2.3443	GOV ELECTR ( 62)	2.3191
PRIM METAL ( 53)	2.4034	POSTAL SER ( 1)	3.3384
PRI ALUMIN ( 77)	2.2099	GOVT NEC ( 2)	3.3354
		HOUSEHOLDS ( 57)	2.3474

**Table 2-20**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF WASHINGTON 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 53)	.18391416E-04	FAB METALS ( 68)	.15174108E-04
CATTLE ( 51)	.19654708E-04	MACHINERY ( 66)	.16260072E-04
MEAT ANIM ( 15)	.40089773E-04	COMPUTERS ( 84)	.12077242E-04
LVSTK NEC ( 4)	.61028957E-04	ELECT GOOD ( 72)	.14338453E-04
FOOD GRAIN ( 26)	.29936426E-04	ELECTRONIC ( 73)	.14257935E-04
FEED GRAIN ( 42)	.22202499E-04	VEHICLES ( 95)	.89195446E-05
HAY ( 2)	.64543332E-04	AIRCRAFT ( 78)	.13317785E-04
OTHER CROP ( 10)	.42658321E-04	AIR PARTS ( 67)	.15965192E-04
FRUIT/NUTS ( 16)	.39689778E-04	MARINE MFG ( 54)	.18243323E-04
VEGETABLES ( 40)	.23871562E-04	INSTRUMENT ( 71)	.14459548E-04
OIL CROPS ( 12)	.40547195E-04	RAILROADS ( 52)	.19361420E-04
FORESTRY ( 29)	.27393098E-04	OTHER TRAN ( 28)	.28907834E-04
NURS/LNDSC ( 9)	.44723409E-04	TRUCK/WARE ( 32)	.26539768E-04
FISHING ( 60)	.17040453E-04	WATER TRAN ( 70)	.14576558E-04
AG SERVICE ( 3)	.61356106E-04	AIR TRANSP ( 63)	.16756701E-04
METAL MINE ( 79)	.12460143E-04	PIPE LINES ( 96)	.78547318E-05
OTHER MINE ( 58)	.17548085E-04	TELEPHONE ( 90)	.11267123E-04
COAL MINE ( 85)	.11863463E-04	RADIO/TV ( 41)	.22823135E-04
GAS EXTRAC ( 18)	.37811729E-04	ELECTRICIT ( 94)	.96758886E-05
SAND & GRA ( 47)	.20591104E-04	GAS ( 97)	.58056789E-05
NEW RESI B ( 35)	.26059895E-04	WATER/SANI ( 65)	.16325779E-04
NEW IND & ( 34)	.26300324E-04	WHOLESALE ( 43)	.21899645E-04
NEW UTIL ( 44)	.21605547E-04	BLDG & GAR ( 22)	.31142896E-04
NEW ROADS ( 55)	.18236840E-04	DEPT STORE ( 21)	.34961296E-04
NEW FARM ( 75)	.14139181E-04	GROCERIES ( 20)	.35752637E-04
NEW EXTRAC ( 31)	.27051577E-04	AUTO DLRS ( 33)	.26311145E-04
NEW GOVT ( 87)	.11653541E-04	APPAREL ( 23)	.30724404E-04
MAINT RESI ( 38)	.24506344E-04	FURNITURE ( 25)	.30292498E-04
MAINT NEC ( 48)	.20071902E-04	RESTAURANT ( 17)	.38562099E-04
MEAT PROC ( 61)	.16862490E-04	RETAIL NEC ( 5)	.51394014E-04
DAIRY PROD ( 81)	.12416211E-04	F-I-R-E ( 74)	.14227837E-04
CAN/FREEZE ( 69)	.15117537E-04	LODGING ( 24)	.30683648E-04
OTHER FOOD ( 86)	.11750044E-04	PER SERVIC ( 8)	.44826164E-04
GRAIN PROC ( 80)	.12448892E-04	BUS SERVIC ( 11)	.42582666E-04
TEXTILES ( 50)	.19846224E-04	DATA PROCE ( 62)	.16760065E-04
LOGGING ( 91)	.10992376E-04	DETECTIVE ( 1)	.73241514E-04
SAWMILLS ( 64)	.16746149E-04	AUTO SERVI ( 37)	.24764131E-04
WOOD PRODU ( 49)	.20057143E-04	REPAIR SER ( 39)	.24355339E-04
MFG NEC ( 57)	.17678469E-04	AMUSEMENTS ( 19)	.35837635E-04
PAPER MILL ( 83)	.12079980E-04	HEALTH SER ( 30)	.27211458E-04
PAPER PROD ( 92)	.10761779E-04	PROF SERVI ( 36)	.24895920E-04
PRINT/PUBL ( 46)	.20661766E-04	EDUCATION ( 13)	.40438801E-04
CHEMICALS ( 88)	.11432754E-04	SOC SERVIC ( 6)	.46292698E-04
REFINING ( 99)	.33768945E-05	ASSOCIATNS ( 14)	.40328439E-04
RUBBER PRO ( 56)	.17897808E-04	S & L GOVT ( 45)	.21337404E-04
CLAY PRODU ( 59)	.17081902E-04	GOV ELECTR ( 82)	.12341510E-04
PRIM METAL ( 76)	.13880423E-04	POSTAL SER ( 27)	.29905323E-04
PRI ALUMIN ( 89)	.11403116E-04	GOVT NEC ( 7)	.45270539E-04
SEC ALUMIN ( 93)	.10232975E-04	HOUSEHOLDS ( 77)	.13879754E-04

**Table 2-21**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF WASHINGTON 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 44)	.68748921E+00	FAB METALS ( 69)	.51554507E+00
CATTLE ( 53)	.61925030E+00	MACHINERY ( 57)	.59227532E+00
MEAT ANIM ( 81)	.46965963E+00	COMPUTERS ( 82)	.46503443E+00
LVSTK NEC ( 23)	.81291926E+00	ELECT GOOD ( 76)	.48724887E+00
FOOD GRAIN ( 22)	.81529862E+00	ELECTRONIC ( 74)	.48999283E+00
FEED GRAIN ( 19)	.83661437E+00	VEHICLES ( 95)	.32401884E+00
HAY ( 5)	.11385098E+01	AIRCRAFT ( 63)	.56849509E+00
OTHER CROP ( 2)	.12604120E+01	AIR PARTS ( 56)	.59785861E+00
FRUIT/NUTS ( 7)	.10081151E+01	MARINE MFG ( 52)	.62696666E+00
VEGETABLES ( 3)	.12533236E+01	INSTRUMENT ( 60)	.57919496E+00
OIL CROPS ( 17)	.84185547E+00	RAILROADS ( 43)	.69108605E+00
FORESTRY ( 45)	.68548095E+00	OTHER TRAN ( 46)	.67984450E+00
NURS/LNDSC ( 11)	.90502208E+00	TRUCK/WARE ( 48)	.66585332E+00
FISHING ( 41)	.70289487E+00	WATER TRAN ( 83)	.46253675E+00
AG SERVICE ( 13)	.88543642E+00	AIR TRANSP ( 72)	.49408686E+00
METAL MINE ( 65)	.54421324E+00	PIPE LINES ( 96)	.27840695E+00
OTHER MINE ( 49)	.66522372E+00	TELEPHONE ( 85)	.45170885E+00
COAL MINE ( 75)	.48811510E+00	RADIO/TV ( 47)	.67607230E+00
GAS EXTRAC ( 68)	.52070171E+00	ELECTRICIT ( 90)	.40441909E+00
SAND & GRA ( 14)	.87334478E+00	GAS ( 97)	.24213909E+00
NEW RESI B ( 16)	.85588938E+00	WATER/SANI ( 64)	.54961324E+00
NEW IND & ( 8)	.97216809E+00	WHOLESALE ( 38)	.72967356E+00
NEW UTIL ( 31)	.76200813E+00	BLDG & GAR ( 15)	.85896492E+00
NEW ROADS ( 54)	.61467546E+00	DEPT STORE ( 30)	.76728863E+00
NEW FARM ( 59)	.57975227E+00	GROCERIES ( 28)	.79484361E+00
NEW EXTRAC ( 9)	.96327543E+00	AUTO DLRS ( 25)	.81028730E+00
NEW GOVT ( 89)	.42420277E+00	APPAREL ( 40)	.70331335E+00
MAINT RESI ( 24)	.81174332E+00	FURNITURE ( 20)	.82603699E+00
MAINT NEC ( 37)	.73212534E+00	RESTAURANT ( 42)	.69692743E+00
MEAT PROC ( 70)	.50384814E+00	RETAIL NEC ( 29)	.77702874E+00
DAIRY PROD ( 84)	.45762461E+00	F-I-R-E ( 71)	.49476999E+00
CAN/FREEZE ( 73)	.49393690E+00	LODGING ( 50)	.66309452E+00
OTHER FOOD ( 92)	.38816667E+00	PER SERVIC ( 33)	.74974221E+00
GRAIN PROC ( 88)	.42662737E+00	BUS SERVIC ( 21)	.82287186E+00
TEXTILES ( 79)	.47719038E+00	DATA PROCE ( 35)	.73836529E+00
LOGGING ( 87)	.42936832E+00	DETECTIVE ( 6)	.10663403E+01
SAWMILLS ( 61)	.57587045E+00	AUTO SERVI ( 36)	.73773837E+00
WOOD PRODU ( 55)	.60063529E+00	REPAIR SER ( 34)	.74892652E+00
MFG NEC ( 66)	.54362822E+00	AMUSEMENTS ( 39)	.71022600E+00
PAPER MILL ( 78)	.48472679E+00	HEALTH SER ( 18)	.83994514E+00
PAPER PROD ( 91)	.39937511E+00	PROF SERVI ( 26)	.80726588E+00
PRINT/PUBL ( 51)	.65262163E+00	EDUCATION ( 27)	.80093992E+00
CHEMICALS ( 80)	.47680378E+00	SOC SERVIC ( 10)	.90742338E+00
REFINING ( 98)	.14268219E+00	ASSOCIATNS ( 12)	.89941847E+00
RUBBER PRO ( 62)	.57207215E+00	S & L GOVT ( 32)	.75431585E+00
CLAY PRODU ( 58)	.58369541E+00	GOV ELECTR ( 77)	.48623016E+00
PRIM METAL ( 67)	.52102900E+00	POSTAL SER ( 4)	.11774553E+01
PRI ALUMIN ( 86)	.44618392E+00	GOVT NEC ( 1)	.13592509E+01
SEC ALUMIN ( 93)	.38441879E+00	HOUSEHOLDS ( 94)	.36736023E+00

**Table 2-22**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF OREGON 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 74)	2.3937	SEC ALUMIN ( 93)	2.0289
CATTLE ( 58)	2.5555	FAB METALS ( 76)	2.3895
MEAT ANI N ( 63)	2.4629	MACHINERY ( 71)	2.4126
LVSTK NEC ( 49)	2.7121	COMPUTERS ( 81)	2.3141
FOOD GRAIN ( 25)	2.9132	ELECTRICAL ( 54)	2.6454
FEED GRAIN ( 24)	2.9435	ELECTRONIC ( 60)	2.5333
HAY ( 6)	3.2315	VEHICLES ( 94)	2.0120
CROPS NEC ( 5)	3.3173	AIRCRAFT ( 66)	2.4487
FRUIT/NUTS ( 7)	3.1148	MARINE EQU ( 64)	2.4586
VEGETABLES ( 3)	3.3293	INSTRUMENT ( 59)	2.5347
SUGAR CROP ( 4)	3.3185	RAILROADS ( 27)	2.9079
OIL CROPS ( 43)	2.7910	TRANS NEC ( 56)	2.6177
FORESTRY ( 36)	2.8436	TRUCK/WARE ( 19)	3.0031
NURS/LNDSC ( 30)	2.8985	WATER TRAN ( 67)	2.4336
FISHING ( 17)	3.0343	AIR TRANSP ( 83)	2.3081
AG SERVICE ( 16)	3.0357	PIPE LINES ( 96)	1.8378
METAL MINE ( 75)	2.3902	TELEPHONE ( 73)	2.3963
MINES NEC ( 55)	2.6252	RADIO/TV ( 22)	2.9654
COAL MINES ( 97)	1.7787	ELECTRICIT ( 91)	2.0943
GAS EXTRAC ( 33)	2.8719	GAS ( 98)	1.7170
SAND & GRA ( 35)	2.8454	WATER/SANI ( 52)	2.6692
NEW RESI ( 10)	3.0750	WHOLESALE ( 39)	2.8237
NEW INDUST ( 12)	3.0651	BLDG GARDE ( 14)	3.0555
NEW UTILIT ( 51)	2.6745	DEPT STORE ( 29)	2.9032
NEW ROADS ( 77)	2.3809	GROCERIES ( 32)	2.8779
NEW FARM B ( 57)	2.5773	AUTO DLRS ( 21)	2.9757
NEW EXTRAC ( 34)	2.8479	APPAREL ( 31)	2.8844
NEW GOV'T ( 65)	2.4548	FURNITURE ( 9)	3.0798
MAINT RESI ( 23)	2.9647	RESTAURANT ( 38)	2.8347
MAINT NEC ( 48)	2.7212	RETAIL NEC ( 28)	2.9033
MEAT PROC ( 53)	2.6523	F-I-R-E ( 82)	2.3110
DAIRY PROD ( 72)	2.3968	LODGING ( 46)	2.7405
CAN/FREEZE ( 79)	2.3485	PERS SERVI ( 40)	2.8178
FOODS NEC ( 87)	2.1589	BUS SERVI ( 47)	2.7382
GRAIN PROC ( 90)	2.1035	DATA PROCE ( 44)	2.7574
MFG NEC ( 69)	2.4188	DETECTIVE ( 8)	3.1031
TEXTILES ( 89)	2.1238	AUTO SERVI ( 45)	2.7534
LOGGING ( 92)	2.0379	REPAIR SER ( 37)	2.8419
SAWMILLS ( 42)	2.7911	AMUSEMENTS ( 26)	2.9106
WOOD PRODU ( 50)	2.7091	HEALTH SER ( 41)	2.7983
PAPER MILL ( 80)	2.3163	PROF SERVI ( 20)	2.9776
PAPER PROD ( 95)	1.9490	EDUCATION ( 18)	3.0269
PRINT/PUBL ( 68)	2.4282	SOC SERVIC ( 13)	3.0639
CHEMICALS ( 85)	2.2097	ASSOCIATNS ( 11)	3.0719
REFINING ( 88)	2.1440	S & L GOV'T ( 15)	3.0512
RUBBER PRO ( 70)	2.4163	GOV ELECTR ( 78)	2.3701
CLAY PRODU ( 62)	2.4767	POSTAL SER ( 1)	3.5440
PRIM METAL ( 84)	2.2840	GOV'T NEC ( 2)	3.5155
PRI ALUMIN ( 86)	2.1749	HOUSEHOLDS ( 61)	2.5162

**Table 2-23**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF OREGON 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 57)	.21121803E-04	PRI ALUMIN ( 91)	.12006954E-04
CATTLE ( 33)	.31490006E-04	SEC ALUMIN ( 89)	.13050602E-04
MEAT ANI N ( 1)	.89365931E-04	FAB METALS ( 68)	.18948806E-04
LVSTK NEC ( 2)	.76938013E-04	MACHINERY ( 70)	.18377772E-04
FOOD GRAIN ( 24)	.37674403E-04	COMPUTERS ( 83)	.14200007E-04
FEED GRAIN ( 40)	.32935002E-04	ELECTRICAL ( 60)	.20587489E-04
HAY ( 4)	.71886767E-04	ELECTRONIC ( 72)	.17477925E-04
CROPS NEC ( 5)	.67357039E-04	VEHICLES ( 95)	.11067681E-04
FRUIT/NUTS ( 13)	.47090914E-04	AIRCRAFT ( 73)	.17301121E-04
VEGETABLES ( 42)	.28759174E-04	MARINE EQU ( 56)	.21157355E-04
SUGAR CROP ( 26)	.34940695E-04	INSTRUMENT ( 71)	.18205144E-04
OIL CROPS ( 25)	.36775560E-04	RAILROADS ( 55)	.21864316E-04
FORESTRY ( 32)	.32675827E-04	TRANS NEC ( 29)	.33495548E-04
NURS/LNDSC ( 16)	.44634482E-04	TRUCK/WARE ( 38)	.29699302E-04
FISHING ( 27)	.34407654E-04	WATER TRAN ( 76)	.16569169E-04
AG SERVICE ( 6)	.67140405E-04	AIR TRANSP ( 67)	.19002007E-04
METAL MINE ( 78)	.15496445E-04	PIPE LINES ( 97)	.82427960E-05
MINES NEC ( 58)	.20870457E-04	TELEPHONE ( 81)	.14741891E-04
COAL MINES ( 96)	.87978242E-05	RADIO/TV ( 44)	.27507889E-04
GAS EXTRAC ( 45)	.26585520E-04	ELECTRICIT ( 94)	.11326410E-04
SAND & GRA ( 51)	.22717581E-04	GAS ( 98)	.67458764E-05
NEW RESI ( 35)	.30904863E-04	WATER/SANI ( 66)	.19373359E-04
NEW INDUST ( 34)	.31068412E-04	WHOLESALE ( 46)	.26271658E-04
NEW UTILIT ( 47)	.25665253E-04	BLDG GARDE ( 23)	.39297411E-04
NEW ROADS ( 59)	.20850710E-04	DEPT STORE ( 20)	.43208813E-04
NEW FARM B ( 74)	.17139457E-04	GROCERIES ( 14)	.46894333E-04
NEW EXTRAC ( 37)	.30429404E-04	AUTO DLRS ( 28)	.33945318E-04
NEW GOVT ( 80)	.15061754E-04	APPAREL ( 12)	.47258967E-04
MAINT RESI ( 41)	.29103598E-04	FURNITURE ( 21)	.40179304E-04
MAINT NEC ( 49)	.23733321E-04	RESTAURANT ( 18)	.43671625E-04
MEAT PROC ( 54)	.21904094E-04	RETAIL NEC ( 7)	.64510721E-04
DAIRY PROD ( 84)	.13807021E-04	F-I-R-E ( 77)	.15916967E-04
CAN/FREEZE ( 69)	.18563838E-04	LODGING ( 22)	.39519902E-04
FOODS NEC ( 85)	.13500179E-04	PERS SERVI ( 9)	.50170787E-04
GRAIN PROC ( 82)	.14576503E-04	BUS SERVI ( 11)	.47386475E-04
MFG NEC ( 63)	.19939982E-04	DATA PROCE ( 48)	.24049228E-04
TEXTILES ( 53)	.22398845E-04	DETECTIVE ( 3)	.74179108E-04
LOGGING ( 90)	.12709378E-04	AUTO SERVI ( 43)	.28485783E-04
SAWMILLS ( 62)	.19990912E-04	REPAIR SER ( 36)	.30740252E-04
WOOD PRODU ( 64)	.19717085E-04	AMUSEMENTS ( 19)	.43272750E-04
PAPER MILL ( 86)	.13304858E-04	HEALTH SER ( 39)	.29552553E-04
PAPER PROD ( 93)	.11593296E-04	PROF SERVI ( 31)	.32862325E-04
PRINT/PUBL ( 52)	.22476075E-04	EDUCATION ( 17)	.44554916E-04
CHEMICALS ( 88)	.13214992E-04	SOC SERVIC ( 8)	.50831164E-04
REFINING ( 92)	.11886672E-04	ASSOCIATNS ( 15)	.45035224E-04
RUBBER PRO ( 65)	.19665693E-04	S & L GOVT ( 50)	.23435443E-04
CLAY PRODU ( 61)	.20498772E-04	GOV ELECTR ( 87)	.13226981E-04
PRIM METAL ( 79)	.15291465E-04	POSTAL SER ( 30)	.33301694E-04
		GOVT NEC ( 10)	.50152717E-04
		HOUSEHOLDS ( 75)	.16943022E-04

**Table 2-24**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF OREGON 1994**

NAME (RANK)	MULTIPLIER	SEC ALUMIN ( 92)	.43033358E+00
DAIRY/POUL ( 58)	.66652000E+00	FAB METALS ( 65)	.63113809E+00
CATTLE ( 52)	.72606868E+00	MACHINERY ( 62)	.64889300E+00
MEAT ANI N ( 67)	.61728889E+00	COMPUTERS ( 75)	.54322565E+00
LVSTK NEC ( 31)	.88641155E+00	ELECTRICAL ( 51)	.73871976E+00
FOOD GRAIN ( 25)	.92933863E+00	ELECTRONIC ( 60)	.65147036E+00
FEED GRAIN ( 15)	.99288255E+00	VEHICLES ( 95)	.37283611E+00
HAY ( 4)	.12310082E+01	AIRCRAFT ( 54)	.69079846E+00
CROPS NEC ( 6)	.12216064E+01	MARINE EQU ( 53)	.71135819E+00
FRUIT/NUTS ( 21)	.95849979E+00	INSTRUMENT ( 57)	.68472862E+00
VEGETABLES ( 5)	.12255696E+01	RAILROADS ( 42)	.80087346E+00
SUGAR CROP ( 2)	.12673731E+01	TRANS NEC ( 56)	.68900126E+00
OIL CROPS ( 40)	.80637306E+00	TRUCK/WARE ( 50)	.74795479E+00
FORESTRY ( 47)	.77035350E+00	WATER TRAN ( 78)	.51420075E+00
NURS/LNDSC ( 35)	.85471517E+00	AIR TRANSP ( 77)	.51574075E+00
FISHING ( 8)	.10898654E+01	PIPE LINES ( 97)	.28517950E+00
AG SERVICE ( 13)	.10236400E+01	TELEPHONE ( 72)	.54722434E+00
METAL MINE ( 71)	.57233566E+00	RADIO/TV ( 49)	.75223339E+00
MINES NEC ( 48)	.76569098E+00	ELECTRICIT ( 88)	.44920477E+00
COAL MINES ( 96)	.29535279E+00	GAS ( 98)	.26983327E+00
GAS EXTRAC ( 27)	.91531527E+00	WATER/SANI ( 70)	.60135013E+00
SAND & GRA ( 23)	.94352382E+00	WHOLESALE ( 37)	.83056247E+00
NEW RESI ( 19)	.96481490E+00	BLDG GARDE ( 10)	.10620561E+01
NEW INDUST ( 9)	.10834023E+01	DEPT STORE ( 20)	.96324575E+00
NEW UTILIT ( 34)	.85671270E+00	GROCERIES ( 17)	.97278130E+00
NEW ROADS ( 69)	.60719162E+00	AUTO DLRS ( 16)	.97935146E+00
NEW FARM B ( 63)	.64874756E+00	APPAREL ( 29)	.89549416E+00
NEW EXTRAC ( 12)	.10302020E+01	FURNITURE ( 11)	.10522367E+01
NEW GOVT ( 82)	.50210214E+00	RESTAURANT ( 45)	.78812027E+00
MAINT RESI ( 26)	.91672945E+00	RETAIL NEC ( 18)	.97016978E+00
MAINT NEC ( 39)	.82136804E+00	F-I-R-E ( 73)	.54709345E+00
MEAT PROC ( 76)	.53694624E+00	LODGING ( 46)	.78282285E+00
DAIRY PROD ( 89)	.44289574E+00	PERS SERVI ( 38)	.82934129E+00
CAN/FREEZE ( 84)	.49958184E+00	BUS SERVI ( 28)	.89938498E+00
FOODS NEC ( 93)	.41830245E+00	DATA PROCE ( 36)	.84077269E+00
GRAIN PROC ( 87)	.46253911E+00	DETECTIVE ( 7)	.10984973E+01
MFG NEC ( 68)	.61408472E+00	AUTO SERVI ( 41)	.80496812E+00
TEXTILES ( 80)	.50693893E+00	REPAIR SER ( 33)	.87972885E+00
LOGGING ( 85)	.48566777E+00	AMUSEMENTS ( 44)	.79033262E+00
SAWMILLS ( 61)	.65055931E+00	HEALTH SER ( 30)	.89102542E+00
WOOD PRODU ( 66)	.61923420E+00	PROF SERVI ( 24)	.93762088E+00
PAPER MILL ( 81)	.50515699E+00	EDUCATION ( 32)	.88288987E+00
PAPER PROD ( 94)	.41256723E+00	SOC SERVIC ( 14)	.10051398E+01
PRINT/PUBL ( 55)	.68922293E+00	ASSOCIATNS ( 22)	.94521523E+00
CHEMICALS ( 79)	.50730586E+00	S & L GOVT ( 43)	.79306358E+00
REFINING ( 91)	.43149868E+00	GOV ELECTR ( 83)	.50046527E+00
RUBBER PRO ( 64)	.63249046E+00	POSTAL SER ( 3)	.12544010E+01
CLAY PRODU ( 59)	.65176624E+00	GOVT NEC ( 1)	.14312303E+01
PRIM METAL ( 74)	.54528958E+00	HOUSEHOLDS ( 90)	.43167055E+00
PRI ALUMIN ( 86)	.47054872E+00		

**Table 2-25**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF IDAHO 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 43)	2.5351	FAB METALS ( 83)	2.0779
CATTLE ( 46)	2.5175	MACHINES ( 72)	2.2018
MEAT ANIMA ( 45)	2.5204	COMPUTERS ( 92)	1.8529
LVSTK NEC ( 41)	2.5601	ELECTRIC G ( 82)	2.0915
FOOD GRAIN ( 18)	2.7600	ELECTRONIC ( 67)	2.2718
FEED GRAIN ( 16)	2.8149	VEHICLES ( 90)	1.9299
HAY/PASTUR ( 8)	3.0589	AIRCRAFT ( 86)	2.0262
GRASS SEED ( 4)	3.1592	AIR PARTS ( 47)	2.5075
FRUIT/NUTS ( 7)	3.0997	BOAT BLDV ( 53)	2.4379
VEGETABLES ( 3)	3.1980	INSTRUMENT ( 56)	2.4274
SUGAR CROP ( 5)	3.1414	RAILROADS ( 40)	2.6019
OIL CROPS ( 12)	2.8844	TRANSP NEC ( 33)	2.6384
FORESTRY ( 10)	2.9552	TRUCK/WH ( 6)	3.1212
NURSERY/LA ( 17)	2.8071	WATER TRAN ( 88)	1.9566
FISHING ( 13)	2.8816	AIR TRANSP ( 75)	2.1405
AG SERVICE ( 15)	2.8299	PIPE LINES ( 22)	2.7030
COPPER MIN ( 52)	2.4487	TELEPHONE ( 79)	2.1173
MINES NEC ( 91)	1.9174	RADIO/TV ( 54)	2.4315
COAL MINES ( 98)	1.6802	ELECTRIC ( 77)	2.1269
GAS EXTRAC ( 14)	2.8509	GAS DIST ( 96)	1.7284
SAND/GRAVE ( 44)	2.5216	WATER/SANI ( 48)	2.5063
NEW RESI ( 21)	2.7426	WHOLESALE ( 55)	2.4297
NEW INDUST ( 20)	2.7574	BLDG MATER ( 27)	2.6767
NEW UTILI ( 73)	2.1825	DEPT STORE ( 28)	2.6721
NEW ROADS ( 84)	2.0590	GROCERIES ( 50)	2.4892
NEW FARM ( 71)	2.2035	AUTO DLRS ( 31)	2.6409
NEW EXTRAC ( 59)	2.3764	APPAREL ( 36)	2.6229
NEW GOVT ( 87)	1.9789	FURNITURE ( 23)	2.6884
RESI MAINT ( 37)	2.6215	RESTAURANT ( 61)	2.3727
MAINT NEC ( 60)	2.3744	RETAIL NEC ( 25)	2.6855
MEAT PROC ( 9)	3.0353	F-I-R-E ( 80)	2.1061
DAIRY PROC ( 39)	2.6027	LODGING ( 49)	2.5033
CAN/FREEZE ( 85)	2.0333	PER SERV ( 29)	2.6663
FOODS NEC ( 69)	2.2545	BUS SERV ( 38)	2.6192
GRAIN PROC ( 89)	1.9484	DATA PROC ( 78)	2.1235
MFG NEC ( 63)	2.3000	DETECTIVE ( 30)	2.6498
TEXTILES ( 95)	1.7701	AUTO SERV ( 51)	2.4829
LOGGING ( 99)	1.6679	REPAIR SER ( 24)	2.6862
SAWMILLS ( 62)	2.3446	AMUSEMENTS ( 26)	2.6847
WOOD PROD ( 65)	2.2793	HEALTH SER ( 32)	2.6388
PAPER MILL ( 81)	2.0922	PROF SERV ( 11)	2.9034
PAPER PROD ( 93)	1.8514	EDUCATION ( 35)	2.6275
PRINT/PUBL ( 58)	2.3967	SOC SERV ( 19)	2.7585
CHEMICALS ( 57)	2.4040	ASSOCIATNS ( 34)	2.6372
REFINING ( 97)	1.7044	S & L GOV ( 42)	2.5464
RUBBER PRO ( 64)	2.2906	ELECT GOV ( 76)	2.1305
CLAY PRODS ( 70)	2.2323	POSTAL SER ( 1)	3.2754
PRIM METAL ( 68)	2.2555	GOVT NEC ( 2)	3.2683
ALUMINUM ( 74)	2.1415	HOUSEHOLDS ( 66)	2.2733

**Table 2-26**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF IDAHO 1994**

NAME (RANK) MULTIPLIER	ALUMINUM ( 64) .19533663E-04
DAIRY/POUL ( 70) .17545122E-04	FAB METALS ( 69) .17588847E-04
CATTLE ( 59) .20546688E-04	MACHINES ( 68) .17756152E-04
MEAT ANIMA ( 5) .55459619E-04	COMPUTERS ( 95) .10454261E-04
LVSTK NEC ( 30) .33703887E-04	ELECTRIC G ( 67) .18176570E-04
FOOD GRAIN ( 35) .32790605E-04	ELECTRONIC ( 79) .15434791E-04
FEED GRAIN ( 43) .26023285E-04	VEHICLES ( 84) .14498537E-04
HAY/PASTUR ( 14) .44957575E-04	AIRCRAFT ( 76) .15799424E-04
GRASS SEED ( 20) .40647494E-04	AIR PARTS ( 52) .21548069E-04
FRUIT/NUTS ( 25) .36617545E-04	BOAT BLDV ( 56) .20794070E-04
VEGETABLES ( 50) .22484641E-04	INSTRUMENT ( 62) .19804347E-04
SUGAR CROP ( 41) .26944625E-04	RAILROADS ( 55) .20977448E-04
OIL CROPS ( 22) .39372364E-04	TRANSP NEC ( 24) .38840924E-04
FORESTRY ( 28) .35173569E-04	TRUCK/WH ( 29) .34356464E-04
NURSERY/LA ( 11) .47955033E-04	WATER TRAN ( 81) .15138922E-04
FISHING ( 16) .43776487E-04	AIR TRANSP ( 58) .20562877E-04
AG SERVICE ( 3) .67632915E-04	PIPE LINES ( 78) .15489046E-04
COPPER MIN ( 66) .18179710E-04	TELEPHONE ( 89) .13301171E-04
MINES NEC ( 92) .11832479E-04	RADIO/TV ( 47) .24758776E-04
COAL MINES ( 87) .13887704E-04	ELECTRIC ( 90) .12775478E-04
GAS EXTRAC ( 1) .17269384E-03	GAS DIST ( 98) .75424450E-05
SAND/GRAVE ( 61) .19832183E-04	WATER/SANI ( 63) .19688601E-04
NEW RESI ( 37) .32040931E-04	WHOLESALE ( 42) .26198750E-04
NEW INDUST ( 32) .33417069E-04	BLDG MATER ( 26) .36409227E-04
NEW UTILI ( 44) .25785626E-04	DEPT STORE ( 15) .44068056E-04
NEW ROADS ( 57) .20699195E-04	GROCERIES ( 19) .40666295E-04
NEW FARM ( 80) .15301162E-04	AUTO DLRS ( 33) .33392917E-04
NEW EXTRAC ( 36) .32276046E-04	APPAREL ( 9) .49884602E-04
NEW GOVT ( 93) .11714621E-04	FURNITURE ( 23) .39117160E-04
RESI MAINT ( 40) .29858455E-04	RESTAURANT ( 17) .43432774E-04
MAINT NEC ( 49) .23893892E-04	RETAIL NEC ( 2) .68944631E-04
MEAT PROC ( 60) .20088910E-04	F-I-R-E ( 72) .16672313E-04
DAIRY PROC ( 86) .14211476E-04	LODGING ( 18) .42166150E-04
CAN/FREEZE ( 83) .14655589E-04	PER SERV ( 4) .58621554E-04
FOODS NEC ( 73) .16239132E-04	BUS SERV ( 7) .53735701E-04
GRAIN PROC ( 88) .13386212E-04	DATA PROC ( 48) .24000612E-04
MFG NEC ( 51) .22389722E-04	DETECTIVE ( 10) .48764065E-04
TEXTILES ( 46) .25303272E-04	AUTO SERV ( 39) .30985386E-04
LOGGING ( 96) .99858908E-05	REPAIR SER ( 27) .35498171E-04
SAWMILLS ( 77) .15713749E-04	AMUSEMENTS ( 12) .47410733E-04
WOOD PROD ( 71) .17010518E-04	HEALTH SER ( 38) .31162781E-04
PAPER MILL ( 94) .11383059E-04	PROF SERV ( 34) .32965858E-04
PAPER PROD ( 91) .12586670E-04	EDUCATION ( 13) .45625569E-04
PRINT/PUBL ( 45) .25580150E-04	SOC SERV ( 8) .51131330E-04
CHEMICALS ( 82) .14965424E-04	ASSOCIATNS ( 21) .40472791E-04
REFINING ( 97) .93753579E-05	S & L GOV ( 54) .21041305E-04
RUBBER PRO ( 53) .21187119E-04	ELECT GOV ( 85) .14347563E-04
CLAY PRODS ( 65) .18236580E-04	POSTAL SER ( 31) .33616649E-04
PRIM METAL ( 75) .15984404E-04	GOVT NEC ( 6) .55143650E-04
HOUSEHOLDS ( 74) .16223914E-04	

**Table 2-27**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF IDAHO 1994**

NAME (RANK)	MULTIPLIER		
DAIRY/POUL ( 33)	.82284820E+00	FAB METALS ( 69)	.51854247E+00
CATTLE ( 44)	.75419939E+00	MACHINES ( 59)	.57255411E+00
MEAT ANIMA ( 43)	.76021427E+00	COMPUTERS ( 90)	.38144583E+00
LVSTK NEC ( 29)	.85085791E+00	ELECTRIC G ( 74)	.50877005E+00
FOOD GRAIN ( 23)	.87590677E+00	ELECTRONIC ( 57)	.58509123E+00
FEED GRAIN ( 11)	.97912335E+00	VEHICLES ( 87)	.39831278E+00
HAY/PASTUR ( 5)	.11944077E+01	AIRCRAFT ( 82)	.44720551E+00
GRASS SEED ( 3)	.12610303E+01	AIR PARTS ( 41)	.77490371E+00
FRUIT/NUTS ( 7)	.11266541E+01	BOAT BLDV ( 49)	.71392608E+00
VEGETABLES ( 2)	.12751698E+01	INSTRUMENT ( 51)	.69720161E+00
SUGAR CROP ( 4)	.12387916E+01	RAILROADS ( 53)	.67528284E+00
OIL CROPS ( 13)	.95547438E+00	TRANSP NEC ( 40)	.77765340E+00
FORESTRY ( 34)	.82054323E+00	TRUCK/WH ( 28)	.85461491E+00
NURSERY/LA ( 12)	.96835941E+00	WATER TRAN ( 95)	.31898579E+00
FISHING ( 8)	.10718304E+01	AIR TRANSP ( 80)	.46154180E+00
AG SERVICE ( 14)	.94951898E+00	PIPE LINES ( 24)	.87103242E+00
COPPER MIN ( 47)	.72973710E+00	TELEPHONE ( 84)	.43710840E+00
MINES NEC ( 83)	.43845943E+00	RADIO/TV ( 60)	.57031876E+00
COAL MINES ( 98)	.19875382E+00	ELECTRIC ( 73)	.51087928E+00
GAS EXTRAC ( 17)	.91283923E+00	GAS DIST ( 92)	.33655497E+00
SAND/GRAVE ( 32)	.82629937E+00	WATER/SANI ( 68)	.52054077E+00
NEW RESI ( 30)	.84219563E+00	WHOLESALE ( 54)	.66747040E+00
NEW INDUST ( 10)	.98651618E+00	BLDG MATER ( 16)	.91778606E+00
NEW UTILI ( 55)	.63928419E+00	DEPT STORE ( 19)	.90528131E+00
NEW ROADS ( 77)	.50208813E+00	GROCERIES ( 35)	.81488597E+00
NEW FARM ( 72)	.51177257E+00	AUTO DLRS ( 26)	.86531341E+00
NEW EXTRAC ( 38)	.80842566E+00	APPAREL ( 31)	.82847482E+00
NEW GOVT ( 93)	.33151948E+00	FURNITURE ( 18)	.90568066E+00
RESI MAINT ( 39)	.78436136E+00	RESTAURANT ( 58)	.57746905E+00
MAINT NEC ( 52)	.68870682E+00	RETAIL NEC ( 15)	.91879356E+00
MEAT PROC ( 56)	.60475725E+00	F-I-R-E ( 78)	.49708551E+00
DAIRY PROC ( 75)	.50791711E+00	LODGING ( 48)	.71813828E+00
CAN/FREEZE ( 85)	.42771173E+00	PER SERV ( 36)	.81433928E+00
FOODS NEC ( 76)	.50712413E+00	BUS SERV ( 22)	.88355607E+00
GRAIN PROC ( 89)	.38599068E+00	DATA PROC ( 67)	.52966356E+00
MFG NEC ( 65)	.55423701E+00	DETECTIVE ( 20)	.90045148E+00
TEXTILES ( 94)	.32676443E+00	AUTO SERV ( 50)	.70898992E+00
LOGGING ( 96)	.31430572E+00	REPAIR SER ( 27)	.85976654E+00
SAWMILLS ( 79)	.48011062E+00	AMUSEMENTS ( 42)	.77405453E+00
WOOD PROD ( 70)	.51774114E+00	HEALTH SER ( 25)	.86573344E+00
PAPER MILL ( 88)	.39604723E+00	PROF SERV ( 9)	.10001569E+01
PAPER PROD ( 86)	.40949759E+00	EDUCATION ( 45)	.74505275E+00
PRINT/PUBL ( 46)	.73220783E+00	SOC SERV ( 21)	.89285064E+00
CHEMICALS ( 64)	.56040096E+00	ASSOCIATNS ( 37)	.81267190E+00
REFINING ( 97)	.25486359E+00	S & L GOV ( 61)	.56958371E+00
RUBBER PRO ( 66)	.53500706E+00	ELECT GOV ( 81)	.45307836E+00
CLAY PRODS ( 62)	.56309158E+00	POSTAL SER ( 6)	.11701481E+01
PRIM METAL ( 71)	.51518989E+00	GOVT NEC ( 1)	.13582160E+01
ALUMINUM ( 63)	.56285733E+00	HOUSEHOLDS ( 91)	.36158240E+00

**Table 2-28**  
**SALES MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF MONTANA**

NAME (RANK)	MULTIPLIER		
LVSTK NEC ( 78)	1.5149	WHOLESALE ( 32)	2.1393
CATTLE ( 80)	1.4940	BLD & GARD ( 19)	2.2971
FOODGRAIN ( 85)	1.3815	DEPT STORE ( 13)	2.3875
FEEDGRAIN ( 86)	1.2917	GROCERIES ( 20)	2.2935
HAY ( 84)	1.4307	AUTO DLRS ( 9)	2.4066
OTHER AG ( 83)	1.4523	APPAREL ( 27)	2.2475
FORESTRY ( 74)	1.7122	FURNITURE ( 15)	2.3365
AG SER/GRE ( 67)	1.8345	RESTAURANT ( 41)	2.0581
MINES NEC ( 53)	1.9533	RETAIL NEC ( 51)	1.9775
COPPER ( 45)	2.0078	BANKS ( 34)	2.1257
GOLD ( 39)	2.0703	BROKERS ( 16)	2.3112
COAL ( 46)	2.0027	INSURANCE ( 44)	2.0101
GAS ( 63)	1.8623	DWELLINGS ( 87)	1.2458
NEW RESI ( 47)	2.0004	REAL ESTAT ( 77)	1.5577
NEW IND CO ( 38)	2.0720	PERS SERV ( 40)	2.0621
NEW UTIL ( 52)	1.9596	BUS SERV ( 71)	1.7707
NEW ROAD ( 65)	1.8455	SERV NEC ( 50)	1.9884
NEW FARM ( 72)	1.7470	COMPUTER S ( 64)	1.8458
NEW EXTRAC ( 35)	2.1100	AUTO SERV ( 70)	1.8129
NEW GOV ( 69)	1.8282	AMUSEMENTS ( 49)	1.9896
RESI MAINT ( 42)	2.0580	PHYSICIANS ( 25)	2.2601
MAINT NEC ( 66)	1.8423	NURSING ( 8)	2.4117
OIL MAINT ( 12)	2.3961	HOSPITALS ( 24)	2.2674
FOOD PROC ( 68)	1.8326	OTHER MEDI ( 57)	1.9291
MILK PROD ( 75)	1.6810	LEGAL SERV ( 48)	1.9965
SUGAR ( 56)	1.9298	SCHOOLS ( 7)	2.4211
SOFT DRINK ( 79)	1.4982	UNIVERSITY ( 10)	2.4059
MFG NEC ( 59)	1.9052	OTHER ED ( 28)	2.2150
LOGGING ( 82)	1.4734	JOB TRAINI ( 5)	2.4859
SAWMILLS ( 21)	2.2931	SOC SERV ( 4)	2.5510
WOOD PROD ( 29)	2.1835	ASSOCIATNS ( 6)	2.4846
PAPER PROD ( 55)	1.9354	ENGINEERS ( 18)	2.3004
PRINT/PUBL ( 58)	1.9123	ACCOUNTANT ( 37)	2.0912
REFINING ( 81)	1.4902	CONSULTANT ( 33)	2.1323
ALUMINUM ( 43)	2.0256	R AND D ( 22)	2.2867
RAILROADS ( 11)	2.4023	L GOV TRAN ( 3)	2.9490
OTHER TRAN ( 61)	1.8950	S & L ELEC ( 30)	2.1717
TRK/WAREHO ( 26)	2.2489	S & L GOVT ( 14)	2.3766
AIR TRANS ( 60)	1.8997	POSTAL ( 2)	2.9816
TELEPHNE ( 54)	1.9394	FED ELECT ( 17)	2.3059
RADIO/TV ( 31)	2.1668	OTHER GOV ( 1)	3.1054
ELECTRICIT ( 62)	1.8724	HOUSEHOLDS ( 36)	2.1077
GAS ( 73)	1.7404		
WAT/SAN ( 23)	2.2801		

**Table 2-29**  
**EMPLOYMENT MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF MONTANA**

NAME (RANK)	MULTIPLIER		
		GAS ( 84)	.74484255E-05
		WAT/SAN ( 54)	.18250406E-04
		WHOLESALE ( 47)	.23186280E-04
LVSTK NEC ( 41)	.25299874E-04	BLD & GARD ( 22)	.36913432E-04
CATTLE ( 65)	.14912310E-04	DEPT STORE ( 5)	.49311457E-04
FOODGRAIN ( 55)	.17515180E-04	GROCERIES ( 9)	.46111403E-04
FEEDGRAIN ( 70)	.12105812E-04	AUTO DLRS ( 19)	.38495295E-04
HAY ( 25)	.34498618E-04	APPAREL ( 3)	.53829826E-04
OTHER AG ( 66)	.14494796E-04	FURNITURE ( 18)	.40166084E-04
FORESTRY ( 62)	.15895230E-04	RESTAURANT ( 16)	.40920811E-04
AG SER/GRE ( 4)	.50062681E-04	RETAIL NEC ( 1)	.69439557E-04
MINES NEC ( 67)	.14315637E-04	BANKS ( 49)	.20376190E-04
COPPER ( 72)	.12027446E-04	BROKERS ( 53)	.18903736E-04
GOLD ( 78)	.11542136E-04	INSURANCE ( 40)	.25326202E-04
COAL ( 77)	.11611755E-04	DWELLINGS ( 86)	.32399844E-05
GAS ( 60)	.15986978E-04	REAL ESTAT ( 59)	.16192764E-04
NEW RESI ( 33)	.28034996E-04	PERS SERV ( 13)	.43293876E-04
NEW IND CO ( 31)	.30038409E-04	BUS SERV ( 20)	.38413014E-04
NEW UTIL ( 39)	.25715100E-04	SERV NEC ( 6)	.48363381E-04
NEW ROAD ( 51)	.20063209E-04	COMPUTER S ( 43)	.25037869E-04
NEW FARM ( 69)	.12430566E-04	AUTO SERV ( 36)	.25940006E-04
NEW EXTRAC ( 28)	.31848969E-04	AMUSEMENTS ( 21)	.37517486E-04
NEW GOV ( 75)	.11658103E-04	PHYSICIANS ( 45)	.24355644E-04
RESI MAINT ( 35)	.27240272E-04	NURSING ( 7)	.47371621E-04
MAINT NEC ( 48)	.20670152E-04	HOSPITALS ( 32)	.29367251E-04
OIL MAINT ( 14)	.42513082E-04	OTHER MEDI ( 24)	.35892754E-04
FOOD PROC ( 74)	.11892032E-04	LEGAL SERV ( 37)	.25925272E-04
MILK PROD ( 81)	.96517806E-05	SCHOOLS ( 12)	.43590262E-04
SUGAR ( 73)	.11911943E-04	UNIVERSITY ( 11)	.43857737E-04
SOFT DRINK ( 83)	.85432603E-05	OTHER ED ( 17)	.40186183E-04
MFG NEC ( 56)	.17263073E-04	JOB TRAINI ( 10)	.45426073E-04
LOGGING ( 82)	.95981486E-05	SOC SERV ( 8)	.46995618E-04
SAWMILLS ( 61)	.15956661E-04	ASSOCIATNS ( 15)	.42051888E-04
WOOD PROD ( 58)	.16653494E-04	ENGINEERS ( 26)	.33014414E-04
PAPER PROD ( 80)	.10214563E-04	ACCOUNTANT ( 27)	.32509466E-04
PRINT/PUBL ( 42)	.25056970E-04	CONSULTANT ( 44)	.24777017E-04
REFINING ( 85)	.50890053E-05	R AND D ( 23)	.36737314E-04
ALUMINUM ( 76)	.11615018E-04	L GOV TRAN ( 30)	.30656734E-04
RAILROADS ( 50)	.20106900E-04	S & L ELEC ( 64)	.14929209E-04
OTHER TRAN ( 34)	.27852124E-04	S & L GOVT ( 52)	.19914592E-04
TRK/WAREHO ( 38)	.25883415E-04	POSTAL ( 29)	.31344360E-04
AIR TRANS ( 57)	.16748050E-04	FED ELECT ( 68)	.12809828E-04
TELEPHNE ( 71)	.12081089E-04	OTHER GOV ( 2)	.54395161E-04
RADIO/TV ( 46)	.23492359E-04	HOUSEHOLDS ( 63)	.15340196E-04
ELECTRICIT ( 79)	.10611781E-04		

**Table 2-30**  
**PERSONAL INCOME MULTIPLIERS HOUSEHOLDS ENDOGENOUS**  
**STATE OF MONTANA**

NAME (RANK) MULTIPLIER		WAT/SAN ( 49) .39221376E+00
LVSTK NEC ( 38) .45066950E+00		WHOLESALE ( 28) .50027448E+00
CATTLE ( 29) .49559036E+00		BLD & GARD ( 12) .67897934E+00
FOODGRAIN ( 74) .26374009E+00		DEPT STORE ( 5) .72222424E+00
FEEDGRAIN ( 70) .30106267E+00		GROCERIES ( 10) .68613309E+00
HAY ( 85) .11879043E+00		AUTO DLRS ( 8) .71194065E+00
OTHER AG ( 86) .11089531E+00		APPAREL ( 19) .58810550E+00
FORESTRY ( 24) .53966177E+00		FURNITURE ( 11) .68295366E+00
AG SER/GRE ( 45) .40580961E+00		RESTAURANT ( 39) .45011565E+00
MINES NEC ( 40) .44979346E+00		RETAIL NEC ( 31) .48560944E+00
COPPER ( 61) .34767464E+00		BANKS ( 42) .43634477E+00
GOLD ( 62) .33668718E+00		BROKERS ( 23) .55241895E+00
COAL ( 46) .40306368E+00		INSURANCE ( 34) .46242389E+00
GAS ( 64) .33216593E+00		DWELLINGS ( 87) .45298155E-01
NEW RESI ( 44) .40849340E+00		REAL ESTAT ( 83) .14565901E+00
NEW IND CO ( 21) .56972671E+00		PERS SERV ( 41) .44348952E+00
NEW UTIL ( 30) .49063441E+00		BUS SERV ( 52) .37862873E+00
NEW ROAD ( 58) .36361712E+00		SERV NEC ( 32) .48452374E+00
NEW FARM ( 76) .23853478E+00		COMPUTER S ( 50) .39088696E+00
NEW EXTRAC ( 15) .64249820E+00		AUTO SERV ( 68) .31756482E+00
NEW GOV ( 78) .21420632E+00		AMUSEMENTS ( 54) .37533697E+00
RESI MAINT ( 37) .45287925E+00		PHYSICIANS ( 16) .64033514E+00
MAINT NEC ( 51) .37947884E+00		NURSING ( 7) .71364349E+00
OIL MAINT ( 3) .78588104E+00		HOSPITALS ( 14) .65231955E+00
FOOD PROC ( 73) .28804716E+00		OTHER MEDI ( 47) .39663529E+00
MILK PROD ( 77) .22824922E+00		LEGAL SERV ( 22) .56140614E+00
SUGAR ( 80) .20285200E+00		SCHOOLS ( 26) .51436698E+00
SOFT DRINK ( 82) .18884867E+00		UNIVERSITY ( 18) .61527759E+00
MFG NEC ( 60) .35814077E+00		OTHER ED ( 27) .50947660E+00
LOGGING ( 81) .19637352E+00		JOB TRAINI ( 6) .72188139E+00
SAWMILLS ( 55) .37442705E+00		SOC SERV ( 4) .73225522E+00
WOOD PROD ( 57) .36479899E+00		ASSOCIATNS ( 9) .69567460E+00
PAPER PROD ( 72) .29664350E+00		ENGINEERS ( 20) .58427632E+00
PRINT/PUBL ( 35) .45901823E+00		ACCOUNTANT ( 36) .45762011E+00
REFINING ( 84) .13728088E+00		CONSULTANT ( 33) .47104755E+00
ALUMINUM ( 66) .32290348E+00		R AND D ( 17) .62098700E+00
RAILROADS ( 25) .52590102E+00		L GOV TRAN ( 13) .66454375E+00
OTHER TRAN ( 65) .32638711E+00		S & L ELEC ( 59) .36229014E+00
TRK/WAREHO ( 48) .39381167E+00		S & L GOVT ( 43) .42562446E+00
AIR TRANS ( 71) .29830465E+00		POSTAL ( 2) .99585581E+00
TELEPHNE ( 63) .33266777E+00		FED ELECT ( 56) .37010074E+00
RADIO/TV ( 53) .37625036E+00		OTHER GOV ( 1) .12442133E+01
ELECTRICIT ( 69) .31433082E+00		HOUSEHOLDS ( 75) .24565127E+00
GAS ( 79) .20984054E+00		

**SECTION 3**  
**ECONOMIC AND DEMOGRAPHIC TRENDS**  
**AND THE CURRENT SITUATION**

### **3.1 EMPLOYMENT CREATED BY BASIC INDUSTRY IN THE STUDY SUBREGIONS**

Sectors with large sales to final demand (sales to export from the subregion, sales to create investment, and sales by government) are the “basic” industries that drive an economy. In the input-output framework, sales to final demand are necessary in order for an economy to exist. The IMPLAN estimates of sales to final demand for a sector can be multiplied by the respective employment, personal income, or sales multipliers to find the total effects of an industry on a region’s economy. Here we use direct, indirect, and induced employment as an indicator of the most important basic industries in the three subregions.

The Upriver Subregion had about 74,935 jobs in 1994 (IMPLAN). Government (local, state, and federal) was the largest single source of direct and indirect employment with 23,548 jobs created, which was 31.4 percent of the labor force. Paper mills created 7,277 jobs directly and indirectly, which was 9.7 percent of the labor force. Sawmills created 5,115 jobs directly and indirectly, which was 6.8 percent of the labor force. Grain producers created 3,228 jobs, logging created 2,166 jobs, FIRE (finance, insurance, and real estate) created 2,066 jobs, fabricated metals created 1,868 jobs, and wood products created 1,101 jobs directly and indirectly. In total, timber based industries created 15,568 jobs directly and indirectly, which was nearly 21 percent of the labor force. The sectors listed above accounted for nearly 62 percent of employment in the Upriver Subregion. The remaining 38 percent of the jobs were created by exports of the many other industries in the region.

The Reservoir Subregion had about 66,230 jobs in 1994 (IMPLAN). Government (local, state, and federal) was the largest single source of direct and indirect employment with 24,007 jobs created, which was 36.3 percent of the labor force. Grain producers created 5,854 jobs directly and indirectly, which was 8.8 percent of the labor force. Food processing created 4,642 jobs directly and indirectly, which was 7 percent of the labor force. Vegetable producers created 1,734 jobs, paper mills created 1,347 jobs, cattle producers created 1,169 jobs, forestry created 1,145 jobs, and fabricated metals created 543 jobs directly and indirectly. The sectors listed above accounted for nearly 61 percent of the employment in the Reservoir Subregion. The remaining employment was created by exports from the many other industries in the subregion.

The Downriver Subregion had about 178,544 jobs in 1994 (IMPLAN). The largest single

source of direct and indirect employment was the professional services sector. Sales to final demand by professional services was large and, because the sector is extremely labor intensive, it has a very large multiplier effect as well. (About 79 percent of sales by the professional services sector was to export from the subregion, seven percent was to local industries, 10.5 percent was to federal government and the remainder was to investment.) Professional services accounted for 39,602 jobs directly and indirectly, which was 22.2 percent of the labor force. Government (local, state and federal, excluding electric generation) created 33,079 jobs directly and indirectly, which was 18.5 percent of the labor force. Food processing (canning and freezing, excluding meat processing which is shown below) created 16,005 jobs directly and indirectly, which was 9 percent of the labor force. Grain producers created 8,768 jobs directly and indirectly, which was 4.9 percent of the labor force. Fruit and vegetable producers created 7,913 jobs directly and indirectly, which was 4.4 percent of the labor force. Federal electric created 5,576 jobs, aluminum manufacturers created 2,803 jobs, and meat processors created 2,177 jobs directly and indirectly. The sectors listed above accounted for nearly 65 percent of the employment in the Downriver Subregion. The remaining 35 percent of the jobs were created by exports from the many remaining sectors in the subregion.

### **3.2 DEMOGRAPHIC TRENDS IN THE STUDY SUBREGIONS**

Most of the counties in the Oregon part of the Downriver Subregion are sparsely populated. The Downriver Subregion purposely excludes Multnomah County, which has a population of 617,433 (Portland, Oregon) because that economy would totally dominate the Downriver economic input-output model. Umatilla County, with a population of 64,150, is the largest Oregon County in the Downriver Subregion. In Washington State, Clark County is excluded because it includes the Vancouver economy and population of 293,384 which would also tend to dominate the Downriver Subregion. The coastal region is the focus of another economic impact study. As in Oregon, the counties along the Columbia River in Washington have low population densities until one reaches Benton County and Franklin County at the eastern side of the Downriver Subregion. The adjoining towns of Kennewick, Richland, and Pasco account for the higher population in these counties. Most of the economic activity, as

evidenced by population, is located at the eastern side of the Downriver Subregion in Benton and Franklin Counties in Washington and Umatilla County in Oregon. These counties adjoin or are nearby the mouth of the Snake River as it enters the Columbia River.

The Reservoir Subregion is entirely in the State of Washington. The eastern side of the subregion is dominated by the town of Walla Walla and Walla Walla County with a population of 53,381. Except for Franklin County (which is included in the Downriver Subregion because its population is located mainly near the mouth of the Snake River), the counties along the Snake River are sparsely populated. Whitman County at the eastern side of the Reservoir Subregion has a population of 39,282. Pullman is the largest town in Whitman County. Asotin County (town of Clarkston) at the southeast corner of the State has a population of 20,262. Thus, the Reservoir Subregion has major population and economic activity at both its west and east sides.

The Upriver Subregion is primarily in central Idaho. Wallowa County in the northeast corner of Oregon is included because it is part of the same upriver watershed as central Idaho. Wallowa County is sparsely populated. Most of the counties in the Upriver Subregion have very low population densities. Most of the population and economic activity in the Upriver Subregion is at its northwest side in Nez Perce County and Latah County. These counties contain the towns of Lewiston and Moscow respectively.

### **3.2.1 Population Density in the Study Regions**

The subregions surrounding the Lower Snake River are sparsely populated. A listing of populations for towns in the Upriver Subregion (see Table 3-1) shows that county and town populations are generally very small. A single town usually dominates over all others in a given county. Many counties do not contain a town large enough to provide the social, human, and economic services of a typical central business district.

**Table 3-1**  
**POPULATIONS OF CENTRAL PLACES IN THE**  
**UPRIVER SUBREGION IN IDAHO AND OREGON**

<p>Clearwater County, Idaho 8,500            Custer County, Idaho 4,200            Latah County, Idaho 32,000            Lemhi County, Idaho 7,200            Lewis County, Idaho 3,800            Idaho County, Idaho 14,200            Nez Perce County, Idaho 35,100            Valley County, Idaho 6,700            Wallowa County, Oregon 6,900</p> <p><u>Towns in Clearwater County, Idaho</u>            Ahsahka 150            Cavendish 30            Dent 0            Elk River 149            Grangemont 0            Cardiff 40            Headquarters 35            Pierce 746            Orofino 2,868            Greer 95            Judgetown 35            Weippe 532            Riverside 170                Total Urban 4,850                Rural 3,650</p> <p><u>Towns in Custer County, Idaho</u>            Challis 1,073            Ellis 40            Clayton 26            Mackay 574            Leslie 0            Lost River 40            Obsidian 0            Lower Stanley 25            Stanley 71            Sunbeam 40                Total Urban 1,889                Rural 2,311</p> <p><u>Towns in Latah County, Idaho</u>            Potlatch 790            Potlatch Junction 35            Viola 150            Moscow 20,000            Genesee 725            Onaway 203            Princeton 75            Harvard 55            Joel 125</p> <p>Troy 699            Avon 0            Deary 529            Helmer 90            Bovill 256            Park 0            Juliaetta 488</p>	<p style="text-align: right;">Total Urban 24,220            Rural 7,780</p> <p><u>Towns in Lemhi County, Idaho</u>            Gibbonsville 100            North Fork 250            Salmon 2,941            Baker 0            Tendoy 200            Lemhi 30            Leadore 74            Shoup 60            Cobalt 130            May 50            Patterson 5                Total Urban 3,840                Rural 3,360</p> <p><u>Towns in Lewis County, Idaho</u>            Craigmont 542            Kamiah 1157            Mohler 0            Reubens 46            Winchester 262            Nezperce 453            Morrow 0            Slickpoo 0                Total Urban 2,460                Rural 1,340</p> <p><u>Towns in Idaho County, Idaho</u>            Woodland 0            Burgdorf 0            Warren 45            Riggins 443            Lucile 135            State Creek 0            White Bird 108            Grangeville 3,226            Mount Idaho 0            Greencreek 30            Keuterville 30            Cottonwood 822            Westlake 0            Ferdinand 135            Winona 0            Kooskia 692            Glenwood 0            Syringa 30            Stites 204            Clearwater 50            Harpster 50            Golden 0            Elk City 149            Fall Creek 0            Rid River Hot Springs 0            Orogrande 0            Dixie 25            Lowell 25            Fenn 30            Pollock 120</p>
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Total Urban 6,349  
Rural 7,851

Nez Perce County, Idaho

Lewiston 30,400  
Waha 0  
Webb 0  
Spalding 90  
Lapwai (N Lapwai) 932  
Sweetwater 100  
Culdesac 280  
Summit 0  
Gifford 0  
Peck 160  
Myrtle 0  
Agatha 0  
Lenore 150  
Cameron 0  
Southwick 40  
Leland 25  
Total Urban 32,177  
Rural 2,923

Valley County, Idaho

Big Creek 30

Yellow Pine 150  
McCall 2,005  
Donnelly 135  
Cascade 877  
Warm Lake 50  
West Mountain 25  
Alpha 0  
Smiths Ferry 50  
Lake Fork 75  
Total Urban 3,397  
Rural 3,303

Wallowa County, Oregon

Troy 25  
Flora 0  
Imnaha 95  
Joseph 1,073  
Enterprise 1,905  
Lostive 231  
Wallowa 748  
Minam 0  
Total Urban 4,077  
Rural 2,823

SOURCE: Rand McNally Maps and Postal Service ZIP Code Listings. Population is 1990 Census from the maps.

### 3.3 POPULATION TRENDS IN THE STUDY AREA COUNTIES

The Upriver Subregion had a 1995 population of 125 thousand with over half the population in Nez Perce and Latah Counties. Except for Valley County, population growth has been well below the Idaho State average of 1.9% and the Oregon State average of 1.6% between 1969 and 1995. Average annual population growth rates<sup>18</sup> for the Idaho counties in the Upriver Subregion were: Clearwater -0.6%, Custer 1.5%, Idaho 0.5%, Latah 1.2%, Lemhi 1.4%, Lewis 0.1%, Nez Perce 0.7% and Valley 3.1%. Population in Wallowa County, Oregon grew by 0.7% over the 1969 to 1995 period. The time series graphs in Figures 3-5 and 2-6 reveal that all the counties in the Upriver Subregion excepting Latah had significant population declines during the late 1980's.

The Reservoir Subregion had a 1995 population of 135,000 with over 2/3 of the population in Walla Walla and Whitman Counties. None of the Counties in the Reservoir Subregion reached the Washington State population growth rate of 1.9% of the 1969 to 1995

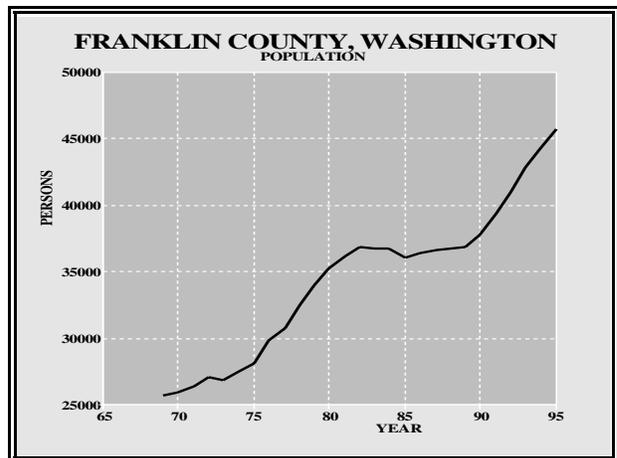
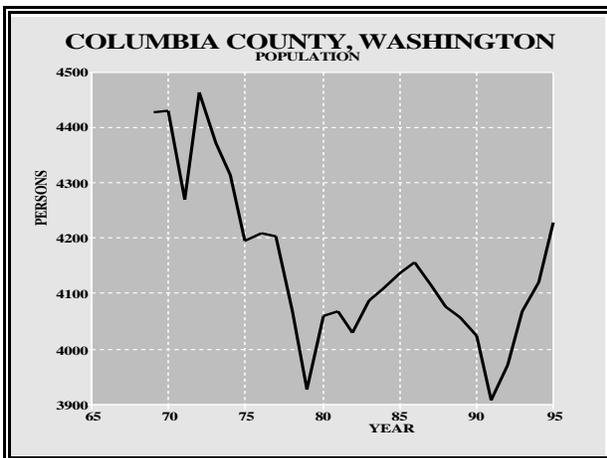
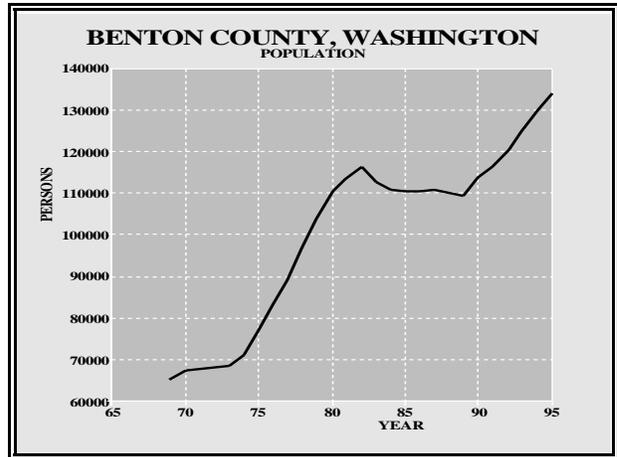
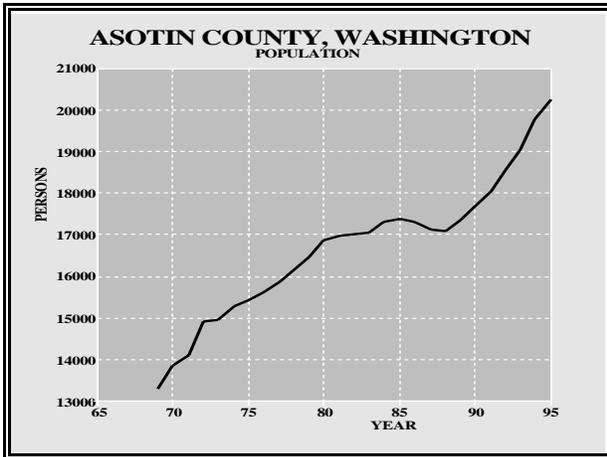
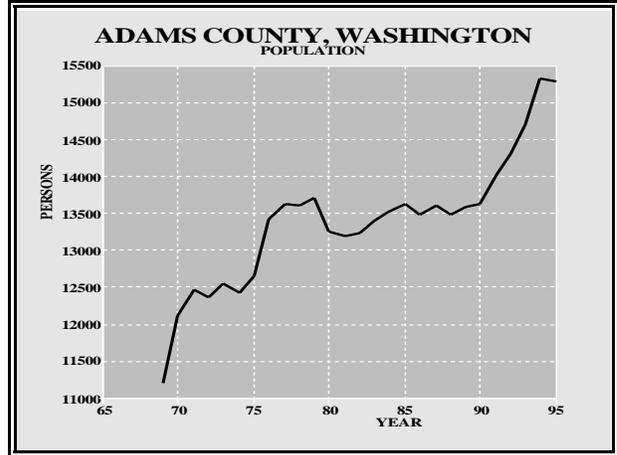
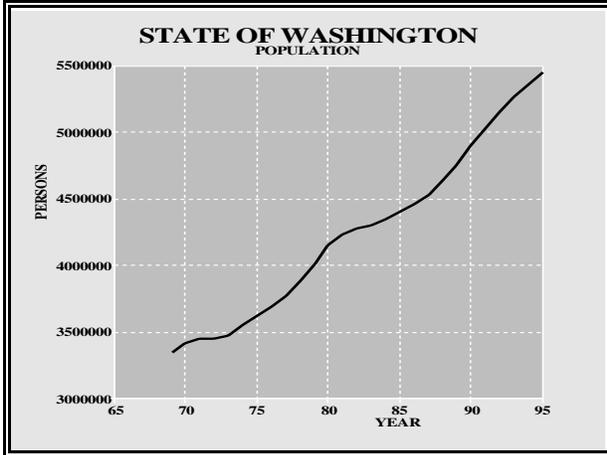
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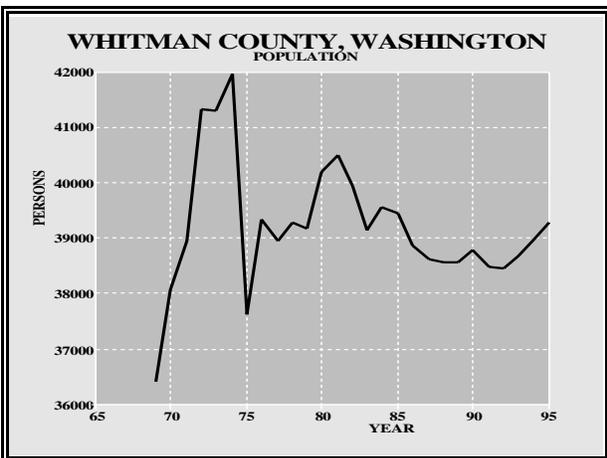
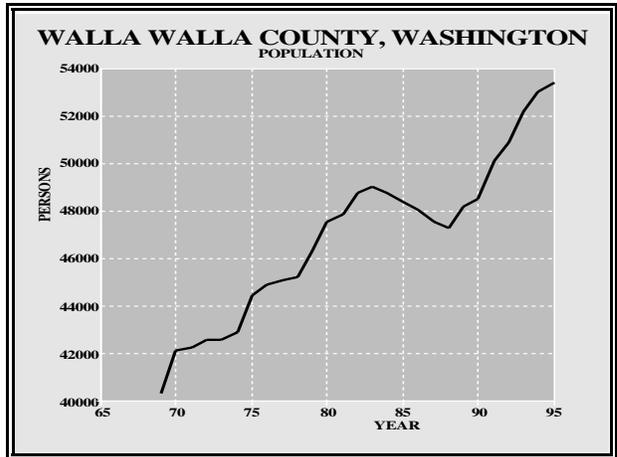
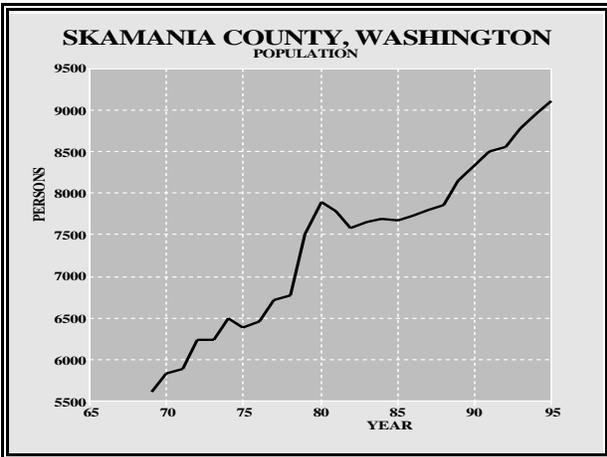
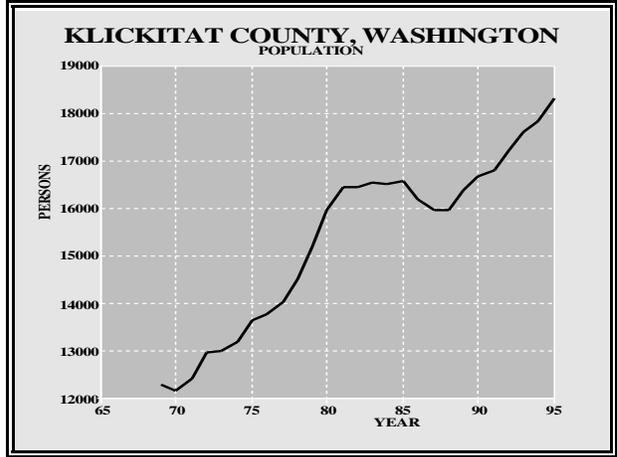
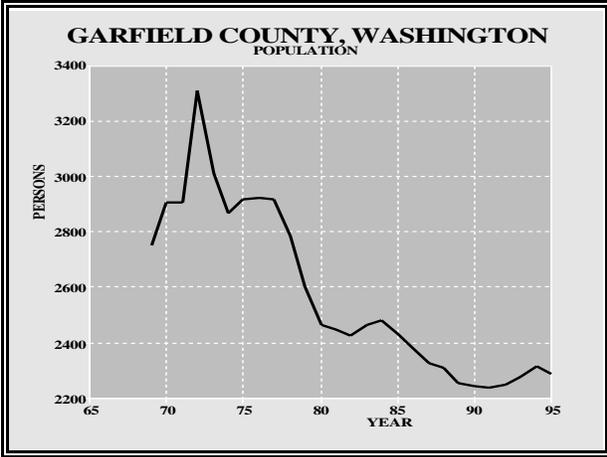
<sup>18</sup> Compound rates of growth.

period. Average annual population growth rates for the Reservoir Subregion counties were: Adams 1.2%, Asotin 1.6%, Columbia -0.2%, Garfield -0.7%, Walla Walla 1.1%, and Whitman 0.3%. Examination of the time series graphs in Figure 3-4 reveals that population growth was generally absent or negative in the late 1980's. Whitman County population has remained relatively constant since 1976 and both Columbia and Garfield Counties have lost population since 1969.

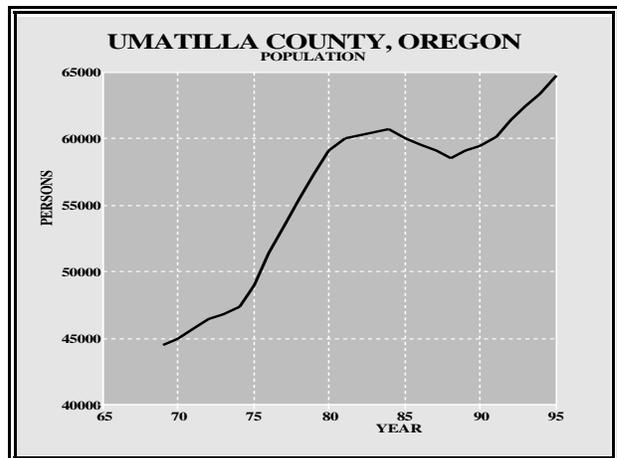
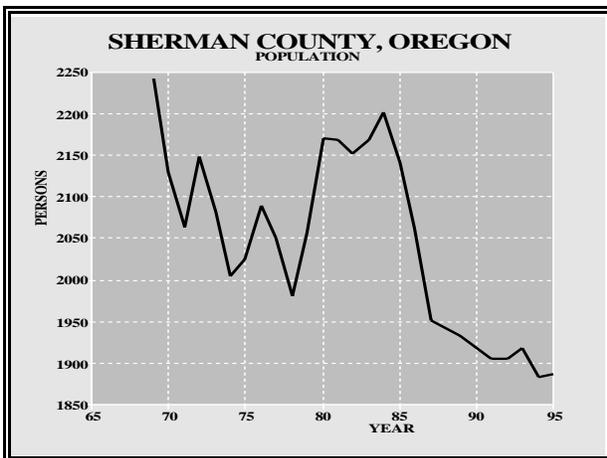
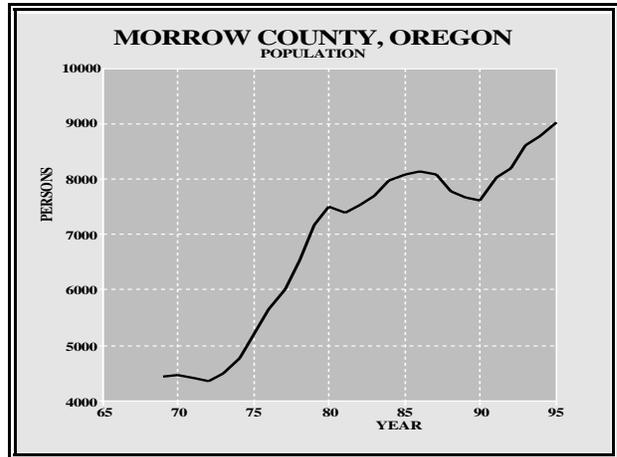
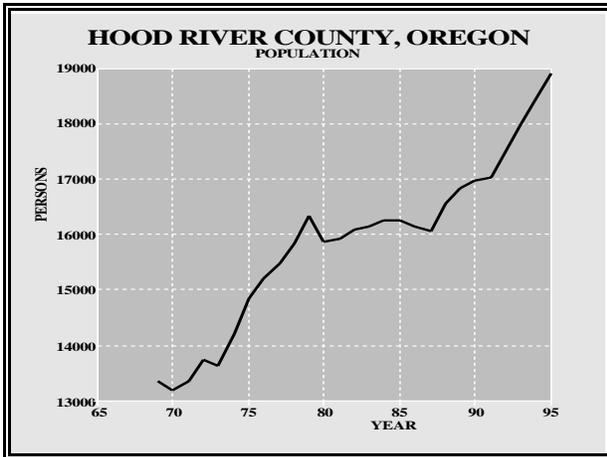
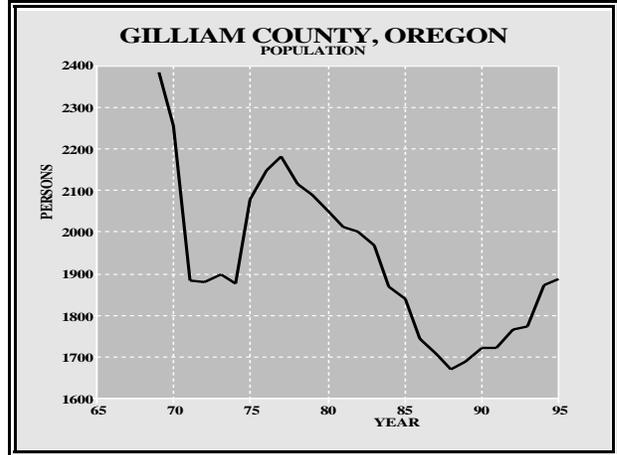
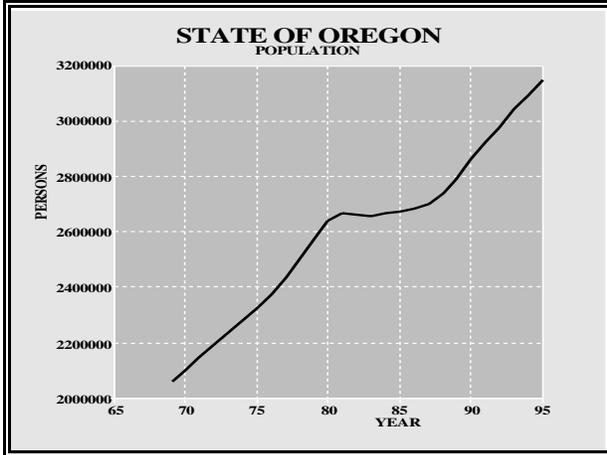
The Downriver Subregion has a 1995 population of 326,000. About 3/4 of the population is clustered in Benton, Umatilla, and Franklin Counties (Tri-Cities). Most of the remaining counties in the Downriver Subregion have relatively small populations and much less population growth than the Tri-Cities area. Most of the Washington counties in the Downriver Subregion have a population growth above or near the Washington State average of 1.9% between 1969 and 1995. Only one of the Oregon counties in the Subregion reach the population growth for the State of Oregon of just over 1.6% between 1969 and 1995. Average annual population growth rates for the Downriver Subregion counties in Washington were: Benton 2.8%, Franklin 2.2%, Klickitat 1.5%, and Skamania 1.9%. Population growth rates for Oregon counties were: Gilliam -0.9%, Hood River 1.3%, Morrow 2.8%, Sherman -0.7%, Wasco 0.5%, and Umatilla 1.4%. The time series graphs in Figure 3-4 show that Franklin, Benton, and Umatilla Counties exhibited constant population during the 1980's, as did many of the smaller counties. Gilliam and Sherman Counties in Oregon (Figure 3-5) showed large percentage declines (from a small population base) over the 26 year period.

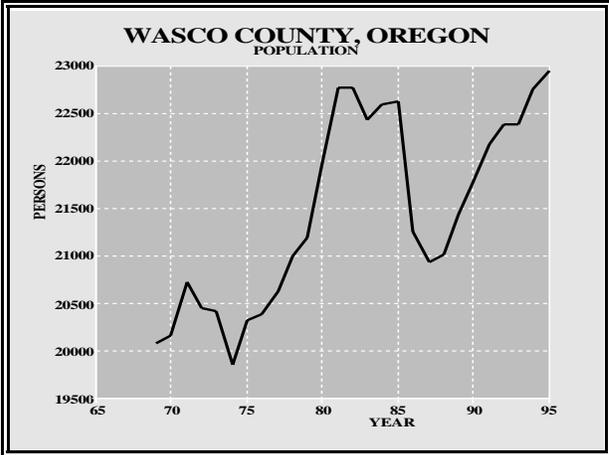
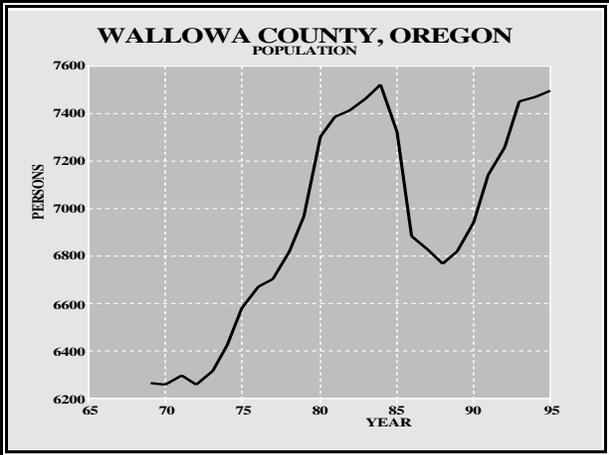
**Figure 3-1**  
**POPULATION TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF WASHINGTON**  
(see following pages)



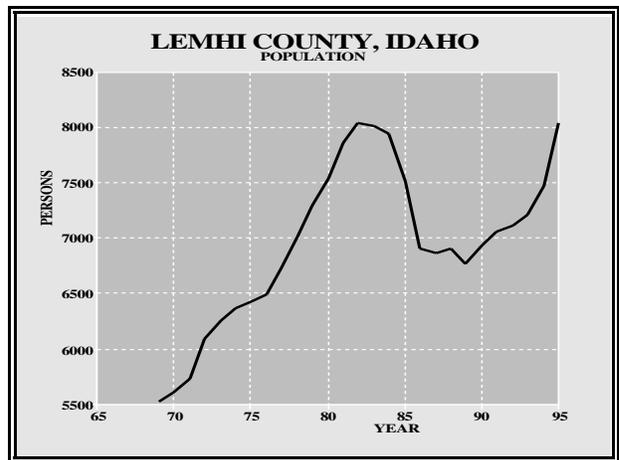
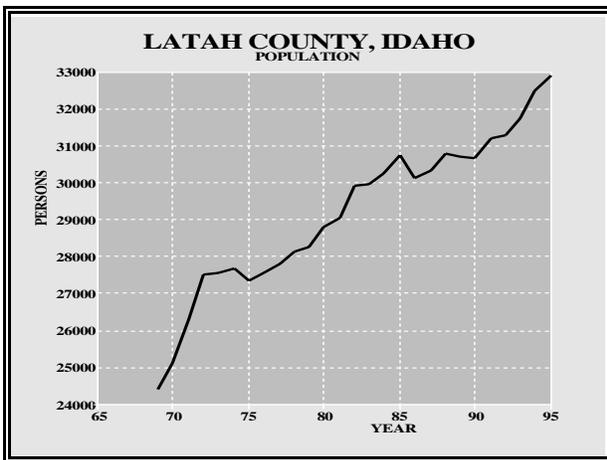
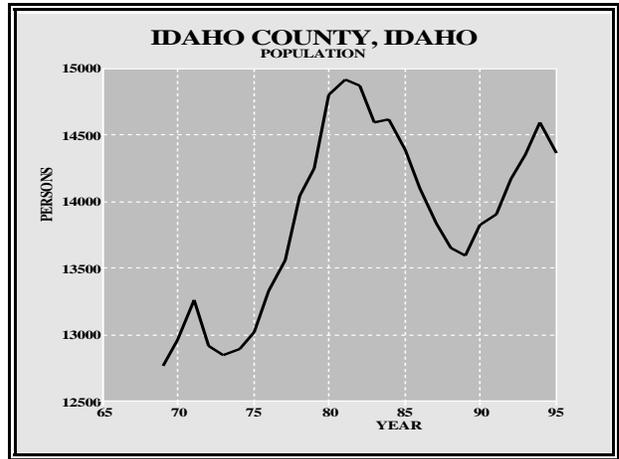
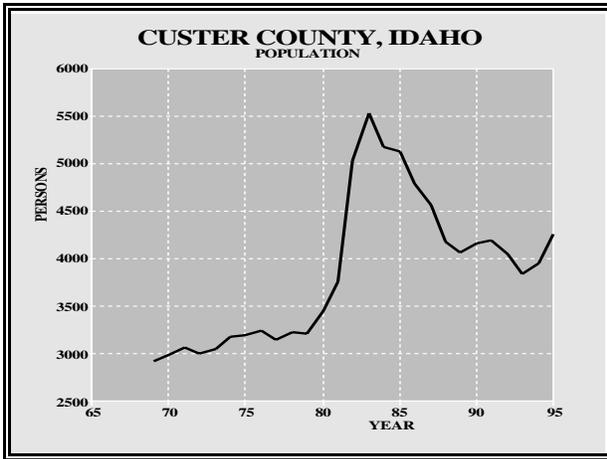
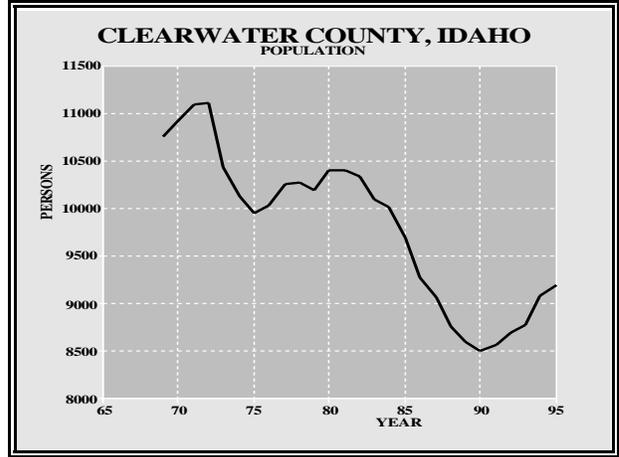
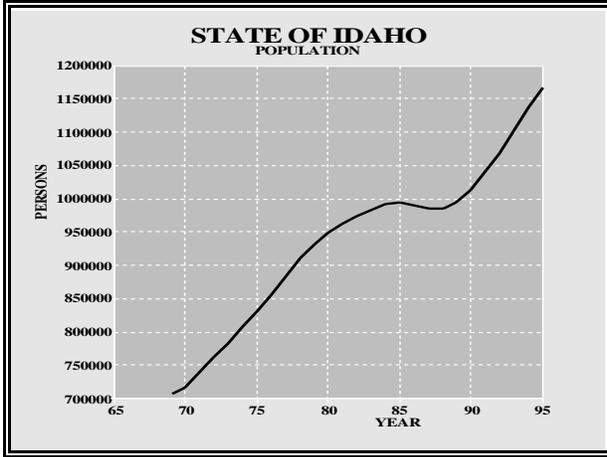


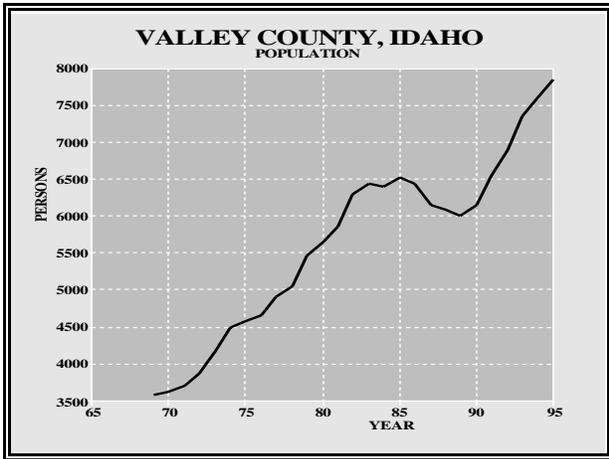
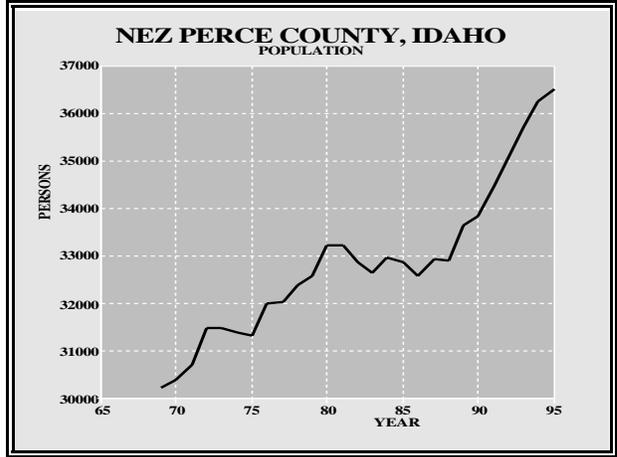
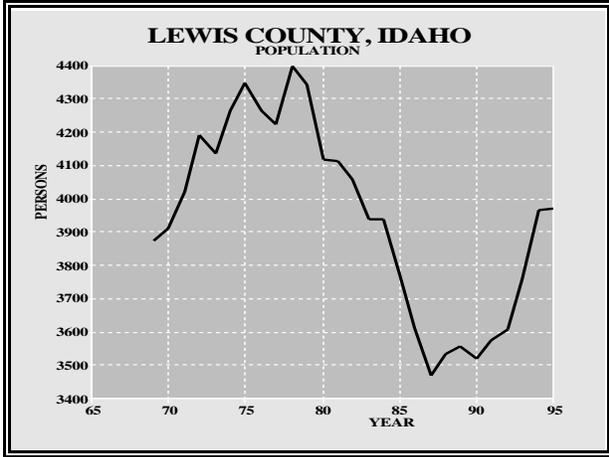
**Figure 3-2**  
**POPULATION TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF OREGON**  
(see following pages)





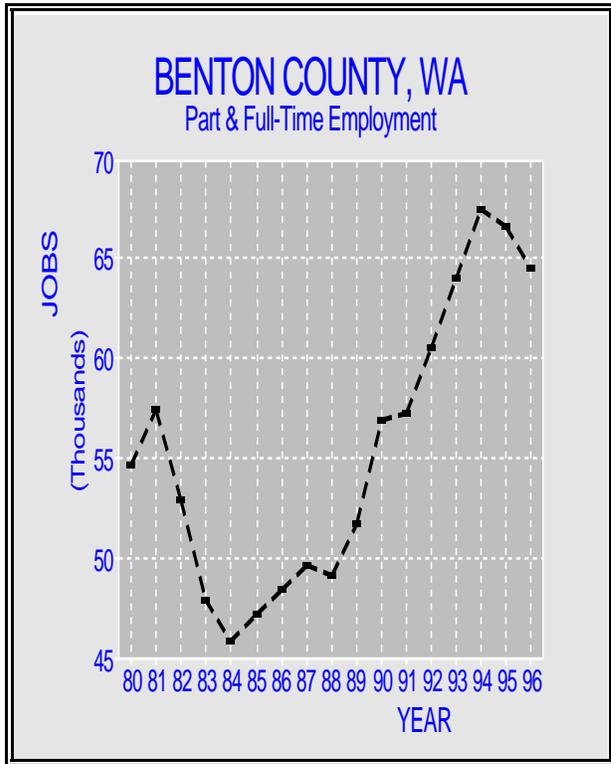
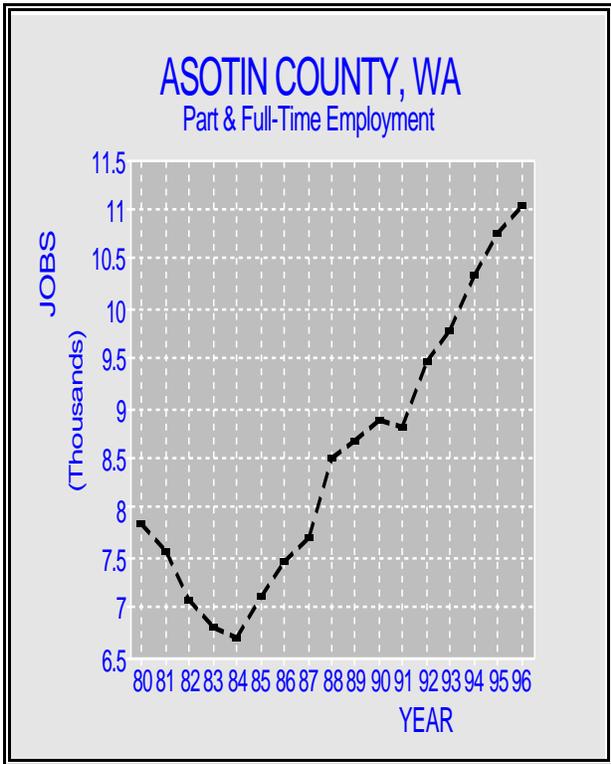
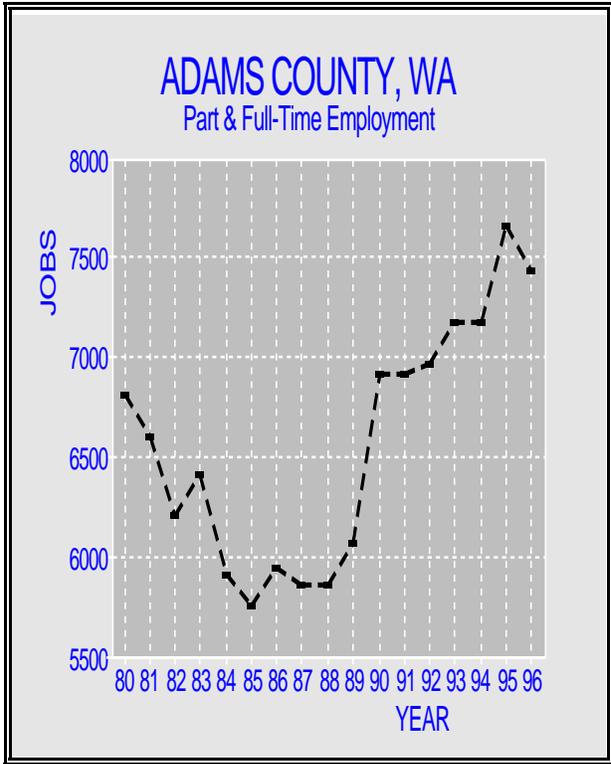
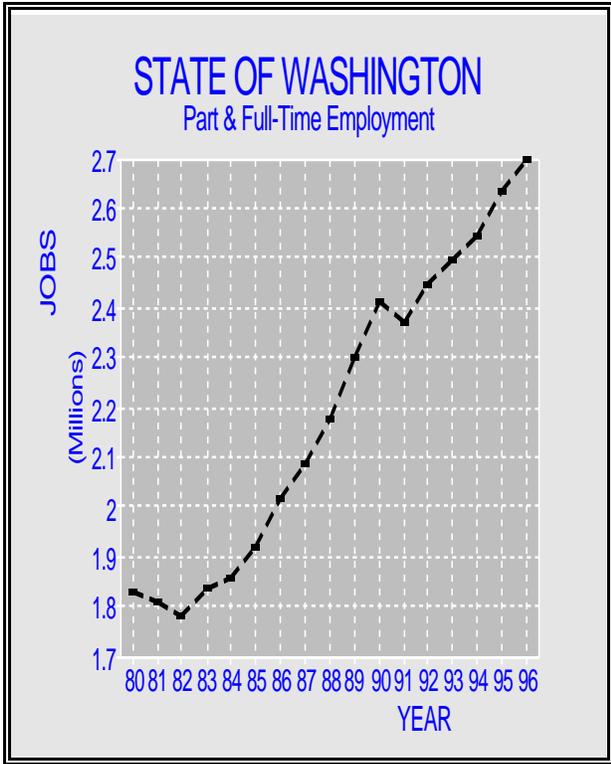
**Figure 3-3**  
**POPULATION TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF IDAHO**  
(see following pages)

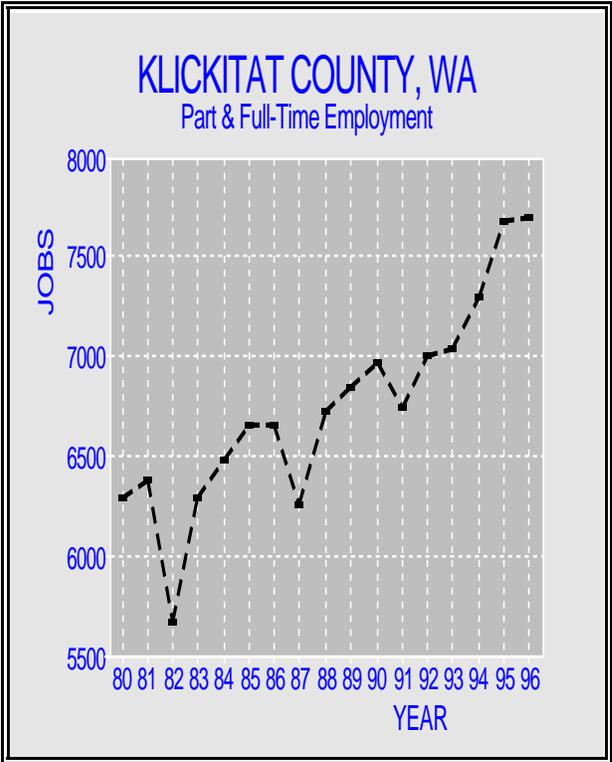
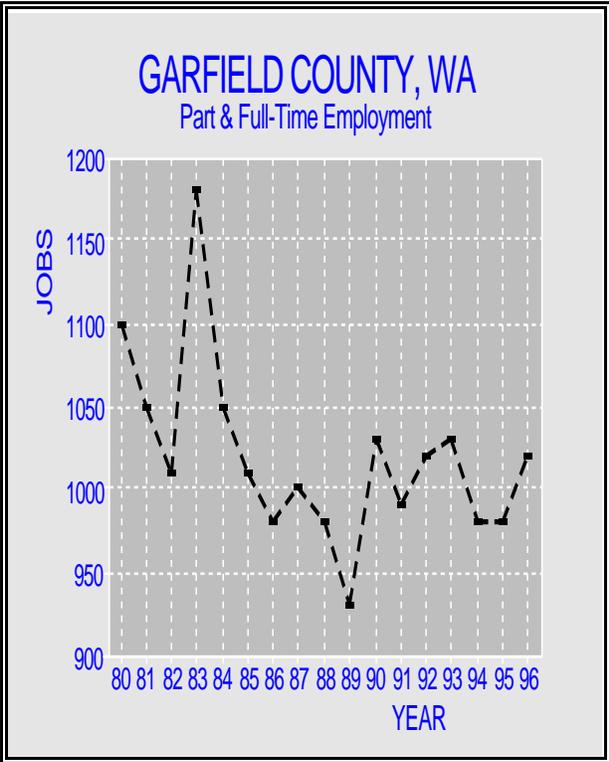
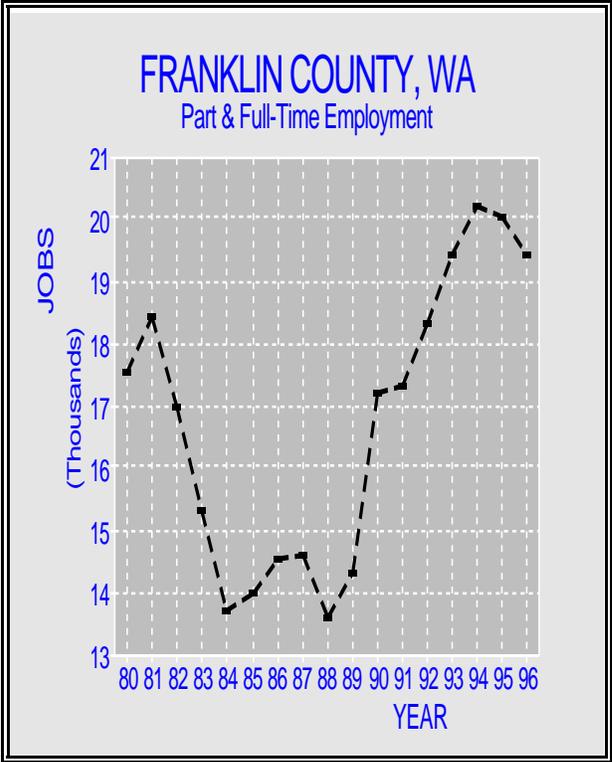
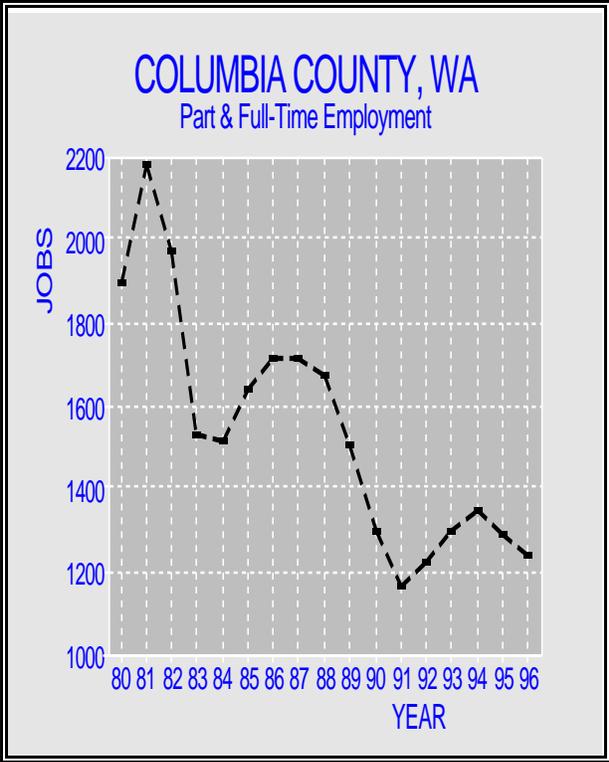


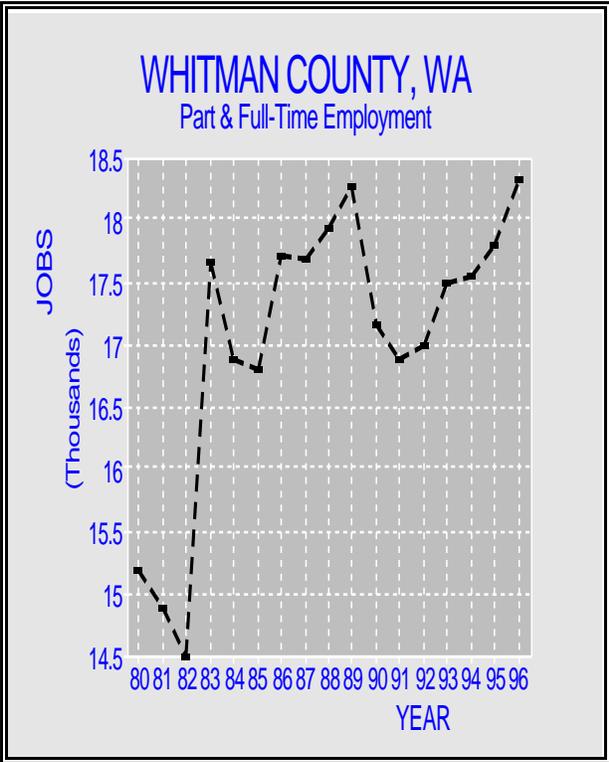
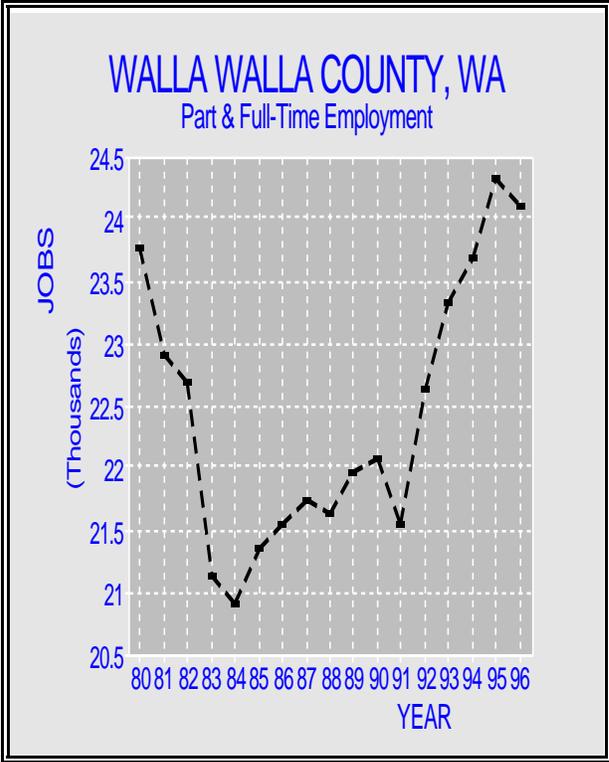
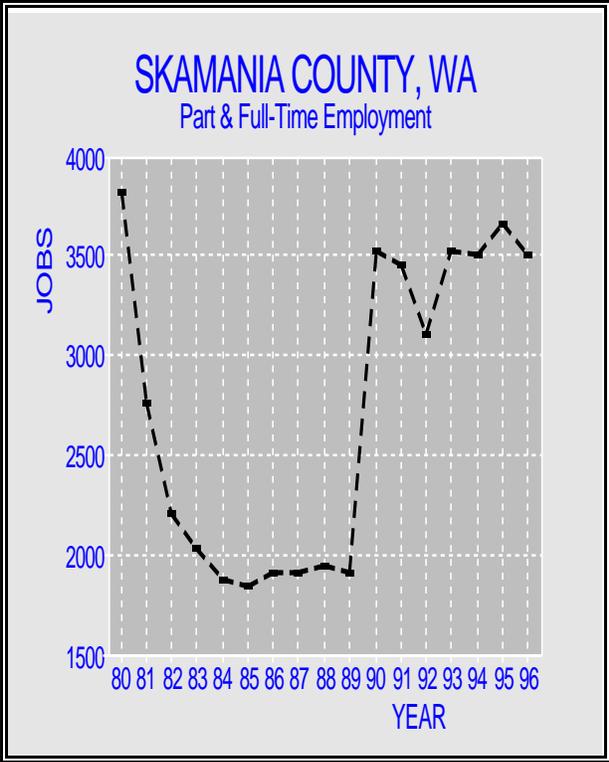


### **3.4 EMPLOYMENT TRENDS IN THE STUDY AREA COUNTIES**

**Figure 3-4**  
**EMPLOYMENT TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF WASHINGTON**  
(see following pages)

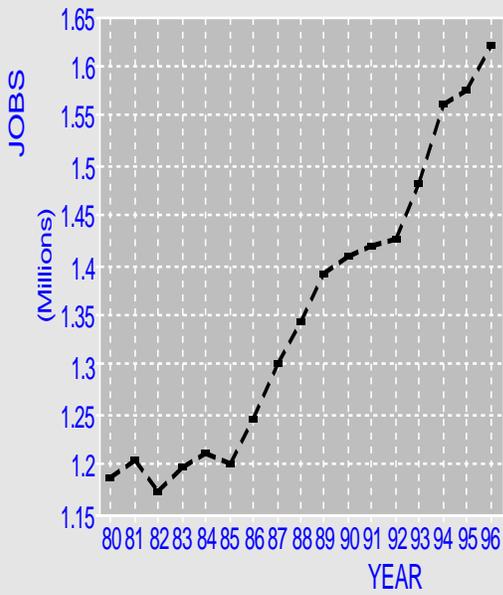




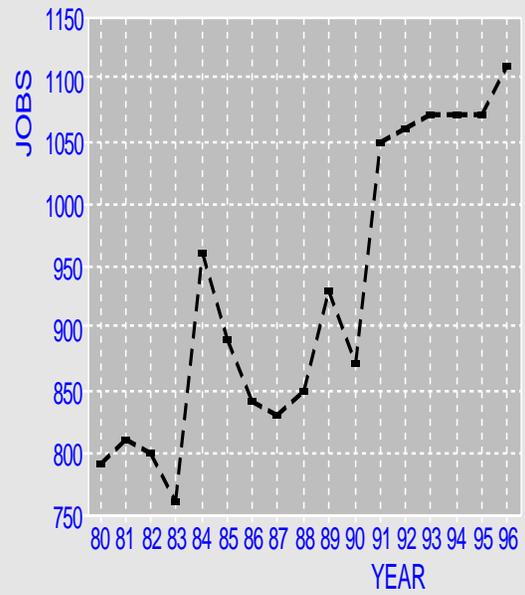


**Figure 3-5**  
**EMPLOYMENT TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF OREGON**  
(see following pages)

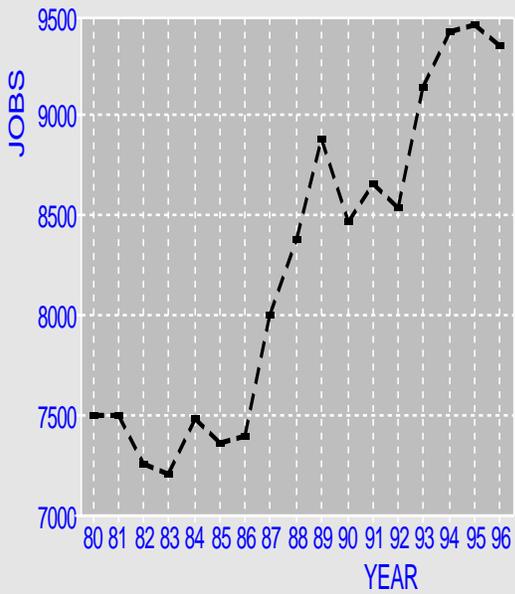
**STATE OF OREGON**  
Part & Full-Time Employment



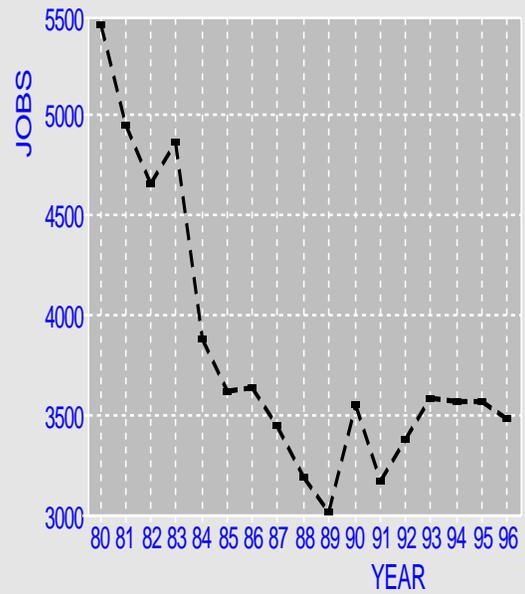
**GILLIAM COUNTY, OR**  
Part & Full-Time Employment

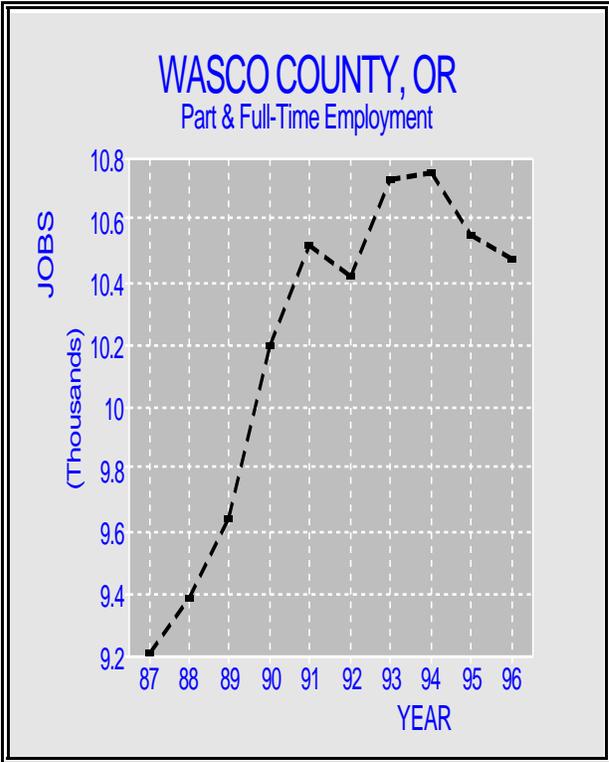
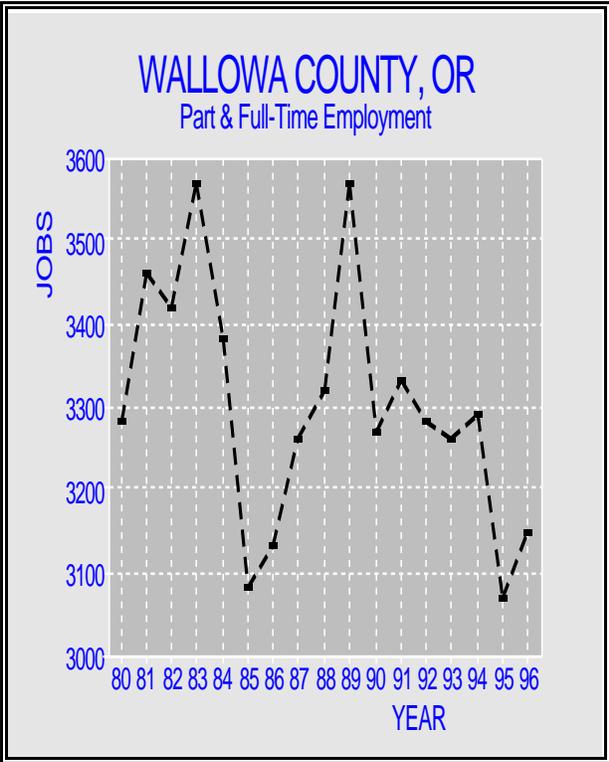
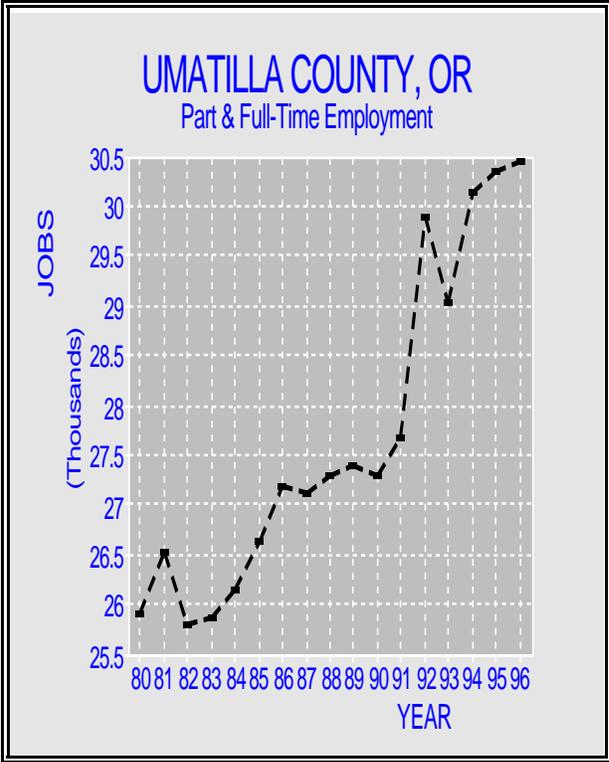
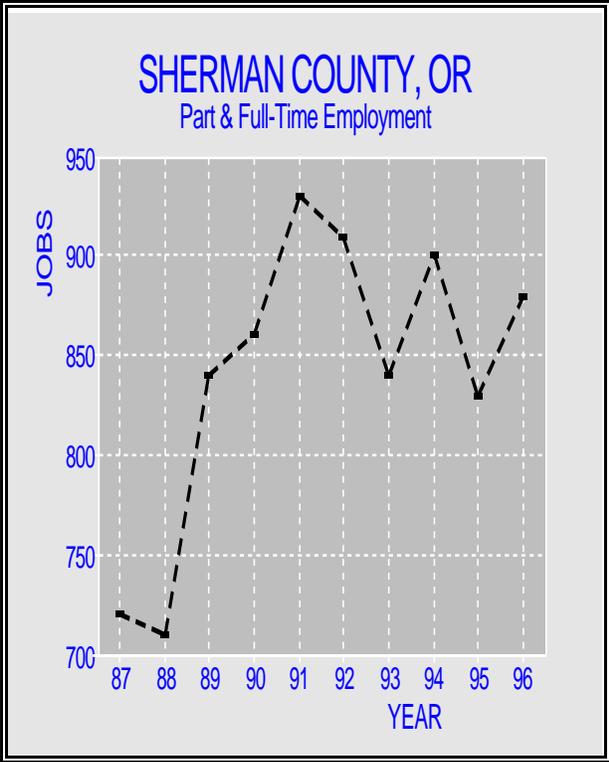


**HOOD RIVER COUNTY, OR**  
Part & Full-Time Employment

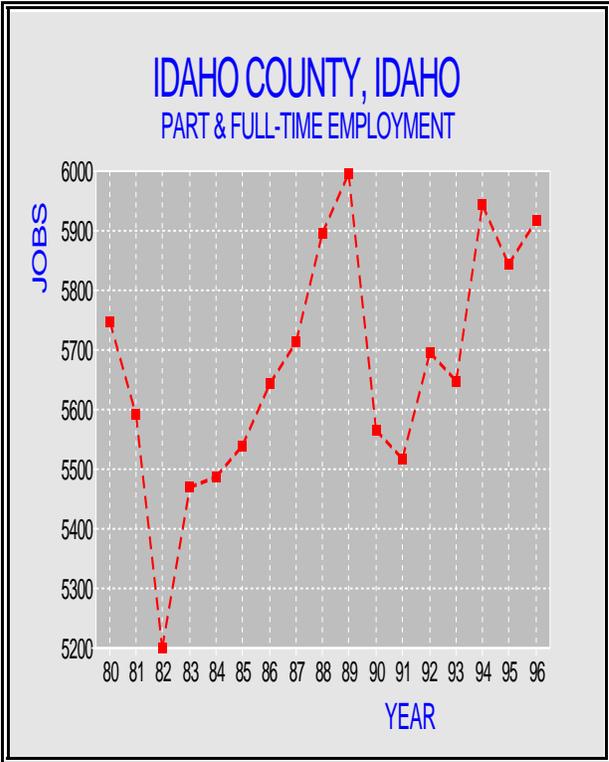
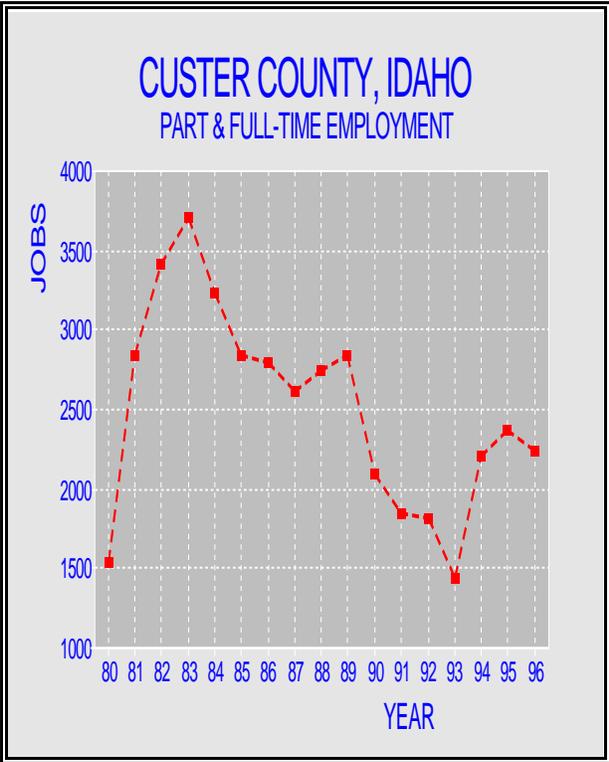
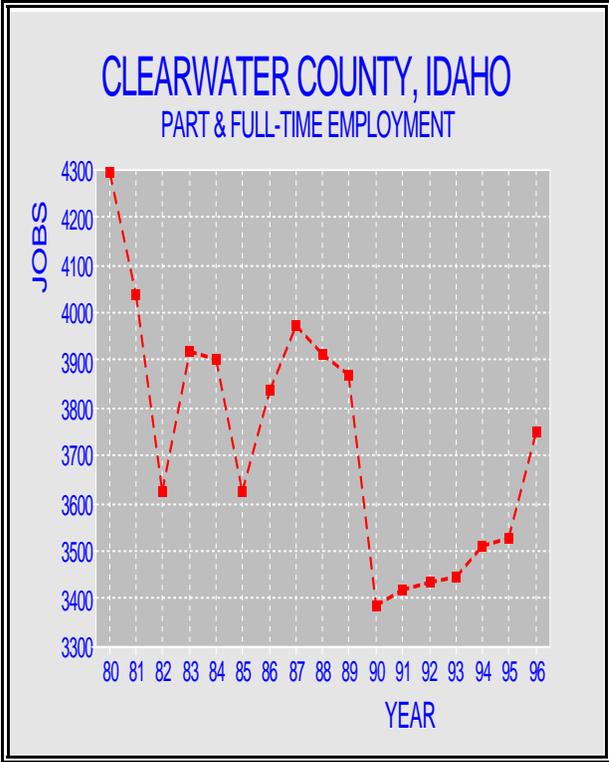
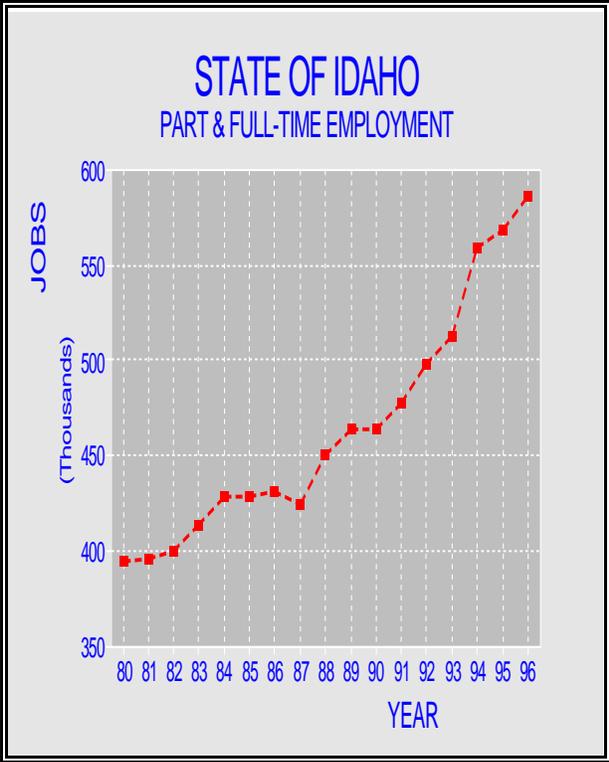


**MORROW COUNTY, OR**  
Part & Full-Time Employment

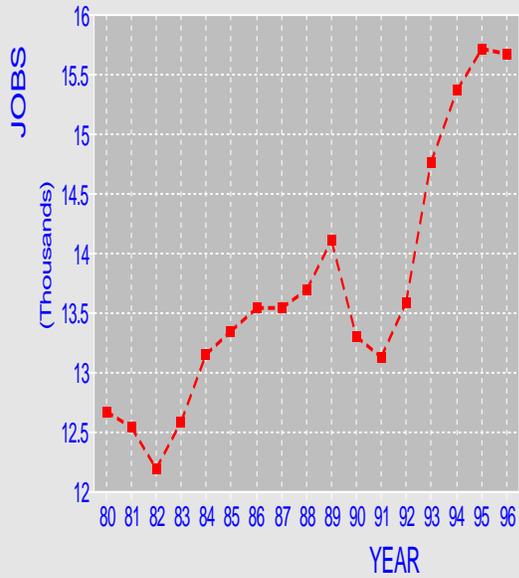




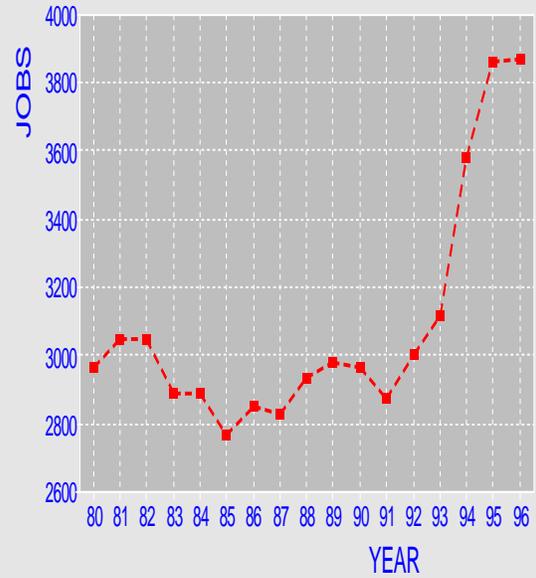
**Figure 3-6**  
**EMPLOYMENT TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF IDAHO**  
(see following pages)



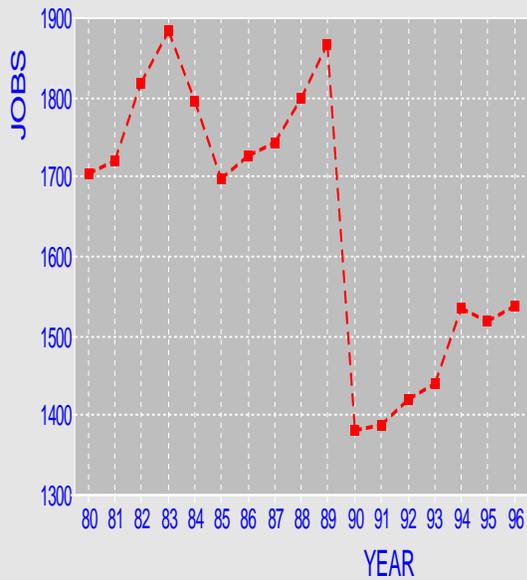
### LATAH COUNTY, IDAHO PART & FULL-TIME EMPLOYMENT



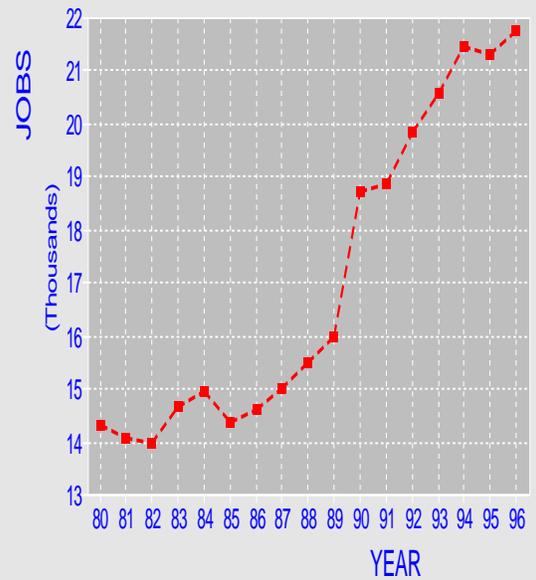
### LEMHI COUNTY, IDAHO PART & FULL-TIME EMPLOYMENT

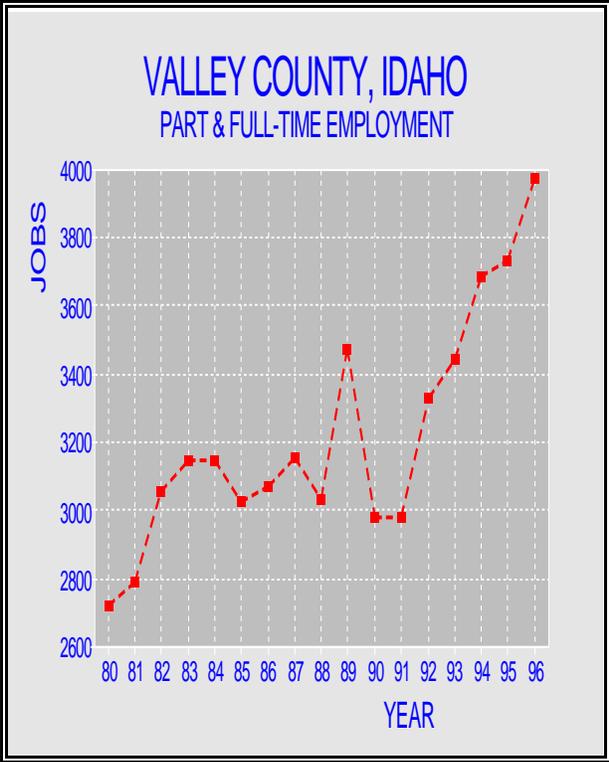


### LEWIS COUNTY, IDAHO PART & FULL-TIME EMPLOYMENT



### NEZ PERCE COUNTY, IDAHO PART & FULL-TIME EMPLOYMENT





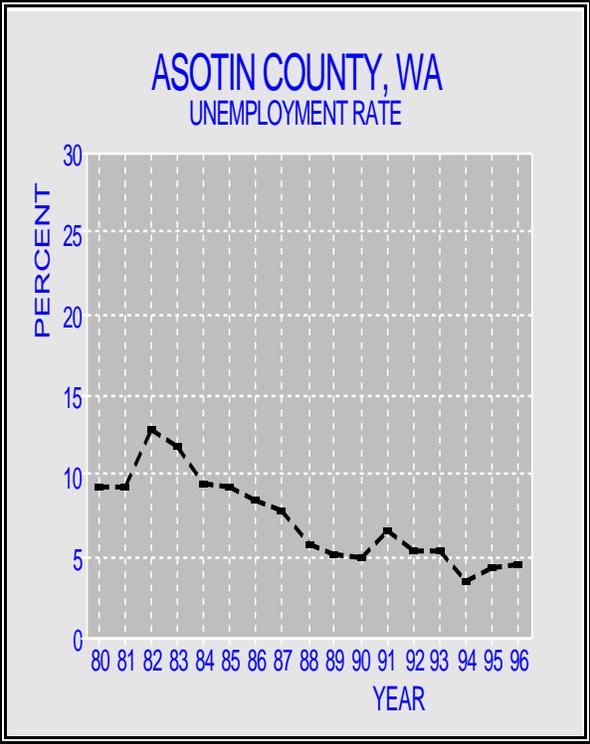
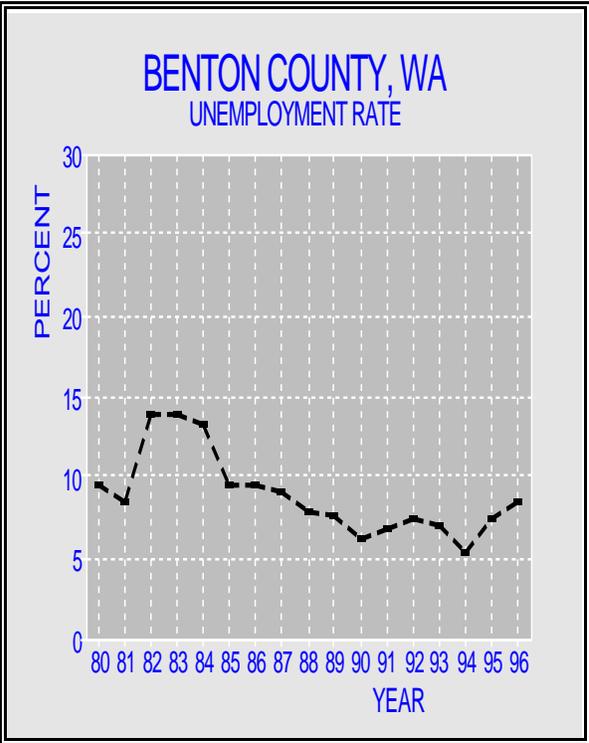
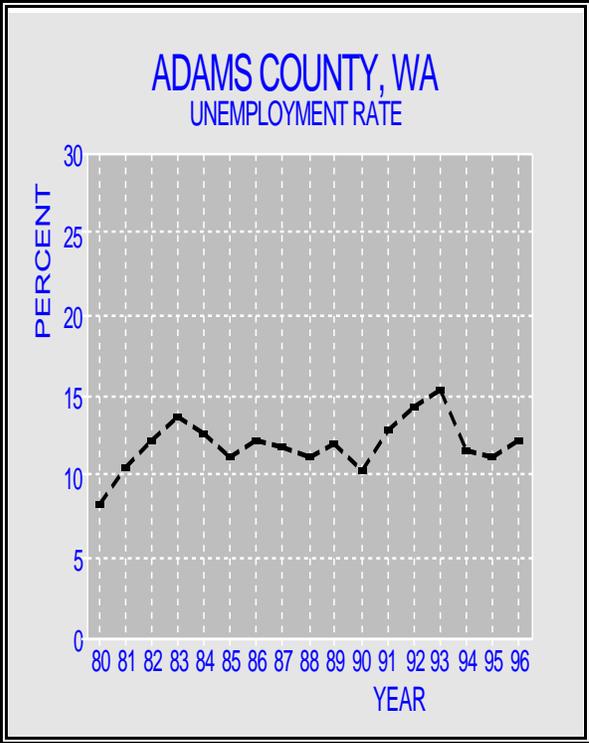
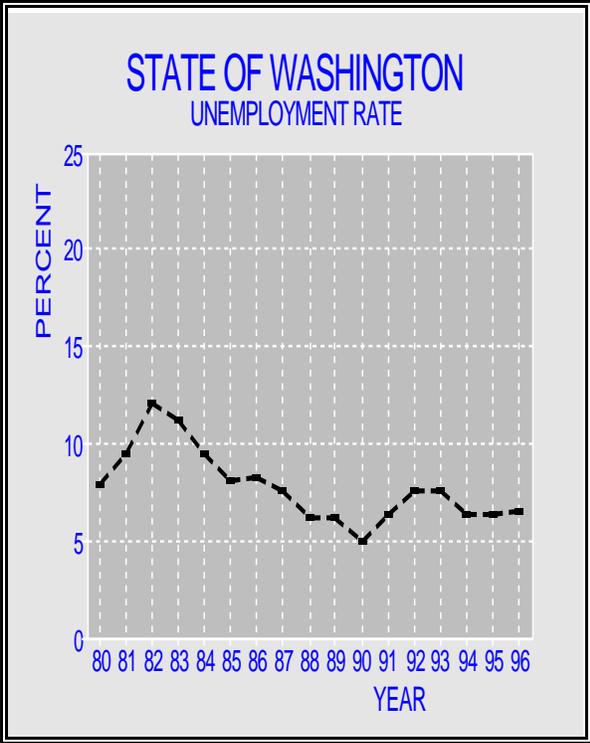
### **3.5 TRENDS IN UNEMPLOYMENT RATE BY COUNTY FOR THE STUDY AREA**

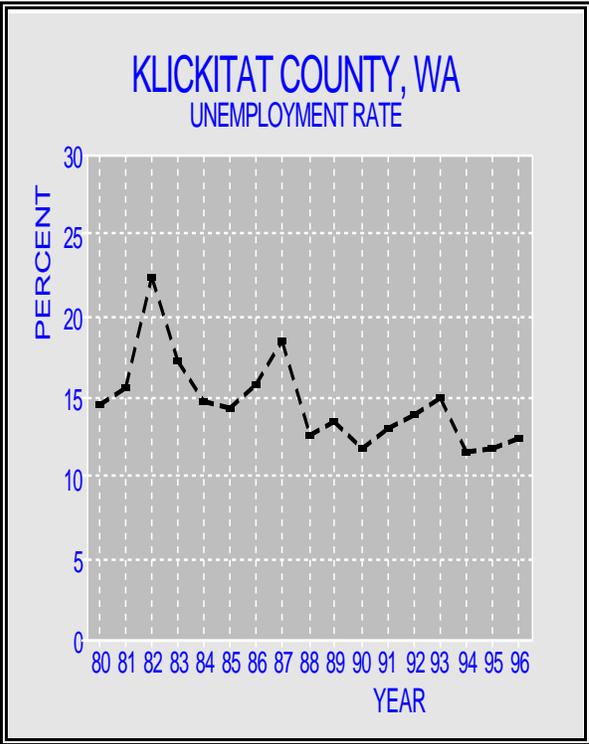
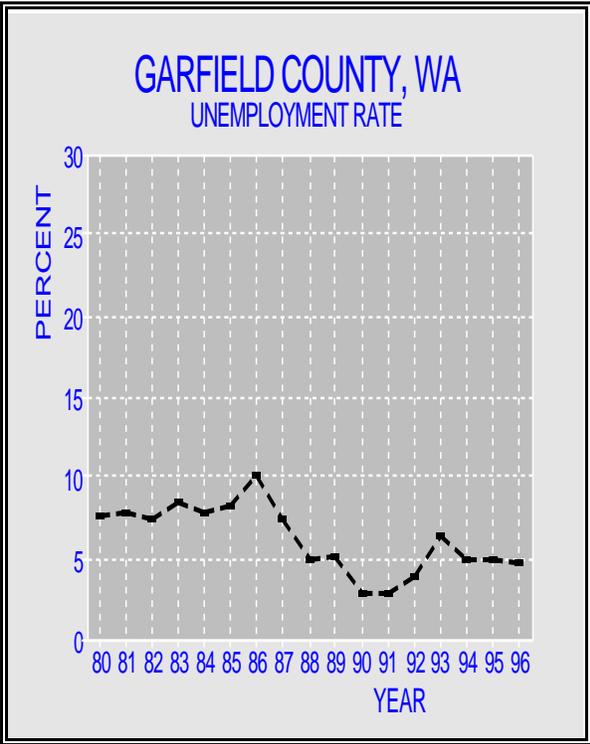
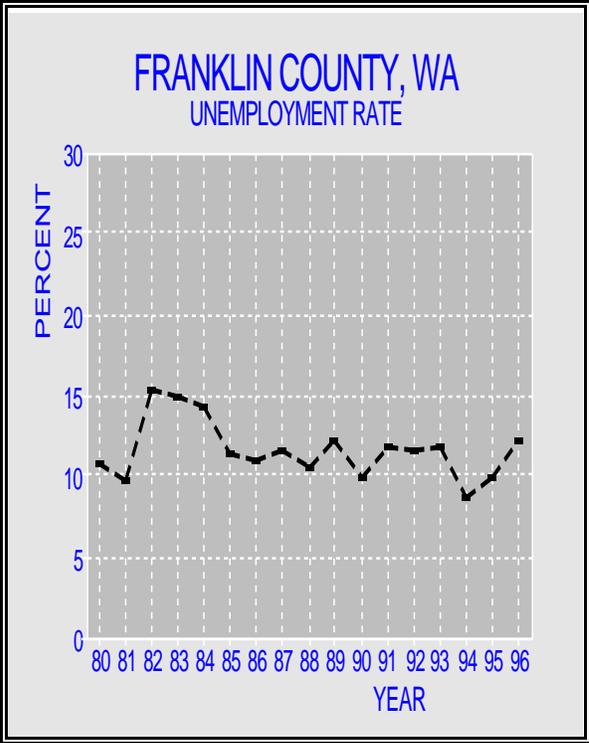
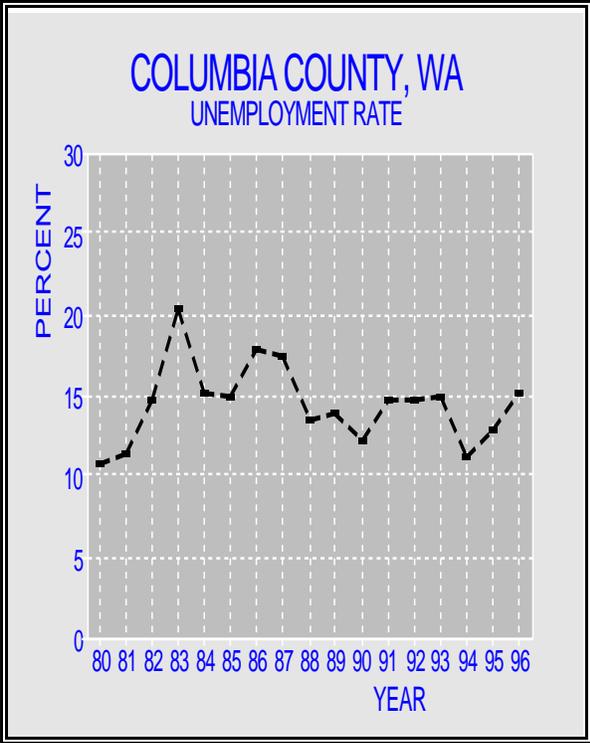
Figures 3-10 and 3-12 reveal that parts of the Upriver Subregion (central Idaho) experienced extremely high rates of unemployment between 1980 and 1996. Some counties fell behind Idaho State and the nation with respect to unemployment rate. While Idaho State had a low unemployment rate of 5.2 percent in 1996 and the nation had 5.4, some Idaho counties in the Upriver Subregion had unemployment rates over 10 percent. Conversely, the more populous counties in the subregion, Nez Perce and Latah, had extremely low unemployment rates that were well below 5 percent. Wallowa County in northeast Oregon had a rate of unemployment approaching 12 percent in 1996.

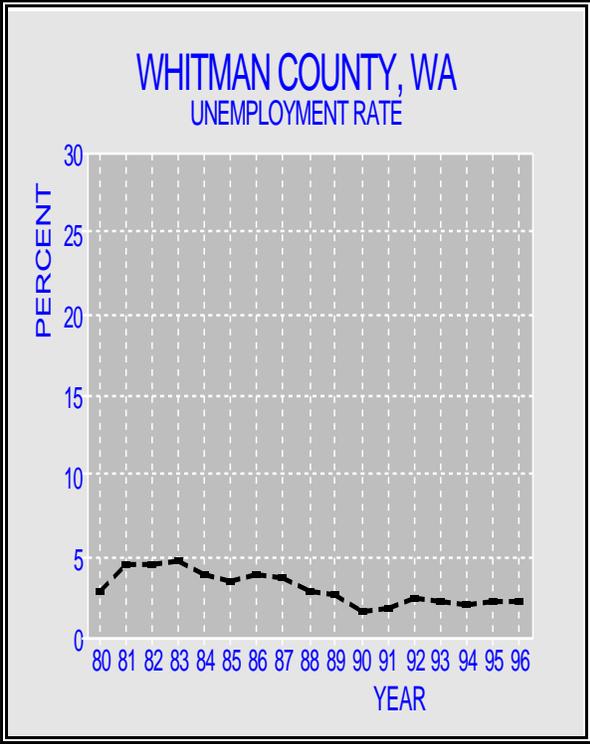
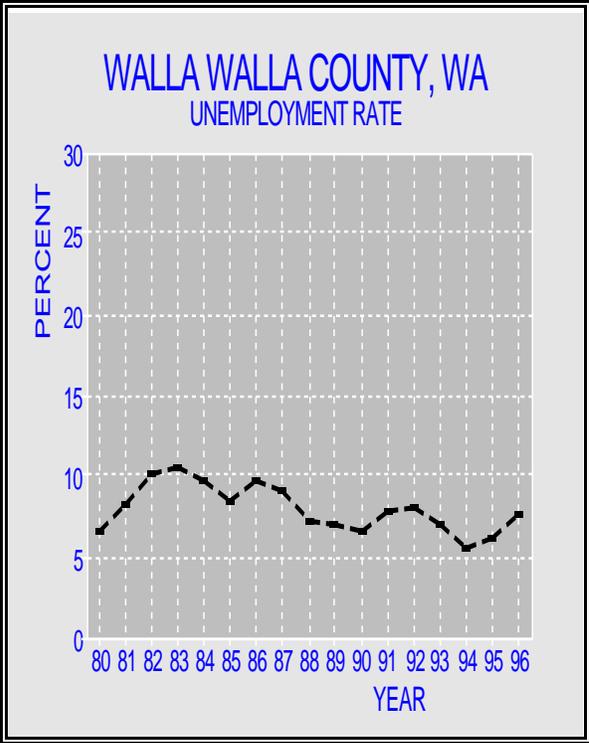
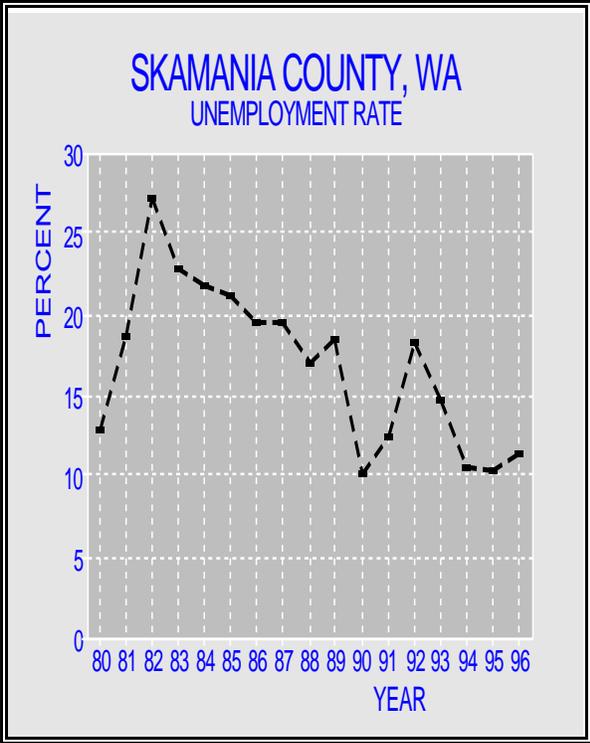
Figure 3-10 includes the unemployment rates for all of the Reservoir Subregion counties. Some of the Reservoir Subregion counties reached extremely high rates of unemployment over the 1980 to 1996 period. Columbia County reached 20 percent in 1983, and Adams County peaked at 15 percent as late as 1993. Asotin County unemployment peaked at 13 percent in 1982 but trended sharply down to only 5 percent by 1989. Garfield and Walla Walla counties had unemployment rates as high as 10 percent. Conversely, Whitman County did not exceed 5 percent unemployment over the entire period and has had a very low rate less than 3 percent since 1989.

Figures 3-10 and 3-11 show that unemployment rates in most of the Downriver Subregion counties were extremely high in the early 1980's but trending lower over time between 1980 and 1996. In Washington, Skamania County peaked at 27 percent unemployment, Klickitat County reached 23 percent, Franklin County reached 15 percent, and Benton County reached 14 percent. By 1996, all of the Washington counties in the Downriver Subregion still had unemployment rates in the 9 to 12 percent range. In comparison, the Washington State average was 6.5 percent in 1996. In Oregon, Hood River County, Morrow County, Sherman County, and Wasco County peaked above 14-15 percent unemployment in the early 1980's. Umatilla County peaked at 12 percent but Gilliam County had a peak unemployment of only about 7 percent. By 1996, almost all of the Oregon Counties (except Gilliam County) in the Downriver Subregion still had unemployment rates between 8 and 10 percent. The Oregon State average was only 5.9 percent in 1996.

Figure 3-7  
UNEMPLOYMENT RATE TRENDS FOR SUBREGION COUNTIES  
IN THE STATE OF WASHINGTON  
(see following pages)

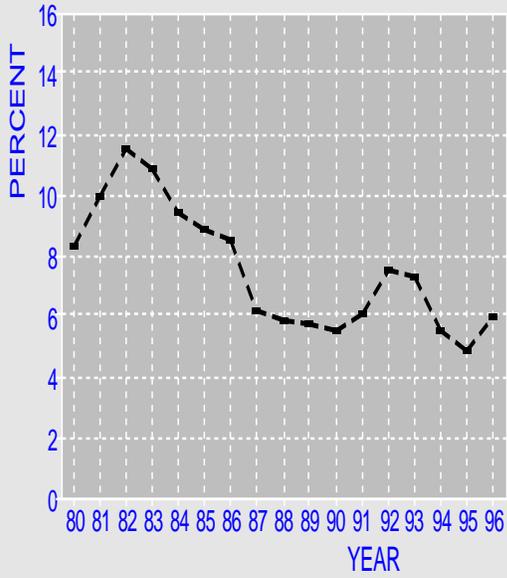




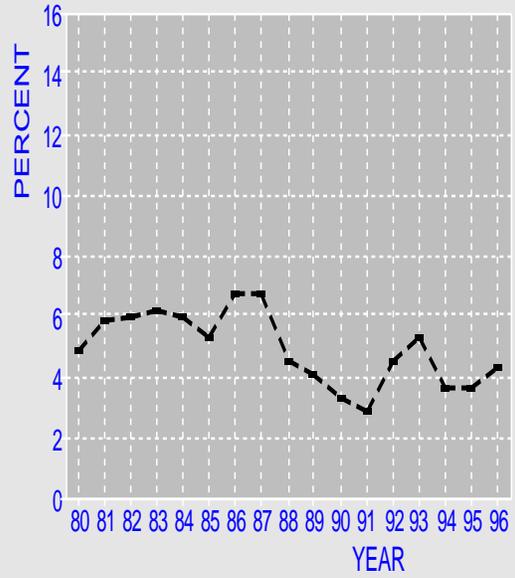


**Figure 3-8**  
**UNEMPLOYMENT RATE TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF OREGON**  
(see following pages)

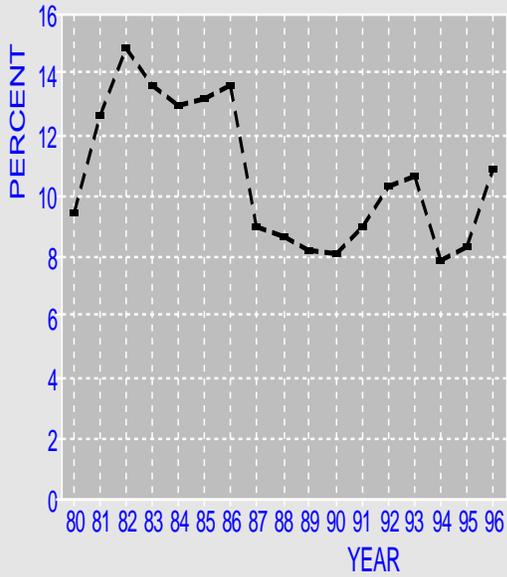
STATE OF OREGON  
UNEMPLOYMENT RATE



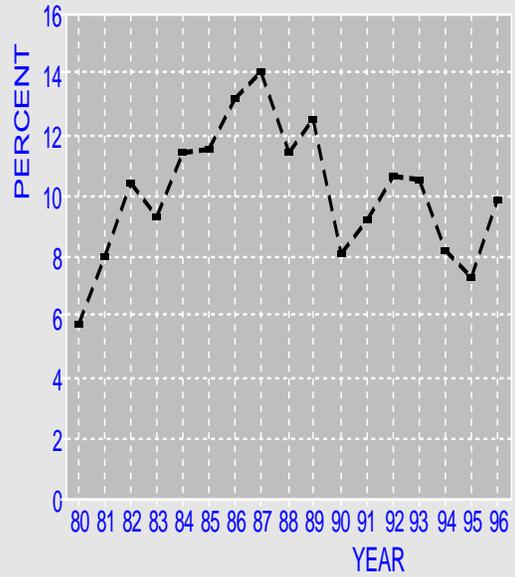
GILLIAM COUNTY, OR  
UNEMPLOYMENT RATE



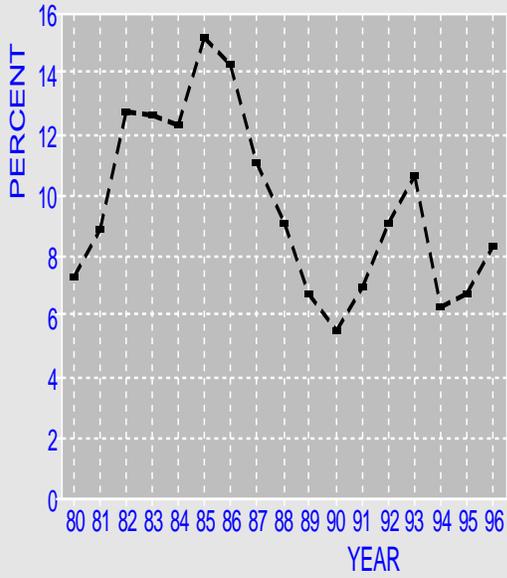
HOOD RIVER COUNTY, OR  
UNEMPLOYMENT RATE



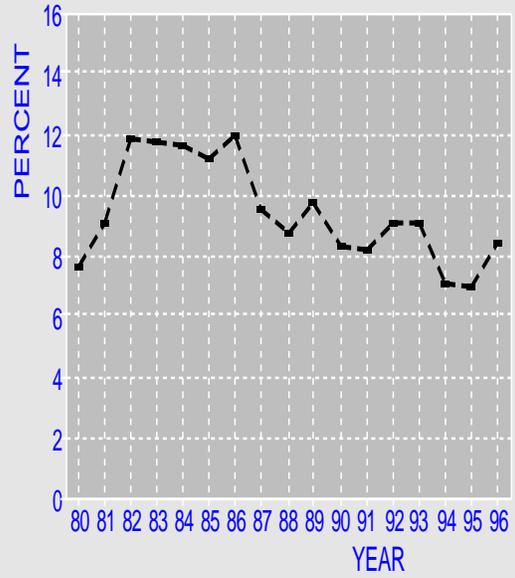
MORROW COUNTY, OR  
UNEMPLOYMENT RATE



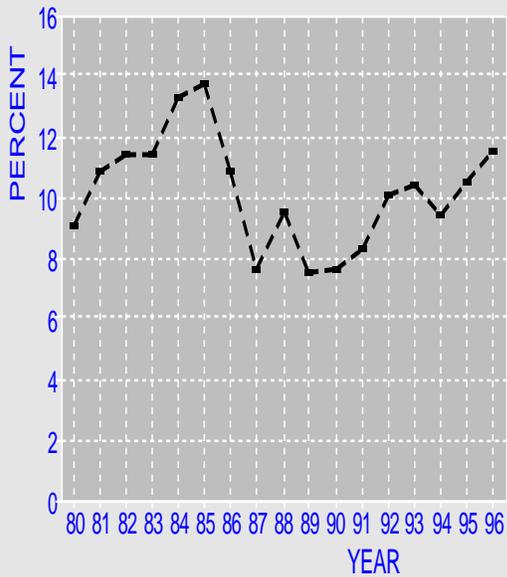
SHERMAN COUNTY, OR  
UNEMPLOYMENT RATE



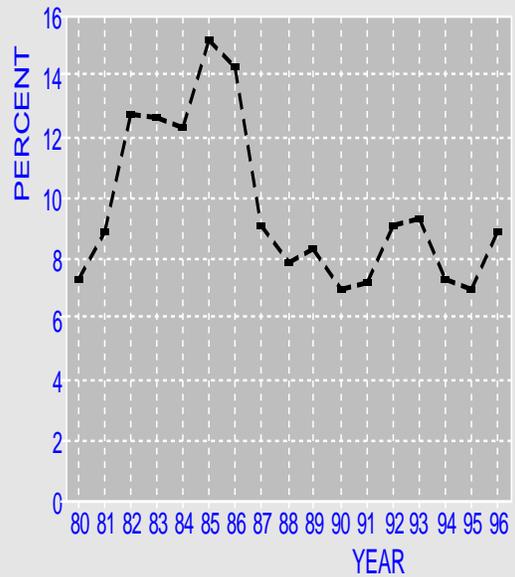
UMATILLA COUNTY, OR  
UNEMPLOYMENT RATE



WALLOWA COUNTY, OR  
UNEMPLOYMENT RATE

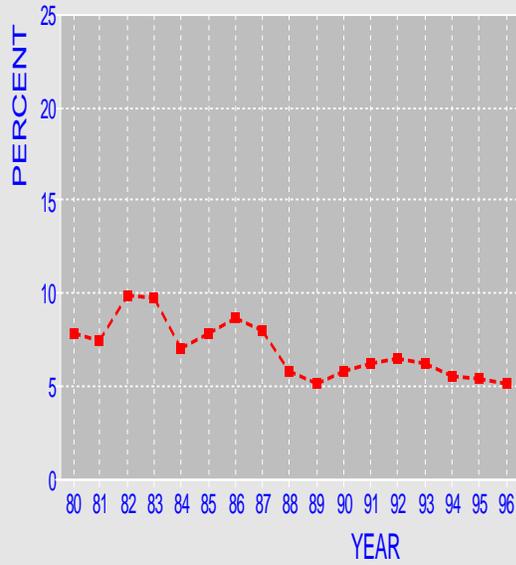


WASCO COUNTY, OR  
UNEMPLOYMENT RATE

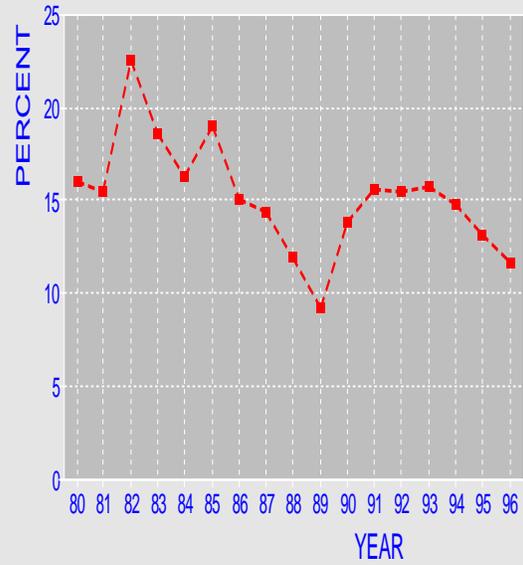


**Figure 3-9**  
**UNEMPLOYMENT RATE TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF IDAHO**  
(see following pages)

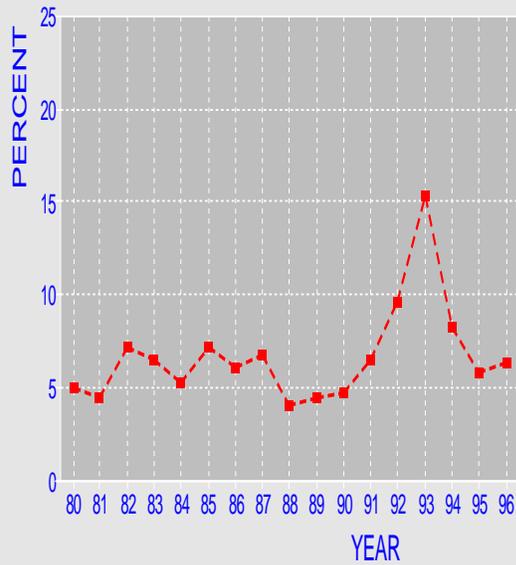
STATE OF IDAHO  
UNEMPLOYMENT RATE



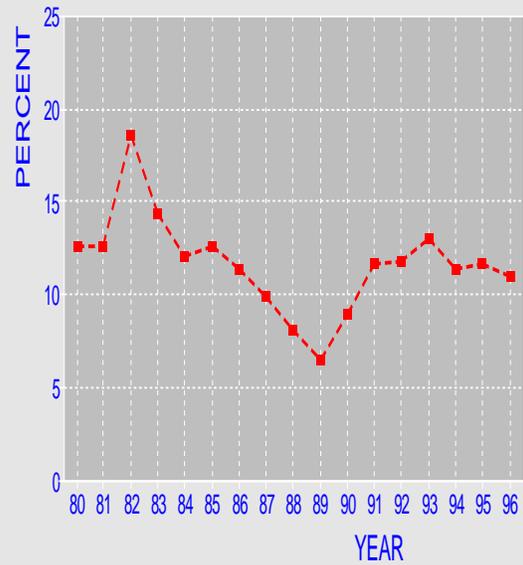
CLEARWATER COUNTY, IDAHO  
UNEMPLOYMENT RATE



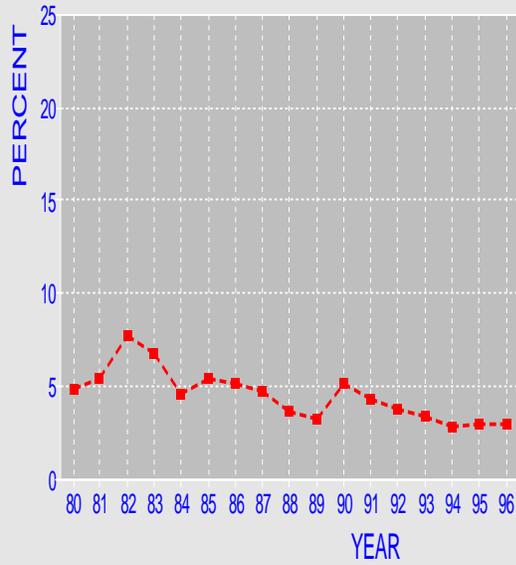
CUSTER COUNTY, IDAHO  
UNEMPLOYMENT RATE



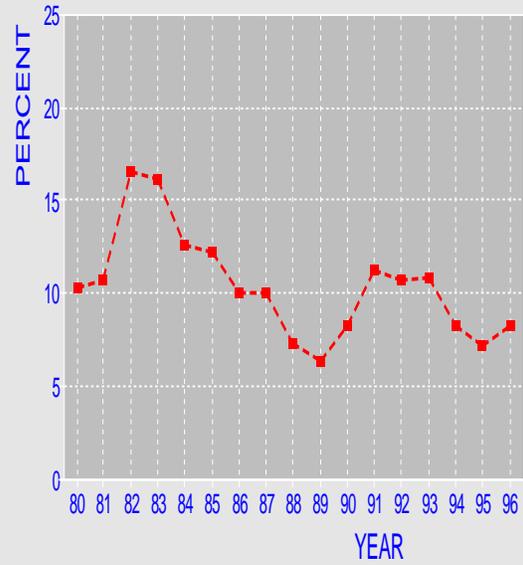
IDAHO COUNTY, IDAHO  
UNEMPLOYMENT RATE



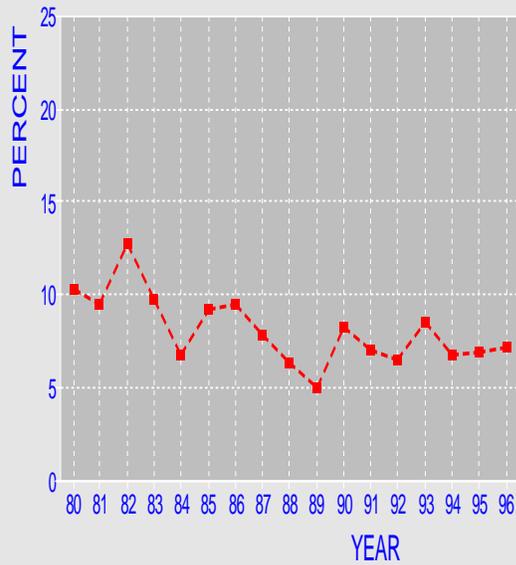
LATAH COUNTY, IDAHO  
UNEMPLOYMENT RATE



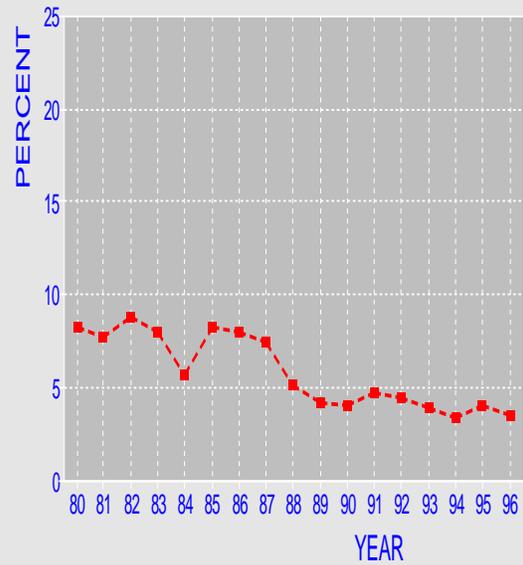
LEMHI COUNTY, IDAHO  
UNEMPLOYMENT RATE

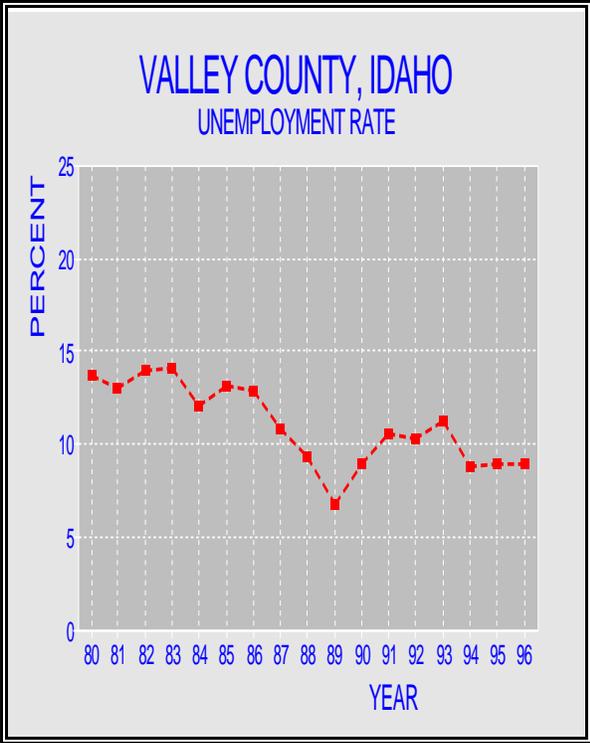


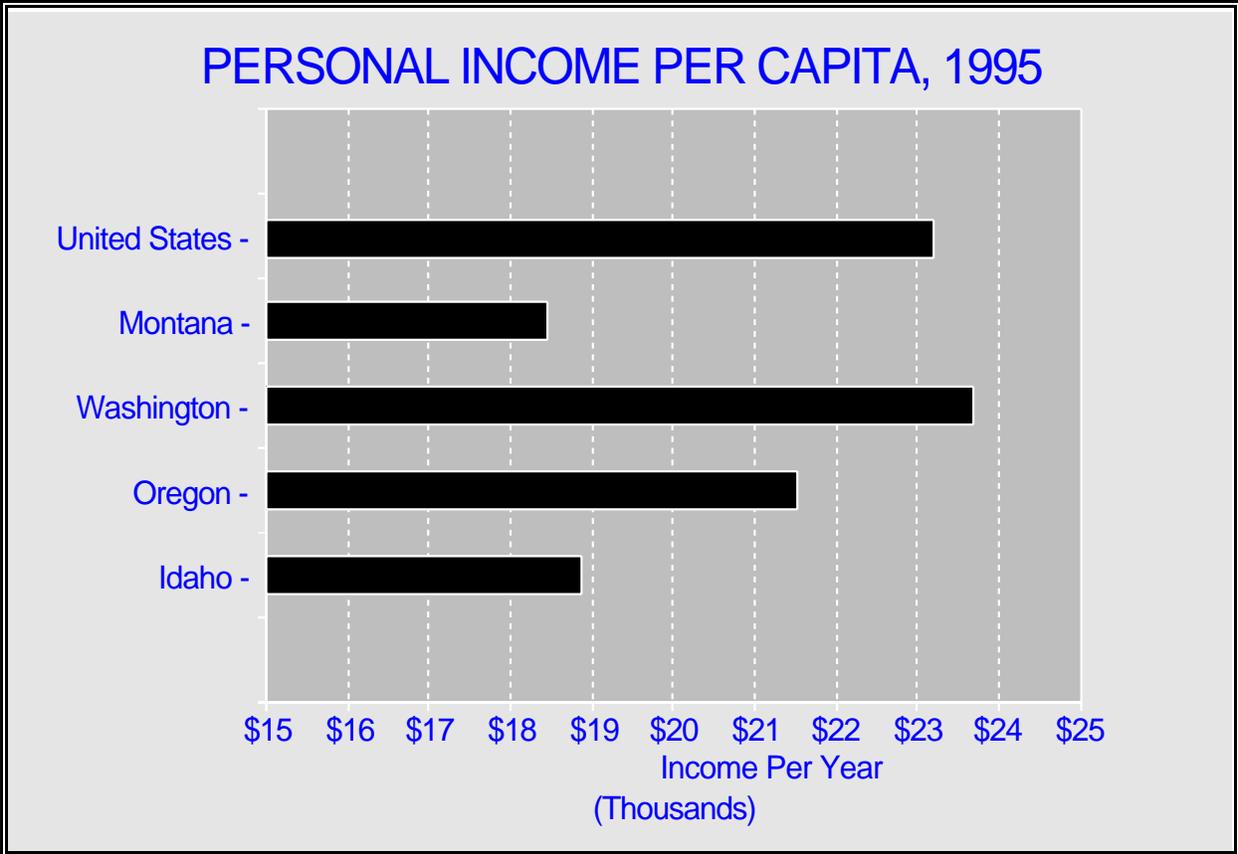
LEWIS COUNTY, IDAHO  
UNEMPLOYMENT RATE



NEZ PERCE COUNTY, IDAHO  
UNEMPLOYMENT RATE

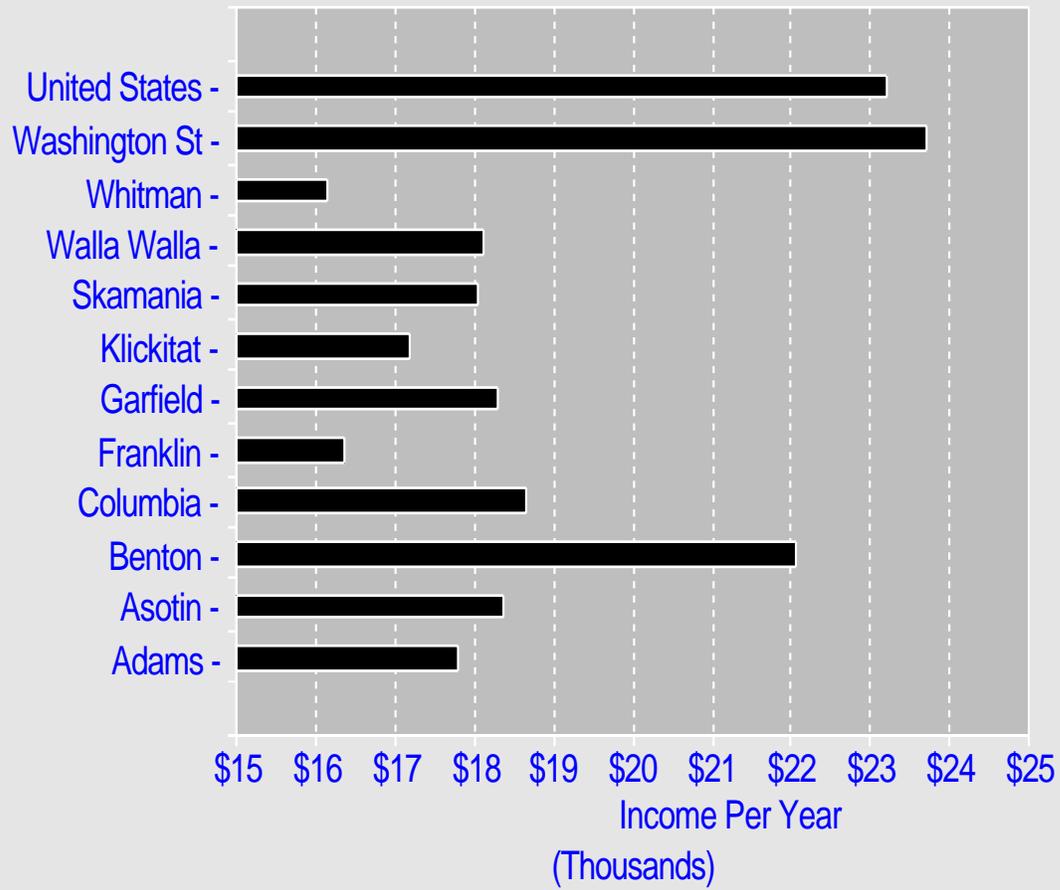




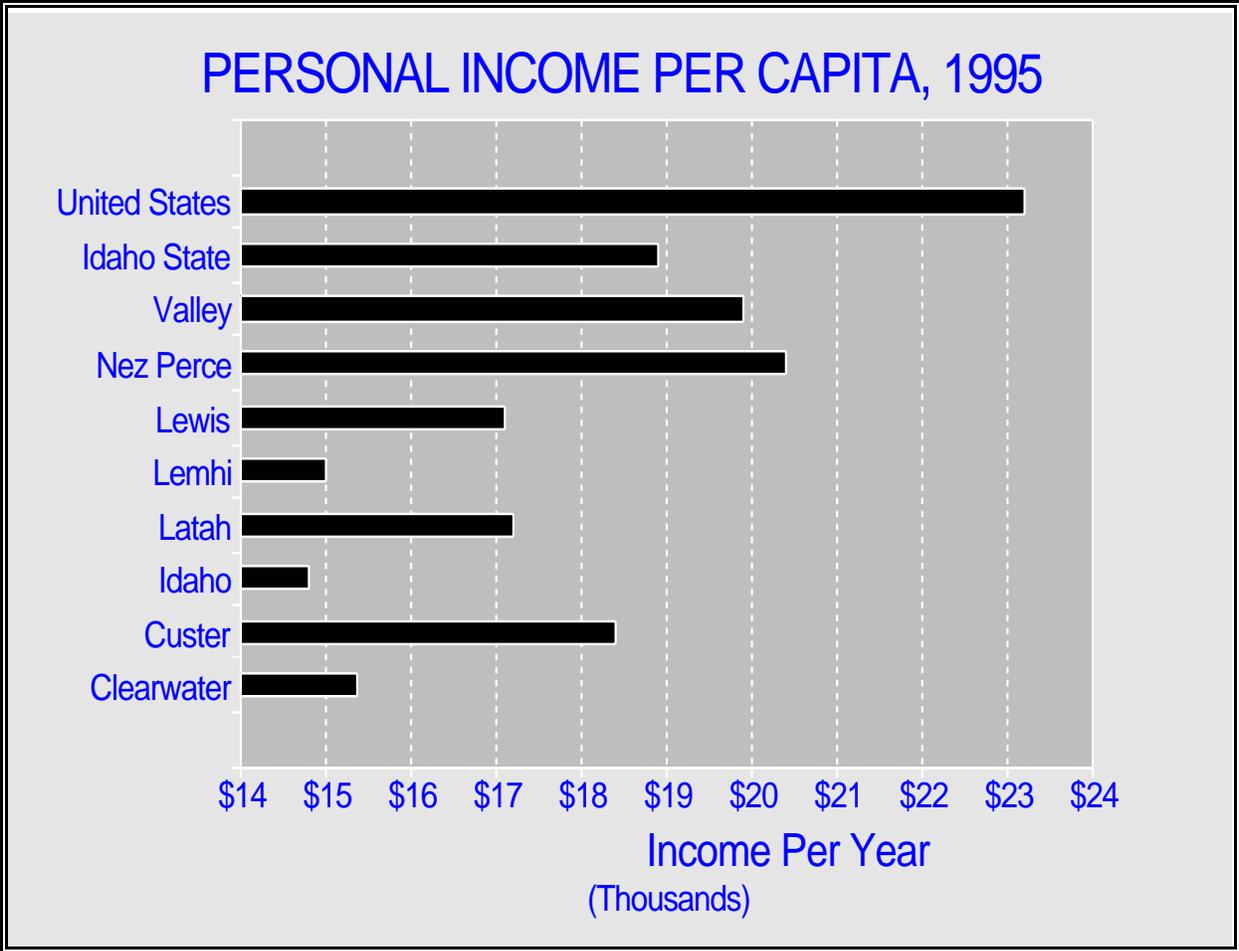


**Figure 3-10 STATE COMPARISONS OF PER CAPITA PERSONAL INCOME**

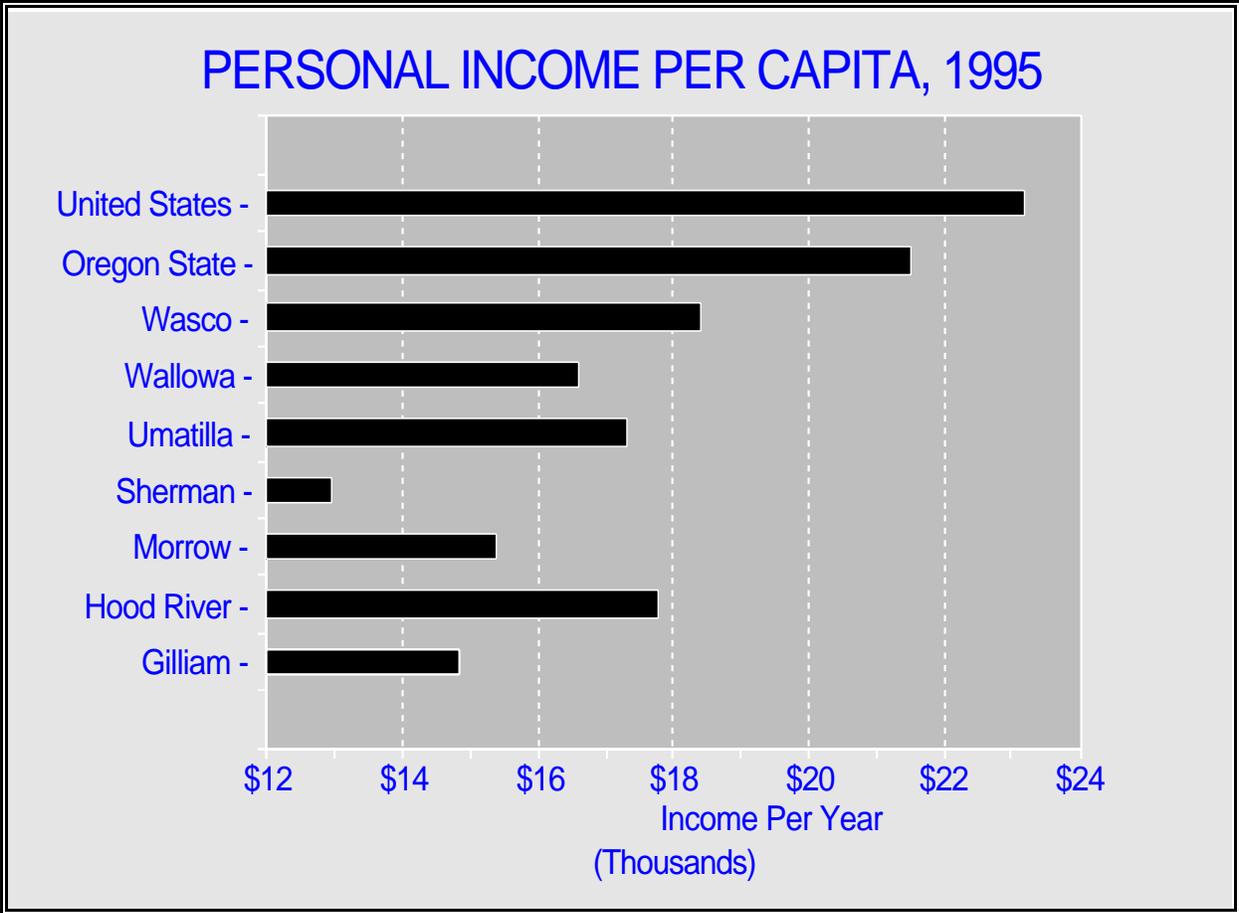
## PERSONAL INCOME PER CAPITA, 1995



**Figure 3-11 COUNTY COMPARISONS OF PER CAPITA PERSONAL INCOME - WASHINGTON**



**Figure 3-12 COUNTY COMPARISONS OF PER CAPITA PERSONAL INCOME - IDAHO**



**Figure 3-13 COUNTY COMPARISONS OF PER CAPITA PERSONAL INCOME - OREGON**

### 3.6 TRENDS IN NOMINAL AND REAL PERSONAL INCOME PER CAPITA FOR COUNTIES IN THE STUDY AREA

Figures 3-13 and 3-15 reveal that the Upriver Subregion (central Idaho) falls far behind Washington State and the nation in personal income per capita.<sup>19</sup> While Washington and the nation had per capita incomes well over \$23,000/year in 1995, the residents of counties in Idaho had much lower incomes. 1995 per capita incomes levels were: Clearwater \$15,370, Custer \$18,380, Idaho \$14,800, Latah \$17,186, Lemhi \$15,006, Lewis \$17,105, Nez Perce \$20,399, and Valley County \$19,885. Wallowa County in northeast Oregon has a personal income per capita of \$16,814. In contrast, the average personal income per capita for the State of Washington was \$23,709 in 1995.

The more populous counties, Latah and Nez Perce counties, had income per capita growth<sup>20</sup> that was similar to the Idaho State average of 7.0% (4.5%)<sup>21</sup> and the Oregon State average of 7.1% (4.6%) between 1969 and 1995. Custer County, with a very small population, exceeded the State average in growth of per capita income. Average annual growth rates of personal income per capita for the Idaho counties in the Upriver Subregion were: Clearwater 6.0% (3.5%), Custer 7.5% (5.0%), Idaho 6.3% (3.8%), Latah 7.2% (4.7%), Lemhi 6.8% (4.3%), Lewis 5.5% (3.0%), Nez Perce 7.1% (4.6%), and Valley County 6.3% (3.8%). Income per capita in Wallowa County, Oregon grew by 6.5% (4.0%) over the 1969 to 1995 period.

The 1995 income per capita for residents of the Reservoir Subregion counties were: Adams \$17,789, Asotin \$18,360, Columbia \$18,670, Garfield \$18,277, Walla Walla \$18,122, and Whitman \$16,154. Excepting Whitman County, very little variation in incomes is observed across the Reservoir Subregion counties. Figure 3-14 shows that all of these Washington

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<sup>19</sup> State personal income averages tend to be dominated by very large cities. The cost of living, including taxes, can be 10 to 30 percent higher in large cities than in smaller towns or rural areas. Thus, variation in real income between counties and States may be much less than is shown by the unadjusted data.

<sup>20</sup> Compound rates of growth.

<sup>21</sup> The compound rate of inflation over the 1980-1996 period was 2.48%. The growth rates shown in parentheses are "real rates" that are adjusted for inflation.

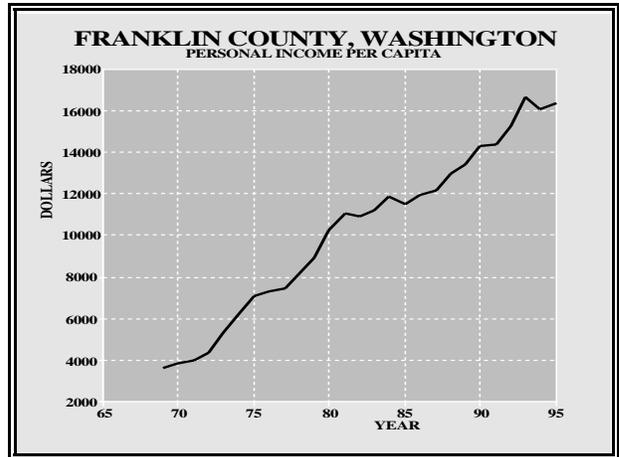
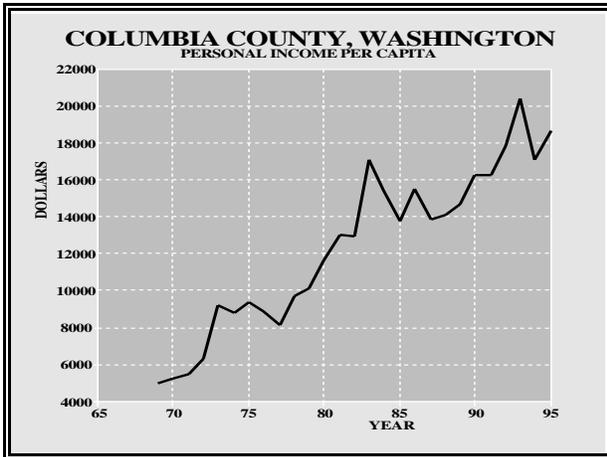
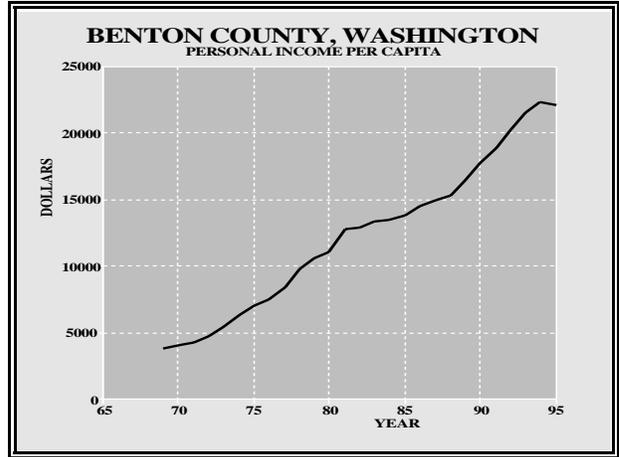
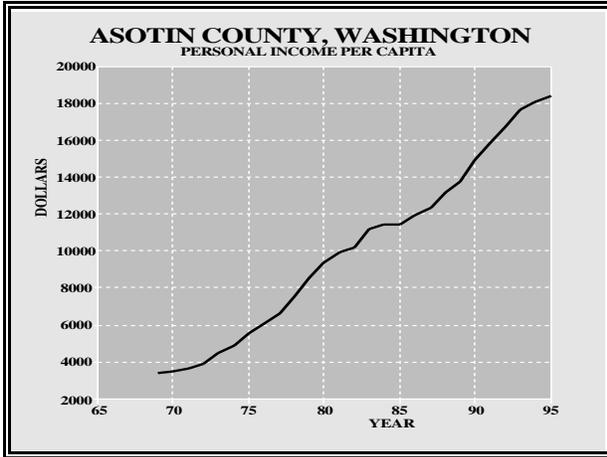
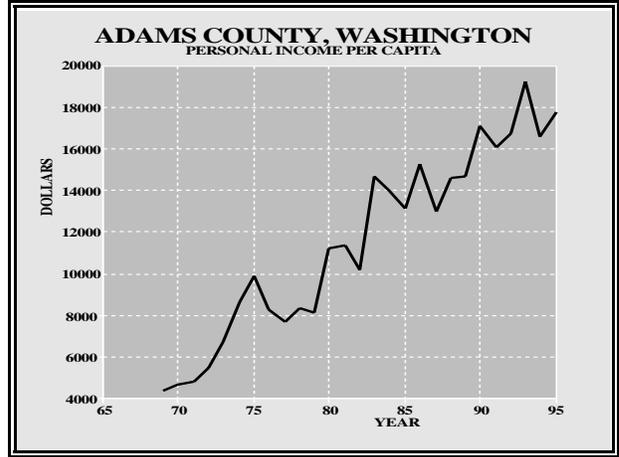
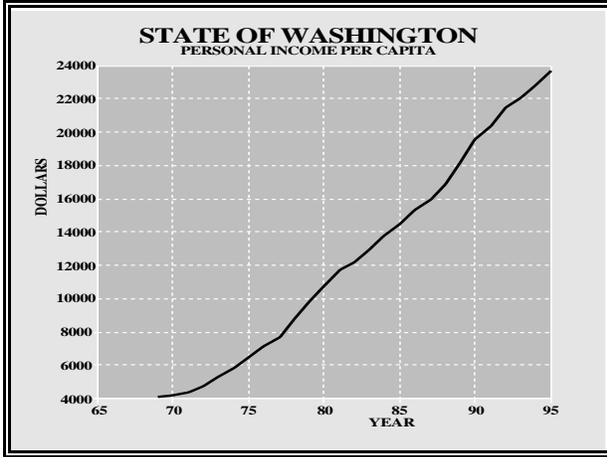
counties fall far below the State of Washington average per capita income of \$23,709 or the national average.

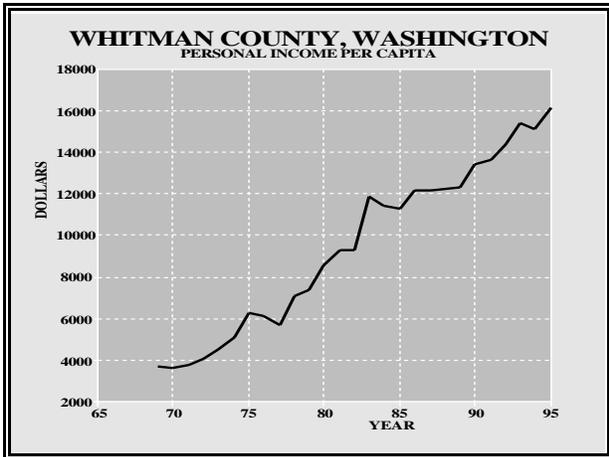
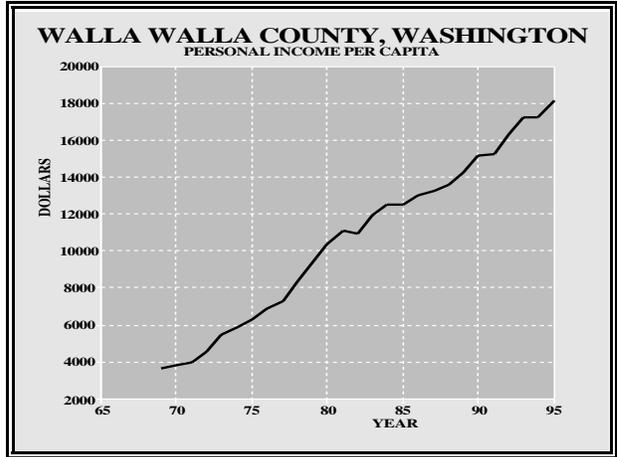
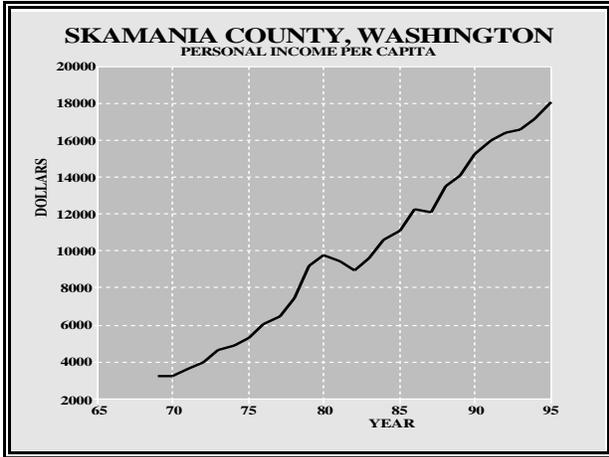
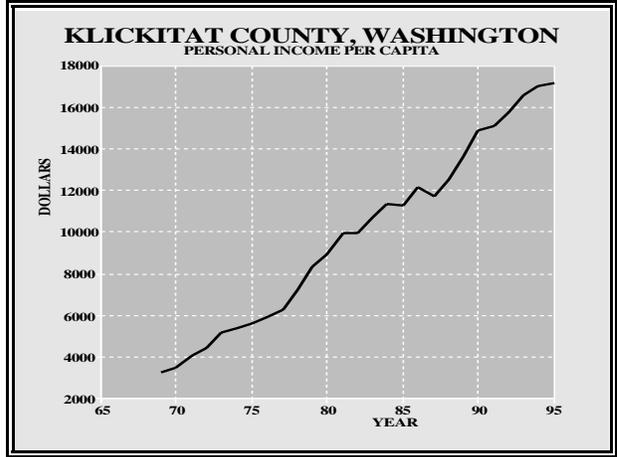
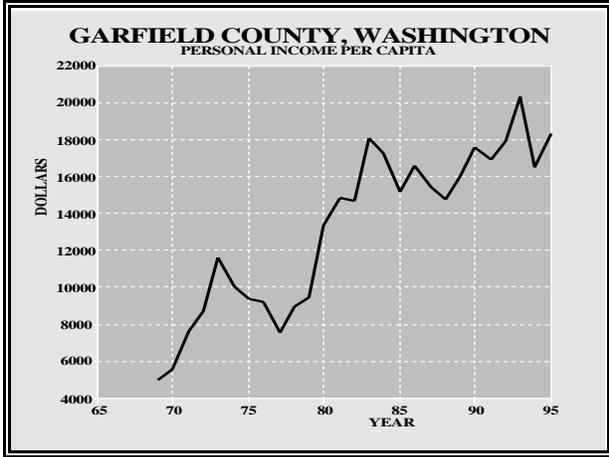
None of the Counties in the Reservoir Subregion (all in Washington) reached the Washington State income per capita growth rate of 7.0% (4.5%) for the 1969 to 1995 period. Average annual growth rates of per capita income for the Reservoir Subregion counties were: Adams 5.6% (3.1%), Asotin 6.7% (4.2%), Columbia 5.2% (2.7%), Garfield 5.1% (2.6%), Walla Walla 6.4% (3.9%), and Whitman 6.4% (3.9%).

Figure 3-14 shows that most of the Washington counties in the Downriver Subregion have an average per capita income level well below the Washington State average of \$23,709 for 1995. Only Benton county is close to the State average. The average per capita incomes for residents of the Downriver Subregion counties in Washington were: Benton \$22,072, Franklin \$16,356, Klickitat \$17,164, and Skamania \$18,036. Figure 3-16 shows that some of the Oregon counties in the Downriver Subregion had average per capita incomes that were much less than the average for Oregon which was \$21,530 for 1995. Average per capita incomes for the Oregon counties were: Gilliam \$14,840, Hood River \$17,771, Morrow \$15,394, Sherman \$12,977, Wasco \$18,409, and Umatilla \$17,329. Several of these Oregon Counties had average per capita incomes that were half to two-thirds the national average. The time series graphs in Figure 3-18 show that Sherman County had a negative growth of per capita income from 1987 through 1995.

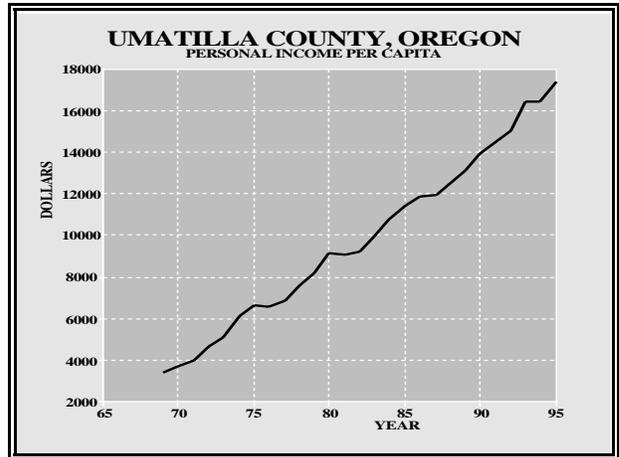
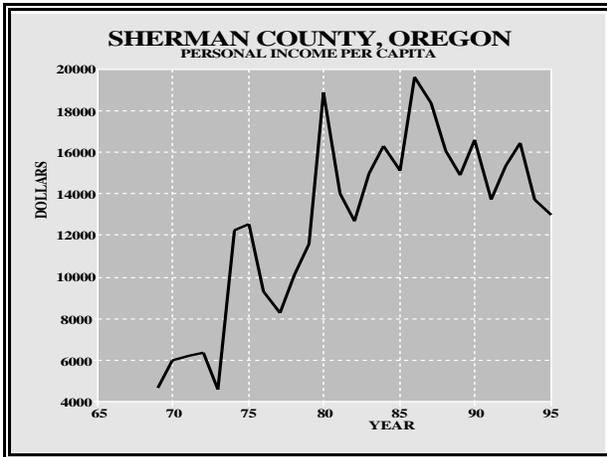
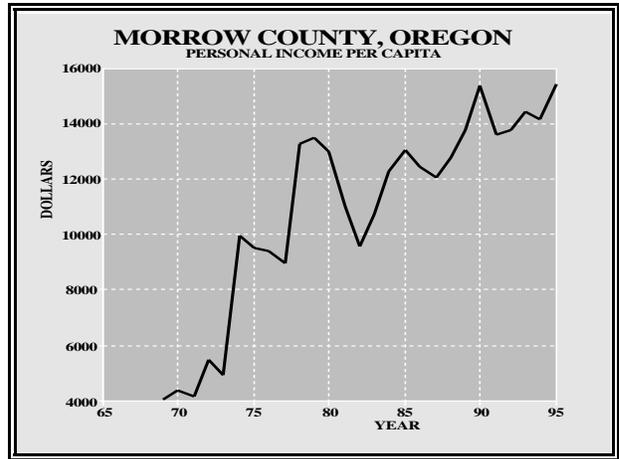
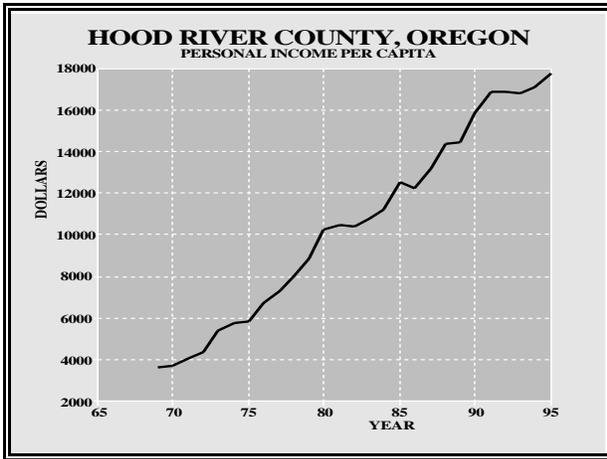
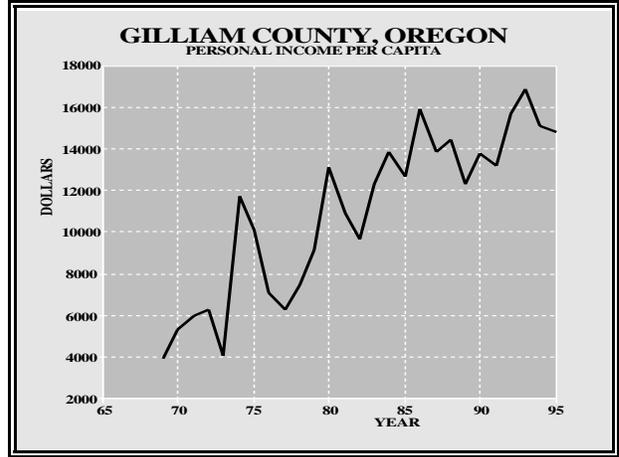
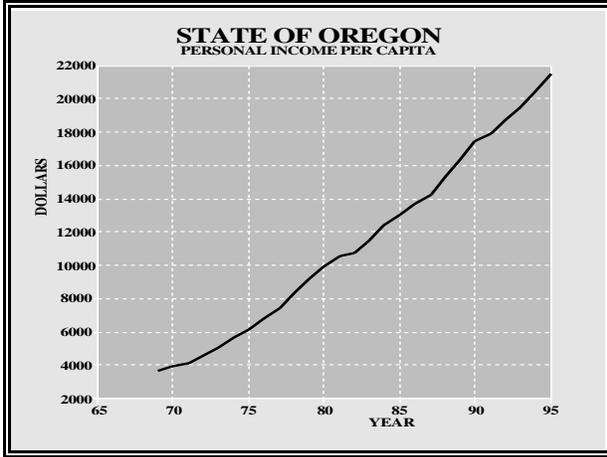
None of the Washington counties in the Downriver Subregion had a per capita income growth above the Washington State average of 7.0% (4.5%) between 1969 and 1995. Average annual growth rates of income per capita for the Downriver Subregion counties in Washington were: Benton 7.0% (4.5%), Franklin 5.3% (2.8%), Klickitat 6.7% (4.2%), and Skamania 6.8% (4.3%). Many of the Oregon counties in the Downriver Subregion had much lower growth in per capita income than the State of Oregon rate of 7.1% (4.6%) between 1969 and 1995. Average annual growth rates of per capita income for Oregon counties were: Gilliam 5.3% (2.8%), Hood River 6.3% (3.8%), Morrow 5.3% (2.8%), Sherman 4.0% (1.5%), Wasco 6.5% (4.0%), and Umatilla 6.4% (3.9%).

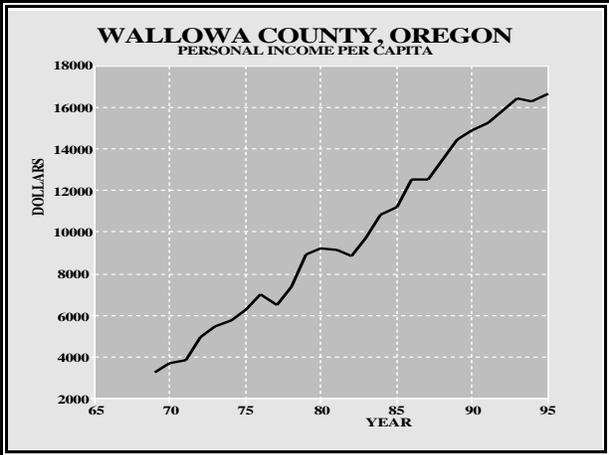
**Figure 3-14**  
**PERSONAL INCOME PER CAPITA TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF WASHINGTON**  
(see following pages)



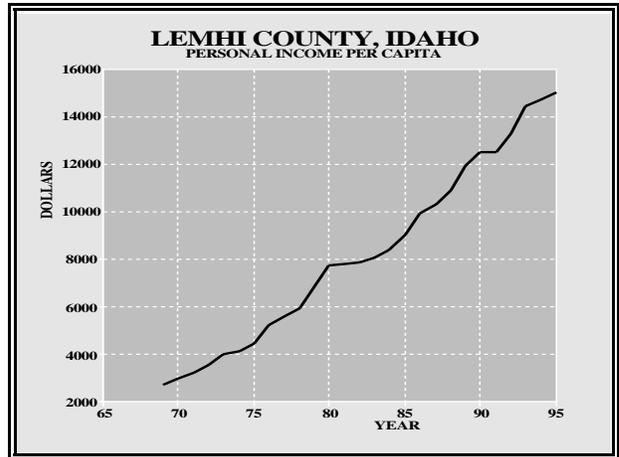
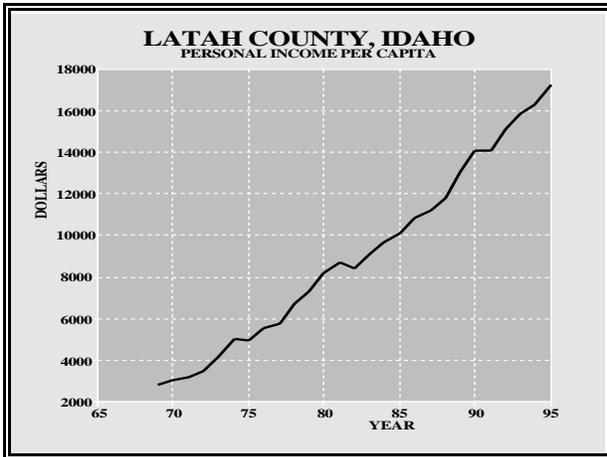
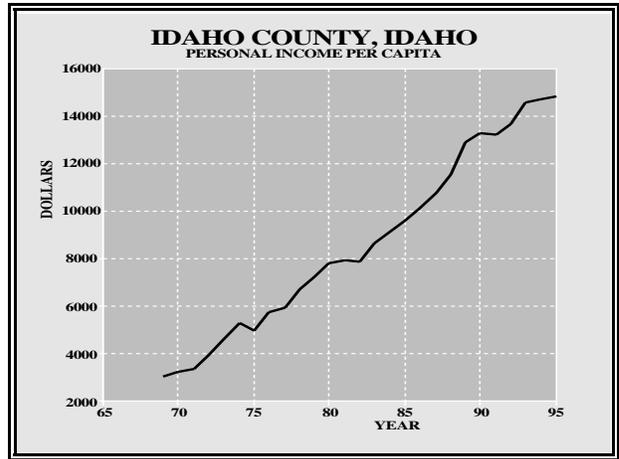
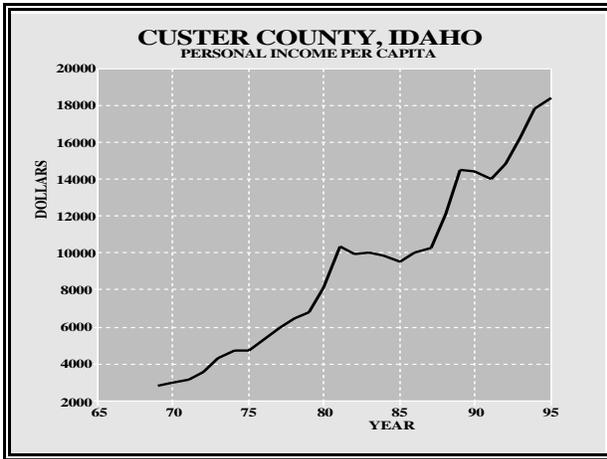
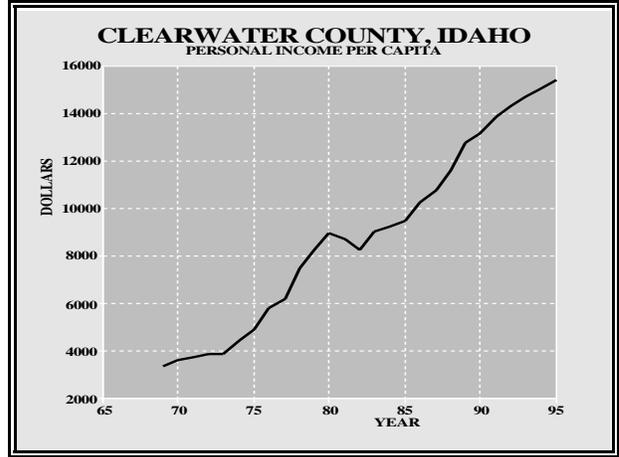
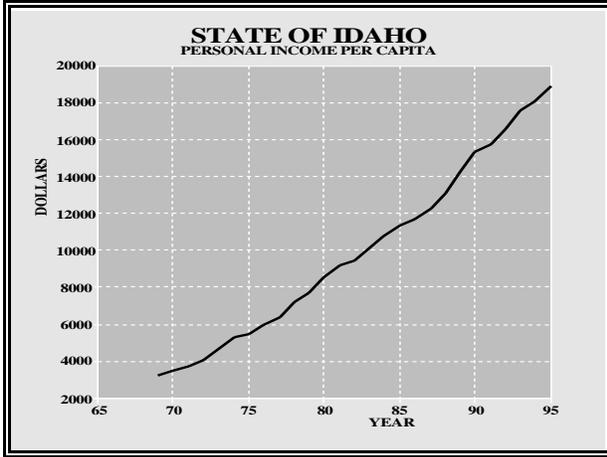


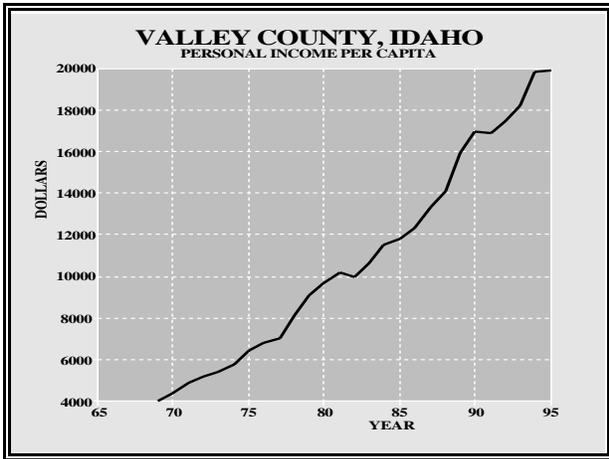
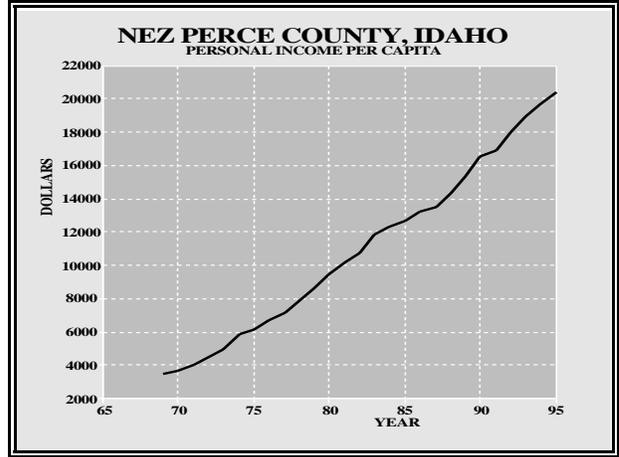
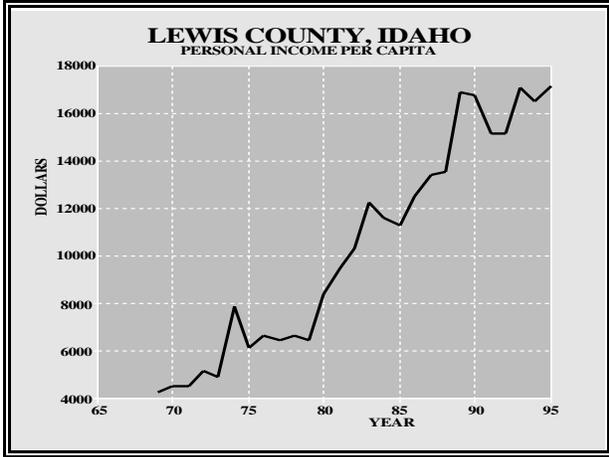
**Figure 3-15**  
**PERSONAL INCOME PER CAPITA TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF OREGON**  
(see following pages)





**Figure 3-16**  
**PERSONAL INCOME PER CAPITA TRENDS FOR SUBREGION COUNTIES**  
**IN THE STATE OF IDAHO**  
(see following pages)





**SECTION 4**

**ESTIMATED DIRECT, INDIRECT, AND INDUCED  
ECONOMIC EFFECTS OF THE ALTERNATIVES**

## **INTRODUCTION**

Contained in section four are estimates and projections of economic values that would occur for five alternatives that can be compared to the baseline alternative. The baseline Alternative, A-1, depicts existing conditions.<sup>22</sup> Four alternatives have been specified for the maximum fish transport scenario. These alternatives reflect four possible levels of modifications to the existing Lower Snake River facilities, (A-2a - maximum transport without major system improvements; A-2b - maximum transport with system improvements, high cost; A-2c - maximum transport with system improvements, low cost; A-2d - system improvements with adaptive migration strategy). The fifth alternative, A-3 - natural river drawdown, channel bypass, is breaching of the earthen part of the four dams on the Lower Snake River. In many cases, only Alternative A-3 (breaching) creates economic changes sufficiently large to warrant measurement by the DREW study teams.

### **4.1 WHAT WAS LEFT OUT OF THIS STUDY**

The transport-related economic impacts of Alternative A-3 (breaching) include the negative effects on production created by the increase in shipping costs when barging is replaced with rail/truck. Increased shipping costs make sectors that previously used barge transport less competitive on national and world markets. Effective demand to these sectors is reduced when more expensive rail/truck transport replaces barge transport.

Each sector may have quite different responses to the increased shipping costs. Some sectors may be relatively insensitive to transport costs (like grain is alleged to be). These sectors may continue to produce at the current rate. If it is true that grain output will not fall if barging is eliminated, then the implications for the grain sectors are that the grain producers will have lower net income and more will be spent on transport. Lower net income to grain producers will have a negative economic impact because their consumer spending will decline. However, farm

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<sup>22</sup> The Implementation and Avoided Cost analyses are shown for two different baselines. One baseline alternative used to create the impact analysis was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” The second baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” Economic impacts are shown for both baselines.

production spending is constant in this scenario. Spending more on rail/truck transportation than was spent for barging would have a positive economic impact because many more people will be employed to load and drive trucks, to operate trains, and to repair roads and railroad beds. Increased road expenditures also implies increased taxes to maintain roads and that will have a negative impact.

Overall, if grain output is maintained at current levels, then the termination of barge transport implies less efficient transport and that will create more jobs and spending than existed with the barges. Of course, if grain output falls, then the result could be highly negative for jobs.

No current studies exist to project the effects of termination of barge transport on grain output. Without knowledge of changes in grain output created by the termination of barging no conclusions can be drawn on the net effect in the grain sectors on jobs and income of barging shutdown.

The same type of scenario as described above applies to other products that are currently shipped by barge. Table 3-4 of the US Army Corps of Engineers (USACE) Technical Report-Navigation, shows that 5.05 million tons of grain, 2.44 million tons of logs/wood chips, 0.56 million tons of paper/paperboard, and 0.44 million tons of wood products are transported by barge. Also 1.66 million tons of petroleum products are shipped by barge. The table does not distinguish outshipments from inshipments, but most petroleum is an inshipment. Other outshipments, not shown on the table, include vegetable products, pulp, animal feed/mill prod/flour, equipment and machines, fertilizer, petroleum products, sulfur/clay/salt, non ferrous metal products, unknown commodities and sand/gravel/stone products.

No current studies exist to project the effects of the termination of barge transport on output of all of these products. Without knowledge of changes in these outputs created by the termination of barging no conclusions can be drawn on the net effect in these sectors on jobs and income of barging shutdown.

In conclusion, the outputs of all the industries that use barge transport are likely to fall, at least to some degree, if barging is replaced by the more expensive truck/rail. Some sectors may be relatively insensitive to increased transport cost and others may be very sensitive. No studies have been conducted to measure the magnitudes of the negative effect on production of increased

transport costs. Therefore, the net economic effects of alternative A-3 (breaching) are unknown with regard to industries that use barge transport.

#### **4.2 THE BASELINE TOTALS**

All economic values are 1994 estimates, even for the baseline scenario, based on average relationships contained in the modified IMPLAN 1994 database (MIG, Inc.). The 1994 baseline IMPLAN business sales and employment are shown in Appendix XV for each of the eight input-output models. Actual economic survey data, which are available for as late as 1996-97, do not contain much industry detail because of federal and state disclosure laws.<sup>23</sup> Thus, forecasts based on more recent published county-level employment data would severely aggregate the economic analysis to about nine industry sectors excluding government. Employment changes in critical industries affected by the alternatives would be totally obscured by the aggregation. Furthermore, input-output forecasts based on a model with only a few sectors would be extremely inaccurate because of aggregation error. There is about a five year lag in the preparation of the input-output tables. Thus, the baseline scenario and the alternate scenarios use the available 1994 IMPLAN data that are estimated for 96 sectors of the economy. If desired, the baseline total business sales or personal income data could be converted to 1998 dollars by multiplying by an inflation index. Such a transformation would only convert 1994 levels to 1998 purchasing power but the adjusted numbers still would not measure actual personal income or business sales in 1998. Most importantly, the IMPLAN 1994 employment estimates cannot be adjusted to represent actual 1998 values with available public data.<sup>24</sup>

#### **4.3 ADJUSTMENT OF SPENDING FOR DIFFERENCES IN PURCHASING POWER**

Data provided by the DREW study teams show the estimated direct changes in spending

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<sup>23</sup> In addition to their low cost, the primary argument for using synthesized databases for economic projections is that they can release very detailed industry data that could not be published if obtained from survey.

<sup>24</sup> Confidential Form ES-202 employment data for 1998 could be used, but the results could not be published or circulated.

by government, households, or industry created by the alternatives. The predicted spending changes are expressed in mid-1998 purchasing power. In order to maintain the correct calibration between dollars of spending and jobs in the input-output models the spending changes created by the alternatives must be deflated back to 1994.<sup>25</sup> Once the forecasts for direct, indirect, and induced spending and employment are made using the input-output models then the dollar denominated variables can be inflated back to mid-1998 purchasing power. The Gross Domestic Product Implicit Price Deflator was used to inflate the money denominated projections created by the input-output program. Various price indices were used to deflate the estimated direct changes in spending by government, households, or industry created by the alternatives from mid-1998 back to 1994 prior to their use in the 1994-based input-output models.

The Gross Domestic Product Implicit Price Deflator was used to inflate the changes in spending forecasted by the input-output models in 1994 dollars to mid-1998 dollars. Unfortunately, the Gross Domestic Product Implicit Price Deflator was only available through the end of the year 1997. The deflator must be projected an added half year to reach mid-1998. The annual growth of the index in the previous several years fell from nearly 2.7 percent to about 2 percent, or for a half year, 1.35 percent down to 1 percent. Adding 1.0 to the index at the end of 1997 would yield  $111.57 + 1.0 = 112.57$ . The ratio of the estimated mid-1998 index to the 1994 index is  $112.57/105.09 = 1.07$ . This ratio of 1.07 is the inflation factor that is applied to the input-output model forecasts that are in 1994 purchasing power to inflate them to mid-1998 purchasing power.

#### **4.4 INDUSTRY BUSINESS SALES, SALES TO FINAL DEMAND, EMPLOYMENT, AND PERSONAL INCOME**

The modified IMPLAN input-output data base is used to develop both economic multipliers and baseline business sales and employment data for each of the States, Regions, and Subregions defined for the economic impact analysis. The IMPLAN database is estimated from published data at a level of industry detail far greater than is available from alternate sources.

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<sup>25</sup> As explained earlier, the input-output models are based partly on the IMPLAN database for 1994.

More than ninety separate industries are defined in the input-output models used in this analysis. Survey-based data at the needed level of industry detail could not be published because of Federal and State laws against disclosing information that could be traced back to a single firm. Aggregates across sectors of the IMPLAN business sales and employment estimates are benchmarked against available published data that are based on survey.

Four economic measures are important for each input-output model, i.e., each State, region or subregion. **Total business sales by sector** is the estimated gross receipts except for the various trade sectors where it is the margin or value added by the trade sector. **Sales to final demand** by sector is the portion of an industries sales that is to export, government or for investment. Sales to final demand are an important measure because they are the driving force that supports the economy. Exports, sales to government or sales for investment (i.e. construction) are the only sources of new spending for a regional economy. Exports and other sales to final demand have a multiplier effect on the economic activity of a region because the exporting sector buys local labor and other inputs from local suppliers to create the products that are exported. The level of economic activity of a region is dependent on the level of exports and other sales to final demand. The third measure is estimated **employment by sector**. Jobs are usually viewed as the single most important outcome of economic development and the greatest concern when economic growth falters. The fourth measure is **personal income**. Personal income (household sales in the input-output tables) consists of wages, salaries, overhead on labor, and profit.

#### **4.5 PREDICTED ECONOMIC CHANGES FROM BASELINE LEVELS**

Data on business sales and employment (or other variables such as personal income) are projected for 100 years from the start of USACE implementation spending in the year 2005 on for 99 years to the year 2104. The primary focus is on the change in employment and other economic variables as compared with the base case.

As discussed earlier, because IMPLAN is calibrated in 1994 price levels, all direct spending change data collected from the DREW study teams must be deflated from 1998 (or whatever year it is measured in) back to 1994 before it is entered into the input-output models.

Alternately, if 1998 DREW study team data are used to drive the input-output projections, the employment forecasts must be deflated by seven percent.

## **4.6 ESTIMATED ECONOMIC IMPACTS OF THE ALTERNATIVES**

### **4.6.1 Electric Power Effects**

#### 4.6.1.1 Economic Effects of Potential Rate Increases

Alternative A-3 (breaching) would terminate hydroelectric generation at the four USACE dams on the lower Snake River leading to a need for replacement power generation. The capital costs for constructing the new power plants and the increased operating costs for these plants would lead to increased electricity bills to ratepayers.

The geographic regions and distribution of increases in electric bills might be determined by Federal legislation and cannot be known in advance. The method of collecting the increased electric bill is also unknown. If the increased electric bill was paid by electric rate increases, that would cause customer substitution out of electricity and increase the demand for natural gas, propane, fuel oil, and insulation. Over time, more efficient household, commercial, and industrial electric appliances, machines, and processes would be substituted for electricity use. The long run demand for electricity has been shown to be sensitive to price increases. As a result, increasing the price per kWh consumed would reduce the amount of electricity that needed to be produced and increase the demand for substitute products. However, if the increased electric bill was paid by an increased fixed monthly charge, the substitution effects would be minimal because few customers would be willing to give up their electricity connection (except for those firms and farms that shut down or leave the region).

Electric bill increases would reduce net income for industries and reduce disposable income for households in the region.<sup>26</sup> The extent to which business firms would leave the

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<sup>26</sup> It is assumed that increased rates paid on electricity consumed by the Federal government would be borne by taxpayers throughout the U.S. so that impacts in the Pacific Northwest would be minimal (DREW Hydropower Impact Study Team (1999)).

region or reduce output and employment in reaction to reduced net income is unknown. Some industries may be able to pass part of the increased electric bill on to their customers while others, such as agriculture, cannot do this because of intense national or global competition. Increased electric bills paid by residential consumers, farmers, and business owners would reduce their disposable income, leading to reduced consumer spending for other goods and services.

The economic impact of increased electricity bills on the aluminum sector is unknown because information is not available to predict the effects of increased operating costs on production and employment. However, the aluminum processing sector could be severely impacted. Based on their share of current electricity use, aluminum plants in Washington would have an increase in their annual electricity bill of \$26.00 million, while plants in Oregon would have an increase of \$12.88 million, and plants in Montana would have an increase of \$4.58 million (see Table 4-1).

#### 4.6.1.2 Impacts on Residential and Farm Incomes Under Alternative A-3 (Breaching)

Increased electric bills to residential and farm irrigation customers are assumed to be paid by households and create a reduction in disposable income to households. The cost to individual households would rise by one to six dollars depending on how many ratepayers were subject to the rate increase. The direct, indirect, and induced economic effects of reduced household income in the States of Washington, Oregon, Idaho, and Montana are estimated using input-output models for these four States. Alternative A-3 (breaching) is the only alternative that would create a significant change in household electricity bills. Table 4-1 shows the projected increase of electricity bills for residential and farm irrigation customers based on current consumption patterns (DREW Hydropower Impact Study Team (1999)).

Increased electric power bills paid by residential and farm households would cause household personal income to fall by -\$57.32 million in Washington. Using the Washington input-output multipliers; business sales in the State would fall by -\$134.56 million, Washington employment would fall by -743 jobs, and personal income would fall by an added -\$21.06 million (personal income down -\$78.39 million throughout the State).

Increased electric power bills paid by households would cause household personal

income to fall by -\$32.00 million in Oregon. Using the Oregon input-output multipliers; business sales in the State would fall by -\$80.52 million, Oregon employment would fall by -507 jobs, and personal income would fall by an added -\$13.81 million (personal income down -\$45.81 million throughout the State).

Increased electric power bills paid by households would cause household personal income to fall by -\$16.32 million in Idaho. Using the Idaho input-output multipliers; business sales in the State would fall by -\$37.10 million, Idaho employment would fall by -248 jobs, and personal income would fall by an added -\$5.90 million (personal income down -\$22.22 million throughout the State).

Increased electric power bills paid by households would cause household personal income to fall by -\$2.50 million in Montana. Using the Montana input-output multipliers; business sales in the State would fall by -\$5.26 million, Montana employment would fall by -36 jobs, and personal income would fall by an added -\$0.61 million (personal income down -\$3.11 million throughout the State).

**Table 4-1**  
**ANNUAL ELECTRICITY EXPENDITURE INCREASES CAUSED BY**  
**ALTERNATIVE A-3 (BREACHING) BY STATE AND SECTOR (Million Dollars) <sup>1/</sup>**

Sector	State							Total
	Wash	Ore	Idaho	Mont	Cal	Nev	Wyom	
Commercial	39.45	24.88	8.49	1.78	0.45	0.07	0.14	72.56
Industrial <sup>1/</sup>	35.24	22.35	12.44	5.10	0.22	1.08	0.27	76.70
Irrigation	3.39	1.74	4.06	0.12	0.18	0.01	0.01	9.51
Residential	53.94	30.26	12.26	2.38	0.71	0.82	0.41	100.78
Aluminum	26.00	12.88	0.00	4.58	0.00	0.00	0.00	43.46
Federal	2.67	0.00	0.00	0.00	0.00	0.00	0.00	2.67
<b>Total</b>	160.69	92.11	37.25	13.96	1.56	1.98	0.83	308.38

1/ Electricity spending increases are distributed to sectors based on the existing spending shares.  
 SOURCE: DREW Hydropower Impact Study Team (1999).

#### 4.6.1.3 Impacts on Local Owners of Commercial and Industrial Firms Under Alternative A-3 (Breaching)

Although the effects on the viability and operating levels of electricity-intensive firms and plants are unknown, the effect on the personal income of in-State owners of many small commercial and industrial firms can be estimated (primary aluminum is excluded because it is not a locally owned small business). Data in Table 4-1 show the projected increase of electricity bills for commercial and industrial firms. Based on unpublished payroll data, a rough estimate of in-State ownership for commercial and industrial firms is 50 percent and 30 percent respectively (precise estimates would require knowledge of electricity consumption by many individual firms and industries). Thus, the commercial row of Table 4-1 was multiplied times 0.5 and the industrial row times 0.3 to find the increased electricity bills paid by in-State owners if Alternative A-3 (breaching) was selected. These estimates of increased electricity bills to local owners of commercial and industrial establishments are treated as reductions of their spendable personal income.

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$30.30 million in Washington. Using the Washington input-output multipliers; business sales in the State would fall by -\$71.13 million, Washington

employment would fall by -393 jobs, and personal income would fall by an added -\$11.13 million (personal income down -\$41.43 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$19.15 million in Oregon. Using the Oregon input-output multipliers; business sales in the State would fall by -\$48.18 million, Oregon employment would fall by -303 jobs, and personal income would fall by an added -\$8.26 million (personal income down -\$27.41 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$7.79 million in Idaho. Using the Idaho input-output multipliers; business sales in the State would fall by -\$17.71 million, Idaho employment would fall by -118 jobs, and personal income would fall by an added -\$2.82 million (personal income down -\$10.61 million throughout the State).

Increased electric power bills paid for commercial and industrial use would cause household personal income to fall by -\$2.43 million in Montana. Using the Montana input-output multipliers; business sales in the State would fall by -\$5.11 million, Montana employment would fall by -34 jobs, and personal income would fall by an added -\$0.60 million (personal income down -\$3.09 million throughout the State).

The impacts shown above are for the “middle” estimate of the change in electric bills. The effects of the “low” estimate can be found by dividing the results shown above by 1.284. The effects of the “high” estimate can be found by multiplying the results shown above by 1.241 (DREW Hydropower Impact Study Team (1999)).

Tables 4-2 - 4-5 show the sector by sector amounts that increased electric power bills under Alternative A-3 (breaching) subtracts from the four States’ economies. The estimated increase in electricity power bills for residential, agricultural, commercial and industrial owners was: Washington \$87.62 million, Oregon \$51.15 million, Idaho 24.11 million, and Montana 4.93 million. The tables show the business sales and employment by sector that would be lost each year as a result of reduced consumer spending because of the increased power bill.

**Table 4-2**  
**SECTOR BY SECTOR EFFECTS OF REDUCTION IN WASHINGTON HOUSEHOLD**  
**DISPOSABLE INCOME BECAUSE OF INCREASED POWER BILLS WITH**  
**BREACHING (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	REDUCTION IN SALES	% CHANGE IN SECTOR	REDUCED EMPLOYMENT
1 DAIRY/POUL	-248896.	-.03	-1.94
2 CATTLE	-397824.	-.07	-3.82
9 FRUIT/NUTS	-81024.	-.01	-1.65
10 VEGETABLES	-162688.	-.03	-1.37
13 NURS/LNDSC	-159232.	-.03	-4.69
15 AG SERVICE	-36256.	-.01	-1.68
28 MAINT RESI	-370048.	-.02	-3.91
29 MAINT NEC	-2139648.	-.03	-20.00
30 MEAT PROC	-918144.	-.08	-3.11
31 DAIRY PROD	-512192.	-.08	-1.36
33 OTHER FOOD	-441984.	-.02	-1.79
34 GRAIN PROC	-531456.	-.06	-2.74
35 TEXTILES	-477888.	-.05	-5.66
38 WOOD PRODU	-122112.	-.01	-1.08
39 MFG NEC	-178176.	-.01	-1.53
42 PRINT/PUBL	-555520.	-.02	-6.20
43 CHEMICALS	-440704.	-.03	-1.66
44 REFINING	-1189632.	-.05	-1.00
55 VEHICLES	-457728.	-.02	-1.24
60 RAILROADS	-175488.	-.02	-1.15
61 OTHER TRAN	-218624.	-.02	-3.51
62 TRUCK/WARE	-1111040.	-.03	-12.00
63 WATER TRAN	-289792.	-.01	-1.27
64 AIR TRANSP	-504960.	-.02	-3.38
66 TELEPHONE	-1382400.	-.03	-4.84
67 RADIO/TV	-216960.	-.03	-1.39
68 ELECTRICIT	-576000.	-.05	-1.50
69 GAS	-739328.	-.07	-1.50
71 WHOLESALE	-4965376.	-.03	-46.76
72 BLDG & GAR	-380672.	-.03	-7.29
73 DEPT STORE	-1658496.	-.09	-38.79
74 GROCERIES	-2105600.	-.08	-51.08
75 AUTO DLRS	-2225152.	-.07	-32.15
76 APPAREL	-903168.	-.07	-17.26
77 FURNITURE	-894208.	-.07	-16.35
78 RESTAURANT	-4779008.	-.08	-123.00
79 RETAIL NEC	-2341888.	-.09	-90.65
80 F-I-R-E	-19951616.	-.05	-108.93
81 LODGING	-939008.	-.06	-17.61
82 PER SERVIC	-1280768.	-.08	-39.36
83 BUS SERVIC	-1154048.	-.03	-34.73
84 DATA PROCE	-561664.	-.01	-3.91
85 DETECTIVE	-42416.	-.03	-2.36
86 AUTO SERVI	-1401088.	-.06	-16.88
87 REPAIR SER	-376832.	-.03	-4.99
88 AMUSEMENTS	-2006784.	-.07	-40.58
89 HEALTH SER	-11740160.	-.09	-179.78
90 PROF SERVI	-2391040.	-.02	-30.17
91 EDUCATION	-1293056.	-.08	-33.43

92 SOC SERVIC	-1276288.	-.10	-40.38
93 ASSOCIATNS	-1168000.	-.06	-29.88
94 S & L GOVT	-1385472.	-.06	-9.63
95 GOV ELECTR	-1678080.	-.05	-4.99
96 POSTAL SER	-590016.	-.06	-7.95
97 GOVT NEC	-105472.	.00	-3.09
99 HOUSEHOLDS	-119906304.	-.10	.00

**Table 4-3**  
**SECTOR BY SECTOR EFFECTS OF REDUCTION IN OREGON HOUSEHOLD**  
**DISPOSABLE INCOME BECAUSE OF INCREASED POWER BILLS WITH**  
**BREACHING (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	REDUCTION IN SALES	% CHANGE IN SECTOR	REDUCED EMPLOYMENT
1 DAIRY/POUL	-159328.	-.06	-1.30
2 CATTLE	-102688.	-.03	-1.78
4 LVSTK NEC	-20352.	-.05	-1.22
9 FRUIT/NUTS	-62368.	-.02	-1.43
10 VEGETABLES	-113744.	-.05	-1.04
14 NURS/LNDSC	-136480.	-.03	-3.45
16 AG SERVICE	-38624.	-.01	-1.87
29 MAINT RESI	-236672.	-.03	-2.67
30 MAINT NEC	-1395200.	-.03	-13.85
31 MEAT PROC	-433440.	-.10	-1.95
32 DAIRY PROD	-470016.	-.07	-1.28
34 FOODS NEC	-369664.	-.02	-1.30
35 GRAIN PROC	-421568.	-.07	-2.24
36 MFG NEC	-145664.	-.01	-1.24
37 TEXTILES	-299680.	-.06	-3.77
43 PRINT/PUBL	-406656.	-.03	-4.42
56 VEHICLES	-385536.	-.01	-1.07
61 TRANS NEC	-159232.	-.03	-2.97
62 TRUCK/WARE	-945152.	-.03	-9.80
64 AIR TRANSP	-191232.	-.02	-1.33
66 TELEPHONE	-1044224.	-.05	-4.29
67 RADIO/TV	-190272.	-.04	-1.32
68 ELECTRICIT	-635136.	-.04	-1.74
71 WHOLESALE	-3571712.	-.04	-36.31
72 BLDG GARDE	-246112.	-.05	-5.61
73 DEPT STORE	-1073920.	-.09	-29.28
74 GROCERIES	-1396096.	-.11	-43.39
75 AUTO DLRS	-1477120.	-.08	-26.42
76 APPAREL	-515776.	-.11	-15.79
77 FURNITURE	-569312.	-.11	-13.22
78 RESTAURANT	-3026944.	-.09	-83.23
79 RETAIL NEC	-1307008.	-.11	-61.67
80 F-I-R-E	-12806144.	-.06	-66.57
81 LODGING	-673664.	-.08	-15.87
82 PERS SERVI	-859136.	-.09	-28.08
83 BUS SERVI	-1019648.	-.04	-32.90
84 DATA PROCE	-503552.	-.04	-5.22
85 DETECTIVE	-39792.	-.04	-2.14
86 AUTO SERVI	-848640.	-.06	-10.80
87 REPAIR SER	-283072.	-.05	-4.50
88 AMUSEMENTS	-1284864.	-.10	-29.67
89 HEALTH SER	-7682048.	-.11	-116.39
90 PROF SERVI	-1629696.	-.04	-25.39
91 EDUCATION	-890880.	-.09	-23.64
92 SOC SERVIC	-851264.	-.10	-28.09
93 ASSOCIATNS	-651712.	-.07	-17.75
94 S & L GOVT	-745344.	-.08	-4.97
95 GOV ELECTR	-606208.	-.04	-1.14
96 POSTAL SER	-320320.	-.05	-4.29

99 HOUSEHOLDS	-73326592.	-.12	.00
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**Table 4-4**  
**SECTOR BY SECTOR EFFECTS OF REDUCTION IN IDAHO HOUSEHOLD**  
**DISPOSABLE INCOME BECAUSE OF INCREASED POWER BILLS WITH**  
**BREACHING (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	REDUCTION IN SALES	% CHANGE IN SECTOR	REDUCED EMPLOYMENT
2 CATTLE	-195520.	-.03	-1.57
14 NURSERY/LA	-43224.	-.04	-1.35
29 RESI MAINT	-95776.	-.03	-1.28
30 MAINT NEC	-486912.	-.03	-5.66
31 MEAT PROC	-386144.	-.07	-1.22
43 PRINT/PUBL	-139136.	-.04	-1.85
61 TRANSP NEC	-66672.	-.06	-1.52
62 TRUCK/WH	-408704.	-.04	-4.97
66 TELEPHONE	-435552.	-.09	-1.79
71 WHOLESALE	-1156096.	-.05	-13.62
72 BLDG MATER	-112720.	-.04	-2.47
73 DEPT STORE	-492768.	-.14	-14.27
74 GROCERIES	-653504.	-.12	-17.79
75 AUTO DLRS	-693056.	-.10	-13.11
76 APPAREL	-167056.	-.15	-5.71
77 FURNITURE	-271808.	-.14	-6.56
78 RESTAURANT	-1447168.	-.13	-43.31
79 RETAIL NEC	-591008.	-.14	-30.80
80 F-I-R-E	-5156352.	-.10	-34.61
81 LODGING	-304640.	-.10	-8.19
82 PER SERV	-360096.	-.14	-14.70
83 BUS SERV	-328704.	-.06	-12.58
84 DATA PROC	-76528.	-.06	-1.08
86 AUTO SERV	-394912.	-.09	-6.22
87 REPAIR SER	-113808.	-.07	-2.35
88 AMUSEMENTS	-465152.	-.13	-13.13
89 HEALTH SER	-3022592.	-.16	-51.33
90 PROF SERV	-462592.	-.03	-7.44
91 EDUCATION	-384784.	-.15	-11.36
92 SOC SERV	-332688.	-.16	-11.49
93 ASSOCIATNS	-267360.	-.11	-6.68
94 S & L GOV	-268528.	-.13	-1.72
96 POSTAL SER	-126208.	-.07	-1.78
99 HOUSEHOLDS	-32841728.	-.16	.00

**Table 4-5**  
**SECTOR BY SECTOR EFFECTS OF REDUCTION IN MONTANA HOUSEHOLD**  
**DISPOSABLE INCOME BECAUSE OF INCREASED POWER BILLS WITH**  
**BREACHING (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	REDUCTION IN SALES	% CHANGE IN SECTOR	REDUCED EMPLOYMENT
22 MAINT NEC	-112448.	-.01	-1.35
45 WHOLESALE	-149376.	-.01	-1.70
47 DEPT STORE	-88336.	-.04	-3.15
48 GROCERIES	-120768.	-.04	-4.04
49 AUTO DLRS	-131424.	-.03	-3.29
50 APPAREL	-27432.	-.04	-1.10
51 FURNITURE	-35760.	-.03	-1.00
52 RESTAURANT	-271360.	-.03	-8.06
53 RETAIL NEC	-96288.	-.03	-5.51
54 BANKS	-171648.	-.02	-1.55
56 INSURANCE	-75648.	-.02	-1.14
58 REAL ESTAT	-265344.	-.03	-2.45
59 PERS SERV	-126656.	-.02	-3.91
61 SERV NEC	-79488.	-.02	-2.96
63 AUTO SERV	-77600.	-.02	-1.21
64 AMUSEMENTS	-90240.	-.02	-2.21
65 PHYSCIANS	-271168.	-.04	-3.41
66 NURSING	-70528.	-.04	-2.36
67 HOSPITALS	-299136.	-.03	-5.37
68 OTHER MEDI	-70016.	-.03	-1.80
69 LEGAL SERV	-64288.	-.03	-1.09
74 SOC SERV	-33880.	-.03	-1.08
75 ASSOCIATNS	-62720.	-.02	-1.60
87 HOUSEHOLDS	-6133760.	-.04	.00

### Power Plants in the Impact Regions

An important short run economic impact expected from the power sector is the construction of replacement capacity either within the subregions or within the States under study. The Upriver Subregion in central Idaho contains one power plant, the Dworshak hydroelectric plant operated by the USACE. Power from this plant is marketed by Bonneville Power Administration. The plant is 400 MW in capacity.

The Reservoir Subregion in southeast Washington contains four power plants. The plants are ice Harbor (603 MW), Lower Monumental (810 MW), Little Goose (810 MW), and Lower Granite (810 MW) hydroelectric power plants operated by the USACE. Power from these plants is marketed by Bonneville Power Administration. These four plants would be put out of operation if the dams were breached.

The Downriver Subregion contains four USACE plants; McNary (986 MW), John Day

(2,160 MW), Dalles (1,814 MW), and Bonneville (1,077 MW). These four plants are hydroelectric. Power from these plants is marketed by Bonneville Power Administration.

Another important power plant in the Downriver Subregion is the Boardman coal-fired steam electric plant, located south of Boardman. The Boardman plant was placed in service in 1980. The plant is jointly owned by Portland General Electric, Pacific Northwest Gen. Co., and Idaho Power Company. Operating cost per MWhr is \$17.06. Average employment at the plant in 1992 was 119. This plant has a capacity of 560 MW.

The Hermiston Generating Project consists of two 234.5 MW natural gas fired combined-cycle cogeneration plants. The Hermiston Generating Project was placed in service in 1996. The plant is located south of Hermiston, Oregon. Cogenerated steam is sold to Lamb-Weston, a potato processor. The plant is owned by U.S. Generating Company, an unregulated subsidiary of PG & E.

The Coyote Springs generating plant is also a natural gas fired combined-cycle cogeneration plant located at Boardman Industrial Park. Cogenerated steam is sold to Logan International, a potato processor. The Coyote Springs plant was placed in service in 1995. The plant is owned by Portland General Electric. The Coyote Springs plant could be expanded with a second unit. Portland General Electric has a site certificate.

One other power plant in the Downriver Subregion is the Washington Public Power Supply System (WPS-2) 1,170 MW nuclear-fueled plant near Richland, Washington (It is known that this plant is not operated at anywhere near its rated capacity, *UDI/McGraw-Hill Power Plant Performance Data*, Sept. 1993). Operating cost per MWhr for this plant is very high relative to other plants in the Pacific Northwest at \$30.76 per MWhr. Power from this plant also is marketed by Bonneville Power Administration. Employment at this plant totaled 1,397 in 1992.

A new combined cycle power plant, Hermiston Power Project, is proposed by Hermiston Power Partners near Hermiston, Oregon. Hermiston Power Partners holds a site certificate. The 556 MW plant would be completed in 2001. The proposed plant is being developed by Ida-West Energy Company, a wholly-owned subsidiary of IDACORP and an affiliate of the Idaho Power Company, and by TransCanada Pipelines Limited. Cogenerated steam would be sold to Simplot for potato processing.

### **Operating Costs for Older Technology Gas-Fired Steam Electric Power Plants**

Data shown in Table 4-6 provides information on virtually all of the gas fired steam electric plants of about 250 mw capacity in the U.S. in 1992. However, the newest plant in the 250 mw range was built in 1972. Few of the plants in the total gas-fired steam electric database were much newer. Newer plants are much more efficient including using much less labor. The average number of workers for all plants of about 250 mw capacity was 51.1. The average number of workers fell to 47.2 if only plants built 1960 or later were included. The average ratio of fuel expense to total operating production expense was 0.694 for the 250 mw plants but the ratio increased to 0.786 for plants built on 1960 or later. The increased share of operating costs spent on fuel indicates that labor costs are lower for the more recently constructed plants. UDI/McGraw-Hill (Table 4, 1993) reports on 220 gas-fired steam electric plants having total annual fuel expenses of \$5,723.49 million and total annual operating expenses of \$6,982.52 million. Thus, for all sizes of gas-fired steam-electric plants in 1992 the ratio of fuel cost to total operating cost was 0.82.

**Table 4-6**  
**STATISTICS FOR ALL GAS-FIRED STEAM ELECTRIC PLANTS**  
**IN THE U.S. WITH A CAPACITY OF ABOUT 250 MW, 1992**

State	Plant	First Unit Year	Capacity	Production Expenses	Fuel Expenses	Jobs
	TX/Joslin	1971	261	13,552,141	11,448,143	33
	TX/Paint Crk	1953	242	6,228,704	4,692,594	34
	TX/Wharton	1960	248	11,801,755	5,586,748	104
	NY/Glenwood	1952	227	24,400,461	16,550,689	65
	FL/Cutler	1948	237	15,648,793	11,181,730	76
	FL/Kennedy	1955	250	7,770,188	1,664,515	51
	FL/Southside	1950	282	10,534,821	3,839,623	46
	KS/Hutchinson	1950	264	2,698,272	705,288	41
	LA/Big Cajun 1	1972	230	13,627,634	11,053,205	34
	MS/Delta	1953	198	4,412,162	2,580,603	25
	NM/Cunningham	1957	265	20,791,937	18,870,157	35
	NM/Rio Grande	1957	266	21,330,123	14,070,321	87
	AZ/Ocotillo	1960	227	9,286,347	6,262,047	28
	CA/Harbor	1943	259	9,255,326	3,525,468	67
	NV/FT Churchill	1968	210	24,888,177	21,396,256	38
	NV/Tracy	1963	243	24,097,743	20,680,045	46
	UT/Gadsby	1951	252	15,077,653	9,152,764	58
	Averages		245	13,847,190	9,603,541	51

SOURCE: 1992 *Production Costs Operating Steam-Electric Plants*. Sept. 1993. UDI/McGraw-Hill. Table 4.

#### 4.6.1.4 Direct, Indirect, and Induced Economic Effects of Power Plant Operation

According to BPA power system modeling, once new combined-cycle plants are constructed, they will operate at 90 percent of their design capacity. The operating costs of the new plants were estimated at \$13.61/MWh. The annual operating cost of each combined-cycle plant is  $(250\text{MW})(0.90)(8760 \text{ hours per year})(\$13.61/\text{MWh}) = \$26.80$  million per year. Thus, the six new plants will create operation spending of  $(6)(\$26.80 \text{ million}) = \$160.80$  million per year. The increase in annual final demand purchases of the \$160.80 million required to operate the six new power plants was split 21% to labor (households) and labor-intensive services, and 79% to the natural gas production, transmission, and distribution sector based on information on combined-cycle plants (DREW Hydropower Impact Study Team (1999)).

Annual spending increases in the Lower Snake River Subregion to operate the plants would be  $(\$26.8 \text{ million})(2) = \$53.60$  million per year in 2008 and \$80.40 million per year in 2009 and thereafter. Annual spending increases in the Puget Sound region would be \$26.8 million per year in 2010, \$53.60 million per year in 2011, and \$80.40 million per year in 2017 and thereafter. Prior to the construction of the new gas-fired steam electric plants, the shortfall of power generated in the region would require electricity imports to the region. It is assumed that these temporary electricity imports do not create any measurable changes in spending or employment within the study region.

The Downriver Subregion is likely to be most impacted by the operation of the new combined-cycle power plants, however the Reservoir Subregion could also be impacted. Thus, the Lower Snake River Model was used to estimate impacts. The business sales multiplier for labor is 2.3695, the employment multiplier is .00001597, and the personal income multiplier is 0.3692.

Labor and labor-intensive services, which make up 21 percent of total operating costs, for the first two plants receives  $(\$26.80 \text{ million})(2)(.21) = \$11.26$  million. Thus, operation labor and labor-intensive services for the first two plants would create some \$26.70 million of direct, indirect and induced spending per year in the region. Operation labor and labor-intensive maintenance services for the first two plants would create some 168 jobs in the region, starting in 2008. Operation labor and labor-intensive maintenance services for the first two plants would

create some \$4.16 million of personal income (direct, indirect, and induced) in the Downriver Subregion, starting in 2008. Adding the third plant would increase the total impacts by 1.5 times to \$40.05 million in business sales, 252 jobs, and \$6.24 million in personal income starting in 2009 and thereafter. The remaining three combined-cycle power plants would add to the impacts in a similar manner in the Puget Sound area in 2010, 2011 and 2017.

The major input to the combined-cycle generating plant is natural gas and that accounts for  $(\$26.80 \text{ million})(2)(.79) = \$42.34$  million per year of purchases from the gas distribution sector for the first two combined-cycle generating plants. The multipliers for business sales, employment, and personal income are 1.584, 0.0000105194, and 0.2730 respectively. Thus, the total (direct, indirect, and induced) added business sales in the region created by the first two plant's gas purchases would be \$67.10 million per year. The added employment from gas purchases to operate the first two plants would be 416 jobs. The added personal income from gas purchases to operate the first two plants (direct, indirect, and induced) would be \$11.56 million per year. Adding the third, equal sized, plant would increase the impacts by 1.5 times to \$100.65 million in business sales, 624 jobs, and \$17.34 million in personal income starting in the year 2009 and thereafter. The remaining three combined-cycle power plants would add to business sales, income, and employment in a similar manner in the Puget Sound area in 2010, 2011 and 2017. Table 4-7 shows the sector by sector effects of operating and fueling the three new combined-cycle power plants in the Downriver Subregion.

**Table 4-7**  
**SECTOR BY SECTOR EFFECTS OF OPERATING AND FUELING THREE NEW**  
**POWER PLANTS USING THE LOWER SNAKE RIVER MODEL**

(Sectors with employment change less than one are excluded, except for households)

	INCREASE	% CHANGE	INCREASE IN
	IN SALES	IN SECTOR	EMPLOYMENT
2 CATTLE	204512.	.08	2.11
7 HAY	37512.	.03	1.22
9 FRUIT/NUTS	107664.	.05	1.89
13 NURS/LNDSC	104484.	.21	2.91
15 AG SERVICE	34512.	.03	1.72
27 MAINT RESI	166464.	.14	1.93
28 MAINT NEC	1617280.	.29	16.49
29 MEAT PROC	436576.	.11	1.08
31 CAN/FREEZE	502528.	.04	2.68
32 OTHER FOOD	312480.	.14	1.49
38 MFG NEC	133688.	.13	1.46
41 PRINT/PUBL	254080.	.23	4.12
58 OTHER TRAN	79572.	.19	2.00
59 TRUCK/WARE	494752.	.14	5.62
61 AIR TRANSP	124956.	.24	1.05
63 TELEPHONE	868512.	.27	3.75
64 RADIO/TV	144688.	.20	1.13
66 GAS	66937172.	155.32	133.55
68 WHOLESALE	1702144.	.18	19.65
69 BLDG & GAR	144408.	.17	2.28
70 DEPT STORE	642624.	.37	18.50
71 GROCERIES	839248.	.35	25.01
72 AUTO DLRS	907808.	.29	15.79
73 APPAREL	137268.	.38	4.27
74 FURNITURE	250392.	.38	6.03
75 RESTAURANT	1875200.	.34	54.27
76 RETAIL NEC	728288.	.37	34.75
77 F-I-R-E	7665664.	.34	40.62
78 LODGING	471840.	.24	11.60
79 PER SERVIC	367112.	.37	13.17
80 BUS SERVIC	385488.	.22	11.08
81 DATA PROCE	366216.	.28	4.50
83 AUTO SERVI	513424.	.29	7.20
84 REPAIR SER	180592.	.23	3.23
85 AMUSEMENTS	585584.	.36	16.46
86 HEALTH SER	3598912.	.39	65.94
87 PROF SERVI	494976.	.02	6.36
88 EDUCATION	431088.	.36	11.83
89 SOC SERVIC	374816.	.33	12.54
90 ASSOCIATNS	485632.	.31	12.75
91 S & L GOVT	762272.	.58	4.50
92 GOV ELECTR	835968.	.11	2.63
93 POSTAL SER	360496.	.39	4.68
96 HOUSEHOLDS	40461312.	.39	.00

#### 4.6.1.5 Direct, Indirect, and Induced Economic Effects of Power Plant Construction

It is assumed that six new power plants would be constructed to replace the lower Snake River dam power output. Two of the six plants are needed to support system reliability.

A total of three new combined-cycle plants would be constructed in the Downriver Subregion. The first two plants would be constructed in 2007 and go on line in 2008. The first two plants are expected to be constructed in Hermiston and Tri-Cities. It is estimated that a third plant would be built in 2008 in Tri-Cities. Three more plants would be constructed in the Puget Sound region. A fourth plant would be built in 2009, a fifth plant in 2010, and a sixth plant in 2016 (DREW Hydropower Impact Study Team (1999)).

Each 250 mw gas-fired combined-cycle steam electric plant was assumed to take one year to construct. The plant construction costs of  $(\$601,000/\text{MW})(250 \text{ MW}) = \$150.00$  million are proposed to occur during the years 2007 (2 plants), 2008, 2009, 2010, and 2016 (DREW Hydropower Impact Study Team (1999)).

The Downriver Subregion utility construction multipliers are 2.2159, 0.00001987, and 0.6989 for business sales, employment, and personal income respectively. Thus, the business sales created by the one-year construction projects for each plant would be \$332.40 million. The total one-year employment effect for each plant would be 2,786 jobs. The household sector would have an increase of \$104.80 million in personal income.

It is assumed that these sales, employment, and personal income impacts would be doubled in the year 2007, in the Downriver Subregion, because two plants would be built simultaneously. A single plant would be built in the Downriver Subregion in 2008. The remaining three combined-cycle plants would be built somewhere in the Puget Sound area outside the Lower Snake River Subregion. Similar construction impacts can be expected in the Puget Sound area. Table 4-8 shows the sector by sector effects of building each new power plant in the Downriver Subregion.

**Table 4-8**  
**SECTOR BY SECTOR EFFECTS OF BUILDING EACH NEW**  
**POWER PLANT USING THE DOWNRIVER SUBREGION MODEL**

(Sectors with employment change less than one are excluded, except for households)

	INCREASE IN SALES	% CHANGE IN SECTOR	INCREASE IN EMPLOYMENT
2 CATTLE	241944.	.29	2.80
9 FRUIT/NUTS	89344.	.05	1.87
10 VEGETABLES	193536.	.08	1.87
13 NURSERY LA	163476.	.49	4.67
15 AG SERVICE	43480.	.05	1.87
22 NEW UTILI	149999952.	298.17	1669.16
27 RESI MAINT	341608.	.46	3.74
28 MAINT NEC	1512992.	.45	14.01
29 MEAT PROC	1033504.	.30	2.80
34 TEXTILES	139512.	.71	1.87
36 SAWMILLS	316816.	.15	1.87
37 WOOD PROD	943584.	.58	5.61
40 PRINT/PUBL	326768.	.61	5.61
55 TRANS NEC	141678.	.54	3.74
56 TRUCK WH	1538176.	.87	16.82
58 AIR TRAN	241700.	.92	1.87
60 TELEPHONE	1529088.	.78	6.54
61 RADIO TV	331136.	.77	2.84
64 WATER/SANI	317512.	.32	1.87
65 WHOLESALE	5150656.	.92	57.01
66 BLD MATERI	421968.	.99	9.35
67 DEPT STORE	1659448.	1.56	47.66
68 GROCERIES	2256192.	1.78	66.36
69 AUTO DLRS	3272640.	1.67	54.21
70 APPAREL	385598.	1.85	11.22
71 FURNITURE	660164.	1.85	15.89
72 RESTAURANT	4334272.	1.40	121.50
73 RETAIL NEC	1846952.	1.90	86.92
74 F-I-R-E	15236864.	1.21	76.64
75 LODGING	1063048.	.98	23.36
76 PERS SERV	925716.	1.65	30.84
77 BUS SERV	908696.	.89	27.10
78 DATA PROC	766304.	.64	9.35
80 AUTO SERV	1538800.	1.53	20.56
81 REPAIR SER	791580.	1.67	13.08
82 AMUSEMENTS	1246856.	1.39	35.51
83 HEALTH SER	7600160.	1.74	133.65
84 PROF SERV	9983360.	.49	125.23
85 EDUCATION	430950.	1.50	11.22
86 SOC SERV	827148.	1.41	25.23
87 ASSOCIATNS	905520.	1.09	23.36
88 S & L GOVT	964960.	1.19	5.61
89 GOV ELECTR	1850304.	.25	5.61
90 POSTAL SER	540640.	1.05	6.54
93 HOUSEHOLDS	104900608.	1.75	0.

4.6.1.6 Direct, Indirect, and Induced Economic Effects of Transmission Line Construction

#### Under Alternative A-3 (Breaching)

A total construction expenditure to modify electricity transmission lines of \$177.00 to \$271.00 million would occur over a two year period during the breaching process. A new transmission line from Spokane to Tri-Cities accounts for \$100.00 to \$150.00 million of the expense. The remainder of the spending is for projects in the Downriver Subregion. It is assumed that the impacts all occur in the Downriver Subregion. The Downriver Subregion utility construction multipliers are 2.2159, 0.00001987, and 0.6989 for business sales, employment, and personal income respectively. The annual spending of \$88.50 to \$135.50 million to modify power lines results in \$196.10 to \$300.30 million in business sales, 1,643 to 2,516 jobs and \$61.90 to \$94.70 million of personal income.

#### 4.6.1.7 Direct, Indirect, and Induced Economic Effects of New Transmission Line Operation and Maintenance

Spending to operate and maintain new electricity transmission lines of approximately \$0.85 million is assumed to occur annually. It is assumed that the spending would occur somewhere in the Lower Snake River Region. The Lower Snake River Region electric utility multipliers are 1.9634, 0.00001052, and 0.4095 for business sales, employment, and personal income respectively. The \$0.85 million spent to operate and maintain power lines would result in \$1.67 million of business sales, 8 jobs and \$0.35 million of personal income.

#### **4.6.2 Outdoor Recreation and Tourism**

Alternative A-3 (breaching) would have several possible effects on outdoor recreation. Recreation at the reservoirs would be drastically changed after breaching. Most of the existing warm water fish would be destroyed by breaching and eventually replaced with bass, sturgeon, steelhead and salmon. Propeller-driven boats and other watercraft must mainly be replaced with jet type watercraft, and lake recreation activities, such as water skiing, swimming, and tour boats would mainly be replaced with river based recreation activities. River fishing, both downstream and upstream, would eventually be enhanced after breaching because of increased salmon and steelhead catch rates. Both wild and planted salmon and steelhead should benefit from

breaching. The Upriver Subregion in central Idaho would particularly benefit from the return of salmon runs and increased steelhead runs (Upriver fishing impacts are discussed in section 4.6.2.3 of the report).

The analysis from a mail survey of residents in Washington and surrounding States suggests that the demand for fishing and recreation would increase greatly under Alternative A-3 (breaching) (*Recreation and Passive Use Values from Removing the Dams on the Lower Snake River to Increase Salmon* - Agricultural Enterprises, Inc. 1999). The amount of visitation would be constrained by regulation and limited access rather than by insufficient demand. The new limits, seasons, catch rates, and carrying capacity of the fishery and the USACE recreation facilities after breaching must be known, prior to estimation of the direct spending on sportfishing. Likewise, the direct, indirect, and induced economic impacts of fishing and other recreation after breaching depend upon allowed visitation and capacity of available facilities and fisheries after breaching. To this end, the USACE has provided the following chronology of expected limits on fishing and recreation activities at the former reservoir sites.

### **Chronology of Recreation Impacts**

In the event of a drawdown, most current recreation activities will have a delay before a resumption of that activity will occur. Most new recreation activities will have a delayed start-up due to changing river and shoreline conditions. Table 4-9 identifies the recreation activity and for existing activities, the years to reach percentage of current use and for new activities the percentage of carrying capacity use, all in 10 percent increments.

**Table 4-9  
CHRONOLOGY FOR FISHING AND RECREATION UNDER ALTERNATIVE A-3**

Recreation Activity	Existing ( E ) New ( N )	YEAR										
		1	2	3	4	5	6	7	8	9	10	20
Prop. Boating	E	0				10					10	10
Jet Boating	E	20				50		80			80	80
Jet Boating	N	10				30			50		60	70
Swimming	E	20		30		40			80		80	100
Camping	E	50				80					100	100
Picnicking	E	80				100					100	100
Boat Fishing	E				10	20					40	60
Shore Fishing	E	10		20		40			50		70	90
Hunting (upland)	E	60				100					100	100
Hunting (waterfowl)	E	20			50						80	100
Drift Boating	N			10		20					40	70
Canoeing	N		10			30		50			60	90
Rafting	N		10			30		50			60	90
Kayaking	N					30		50			60	90

SOURCE: USACE

Current recreation activities will likely continue with the same monthly use (visitation) patterns up to the lowering of the lakes behind each dam. There might be a slight upswing (10 to 20 percent) in the six months proceeding the drawdown by nostalgia seekers. During the deconstruction phase and immediately after the breaching there will be a large surge (50 to 100 percent) in visitation especially at recreation areas near the dams. This increase will be from persons interested or curious about the breaching who want to see what things look like during the process and afterwards. This curiosity visitation will decrease within a few months after the breaching. The years shown at the top of the matrix is the year from the completion of the breaching and apply to each lake individually. It can be applied to any year that is chosen by the study managers for the breaching. (Source: Phil Benge, USACE)

### **Reservoir Recreation**

The USACE chronology (and related discussion) in the previous section shows the projected fishing and other recreation activities that would be allowed at the site of the former reservoirs. Much of the existing recreation activities at the four reservoirs would terminate over time as the dams are removed. For example, propeller driven boats (which includes water skiing) is limited to

zero for five years and then increases to a maximum of ten percent of the former level of activity. After the dams have been breached, limited recreation would occur until rehabilitation of the new shore lines and recreation facilities are completed. Fish catch rates after breaching are likely to be extremely low because many of the species would be destroyed and the replacement species require time to develop. After a number of years, the river fishes (steelhead, bass, and salmon) in the free flowing river are expected to rise to a sustainable level. Shore fishing is limited to ten or twenty percent of the former levels for five years and does not rise to 90 percent until after 20 years. Boat fishing is even more limited and rises to 60 percent of its former level after twenty years. Rehabilitated recreation facilities are projected to be available for non fishing recreation fairly soon after breaching but camping is limited to 50 percent of the current levels until the fifth year after breaching. Swimming is projected to rise slowly, requiring 20 years to reach current levels. Jet boating is limited to 20 percent of current levels until the fifth year after breaching. New activities, such as, drift boating, canoeing, rafting, and kayaking are limited to a gradual increase over 20 years.

Quantifying the net effects on fishing and recreation that would occur in the former reservoir reach after breaching is problematic. The Agricultural Enterprises Inc. (AEI) survey indicates very high demand for fishing and recreation but limitations on available fishing and recreation facilities and protection of newly developing fisheries and endangered fishes suggest limited overall recreation activity for an extended period of time. The USACE chronology indicates that fishing activity will be down at least 80 percent for 4 years, down by about 60-70 percent for five more years, down by about 45 percent for ten more years and still down by about 25 percent after 20 years. Picnicking is the only major recreation activity not greatly reduced by breaching. Camping, swimming, all kinds of boating, and hunting are limited to 20 - 60 percent of current levels for the first five years. The absolute levels of the new recreation activities are undefined, but the limits increase slowly over time, not reaching their peak for 20 or more years.

### **Estimation of Fishing and Recreation Economic Effects**

Spending for the existing fishing and other reservoir outdoor recreation has been documented

through extensive survey of visitors by AEI as a part of the USACE economic impact research. The data below show the current direct expenditures estimated for fishing and other reservoir-related outdoor recreation. These expenditures are used to drive the input-output model to project indirect, and induced effects on sales, incomes and employment in the regions surrounding the four reservoirs.

#### 4.6.2.1 The Current Economic Impact of Reservoir Fishing

The sportfisher spending survey collected detailed information on the types of purchases and the place the purchases occurred. Separate data were collected for the trip to the reservoirs, while on-site at the reservoirs, and on the trip home. Expenditure data for some 26 seller categories were obtained. The data allow measuring the average expenditure by type of purchase for various distances from the reservoirs. The name of the town nearest where each purchase occurred was collected allowing estimation of average purchases for each of the seller categories for a large number of towns.

Average group expenditures were \$229 per trip, and the group size was 2.5 persons. Angler spending per person per trip was thus nearly \$92. Multiplying the per trip cost times the trips per year (20.255) resulted in annual spending of about \$1,855 for anglers traveling to the reservoirs. Total annual spending by anglers traveling to the reservoirs is found by multiplying the number of anglers (3,305) times annual spending per angler (\$1,855) or  $3,305 \times \$1,855 = \$6,130,775$  per year.

The breaching would occur first on the two upriver reservoirs, Lower Granite and Little Goose, at the east end of the Reservoir Subregion. These two reservoirs accounted for about 59 percent of the reservoir fishing activity according to the 1998 creel survey conducted by the University of Idaho. The breaching on the downriver dams, Ice Harbor and Lower Monumental, would occur about two years later. The downriver reservoirs accounted for about 41 percent of the reservoir fishing activity.

It was assumed that angler spending is split between the two upper and two lower reservoirs in the shares indicated by the creel survey. Thus, the upper two reservoirs contributed  $(0.59)(\$6,130,775) = \$3,617,157$  of annual angler spending. The lower two reservoirs contributed  $(0.41)(\$6,130,775) = \$2,513,618$  of annual angler spending. It was assumed that the various A-2 alternatives would not significantly affect angler spending at the reservoirs.

Angler spending that occurred during the Lower Snake River reservoir fishing trips excluded spending made while traveling to other fishing sites and excluded major purchases of boats or other gear, maintenance, storage, insurance and other non-trip related fishing costs. Angler trip expenditures includes non-fishing related purchases made during the trip.

Reservoir fishing on the two eastern reservoirs created  $45/1.07 = 42$  total jobs, including direct, indirect, and induced effects using the Lower Snake River Model (all three subregions combined). Fishing on all four reservoirs created  $76/1.07 = 71$  total jobs, including direct, indirect, and induced effects. (Division by 1.07 to adjust for calibration of the 1994 IMPLAN model).

Tables 4-10 and 4-11 show the sector by sector amounts that sportfishing at the reservoirs currently adds to the economy of the Lower Snake River Region. The first table, Table 4-10 shows the amount added to the economy by sportfishing on the two easternmost reservoirs. The table shows the amounts of business sales and employment that would be lost in each sector of the economy. The second table, Table 4-11 shows the amount added to the economy by sportfishing at all four reservoirs. This is the amount of business sales and employment that is the baseline level used when calculating the economic changes created by the Alternatives.

Table 4-12 shows the fractional distribution of angler and recreationist spending among the sectors in the input-output model. These spending distributions were derived from two input-output surveys of anglers and recreationists conducted by AEI. The Lower Snake River Model containing the three subregions surrounding the reservoirs was used to estimate the direct, indirect, and induced economic effects of angler and recreationist spending.

**Table 4-10**  
**BUSINESS SALES AND EMPLOYMENT BY SECTOR CREATED**  
**BY SPORTFISHING AT THE TWO EASTERN RESERVOIRS**

(Sectors with less than \$50,000 of added business sales are not shown)  
(1994 dollars)

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
60 WATER TRAN	98270.	0.294	0.54
61 AIR TRANSP	88968.	0.169	0.80
68 WHOLESALE	75328.	0.007	0.93
71 GROCERIES	92960.	0.038	2.96
28 MAINT NEC	249728.	0.044	2.72
72 AUTO DLRS	157696.	0.049	2.93
75 RESTAURANT	91968.	0.016	2.85
76 RETAIL NEC	116000.	0.058	5.92
77 F-I-R-E	234752.	0.010	1.33
78 LODGING	201600.	0.103	5.30
83 AUTO SERVI	104080.	0.059	1.56
86 HEALTH SER	89856.	0.009	1.76
87 PROF SERVI	43904.	0.002	0.60
91 S & L GOVT	709776.	0.543	4.48
96 HOUSEHOLDS	1013760.	0.009	0.00
102 ANGLERS	1591888.	0.000	0.00

**Table 4-11**  
**BUSINESS SALES AND EMPLOYMENT BY SECTOR CREATED BY**  
**SPORTFISHING AT ALL FOUR RESERVOIRS**  
(Sectors with less than \$50,000 of added business sales are not shown)  
(1994 dollars)

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
28 MAINT NEC	423232.	0.076	4.62
60 WATER TRAN	166562.	0.498	0.92
61 AIR TRANSP	150796.	0.287	1.35
68 WHOLESALE	127808.	0.013	1.58
71 GROCERIES	157648.	0.065	5.03
72 AUTO DLRS	267232.	0.084	4.97
75 RESTAURANT	155968.	0.028	4.83
76 RETAIL NEC	196672.	0.099	10.04
77 F-I-R-E	398336.	0.017	2.26
78 LODGING	341808.	0.175	8.99
83 AUTO SERVI	176448.	0.100	2.65
86 HEALTH SER	152704.	0.016	2.99
87 PROF SERVI	74368.	0.003	1.02
91 S & L GOVT	1203088.	0.922	7.60
92 GOV ELECTR	106304.	0.013	0.36
96 HOUSEHOLDS	1720320.	0.016	0.00
102 ANGLERS	2698118.	0.000	0.00

**Table 4-12**  
**SPENDING DISTRIBUTIONS FOR ANGLERS AND RECREATIONISTS**  
**ESTIMATED FROM I-O EXPENDITURE MAIL SURVEYS**

	Anglers	Recreationists
60 WATER TRAN	.02537200	.00802800
61 AIR TRANSP	.02310100	.00000000
69 BLDG & GAR	.00168900 1/	.00089700 1/
70 DEPT STORE	.00125900 1/	.00348300 1/
71 GROCERIES	.01934200 1/	.02189300 1/
72 AUTO DLRS	.03472100 1/	.02818600 1/
73 APPAREL	.00334100 1/	.00257700 1/
74 FURNITURE	.01147100 1/	.00000000 1/
75 RESTAURANT	.01147100 1/	.00706600 1/
76 RETAIL NEC	.02641800 1/	.04790800 1/
78 LODGING	.05150600	.01695700
79 PER SERVIC	.00004600	.00601800
80 BUS SERVIC	.00000000	.00030900
83 AUTO SERVI	.02379300	.08508600
84 REPAIR SER	.00755100	.00868900
85 AMUSEMENTS	.00732000	.02220800
91 S & L GOVT	.19169299	.08351100

1/ The Trade Sectors are margined at 15 percent of the actual spending share. Divide the Trade Sectors fractions by 0.15 to find their actual share.

SOURCE: AEI Survey.

#### 4.6.2.2 Direct, Indirect, and Induced Economic effects on Sportfishing Under Alternative A-3 (Breaching)

The following table (Table 4-13) shows the sportfishing effects of breaching on business sales, employment, and personal income in the Reservoir Subregion. The various A-2 alternatives (based on the now outdated PATH results) did not create significant fishing effects. The impacts shown are based on the DREW Anadromous Fish Study Team (1999) projected fish availability. Fishing trips are constrained well below AEI's contingent behavior low forecast of fishing demand by the limited availability of fish projected by the DREW Anadromous Fish Study Team. Table 4-14 shows the sector by sector effects of reservoir fishing with breaching in year 20.

**Table 4-13**  
**ECONOMIC EFFECTS OF FISHING IN THE RESERVOIR SUBREGION**  
**FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million)	Increase in Jobs	Increase in Personal Income (\$ Million)
0	3.40	36	0.86
5	2.79	29	0.71
10	4.72	50	1.20
15	5.44	57	1.39
20	7.10	75	1.81
25	8.77	92	2.23
30	8.99	94	2.29
35	9.32	98	2.37
40	9.18	96	2.34
45	9.11	96	2.32
50	9.08	95	2.31
55	9.08	95	2.31
60	8.89	93	2.26
65	8.91	94	2.27
70	9.14	96	2.33
75	9.10	96	2.32
80	9.21	97	2.34
85	9.22	97	2.35
90	9.47	99	2.41
95	9.30	98	2.37
100	9.18	96	2.34

1/ Fishing trips are constrained below AEI's contingent behavior low forecast of fishing demand by the limited availability of fish projected by the DREW Anadromous Fish Study Team (1999).

**Table 4-14**  
**SECTOR BY SECTOR EFFECTS OF RESERVOIR SUBREGION FISHING IN YEAR**  
**30, ALTERNATIVE A-3 (BREACHING) (1998 dollars)<sup>1/</sup>**

**(Sectors with employment change less than one are excluded, except for households)**

	ADDITIONAL SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
28 MAINT NEC	560256.	.10	5.71
60 WATER TRAN	217918.	.65	1.13
61 AIR TRANSP	199136.	.38	1.67
68 WHOLESALE	168320.	.02	1.94
70 DEPT STORE	48672.	.03	1.40
71 GROCERIES	208736.	.09	6.22
72 AUTO DLRS	355168.	.11	6.19
73 APPAREL	36560.	.10	1.14
74 FURNITURE	108680.	.16	2.62
75 RESTAURANT	207040.	.04	5.99
76 RETAIL NEC	261840.	.13	12.50
77 F-I-R-E	530432.	.02	2.81
78 LODGING	453168.	.23	11.14
80 BUS SERVIC	49920.	.03	1.43
83 AUTO SERVI	234384.	.13	2.89
84 REPAIR SER	94984.	.12	1.69
85 AMUSEMENTS	102816.	.06	2.89
86 HEALTH SER	202752.	.02	3.71
87 PROF SERVI	97792.	.00	1.25
91 S & L GOVT	1598968.	1.23	9.44
96 HOUSEHOLDS	2277376.	.02	.00

1/ Increased fishing-related exports after breaching are constrained by available anadromous and resident fish to a level below the “low” contingent behavior forecast of fishing demand.

2/ Adjusted for the 1994 IMPLAN calibration.

## **The Sportfisher Spending Survey**

Anglers were contacted at the reservoirs over the period from June 24, 1997 through November 29, 1997 and requested to take part in the sportfishing spending mail survey. Most persons contacted on-site were agreeable to receiving a mail questionnaire and provided their name and mailing address. A small share of those contacted preferred a telephone interview and provided a telephone number. The sportfishing spending survey data are expanded to show the direct economic effects on spending, earnings, and employment in the Lower Snake River region.

The spending survey provided a list of potential spending choices and requested the amount spent and the location for each of the spending categories. Separate forms were provided for spending during travel to the site, spending while at the site, and spending on the trip home. A copy of the questionnaire is shown in Appendix XI. The sportfishing "spending" survey resulted in a sample of 411 useable responses. A total of 694 surveys were mailed out yielding a useable response rate of over 59 percent.

## **Geographic Location of Economic Impacts**

The sportfishing "demand" survey<sup>27</sup> found that about 148 visitors, or 25.7 percent of the sample, lived within ten miles of the Lower Snake River reservoirs. An added 84 visitors (14.6 percent) of the sample) lived within 20 miles of the reservoirs. Clearly, many (70 percent) of the sportfishing visitors in this sample lived within 50 miles of the reservoirs. The sportfisher spending survey found that about 91 visitors, or about 22.1 percent of the sample, lived within a ten mile radius of the reservoirs. The number of visitors living between 10 and 20 miles from the reservoir was 43 which was 10.5 percent of the sample. This spending survey received back a smaller share of locals living within 20 miles of the reservoirs than the demand survey, (32.6 percent versus 40.3 percent). The discrepancy in sample share lessens above 20 miles. The demand survey shows 51.6 percent of the anglers live within 30 miles while the spending survey indicates 46.2 percent.

A possible explanation for the difference between the surveys in response rate by locals may lie in the content of the questionnaires. The demand survey asks many questions related to the fishing activity, other fishing sites, and about the angler. Locals will find many questions that pertain to them even if they don't spend much on travel. In contrast, the spending survey is focused on spending on travel to the site, at the site, or on the return trip home. Persons living very close to the reservoirs might find the questions irrelevant to them and discard it. A more representative response rate by distance traveled in the spending survey could have been obtained if (1) persons were requested to return the form even if most answers were zero, and (2) the survey incorporated more fishing-related questions so that the angler would have felt that their answers would be useful.

## **Angler Spending Distributions**

Table 4-15 displays the average spending by sector tabulated from the angler spending survey. Spending is shown separately for travel from home to site, while on the site, and on the trip home from the site.

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<sup>27</sup> AEI conducted a travel cost demand survey concurrently with the input-output spending survey.

**Table 4-15  
EXPENDITURES MADE BY RESERVOIR ANGLERS**

Type of Purchase	Going to Reservoir	At Reservoir	Returning Home
County Government	\$7.49	\$0.38	\$0.00
State Government	\$29.34	\$3.31	\$0.64
Federal Government	\$2.24	\$0.90	\$0.01
Tour Boat	\$3.62	\$1.83	\$0.00
Airline	\$2.48	\$0.00	\$2.48
Auto/Truck/RV Rental	\$4.69	\$1.04	\$0.12
Service Station #1	\$29.21	\$3.63	\$5.04
Service Station #2	\$4.80	\$0.79	\$0.40
Grocery Store	\$21.51	\$4.85	\$1.33
Auto Dealer	\$1.14	\$0.00	\$0.00
Clothing Store	\$3.91	\$0.87	\$0.00
Boat/Marine Store	\$9.86	\$1.52	\$0.20
Sporting Goods Store	\$20.10	\$1.83	\$0.75
Hardware Store	\$2.00	\$0.32	\$0.10
Restaurant	\$9.23	\$4.89	\$2.30
Department Store	\$0.94	\$0.71	\$0.15
Other Retail	\$1.70	\$0.25	\$0.00
Lodging	\$7.83	\$3.13	\$0.10
Guide Services	\$0.00	\$0.00	\$0.00
Equipment Rental	\$0.01	\$0.00	\$0.00
Parking & Car Wash	\$0.36	\$0.04	\$0.09
Auto Repair	\$3.20	\$0.25	\$0.01
Other Repair	\$0.92	\$0.01	\$0.69
Entertainment	\$0.73	\$0.71	\$0.13
Health Services	\$0.00	\$0.00	\$0.00
All Other Purchases	\$0.59	\$0.95	\$0.07

### **Expenditure Per Angler, Per Trip From Home to Site, and per Year**

Summing the detailed expenditures collected in the spending survey and shown in Table 4-15 results in a spending total of \$92,548 for the 404 angler groups in the survey. The average size of each group was 2.5 persons. Average group expenditures for the sample were \$229 per fishing round trip and  $\$229/2.5 = \$91.60$  per angler per trip. Multiplying cost per angler per trip times the number of trips per year (20.255) results in an annual fishing trip-related cost of \$1,855 per year for the average angler.

Total annual spending by anglers is found by multiplying annual spending per angler per year (\$1,855) times the number of unique anglers<sup>28</sup> (3,305) or  $\$1,855 \times 3,305 = \$6,130,775$  total angler spending per year.

In comparison, average angler spending estimates for Washington State from the U.S. Fish and Wildlife Service are much smaller.<sup>29</sup> The U.S. Fish and Wildlife Service survey (1993) shows average annual trip-related expenditures for anglers in the State of Washington in 1991 were \$315 per angler. Adjusting for inflation between 1991 and 1997 would increase their estimate to about \$366 per angler per year. Annual trip-related expenditures were \$135 for food and lodging, \$84 for transportation, \$91 for rentals and fees, \$137 for boat storage, launching, mooring, maintenance, insurance, and fuel, \$22 for bait, and \$11 for ice. Average total angler spending (trip and non-trip) was \$1,044 per year in 1991, according to the U.S. Fish and Wildlife Service. In 1997 dollars their total spending estimate would be about \$1,211 per angler per year. It appears that the U.S. Fish and Wildlife Service data exclude spending by anglers that is not trip-related. That was not the goal of this study. It was intended to measure spending that occurred as a result of the fishing trips whether the spending was for fishing activities or not.

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<sup>28</sup> The number of unique anglers was derived in Sport Fishery Use and Value on Lower Snake River Reservoirs: Phase I Report: Volume 1 of 2, Willingness-to-Pay and Direct Expenditures by Anglers on the Lower Snake River Reservoirs.

<sup>29</sup> The U.S. Fish and Wildlife Service estimates of fishing and hunting expenditures also were much lower than were found in our survey of 3,500 anglers and hunters in Colorado (McKean and Nobe 1983, 1984).

### **Sportfishing Expenditure Rates by Town**

The database collected by the sportfishing spending survey allowed detailed measurement of spending by community, by type of purchase, and by travel to site, on-site, or return trip. For example, for every 1,000 anglers visiting the reservoirs, the towns of Lewiston and Clarkston have \$8,900 in gas station sales purchased during the trip to the reservoirs. Richland-Kennewick-Pasco have \$5,730 in gas station sales to anglers on the way to the reservoirs for every 1,000 anglers visiting the reservoirs. About 85 towns where sportfisher spending occurred are identified in the database.

### **Angler Lodging**

Only one-third of the 574 responses to the travel cost demand survey stayed overnight at the reservoirs.<sup>30</sup> Table 4-16 shows that, of those anglers that do stay overnight, only a small fraction stay at motels or commercial campgrounds. About 91 percent of the overnights stay with friends, in campers, trailers, mobile homes, tents, or in other accommodations.

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<sup>30</sup> The travel cost demand survey was conducted concurrently with the input-output spending survey by AEI.

**Table 4-16**  
**OVERNIGHT LODGING BY ANGLERS**  
**(Sample of 574)**

Type of Lodging	Anglers
Camper	60
Trailer	20
Commercial Camp	7
Motel	11
With Friends	21
Public Camp	34
Didn't Stay Overnight	381
Other	40

**Angler Mode of Transportation**

Method of travel used by the 404 anglers in the input-output spending survey sample was classified into eight categories as shown in Table 4-17. As expected, personal car/van/truck dominated the transport method. Personal camper or RV was second most likely to be used for transport.

**Table 4-17**  
**TYPE OF TRANSPORTATION USED BY ANGLERS <sup>1/</sup>**

Mode of Transport	Percent of Sample
Personal Car/Van/Truck	87.35
Rented Car/Van/Truck	0.24
Personal Camper/RV	18.29
Rented Camper/Mobile Home/RV	1.22
Bus	0.00
Tour Bus	0.00
Tour Boat	0.73
Other	5.12

1/ Total percent exceeds 100 because some anglers used more than one transportation type.

#### 4.6.2.3 Reservoir Recreation Activity (excludes primary anglers)

An outdoor recreationist input-output spending survey (AEI) was conducted to collect detailed information on the types of purchases and the place the purchase occurred.<sup>31</sup> Separate data were collected for the trip to the reservoirs, while on-site at the reservoirs, and on the trip home. Expenditure data for some 26 seller categories were obtained. The data allow measuring the average expenditure by type of purchase for various distances from the reservoirs. The name of the town nearest where each purchase occurred was collected allowing estimation of average purchases for each of the seller categories for a large number of towns and counties.

Average group expenditures were \$524 per trip and the group size was 4.87 persons. Recreationist spending per person per trip was nearly \$108 ( $\$524/4.87$ ). Recreationists in the input-output survey averaged 10.74 trips per year (compared to 8.364 trips in the travel cost demand analysis survey). Thus, average annual spending on trips to the reservoirs per recreationist was \$1,156. Recreationist spending that occurred during the Lower Snake River reservoir outdoor recreation trips excluded spending made while traveling to other outdoor recreation sites and excluded major purchases of boats or other gear, maintenance, storage, insurance and other non-trip related outdoor recreation costs. Recreationist trip expenditures included any non-outdoor recreation related purchases made during the trip. Total annual spending by recreationists was estimated at \$61,249,504 per year.

The breaching may occur first on the two upriver reservoirs, Lower Granite and Little Goose, at the east end of the Reservoir Subregion. These two reservoirs accounted for about 46 percent of the reservoir recreation activity (visitor hours) according to the 1997 USACE Walla Walla District Natural Resources Management Report. The breaching on the downriver dams, Ice Harbor and Lower Monumental, would occur about two years later. The downriver reservoirs accounted for about 54 percent of the reservoir recreation activity.

It was assumed that recreation (non-angler) spending was split between the two upper and two lower reservoirs in the shares indicated by the USACE Natural Resources Management Report.

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<sup>31</sup> Willing-participant recreationists were contacted on-site at the reservoirs and identified as primarily anglers or non-anglers. Their name and address was recorded and the appropriate survey form was later mailed to them.

Thus, the upper two reservoirs contribute  $(0.46)(\$61,249,504) = \$28,174,772$  of annual recreation (non-angler) spending. The lower two reservoirs contribute  $(0.54)(\$61,249,504) = \$33,074,732$  of annual recreation (non-angler) spending. It was assumed that the various A-2 alternatives would not significantly affect recreation spending at the reservoirs.

Reservoir recreation (excluding fishing) on the two eastern reservoirs created 326 total jobs (including direct, indirect, and induced effects) using the Lower Snake River Model (all three subregions combined). Reservoir recreation (excluding fishing) on all four reservoirs created 708 total jobs (including direct, indirect, and induced effects).

The following table (Table 4-18) shows the recreation effects of Alternative A-3 (breaching) on business sales, employment, and personal income in the Reservoir Subregion. The various A-2 alternatives (based on the now outdated PATH results) did not create significant recreation effects. The impacts shown are based on the AEI's contingent behavior "low" forecast. Recreation facilities limitations do not constrain the low forecast impact estimates.

**Table 4-18**  
**ECONOMIC EFFECTS OF RIVER RECREATION IN THE RESERVOIR**  
**SUBREGION LOW FORECAST FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million)	Increase in Jobs	Increase in Personal Income (\$ Million)
0	9.77	124	2.62
5	13.55	172	3.64
10	21.58	274	5.79
20 to 100	22.44	285	6.02

1/ The Low Forecast is based on the AEI contingent behavior survey for recreation visits after breaching.

The following table (Table 4-19) shows the recreation effects of breaching on business sales, employment, and personal income in the Reservoir Subregion. The various A-2 alternatives (based on the now outdated PATH results) did not create significant recreation effects. The impacts shown are based on the AEI's contingent behavior "middle level" forecast.

**TABLE 4-19**  
**ECONOMIC EFFECTS OF RIVER RECREATION IN THE RESERVOIR**  
**SUBREGION MIDDLE FORECAST FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million)	Increase in Jobs	Increase in Personal Income (\$ Million)
0	35.95	456	9.65
5	49.84	631	13.37
10	73.14	927	19.63
20 to 100	77.28	980	20.74

1/ The Middle Forecast is based on the AEI contingent behavior survey for recreation visits after breaching.

Recreation facilities limitations do not affect the middle forecast impact estimates.

The following table (Table 4-20) shows the recreation effects of breaching on business sales, employment, and personal income in the Reservoir Subregion. The various A-2 alternatives (based on the now outdated PATH results) did not create significant recreation effects. The impacts shown are based on the AEI's contingent behavior "mid-high level" forecast. The limited capacity of recreation facilities constrains the mid-high forecast impact estimates to some extent.

**Table 4-20**  
**ECONOMIC EFFECTS OF RIVER RECREATION IN THE RESERVOIR**  
**SUBREGION HIGH FORECAST FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million)	Increase in Jobs	Increase in Personal Income (\$ Million)
0	94.46	1,198	25.35
5	133.44	1,692	35.81
10	181.96	2,307	48.83
20 to 100	193.59	2,455	51.95

1/ The Mid-High Forecast is based on the AEI contingent behavior survey for recreation visits after breaching and USACE estimates of the capacity limits of recreation facilities.

Table 4-21 shows the sector by sector effects of reservoir recreation with breaching in year 20 for the “middle” level contingent behavior forecast of recreation trips.

**Table 4-21**  
**SECTOR BY SECTOR EFFECTS OF RESERVOIR SUBREGION RECREATION**  
**IN YEAR 20 FOR THE MIDDLE CONTINGENT BEHAVIOR FORECAST**  
**ALTERNATIVE A-3 (BREACHING) (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	REDUCTION IN SALES	% CHANGE IN SECTOR	REDUCED EMPLOYMENT <sup>1/</sup>
2 CATTLE	241524528.	241643360.	1.23
9 FRUIT/NUTS	238112032.	238174880.	1.10
13 NURS/LNDSC	49202660.	49300644.	2.72
15 AG SERVICE	114376336.	114398592.	1.11
27 MAINT RESI	117281200.	117429040.	1.71
28 MAINT NEC	555765120.	558854016.	31.49
31 CAN/FREEZE	1312914432.	1313223680.	1.65
38 MFG NEC	105182904.	105308272.	1.36
41 PRINT/PUBL	112733024.	113058456.	5.28
49 MACHINERY	112317784.	112445136.	1.00
58 OTHER TRAN	41536792.	41623120.	2.17
59 TRUCK/WARE	359040768.	359514624.	5.37
60 WATER TRAN	33380530.	34173272.	4.10
63 TELEPHONE	316054944.	316717184.	2.85
64 RADIO/TV	72491040.	72752608.	2.05
68 WHOLESALE	951085824.	952436992.	15.59
69 BLDG & GAR	85312776.	85492712.	4.08
70 DEPT STORE	173753216.	174446176.	19.94
71 GROCERIES	241867168.	244368912.	74.54
72 AUTO DLRS	317989952.	321391520.	59.13
73 APPAREL	36179000.	36494168.	9.81
74 FURNITURE	66735268.	66883752.	3.57
75 RESTAURANT	556446144.	558105536.	48.03
76 RETAIL NEC	198231808.	203049392.	229.88
77 F-I-R-E	2226515968.	2231332096.	25.52
78 LODGING	195132704.	196983504.	45.50
79 PER SERVIC	99121648.	99973392.	30.56
80 BUS SERVIC	178367552.	178820832.	13.02
81 DATA PROCE	132998200.	133199368.	2.47
83 AUTO SERVI	175170784.	183269280.	113.94
84 REPAIR SER	78024176.	79086736.	18.94
85 AMUSEMENTS	162374736.	164923872.	71.63
86 HEALTH SER	923988608.	925835008.	33.83
87 PROF SERVI	2138514176.	2139229952.	9.19
88 EDUCATION	118589200.	118819168.	6.31
89 SOC SERVIC	114584208.	114776304.	6.43
90 ASSOCIATNS	158933248.	159231968.	7.84
91 S & L GOVT	130475968.	138350720.	46.48
92 GOV ELECTR	784303232.	785272320.	3.04
93 POSTAL SER	92704976.	92912928.	2.70
96 HOUSEHOLDS	10318804992.	10339560448.	.00

1/ Adjusted for 1994 IMPLAN calibration.

Table 4-22 shows the amount currently added to the economy by nonangling recreation on the two easternmost reservoirs. The table shows the amounts of business sales and employment that would be currently created (1994 dollars) in each sector of the economy. Table 4-23 shows the amount added to the economy by all four reservoirs.

**Table 4-22**  
**BUSINESS SALES AND EMPLOYMENT BY SECTOR CREATED**  
**BY RESERVOIR RECREATION AT THE TWO EASTERN RESERVOIRS**  
**(Sectors with less than \$100,000 of added business sales are not shown)**  
**(1994 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
28 MAINT NEC	960512.	0.17	10.48
41 PRINT/PUBL	101384.	0.09	1.76
59 TRUCK/WARE	147648.	0.04	1.79
60 WATER TRAN	247374.	0.74	1.37
63 TELEPHONE	205504.	0.07	0.95
68 WHOLESALE	420096.	0.04	5.19
70 DEPT STORE	215376.	0.12	6.63
71 GROCERIES	777472.	0.32	24.79
72 AUTO DLRS	1056896.	0.33	19.66
75 RESTAURANT	515584.	0.09	15.97
76 RETAIL NEC	1496624.	0.75	76.41
77 F-I-R-E	1495296.	0.07	8.48
78 LODGING	575344.	0.29	15.13
79 PER SERVIC	264904.	0.27	10.17
80 BUS SERVIC	141120.	0.08	4.34
83 AUTO SERVI	2516192.	1.44	37.72
84 REPAIR SER	330320.	0.42	6.30
85 AMUSEMENTS	791840.	0.49	23.81
86 HEALTH SER	573440.	0.06	11.24
87 PROF SERVI	222464.	0.01	3.05
91 S & L GOVT	2446608.	1.88	15.45
92 GOV ELECTR	301248.	0.04	1.01
96 HOUSEHOLDS	6449152.	0.06	0.00

**Table 4-23**  
**BUSINESS SALES AND EMPLOYMENT BY SECTOR**  
**CREATED BY RESERVOIR RECREATION AT ALL FOUR RESERVOIRS**  
**(Sectors with less than \$100,000 of added business sales are not shown)**  
**(1994 dollars)**

	ADDITIONAL SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
27 MAINT RESI	99424.	0.08	1.23
28 MAINT NEC	2087936.	0.38	22.77
29 MEAT PROC	172864.	0.04	0.46
30 DAIRY PROD	107504.	0.06	0.33
31 CAN/FREEZE	209536.	0.02	1.20
32 OTHER FOOD	126416.	0.06	0.64
41 PRINT/PUBL	220448.	0.20	3.82
59 TRUCK/WARE	321024.	0.09	3.90
60 WATER TRAN	537782.	1.61	2.98
61 AIR TRANSP	50132.	0.10	0.45
63 TELEPHONE	446880.	0.14	2.06
64 RADIO/TV	176920.	0.24	1.48
65 ELECTRICIT	209248.	0.08	0.64
68 WHOLESALE	913664.	0.10	11.28
69 BLDG & GAR	121664.	0.14	2.95
70 DEPT STORE	468256.	0.27	14.42
71 GROCERIES	1690256.	0.70	53.89
72 AUTO DLRS	2297536.	0.72	42.74
73 APPAREL	212136.	0.59	7.07
74 FURNITURE	100344.	0.15	2.58
75 RESTAURANT	1120896.	0.20	34.71
76 RETAIL NEC	3253600.	1.64	166.12
77 F-I-R-E	3251968.	0.15	18.44
78 LODGING	1250816.	0.64	32.90
79 PER SERVIC	575920.	0.58	22.11
80 BUS SERVIC	306704.	0.17	9.42
81 DATA PROCE	136024.	0.10	1.79
83 AUTO SERVI	5470032.	3.12	82.00
84 REPAIR SER	718088.	0.92	13.69
85 AMUSEMENTS	1721472.	1.06	51.76
86 HEALTH SER	1247168.	0.13	24.45
87 PROF SERVI	484096.	0.02	6.65
88 EDUCATION	154888.	0.13	4.55
89 SOC SERVIC	130016.	0.11	4.66
90 ASSOCIATNS	201872.	0.13	5.67
91 S & L GOVT	5318880.	4.08	33.59
92 GOV ELECTR	654848.	0.08	2.20
93 POSTAL SER	140352.	0.15	1.95
96 HOUSEHOLDS	14022656.	0.14	0.00

Table 4-24 shows the fractional distribution of angler and recreationist reservoir-induced spending among the sectors in the input-output model. These spending distributions were derived from two input-output surveys of anglers and recreationists conducted by AEI. The Lower Snake River Model containing the three subregions surrounding the reservoirs was used to estimate the direct, indirect, and induced economic effects of angler and recreationist spending that was distributed across sectors as shown in Table 4-24.

**Table 4-24**  
**SPENDING DISTRIBUTIONS FOR ANGLERS AND RECREATIONISTS**  
**ESTIMATED FROM I-O EXPENDITURE MAIL SURVEYS**

	<b>Anglers</b>	<b>Recreationists</b>
60 WATER TRAN	.02537200	.00802800
61 AIR TRANSP	.02310100	.00000000
69 BLDG & GAR	.00168900 1/	.00089700 1/
70 DEPT STORE	.00125900 1/	.00348300 1/
71 GROCERIES	.01934200 1/	.02189300 1/
72 AUTO DLRS	.03472100 1/	.02818600 1/
73 APPAREL	.00334100 1/	.00257700 1/
74 FURNITURE	.01147100 1/	.00000000 1/
75 RESTAURANT	.01147100 1/	.00706600 1/
76 RETAIL NEC	.02641800 1/	.04790800 1/
78 LODGING	.05150600	.01695700
79 PER SERVIC	.00004600	.00601800
83 AUTO SERVI	.02379300	.08508600
84 REPAIR SER	.00755100	.00868900
85 AMUSEMENTS	.00732000	.02220800
91 S & L GOVT	.19169299	.08351100

1/ The trade sectors are margined at 15 percent of the actual spending share. Divide the Trade Sectors spending fraction by 0.15 to find their actual share.

SOURCE: AEI Survey.

### **The Reservoir Outdoor Recreation Expenditure Survey (excludes primary anglers)**

Recreationists were contacted at the reservoirs over the period from June 24, 1997 through November 29, 1997 and requested to take part in the outdoor recreation spending mail survey. Most persons contacted on-site were agreeable to receiving a mail questionnaire and provided their name and mailing address. A small share of those contacted preferred a telephone interview and provided a telephone number. The outdoor recreation spending survey data are expanded to show the direct economic effects on spending, earnings, and employment in the Lower Snake River region.

The spending survey provided a list of potential spending choices and requested the amount spent and the location for each of the spending categories. Separate forms were provided for spending during travel to the site, spending while at the site, and spending on the trip home. A copy of the questionnaire is shown in Appendix I. The outdoor recreation input-output "spending" survey resulted in a sample of 367 completely useable responses. A total of 573 surveys were mailed out yielding a useable response rate of 64 percent.

### **Geographic Location of Economic Impacts**

The zip code address of visitors to the reservoirs was derived from two mail surveys of recreation (excluding primary anglers) visitors that were conducted concurrently for the USACE (AEI 1998). One survey was for a travel cost demand model and had 438 observations. The other survey is the input-output survey discussed above that collected detailed data on visitor purchases and had 367 observations.

About 70 visitors, or 16.1 percent of the 438 observation sample, lived within ten miles of the Lower Snake River reservoirs. An added 42 visitors (9.7 percent of the sample) lived within 20 miles of the reservoirs. Clearly, many (52 percent) of the outdoor recreation visitors in the demand survey sample lived and made purchases within 50 miles of the reservoirs.

About 55 visitors, or about 14.9 percent of the 374 observation sample, lived within a ten mile radius of the reservoirs. The number of visitors living between 10 and 20 miles from the reservoir was 61 which was 16.5 percent of the sample. About 64 percent of the spending survey sample lived and made purchases within 50 miles of the reservoir sites where they recreated.

## **Recreation Spending Distributions**

Table 4-25 shows sample spending distributed across economic sectors for the trip to the reservoir, while on site, and during the return trip home.

## **Expenditure Per Visitor per Year and Total Annual Spending**

Summing the detailed expenditures collected in the spending survey and shown in Table 4-25 results in a spending total of \$192,385 for the 367 recreationist groups in the survey. The average size of a recreation group was 4.87 persons. Average group expenditures for the sample were \$524 per outdoor recreation round trip and  $\$524/4.87 = \$107.6$  per recreationist per trip. The average number of trips per year was 10.74 resulting in  $\$107.6 \times 10.74 = \$1,156$  average annual spending per recreationist on trips to the reservoirs.

Recreational spending induced by the presence of the reservoirs can include capital purchases as well as spending during travel and while recreating at the reservoirs. One group spent \$50,000 for automotive equipment and \$20,000 for boating equipment. Only three groups spent anything for automotive equipment.

**Table 4-25**  
**EXPENDITURES MADE BY RESERVOIR NONANGLER RECREATIONISTS**

Type of Purchase	Going to Reservoir	At Reservoir	Returning Home
County Government	\$7.31	\$1.15	\$0.00
State Government	\$17.32	\$4.98	\$0.03
Federal Government	\$2.60	\$3.64	\$0.02
Tour Boat	\$2.75	\$0.37	\$0.00
Airline	\$0.00	\$0.00	\$0.00
Auto/Truck/RV Rental	\$2.39	\$0.38	\$0.67
Service Station #1	\$42.27	\$8.46	\$6.65
Service Station #2	\$7.82	\$1.43	\$1.30
Grocery Store	\$41.05	\$9.86	\$3.05
Auto Dealer	\$0.38	\$0.00	\$0.00
Clothing Store	\$3.34	\$0.53	\$0.08
Boat/Marine Store	\$37.68	\$2.04	\$0.64
Sporting Goods Store	\$15.42	\$0.91	\$0.63
Hardware Store	\$1.99	\$0.29	\$0.08
Restaurant	\$7.64	\$5.64	\$4.45
Department Store	\$0.51	\$7.06	\$1.16
Other Retail	\$0.73	\$0.44	\$0.38
Lodging	\$2.20	\$2.76	\$1.62
Guide Services	\$0.96	\$0.00	\$0.00
Equipment Rental	\$0.12	\$1.37	\$0.01
Parking & Car Wash	\$0.22	\$1.00	\$0.05
Auto Repair	\$20.21	\$7.13	\$1.29
Other Repair	\$2.96	\$0.42	\$0.00
Entertainment	\$3.37	\$3.02	\$0.87
Health Services	\$0.00	\$1.91	\$0.54
All Other Purchases	\$2.39	\$5.24	\$0.86

Total annual spending by recreationists visiting the reservoirs (excluding those primarily fishing) is the product of annual spending per visitor (\$1,156) times the number of unique visitors (estimated at 52,984 in the first section of the report) or  $\$1,156 \times 52,984 = \$61,249,504$  per year.<sup>32</sup>

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<sup>32</sup> The estimation of total recreation spending requires knowledge of the total population of site visitors. The number of recreationists can be inferred from our sample values for hours on-site per day and days on-site per year combined with the estimated total annual hours on-site at the reservoirs (COE annual). Hours on-site per year for the average recreationist is estimated from the product of average hours on-site per day (15.07 hours) times average days per year (13.19) or  $15.07 \times 13.19 = 198.77$  hours on-site per year for the average visitor. The COE (1997) estimated total annual hours on-site at the four reservoirs at 10,219,824 hours per year. Hours on site by persons primarily interested in fishing must be removed from the total annual hours to find total annual hours on site by recreationists. Normandeau Associates et al. (1998a) estimated 489,215 hours per year fishing at the reservoirs. Our survey of anglers at the reservoirs (Normandeau Associates et al. 1998b) showed that nearly one-half (19/40) the time on site is spent fishing, thus we double the fishing hours to convert it to on-site hours for anglers. Removing the total annual hours on site by anglers leaves  $10,219,824 - (489,215 \times 2) = 9,241,394$  hours on site per year for recreationists. Dividing total annual hours on-site by our estimate of on-site hours per year for an individual yields total recreationists or  $9,241,394/198.77 = 46,493$  unique recreationists that visit the reservoirs. Multiplying annual spending per recreationist (from the AEI survey) times the number of unique recreationists yields total annual spending.

An adjustment for bias caused by nonresponse could increase the total annual willingness-to-pay (and expenditures also) by as much as 14 percent. About 35 percent of recreationists contacted did not return a useable survey. A survey of nonresponders was not attempted for this data set. However, a telephone survey on nonresponding anglers reported in the Lower Snake River Reservoir angling survey resulted in an average of 13 trips per year compared to about 20 trips per year for those who did respond (Normandeau Associates et al. 1998b). These data suggest about 35 percent less participation by nonrespondents. A crude adjustment for nonresponse bias assumes that the 35 percent reduction in trips also applies to recreationist hours per year from our survey. Given that assumption, the average hours per year remains 198.77 for responders and becomes  $198.77 \times (1-0.35)$  for nonresponders and the adjusted average hours per recreationist is  $[198.77 \times 0.65] + [198.77 \times (1-0.35) \times 0.35] = 174.42$  where the response rate was 0.65 and the nonresponse rate was 0.35. The result of the adjustment for lower participation by nonresponders is to lower the average on-site hours per year from 198.77 to 174.42 which is a 13.3 percent reduction in estimated average hours per year per recreationist. As before, the number of recreationists was estimated by dividing total hours per year for recreationists (COE) by annual hours per recreationist ( $9,241,394/174.42 = 52,984$ ) unique recreationists. Compared to our previous estimate of 46,493 unique recreationists before the adjustment for nonresponse, this is a fourteen percent increase in unique recreationists.

## **Recreation Expenditure Rates by Town**

The database collected by the outdoor recreation spending survey allowed detailed measurement of spending by community or county, by type of purchase, and by travel to site, on-site, or return trip. For example, for every 100 recreationists visiting the reservoirs, a specified town or county would have so many dollars of business sales by each economic sector during the trip to the reservoirs while on-site and on the return trip. About 85 towns where outdoor recreationist spending occurred are identified in the database.

### 4.6.2.4 Upriver Subregion Fishing and Other Recreation

#### **Increased Idaho Hatchery Salmon Survival Under Alternative A-3 (Breaching)**

##### **MEMORANDUM**

**To: Erik Nielsen, Foster Wheeler**

**From: Bert Bowler, IDFG**

**Date: 14 Jan 1999**

#### **RE: Hatchery Salmon Response To A-3 - Breaching The Lower Snake River Dams**

*The Snake River Basin in Idaho supports two chinook hatchery mitigation programs that are not connected to the Lower Snake River Compensation Program (LSRCP). Those include Rapid River and Pahsimeroi Fish Hatchery programs within the Salmon River that are tied to Idaho Power Company mitigation for the Hells Canyon complex of dams and a portion of the Dworshak Hatchery complex that is mitigation for Dworshak Dam in the Clearwater River drainage. The Rapid River facility is adjacent to Riggins, Idaho and the Dworshak complex is in the Orofino, Idaho area.*

*The PATH process for estimating the recovery of listed salmon stocks deals only with wild fish. The issue of hatchery fish is much different with respect to the response of returning adults and subsequent fishing opportunity because in some cases the brood source is immediately available to take advantage of the improved survival under Lower Snake River Breach (A-3).*

*The estimated smolt to adult survival rate for salmon migrating from and returning to Rapid River Hatchery for the 1964-68 brood years (1966-70 smolt migration years) was 0.64%. This survival rate backed down to the Lower Snake approximates 0.86%. Lower Granite Dam had not been completed by 1970 but the other dams were in place. Passage survival at the dams for non-transported fish was considered poor during the early years because the projects were without a full compliment of turbines creating high spill rates with associated dissolved gas problems. Also debris that was collecting at the turbine entrances caused descaling and mortality of smolts.*

*The 1993 brood year was among the strongest observed in the last decade. The estimated smolt to*

*adult survival from Rapid River to Rapid River was estimated at 0.45%. The estimate to the Lower Snake is 0.61%. Many of the other survival rates to rapid River Hatchery during the last 10 years were below 0.10%*

*Under the PATH analysis, A-3 is likely to meet a survival and recovery standard that will provide in excess of 3.0% (actually 3.0 to 6.0%) smolt to adult survival rate in the Snake River for wild salmon stocks. Using a conservative range of performance of hatchery salmon that is 20 to 50% of that of wild fish would put their survival rate to the Snake River between 0.60 to 1.5%. LSRCP modeled its needs on a smolt to adult survival of 0.89%, which has not been achieved.*

*The mitigation goal is a release of 3.0 million smolts annually from Rapid River Hatchery. The non-LSRCP Dworshak complex mitigation goal is about 600,000 smolts.*

*With a smolt to adult survival ranging from 0.6 to 1.5% the contribution of Rapid River Hatchery could range from 18,000 to 45,000 adults to the Snake River. The Clearwater could expect 3,600 to 9,000 from the Dworshak complex. This would significantly bolster fishing opportunity throughout the state, most dramatically in the Lewiston/Orofino and Riggins areas.*

*Keep in mind that these figures are only from the non-LSRCP production facilities. If the LSRCP was to be phased out on some time schedule as wild stocks were recovering under A-3 there could be a tremendous response from hatchery stocks for fishing opportunity in the interim. PATH estimates the Lower Snake River under A-3 would stabilize in 3 to 8 years with the flushing of sediments etc. Hatchery fish response may be very good compared to wild stocks which will not have an instant brood source. It is also very evident that the salmon hatchery mitigation debt either from the non-LSRCP or the LSRCP can not be met without A-3 or A.*

**Table 4-26**  
**YEARLY TOTALS OF SALMONIDS COUNTED**  
**OVER ICE HARBOR DAM, 1962 - 1996**

YEAR	CHINOOK*	STEELHEAD	SOCKEYE	COHO*	TOTALS*
1962	94,301	115,796	38	3,207	213,342
1963	61,190	74,539	1,118	1,933	138,780
1964	60,097	58,860	1,276	2,071	122,304
1965	39,233	62,873	317	320	102,743
1966	75,882	65,798	278	878	142,836
1967	84,930	44,205	717	3,770	133,622
1968	98,681	82,383	1,165	6,227	188,456
1969	100,514	63,889	745	5,316	170,464
1970	77,698	53,870	797	3,636	136,001
1971	70,248	67,029	532	2,969	140,778
1972	82,632	63,593	363	2,522	149,110
1973	81,821	38,311	233	2,443	122,808
1974	32,444	12,528	204	1,334	46,510
1975	31,686	16,218	243	1,559	49,706
1976	36,556	23,885	771	1,991	63,203
1977	56,514	54,820	582	1,561	113,477
1978	61,352	27,142	86	652	89,232
1979	13,929	23,117	30	398	37,474
1980	14,717	50,221	36	58	65,032
1981	22,092	41,290	142	82	63,606
1982	22,646	73,405	174	348	96,573
1983	20,259	88,475	216	465	109,415
1984	17,757	94,030	105	22	111,914
1985	47,981	128,481	24	10	176,496
1986	52,615	144,292	20		196,927
1987	47,477	74,491	13		121,981
1988	48,066	99,714	22		147,802
1989	27,234	151,101	4		178,339
1990	31,841	54,758	1	1	86,601
1991	23,175	123,762	9	1	146,947
1992	36,021	160,614	33		196,668
1993	34,991	73,107	17		108,115
1994	7,577	51,704		1	59,282
1995	7,990	92,026	5	4	100,025
1996	16,375	97,250	1		113,626
Totals	1,638,522	2,547,577	10,317	43,779	4,240,195
10-Year Average	28,075	97,853	12		125,939

\*Jacks included

SOURCE: USACE, Internet.

### **Exports of Fishing Recreation from the Upriver Subregion (Central Idaho)**

Estimation of the economic impact created by export of fishing recreation requires information on: (1) the amount of fishing recreation in the Upriver subregion, (2) spending distributions showing the types and amounts of purchases made by anglers, and (3) the share of fishing recreation that is “purchased” by nonresident anglers. The latter adjustment is based on the conservative assumption that resident anglers would make some other type of purchase locally if fishing was not available. If resident anglers would, in fact, leave the region to continue fishing if local fishing was not available then this assumption is invalid and spending by resident anglers should be included when measuring economic impacts.

The AEI 1998 study found that only 9.27 percent of the 259 anglers in the mail survey had local zip codes. Thus, 90.73 percent of the anglers created export sales from the Upriver Subregion. However, non-local anglers took many fewer trips per year than local anglers. A sort on trips by distance revealed that only 53.4 percent of the trips were over 50 miles. Thus, 53.4 percent of the trips are exports from the Upriver Subregion.

### **Economic Impact of Fishing in Central Idaho (Upriver Subregion)**

The sportfisher spending survey (AEI 1998) collected detailed information on the types of purchases and the place the purchases occurred. Separate data were collected for the trip to the fishing site, while on-site at the river, and on the trip home. Expenditure data for some 26 seller categories were obtained. The data allow measuring the average expenditure by type of purchase for various distances from the fishing site. The name of the town nearest where each purchase occurred was collected, allowing estimation of average purchases for each of the seller categories for a large number of towns. Collecting spending data for each town increased the accuracy for the critical measure of the angler spending that occurred within the Upriver Subregion versus spending outside the Upriver Subregion.

Average group expenditures were \$840.40 per trip, and the average group size was 3.51 persons. Angler spending per person per trip was  $\$840.40/3.51 = \$239.43$ . Multiplying the per trip cost times the trips per year (6.48) resulted in average annual spending of \$1,551.51 for each angler traveling to a central Idaho fishing site.

Steelhead and salmon fishing data are available for Idaho in the U.S. Fish and Wildlife *National Survey of Fishing, Hunting, and Wildlife-Associated Recreation* (various years) and from license sales data. The steelhead fishing data apply to the Upriver Subregion (central Idaho) because the Subregion was defined to include all counties that contain the Snake River and its tributaries. Thus, the Upriver Subregion captures the seagoing share<sup>33</sup> of the fishing activity in Idaho for anadromous fish (steelhead and salmon). In recent years, salmon fishing in Idaho has been almost completely for landlocked planted salmon, not for seagoing salmon.

The total annual spending for all anglers requires knowledge of the total population of anglers which fish in the Snake River Basin. The number of anglers can be inferred from Steelhead licenses sold and the sample share of steelhead to total anglers in central Idaho. The Upriver Subregion includes all Idaho rivers and streams that are accessible to the ocean. Thus, it is assumed that the 40,300 steelhead licenses<sup>34</sup> sold in Idaho in 1998 is the number of unique steelhead anglers in the Upriver Subregion in central Idaho. In comparison, the U.S. Fish and Wildlife publication, *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, reported 47,000 steelhead anglers for Idaho. According to our survey, trout was the primary fish caught in the Upriver Subregion. Anglers (sample of 372 anglers) listed rainbow trout (69.6%), other fish (47.3%), steelhead (38.4%), smallmouth bass (16.4%), sturgeon (5.4%) and bull trout (3.8%) among the species caught. The percentages sum to more than 100% because some anglers caught several of the species. Thus, 38.4 percent of the anglers are assumed to have purchased steelhead licenses. Total anglers for the Upriver Subregion is estimated by the ratio of steelhead angler license numbers to its share, or  $40,300/0.384 = 104,948$  total anglers. In comparison, total anglers in the State of Idaho in 1996 is reported to be 474,000 by the U.S. Fish and Wildlife Service. The *1985 National Survey of Fishing, Hunting and Wildlife-Associated Recreation* shows 44,000 anglers in region 2 and 128,100 anglers in region 6 for a total of 172,100 anglers.<sup>35</sup> (U.S. Fish and Wildlife Service regions 2 and

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<sup>33</sup> Anadromous fish exist in northern Idaho outside of the Upriver Subregion and landlocked fish may exist where planted.

<sup>34</sup> Includes season licenses and 3-day permits.

<sup>35</sup> 1985 is the last year for which the U.S. Fish and Wildlife Service reported data by regions within States.

6 are slightly larger than the area covered by the Upriver Subregion in central Idaho.)

Multiplying annual spending per angler times the number of unique anglers yields total direct annual spending of  $\$1,551.51 \times 104,948 = \$162.8$  million per year for anglers that fish in the Upriver Subregion in central Idaho in 1998. Steelhead fishing, according to our survey, would account for 21.25% of total annual spending on fishing in the Upriver Subregion or direct spending of about \$34.6 million per year.

Export sales to nonresident anglers in the Upriver Subregion are estimated to be about 53.4 percent of total sales or  $0.534 \times \$162.8$  million = \$86.9 million. (1998 dollars) About eight percent of the sales are made outside the Upriver Subregion, reducing the effective sales to \$80 million. (1998 dollars) Based on the spending distribution for anglers in central Idaho, export sales to anglers directly and indirectly currently creates some  $1,555/1.07 = 1,453$  jobs, \$22.247 million in personal income, and \$96.735 million in added business sales dollars in the Upriver Subregion <sup>36</sup> (1998 dollars). (Employment is divided by 1.07 to calibrate the 1994 IMPLAN model.)

### **Sportfishing Spending on Salmon Fishing in Central Idaho Recovered to Levels of 1950-1960**

Reading (*The Economic Impact of Steelhead Fishing and the Return of Salmon Fishing In Idaho*, September 1996) estimates 150,000 days annually of salmon fishing effort (for sea-run salmon) in the 1950's and 1960's.<sup>37</sup> The 1996 *National Survey* shows 23,000 salmon anglers in Idaho fishing 162,000 days, mainly for landlocked planted salmon. (Using the *National Survey* ratio of anglers to fishing days implies that Reading's projected 150,000 sea run salmon fishing days is equivalent to 21,300 salmon anglers). In 1991, the *National Survey* showed 30,300 salmon anglers fishing 175,600 days in Idaho. However, in 1985, the *National Survey* showed a huge 75,200 salmon anglers fishing 746,300 days in Idaho.

It might be argued that the reintroduction of a major new seagoing salmon fishery would divert existing anglers from fishing for landlocked salmon and resident fish instead of adding to the

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<sup>36</sup> Note that all retail sales are margined at 15 percent and the 85 percent of sales that is cost of goods sold is assumed to be produced outside of the region (imported by retailers).

<sup>37</sup> Based on 23,000 fish caught per year and 6.5 fishing days per fish caught.

angler total. However, this argument is circumvented by the use of historical salmon angler data. Given the large population increases in the western U.S., historical salmon fishing data for Idaho are likely to understate the effect of reintroducing seagoing salmon into central Idaho. The results of the contingent behavior survey (AEI 1998) for the reservoir reach on the Lower Snake River after breaching add further support for the very high demand (and very limited supply) of seagoing salmon sportfishing.

The \$1,551.51 direct annual spending per angler for all species is probably a very conservative (low) estimate of the spending on sea run salmon fishing. If that estimate is applied to recovered salmon runs, using the angler total based partly on the Reading angler days estimate, annual sportfishing spending times number of anglers is  $\$1,551.51 \times 21,300 = \$33.05$  million (1998 dollars).

If the *National Survey* data for 1985 is adjusted downward to exclude anglers fishing for land-locked salmon (based on current land-locked salmon angler data) that becomes  $75,200 - 23,000 = 52,200$  anglers fishing for sea-run salmon. Total annual spending is annual sportfishing spending per angler times number of anglers or  $\$1,551.51 \times 52,200 = \$80.99$  million. These estimates of total annual spending on recovered salmon fishing do not take into account the part of the Snake River Basin that extends into northeast Oregon. Added annual spending on salmon sportfishing would be created in the State of Oregon (which is part of the Upriver Subregion) if sea run chinook salmon fishing was restored in northeast Oregon.

Note also, that the annual spending per angler (\$1,551.51) is based on the average for all species of fish in central Idaho. The annual spending per angler of fishing in Idaho for sea run salmon could be much higher than for resident fish.

If the same percentage of fishing trips that are by non-locals is assumed for sea run salmon, the export sales would be,  $0.534 \times \$80.99$  million = \$43.25 million. (This figure may understate export sales if sea run salmon attract more non-local anglers.) Thus, the full recovery of sea-run salmon would add at least 54 percent to the existing sport fishing exports in the upriver Subregion. The result would be at least 785 more jobs, \$12.01 million more in personal income, and \$52.24 million more in business sales in the Upriver Subregion.

**Table 4-27**  
**SPENDING DISTRIBUTIONS FOR ANGLERS AND RECREATIONISTS**  
**ESTIMATED FROM I-O EXPENDITURE MAIL SURVEYS**

	ANGLERS	RECREATIONISTS
51 TRANSP NEC	.00908387	.01231994
53 WATER TRAN	.01442973	.08297159
54 AIR TRAN	.06219433	.10094250
60 BLDG MATER	.00067836 1/	.00023900 1/
61 DEPT STORE	.00221419 1/	.00040500 1/
62 GROCERIES	.00995333 1/	.00501698 1/
63 AUTO DLRS	.03337089 1/	.01396393 1/
64 APPAREL	.00145278 1/	.00162099 1/
66 RESTAURANT	.01010742 1/	.00954395 1/
67 RETAIL NEC	.02982298 1/	.02099890 1/
69 LODGING	.09320796	.09240054
70 PERS SERV	.00514276	.00838896
74 AUTO SERV	.02772786	.02907486
75 REPAIR SER	.00119064	.00086400
76 AMUSEMENTS	.14974725	.31223345
77 HEALTH SER	.00511974	.00210299
82 S & L GOVT	.04279994	.01218994
84 GOVT NEC	.00530885	.00130799
89 IMPORTS	.49644607	.29341355

1/ The Trade Sectors are margined at 15 percent of the actual spending share. Divide the Trade Sectors fractions by 0.15 to find their actual share.

SOURCE: AEI Survey.

### **Sportfishing Economic Impacts of Alternative A-3 (Breaching)**

The following table (Table 4-28) shows the sportfishing effects of breaching on business sales, employment, and personal income in central Idaho and north east Oregon. The various A-2 alternatives did not create significant upstream fishing effects. The impacts shown are based on the increased supply of fish (mainly increased steelhead and a small increase in salmon) projected by the DREW Anadromous Fish Study Team (1999) for Alternative A-3 (breaching). Table 4-29 shows the sector by sector effects of central Idaho fishing under breaching in year 20.

**Table 4-28**  
**ECONOMIC EFFECTS OF FISHING IN CENTRAL IDAHO**  
**FOR ALTERNATIVE A-3 (BREACHING)<sup>1/</sup>**

Year	Increase in Business Sales (\$ Million)	Increase in Jobs	Increase in Personal Income (\$ Million)
0	6.15	92	1.73
5	4.40	66	1.24
10	28.74	432	8.10
15	20.98	312	5.85
20	24.57	369	6.92
25	25.70	386	7.24
30	26.79	402	7.56
35	27.65	415	7.79
40	26.74	402	7.53
45	26.98	405	7.60
50	27.42	412	7.72
55	27.43	412	7.73
60	27.14	408	7.64
65	27.86	418	7.85
70	28.43	427	8.01
75	27.71	416	7.80
80	27.88	419	7.85
85	27.79	418	7.83
90	28.18	423	7.94
95	27.17	408	7.65
100	27.10	407	7.63

1/ The increase in fishing trips is constrained by the increased supply of fish projected by the DREW Anadromous Fish Study Team (1999).

**Table 4-29**  
**SECTOR BY SECTOR EFFECTS OF CENTRAL IDAHO FISHING IN YEAR 20**  
**ALTERNATIVE A-3 (BREACHING) (1998 dollars)<sup>1/</sup>**

(Sectors with employment change less than one are excluded, except for households)

	ADDITIONAL SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
12 NURSERY/LA	8830990.	8862150.	1.17
26 MAINT NEC	142513536.	143258128.	8.92
37 PRINT/PUBL	28174570.	28310416.	2.33
51 TRANSP NEC	8455800.	8788391.	8.05
52 TRUCK/WH	115556720.	115752896.	2.33
53 WATER TRAN	23536340.	23923636.	2.06
54 AIR TRAN	16405700.	17845548.	12.96
56 RADIO/TV	19164760.	19318904.	1.27
59 WHOLESALE	231759728.	232247520.	6.11
60 BLDG MATER	27604932.	27650276.	1.08
61 DEPT STORE	43937100.	44110732.	5.09
62 GROCERIES	55788660.	56182568.	12.54
63 AUTO DLRS	72405248.	73369888.	19.01
64 APPAREL	10005870.	10073554.	2.40
65 FURNITURE	18958270.	19025618.	1.65
66 RESTAURANT	131845984.	132450448.	18.76
67 RETAIL NEC	49979668.	50818724.	44.34
68 F-I-R-E	507464896.	509060768.	9.55
69 LODGING	56015300.	58190684.	62.68
70 PERS SERV	28881928.	29119144.	9.67
71 BUS SERV	18803560.	18914624.	4.13
74 AUTO SERV	46616152.	47338332.	11.16
75 REPAIR SER	19695610.	19804968.	2.42
76 AMUSEMENTS	43575664.	47476668.	106.42
77 HEALTH SER	242245536.	243194560.	18.08
78 PROF SERV	57731040.	57974832.	4.65
80 SOC SERV	27773900.	27863116.	3.38
81 ASSOCIATNS	40980168.	41086752.	2.84
82 S & L GOVT	21766730.	22796644.	6.33
84 GOVT NEC	413884800.	414002368.	4.39
86 HOUSEHOLDS	2108380928.	2115926912.	.00

1/ Increased fishing-related exports after breaching are constrained by available anadromous and resident fish.

2/ Adjusted for the 1994 IMPLAN calibration.

### The Sportfisher Spending Survey

Anglers were contacted on-site over the period from April 15, 1998 through November 30, 1998 and requested to take part in the sportfishing spending mail survey (AEI 1998). Most persons contacted on-site were agreeable to receiving a mail questionnaire and provided their name and mailing address. Persons on guided tours or guided rafting trips were not directly accessible and tour

guides mailed or handed out surveys to their clients. The sportfishing spending survey data are expanded to show the direct economic effects on spending, earnings, and employment in the Upriver Subregion (central Idaho).

The spending survey provided a list of potential spending choices and requested the amount spent and the location for each of the spending categories. Separate forms were provided for spending during travel to the site, spending while at the site, and spending on the trip home. A copy of the questionnaire is shown in Appendix XIII. The sportfishing spending survey resulted in a sample of 259 useable responses. Because of the varied ways in which surveys were distributed it was not possible to calculate a response rate.

### **Geographic Location of Sportfishing Economic Impacts**

Table 4-30 is based on the sportfisher spending survey that contained 259 observations. The table shows that 30 visitors, or about 11.6 percent of the sample, lived within a fifty mile radius of their fishing site.<sup>38</sup> The number of visitors living between 50 and 100 miles from the fishing site was 38 which was 14.7 percent of the sample. Over 81 percent of the anglers lived within 400 miles of the central Idaho fishing site. About 55 percent of the recreationists lived within 400 miles of the central Idaho recreation site.

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<sup>38</sup> In contrast, most anglers at the four reservoirs on the lower Snake River lived nearby their fishing site. The travel cost demand survey found that 70 percent of the anglers at the lower Snake River reservoirs lived within 50 miles of their fishing site.

**Table 4-30**  
**ANGLERS AND RECREATIONISTS BY DISTANCE TRAVELED**

Miles One Way	Anglers	Recreationists
50	30	14
100	38	44
150	52	50
200	31	49
250	19	28
300	14	19
350	14	10
400	14	6
450	8	14
500	4	12
550	3	2
600	6	12
650	1	1
700	0	2
750	0	0
800	1	4
850	1	4
900	1	4
950	0	1
1000	1	15
1050	0	0
1100	0	0
1150	0	0
1200	1	6
1250	1	0
1300	0	8
1350	0	0
1400	0	2
1450	0	0
>1450	6	43

**Table 4-31  
EXPENDITURES MADE BY CENTRAL IDAHO ANGLERS**

Type of Purchase	Going to Central Idaho	At Idaho Site	Returning Home
County Government	\$5.17	\$1.17	\$0.10
State Government	\$19.76	\$9.75	\$0.00
Federal Government	\$3.33	\$1.57	\$0.00
Bus & Tour Boat	\$7.63, \$9.19	\$0.00, \$2.93	\$0.00, \$0.00
Airline	\$43.85	\$7.93	\$0.46
Auto/Truck/RV Rental	\$8.90	\$0.21	\$0.00
Service Station #1	\$29.62	\$9.43	\$13.68
Service Station #2	\$9.68	\$3.24	\$2.84
Grocery Store	\$37.09	\$15.71	\$2.92
Auto Dealer	\$117.30	\$0.89	\$0.21
Clothing Store	\$6.47	\$1.65	\$0.00
Boat/Marine Store	\$3.02	\$1.06	\$121.62
Sporting Goods Store	\$15.92	\$8.27	\$0.54
Hardware Store	\$1.56	\$1.86	\$0.41
Restaurant	\$26.91	\$21.49	\$8.23
Department Store	\$10.60	\$1.77	\$0.00
Other Retail	\$1.61	\$1.25	\$0.48
Lodging	\$25.55	\$49.16	\$3.58
Guide Services	\$67.97	\$51.68	\$0.00
Equipment Rental	\$2.36	\$1.96	\$0.00
Parking & Car Wash	\$4.61	\$0.05	\$0.04
Auto Repair	\$8.88	\$0.00	\$0.60
Other Repair	\$0.42	\$0.58	\$0.00
Entertainment	\$4.03	\$2.10	\$50.00
Health Services	\$0.98	\$3.22	\$0.10
All Other Purchases	\$11.01	\$2.24	\$0.00

### **Expenditure per Angler, per Trip From Home to Site, and per Year**

Summing the detailed expenditures collected in the spending survey and shown in Table 4-31 results in a spending total of  $\$840.40 \times 259 = \$217,664$  for the 259 angler groups in the survey. Average group expenditures for the sample were  $\$840.40$  per fishing round trip or  $\$840.40/3.51 = \$239.43$  per angler per trip. Multiplying cost per angler per trip times the number of trips per year (6.48) results in an annual fishing trip-related cost of  $\$1,551.51$  per year per angler.

Total annual spending by anglers is found by multiplying annual spending per angler per year ( $\$1,551.51$ ) times the number of unique anglers (104,948) or  $\$1,551.51 \times 104,948 = \$162.8$  million total angler spending per year in Central Idaho.

In comparison, average angler spending estimates for Idaho State from the U.S. Fish and Wildlife Service are much smaller.<sup>39</sup> The *National Survey* (1996) shows average annual trip-related and equipment expenditures for anglers in the State of Idaho in 1991 were  $\$573$  per angler per year. Annual fishing expenditures per angler were  $\$109$  for food and lodging,  $\$107$  for transportation,  $\$57$  for other trip costs (boat or equipment rental, guides, charter boats, land use, boating costs, bait, ice, heating and cooking fuel),  $\$57$  for fishing equipment,  $\$16$  for auxiliary equipment,  $\$112$  for special equipment,  $\$1$  for magazines and books, and  $\$113$  for licenses, stamps, tags, permits, land leasing and ownership. It appears that the U.S. Fish and Wildlife Service data exclude spending by anglers that is not directly trip-related. That was not the goal of this study. It was intended to measure spending that occurred as a result of the fishing trips whether the spending was for fishing activities or not.

### **Sportfishing Expenditure Rates by Town**

The database collected by the sportfishing spending survey will allow detailed measurement of spending by community, by type of purchase, and by travel to site, on-site, or return trip. Towns where sportfisher spending occurred are identified in the database. These detailed spending data are used in the regional economic impact analyses.

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<sup>39</sup> The U.S. Fish and Wildlife Service estimates of fishing and hunting expenditures also were much lower than were found in our survey of 3,500 anglers and hunters in Colorado (McKean and Nobe 1983, 1984).

## Angler Lodging

About 330 of the 371 anglers in the travel cost demand survey<sup>40</sup> stayed overnight in central Idaho. Table 4-32 shows that, of those anglers that do stay overnight, 62 stayed at motels or commercial campgrounds. About 81 percent of the overnights stay with friends, in campers, trailers, mobile homes, tents, or in other accommodations.

**Table 4-32  
OVERNIGHT LODGING BY ANGLERS**

Type of Lodging	Anglers
Camper	46
Trailer	31
Commercial Campground	9
Motel	62
With Friends	18
Public Campground	73
Didn't Stay Overnight	41
Other Lodging	91

## Angler Mode of Transportation

Method of travel used by the 259 anglers in the spending survey sample was classified into eight categories as shown in Table 4-33. As expected, personal car/van/truck dominated the transport method. Personal camper or RV was second most likely to be used for transport.

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<sup>40</sup> A travel cost demand survey in central Idaho was conducted by AEI concurrently with the spending survey.

**Table 4-33**  
**TYPE OF TRANSPORTATION USED BY ANGLERS <sup>1/</sup>**

Mode of Transport	Percent of Sample
Personal Car/Van/Truck	83.33
Rented Car/Van/Truck	3.49
Personal Camper/RV	16.28
Rented Camper/Mobile Home/RV	0.39
Airplane	8.53
Bus	0.00
Tour Bus	0.39
Tour Boat	0.00
Other	6.59

1/ Total percent exceeds 100 because some anglers used more than one transportation type.

**Importance of Recreation Activities During the Fishing Trip**

Anglers were asked to rate 17 recreation activities using a scale from one to five where one was most important and five was least important. The results of this survey question are shown in Table 4-34. The question was phrased, “what recreation activities were important to you and your group on this trip?”

Average group size for the 259 anglers in this survey was 3.51 persons. Table 4-34 also shows the number of anglers responding for each recreation category. Many persons did not rate all of the types of recreation on the questionnaire. For example, only 51 persons out of 259 responded to the “other” category. Evidently anglers avoided rating recreation activities that were undefined or irrelevant to them. Many anglers simply marked the categories they liked without including a rating number. It was assumed that anglers had the lowest rating on the categories of recreation that they left blank and thus the averages are generally low. However, the response rate itself may be an indicator of angler interest in the various types of recreation. Only two recreation categories drew a response from more than half the anglers: trout fishing, and steelhead fishing.

None of the recreation categories except for trout fishing (rated 2.74) and steelhead fishing

(rated 3.08) seemed very important to the anglers. It is clear from the responses shown in Table 4-34, that the angler group of outdoor recreationists in central Idaho are primarily interested in trout fishing, steelhead fishing, camping, wildlife watching, and nature viewing.

**Table 4-34**  
**IMPORTANCE OF RECREATION ACTIVITIES DURING FISHING TRIP**

Type of Recreation Activity While on Fishing Trip	Number of Anglers Responding to Question out of 259 Surveyed	Average Rating to Group (1 = most important, 5 = least important) Nonresponses Excluded
Steelhead Fishing	173	3.08
Smallmouth Bass Fishing	107	4.60
Trout Fishing	181	2.74
Sturgeon Fishing	98	4.72
Bull Trout Fishing	95	4.73
Jetboating	112	4.46
Camping	152	3.44
Other	51	4.51
Rafting	110	4.38
Kayaking	91	4.81
Canoeing	92	4.86
Hiking	122	4.09
Bird Watching	109	4.29
Wildlife Watching	142	3.67
Sightseeing	128	3.81
Biking	95	4.78
Nature Viewing	142	3.53

## **Economic Impact of Outdoor Recreation in the Upriver Subregion (Central Idaho)**

The outdoor recreationist input-output spending survey (AEI 1998) collected detailed information on the types of purchases and the place the purchase occurred. Separate data were collected for the trip to the recreation site, while on-site, and on the trip home. Expenditure data for some 26 seller categories were obtained. The data allow measuring the average expenditure by type of purchase for various distances from the recreation site. The name of the town nearest where each purchase occurred was collected, allowing estimation of average purchases for each of the seller categories for a large number of towns and counties. Knowledge of the zip code address of the recreationist allowed estimation of exports by the recreation sector. Knowledge of the name of each town where spending occurred, allowed estimation of the part of recreationist spending that was within the Upriver Subregion.

Average group expenditures were \$1,307.71 per trip. Recreationists in the input-output survey averaged 2.83 trips per year (compared to 6.48 trips per year for anglers). Recreationist spending that occurred during the outdoor recreation trips excluded spending made while traveling to other outdoor recreation sites and excluded major purchases of capital items, maintenance, storage, insurance and other non-trip related outdoor recreation costs. Recreationist trip expenditures included any non-outdoor recreation related purchases made during the trip. Total annual spending by all travelers in the Upriver Subregion was estimated at about \$298.8 million per year (1998 dollars).<sup>41</sup> AEI estimated that \$162.8 million per year was spent by anglers in the Upriver Subregion (see previous section) leaving \$136 million per year attributed to nonangler recreationists.

Export sales to nonresident recreationists traveling to the Upriver Subregion are estimated to be about 95 percent of total sales or  $0.95 \times \$136 \text{ million} = \$129.2 \text{ million}$  (1998 dollars).<sup>42</sup> About 26 percent of sales are made outside the Upriver Subregion, reducing effective sales to \$95.6 million (1998 dollars). Based on the spending distribution for nonangler recreationists in central Idaho,

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<sup>41</sup> Annual travel spending by county was estimated by Dean Runyan Associates for the Idaho Division of Tourism Development, Department of Commerce and Oregon Tourism Commission, Economic Development Department.

<sup>42</sup> Nonresident percentage is based on the zip codes of residence for the sample of 402 recreationists in the sample.

current export sales to recreationists directly and indirectly creates some 2,325 jobs, \$41 million in personal income, and \$156.3 million in added business sales dollars in the Upriver Subregion (1998 dollars)

Current exports for outdoor recreation in central Idaho create some 2,325 jobs compared to 1,453 jobs created by sportfishing. Alternative A-3 (breaching) caused sportfishing in central Idaho to add as much as 432 jobs. The effect of Alternative A-3 on non-fishing outdoor recreation in central Idaho is unknown. However, a significant positive effect on outdoor recreation exports is likely to occur. Table 4-41 shows that the most important outdoor recreation activities in central Idaho are rafting, nature viewing, camping, sightseeing, wildlife watching, and hiking. Greatly increased runs of anadromous fish (steelhead and salmon) imply a greater abundance of wildlife (in addition to anadromous fish) that feed on salmon and steelhead directly or indirectly. Wildlife viewing, as well as hunting and fishing would be improved by Alternative A-3 (breaching). The increase in exports of outdoor recreation in central Idaho created by Alternative A-3 (breaching) might approach the amount found for anglers.

**Table 4-35**  
**SPENDING DISTRIBUTIONS FOR ANGLERS AND RECREATIONISTS**  
**ESTIMATED FROM I-O EXPENDITURE MAIL SURVEYS**

	ANGLERS	RECREATIONISTS
51 TRANSP NEC	.00908387	.01231994
53 WATER TRAN	.01442973	.08297159
54 AIR TRAN	.06219433	.10094250
60 BLDG MATER	.00067836 1/	.00023900 1/
61 DEPT STORE	.00221419 1/	.00040500 1/
62 GROCERIES	.00995333 1/	.00501698 1/
63 AUTO DLRS	.03337089 1/	.01396393 1/
64 APPAREL	.00145278 1/	.00162099 1/
66 RESTAURANT	.01010742 1/	.00954395 1/
67 RETAIL NEC	.02982298 1/	.02099890 1/
69 LODGING	.09320796	.09240054
70 PERS SERV	.00514276	.00838896
74 AUTO SERV	.02772786	.02907486
75 REPAIR SER	.00119064	.00086400
76 AMUSEMENTS	.14974725	.31223345
77 HEALTH SER	.00511974	.00210299
82 S & L GOVT	.04279994	.01218994
84 GOVT NEC	.00530885	.00130799
89 IMPORTS	.49644607	.29341355

1/ The Trade Sectors are margined at 15 percent of the actual spending share. Divide the Trade Sectors fractions by 0.15 to find their actual share.

SOURCE: AEI Survey.

**Table 4-36**  
**BUSINESS SALES AND EMPLOYMENT BY SECTOR CREATED**  
**BY RECREATION NEAR RIVERS IN CENTRAL IDAHO**  
**(Sectors with less than \$100,000 of added business sales are not shown)**  
**(1998 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>1/</sup>
12 NURSERY/LA	185359.	2.10	6.93
25 RESI MAINT	187616.	0.76	2.60
26 MAINT NEC	2739776.	1.92	32.80
28 DAIRY PROC	134564.	1.19	0.33
33 SAWMILLS	123712.	0.03	0.65
37 PRINT/PUBL	863588.	3.07	14.79
51 TRANSP NEC	2137288.	25.28	53.23
52 TRUCK/WH	1096304.	0.95	13.00
53 WATER TRAN	8822986.	37.49	46.94
54 AIR TRAN	9775884.	59.59	90.56
55 TELEPHONE	1153424.	1.64	5.17
56 RADIO/TV	990742.	5.17	8.17
57 ELECTRIC	707264.	1.70	2.58
58 WATER/SANI	299206.	1.45	1.93
59 WHOLESALE	2785392.	1.20	35.00
60 BLDG MATER	180556.	0.65	4.32
61 DEPT STORE	691828.	1.57	20.31
62 GROCERIES	1374732.	2.46	43.78
63 AUTO DLRS	2442704.	3.37	48.15
64 APPAREL	337336.	3.37	11.97
65 FURNITURE	353272.	1.86	8.67
66 RESTAURANT	2945216.	2.23	91.40
67 RETAIL NEC	2882144.	5.77	156.70
68 F-I-R-E	9272672.	1.83	55.30
69 LODGING	9246156.	16.51	274.16
70 PERS SERV	1419994.	4.92	52.90
71 BUS SERV	695774.	3.70	25.87
72 DATA PROC	217216.	3.23	3.36
74 AUTO SERV	3289724.	7.06	48.85
75 REPAIR SER	577338.	2.93	11.75
76 AMUSEMENTS	33694224.	77.32	945.71
77 HEALTH SER	4595392.	1.90	90.08
78 PROF SERV	1471688.	2.55	28.04
79 EDUCATION	148731.	1.45	5.03
80 SOC SERV	470280.	1.69	17.85
81 ASSOCIATNS	640416.	1.56	17.08
82 S & L GOVT	1574608.	7.23	9.66
83 POSTAL SER	358272.	1.70	4.88
84 GOVT NEC	121504.	0.03	4.54
86 HOUSEHOLDS	40924654.	1.89	0.00

1/ Adjusted to calibrate the 1994 IMPLAN model.

### **The Outdoor Recreation Expenditure Survey (excludes primary anglers)**

Recreationists were contacted at recreation sites over the period from April 15, 1998 through November 30, 1998 and requested to take part in the outdoor recreation spending mail survey. Most persons contacted on-site were agreeable to receiving a mail questionnaire and provided their name and mailing address. Persons on guided tours or guided rafting trips were not directly accessible and tour guides mailed or handed out surveys to their clients. The outdoor recreation spending survey data are expanded to show the direct economic effects on spending, earnings, and employment in central Idaho (Upriver Subregion).

The spending survey provided a list of potential spending choices and requested the amount spent and the location for each of the spending categories. Separate forms were provided for spending during travel to the site, spending while at the site, and spending on the trip home. The outdoor recreation input-output spending survey resulted in a sample of 402 completely useable responses. Because of the varied ways in which surveys were distributed it was not possible to calculate a response rate.

### **Geographic Location of Recreation Economic Impacts**

Table 4-37 is based on the outdoor recreationist input-output spending survey that contained 402 useable observations on the variable trips by distance. The table shows that only 14 visitors, or about 3.5 percent of the sample, lived within a 50 mile radius of the recreation site. The number of visitors living between 50 and 100 miles from the recreation site was 44 which was about 11 percent of the sample. About 55 percent of the sample lived and within 400 miles of the sites in central Idaho where they recreated.<sup>43</sup>

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<sup>43</sup> In contrast, the spending survey on the four lower Snake River reservoirs found that 64 percent of the sample lived within 50 miles of the reservoirs where they recreated.

**Table 4-37**  
**ANGLERS AND RECREATIONISTS BY DISTANCE TRAVELED**

Miles One Way	Anglers	Recreationists
50	30	14
100	38	44
150	52	50
200	31	49
250	19	28
300	14	19
350	14	10
400	14	6
450	8	14
500	4	12
550	3	2
600	6	12
650	1	1
700	0	2
750	0	0
800	1	4
850	1	4
900	1	4
950	0	1
1000	1	15
1050	0	0
1100	0	0
1150	0	0
1200	1	6
1250	1	0
1300	0	8
1350	0	0
1400	0	2
1450	0	0
>1450	6	43

**Table 4-38**  
**EXPENDITURES MADE BY CENTRAL IDAHO NONANGLER RECREATIONISTS**

Type of Purchase	Going to Central Idaho	At Central Idaho	Returning Home
County Government	\$1.84	\$1.86	\$0.00
State Government	\$8.23	\$3.76	\$0.25
Federal Government	\$0.97	\$0.74	\$0.00
Bus & Tour Boat	\$4.16, \$50.69	\$11.94, \$56.27	\$0.01, \$1.54
Airline	\$108.19	\$3.36	\$20.45
Auto/Truck/RV Rental	\$16.29	\$2.79	\$3.98
Service Station #1	\$24.98	\$8.69	\$12.73
Service Station #2	\$8.27	\$1.55	\$3.72
Grocery Store	\$25.27	\$12.39	\$6.09
Auto Dealer	\$61.34	\$0.45	\$0.03
Clothing Store	\$9.32	\$4.31	\$0.47
Boat/Marine Store	\$126.00	\$1.47	\$0.00
Sporting Goods Store	\$8.19	\$2.69	\$0.27
Hardware Store	\$1.24	\$0.76	\$0.08
Restaurant	\$37.64	\$31.10	\$14.46
Department Store	\$2.30	\$0.27	\$0.94
Other Retail	\$3.32	\$13.81	\$0.12
Lodging	\$57.91	\$52.79	\$10.13
Guide Services	\$144.73	\$248.07	\$1.12
Equipment Rental	\$9.98	\$0.99	\$0.00
Parking & Car Wash	\$1.25	\$0.29	\$0.30
Auto Repair	\$6.53	\$6.49	\$0.10
Other Repair	\$1.13	\$0.00	\$0.00
Entertainment	\$9.80	\$3.37	\$1.21
Health Services	\$0.65	\$1.23	\$0.87
All Other Purchases	\$18.54	\$8.64	\$0.00

### **Expenditure Per Visitor per Year and Total Annual Spending**

Summing the detailed expenditures collected in the spending survey and shown in Table 4-38 results in a spending total of  $\$1,307.71 \times 402 = \$525,699$  for the 402 recreationist groups in the survey. Total annual spending by all travelers visiting central Idaho was estimated at \$298.8 million per year (1998 dollars). Visitor spending by county was taken from reports prepared for Idaho Division of Tourism Development and for the Oregon tourism Commission, Economic Development Department by Dean Runyan Associates (Internet). Data for 1996 and 1997 were inflated to 1998 using the consumer price index. We estimated that \$162.8 million per year was spent by anglers<sup>44</sup> in the Upriver Subregion leaving \$136 million per year attributed to nonangler recreationists. Dividing the annual recreationist spending (\$136 million) by annual average spending per recreationist group (\$1,307.71) yields 104,000 nonangling recreationists groups. Group size was 1.7305 resulting in  $104,000 \times 1.7305 = 180,000$  unique river recreationists.<sup>45</sup> Annual spending per river recreationist was  $\$136 \text{ million} / 180,000 = \$755.55$  per year.

### **Recreation Expenditure Rates by Town**

The database collected by the outdoor recreation spending survey will allow detailed measurement of spending by community or county, by type of purchase, and by travel to site, on-site, or return trip. For example, for every 100 recreationists visiting the recreation sites, a specified town or county will have so many dollars of sales by each economic sector during the trip to the recreation site, while on-site and on the return trip. Towns where outdoor recreationist spending occurred are identified in the database.

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<sup>44</sup> Based on the data from the AEI spending survey for recreationists and estimates of the number of anglers visiting the Upriver Subregion.

<sup>45</sup> Our survey question for group size was misinterpreted as rafting group size resulting in an overstated value.

## Recreation Lodging

About 87 percent of the 317 recreationists in the travel cost demand survey<sup>46</sup> stayed overnight at the recreation site. Table 4-39 shows that, of those recreationists that do stay overnight, only a small fraction stay at motels or commercial campgrounds. Most of the overnighters stay in campers, trailers, tents, or in other accommodations.

**Table 4-39  
OVERNIGHT LODGING BY ANGLERS**

Type of Lodging	Percent of Anglers
Camper	4.42%
Trailer	4.73%
Commercial Campground	6.31%
Motel	12.62%
With Friends	3.79%
Public Campground	15.77%
Didn't Stay Overnight	13.25%
Other Lodging	39.11%

## Recreation Mode of Transportation

Method of travel used by the 402 recreationists in the input-output spending survey sample was classified into eight categories as shown in Table 4-40. As expected, personal car/van/truck dominated the transport method. Personal camper or RV was second most likely to be used for transport (excluding the All Other category).

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<sup>46</sup> A travel cost demand survey in central Idaho was conducted by AEI concurrently with the spending survey.

**Table 4-40**  
**TYPE OF TRANSPORTATION USED BY RECREATIONISTS <sup>1/</sup>**

Mode of Transport	Percent of Sample
Personal Car/Van/Truck	71.14
Rented Car/Van/Truck	7.21
Personal Camper/RV	12.44
Airplane	15.42
Rented Camper/Mobile Home/RV	0.25
Bus	4.98
Tour Bus	4.73
Tour Boat	2.49
All Other	44.78

1/ Total percent exceeds 100 because many recreation groups used more than one transportation type.

### **Importance of Recreation Activities During the Trip**

Recreationists were asked to rate 17 recreation activities using a scale from one to five where one was most important and five was least important. The results of this survey question are shown in Table 4-41. The question was phrased, “what recreation activities were important to you and your group on this trip?”

Average group size for the 402 recreationists who responded to this survey question was 6.91. Table 4-41 shows the number of recreationists responding for each recreation category. Many persons did not rate all of the types of recreation on the questionnaire. For example, only 76 persons out of 402 responded to the “other” category. Evidently recreationists avoided rating recreation activities that were undefined or irrelevant to them. It was assumed that recreationists had a low opinion on the categories of recreation that they left blank (blanks were set to 5) and thus the averages for most categories tend to be low. However, the response rate itself may be an indicator of recreationist interest in other types of recreation. Six recreation categories drew a response from more than half the recreationists: rafting, nature viewing, camping, sightseeing, wildlife watching, and hiking. The activities with the highest rating included rafting (rated 1.85), camping (rated 3.11),

and sightseeing (rated 3.25). It is clear from the rankings that the recreationist group (which was selected to exclude primary anglers) visits central Idaho rivers mainly to engage in nature viewing, wildlife watching, camping, and sight seeing while rafting or while hiking.

**Table 4-41**  
**IMPORTANCE OF RECREATION ACTIVITIES DURING**  
**THE OUTDOOR RECREATION TRIP**

Type of Recreation Activity While on Outdoor recreation Trip	Number of Recreationists Responding to Question out of 402 Surveyed	Average Rating to Group (1 = most important, 5 = least important) Nonresponses Excluded
Steelhead Fishing	140	4.82
Smallmouth Bass Fishing	143	4.81
Trout Fishing	166	4.59
Sturgeon Fishing	141	4.81
Bull Trout Fishing	136	4.89
Jet Boating	154	4.59
Camping	262	3.11
Other	76	4.48
Rafting	346	1.85
Kayaking	198	3.82
Canoeing	143	4.58
Hiking	216	3.79
Bird Watching	166	4.26
Wildlife Watching	230	3.62
Sightseeing	257	3.25
Biking	148	4.68
Nature Viewing	271	3.01

#### 4.6.2.5 Downriver Subregion Sportfishing

Under Alternative A-3 (breaching), recreational fishing is expected to increase to the extent allowed by fisheries managers. Breaching of the dams is expected to increase catch rates for both wild and planted salmon and steelhead. Results of the contingent behavior survey for the lower Snake River reservoir reach (AEI 1998) suggest that sportfishing demand will far outstrip the capacity of the fisheries in the region. Estimation of economic impacts is contingent on knowledge of fisheries management practices on the lower Columbia River given dam breaching. Increases or

decreases in stocking of anadromous fish versus wild fish survival, limitations on catch, and on season length are unknowns that determine the economic impacts of changes in sportfishing in the Downriver Subregion.

*Data from the DREW Adronomous Fish Study Team not available at the time of this report.*

#### **4.6.3 Transportation Effects With Alternative A-3 (Breaching)**

Transportation effects occur only under Alternative A-3 (breaching), natural river drawdown. There are no transportation effects with any of the A-2 alternatives. Thus, this section focuses only on the economic impacts in the study region that would occur with Alternative A-3 (breaching).

##### **4.6.3.1 Impacts of New Construction for Rail Transport**

New railroad hopper cars costing \$14.00 to \$26.85 million would be required. The place of construction unknown. It was assumed that the rail car construction would occur outside the Pacific Northwest study region.

Construction of tidewater railroad track for car storage is projected to cost between \$1.99 and \$4.05 million. This construction is located near ocean ports. It was assumed that the rail car storage is located in Oregon. The IMPLAN new road construction sector for Oregon was used to model impacts of railroad construction. The road construction sector is also other heavy construction which includes railroad construction. The Oregon multipliers were 2.3809, 0.00002085, and 0.6072, for business sales, employment, and personal income, respectively. The range of effects of rail car storage construction in Oregon would be \$ 4.74 to \$9.64 million in business sales. The effect on employment would be 41 to 84 jobs. The effect on personal income would be \$1.21 to \$2.46 million. It is assumed that the rail car storage construction is completed within one year.

New mainline railroad track upgrades of \$14.00 to \$24.00 million would be required somewhere in the Lower Snake River Region. Short-line railroad upgrades are estimated at \$19.90 to \$23.80 million. Thus, total rail construction would be \$33.90 to \$47.80 million. The new road construction sector was used to model impacts of railroad construction. The IMPLAN road construction sector is also other heavy construction which includes railroad construction. Lower

Snake River Region multipliers are 2.5584, 0.00002283, and 0.68325 for business sales, employment, and personal income. The range of effects of railroad track construction on business sales would be \$86.73 to \$122.29 million. The range of employment effects would be 723 to 1,020 jobs. The range of personal income effects would be \$23.16 to \$32.66 million. It is assumed that railroad track improvements would have to be completed rapidly (within a year) to meet the increased hopper car traffic.

#### 4.6.3.2 Impacts of New Construction for Road Transport

Road construction costs of \$84.10 to \$100.70 million are one-time costs for intersection and road improvements in the Lower Snake River Region. These estimates are for Washington only. The IMPLAN new road construction sector for the Lower Snake River model again is used to estimate the impacts of road construction. The range of effects on business sales would be \$215.16 to \$257.63 million. The range of employment effects would be 1,794 to 2,149 jobs. The range of personal income effects would be \$57.46 to \$68.80 million. Road and intersection improvements would have to be completed rapidly (within a year) to accommodate the increased heavy truck traffic. Note: Road construction impacts outside Washington in central Idaho and northeast Oregon are unknown.

#### 4.6.3.3 Impacts of New Construction for Transport-Related Facilities

Country grain elevators are estimated to have \$14.00 to \$16.90 million in new construction and river elevators are estimated to have \$58.70 to 335.40 million in new construction. Total elevator construction would be between \$72.70 million and \$352.30 million. The Lower Snake River Region new industrial buildings sector is used to model impacts of grain elevator construction. The multipliers are 2.7916, 0.000029297, and 0.9366 for business sales, employment, and personal income respectively. The range of effects on business sales would be \$202.95 to \$983.48 million. The range of effects on employment would be 1,991 to 9,646 jobs. The range of effects on personal income would be \$6.75 to \$329.96 million. (Note: the most likely impacts were set at 1.2 times the average impacts for transport related facilities by the DREW Transportation Impact Study Team (1999). Grain elevator improvements would have to be completed rapidly (within a year) to

accommodate the increased use of rail and truck in place of barge transport.

### **Sector by Sector Effects of Transport-Related Construction**

The data provided by the DREW Transport Impact Study Team (1999) show railroad construction of \$33.90 to \$47.89 million, road and intersection construction of \$84.10 to \$100.70 million, and grain elevator-related construction of \$72.70 to \$352.30 million. This heavy construction is in the Lower Snake River Region. Table 4-42 shows the sector by sector effects of this in the Lower Snake River Region. Midpoints of the ranges are used to represent the most likely construction spending, except in the case of grain elevator construction where the midpoint value is increased by 20 percent (DREW Transport Impact Study Team (1999)). The road and rail construction sector has an increase of \$133.25 million and the new industrial building sector has an increase of \$255 million.

**TABLE 4-42**  
**SECTOR BY SECTOR EFFECTS OF**  
**TRANSPORT-RELATED HEAVY CONSTRUCTION<sup>1/</sup>**  
**LOWER SNAKE RIVER MODEL**  
**(1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
1 DAIRY/POUL	3.	1.20	2.80
2 CATTLE	19.	.70	17.76
3 MEAT ANIM	2.	.86	1.87
4 LVSTK NEC	4.	1.34	3.74
5 FOOD GRAIN	8.	.10	7.48
6 FEED GRAIN	7.	.22	6.54
7 HAY	12.	.32	11.22
9 FRUIT/NUTS	17.	.37	15.89
10 VEGETABLES	7.	.24	6.54
12 FORESTRY	2.	.22	1.87
13 NURS/LNDSC	45.	3.09	42.06
14 FISHING	2.	.88	1.87
15 AG SERVICE	19.	.32	17.76
17 OTHER MINE	13.	13.60	12.15
19 SAND & GRA	19.	5.81	17.76
21 NEW IND &	4176.	100.11	3902.80
23 NEW ROADS	1360.	112.23	1271.03
27 MAINT RESI	17.	1.15	15.89
28 MAINT NEC	75.	1.23	70.09
29 MEAT PROC	10.	.92	9.35
30 DAIRY PROD	7.	1.18	6.54
31 CAN/FREEZE	24.	.32	22.43
32 OTHER FOOD	13.	1.13	12.15
33 GRAIN PROC	2.	.97	1.87
34 TEXTILES	7.	1.87	6.54
35 LOGGING	5.	.22	4.67
36 SAWMILLS	13.	.36	12.15
37 WOOD PRODU	34.	2.16	31.78
38 MFG NEC	19.	1.58	17.76
39 PAPER MILL	2.	.08	1.87
40 PAPER PROD	2.	1.09	1.87
41 PRINT/PUBL	41.	2.09	38.32
42 CHEMICALS	4.	.35	3.74
43 REFINING	6.	45.03	5.61
45 CLAY PROD	77.	23.82	71.96
46 PRIM METAL	4.	.67	3.74
47 PRI ALUMIN	2.	.17	1.87
48 FAB METALS	30.	2.13	28.04
49 MACHINERY	6.	.69	5.61
51 ELECT GOOD	4.	6.42	3.74
53 VEHICLES	3.	.85	2.80
55 MARINE EQU	3.	1.43	2.80
56 INSTRUMENT	2.	.44	1.83
57 RAILROADS	9.	.69	8.41
58 OTHER TRAN	20.	1.76	18.69
59 TRUCK/WARE	125.	2.87	116.82
60 WATER TRAN	2.	1.25	1.83
61 AIR TRANSP	9.	1.97	8.41

63	TELEPHONE	36.	2.49	33.65
64	RADIO/TV	12.	1.97	11.22
65	ELECTRICIT	6.	.84	5.61
66	GAS	2.	1.83	1.83
67	WATER/SANI	7.	1.01	6.54
68	WHOLESALE	234.	1.99	218.69
69	BLDG & GAR	32.	1.55	29.91.
70	DEPT STORE	170.	3.18	158.88
71	GROCERIES	234.	3.04	218.69
72	AUTO DLRS	177.	2.99	165.42
73	APPAREL	39.	3.24	36.45
74	FURNITURE	56.	3.24	52.34
75	RESTAURANT	479.	2.78	447.66
76	RETAIL NEC	330.	3.26	308.41
77	F-I-R-E	359.	2.84	335.51
78	LODGING	120.	2.34	112.15
79	PER SERVIC	119.	3.12	111.22
80	BUS SERVIC	148.	2.69	138.32
81	DATA PROCE	28.	1.59	26.17
82	DETECTIVE	5.	1.23	4.67
83	AUTO SERVI	99.	3.77	92.52
84	REPAIR SER	78.	5.25	72.90
85	AMUSEMENTS	146.	2.99	136.45
86	HEALTH SER	575.	3.18	537.38
87	PROF SERVI	328.	1.12	306.54
88	EDUCATION	103.	2.97	96.26
89	SOC SERVIC	110.	2.67	102.80
90	ASSOCIATNS	110.	2.47	102.80
91	S & L GOVT	21.	2.53	19.63
92	GOV ELECTR	22.	.84	20.56
93	POSTAL SER	32.	2.52	29.91.
96	HOUSEHOLDS	0.	.00	0.

## **Barge Transport Commodity Flows**

All ports upstream of Ice Harbor Dam would be eliminated by a breaching of the four Lower Snake River dams. The adjoining downstream ports would see increased activity following the breaching. The list of affected ports (which excludes ports without elevators) begins downstream and progresses upstream starting with the McNary pool.

The McNary pool would be the new terminus of river transport after the breaching and would have greatly increased demands on its port facilities. The ports on the McNary pool include, Umatilla, Port Kelley, Wallula, Kennewick, Pasco, and Burbank. Umatilla is in Umatilla County, Oregon. Port Kelley and Wallula are in Walla Walla County. Kennewick is in Benton County, Washington. Pasco is in Franklin County, Washington. Burbank is in Walla Walla County, Washington. Ports in the Ice Harbor pool include Sheffler and Windust. Sheffler is in Walla Walla County and Windust is in Franklin County, Washington. Ports in the Lower Monumental pool include Lyons Ferry. Lyons Ferry is in Franklin County, Washington. Ports in the Little Goose pool include Garfield, Central Ferry, and Almota. Garfield is in Garfield County, Washington, directly across the river from Central Ferry. Central Ferry and Almota are in Whitman County, Washington. Ports in the Lower Granite pool include Wilma, Clarkston, and Lewiston. Wilma is Whitman County, Washington. Clarkston is in Asotin County, Washington and Lewiston is in Nez Perce County, Idaho.

The USACE publishes barge tonnage as it passes through the locks on the Columbia and Lower Snake Rivers (*USACE Lock Tonnage Report*). The differences in tonnage between consecutive locks were used to estimate outshipments and inshipments for each reservoir. Downstream shipping outweighs upstream shipping by a factor of several times. The McNary pool (Tri-Cities) contributed some 1,937,692 tons in 1995. About 85.3 percent of the barge shipping was for wheat while vegetables accounted for 4.5 percent and fertilizer for 3.8 percent. The Ice Harbor pool accounted for 649,901 tons in 1995. Over 97.8 percent of the Ice Harbor barge shipping was for wheat. The Lower Monumental pool accounted for only 154,991 tons in 1995. About 91.8 percent of barge shipping from Lower Monumental was wheat. About 7.4 percent of barge shipping was for other grains. Little Goose pool accounted for 1,339,481 tons of barge shipping in 1995. Some 82.5 percent of the barge shipping was for wheat while other grains accounted for over 16.9

percent of the tonnage. Lower Granite pool (Lewiston-Clarkston) contributed some 2,236,867 tons

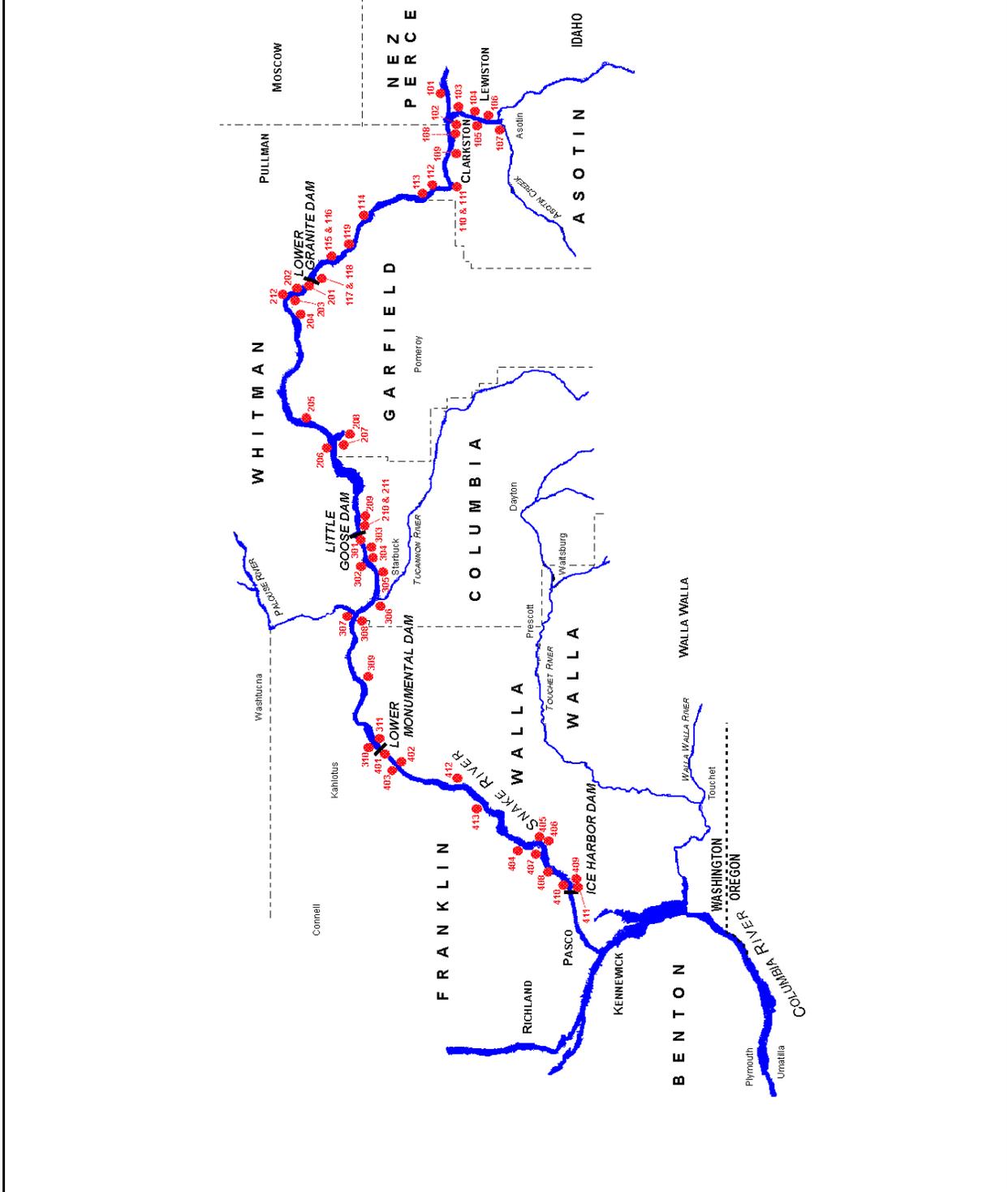


Figure 4-1 THE FOUR RESERVOIRS (The numbered access points are described in Appendix XIV)

of shipping. Wheat made up some 55.1 percent followed by forest products at 31.1 percent, other grains at 5.7 percent, and paper products at 5 percent.

Other products shipped out of the area on barges included: fuels, distillates, organic chemicals, pulp, sand, sulfur, nonferrous metal products, oilseeds, animal feeds, other agricultural products, barged salmon, machinery, and unknown goods. Table 4-43 shows the estimated breakdown of outshipments from each pool for 1995.

Apparently some intra-reservoir shipping occurs. The negative numbers in Table 4-43 indicate that the amount of a product shipped downstream declined as it passed one of the pools. Off-loading of some products occurred as the barges moved downstream.

Upstream shipping is much smaller than downstream, and has little significance above the McNary pool (Tri-Cities). Total upriver shipping above Tri-Cities is only about 9.4 percent of the barge shipping to Tri-Cities. Upstream shipping past Ice Harbor Dam to the four reservoirs was only 204,529 tons in 1995 compared to 4,371,127 tons barged downstream from the four reservoirs, a difference of over 21 times. Virtually all of the upstream shipping above Tri-Cities is to the Lower Granite pool. Fuels make up most of the shipments to the Lower Granite pool (Lewiston-Clarkston).

Barging upstream to Tri-Cities is also dominated by liquid fuels (86.5 percent) and fertilizer (10.3 percent). The distribution of upstream shipping by product for each pool is shown in Table 4-44. On-loading of some products occurred as the barges move upstream. (In the future, intra-reservoir shipping could become much more important if output from the tree farms located along the Snake and Columbia Rivers were to be shipped upstream to the paper mill at Lewiston).

**Table 4-43**  
**BARGE OUTSHIPMENTS ON THE LOWER SNAKE RIVER IN 1995**  
**(Tons)**

Commodity Name / Pools	McNary	Ice Harbor	Lower Monumental	Little Goose	Lower Granite
Gasoline/Jet Fuel/Kerosene	9,625				518
Distillate/Residual/Fuel Oil	24,658			1,680	2,390
Petrol/Pitches/Asphlt/Naptha					
Fertilizer	72,910			2,972	
Organic Industrial Chemicals	45				70
Crude Materials (inedible)					
For Prod/Lumber/Logs/Chips	(5,072)	(1,924)		(1,542)	696,609
Pulp/Waste Products	(114)			1,246	12,040
Sand/Gravel/Stone/Rock	56				79
Iron Ore/Iron Steel Scrap	8,700				
Sulfur/Clay/Salt	(444)	(160)	(3)		6,409
Paper & Allied Products	17,946	(630)	(2,500)	1,082	112,097
Pri Non-Ferrous Metal Prod	4,471	3,273	737	491	1,488
Prim WoodProducts/Plywd	15				
Wheat	1,653,447	635,744	142,254	1,105,908	1,233,034
Corn	2,210				
Rye/Barley/Sorghum/Oats	(45,736)	9,417	11,405	226,838	126,473
Oilseeds/Soybean/Flaxseed	5,759				
Vegetable Products	87,661	(1,596)	446	(13)	41,521
Animal Feed/Mill Prod/Flour	18,081	354		269	2,443
Other Ag Prods/Food	15,411			(20)	20
Barged Fish	(18)	95	149	586	
Mfg Equipment & Machines	4,809	700	(44)	44	686
Commodity Unknown	11,888	318	(1)	45	990
<b>TOTAL TONS</b>	<b>1,937,692</b>	<b>649,901</b>	<b>154,991</b>	<b>1,339,481</b>	<b>2,236,867</b>

**Table 4-44**  
**BARGE INSHIPMENTS ON THE LOWER SNAKE RIVER IN 1995**  
**(Tons)**

Commodity Name / Pools	McNary	Ice Harbor	Lower Monumental	Little Goose	Lower Granite
Gasoline/Jet Fuel/Kerosene	1,219,417				52,638
Distillate/Residual/Fuel Oil	697,750			1,680	87,884
Petrol/Pitches/Asphlt/Naptha		(1,462)			1,462
Fertilizer	229,238			18,400	9,603
Organic Industrial Chemicals	29,610				5,000
Crude Materials (inedible)	2,375				3,100
For Prod/Lumber/Logs/Chips					3,000
Pulp/Waste Products					
Sand/Gravel/Stone/Rock					
Iron Ore/Iron Steel Scrap					
Sulfur/Clay/Salt					
Paper & Allied Products					
Pri Non-Ferrous Metal Prod	22,080	(985)	72	800	14,081
Prim WoodProducts/Plywd					
Wheat	12,940	5,448	(5,100)	5,100	
Corn					
Rye/Barley/Sorghum/Oats			240		
Oilseeds/Soybean/Flaxseed					
Vegetable Products					
Animal Feed/Mill Prod/Flour					
Other Ag Prods/Food					
Barged Fish					
Mfg Equipment & Machines	3,927	2,053		(105)	300
Commodity Unknown	33	10	(140)	(120)	260
<b>TOTAL TONS</b>	<b>2,217,370</b>	<b>7,511</b>	<b>312</b>	<b>25,980</b>	<b>174,416</b>

#### 4.6.3.4 Effects of Increased Transport Costs on the Non-Farm Sectors

The effects of increased transport cost for Alternative A-3 (breaching) in the Upriver and Reservoir Subregions are complex. On the one hand, the trucking/warehousing sector could decline because grains and other products currently trucked to the ports in Lewiston/Clarkston from distant locations such as, southern Idaho, Montana, and North Dakota are terminated. However, trucking to rail terminals and ports located near Tri-Cities will increase.

The effect on rail transport also is not clear cut. Rail transport is more labor-intensive than barge so that a shift of transport mode from barge to rail implies increased employment in the Upriver Subregion. However, that simplistic outcome has an implicit assumption of a zero price elasticity of demand for transport which is unlikely to be valid.

When transport prices increase, because barge transport is not available, several reactions can occur. First, a “substitution effect” can cause a search for alternate carriers or alternate routes to minimize the impact of increased transport costs. Lacking alternate carriers, routes for some products, may shift away from the west coast and the Upriver Subregion. Second, the “output effect” of increased transport costs can cause various producers to reduce their outputs because they become less competitive on national and world markets when their cost of production increases. A third effect is the “stages of production” effect. Export of raw materials is promoted by low cost transportation. Bulk materials are less likely to be shipped if cost per ton is increased. The decision is either to, (a) stop producing the bulk materials, or (b) increase the stages of production so that the materials shipped out have a higher value per ton. The latter option implies that more processed goods would be shipped out of the region and fewer bulk materials. Local value added within the Upriver Subregion could rise. Total quantity shipped might fall and yet the total value shipped might rise if more processing of raw materials was conducted in the Upriver Subregion.

Given these possible long run adjustments to increased transport costs, it is unclear how much transport volume might fall over time if barging was eliminated. No studies exist to project the possible changes in shipping volume. Thus, it is impossible to model the direct, indirect, and induced effects in the transport sector created by dam breaching. The price elasticity of transport demand depends upon the impacts on and the unknown reactions by the sectors that utilize the transport services. The demand for transport depends upon the changes induced in the sectors

utilizing transport, but these sectors have not been studied.

#### 4.6.3.5 Potential Effects of Increased Transport Costs for Farm Products

It is likely that replacement of subsidized barge transport by railroad and truck transport would create financial hardship for marginal farm operations in the Reservoir Subregion and in the Upriver Subregion. It is also possible that farm production could continue unabated although some farmland would change hands when debt service for marginal or underfunded farms could not be continued.<sup>47</sup>

#### **Supply Elasticity for Wheat Output**

Grain markets are world wide and highly competitive. Regional farms cannot pass production cost or shipping cost increases on the consumer. Thus, increased shipping costs that would occur under Alternative A-3 (breaching) must be paid by the farmer. Over two million acres of grain land exists in the Reservoir and Upriver Subregions. Even a small percentage change in output would create significant economic impacts.

Monopoly railroad services set price to what the market will bear, not at their marginal cost of production. The upper limit price for railroad grain hauling is at the level that causes farm production either to shut down or to shift grain hauling to trucks.

The correct framework for analysis of the economic impacts of breaching is with or without breaching, not before and after breaching. Exogenous changes affecting the grain industry that occur concurrently usually are irrelevant to the breaching impacts. However, the current grain market

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<sup>47</sup> Dam breaching would reduce profits and create hardship for farmers who have paid high capital values to obtain farm land in the region. Although individual farmers would suffer, most of the land could remain in production if transport costs increase. Farm land may be lost by high cost operators with high debt but others may purchase the land as its price declines to reflect the reduced profit after transport costs increase. Thus, an economic impact analysis might show total farm output and employment relatively unchanged by dam removal. The impact analysis is not intended to reveal the economic hardship and loss of capital values to current farm owners facing increased transport costs. These financial hardship effects might be accounted for in a “mitigation and compensation” framework.

situation is in flux and few historical data exist to define “the current situation.” Several changes have occurred or are occurring that could greatly magnify the effects of breaching. Subsidy and price support programs for grain have been discontinued. World grain prices have declined recently. The strength of the dollar and major declines in the purchasing power of some foreign currencies have recently reduced the ability of U.S. farmers to export. A possible shortfall in rail service after breaching also would increase risk to farmers. Added farms might enter the conservation reserve program which offers near risk free income for marginal lands. Each of these recent changes in the situation facing grain farms could magnify production declines caused by breaching.

In the short run (which could be the lifespan of a farmer) grain prices can fluctuate over a quite wide range without causing grain production to vary. Much of the dryland used for grain production has no alternate use. As long as price is sufficient to cover operating costs, and farmers (and lenders) are willing to accept the risk, output will remain steady.

In the long run, grain output will tend to decline when net price falls, as shown by the conventional supply/demand model. Empirical estimates of supply elasticity for grain range from 0.047 to 0.98.<sup>48</sup> Blaksee (Technical Bulletin 93, Washington State University, College of Agriculture Research Center, 1980) estimated a supply range from 0.047 to 0.188. Other estimates include Salathe, Price and Gadson (0.29), Gallagher, Lancaster, Bredahl and Ryan (0.51), Honma and Heady (0.35), Longmire and Morey (0.20), Morton, Devados and Heady (0.98), and Zwart and Meilke (0.09).

Selecting from the midrange of these estimated supply elasticities, assume 0.38 for the grain supply elasticity. Thus, each one percent drop in price would cause output to fall by 0.38 of a percent. Because of the intense national and international competition in grain markets, producers will bear virtually all of an increase in transport costs.

Assume that all central Idaho grain pays an extra 26 cents/bushel, that 33 percent of the eastern Washington grain pays an extra 11 cents/bushel, and 36 percent of eastern Washington grain pays an extra 20 cents/bushel for transport under Alternative A-3 (breaching). The eastern Washington scenario is based on information in the *Lower Snake River Drawdown Study*, by HDR

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<sup>48</sup> *An Empirical Analysis of Alternative Export Subsidy Programs for U.S. Wheat*, by Salathe and Langley, Agricultural Economics Research Winter 1986.

Engineering.<sup>49</sup> In comparison, Jim Fredericks averaged the transportation cost increases for just those farms currently using barge transportation in the USACE transportation model (see technical report by the DREW Transportation Impact Study Team (1999)). He found that the average increase in transport cost for grain was about 33 cents per bushel (data under revision).

Assume grain price is \$3.50 per bushel so that decreases in net grain price after breaching are 7.43 percent, 3.14 percent, and 5.71 percent for the 26 cents, 11 cents, and 20 cents increases in transport cost. In the Upriver Subregion in central Idaho, the supply elasticity times the percentage net price decline is  $(0.38)(7.43) = 2.82$  percent. Given the assumptions, in the Upriver Subregion, a 26 cent/bushel increase in transport cost will cause grain output to fall by 2.82 percent in the long run. The total acreage devoted to grains (all wheat and barley) in the Upriver Subregion is about 425,000 acres, so the reduction is 11,985 acres. (Assuming proportionality between acres and output.) The Reservoir Subregion has about 1,575,760 acres of grain land. Net price to the farmer is expected to fall by 3.14 percent on 33 percent of that acreage and 5.71 percent on 36 percent of that acreage. Output is expected to fall by  $(0.38)(3.14) = 1.19$  percent and  $(0.38)(5.71) = 2.17$  percent respectively. On 33 percent of the 1,575,760 acres of grain land in eastern Washington that becomes a reduction of  $(.33)(1,575,760)(.0119) = 6,188$  acres. On 36 percent of the 1,575,760 acres of grain land that becomes a reduction of  $(.36)(1,575,760)(.0217) = 12,310$  acres. Total acres out

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<sup>49</sup> Ken Casavant, transportation specialist from Washington State University, was quoted in the Jan 3, 1999 *Idaho Spokesman Review*. “But without competition from barges, railroads likely would raise their rates, he says. Casavant predicts the actual increase would be 10 to 26 cents per bushel.”

The *Lower Snake River Drawdown Study* by HDR Engineering (referring only to eastern Washington grain) states, “About 35 to 40 percent of the grain crop will not be directly impacted by a drawdown ...” “About 33 percent of the grain crop will experience increased shipping costs of \$0.11 per bushel... The remainder will experience increased shipping costs of \$0.20 per bushel or more.”

A study of rail transportation in the Missouri Valley published in *The Review of Regional Studies* by M.L. Burton concludes, “The results point to water-compelled railroad rates for the movement of some commodities - in particular farm products.”

The Corps transportation report shows barging from Wilma to Portland costs 10.26 cents per bushel. The HDR report shows the minimum cost for trucking grain (using huge 105,000 lb. trucks) is \$0.0025 per bushel per mile. The distance is about 141 miles so that the trucking cost would be 35.25 cents per bushel, an increase of about 25 cents per bushel over the cost of barging.

of production for Alternative A-3 (breaching) would be about  $11,985 + 6,188 + 12,310 = 30,483$  acres in the Upriver and Reservoir Subregions.

### **Historical Production Data**

Graphs of historical data on farm production in the Reservoir Subregion and in the Upriver Subregion before and after the availability of barge transport provide an indicator of the positive effect, if any, of barging on farm production. The subsidized lock system on the Lower Snake River made barge transport less expensive than rail freight. In many cases railroads have given up the contest to barge shipping. The question is whether the reduction in shipping costs for grains and other farm products created an expansion of the farm producer sector that should be measured in an economic impact analysis. If the reduced shipping costs brought about by competition from barge transport did cause an expansion of the farm producer sector then it could be argued that breaching of the dams (and the termination of barge transport) would reverse the previous farm expansion.

Wheat and barley acres harvested is used to measure farm production in the Reservoir Subregion and the Upriver Subregion. Historical data (Washington Crop and Livestock Reporting Service) for wheat acres harvested in the six counties surrounding the reservoirs in Washington State are plotted over time. The six counties in the Reservoir Subregion are Adams, Asotin, Columbia, Garfield, Walla Walla and Whitman. Historical wheat and barley acres harvested data for five counties in the Upriver Subregion in Idaho (Idaho Crop and Livestock Reporting Service) are also plotted over time. The Idaho counties are Clearwater, Idaho, Latah, Lewis and Nez Perce.

A system of locks provides barge access from ocean ports inland to Lewiston, Idaho - Clarkston, Washington. Locks in the lower Columbia River, starting downstream, include Bonneville dam (1938), The Dalles dam (1957), John Day dam (1968), and McNary dam (1953). The locks relevant to lower shipping costs along the Lower Snake River are Ice Harbor dam (Dec. 18, 1961), Lower Monumental dam (May 28, 1969), Little Goose dam (May 26, 1970) and Lower Granite dam (April 3, 1975) (Interagency Team, 1971).

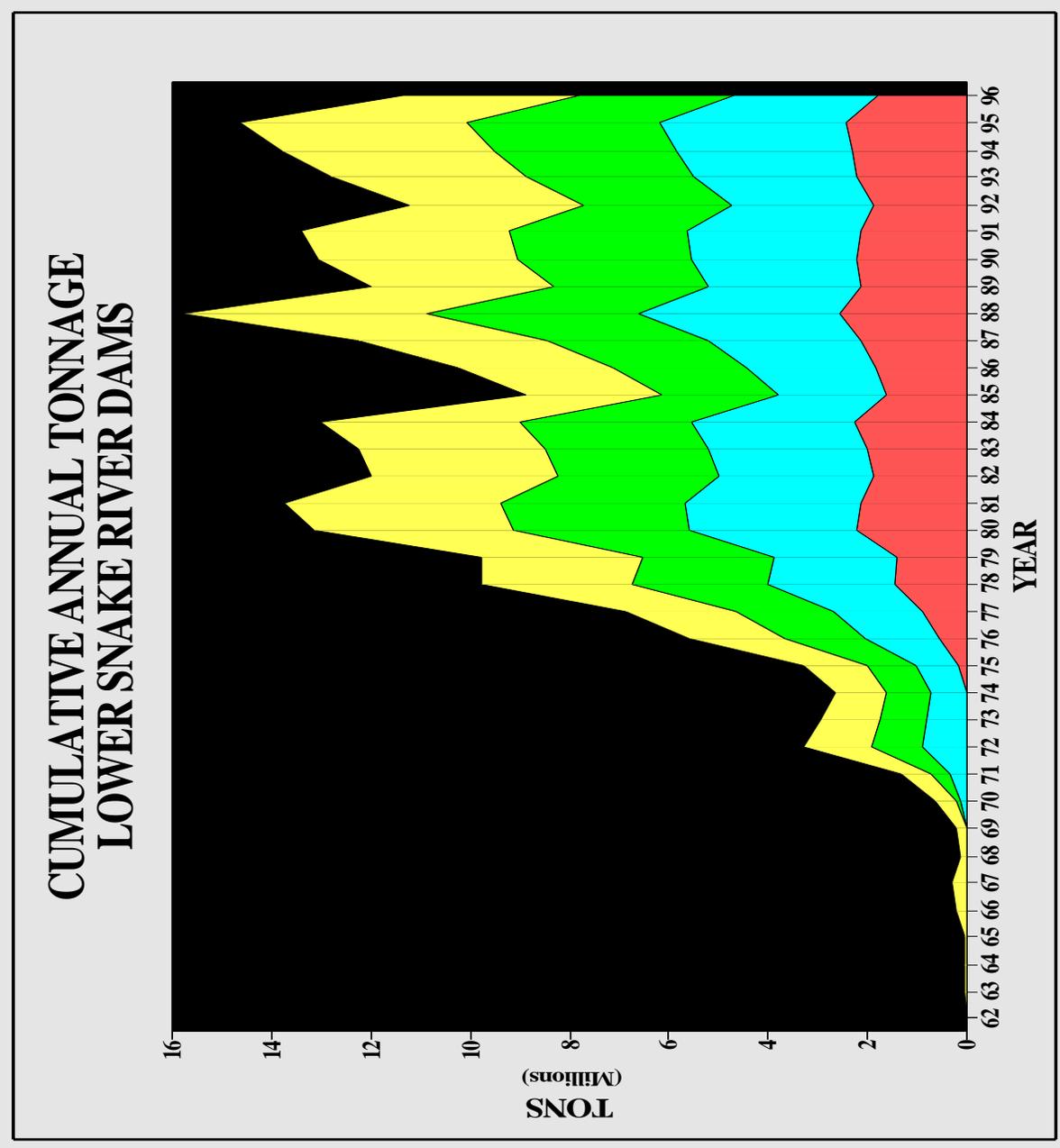
Examination of the navigation tonnage history shows little increase in barge transport on the Snake River until 1969. Between 1969 and 1981, tonnage shipped on the Lower Snake River increased rapidly to over 13 million tons and later peaked at nearly 16 million tons in 1988 (See

Figure 4-2).

The introduction of barge transport on the lower Snake River between 1969 and 1981 can be compared to the grain acres harvested data to see if added acres were put in production because of lower shipping costs. Wheat acres harvested in the six counties in Washington do tend to rise in the early 1970's but begin to decline again in the late 1970's (see Figures 4-3 through 4-8). Thus, total wheat acres harvested in the Reservoir Subregion (Washington State) shows little change before and after barge transport was available. Barley acres planted in the Reservoir Subregion can best be described as highly variable with no discernible patterns over time (see Figures 4-9 through 4-14).

Idaho acres harvested data are plotted for dryland winter wheat, dryland spring wheat and dryland barley. The winter wheat acres harvested generally follows the pattern shown for Washington, rising during the 1970's and declining in the 1980's (See Figures 4-25 through 4-28). Two exceptions are Latah and Lewis counties where the growth of acres harvested is maintained during the 1980's. Dryland spring wheat accounts for only a small part of the grain acreage in the Upriver Subregion. Spring wheat in the Upriver Subregion shows very large percentage declines in the 1950's with minor gains in the 1970's (see Figures 4-20 through 4-24). Barley acres harvested in central Idaho shows no discernible gain over the 1950-1996 time period (see Figures 4-16 through 4-19).

Although the lock system provided lower shipping costs for farm produce along the lower Snake River, the data do not indicate a resulting increase in farm production in Washington. Farm producers that are furthest upstream should have the most to gain from the introduction of barge transport. Increased winter wheat acres harvested are evidenced for Latah and Lewis counties in Idaho. Latah county winter wheat acres harvested jumps from 60,000 acres between 1950 and 1971 to about 80,000 acres between 1973 and 1996. Lewis county winter wheat acres harvested rises from about 35,000 acres prior to 1965 to about 45,000 acres in the later period. Other grains in these two counties show no pattern of increases.



**Figure 4-2 BARGING ON THE LOWER SNAKE RIVER**

The historical data and empirical studies suggest a possibility that some 30,000 acres of dryland winter wheat in central Idaho could have been added because of the lower transport costs of barge transport. The possibility exists that this production may be lost if barge transport is terminated. Note that a 30,000 acre reduction is only about 1.5 percent of the grain acres in the Upriver and Reservoir Subregions.

The primary effect of the lock system was to increase net income and capital values of farm land in the Reservoir Subregion. The effect in the Upriver Subregion is not so clear cut, because two counties did develop and maintain higher acres harvested after the locks were constructed. A gain of 30,000 acres planted to winter wheat “could” be due to lower shipping costs created by barging.

#### 4.6.3.6 Sensitivity Analysis: Economic Impact of 30,000 Acre Decrease of Farm Production in the Upriver Subregion

A grain supply elasticity of 0.38 (discussed earlier) implies that about 30,000 acres might go out of production in eastern Washington and Idaho. Time series data also suggest Idaho may have gained 30,000 acres when barging became available. Thus, the direct, indirect, and induced economic effects of a loss of production of 30,000 acres of winter wheat in the Upriver Subregion are measured as an example of potential effects of Alternative A-3 (breaching).

Latah County in 1995 harvested winter wheat on 81,900 acres out of 88,200 acres planted and the yield on harvested acres was 72.7 bushels per acre (1997 Idaho Agricultural Statistics). Adjusting the 30,000 planted acres that might be lost due to breaching to harvested acres and multiplying by the yield per harvested acre shows the loss of production in bushels of winter wheat.  $(30,000 \text{ acres of winter wheat}) \times (81,900/88,200) \times (72.7 \text{ bu per harvested acre}) = 2,025,214 \text{ bushels}$ . A price of \$4.47/bushel is reported for Idaho winter wheat in 1995 (1997 Idaho Agricultural Statistics). The value of winter wheat production possibly lost in the Upriver Subregion after breaching is estimated to be  $2,025,214 \times \$4.47 = \$9,052,708$ .

The employment multiplier on food grains is .00002884. The direct, indirect, and induced loss of employment in the Upriver Subregion is  $(.00002884)(\$9,052,708) = 261$  jobs. Table 4-45 shows sector by sector impacts. It shows that household sales (personal income including wages, salaries and profits) falls by some \$6.8 million (1994 dollars) or nearly 7.3 million in 1998 dollars.

**TABLE 4-45**  
**SECTOR BY SECTOR EFFECTS OF THE LOSS**  
**OF 30,000 ACRES OF GRAIN PRODUCTION LAND**  
**UPRIVER SUBREGION MODEL**  
**(Excludes sectors with changes less than \$100,000 in business sales)**  
**(1994 dollars)**

	CHANGE IN SALES	% CHANGE	ADDED EMPLOYMENT
5 FOOD GRAIN	-9278340.	-13.52	-138.20
14 AG SERVICE	-291203.	-1.76	-14.61
26 MAINT NEC	-251584.	-0.18	-3.22
38 CHEMICALS	-108638.	-1.70	-0.58
52 TRUCK/WH	-308760.	-0.27	-3.92
55 TELEPHONE	-126696.	-0.18	-0.61
59 WHOLESALE	-562480.	-0.24	-7.57
61 DEPT STORE	-112840.	-0.26	-3.54
62 GROCERIES	-156608.	-0.28	-5.34
63 AUTO DLRS	-197536.	-0.27	-4.17
66 RESTAURANT	-312352.	-0.24	-10.37
67 RETAIL NEC	-159884.	-0.32	-9.04
68 F-I-R-E	-1679488.	-0.33	-10.76
77 HEALTH SER	-755008.	-0.31	-15.39
86 HOUSEHOLDS	-6829824.	-0.32	0.00

### **Further Economic Effects Within the Transport Sector**

The negative direct, indirect, and induced effects that accompany the example of a 30,000 acre reduction in grain producing land would be partially offset by the positive effects within the transport sector. Termination of barge transport implies an income transfer from the farm sector to the transport sector. Increased trucking and railroad shipping replaces barge transport. Because rail and trucking are more labor and energy intensive than barge shipping that implies greater employment opportunities and incomes to sectors and households that supply inputs to rail and trucking. Replacement of barge transport with rail and trucking implies a net increase in employment in the transport of grains, if there is only a small decline of grain output.

Using 72.2 bushels per acre yield times the central Idaho acres of wheat land less the 30,000

acres that is shut down  $(72.2)(366,300 - 30,000) = 22,449,010$  bushels of production.<sup>50</sup> Added income to the rail and trucking sectors would be  $(22,449,010)(0.26) = \$5.84$  million.<sup>51</sup>

The employment multiplier for trucking is .00003341 in the Upriver Subregion so that employment increase would be 195 jobs if all grain was trucked. Sector by sector impacts on business sales and employment if all grain was trucked are shown in Table 4-46.

The employment multiplier is .00002064 for rail transport so that the employment increase would be 121 jobs if all grain was shipped by rail. Sector by sector impacts on business sales and employment if all grain was shipped by rail are shown in Table 4-47.

**TABLE 4-46**  
**SECTOR BY SECTOR EFFECTS IF THE INCREASE**  
**IN GRAIN TRANSPORT SPENDING WAS ALL ON TRUCKING<sup>1/</sup>**  
**UPRIVER SUBREGION MODEL**  
**(Excludes sectors with changes less than \$100,000 in business sales)**  
**(1994 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
26 MAINT NEC	163840.	0.11	2.10
28 DAIRY PROC	13590.	0.12	0.03
52 TRUCK/WH	7875360.	6.82	99.98
55 TELEPHONE	152464.	0.22	0.73
59 WHOLESALE	334128.	0.14	4.50
61 DEPT STORE	120672.	0.27	3.79
62 GROCERIES	183480.	0.33	6.25
63 AUTO DLRS	440288.	0.61	9.29
66 RESTAURANT	241760.	0.18	8.03
67 RETAIL NEC	205548.	0.41	11.62
68 F-I-R-E	966464.	0.19	6.19
74 AUTO SERV	209800.	0.45	3.47
77 HEALTH SER	552288.	0.23	11.26
78 PROF SERV	117140.	0.20	2.39
86 HOUSEHOLDS	4997120.	0.24	0.00

1/ The total spending increase (\$5,840,000) applies to trucking services, warehousing, and handling which are all included in the IMPLAN trucking/warehouse sector.

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<sup>50</sup> This overstates the decline in production because the lowest yield lands would be shut down.

<sup>51</sup> The added grain transport costs estimated for truck, rail, handling, and storage for all the Upriver Subregion counties was \$6.36 million in the unpublished data used in the Transport Report (assuming no farm land shutdown). Thus, this example may understate the effects on transport and grain farm incomes for central Idaho by about seven percent. (Spreadsheets received from Erik Nielsen, Foster-Wheeler Environmental)

**TABLE 4-47**  
**SECTOR BY SECTOR EFFECTS IF THE INCREASE**  
**IN GRAIN TRANSPORT SPENDING WAS ALL ON RAILROADS<sup>1/</sup>**  
**UPRIVER SUBREGION MODEL**  
**(Excludes sectors with changes less than \$100,000 in business business sales)**  
**(1994 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
26 MAINT NEC	999872.	0.70	12.81
50 RAILROADS	3719361.	37.51	26.25
52 TRUCK/WH	3066208.	2.65	38.93
55 TELEPHONE	101656.	0.14	0.49
59 WHOLESALE	318112.	0.14	4.28
62 GROCERIES	125544.	0.23	4.28
63 AUTO DLRS	243256.	0.34	5.13
66 RESTAURANT	205400.	0.16	6.82
67 RETAIL NEC	135900.	0.27	7.68
68 F-I-R-E	793536.	0.16	5.08
74 AUTO SERV	115832.	0.25	1.92
77 HEALTH SER	470848.	0.19	9.60
86 HOUSEHOLDS	4259328.	0.20	0.00

1/ Part of the increase in transport cost is for warehousing which is included in the IMPLAN trucking sector. Based on technical reports by the DREW Transportation Impact Study Team (1999), 38 percent of the increase in rail-based transport spending (\$2,219,200) is for storage and handling which is allocated to the IMPLAN trucking/warehouse sector. The Remaining 62 percent of the increase (\$3,620,800) is allocated to the IMPLAN railroad sector.

The \$5.84 million that is added to the transport costs of agricultural producers is a reduction in their disposable income. Applying the Upriver Subregion household employment multiplier (0.00001681) to the reduction of \$5.84 million in farm household income results in a loss of 98 jobs (direct, indirect, and induced). Thus, shifting the added transportation charge out of the farm sector household income and into the rail or truck transport sector creates a small gain in jobs. Some 121 to 195 jobs are gained by the increased spending for rail and trucking while 98 jobs are lost due to decreased farm consumer spending. Sector by sector impacts on business sales and employment are shown in Table 4-48.

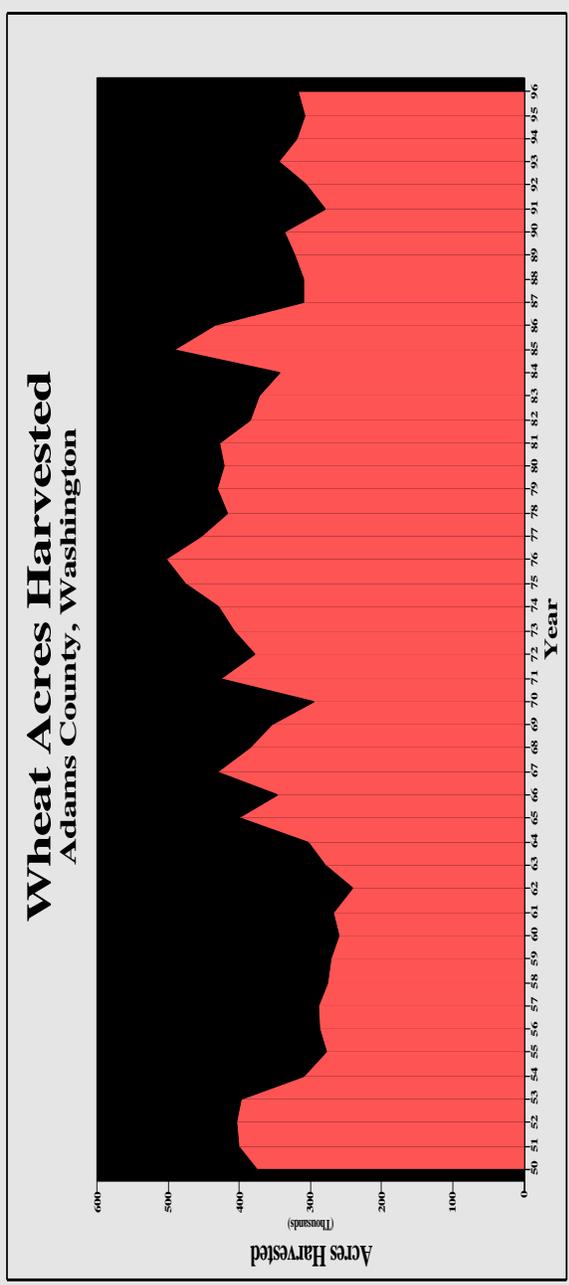
**TABLE 4-48**  
**SECTOR BY SECTOR EFFECTS ON GRAIN FARM HOUSEHOLDS**  
**OF THE INCREASE IN GRAIN TRANSPORT SPENDING**  
**UPRIVER SUBREGION MODEL<sup>1/</sup>**  
**(Excludes sectors with changes less than \$100,000 in business sales)**  
**(1994 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT
26 MAINT NEC	-111984.	-0.08	-1.43
55 TELEPHONE	-122320.	-0.17	-0.59
59 WHOLESALE	-305488.	-0.13	-4.11
61 DEPT STORE	-124636.	-0.28	-3.91
62 GROCERIES	-170012.	-0.30	-5.79
63 AUTO DLRS	-174800.	-0.24	-3.69
66 RESTAURANT	-359728.	-0.27	-11.94
67 RETAIL NEC	-170176.	-0.34	-9.62
68 F-I-R-E	-1205472.	-0.24	-7.72
76 AMUSEMENTS	-110972.	-0.25	-3.24
77 HEALTH SER	-882496.	-0.36	-17.99
86 HOUSEHOLDS	-7985408.	-0.38	0.00

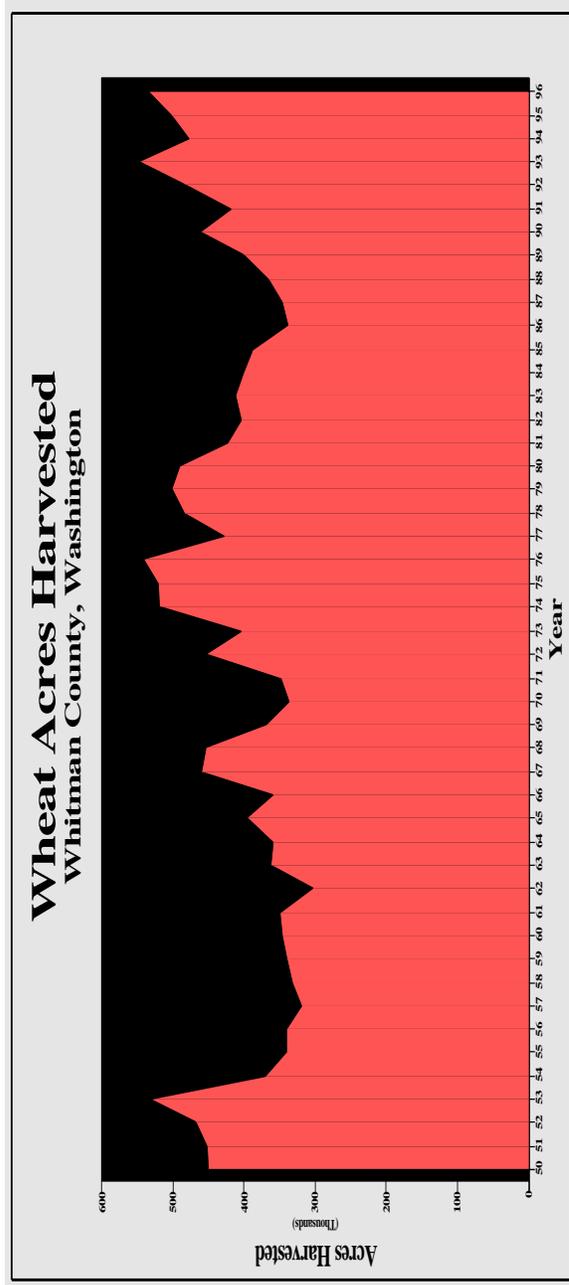
1/ Household income declines by the increase in grain transport cost (-\$5,840,000).

The shut down of farm operations on 30,000 acres of wheat land cost the regional economy 261 jobs directly and indirectly, but the transfer of income from farm households to the transport sector, in balance, created between 23 and 97 jobs.

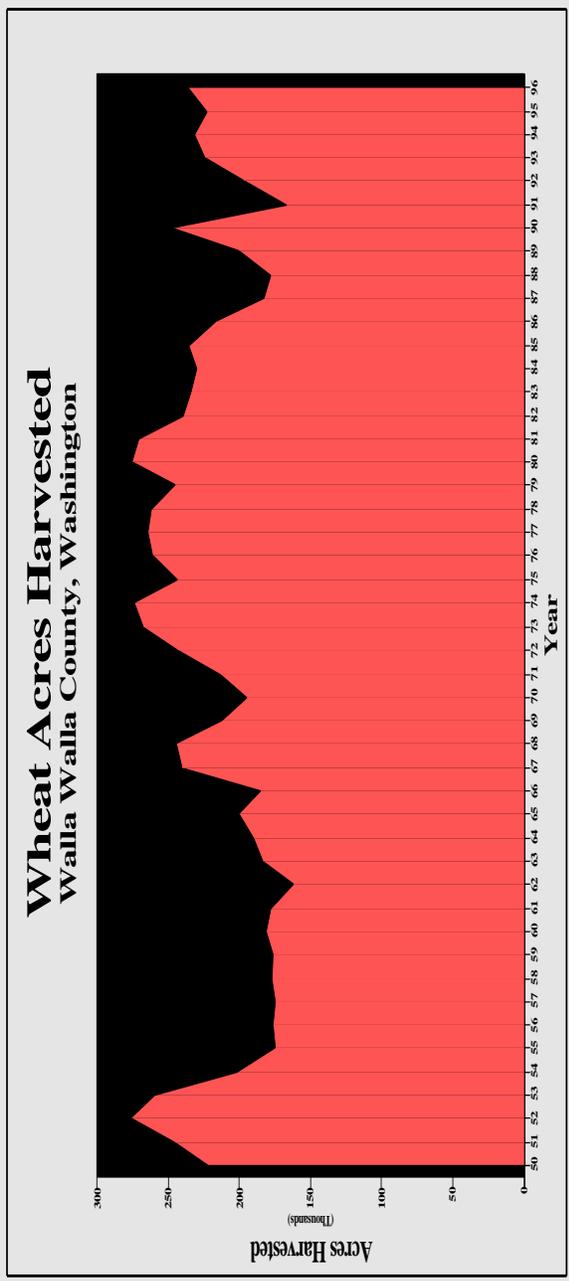
If the shutdown of grain land caused by increased transport costs was very small, then the entire net 23 to 97 jobs created through the use of more labor intensive transport would be a net gain in jobs for the region. The added jobs are paid for by reduced income in the farm sector.



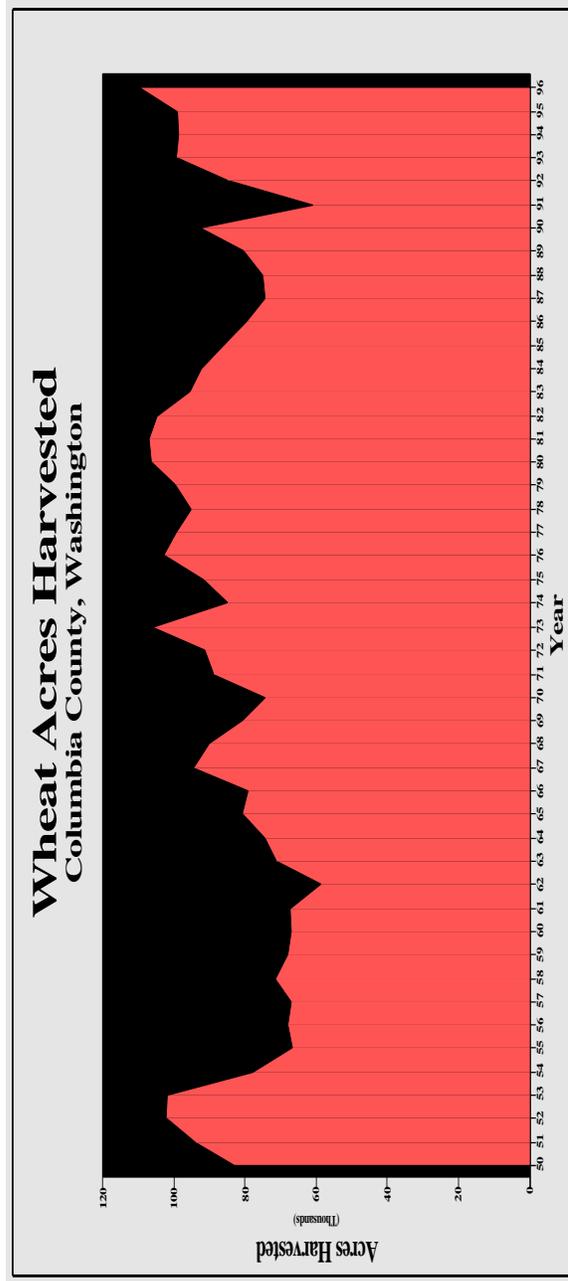
**Figure 4-3 WHEAT ACRES HARVESTED, ADAMS COUNTY WASHINGTON**



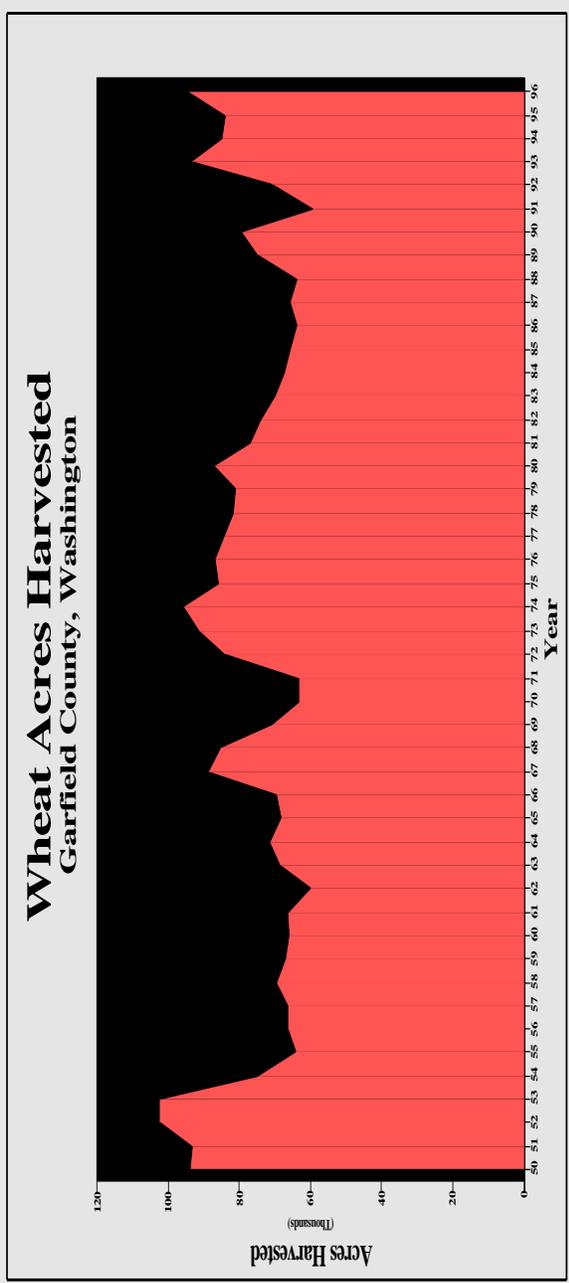
**Figure 4-4 WHEAT ACRES HARVESTED, WHITMAN COUNTY WASHINGTON**



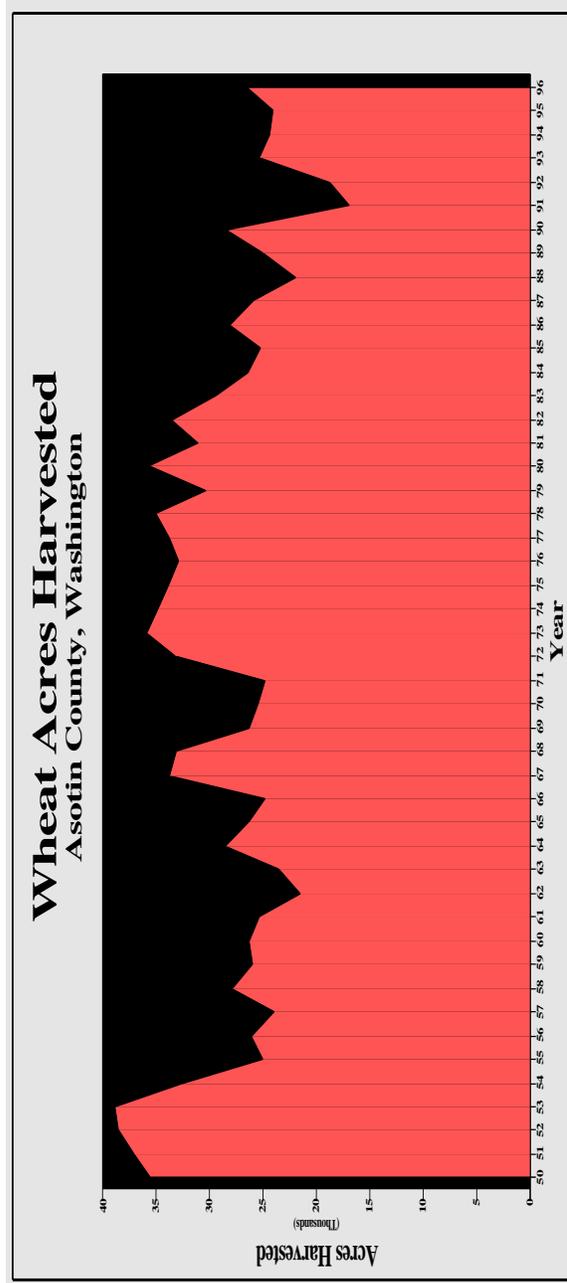
**Figure 4-5 WHEAT ACRES HARVESTED, WALLA WALLA COUNTY WASHINGTON**



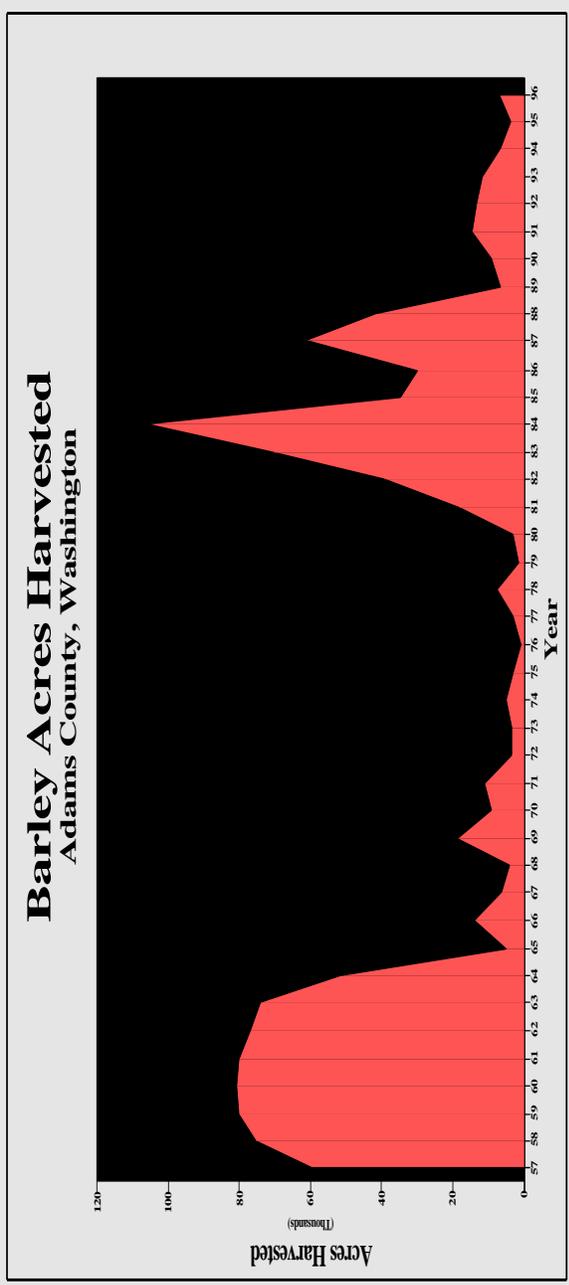
**Figure 4-6 WHEAT ACRES HARVESTED, COLUMBIA COUNTY WASHINGTON**



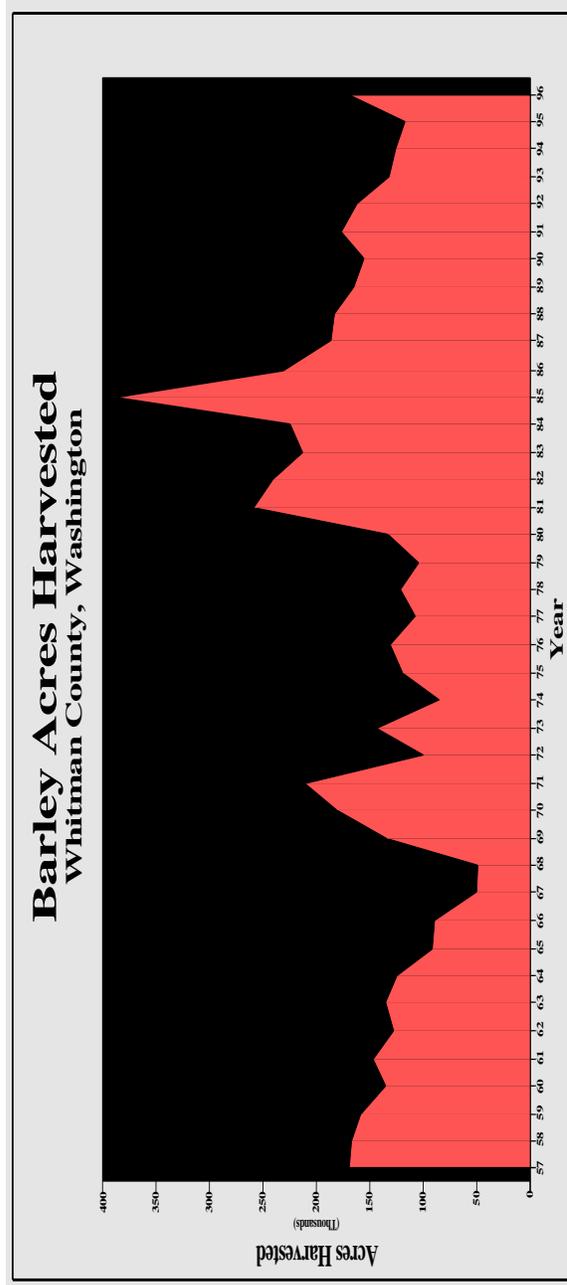
**Figure 4-7 WHEAT ACRES HARVESTED, GARFIELD COUNTY WASHINGTON**



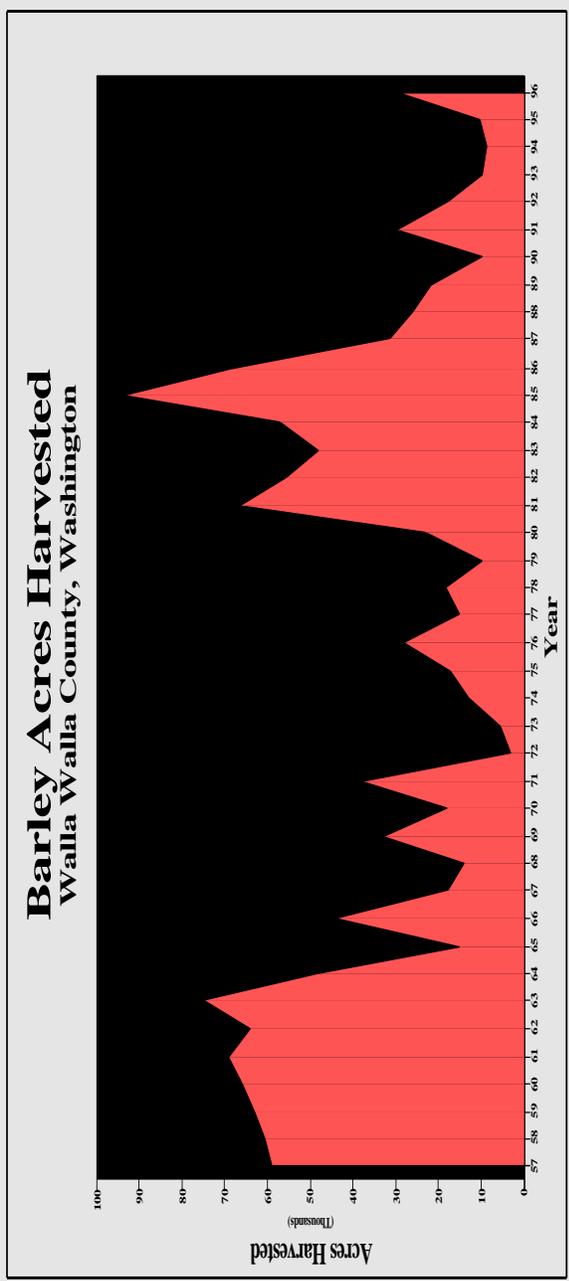
**Figure 4-8 WHEAT ACRES HARVESTED, ASOTIN COUNTY WASHINGTON**



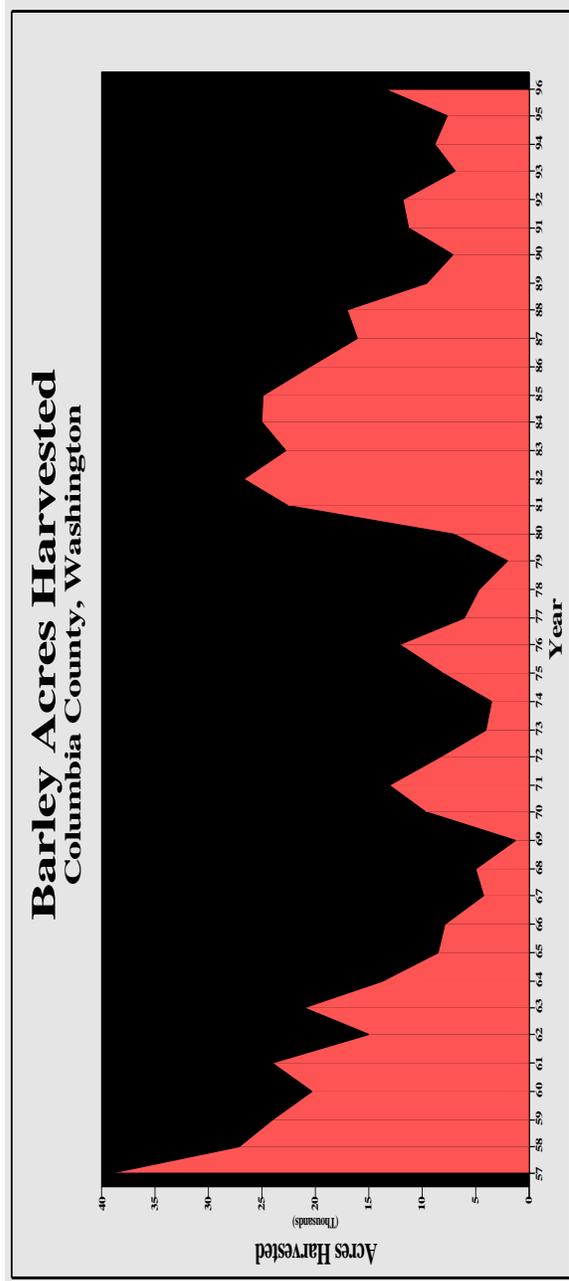
**Figure 4-9 BARLEY ACRES HARVESTED, ADAMS COUNTY WASHINGTON**



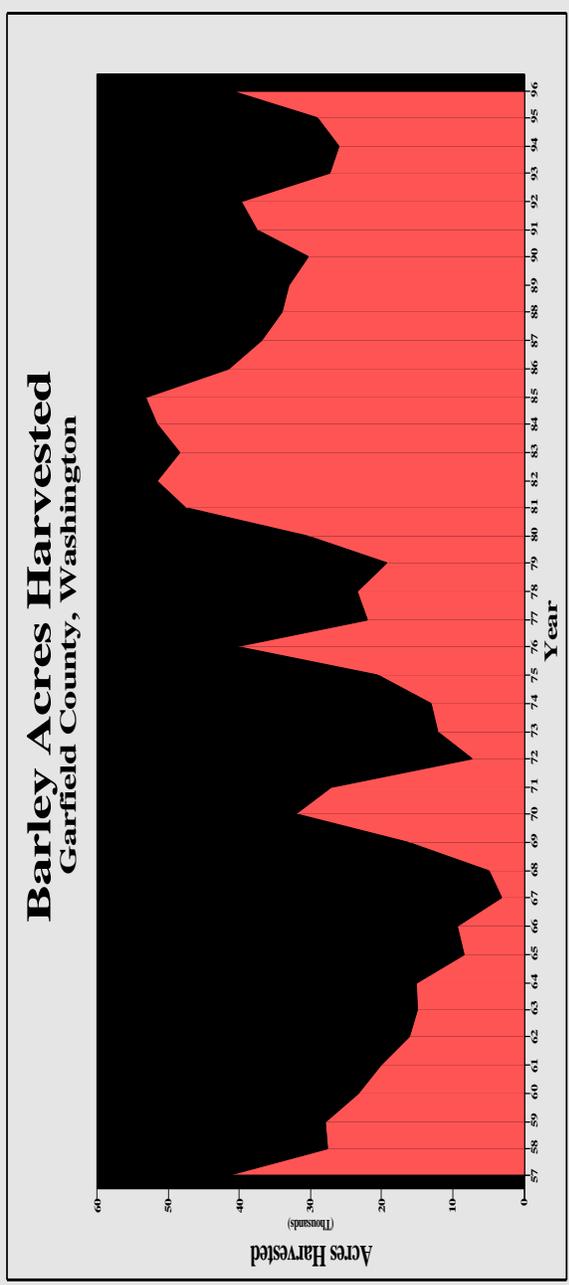
**Figure 4-10 BARLEY ACRES HARVESTED, WHITMAN COUNTY WASHINGTON**



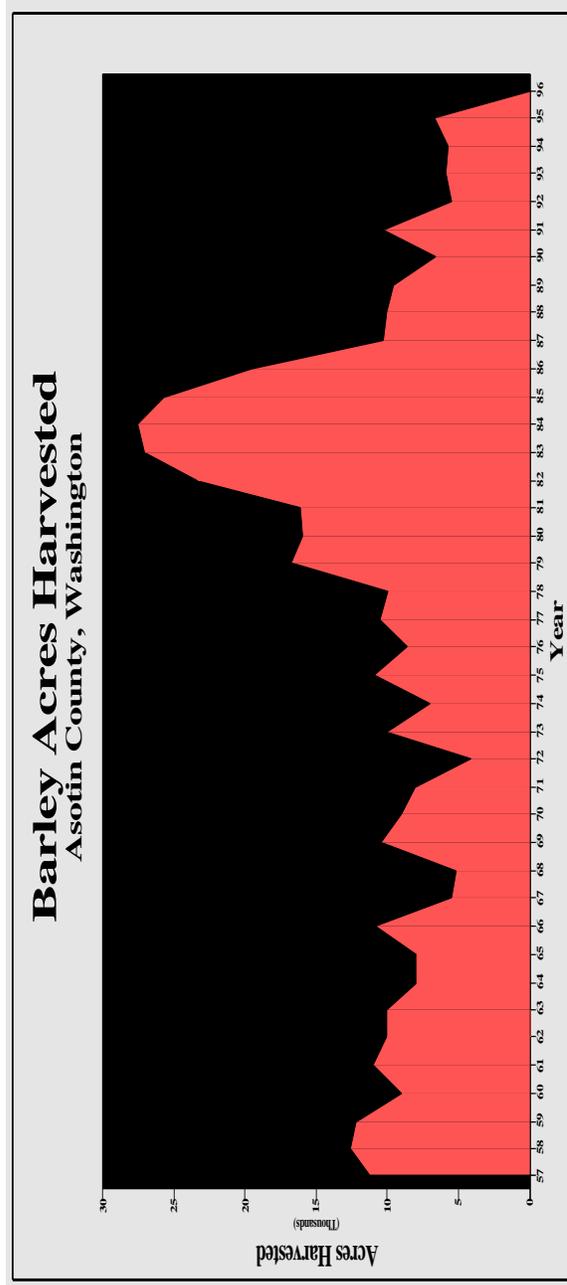
**Figure 4-11 BARLEY ACRES HARVESTED, WALLA WALLA COUNTY WASHINGTON**



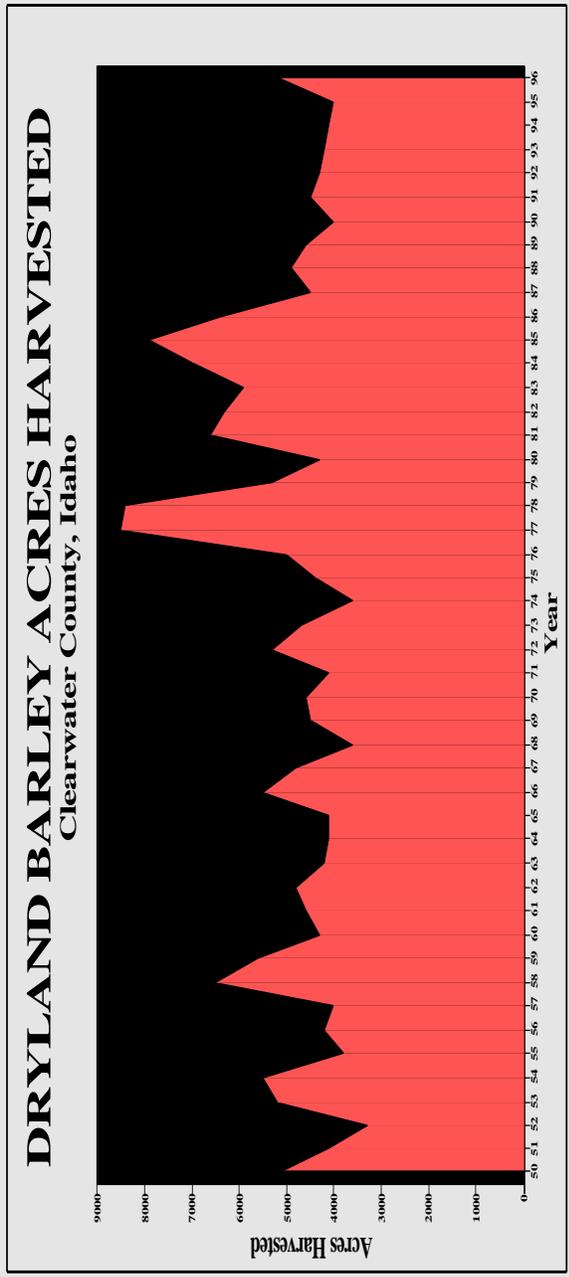
**Figure 4-12 BARLEY ACRES HARVESTED, COLUMBIA COUNTY WASHINGTON**



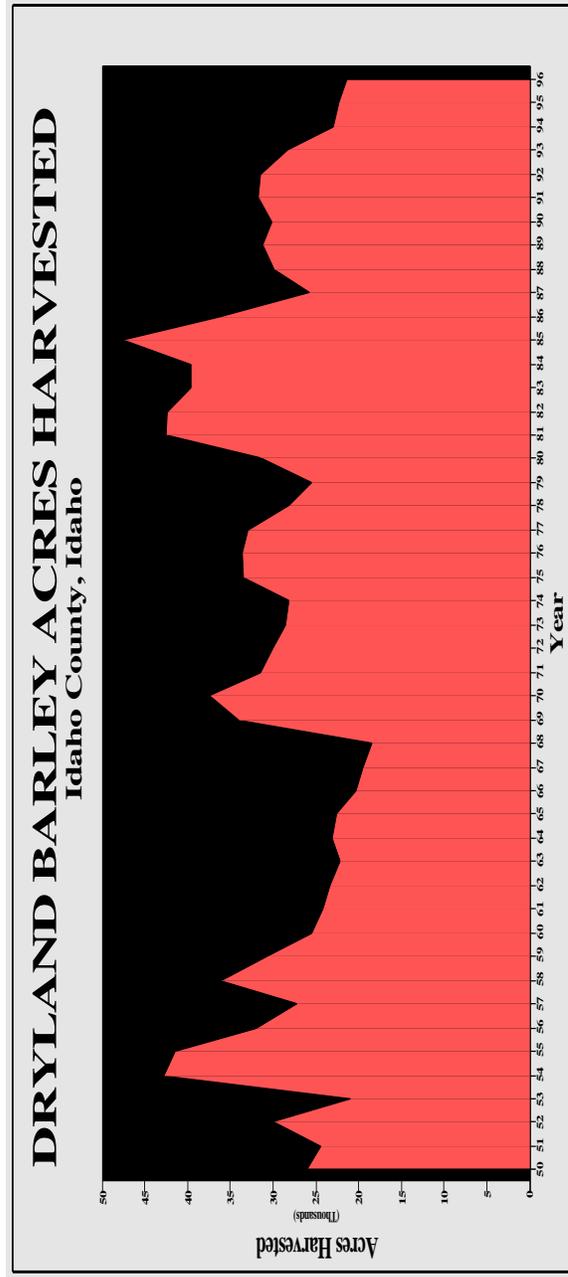
**Figure 4-13 BARLEY ACRES HARVESTED, GARFIELD COUNTY WASHINGTON**



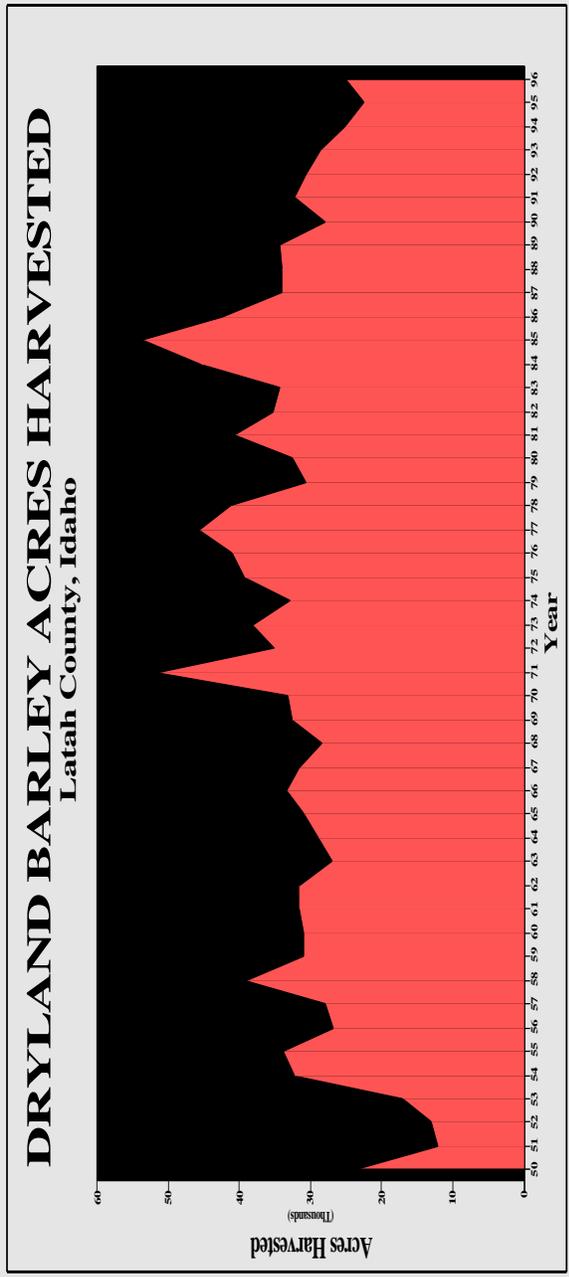
**Figure 4-14 BARLEY ACRES HARVESTED, ASOTIN COUNTY WASHINGTON**



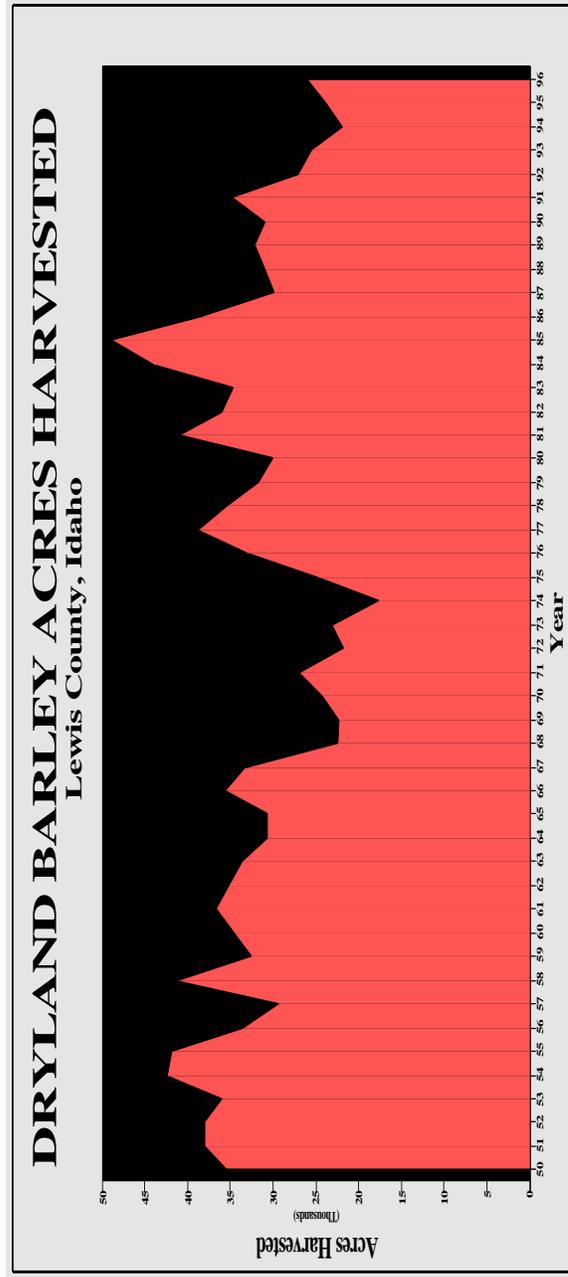
**Figure 4-15 BARLEY ACRES HARVESTED, CLEARWATER COUNTY IDAHO**



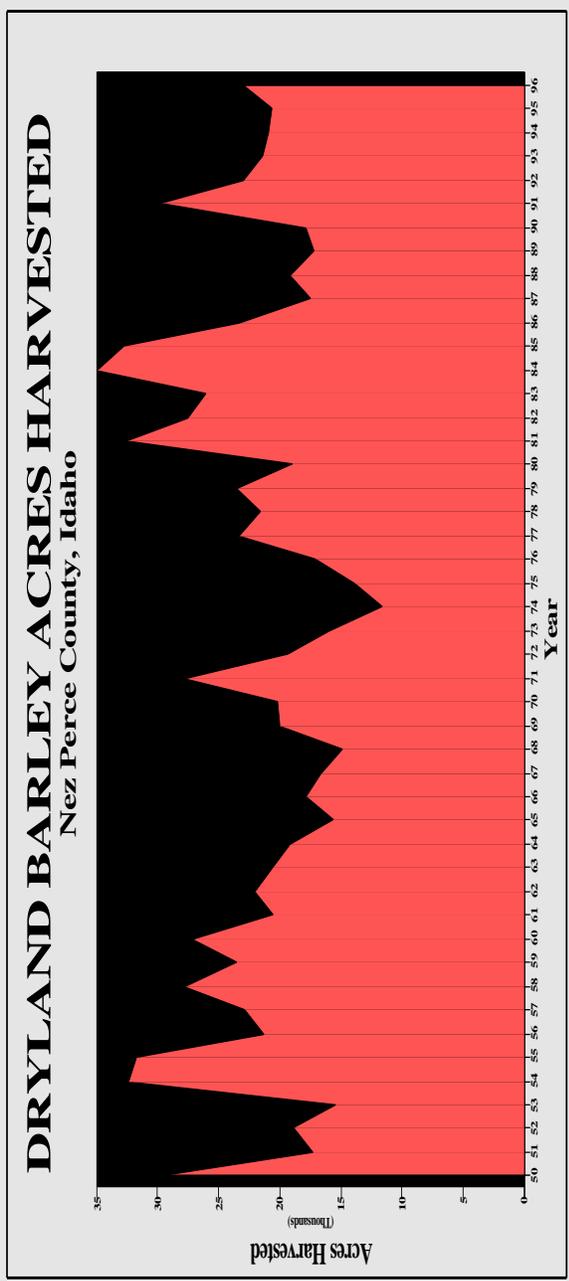
**Figure 4-16 BARLEY ACRES HARVESTED, IDAHO COUNTY IDAHO**



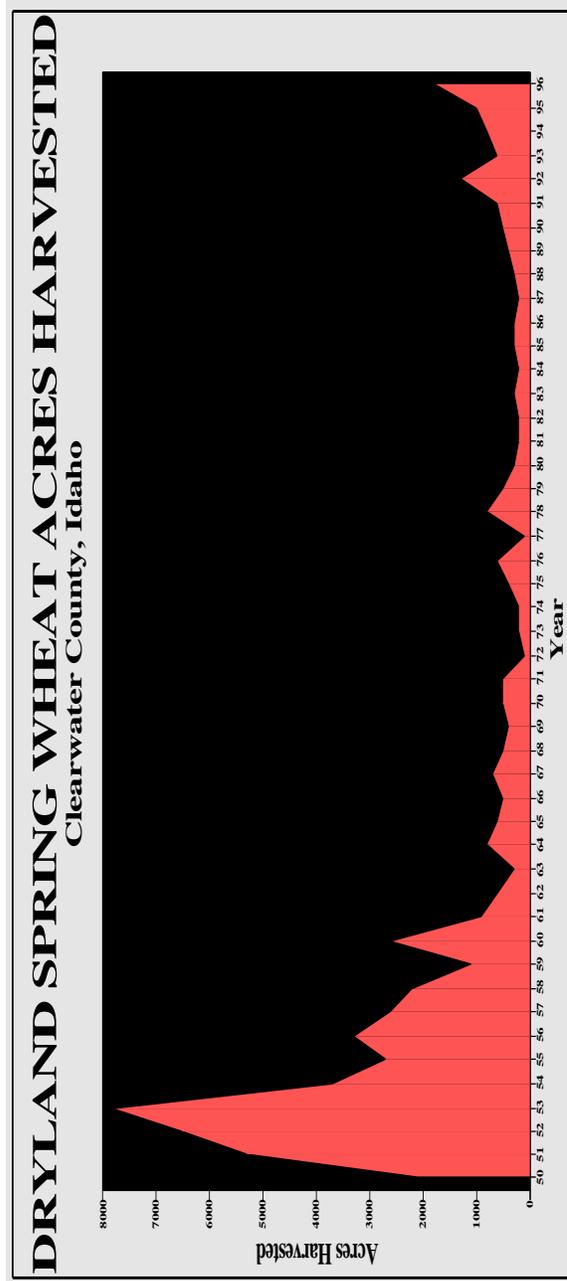
**Figure 4-17 BARLEY ACRES HARVESTED, LATAH COUNTY IDAHO**



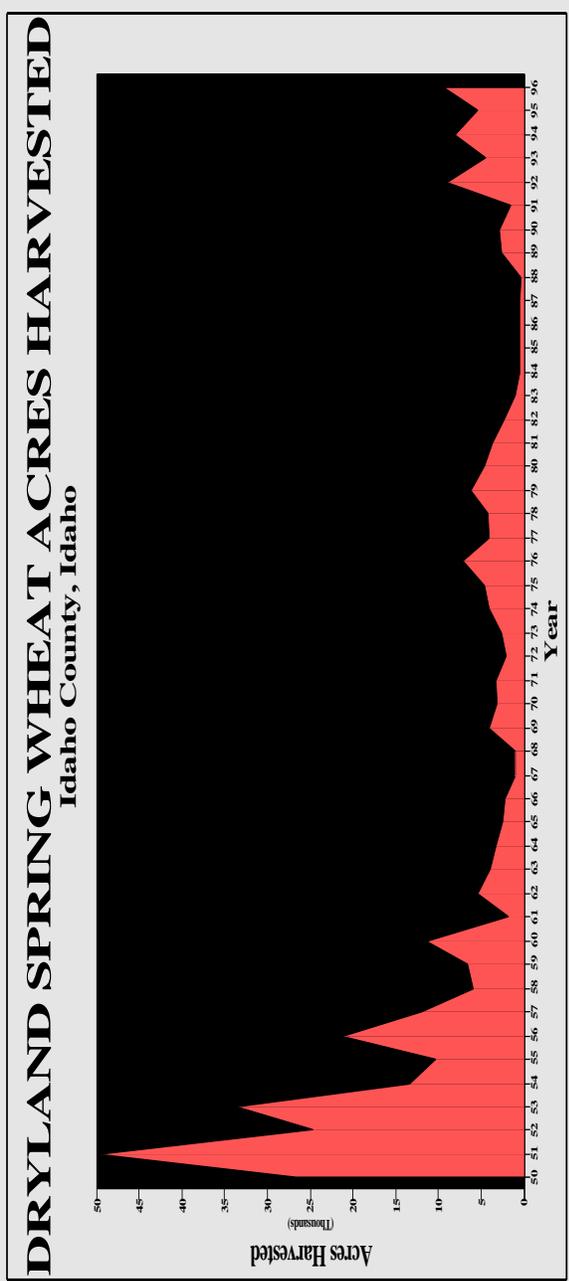
**Figure 4-18 BARLEY ACRES HARVESTED, LEWIS COUNTY IDAHO**



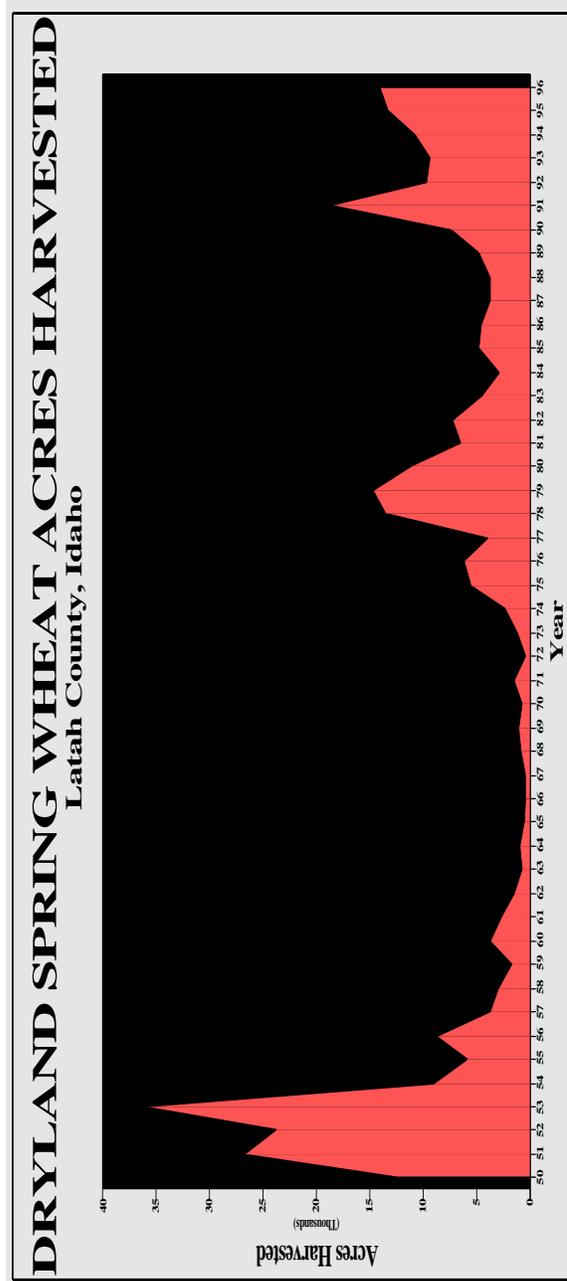
**Figure 4-19 BARLEY ACRE HARVESTED, NEZ PERCE COUNTY IDAHO**



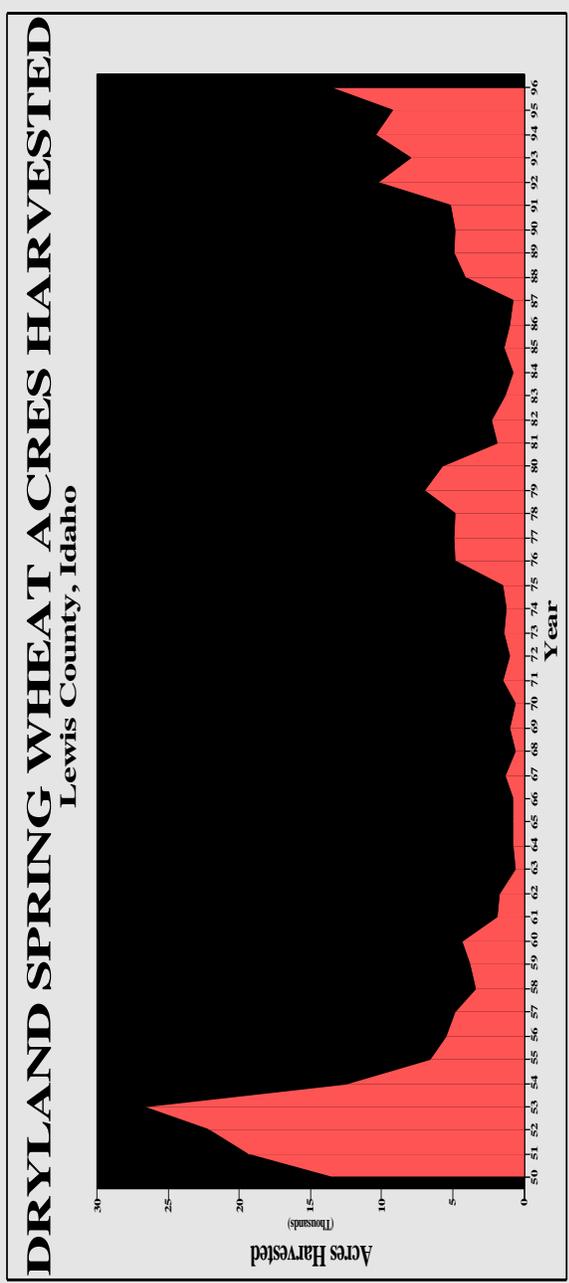
**Figure 4-20 SPRING WHEAT ACRES HARVESTED, CLEARWATER COUNTY IDAHO**



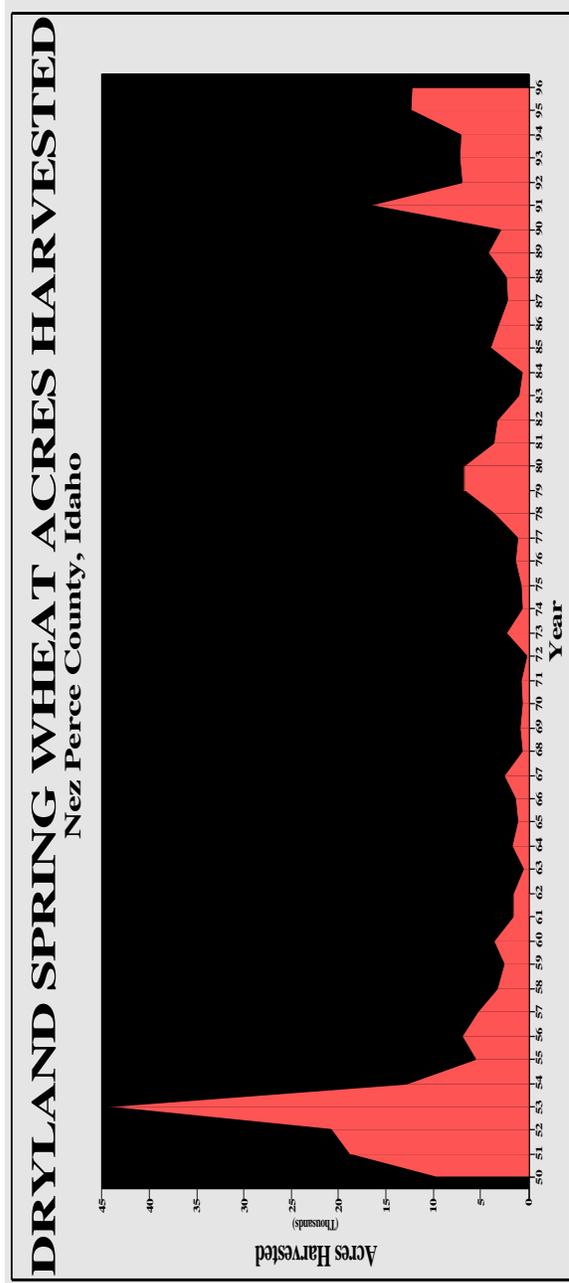
**Figure 4-21 SPRING WHEAT ACRES HARVESTED, IDAHO COUNTY IDAHO**



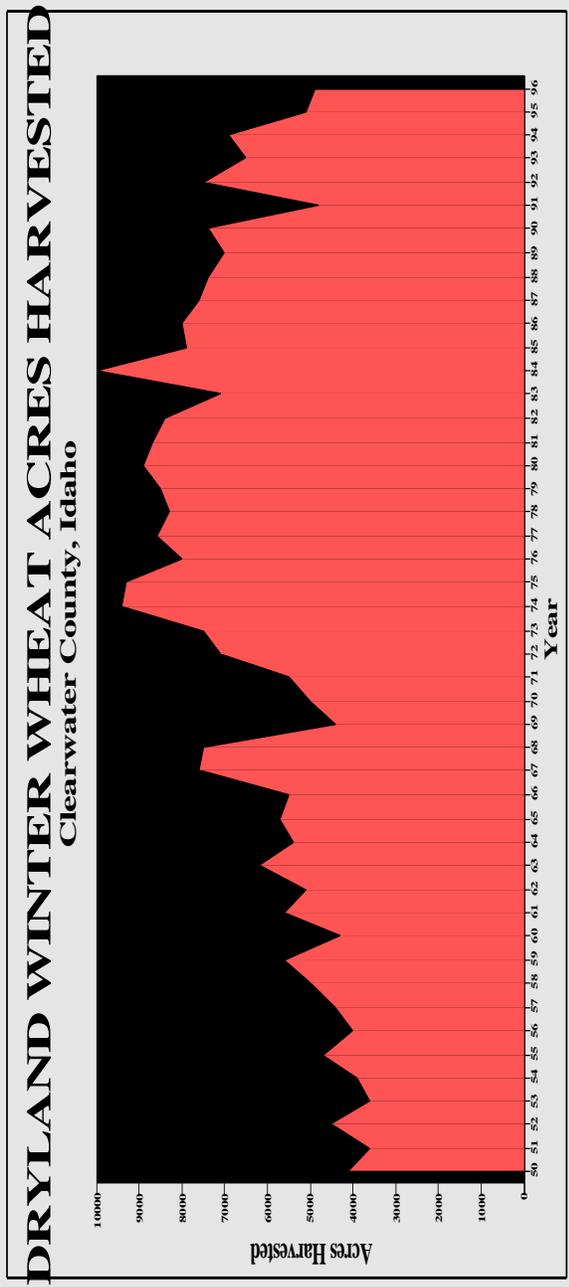
**Figure 4-22 SPRING WHEAT ACRES HARVESTED, LATAH COUNTY IDAHO**



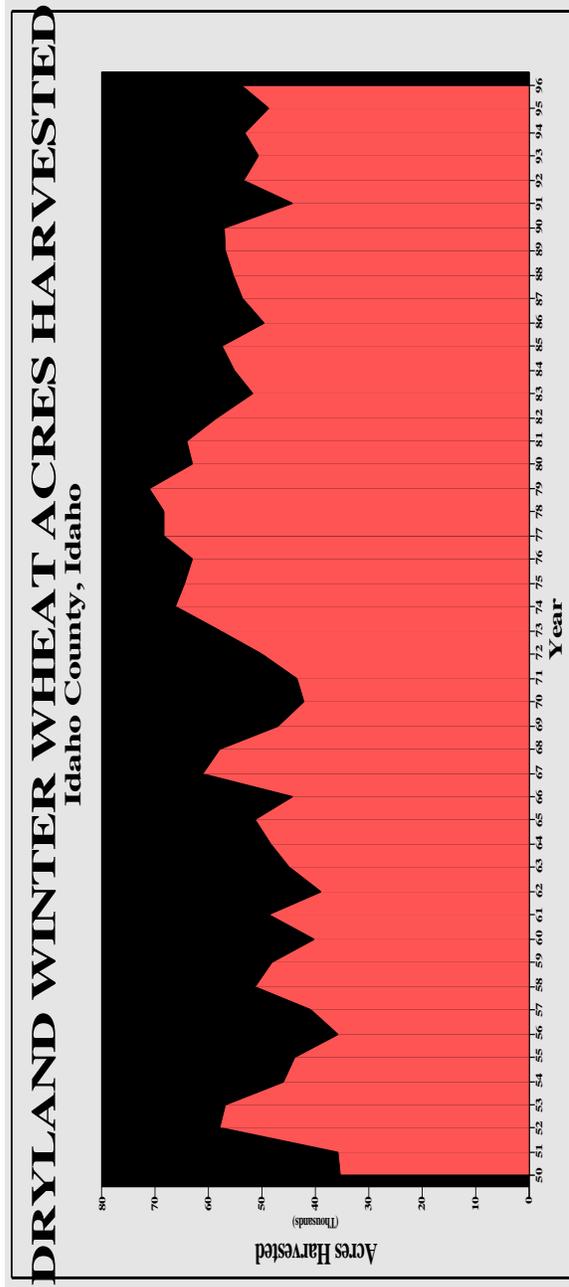
**Figure 4-23 SPRING WHEAT ACRES HARVESTED, LEWIS COUNTY IDAHO**



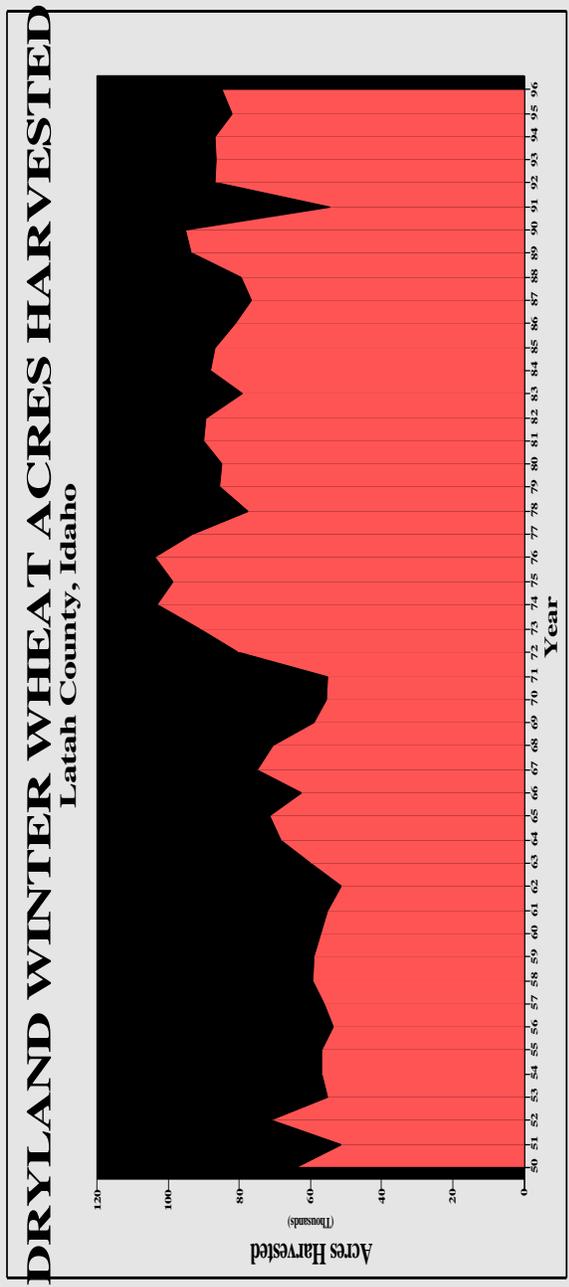
**Figure 4-24 SPRING WHEAT ACRES HARVESTED, NEZ PERCE COUNTY IDAHO**



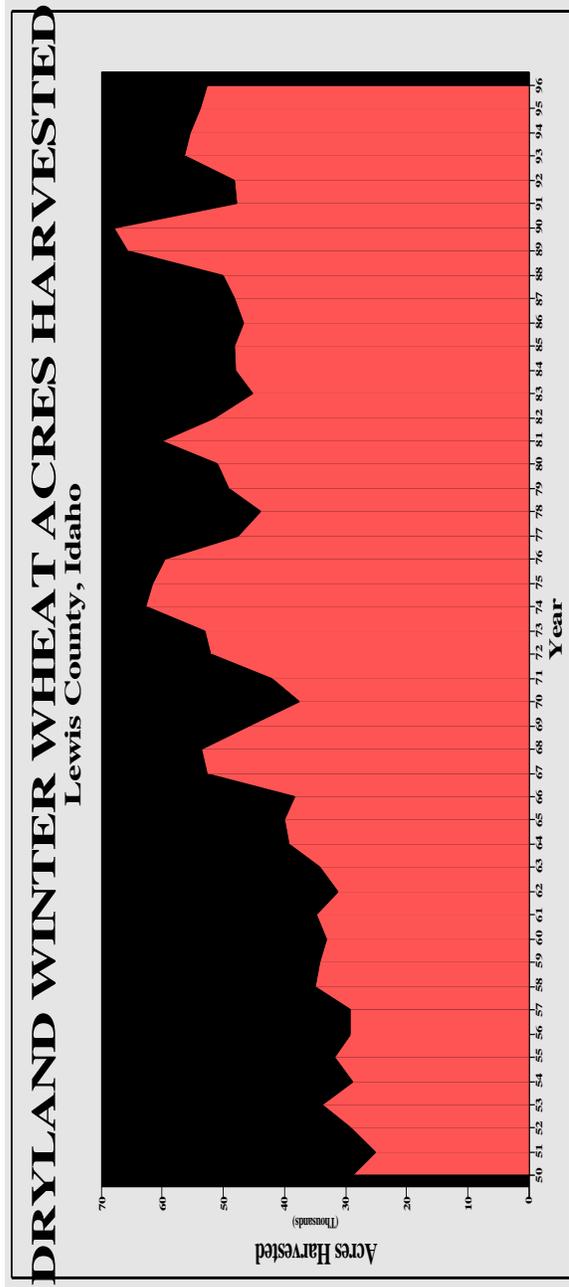
**Figure 4-25 WINTER WHEAT ACRES HARVESTED, CLEARWATER COUNTY IDAHO**



**Figure 4-26 WINTER WHEAT ACRES HARVESTED, IDAHO COUNTY IDAHO**



**Figure 4-27 WINTER WHEAT ACRES HARVESTED, LATAH COUNTY IDAHO**



**Figure 4-28 WINTER WHEAT ACRES HARVESTED, LEWIS COUNTY IDAHO**

#### 4.6.3.7 Direct, Indirect, and Induced Economic Effects in Central Idaho and NE Oregon of Increased Transport Costs of Alternative A-3 (Breaching) Assuming Grain Production Is Not Reduced

Unpublished data on grain transport cost increases for Alternative A-3 (breaching) from the Navigation Report (see technical reports by the DREW Transportation Impact Study Team) shows increased trucking spending of \$2,937,118, increased handling and storage for trucking of \$1,141,806 increased rail spending of \$1,412,724, and increased handling and storage for rail of \$866,512.<sup>52</sup> The IMPLAN model lumps storage (warehousing) and handling with the trucking sector. Thus, the increase in grain transport spending for central Idaho and NE Oregon (the Upriver Subregion) is: trucking/warehousing ( $\$2,937,118 + \$1,141,806 + \$866,512 = \$4,945,436$ ); railroads ( $\$1,412,724$ ). (1998 dollars)

The Upriver Subregion business sales multiplier for Trucking/Warehousing is 3.028, the employment multiplier is 0.000033409407, and the personal income multiplier is 0.85521239. The direct, indirect, and induced effects on business sales is \$14.975 million. The direct, indirect, and induced effects on employment is  $165/1.07 = 154$  jobs (adjusted to calibrate the 1994 IMPLAN model). The direct, indirect, and induced effect on personal income is \$4.229 million.

The Upriver Subregion business sales multiplier for railroads is 2.4702, the employment multiplier is 0.000020640662, and the personal income multiplier is 0.65148407. The direct, indirect, and induced effects on business sales is \$3.490 million. The direct, indirect, and induced effect on employment is  $29/1.07 = 27$  jobs (adjusted to calibrate the 1994 IMPLAN model). The direct, indirect, and induced effect on personal income is \$0.92 million.

The total cumulative impacts of the increase in truck/rail transport spending in central Idaho and NE Oregon for Alternative A-3 (breaching) is \$18.465 million increase in business sales, an increase in employment of 181 jobs, and an increase of personal income of \$5.149 million. Sector by sector effects on business sales and employment are shown in Table 4-49.<sup>53</sup>

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<sup>52</sup> Spreadsheets received from Erik Nielsen, Foster-Wheeler Environmental.

<sup>53</sup> The IMPLAN model shows 185 persons directly employed in the water transport sector. Breaching would eliminate barge and cruise ship related jobs in the Upriver Subregion. However, many of the water transport jobs are likely to be jet boats. Thus, the loss of jobs is much smaller than the 185 total jobs in water transport. Barge related jobs would mainly shift to

**TABLE 4-49**  
**SECTOR BY SECTOR EFFECTS IN CENTRAL IDAHO AND**  
**NE OREGON OF THE INCREASE IN GRAIN TRANSPORT**  
**SPENDING FOR ALTERNATIVE A-3 (BREACHING)**  
**UPRIVER SUBREGION MODEL<sup>1/</sup>**  
**(Excludes sectors with changes less than \$100,000 in business business sales)**  
**(1998 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
26 MAINT NEC	504528.	0.35	6.04
50 RAILROADS	1457927.	14.70	9.62
52 TRUCK/WH	6697704.	5.80	79.47
55 TELEPHONE	146160.	0.21	0.65
59 WHOLESALE	357520.	0.15	4.50
61 DEPT STORE	117760.	0.27	3.46
62 GROCERIES	177196.	0.32	5.64
63 AUTO DLRS	402480.	0.56	7.93
66 RESTAURANT	248920.	0.19	7.73
67 RETAIL NEC	196552.	0.39	10.38
68 F-I-R-E	984704.	0.19	5.90
74 AUTO SERV	191724.	0.41	2.96
77 HEALTH SER	569456.	0.24	10.85
78 PROF SERV	117280.	0.20	2.23
86 HOUSEHOLDS	5152512.	0.24	0.00

1/ Assumes no decline in grain output. Excludes the effect of lowered farm household incomes created by increased grain transport costs.

2/ Adjusted to calibrate the 1994 IMPLAN model.

The \$6,358,160 that is added to the transport costs of agricultural producers is a reduction in their disposable income. The Upriver Subregion business sales multiplier for households is 2.2273. The direct, indirect, and induced decrease in business sales because of the drop in farm household income is  $(2.2273)(-\$6,358,160) = -\$14,161,530$ . Applying the Upriver Subregion household employment multiplier (0.00001681) to the reduction of  $-\$6,358,160$  in farm household income results in a loss of  $-106.88/1.07 = -100$  jobs (adjusted to calibrate the 1994 IMPLAN model). The Upriver Subregion personal income multiplier for households is 0.366569. The direct, indirect, and induced reduction in personal income is  $(0.366569)(-\$6,358,160) = -\$2,330,704$ .

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Tri-Cities in the Downriver Subregion.

#### 4.6.3.8 Direct, Indirect, and Induced Economic Effects in Eastern Washington of Increased Transport Costs of Alternative A-3 (Breaching) Assuming Grain Production Is Not Reduced

Unpublished data on grain transport cost increases for Alternative A-3 (breaching) from the Navigation Report (see technical reports by the DREW Transportation Impact Study Team) shows increased trucking spending of \$6,784,787, increased handling for trucking of \$4,104,556 (no increase in storage cost), increased rail spending of \$1,000,751, and increased handling and storage for rail of \$311,946.<sup>54</sup> The IMPLAN model lumps storage (warehousing) and handling with the trucking sector. Thus, the increase in grain transport spending for eastern Washington (the Reservoir Subregion) is: trucking/warehousing ( $\$6,784,787 + \$4,104,556 + \$311,946 = \$11,201,289$ ); railroads ( $\$1,000,751$ ). (1998 dollars)

The Reservoir Subregion business sales multiplier for trucking/warehousing is 2.5368, the employment multiplier is 0.000026657483, and the personal income multiplier is 0.65081286. The direct, indirect, and induced effects on business sales is \$28.415 million. The direct, indirect, and induced effect on employment is  $299/1.07 = 279$  jobs (adjusted to calibrate the 1994 IMPLAN model). The direct, indirect, and induced effect on personal income is \$7.29 million.

The Reservoir Subregion business sales multiplier for railroads is 2.16, the employment multiplier is 0.000016341352, and the personal income multiplier is 0.54894435. The direct, indirect, and induced effects on business sales is \$2.162 million. The direct, indirect, and induced effects on employment is  $16/1.07 = 15$  jobs (adjusted to calibrate the 1994 IMPLAN model). The direct, indirect, and induced effect on personal income is \$ 0.549 million.

The total cumulative impacts of the increase in truck/rail transport spending in eastern Washington for Alternative A-3 (breaching) is \$30.612 million increase in business sales, an increase in employment of 294 jobs, and an increase of personal income of \$7.839 million. Sector by sector effects on business sales and employment are shown in Table 4-50.<sup>55</sup>

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<sup>54</sup> Spreadsheets received from Erik Nielsen, Foster-Wheeler Environmental.

<sup>55</sup> The IMPLAN model shows 24 persons directly employed in the water transport sector. Breaching would eliminate these jobs in the Reservoir Subregion. However, new water transport jobs would occur in the nearby Tri-Cities, which is in the Downriver Subregion.

**TABLE 4-50**  
**SECTOR BY SECTOR EFFECTS IN EASTERN WASHINGTON**  
**OF THE INCREASE IN GRAIN TRANSPORT**  
**SPENDING FOR ALTERNATIVE A-3 (BREACHING)**  
**RESERVOIR SUBREGION MODEL<sup>1/</sup>**  
**(Excludes sectors with changes less than \$100,000 in business sales)**  
**(1998 dollars)**

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
5 FOOD GRAIN	187216.	0.09	2.20
6 FEED GRAIN	104736.	0.09	0.66
27 MAINT NEC	369144.	0.46	3.81
54 RAILROADS	1042324.	14.40	7.13
55 TRANS NEC	245478.	3.67	6.07
56 TRUCK/WH	13920240.	20.73	162.70
59 TELEPHONE	213992.	0.44	0.94
61 ELECTRIC	198880.	0.27	0.55
64 WHOLESALE	416560.	0.26	4.75
66 DEPT STORE	132610.	0.57	3.77
67 GROCERIES	287896.	0.49	8.16
68 AUTO DLRS	685412.	1.38	11.93
71 RESTAURANT	331776.	0.29	9.63
72 RETAIL NEC	347788.	0.68	15.19
73 F-I-R-E	1294240.	0.28	6.77
76 BUS SERV	109132.	0.19	2.63
79 AUTO SERV	370062.	1.32	5.21
82 HEALTH SER	712560.	0.29	13.52
83 PROF SERV	233860.	0.39	3.88
87 S & L GOVT	100916.	0.37	0.58
92 HOUSEHOLDS	7847424.	0.35	0.00

1/ Assumes no decline in grain output. Excludes the effect of lowered farm household incomes created by increased grain transport costs.

2/ Adjusted to calibrate the 1994 IMPLAN model.

The \$12,202,040 that is added to the transport costs of agricultural producers is a reduction in their disposable income. The Reservoir Subregion business sales multiplier for households is 1.9849. The direct, indirect, and induced decrease in business sales because of the drop in farm household income is  $(1.9849)(-\$12,202,040) = -\$24,219,829$ . Applying the Reservoir Subregion household employment multiplier (0.0000121921) to the reduction of  $-\$12,202,040$  in farm household income results in a loss of  $-148.77/1.07 = -139$  jobs (adjusted to calibrate the 1994 IMPLAN model). The Reservoir Subregion personal income multiplier for households is 0.2816254. The direct, indirect, and induced reduction in personal income is  $(0.2816254)(-\$12,202,040) = -\$3,436,404$ .

#### 4.6.3.9 The Net Economic Grain Farm Effects of Breaching Assuming Grain Production Is Not Reduced

Based on the estimates and assumptions of the Navigation Report, the economies of both central Idaho and eastern Washington increase due to the termination of the barging of grain. The Washington economy increases more because more grain is subject to the increased shipping cost.

In Idaho and NE Oregon, net sales increase by \$4.303 million, net jobs increase by 81 jobs (less the unknown loss of barge and cruise ship jobs that mainly shift to Tri-Cities), and net personal income increases by \$2.818 million. These increases are the result of replacement of inexpensive barge transport with more expensive truck and rail transport services and the assumption that increased costs can and will be borne by the grain farmers.

In Washington, net sales increase by \$6.392 million, net employment increases by 155 jobs (less the 24 barge-related jobs that mainly shift to Tri-Cities), and net personal income increases by \$4.403 million. These increases are the result of replacement of inexpensive barge transport with more expensive truck and rail transport services and the assumption that increased costs can and will be borne by the grain farmers.

The critical unsupported assumption of zero price elasticity of the regional grain supply made

by the Navigation Report makes the projected outcomes highly speculative. The amount by which grain output declines when transport costs rise is unknown. Therefore, no useable data for accurately estimating grain farm-related economic impacts are currently available.

#### 4.6.3.10 Cruise Ship Effects: A Navigation Impact

Tour boats are classified as navigation rather than as recreation and tourism by the USACE. That classification is consistent with the industry definition (Standard Industrial Classification Manual 1987, Office of Management and Budget.) SIC industry 4489, Water Transportation of passengers, NEC includes excursion boat operations, passenger water transportation on rivers and canals, and sightseeing boats.

Existing cruise ships cannot operate in the swift and shallow waters of a free-flowing Snake River which would occur under Alternative A-3. However, it is likely that some of the cruise ship employment and retail sales to passengers would shift to the Downriver Subregion if the Snake River was unavailable with breaching.

Direct purchases by the cruise ship sector in the Upriver Subregion are estimated at \$2.64 million per year (DREW transportation Impact Study Team (1999)). Cruise ship companies purchase engine fuel, jet boat services, laundry services, water supplies, and docking. The largest purchases are for prepaid jet boat tours and fuel which account for about 46 and 45 percent of direct purchases. The multipliers for the mix of direct purchases made by cruise ship companies are 2.181 for business sales, 0.0000228 for employment, and 0.5240 for personal income. Thus, the direct, indirect, and induced effects of Alternative A-3 (breaching) on the cruise ship sector in the Upriver Subregion include -\$7.96 million in annual business sales, -76 lost jobs, and -\$2.11 million lost personal income per year from direct purchases and payroll by cruise ship companies in the Upriver Subregion.<sup>56</sup>

About 21,315 passengers are estimated to travel to the Upriver Subregion by cruise ship (DREW Transportation Impact Study Team (1999)). The annual loss of retail sales to cruise ship

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<sup>56</sup> The total impact estimate also includes the effects of direct cruise ship employment and payroll in the Upriver Subregion based on confidential reports (DREW Regional Impact Study Team (1999)).

passengers in the Upper Subregion might be about -\$1.21 million. (Assuming that the average spending per passenger in Lewiston is \$57, DREW Regional Impact Study Team (1999)). The IMPLAN model requires that trade sales be expressed as a margin of about 15 percent. Thus, lost retail sales margins are \$1.21 million x 0.15 = \$181,500. Lost retail sales then would reduce total business sales by -\$0.43 million, employment by -7 jobs and personal income by -\$0.14 million in the Upriver Subregion.

Total impacts include the effects of lost sales to cruise ship companies, lost cruise ship payroll, and lost retail sales to passengers. Total direct, indirect, and induced losses in the Upriver Subregion are estimated at -\$8.39 million per year in business sales, -83 jobs and -\$2.25 million per year in personal income.

Examination of confidential ES-202 data for that sector in Idaho, Washington, and Oregon revealed a small number of firms operating tour boats and other passenger boat services. The number of employees of tour boats in the Lower Snake River region is small. The average pay rate for water travel was \$33,823 in 1994 (Washington Employment Security Department).<sup>57</sup> However, the number of employees within the study region is very small.

Many of the tour boat (or other passenger boat operations) firms listed in the ES-202 were headquartered in Seattle or in the Puget Sound area. None were headquartered in the study regions on the Lower Snake river. It was assumed that management operations, boat maintenance and the like do not take place within the study region. The primary impact would be spending by employees and passengers. When passengers disembark at various stops to visit points of interest (including Tribal activities) or to take part in jet boating and similar activities they create export sales for the region. Boat tourist spending (either by the passengers or by the tour boat company for the passengers) can include very few meals not on shipboard, busing from the river to points of interest, jet boats rental or tours, and various retail items. Boat tourists buy few meals, and spend nothing for fuel or lodging as would tourists arriving by automobile. Spending by boat travelers is unknown. A survey

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<sup>57</sup> As reported in Table IV-1 of: *Travel Industry Employment in Washington State*, Dean Runyan Associates (Portland) for Washington State Community Trade and Economic Development.

conducted for Washington State Community, Trade and Economic Development<sup>58</sup> shows that day visitors spend \$106.80 per day, but \$30.60 is paid to restaurants, and \$18.00 is for private transportation or car rental, items a boat travel won't purchase often. A rough estimate of boat tourist spending might be about \$57 per day (in 1995-96 dollars) or \$55 per day in 1994 dollars.

Most of the spending by boat tourists is paid to the cruise line which provides for their needs on board the boat during the tour. It is assumed that boat stores are replenished in Portland or other places outside the study region. If boat tours on the Columbia continue after breaching, then little impact is expected on tour boat employment in the region. The primary impact of tour boating, the tour boat payroll should remain in the Reservoir and Downriver Subregions.

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<sup>58</sup> *Washington State Visitor Profile*, March 1997. Dean Runyan Associates, Portland.

**Table 4-51**  
**SECTOR BY SECTOR EFFECTS OF TERMINATION OF**  
**CRUISE SHIP TRAVEL TO LEWISTON <sup>1/</sup>**

(Sectors with employment change less than one are excluded, except for households)

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
26 MAINT NEC	88384.	.06	1.06
53 WATER TRAN	1374692.	5.84	18.53
59 WHOLESALE	1350800.	.58	17.00
61 DEPT STORE	218104.	.50	6.40
62 GROCERIES	50052.	.09	1.60
63 AUTO DLRS	57920.	.08	1.14
66 RESTAURANT	111680.	.08	3.47
67 RETAIL NEC	50676.	.10	2.68
68 F-I-R-E	518816.	.10	3.10
69 LODGING	43488.	.08	1.25
70 PERS SERV	171120.	.59	6.98
71 BUS SERV	35470.	.19	1.32
76 AMUSEMENTS	38304.	.09	1.05
77 HEALTH SER	249760.	.10	4.76
78 PROF SERV	80032.	.14	1.52
80 SOC SERV	26704.	.10	1.01
84 GOVT NEC	49952.	.01	1.87
86 HOUSEHOLDS	2257792.	.11	.00

#### 4.6.4 Water Supply Effects of Alternative A-3 (Breaching)

##### 4.6.4.1 Shut Down of Irrigation

Irrigated agricultural output near Ice Harbor Dam would decline with breaching. The lost production is in the Reservoir Subregion but reduced farm spending would also occur in the Downriver Subregion. Therefore, the Lower Snake River Region multipliers were used. The maximum direct value of production lost is estimated at -\$75.87 million per year. This assumes that all 37,000 irrigated acres are shut down.

The maximum loss of annual business sales (direct, indirect, and induced) was estimated at -\$232.26 million with breaching (DREW Regional Impact Study Team (1999)). The maximum direct, indirect, and induced employment loss from reduction in irrigated lands was estimated to be -2,256 jobs. The maximum loss of personal income was estimated at -\$79.19 million per year.

About 21 percent of the irrigated land might support the development of alternative water supplies to replace the lost irrigation water. If fruit orchards and vineyards production continued on 7,735 of the 37,000 acres, the direct value of production lost would be -\$38.37 million (DREW Regional Impact Study Team (1999)). In that case, (direct, indirect, and induced) annual business sales would fall by -\$119.43 million, jobs would decline by -901, and personal income would fall by -\$42.07 million per year with breaching.

##### 4.6.4.2 Reduction in Irrigated Agriculture

Dam breaching increases the costs of pumping water from the reservoirs for irrigated agriculture in the area surrounding Ice Harbor Reservoir. The cost of reconstructing the pumping system is large. If the cost of rebuilding the pumping stations is deemed prohibitive by the USACE, pumping for irrigation would be terminated under the breaching alternative (alternative A-3).<sup>59</sup> About 37,000 acres of irrigated agriculture could be discontinued around Ice Harbor Reservoir according to the USACE. The dry lands surrounding the reservoirs would be unproductive without irrigation and agricultural output might cease to exist. It is assumed that none of the various A-2

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<sup>59</sup> The reduction of water withdrawal for agriculture would have an added benefit for fish recovery because the consumptive use component of the irrigation withdrawals is added to the instream flow in the Snake and Columbia rivers.

alternatives would cause termination or reduction of production on the 37,000 irrigated acres.

The USACE conducted a survey of farms near Ice Harbor Reservoir in 1997/98 and derived acres by crop for 32,100 acres. Table 9 of Economic Analysis of Water Supply Impacts (November 30, 1998) shows the estimated crop acres by type of crop for 32,100 acres. The crop acres were expanded proportionately, excluding the 8,600 acres of Cottonwood/Poplars, so that total irrigated acres increased from 32,100 to 37,000. The Cottonwood/Poplar acreage was held constant at 8,600 acres.

Gross value produced per acre for all of the crops (except Cottonwood/Poplar trees) can be estimated from total acres and total value produced shown in

**Table 4-52**  
**IRRIGATED LANDS SURROUNDING ICE HARBOR RESERVOIR:**  
**CROPPING PATTERNS, VALUE PRODUCED PER ACRE,**  
**AND ESTIMATED TOTAL VALUE PRODUCED FOR 37,000 ACRES IN 1994**  
**(1994 dollars)**

Potatoes, 6,647 acres x \$2,779 per acre = \$18,472,013 (3.2371 \$59.89 million)(0.00002431, 449 total jobs)(1.2259, \$22.64 million)  
 Corn for Grain, 6,043 acres x \$500 per acre = \$3,021,500 (2.9841, \$9.02 million)(0.00002555, 77 total jobs)(0.9378, \$2.83 million)  
 Apples/Cherries, (output projected, not 1994), 4,955 acres x \$6,117 per acre = \$30,309,735 (3.009, \$91.2 million)(0.00003868, 1,172 total jobs)(0.9895, \$30.00 million)  
 Winter Wheat (irrigated), 4,230 acres x \$ 376 per acre = \$1,590,480 (2.8340, \$4.51 million)(0.00003208, 51 total jobs)(0.8169, \$1.30 million)  
 Vineyards, 2,780 acres x \$1,704 per acre = \$4,737,120 (3.009, \$14.25 million)(0.00003868, 183 total jobs)(0.9895, \$4.69 million)  
 Sweet Corn (assumed for processing), 2,417 acres x \$664 per acre = \$1,604,888 (3.237, \$5.20 million)(0.00002431, 40 total jobs)(1.2259, \$1.97 million)  
 Onions, 1,329 acres x \$5,168 per acre = \$6,868,272 (3.2371, \$22.23 million)(0.00001664, 114 total jobs)(1.2259, \$8.42 million)  
 Cottonwood/Poplar (output projected not 1994), 8,600 acres x \$500 per acre = \$4,300,000 (2.5247, \$10.86 million)(.00002732, 117 total jobs)(0.5029, \$2.16 million)

**Losses with Total Shutdown**

**TOTAL IRRIGATED LAND LOST 37,000 ACRES**

**TOTAL VALUE OF AGRICULTURAL PRODUCTION LOST \$70.90 million (1994 dollars), \$75.87 million (1998 dollars)**

**DIRECT, INDIRECT AND INDUCED SALES LOST \$217.07 million (1994 dollars), \$232.26 million (1998 dollars)**

**DIRECT, INDIRECT AND INDUCED EMPLOYMENT LOST 2,256 JOBS**

**DIRECT, INDIRECT AND INDUCED PERSONAL INCOME LOST \$74.01 million (1994 dollars), \$79.19 million (1998 dollars)**

**Losses with Partial Shutdown**

**TOTAL IRRIGATED LAND LOST 7,735 ACRES**

**TOTAL VALUE OF AGRICULTURAL PRODUCTION LOST \$35.05 million (1994 dollars), \$37.50 million (1998 dollars)**

**DIRECT, INDIRECT AND INDUCED SALES LOST \$111.62 million (1994 dollars), \$119.43 million (1998 dollars)**

**DIRECT, INDIRECT AND INDUCED EMPLOYMENT LOST 901 JOBS**

**DIRECT, INDIRECT AND INDUCED PERSONAL INCOME LOST \$39.32 million (1994 dollars), \$42.07 million (1998 dollars)**

Washington Agricultural Statistics 1995-96 for 1994 (the required year for the input-output models). Comparisons were made to the surrounding states using Oregon Agricultural Statistics and Idaho Agricultural Statistics. The value per acre data are state averages. Value of production for irrigated winter wheat was based on average yields for 1994 in Franklin and Walla Walla Counties. Cottonwood/Poplar tree value of production per acre was based on the highest value that could be achieved if the trees were harvested after 8 years (\$425 to \$500 per acre) for hybrid Poplar plantations (Blatner, personal Communication). Also, Bradshaw (email) estimated that production of Populus would create about \$500 per acre per year. It is assumed that agricultural output (or any other output) on the land after termination of irrigation is negligible.

Two estimates of the value of lost irrigated agricultural output near Ice Harbor Dam after breaching of the dams are shown in Table 4-52. The first estimate shows the losses with complete shut down of lands irrigated with USACE pumped water. The second estimate assumes that some crops utilize other water sources to stay in production (DREW Water Supply Study Team (1999)).

With complete shut down, the direct value of production lost using 1994 prices and yields is \$70,904,000 or \$75,867,000 in 1998 dollars.<sup>60</sup> The input-output model for the Reservoir Subregion contains separate sectors for most of the crops that have reduced output due to the dam breaching.<sup>61</sup> The business sales multiplier for each crop<sup>62</sup> (Reservoir Subregion) is shown in Table 4-52 in parentheses. Also shown is the effect on total business sales as given by the multiplier times the direct loss of output for the crop. The economic multipliers show the backward-linked effects

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<sup>60</sup> Prices and yields can vary widely from year to year. Timber and fruit production is projected rather than for 1994 because the Poplar plantations and some of the orchards are just reaching maturity.

<sup>61</sup> The input-output model agricultural sectors include: dairy & poultry, cattle, meat animals, livestock nec, food grains, feed grains, hay and pasture, crops nec, fruit and nuts, vegetables, oil crops, as well as sectors for forestry and nursery.

<sup>62</sup> The sales multiplier shows the direct, indirect and induced backward-linked effects on sales. Firms and households the directly or indirectly supply inputs to the sector are measured. Possible forward-linked effects, such as change in local supplies of irrigated agriculture output to food processors, are not included in a sales multiplier.

on the local economy, i.e., the loss in sales and incomes by firms and workers that supply inputs directly or indirectly to the agricultural sectors in the Reservoir Subregion. The total direct, indirect, and induced loss of business sales in the area is estimated as the sum of the direct effects on gross agricultural sales times the appropriate multiplier for each crop. The total loss of business sales (direct, indirect, and induced) for complete shut down of irrigated lands is estimated at \$217.07 million (1994 dollars) or \$232.26 million in 1998 dollars. Also shown in parentheses for each crop are the employment multiplier and the estimated direct, indirect, and induced employment effects. These are the backward-linked jobs in local industries that directly or indirectly supply inputs to irrigated agriculture. Total employment loss from complete shut down of irrigated lands is estimated to be 2,256 jobs. Also shown in parentheses for each crop are the personal income multiplier and the estimated direct, indirect, and induced effects on personal income. Total loss in personal income from complete shut down in irrigated lands is estimated to be \$74.01 million (1994 dollars) or \$79.19 million in 1998 dollars.

If fruit orchard and vineyard production continued on 7,735 of the 37,000 irrigated acres, the direct value of production lost would be -\$38.37 million (DREW Regional Impact Study Team (1999)). In that case, (direct, indirect, and induced) annual business sales would fall by -\$119.43 million, jobs would decline by -901, and personal income would fall by -\$42.07 million per year with breaching.

Table 4-53 shows sector by sector losses in business sales and jobs for the complete shutdown case. Sales loss for the households sector is \$74 million (1994 dollars), \$79.2 million in 1998 dollars. Sales by households is personal income. Thus, the direct, indirect, and induced loss of personal income (wages, salaries, profits) totals \$79.2 million (1998 dollars) summed across workers in all sectors.

In comparison, a preliminary estimate from the Bureau of Reclamation (email) indicates losses of agricultural output in south Idaho of \$67 million to \$106 million caused by a million acre foot increase of instream flow in the Snake River. (Additional output losses would occur in recreation but hydropower output can actually rise under one scenario). The agricultural output losses at Ice Harbor reservoir could be similar to those found for south Idaho even though the volume of water involved is much less. Reduced irrigation would have more direct economic effect on the

lower Snake River because many of the crops have a very high value of production per acre. (Also part of the million acre feet added to Snake River instream flow in south Idaho may not be removed from irrigation). Comparable multiplier effects are not yet available for the southern Idaho MAF.

The input-output sectors: food grains, feed grains, fruit, vegetables, and forestry were assumed to have reductions in sales to final demand as shown in Table 4-52. The business sales multipliers and employment multipliers used assumed that the irrigated farms made their purchases of inputs in the Reservoir Subregion. However, the farms are relatively close to Tri-Cities which is in the Downriver Subregion. Economic impacts are likely to occur in both subregions.

A model that contains these two subregions is not available and thus the Lower Snake River model which contains the three Subregions was used to estimate the sector by sector effects of termination of cropping on the 37,000 acres irrigated from the reservoirs. Use of the Lower Snake River model results in much larger employment effects in comparison with the Reservoir Subregion model. The Reservoir Subregion model showed a total loss of 1,306 jobs within the Reservoir Subregion (including direct, indirect and induced effects) while the Lower Snake River model showed a total loss of 2,256 jobs in the three Subregions. The larger effect on employment in the Lower Snake River model shows that much of the spending leakages to imports in the Reservoir Subregion model were captured by the larger model which included the Subregions on both sides of the Reservoir Subregion model. The difference in jobs between the two models ( $2,256 - 1,306 = 950$  jobs) includes primarily the jobs created in the other subregions, but also a slightly higher estimate for jobs within the Reservoir Subregion. It is likely, given the proximity of the farms to Tri-Cities, that virtually all of the nearly 950 jobs are lost in the Downriver Subregion.

At the state level, the employment multipliers for the State of Washington for the agricultural sectors are virtually the same as those for the Lower Snake River Region. The employment multiplier for feed grains is actually smaller for the State level than for the region.<sup>63</sup> Thus, the input-output data indicate that virtually all the economic impacts of a /reduction in

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<sup>63</sup> A possible cause is that local ownership among farm suppliers for the region is higher than the average for the State.

**Table 4-53**  
**SECTOR BY SECTOR EFFECTS OF THE MAXIMUM LOSS**  
**OF 37,000 ACRES OF IRRIGATED AGRICULTURE**  
**USING THE LOWER SNAKE RIVER MODEL (3 SUBREGIONS COMBINED)**  
**(Sectors with less than \$100,000 change in business sales are excluded)**  
**(1994 dollars)**

	ORIGINAL SALES	FORECAST SALES	CHANGE IN SALES	% CHANGE	ORIGINAL EMPLOYMENT	FORECAST EMPLOYMENT	CHANGE IN EMPLOYMENT
1 DAIRY/POUL	46138552.	45810256.	-328296.	-0.71	248.	246.	-1.76
2 CATTLE	241524528.	241014464.	-510064.	-0.21	2673.	2667.	-5.65
5 FOOD GRAIN	471730304.	469567616.	-2162688.	-0.46	8029.	7992.	-36.81
6 FEED GRAIN	317517120.	313854816.	-3662304.	-1.15	3285.	3247.	-37.89
8 OTHER CROP	94317248.	94207976.	-109272.	-0.12	2084.	2082.	-2.41
9 FRUIT/NUTS	238112032.	202698976.	-35413056.	-14.87	4468.	3804.	-664.50
10 VEGETABLES	396671200.	368909536.	-27761664.	-7.00	2756.	2563.	-192.88
12 FORESTRY	184732000.	180243376.	-4488624.	-2.43	770.	770.	-19.17
13 NURS/LNSC	49202660.	48577364.	-625296.	-1.27	1463.	1444.	-18.59
15 AG SERVICE	114376336.	107894128.	-6482208.	-5.67	6090.	5745.	-345.13
27 MAINT RESI	117281200.	116969136.	-312064.	-0.27	1450.	1446.	-3.86
28 MAINT NEC	555765120.	554008576.	-1756544.	-0.32	6062.	6043.	-19.16
29 MEAT PROC	388479936.	387675008.	-804928.	-0.21	1032.	1032.	-2.14
30 DAIRY PROD	185602912.	185110656.	-492256.	-0.27	567.	565.	-1.50
31 CAN/FREEZE	1312914432.	1311958016.	-956416.	-0.07	7489.	7484.	-5.46
32 OTHER FOOD	229745024.	228834848.	-910176.	-0.40	1170.	1165.	-4.64
33 GRAIN PROC	57887336.	57753448.	-133888.	-0.23	172.	172.	-0.40
34 TEXTILES	23757852.	23564676.	-193176.	-0.81	378.	375.	-3.07
36 SAWMILLS	639266880.	639069056.	-197824.	-0.03	3675.	3674.	-1.14
37 WOOD PRODU	240415424.	240254448.	-160976.	-0.07	1592.	1591.	-1.07
38 MFG NEC	105182896.	104916656.	-266240.	-0.25	1224.	1221.	-3.10
39 PAPER MILL	801937280.	801753664.	-183616.	-0.02	2323.	2322.	-0.53
40 PAPER PROD	23233000.	23082704.	-150296.	-0.65	138.	137.	-0.89
41 PRINT/PUBL	112733024.	112252800.	-480224.	-0.43	1956.	1948.	-8.33
42 CHEMICALS	238454112.	237951232.	-502880.	-0.21	1086.	1084.	-2.29
49 MACHINERY	112317792.	112126912.	-190880.	-0.17	943.	941.	-1.60
57 RAILROADS	184797248.	184549584.	-247664.	-0.13	1291.	1289.	-1.73
58 OTHER TRAN	41536792.	41388168.	-148624.	-0.36	1117.	1113.	-4.00
59 TRUCK/WARE	359040768.	357564032.	-1476736.	-0.41	4360.	4342.	-17.93
61 AIR TRANSP	52475136.	52253928.	-221208.	-0.42	471.	469.	-1.99
63 TELEPHONE	316054944.	314407616.	-1647328.	-0.52	1458.	1450.	-7.60
64 RADIO/TV	72491040.	72212752.	-278288.	-0.38	606.	604.	-2.33

65 ELECTRICIT	251021120.	250561408.	-459712.	773.	772.	-1.42
66 GAS	43096012.	42918524.	-177488.	92.	92.	-0.38
67 WATER/SANI	123258384.	122790928.	-467456.	712.	709.	-2.70
68 WHOLESale	951085824.	946949888.	-4135936.	11744.	11693.	-51.07
69 BLDG & GAR	85312776.	85045056.	-267720.	2071.	2064.	-6.50
70 DEPT STORE	173753216.	172571440.	-1181776.	5352.	5316.	-36.40
71 GROCERIES	241867168.	240319104.	-1548064.	7711.	7662.	-49.35
72 AUTO DLRS	317989952.	316285888.	-1704064.	5915.	5883.	-31.70
73 APPAREL	36179000.	35928960.	-250040.	1205.	1197.	-8.33
74 FURNITURE	66735268.	66274044.	-461224.	1718.	1706.	-11.87
75 RESTAURANT	556446144.	553015936.	-3430208.	17233.	17127.	-106.23
76 RETAIL NEC	198231808.	196889200.	-1342608.	10121.	10052.	-68.55
77 F-I-R-E	2226515968.	2211954688.	-14561280.	12624.	12541.	-82.56
78 LODGING	195132704.	194221456.	-911248.	5132.	5108.	-23.97
79 PER SERVIC	99121648.	98415640.	-706008.	3805.	3778.	-27.10
80 BUS SERVIC	178367552.	177663616.	-703936.	5481.	5459.	-21.63
81 DATA PROC	132998200.	132617904.	-380296.	1748.	1743.	-5.00
83 AUTO SERVI	175170784.	174204768.	-966016.	2626.	2612.	-14.48
84 REPAIR SER	78024176.	77524248.	-499928.	1488.	1478.	-9.53
85 AMUSEMENTS	162374736.	161288192.	-1086544.	4882.	4849.	-32.67
86 HEALTH SER	923988608.	917400768.	-6587840.	18114.	17985.	-129.15
87 PROF SERVI	2138514176.	2137578880.	-935296.	29361.	29348.	-12.84
88 EDUCATION	118589200.	117799088.	-790112.	3482.	3459.	-23.20
89 SOC SERVIC	114584208.	113897776.	-686432.	4104.	4079.	-24.59
90 ASSOCIATNS	158933248.	158073504.	-859744.	4463.	4439.	-24.14
91 S & L GOVT	130475968.	129736032.	-739936.	824.	819.	-4.67
92 GOV ELECTR	784303232.	782867584.	-1435648.	2634.	2629.	-4.82
93 POSTAL SER	92704976.	92217280.	-487696.	1289.	1282.	-6.78
96 HOUSEHOLDS	10318804992.	10244744192.	-74060800.	0.	0.	0.00

irrigated agriculture output near Ice Harbor Reservoir would be felt in the Lower Snake River Region which consists of the three Subregions surrounding the reservoirs.

Note: None of the impact measurements on irrigated agriculture includes the possible effect on the food processing industry if affordable replacement produce inputs could not be obtained. Only the backward-linked effects on the direct or indirect suppliers to irrigated agriculture are measured.

#### 4.6.4.3 Modifications to Municipal and Industrial Pump Stations

There are eight existing municipal and industrial pump stations along the lower Snake River, all located on the Lower Granite reservoir. Water withdrawn from these stations is used for municipal water system backup, golf course irrigation, industrial process water for paper production, concrete aggregate washing, and park irrigation. Under Alternative A-3 (breaching), the river elevation would fall to its natural level and these pumping stations would require modification to maintain current water supplies (DREW Water Supply Study Team (1999)).

Modification of municipal and industrial pump stations was estimated to cost between \$11.51 million and \$55.20 million (DREW Water Supply Study Team (1999)). The wide range of costs reflects uncertainty about required modifications to the Potlatch Corporation system (DREW Water Supply Study Team (1999)). The direct, indirect, and induced economic effects for industrial pump station modification were estimated using the Upriver Subregion utility construction multiplier. These were assumed to be one-year impacts. A range of \$25.14 to \$120.56 million increase in total business sales would be created in the Upriver Subregion by construction to modify industrial pump stations and related facilities on Lower Granite Reservoir. Employment effects would range from an increase of 292 to 1,397 jobs in the Upriver Subregion. Total personal income effects would range from an increase of \$7.73 to \$37.10 million in the Upriver Subregion.

Note: Increased energy costs because of the increased pumping lift for the breaching alternative were not reported. The energy cost increases would be relatively minor because the backup municipal pumps would not be used and the paper manufacturing pump would not have increased lift. However, the industrial plants with increased energy input costs for pumping would

have reduced net income. The effect of the reduced net income for industrial plants on output, employment, or personal income could not be estimated.

Table 4-54 shows the sector by sector amounts that modification of the industrial pump stations adds to the Upper Subregion economy based on the midpoint of the expenditure range (\$33.355 million). The input-model and sector used is the Upriver Subregion and the New Utility Construction sector. The table shows business sales and employment that would be added over the short term construction period (assumed to be one year).

**Table 4-54**  
**SECTOR BY SECTOR EFFECTS OF MODIFICATIONS TO MUNICIPAL AND**  
**INDUSTRIAL PUMP STATIONS BECAUSE OF BREACHING (1998 dollars)<sup>1/</sup>**

(Sectors with employment change less than one are excluded, except for households)

	ADDED SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>2/</sup>
12 NURSERY/LA	27343.	.31	1.02
20 NEW UTILIT	33354732.	153.11	539.46
26 MAINT NEC	362240.	.25	4.34
37 PRINT/PUBL	99910.	.35	1.71
52 TRUCK/WH	503376.	.44	5.97
55 TELEPHONE	372168.	.53	1.67
59 WHOLESALE	1243136.	.54	15.65
60 BLDG MATER	98216.	.36	2.36
61 DEPT STORE	385804.	.88	11.33
62 GROCERIES	542336.	.97	17.27
63 AUTO DLRS	767976.	1.06	15.14
64 APPAREL	110080.	1.10	3.91
65 FURNITURE	209190.	1.10	5.14
66 RESTAURANT	1019760.	.77	31.36
67 RETAIL NEC	561488.	1.12	29.67
68 F-I-R-E	3601600.	.71	21.56
69 LODGING	247256.	.44	7.12
70 PERS SERV	271886.	.94	11.08
71 BUS SERV	134884.	.72	5.02
74 AUTO SERV	277756.	.60	4.29
75 REPAIR SER	172154.	.87	3.80
76 AMUSEMENTS	315988.	.73	8.62
77 HEALTH SER	2480704.	1.02	47.26
78 PROF SERV	935236.	1.62	17.82
79 EDUCATION	82300.	.80	2.79
80 SOC SERV	265448.	.96	10.08
81 ASSOCIATNS	214244.	.52	5.72
82 S & L GOVT	166566.	.77	1.02
83 POSTAL SER	107802.	.51	1.47
86 HOUSEHOLDS	22448256.	1.06	.00

1/ The sector by sector economic impacts are shown for the midpoint value of municipal and industrial pump station modification.

2/ Adjusted to calibrate the 1994 IMPLAN model.

#### 4.6.4.4 Modifications to Privately Owned Wells

Approximately 209 functioning wells are presently located within one mile of the Snake River. A total of approximately 95 water-wells within one mile of the Snake River were estimated to require modification under Alternative A-3 (breaching). The estimates were based on an engineering analysis of a sample of 50 representative wells (DREW Water Supply Study Team (1999)). Modification would be required because of a lowering of the river water surface elevation. No water well modifications were required for any of the other alternatives.

Construction spending in the Reservoir Subregion to modify private wells was estimated at \$56.45 million (DREW Water Supply Team (1999)). About 22 percent of the wells were in the Downriver Subregion (Franklin County) and the rest were in the Reservoir Subregion. The impact of construction expenditures to modify private wells was estimated using the maintenance-and-repair-not-elsewhere-classified sales multiplier. Well modification in the Reservoir Subregion would result in a \$107.76 million increase in business sales. Employment in the Reservoir Subregion would increase by 916 jobs. Personal income in the Reservoir Subregion would increase by \$29.52 million. These are assumed to be one-year impacts. Well modification in the Downriver Subregion would result in a \$30.40 million increase in business sales. Employment in the Downriver Subregion would increase by 259 jobs. Personal income in the Downriver Subregion would increase by \$8.33 million. These are assumed to be one-year impacts.

Table 4-55 shows the sector by sector amounts that modification of the private wells adds to the Lower Snake River economy. The table shows business sales and employment that would be added over the short term construction period (assumed to be one year). The total water well construction cost of \$56.45 million was analyzed using the Lower Snake River input-output model (all three subregions). The industry used was the maintenance-and-repair-not-elsewhere-classified sector. Construction was assumed to take place within one year.

**Table 4-55**  
**SECTOR BY SECTOR EFFECTS OF MODIFICATIONS TO PRIVATE WELLS**  
**BECAUSE OF BREACHING (1998 dollars)**

(Sectors with employment change less than one are excluded, except for households)

	ADDITIONAL SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>1/</sup>
2 CATTLE	194368.	.08	2.01
5 FOOD GRAIN	73120.	.02	1.16
7 HAY	44800.	.04	1.45
9 FRUIT/NUTS	103296.	.04	1.81
13 NURS/LNDSC	628924.	1.28	17.48
15 AG SERVICE	76784.	.07	3.82
17 OTHER MINE	307233.	2.78	2.52
19 SAND & GRA	295104.	.82	2.44
27 MAINT RESI	169312.	.14	1.95
28 MAINT NEC	57369216.	10.32	584.81
29 MEAT PROC	412960.	.11	1.03
31 CAN/FREEZE	480128.	.04	2.56
32 OTHER FOOD	304896.	.13	1.45
35 LOGGING	498848.	.10	2.29
36 SAWMILLS	1512192.	.24	8.12
37 WOOD PRODU	704912.	.29	4.36
38 MFG NEC	354128.	.34	3.85
41 PRINT/PUBL	299712.	.27	4.86
45 CLAY PROD	999316.	2.88	8.65
46 PRIM METAL	261536.	.23	1.21
48 FAB METALS	577344.	.25	3.36
49 MACHINERY	159384.	.14	1.25
51 ELECT GOOD	141289.	1.59	1.00
57 RAILROADS	203792.	.11	1.33
58 OTHER TRAN	91544.	.22	2.30
59 TRUCK/WARE	1706624.	.48	19.36
61 AIR TRANSP	120808.	.23	1.01
63 TELEPHONE	1072704.	.34	4.63
64 RADIO/TV	190448.	.26	1.49
68 WHOLESALE	3357568.	.35	38.75
69 BLDG & GAR	187096.	.22	4.24
70 DEPT STORE	701120.	.40	20.19
71 GROCERIES	961184.	.40	28.64
72 AUTO DLRS	1603456.	.50	27.88
73 APPAREL	150220.	.42	4.67
74 FURNITURE	276908.	.41	6.57
75 RESTAURANT	1800768.	.32	52.12
76 RETAIL NEC	873136.	.44	41.66
77 F-I-R-E	7904256.	.36	41.89
78 LODGING	538352.	.28	13.23
79 PER SERVIC	360080.	.36	12.92
80 BUS SERVIC	843360.	.47	24.22
81 DATA PROCE	222344.	.17	2.73
83 AUTO SERVI	790080.	.45	11.07
84 REPAIR SER	603144.	.77	10.75
85 AMUSEMENTS	563168.	.35	15.82
86 HEALTH SER	3367168.	.36	61.69
87 PROF SERVI	560000.	.03	7.19
88 EDUCATION	408672.	.34	11.22
89 SOC SERVIC	350656.	.31	11.74
90 ASSOCIATNS	452496.	.28	11.88

91 S & L GOVT	391424.	.30	2.31
92 GOV ELECTR	850240.	.11	2.67
93 POSTAL SER	281088.	.30	3.65
96 HOUSEHOLDS	37855232.	.37	.00

1/ Adjusted to calibrate the 1994 IMPLAN model.

#### **4.6.5 Tribal Circumstances Effects**

*Data from the DREW Tribal Circumstances Study Team not available at the time of this report.*

#### **4.6.6 Implementation Effects**

Implementation spending is defined as the difference in construction spending between the baseline Alternative (A-1, existing conditions) and the other alternatives under consideration. The estimated direct, indirect, and induced economic effects for implementation result from these construction spending differences (positive or negative).

#### **Distributing the Construction Purchases Across Sectors**

As might be expected, none of the available construction sectors in the IMPLAN input-output model closely match that required for dam breaching or for the other alternatives. Appendix XII shows the actual purchases allocations for various types of construction activities that are available in the IMPLAN input-output model. The “new highways and streets” sector includes some activities similar to earthen dam breaching but the “new government facilities” construction sector is specifically defined to include construction of dams and reservoirs (among many other things). The IMPLAN “new highways and streets” purchases allocation is defined for the 1982 Bureau of Economic Analysis (BEA) Commodity Code 11.0400. That code specifies the construction of “new highways and streets.” The IMPLAN “new government facilities” purchases allocation is defined for the BEA Commodity Codes 11.0701 - 11.0704, which includes (1) new military facilities, (2) new dams and reservoirs, (3) other new conservation and development facilities, and (4) other new nonbuilding facilities.

An example of the very large differences in economic impacts, depending on the assumed purchases distribution across sectors, is demonstrated in the following sections by applying these

two construction purchases distributions to the peak year (2005) USACE construction spending for breaching. The projected direct, indirect, and induced jobs are 146 percent larger for the “new street and highway” purchases distribution in comparison to the “new government facilities” distribution. Even more striking, the direct jobs projections are over seven times as large using the “new street and highway” purchases distribution as compared to the “new government facilities” distribution.

### **Faulty Construction Impacts Based on the IMPLAN “New Government Facilities” Purchases Distribution**

The direct, indirect, and induced employment created by \$203 million of construction costs (the peak year of breaching cost) is first estimated using the IMPLAN “new government facilities” construction sector from IMPLAN (Lower Snake River Region Model) which has an employment multiplier of 0.00001555. The 1998 spending data was deflated by seven percent to obtain 1994 purchasing power for proper calibration with the IMPLAN model. The projected total jobs (direct, indirect, and induced) created by the construction spending would be: 2,950 jobs in 2005. Direct jobs can be estimated using the IMPLAN direct employment coefficient of 0.00000143989 (and again deflating the spending by seven percent to express it in 1994 purchasing power). The direct jobs are those jobs either on-site or off-site that are funded for the construction operations.<sup>64</sup> The projected direct (on-site and off-site) jobs created by the construction spending would be: 273 jobs in 2005,

### **Faulty Construction Impacts Based on the IMPLAN “Road Construction” Purchases Distribution**

For comparison purposes, the direct, indirect, and induced employment created by the \$203 million of construction costs is estimated using the “new road construction” sector from

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<sup>64</sup> The IMPLAN model does not separate direct jobs into on-site and off-site jobs. Measurement of on-site jobs can be especially important because of the congestion and other socio-economic effects of the influx of a large group of workers to a region. However, in this case, the four work sites are some distance apart.

IMPLAN (Lower Snake River Region Model) which has an employment multiplier of 0.00002283. The 1998 spending data was deflated by seven percent to obtain 1994 purchasing power for proper calibration with the IMPLAN model. The projected total jobs (direct, indirect, and induced) created by the construction spending would be: 4,331 jobs in 2005. Direct, on-site jobs can be estimated using the IMPLAN direct employment coefficient of 0.00001020776 (and again deflating the spending by seven percent to express it in 1994 purchasing power). The projected direct (on-site and off-site) jobs created by the construction spending would be: 1,937 jobs in 2005.

**Because the economic impact estimates based on IMPLAN coefficients would apply to a mix of construction activities that differ widely from dam breaching, an alternate engineering-based estimate specific to dam breaching is used to estimate economic impacts.**

### **Construction Impacts Based on an “Industry Sources” Purchases Distribution**

A depiction of construction spending that is more accurate than the broad construction classifications in IMPLAN is provided by “industry sources.” A senior estimator at a well known international construction firm provided a typical budget for the construction activities described in USACE publications on the earthen dam breaching alternative. Physical labor was 35%, management labor was 10%, equipment was 35%, and materials (fuel) and subcontractors was 20%. Engineering design was 10% on top of the above construction costs.

Imports for construction activity would be substantial for the Lower Snake River region. It was assumed that 50% of physical labor, all management services, all engineering professionals, and 90% of heavy equipment would be imported into the Lower Snake River Subregion. It was assumed that purchases from suppliers of materials and fuels and from subcontractors would be spent 100% within the subregion. Factoring in the engineering design (professional services) into the above percentages results in: physical labor (both local household sector and import sector) 31.5%, management services (import sector) 9%, engineering services (import sector) 10%, heavy equipment (both local and import sector) 31.5%, materials, fuel or subcontractors (local wholesale sector) 18%.

The resulting budget allocation is: imports (import sector) 58.6%, local labor (household sector) 20.25%, local equipment (government facilities construction sector) 3.15%, local materials, fuel and materials (wholesale sector) 18%. Imports of construction engineering and management services to the Lower Snake River region has no multiplier effect in the region and will accrue to a national or international construction company of unknown location. It is assumed that fifty percent of the physical labor will commute from nearby population centers for this short term project and will not create a significant impact in the Lower Snake River region.

Multipliers specific to the construction budget allocation have been calculated by weighting the respective IMPLAN multipliers (households, wholesale, and government facilities construction) by the sector shares shown above. The estimated multipliers are: business sales 0.999278; employment 0.000008108199; and personal income 0.2072187.<sup>65</sup>

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<sup>65</sup> In the case of the direct labor purchase for the breaching, the employment and personal income multipliers do not include it. (All input-output multipliers assume that the initial change is in dollars of sales to final demand not a change in jobs and associated personal income.) Therefore, the direct project jobs and personal income must be added to the values estimated by the multipliers. The sales multiplier of less than one is caused by the high amount of management and engineering services provided from outside the region, the high amount of labor commuting, and the reduction of trade purchases to the trade margin (15% of sales) to satisfy the calibration of the IMPLAN model.

**Table 4-56**  
**ALTERNATE IMPLEMENTATION SPENDING FLOWS <sup>1/</sup>**  
**(\$1,000)**

Year	Alternative A-1 Baseline	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	8,966	7,070	7,070	7,488	8,966	20,000
2002	33,930	26,567	28,811	29,536	36,175	25,000
2003	(25,723) 28,036	21,094	35,091	37,455	41,027	48,685
2004	(11,039) 17,846	12,693	42,165	44,121	43,323	122,405
2005	480	480	28,286	28,910	24,321	202,894
2006	0	0	18,538	14,968	15,610	198,682
2007	0	0	12,020	0	13,599	169,493
2008	0	0	36,121	0	42,117	47,052
2009	0	0	35,984	0	41,957	24,728
2010	0	0	25,919	0	30,222	0

1/ The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The data for the In-River Conditions baseline are shown in parentheses. The baseline data were different for the years 2003 and 2004.

**Table 4-57**  
**CHANGE IN CONSTRUCTION SPENDING FROM**  
**A-1 (BASELINE) TO THE ALTERNATIVES <sup>1/</sup>**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	-1,896	-1,896	-1,478	0	11,034
2002	-7,363	-5,119	-4,394	2,245	-8,930
2003	(-4,629) -6,942	(9,368) 7,055	(11,732) 9,419	(15,304) 12,991	(22,962) 20,649
2004	(1,644) -5,153	(31,116) 24,319	(33,072) 26,275	(32,274) 25,477	(111,356) 104,559
2005	0	27,806	28,430	23,841	202,414
2006	0	18,538	14,968	15,610	198,682
2007	0	12,020	0	13,599	169,493
2008	0	36,121	0	42,117	47,052
2009	0	35,984	0	41,957	24,728
2010	0	25,919	0	30,222	0

1/ The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The data for the In-River Conditions baseline are shown in parentheses. The baseline data were different for the years 2003 and 2004.

These multipliers are applied to the change in spending between the baseline (Alternative A-1) and the other alternatives in order to estimate the direct, indirect, and induced effects on business sales, employment, and personal income.

### **The Direct, Indirect, and Induced Effects of Implementation**

Table 4-56 shows the reported engineering estimates of the USACE outlay for current operations (Alternative A-1) and Alternatives A-2a, A-2b, A-2c, A-2d, and A-3 (breaching). Table 4-57 shows the difference in USACE spending between the baseline (A-1) and the various alternatives. The differences in construction costs shown in Table 4-57 are the Implementation Costs. Tables 4-58 - 5-60 show the estimated direct, indirect, and induced effects of the changes in construction spending on business sales, employment, and personal income in the Lower

Snake River region. The remaining spending for construction engineering and management services would be at an unknown major construction firm located anywhere in the world.

**Table 4-58**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON INDUSTRY SALES OF IMPLEMENTATION <sup>1/</sup>**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	-1,894	-1,894	-1,476	0	11,026
2002	-7,358	-5,115	-4,391	2,243	-8,924
2003	(-4,626) -6,937	(9,361) 7,050	(11,724) 9,412	(15,293) 12,982	(22,945) 20,634
2004	(1,643) -5,149	(31,094) 24,301	(33,048) 26,256	(32,251) 25,459	(111,276) 104,484
2005	0	27,786	28,409	23,824	202,268
2006	0	18,525	14,957	15,599	198,539
2007	0	12,011	0	13,589	169,371
2008	0	36,095	0	42,087	47,018
2009	0	35,958	0	41,927	24,710
2010	0	25,900	0	30,200	0

1/ The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The data for the In-River Conditions baseline are shown in parentheses. The baseline data were different for the years 2003 and 2004.

**Table 4-59**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON EMPLOYMENT OF IMPLEMENTATION** <sup>1/2/</sup>  
**(Jobs)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	-28	-28	-22	0	164
2002	-110	-77	-67	34	132
2003	(695) -103	(140) 105	(176) 140	(229) 193	(343) 308
2004	(24) -77	(465) 362	(495) 392	(483) 381	(1,664) 1,564
2005	0	414	426	355	3,025
2006	0	276	223	235	2,970
2007	0	179	0	203	2,532
2008	0	540	0	629	704
2009	0	538	0	627	369
2010	0	387	0	452	0

1/ Deflated by seven percent to adjust to the 1994 calibration of the IMPLAN input-output model.

2/ The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The data for the In-River Conditions baseline are shown in parentheses. The baseline data were different for the years 2003 and 2004.

**Table 4-60**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON PERSONAL INCOME OF IMPLEMENTATION <sup>1/</sup>**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	-775	-775	-603	0	4,519
2002	-3,009	-2,092	-1,796	917	-3,658
2003	(-1,891) -2,836	(3,828) 2,883	(4,794) 3,849	(6,253) 5,323	(9,408) 8,460
2004	(672) -2,106	(12,715) 9,937	(13,514) 10,738	(13,223) 10,438	(45,624) 42,840
2005	0	11,363	11,617	9,767	82,932
2006	0	7,574	6,117	6,396	81,403
2007	0	4,912	0	5,572	69,443
2008	0	14,760	0	17,255	19,278
2009	0	14,705	0	17,190	10,131
2010	0	10,592	0	12,383	0

1/ The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The data for the In-River Conditions baseline are shown in parentheses. The baseline data were different for the years 2003 and 2004.

Table 4-61 shows the sector by sector effects of breaching in the peak spending year of 2005. Sectors with less than \$100,000 direct, indirect, and induced change in spending are omitted to save space.

**Table 4-61**  
**SECTOR BY SECTOR EFFECTS OF**  
**BREACHING IMPLEMENTATION IN 2005**  
(Sectors with less than \$100,000 change in business sales are excluded)

	ADDITIONAL SALES	% CHANGE IN SECTOR	ADDED EMPLOYMENT <sup>1/</sup>
1 DAIRY/POUL	139836.	0.30	.70
2 CATTLE	426688.	0.18	4.41
6 FEED GRAIN	147008.	0.05	1.42
9 FRUIT/NUTS	224352.	0.09	3.93
10 VEGETABLES	237408.	0.06	1.54
13 NURS/LNDSC	228044.	0.46	6.34
26 NEW GOVT	6376048.	2.89	8.58
27 MAINT RESI	357688.	0.30	4.13
28 MAINT NEC	2167040.	0.39	22.09
29 MEAT PROC	907008.	0.23	2.25
30 DAIRY PROD	556016.	0.30	1.59
31 CAN/FREEZE	1046912.	0.08	5.58
32 OTHER FOOD	654464.	0.28	3.11
33 GRAIN PROC	141732.	0.24	.39
34 TEXTILES	113542.	0.48	1.69
35 LOGGING	142976.	0.03	.65
36 SAWMILLS	355456.	0.06	1.91
37 WOOD PRODU	393840.	0.16	2.43
38 MFG NEC	331224.	0.31	3.60
39 PAPER MILL	286720.	0.04	.78
40 PAPER PROD	169440.	0.73	.94
41 PRINT/PUBL	935632.	0.83	15.17
42 CHEMICALS	165904.	0.07	.71
45 CLAY PROD	320148.	0.92	2.78
48 FAB METALS	299808.	0.13	1.74
49 MACHINERY	117744.	0.10	.93
57 RAILROADS	235824.	0.13	1.54
58 OTHER TRAN	210964.	0.51	5.30
59 TRUCK/WARE	1397120.	0.39	15.86
61 AIR TRANSP	352536.	0.67	2.95
63 TELEPHONE	2390176.	0.76	10.31
64 RADIO/TV	616264.	0.85	4.81
65 ELECTRICIT	572304.	0.23	1.64
66 GAS	232004.	0.54	.47
67 WATER/SANI	292880.	0.24	1.58
68 WHOLESALE	40710464.	4.28	469.80
69 BLDG & GAR	308608.	0.36	7.00
70 DEPT STORE	1341312.	0.77	38.62
71 GROCERIES	1764528.	0.73	52.57
72 AUTO DLRS	2040960.	0.64	35.48
73 APPAREL	284688.	0.79	8.86
74 FURNITURE	524108.	0.79	12.61
75 RESTAURANT	4053824.	0.73	117.34
76 RETAIL NEC	1537344.	0.78	73.36
77 F-I-R-E	16679936.	0.75	88.38
78 LODGING	1594544.	0.82	39.20
79 PER SERVIC	878040.	0.89	31.50
80 BUS SERVIC	1715744.	0.96	49.27
81 DATA PROCE	513192.	0.39	6.30
83 AUTO SERVI	1712976.	0.98	24.00
84 REPAIR SER	703136.	0.90	12.53
85 AMUSEMENTS	1300240.	0.80	36.53

86 HEALTH SER	7379136.	0.80	135.20
87 PROF SERVI	2748928.	0.13	35.28
88 EDUCATION	884224.	0.75	24.26
89 SOC SERVIC	769176.	0.67	25.75
90 ASSOCIATNS	1056032.	0.66	27.71
91 S & L GOVT	910152.	0.70	5.37
92 GOV ELECTR	1791360.	0.23	5.63
93 POSTAL SER	654944.	0.71	8.52
96 HOUSEHOLDS	82962432.	0.80	.00

#### 4.6.7 Avoided Cost Effects

Avoided Cost spending is defined as the difference in operation spending between the baseline alternative (A-1, existing conditions) and the other alternatives under consideration. The estimated direct, indirect, and induced economic effects for the avoided costs result from these operation spending differences (positive or negative).

Table 4-62 shows the projected operation spending for the alternatives under study for the years 2001 through 2100. Subtracting the entries in column one (A-1 Baseline) from the corresponding entries in the other columns results in the difference in operating cost (avoided cost) for Alternatives A-2a, A-2b, A-2c, A-2d and A-3 (breaching). The differences in operating cost (avoided costs) are shown in Table 4-63 for the years 2001 through 2100.

The differences in operating cost are changes in spending flows (either negative or positive) that have negative or positive effects on the region's economy. The geographical distribution of job losses or gains and other spending changes was not known. It was assumed that changes in jobs and spending would occur primarily in the Lower Snake River region (except for imports which are accounted for in the input-output model calibration). The direct, indirect, and induced economic effects were estimated using the Lower Snake River input-output model.

The distribution of spending reductions or increases by type of input also was unknown and a specific set of multipliers for the alternatives could not be created. Instead, the IMPLAN "Government NEC" sector was used to estimate the direct, indirect, and induced economic effects of the avoided costs. The business sales multiplier for the Lower Snake River region for Government NEC is 2.3693. The employment multiplier for the Lower Snake River region for

Government NEC is 0.0000512211. The personal income multiplier for the Lower Snake River region for government NEC is 1.368971. The change in operating spending estimates shown in Table 4-63 were multiplied times the sales, employment, or personal income multipliers to calculate the direct, indirect, and induced economic impacts of the avoided costs.

**Table 4-62**  
**ALTERNATE U S ARMY CORPS OF ENGINEERS**  
**OPERATIONS SPENDING FLOWS**  
**(\$1,000)**

Year	Alternative A-1 Baseline	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	52,740	51,015	56,295	53,662	57,585	49,925
2002	52,740	51,015	56,295	53,662	57,585	49,925
2003	52,740	51,015	56,295	53,662	57,585	49,925
2004	53,651	51,925	57,206	54,573	58,496	50,665
2005	56,330	54,605	59,885	57,252	61,175	53,780
2006	56,330	54,605	59,885	57,252	61,175	44,525
2007	57,915	56,190	61,470	58,837	62,760	30,590
2008	59,733	58,008	63,288	60,655	64,578	30,815
2009	61,371	59,646	64,926	62,293	66,216	30,640
2010	58,346	65,621	61,901	59,268	63,191	30,615
2011	55,532	53,808	59,088	56,455	60,378	30,615
2012	57,668	55,944	61,224	58,591	62,514	30,590
2013	58,160	56,435	61,715	59,082	63,005	30,615
2014	60,780	59,055	64,335	61,702	65,625	30,563
2015	55,875	54,151	59,431	56,798	60,721	30,093
2016	55,954	54,229	59,509	56,876	60,799	29,320
2017	58,139	56,414	61,694	59,061	62,984	29,086
2018	58,160	56,435	61,715	59,082	63,005	28,499
2019	57,428	55,703	60,983	58,350	62,273	28,516
2020	55,554	53,829	59,109	56,476	60,399	28,516
2021	55,543	53,818	59,098	56,465	60,388	28,534
2022	56,846	56,121	60,401	57,768	61,691	28,515
2023	58,134	56,414	61,694	59,061	62,984	28,499
2024	59,931	58,206	63,486	60,853	64,776	28,499
2025	57,557	55,833	61,113	58,480	62,403	28,534

**Table 4-62 (Continued)**  
**ALTERNATE U S ARMY CORPS OF ENGINEERS**  
**OPERATIONS SPENDING FLOWS**  
**(\$1,000)**

Year	Alternative A-1 Baseline	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2026	55,543	53,818	59,098	56,465	60,388	28,516
2027	52,479	52,479	53,960	53,010	53,091	26,054
2028	52,859	52,859	54,340	53,390	53,471	26,054
2029	55,586	55,586	57,067	56,117	56,198	25,124
2030	50,429	50,429	51,910	50,960	51,041	22,763
2031	50,755	50,755	52,236	51,286	51,367	21,600
2032	52,901	52,901	54,382	53,432	53,513	21,600
2033	53,729	53,729	55,210	54,260	54,341	21,600
2034	53,970	53,970	55,451	54,501	54,582	21,600
2035	50,263	50,283	51,744	50,794	50,875	21,600
2036	51,667	51,667	53,148	52,198	52,279	21,600
2037	52,880	52,880	54,361	53,411	53,492	21,600
2038	54,716	54,716	56,197	55,247	55,328	21,600
2039	52,101	52,101	53,582	52,632	52,713	21,600
2040	50,263	50,263	51,744	50,794	50,875	21,600
2041	52,549	52,549	54,030	53,080	53,161	21,600
2042	52,880	52,880	54,361	53,411	53,492	21,600
2043	52,880	52,880	54,361	53,411	53,492	21,600
2044	47,460	47,460	48,941	47,991	48,072	21,600
2045	47,460	47,460	48,941	47,991	48,072	21,600
2046	47,460	47,460	48,941	47,991	48,072	21,600
2047	47,460	47,460	48,941	47,991	48,072	21,600
2048	47,460	47,460	48,941	47,991	48,072	21,600
2049	47,460	47,460	48,941	47,991	48,072	21,600
2050	47,460	47,460	48,941	47,991	48,072	21,600

**Table 4-62 (Continued)**  
**ALTERNATE U S ARMY CORPS OF ENGINEERS**  
**OPERATIONS SPENDING FLOWS**  
**(\$1,000)**

<b>Year</b>	<b>Alternative A-1 Baseline</b>	<b>Alternative A-2a</b>	<b>Alternative A-2b</b>	<b>Alternative A-2c</b>	<b>Alternative A-2d</b>	<b>Alternative A-3 (Breaching)</b>
2051	47,460	47,460	48,941	47,991	48,072	21,600
2052	47,460	47,460	48,941	47,991	48,072	21,600
2053	47,460	47,460	48,941	47,991	48,072	21,600
2054	47,460	47,460	48,941	47,991	48,072	21,600
2055	48,371	48,371	49,852	48,902	48,983	21,600
2056	51,050	51,050	52,531	51,581	51,662	21,600
2057	51,050	51,050	52,531	51,581	51,662	21,600
2058	52,635	52,635	54,116	53,166	53,247	21,600
2059	54,453	54,453	55,934	54,984	55,065	21,600
2060	56,091	56,091	57,572	56,622	56,703	21,600
2061	53,066	53,066	54,547	53,597	53,678	21,600
2062	50,253	50,253	51,734	50,784	50,865	21,600
2063	52,389	52,389	53,870	52,920	53,001	21,600
2064	52,880	52,880	54,361	53,411	53,492	21,600
2065	55,500	55,500	56,981	56,031	56,112	21,600
2066	50,596	50,596	52,077	51,127	51,208	21,600
2067	50,674	50,674	52,155	51,205	51,286	21,600
2068	52,859	52,859	54,340	53,390	53,471	21,600
2069	52,880	52,880	54,361	53,411	53,492	21,600
2070	52,148	52,148	53,629	52,679	52,760	21,600
2071	50,274	50,274	51,755	50,805	50,886	21,600
2072	50,263	50,263	51,744	50,794	50,875	21,600
2073	51,566	51,566	53,047	52,097	52,178	21,600
2074	52,859	52,859	54,340	53,390	53,471	21,600
2075	54,651	54,651	56,132	55,182	55,263	21,600

**Table 62 (Continued)**  
**ALTERNATE U S ARMY CORPS OF ENGINEERS**  
**OPERATIONS SPENDING FLOWS**  
**(\$1,000)**

Year	Alternative A-1 Baseline	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2076	52,278	52,278	53,759	52,809	52,890	21,600
2077	50,263	50,263	51,744	50,794	50,875	21,600
2078	52,479	52,479	53,960	53,010	53,091	21,600
2079	52,859	52,859	54,340	53,390	53,471	21,600
2080	55,586	55,586	57,067	56,117	56,198	21,600
2081	50,429	50,429	51,910	50,960	51,041	21,600
2082	50,755	50,755	52,236	51,286	51,367	21,600
2083	52,901	52,901	54,382	53,432	53,513	21,600
2084	53,729	53,729	55,210	54,280	54,341	21,600
2085	53,970	53,970	55,451	54,501	54,582	21,600
2086	50,263	50,263	51,744	50,794	50,875	21,600
2087	51,667	51,667	53,148	52,198	52,279	21,600
2088	52,880	52,880	54,361	53,411	53,492	21,600
2089	54,716	54,716	56,197	55,247	55,328	21,600
2090	52,101	52,101	53,582	52,632	52,713	21,600
2091	50,263	50,263	51,744	50,794	50,875	21,600
2092	52,549	52,549	54,030	53,080	53,161	21,600
2093	52,880	52,880	54,361	53,411	53,492	21,600
2094	52,880	52,880	54,361	53,411	53,492	21,600
2095	47,460	47,460	48,941	47,991	48,072	21,600
2096	47,460	47,460	48,941	47,991	48,072	21,600
2097	47,460	47,460	48,941	47,991	48,072	21,600
2098	47,460	47,460	48,941	47,991	48,072	21,600
2099	47,460	47,460	48,941	47,991	48,072	21,600
2100	47,460	47,460	48,941	47,991	48,072	21,600

**Table 4-63**  
**CHANGE IN OPERATION SPENDING FROM**  
**A-1 (BASELINE) TO THE ALTERNATIVES**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2001	-1,725	3,555	922	4,845	-2,815
2002	-1,725	3,555	922	4,845	-2,815
2003	-1,725	3,555	922	4,845	-2,815
2004	-1,725	3,555	922	4,845	-2,986
2005	-1,725	3,555	922	4,845	-2,555
2006	-1,725	3,555	922	4,845	-11,805
2007	-1,725	3,555	922	4,845	-27,325
2008	-1,725	3,555	922	4,845	-28,918
2009	-1,725	3,555	922	4,845	-30,731
2010	-1,725	3,555	922	4,845	-27,731
2011	-1,725	3,555	922	4,845	-24,917
2012	-1,725	3,555	922	4,845	-27,077
2013	-1,725	3,555	922	4,845	-27,545
2014	-1,725	3,555	922	4,845	-30,217
2015	-1,725	3,555	922	4,845	-25,782
2016	-1,725	3,555	922	4,845	-26,634
2017	-1,725	3,555	922	4,845	-29,053
2018	-1,725	3,555	922	4,845	-29,661
2019	-1,725	3,555	922	4,845	-28,912
2020	-1,725	3,555	922	4,845	-27,038
2021	-1,725	3,555	922	4,845	-27,009
2022	-1,725	3,555	922	4,845	-28,331
2023	-1,725	3,555	922	4,845	-29,636
2024	-1,725	3,555	922	4,845	-31,432
2025	-1,725	3,555	922	4,845	-29,023

**Table 4-63 (Continued)**  
**CHANGE IN OPERATION SPENDING FROM**  
**A-1 (BASELINE) TO THE ALTERNATIVES**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2026	-1,725	3,555	922	4,845	-27,027
2027	0	1,481	531	612	-26,425
2028	0	1,481	531	612	-26,805
2029	0	1,481	531	612	-30,462
2030	0	1,481	531	612	-27,666
2031	0	1,481	531	612	-29,155
2032	0	1,481	531	612	-31,301
2033	0	1,481	531	612	-32,129
2034	0	1,481	531	612	-32,370
2035	0	1,481	531	612	-28,663
2036	0	1,481	531	612	-30,067
2037	0	1,481	531	612	-31,280
2038	0	1,481	531	612	-33,116
2039	0	1,481	531	612	-30,501
2040	0	1,481	531	612	-28,663
2041	0	1,481	531	612	-30,945
2042	0	1,481	531	612	-31,280
2043	0	1,481	531	612	-31,280
2044	0	1,481	531	612	-25,860
2045	0	1,481	531	612	-25,860
2046	0	1,481	531	612	-25,860
2047	0	1,481	531	612	-25,860
2048	0	1,481	531	612	-25,860
2049	0	1,481	531	612	-25,860
2050	0	1,481	531	612	-25,860

**Table 4-63 (Continued)**  
**CHANGE IN OPERATION SPENDING FROM**  
**A-1 (BASELINE) TO THE ALTERNATIVES**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2051	0	1,481	531	612	-25,860
2052	0	1,481	531	612	-25,860
2053	0	1,481	531	612	-25,860
2054	0	1,481	531	612	-25,860
2055	0	1,481	531	612	-26,771
2056	0	1,481	531	612	-29,450
2057	0	1,481	531	612	-29,450
2058	0	1,481	531	612	-31,035
2059	0	1,481	531	612	-32,853
2060	0	1,481	531	612	-34,491
2061	0	1,481	531	612	-31,466
2062	0	1,481	531	612	-28,653
2063	0	1,481	531	612	-30,789
2064	0	1,481	531	612	-31,280
2065	0	1,481	531	612	-33,900
2066	0	1,481	531	612	-28,969
2067	0	1,481	531	612	-29,074
2068	0	1,481	531	612	-31,259
2069	0	1,481	531	612	-31,280
2070	0	1,481	531	612	-30,548
2071	0	1,481	531	612	-28,674
2072	0	1,481	531	612	-28,663
2073	0	1,481	531	612	-29,966
2074	0	1,481	531	612	-31,259
2075	0	1,481	531	612	-33,051

**Table 4-63 (Continued)**  
**CHANGE IN OPERATION SPENDING FROM**  
**A-1 (BASELINE) TO THE ALTERNATIVES**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d	Alternative A-3 (Breaching)
2076	0	1481	531	612	-30678
2077	0	1481	531	612	-28663
2078	0	1481	531	612	-30879
2079	0	1481	531	612	-31259
2080	0	1481	531	612	-33986
2081	0	1481	531	612	-28829
2082	0	1481	531	612	-29155
2083	0	1481	531	612	-31301
2084	0	1481	531	612	-32129
2085	0	1481	531	612	-32370
2086	0	1481	531	612	-28663
2087	0	1481	531	612	-30067
2088	0	1481	531	612	-31280
2089	0	1481	531	612	-33116
2090	0	1481	531	612	-30501
2091	0	1481	531	612	-28663
2092	0	1481	531	612	-30949
2093	0	1481	531	612	-31280
2094	0	1481	531	612	-31280
2095	0	1481	531	612	-25860
2096	0	1481	531	612	-25860
2097	0	1481	531	612	-25860
2098	0	1481	531	612	-25860
2099	0	1481	531	612	-25860
2100	0	1481	531	612	-25860

### **The Direct, Indirect, and Induced Effects of the Avoided Costs**

The change in spending remains constant between the years 2001 and 2026 and between 2027 and 2100 for the four A-2 alternatives. Thus, the direct, indirect, and induced economic impacts of the A-2 alternatives only need be shown for these two time periods. The economic effects of the four A-2 alternatives are shown in Tables 4-64 to 4-66.

The change in spending for the A-3 (breaching) alternative is relatively stable and shows no trend after 2007. The economic impact estimates for the avoided costs of Alternative A-3 (breaching) are shown in Table 4-67.

Note: The baseline alternative used to construct the tables was labeled, “Option A-1, Existing Conditions - Adaptive Management Strategy.” Another baseline alternative was labeled, “Option A-1a, Existing Conditions - In-River Conditions.” The A-1a baseline data are \$256,000 smaller than the baseline A-1 data for each year. Thus, if the economic effects of a change from the A-1a baseline spending data is calculated, all the spending changes will be increased by \$256,000. The direct, indirect, and induced economic impacts would increase by \$256,000 times the respective multipliers. The additional sales for each year would be  $\$256,000 \times 2.3693 = \$606,541$ . The additional jobs for each year would be  $\$256,000 \times 0.000051221083 = 13.1$  jobs. The additional personal income for each year would be  $\$256,000 \times 1.368971 = \$350,457$ .

**Table 4-64**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON INDUSTRY SALES OF AVOIDED COSTS**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d
2001-2026	-4,087	8,423	2,184	11,479
2027-2100	0	3,509	1,258	1,450

**Table 4-65**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON EMPLOYMENT OF AVOIDED COSTS <sup>1/</sup>**  
**(Jobs)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d
2001-2026	-83	170	44	232
2027-2100	0	71	25	29

1/ Deflated by seven percent to adjust to the 1994 calibration of the IMPLAN input-output model.

**Table 4-66**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS ON PERSONAL INCOME OF AVOIDED COSTS**  
**(\$1,000)**

Year	Alternative A-2a	Alternative A-2b	Alternative A-2c	Alternative A-2d
2001-2026	-2,361	4,867	1,262	6,633
2027-2100	0	2,027	727	838

**Table 4-67**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS OF AVOIDED COSTS FOR ALTERNATIVE A-3 (BREACHING)**

<b>Year</b>	<b>Change in Business Sales (\$1,000)</b>	<b>Change in Employment <sup>1/</sup> (Jobs)</b>	<b>Change in Personal Income (\$1,000)</b>
2001	-6,670	-135	-3,854
2002	-6,670	-135	-3,854
2003	-6,670	-135	-3,854
2004	-7,075	-143	-4,088
2005	-6,054	-122	-3,498
2006	-27,970	-565	-16,161
2007	-64,741	-1,308	-37,407
2008	-68,515	-1,384	-39,588
2009	-72,811	-1,471	-42,070
2010	-65,703	-1,327	-37,963
2011	-59,036	-1,193	-34,111
2012	-64,154	-1,296	-37,068
2013	-65,262	-1,319	-37,708
2014	-71,593	-1,446	-41,366
2015	-61,085	-1,234	-35,295
2016	-63,104	-1,275	-36,461
2017	-68,835	-1,391	-39,773
2018	-70,276	-1,420	-40,605
2019	-68,501	-1,384	-39,580
2020	-64,061	-1,294	-37,014
2021	-63,992	-1,293	-36,925
2022	-67,125	-1,356	-38,784
2023	-70,217	-1,419	-40,571
2024	-74,472	-1,505	-43,029
2025	-68,764	-1,389	-39,732

**Table 4-67 (Continued)**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS OF AVOIDED COSTS FOR ALTERNATIVE A-3 (BREACHING)**

<b>Year</b>	<b>Change in Business Sales (\$1,000)</b>	<b>Change in Employment <sup>1/</sup> (Jobs)</b>	<b>Change in Personal Income (\$1,000)</b>
2026	-64,035	-1,294	-36,999
2027	-62,609	-1,265	-36,175
2028	-63,509	-1,283	-36,695
2029	-72,174	-1,458	-41,702
2030	-65,549	-1,324	-37,874
2031	-69,077	-1,396	-39,912
2032	-74,161	-1,498	-42,850
2033	-76,123	-1,538	-43,984
2034	-76,694	-1,550	-44,314
2035	-67,911	-1,372	-39,239
2036	-71,238	-1,438	-41,161
2037	-74,112	-1,497	-42,821
2038	-78,462	-1,585	-45,335
2039	-72,266	-1,460	-41,755
2040	-67,911	-1,372	-39,239
2041	-73,318	-1,481	-42,363
2042	-74,112	-1,497	-42,821
2043	-74,112	-1,497	-42,821
2044	-61,270	-1,238	-35,402
2045	-61,270	-1,238	-35,402
2046	-61,270	-1,238	-35,402
2047	-61,270	-1,238	-35,402
2048	-61,270	-1,238	-35,402
2049	-61,270	-1,238	-35,402
2050	-61,270	-1,238	-35,402

**Table 4-67 (Continued)**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS OF AVOIDED COSTS FOR ALTERNATIVE A-3 (BREACHING)**

<b>Year</b>	<b>Change in Business Sales (\$1,000)</b>	<b>Change in Employment <sup>1/</sup> (Jobs)</b>	<b>Change in Personal Income (\$1,000)</b>
2051	-61,270	-1,238	-35,402
2052	-61,270	-1,238	-35,402
2053	-61,270	-1,238	-35,402
2054	-61,270	-1,238	-35,402
2055	-63,429	-1,282	-36,649
2056	-69,776	-1,410	-40,316
2057	-69,776	-1,410	-40,316
2058	-73,531	-1,486	-42,486
2059	-77,839	-1,573	-44,975
2060	-81,720	-1,651	-47,217
2061	-74,552	-1,506	-43,076
2062	-67,888	-1,372	-39,225
2063	-72,948	-1,474	-42,149
2064	-74,112	-1,497	-42,821
2065	-80,319	-1,623	-46,408
2066	-68,636	-1,387	-39,658
2067	-68,885	-1,392	-39,804
2068	-74,062	-1,496	-42,793
2069	-74,112	-1,497	-42,821
2070	-72,377	-1,462	-41,819
2071	-67,937	-1,373	-39,254
2072	-67,911	-1,372	-39,239
2073	-70,998	-1,434	-41,023
2074	-74,062	-1,496	-42,793
2075	-78,308	-1,582	-45,246

**Table 4-67 (Continued)**  
**DIRECT, INDIRECT, AND INDUCED ECONOMIC**  
**EFFECTS OF AVOIDED COSTS FOR ALTERNATIVE A-3 (BREACHING)**

Year	Change in Business Sales (\$1,000)	Change in Employment <sup>1/</sup> (Jobs)	Change in Personal Income (\$1,000)
2076	-72,685	-1,469	-41,997
2077	-67,911	-1,372	-39,239
2078	-73,162	-1,478	-42,272
2079	-74,062	-1,496	-42,793
2080	-80,523	-1,627	-46,526
2081	-68,305	-1,380	-39,466
2082	-69,077	-1,396	-39,912
2083	-74,161	-1,498	-42,850
2084	-76,123	-1,538	-43,984
2085	-76,694	-1,550	-44,314
2086	-67,911	-1,372	-39,239
2087	-71,238	-1,439	-41,161
2088	-74,112	-1,497	-42,821
2089	-78,462	-1,585	-45,335
2090	-72,266	-1,460	-41,755
2091	-67,911	-1,372	-39,239
2092	-73,327	-1,482	-42,368
2093	-74,112	-1,497	-42,821
2094	-74,112	-1,497	-42,821
2095	-61,270	-1,238	-35,402
2096	-61,270	-1,238	-35,402
2097	-61,270	-1,238	-35,402
2098	-61,270	-1,238	-35,402
2099	-61,270	-1,238	-35,402
2100	-61,270	-1,238	-35,402

1/ Deflated by seven percent to adjust to the 1994 calibration of the IMPLAN input-output model.

#### **4.6.8 Mitigation Effects**

(Partly Included in the Implementation Effects)

*Data from the DREW Mitigation Study Team not available at the time of this report.*



## APPENDIX I: Input-Output Sector Definitions

Sector Name	Standard Industrial Classification Codes
DAIRY/POUL	0241 - 0259, 0291 (part), 0191 (part)
CATTLE	0211 - 0212, 0219 (part), 0291 (part), 0191 (part)
MEAT ANIMALS NEC	0213 - 0214, 0219 (part), 0291 (part), 0191 (part)
LIVESTOCK NEC	0271 - 0291, 0219 (part), 0291 (part), 0191 (part)
FOOD GRAIN	0111 - 0112, 0291 (part), 0191 (part)
FEED GRAIN	0115, 0291 (part), 0191 (part)
HAY	part of 0139, 0291, 0191
CROPS NEC	part of 0119, 0139, 0191, 0259, 0291
FRUIT/NUTS	0171 - 0179, 0182 (part), 0291 (part), 0191 (part)
VEGETABLES	0134, 0161, part of 0119, 0139, 0291, 0191
SUGAR CROP	0133, 0291 (part), 0191 (part)
OIL CROPS	0116, part of 0119, 0139, 0173, 0191, 0291
FORESTRY	0811, 0831, 0851, 0971
NURSERY/LANDSCAPE	0780, 0181, 0182, 0191
COMMERCIAL FISHING	0910, 0920, 0970
AG SERVICE	0710, 0720, 0740, 0750, 0760
METAL MINE	1010 - 1099
MINES NEC	1411 - 1499 excluding 1442 & 1446
COAL MINES	1220 - 1241
GAS EXTRACTION	1311 - 1389
SAND & GRAVEL	1442, 1446
NEW RESIDENTIAL CONSTRUCT	1521, 1522, 1531
NEW INDUSTRIAL CONSTRUCTION	1541
NEW UTILITY CONSTRUCTION	1623
NEW ROAD CONSTRUCTION	1611
NEW FARM BUILDINGS	1542
NEW EXTRACTION CONSTRUCTION	1629
NEW GOVERNMENT CONSTRUCTION	1622
MAINTENANCE RESIDENTIAL	1711 - 1799
MAINTENANCE NEC	1711 - 1799
MEAT PROCESSING	2011 - 2015
DAIRY PRODUCTION	2021 - 2026
CAN/FREEZE	2032 - 2038, 2091, 2092
FOODS PROCESSING NEC	2061 - 2087, 2095 - 2099
GRAIN PROCESSING	2041 - 2053
MFG NEC	2111 - 2141
TEXTILES	2211 - 2299, 2311 - 2399
LOGGING	2411
SAWMILLS	2421 - 2431
WOOD PRODUCTS	2434 - 2512
PAPER MILLS	2611 - 2631
PAPER PRODUCTS	2652 - 2679
PRINT/PUBLISH	2711 - 2796
CHEMICALS	2812 - 2899
REFINING	2911 - 2999
RUBBER PRODUCTS	3011 - 3089
CLAY PRODUCTS	3241 - 3279
PRIMARY METALS	3312 - 3351 excluding 3334
PRIMARY ALUMINUM	3334
SECONDARY ALUMINUM	3353 - 3355, 3363, 3365

## APPENDIX I: Input-Output Sector Definitions

Sector Name	Standard Industrial Classification Codes
FABRICATED METALS	3411 - 3499
MACHINERY	3511 - 3569, 3581 - 3599
COMPUTERS	3571 - 3579
ELECTRICAL PRODUCTS	3612 - 3648, 3691 - 3699
ELECTRONIC PRODUCTS	3651 - 3679
VEHICLES	3711 - 3716, 3743 - 3751, 3792 - 3799
AIRCRAFT	3721 - 3728, 3761 - 3769
MARINE EQUIPMENT	3731 - 3732
INSTRUMENTS	3812 - 3873
RAILROAD TRANSPORT	4011 - 4013
TRANSPORTATION NEC	4111 - 4173, 4724 - 4789
TRUCKING/WAREHOUSING	4212 - 4231
WATER TRANSPORT	4412 - 4499
AIR TRANSPORT	4512 - 4581
PIPE LINES	4612 - 4619
TELEPHONE	4812 - 4822, 4899
RADIO/TELEVISION	4832 - 4841
ELECTRIC UTILITIES	4911, 4931
GAS UTILITIES	4922, 4925, 4932
WATER/SANITATION UTILITIES	4941 - 4959, 4971
WHOLESALE TRADE	5012 - 5199
BUILDING/GARDEN RETAIL	5211 - 5231, 5251, 5261
DEPT STORE RETAIL	5311 - 5399
GROCERIES RETAIL	5411 - 5499
AUTO DEALER RETAIL	5511 - 5599
APPAREL RETAIL	5611 - 5699
FURNITURE RETAIL	5712 - 5719, 5736
RESTAURANT RETAIL	5812, 5813
RETAIL NEC	5912 - 5999
FINANCE/INSURANCE/REAL EST.	6011 - 6799
LODGING SERVICES	7011 - 7041
PERSONAL SERVICES	7211 - 7299
BUSINESS SERVICES	7311 - 7363, 7383 - 7389
DATA PROCESSING SERVICES	7371 - 7389
DETECTIVE SERVICES	7381, 7382
AUTO SERVICES	7513 - 7549
REPAIR SERVICES	7622 - 7699
AMUSEMENTS	7812 - 7999
HEALTH SERVICES	8011 - 8099
PROFESSIONAL SERVICES	8111, 8711 - 8748
EDUCATION	8211 - 8299
SOCIAL SERVICES	8322 - 8399
ASSOCIATIONS	8412 - 8699
STATE AND LOCAL GOVT	
GOVERNMENT ELECTRICAL UTIL.	4911 (part)
U.S. POSTAL SERVICES	4300
GOVERNMENT NEC	
ERROR	
HOUSEHOLDS	88

## APPENDIX II: Upriver Subregion - Estimated Ownership Composition by Sector

Sector Name	Standard Industrial Classification Codes
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	49.500%
NURSERY/LANDSCAPE	96.600%
COMMERCIAL FISHING	na
AG SERVICE	93.400%
METAL MINE	3.200%
MINES NEC	100.000%
COAL MINES	na
GAS EXTRACTION	na
SAND & GRAVEL	8.800%
NEW RESIDENTIAL CONSTRUCTION	99.900%
NEW INDUSTRIAL CONSTRUCTION	99.900%
NEW UTILITY CONSTRUCTION	27.100%
NEW ROAD CONSTRUCTION	27.100%
NEW FARM BUILDINGS	99.900%
NEW EXTRACTION CONSTRUCTION	27.100%
NEW GOVERNMENT CONSTRUCTION	27.100%
MAINTENANCE RESIDENTIAL	83.100%
MAINTENANCE NEC	83.100%
MEAT PROCESSING	100.000%
DAIRY PRODUCTION	100.000%
CAN/FREEZE	3.100%
FOODS PROCESSING NEC	100.000%
GRAIN PROCESSING	na
MFG NEC	100.000%
TEXTILES	100.000%
LOGGING	63.200%
SAWMILLS	25.300%
WOOD PRODUCTS	28.700%
PAPER MILLS	0.000%
PAPER PRODUCTS	100.000%
PRINT/PUBLISH	11.100%
CHEMICALS	100.000%
REFINING	100.000%
RUBBER PRODUCTS	100.000%
CLAY PRODUCTS	98.000%
PRIMARY METALS	na
PRIMARY ALUMINUM	na
SECONDARY ALUMINUM	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

## APPENDIX II: Upriver Subregion - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
FABRICATED METALS	1.400%
MACHINERY	98.800%
COMPUTERS	na
ELECTRICAL PRODUCTS	0.000%
ELECTRONIC PRODUCTS	na
VEHICLES	100.000%
AIRCRAFT	100.000%
MARINE EQUIPMENT	100.000%
INSTRUMENTS	100.000%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	92.600%
TRUCKING/WAREHOUSING	97.600%
WATER TRANSPORT	52.100% 1/
AIR TRANSPORT	82.400%
PIPE LINES	na
TELEPHONE	39.700%
RADIO/TELEVISION	90.800%
ELECTRIC UTILITIES	71.700%
GAS UTILITIES	na
WATER/SANITATION UTILITIES	94.900%
WHOLESALE TRADE	91.500%
BUILDING/GARDEN RETAIL	95.800%
DEPT STORE RETAIL	32.800%
GROCERIES RETAIL	52.500%
AUTO DEALER RETAIL	71.300%
APPAREL RETAIL	99.700%
FURNITURE RETAIL	100.000%
RESTAURANT RETAIL	95.100%
RETAIL NEC	95.800%
FINANCE/INSURANCE/REAL ESTATE	58.500%
LODGING SERVICES	81.200%
PERSONAL SERVICES	53.500%
BUSINESS SERVICES	98.500%
DATA PROCESSING SERVICES	95.800%
DETECTIVE SERVICES	91.100%
AUTO SERVICES	99.600%
REPAIR SERVICES	96.100%
AMUSEMENTS	57.900%
HEALTH SERVICES	31.300%
PROFESSIONAL SERVICES	20.100%
EDUCATION	na
SOCIAL SERVICES	58.800%
ASSOCIATIONS	22.200%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

1/ This percentage pertains only to locally owned water transport, not to barging.

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape.  
Agricultural sectors by assumption.

### APPENDIX III: Reservoir Subregion - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	100.000%
NURSERY/LANDSCAPE	36.300%
COMMERCIAL FISHING	na
AG SERVICE	73.300%
METAL MINE	na
MINES NEC	50.800%
COAL MINES	na
GAS EXTRACTION	100.000%
SAND & GRAVEL	na
NEW RESIDENTIAL CONSTRUCTION	90.700%
NEW INDUSTRIAL CONSTRUCTION	90.700%
NEW UTILITY CONSTRUCTION	71.800%
NEW ROAD CONSTRUCTION	71.800%
NEW FARM BUILDINGS	90.700%
NEW EXTRACTION CONSTRUCTION	71.800%
NEW GOVERNMENT CONSTRUCTION	71.800%
MAINTENANCE RESIDENTIAL	99.600%
MAINTENANCE NEC	99.600%
MEAT PROCESSING	0.000%
DAIRY PRODUCTION	100.000%
CAN/FREEZE	3.000%
FOODS PROCESSING NEC	92.500%
GRAIN PROCESSING	100.000%
MFG NEC	100.000%
TEXTILES	100.000%
LOGGING	100.000%
SAWMILLS	3.700%
WOOD PRODUCTS	100.000%
PAPER MILLS	0.000%
PAPER PRODUCTS	6.000%
PRINT/PUBLISH	55.700%
CHEMICALS	100.000%
REFINING	100.000%
RUBBER PRODUCTS	100.000%
CLAY PRODUCTS	88.000%
PRIMARY METALS	100.000%
PRIMARY ALUMINUM	na
SECONDARY ALUMINUM	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

### APPENDIX III: Reservoir Subregion - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
FABRICATED METALS	9.100%
MACHINERY	11.300%
COMPUTERS	na
ELECTRICAL PRODUCTS	0.000%
ELECTRONIC PRODUCTS	na
VEHICLES	100.000%
AIRCRAFT	na
MARINE EQUIPMENT	100.000%
INSTRUMENTS	100.000%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	100.000%
TRUCKING/WAREHOUSING	79.200%
WATER TRANSPORT	100.000% <sup>1/</sup>
AIR TRANSPORT	99.300%
PIPE LINES	na
TELEPHONE	13.900%
RADIO/TELEVISION	61.500%
ELECTRIC UTILITIES	67.900%
GAS UTILITIES	100.000%
WATER/SANITATION UTILITIES	28.400%
WHOLESALE TRADE	63.900%
BUILDING/GARDEN RETAIL	95.000%
DEPT STORE RETAIL	26.000%
GROCERIES RETAIL	42.400%
AUTO DEALER RETAIL	95.200%
APPAREL RETAIL	85.200%
FURNITURE RETAIL	96.800%
RESTAURANT RETAIL	84.100%
RETAIL NEC	75.200%
FINANCE/INSURANCE/REAL ESTATE	57.300%
LODGING SERVICES	83.600%
PERSONAL SERVICES	98.200%
BUSINESS SERVICES	45.300%
DATA PROCESSING SERVICES	100.000%
DETECTIVE SERVICES	100.000%
AUTO SERVICES	93.200%
REPAIR SERVICES	100.000%
AMUSEMENTS	44.700%
HEALTH SERVICES	19.800%
PROFESSIONAL SERVICES	7.700%
EDUCATION	na
SOCIAL SERVICES	76.100%
ASSOCIATIONS	89.300%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

1/ This percentage pertains only to locally owned water transport, not to barging.

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

## APPENDIX IV: Downriver Subregion - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	30.000%
NURSERY/LANDSCAPE	24.900%
COMMERCIAL FISHING	100.000%
AG SERVICE	47.800%
METAL MINE	100.000%
MINES NEC	85.700%
COAL MINES	na
GAS EXTRACTION	na
SAND & GRAVEL	51.100%
NEW RESIDENTIAL CONSTRUCTION	59.800%
NEW INDUSTRIAL CONSTRUCTION	59.800%
NEW UTILITY CONSTRUCTION	36.700%
NEW ROAD CONSTRUCTION	36.700%
NEW FARM BUILDINGS	59.800%
NEW EXTRACTION CONSTRUCTION	36.700%
NEW GOVERNMENT CONSTRUCTION	36.700%
MAINTENANCE RESIDENTIAL	34.200%
MAINTENANCE NEC	34.200%
MEAT PROCESSING	0.500%
DAIRY PRODUCTION	na
CAN/FREEZE	4.900%
FOODS PROCESSING NEC	54.400%
GRAIN PROCESSING	16.600%
MFG NEC	36.400%
TEXTILES	70.200%
LOGGING	72.000%
SAWMILLS	6.700%
WOOD PRODUCTS	6.000%
PAPER MILLS	na
PAPER PRODUCTS	na
PRINT/PUBLISH	27.600%
CHEMICALS	0.900%
REFINING	na
RUBBER PRODUCTS	41.700%
CLAY PRODUCTS	32.600%
PRIMARY METALS	3.600%
PRIMARY ALUMINUM	0.000%
SECONDARY ALUMINUM	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

## APPENDIX IV: Downriver Subregion - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
FABRICATED METALS	78.000%
MACHINERY	74.900%
COMPUTERS	na
ELECTRICAL PRODUCTS	100.000%
ELECTRONIC PRODUCTS	34.700%
VEHICLES	100.000%
AIRCRAFT	100.000%
MARINE EQUIPMENT	83.400%
INSTRUMENTS	10.000%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	32.500%
TRUCKING/WAREHOUSING	38.600%
WATER TRANSPORT	97.900% 1/
AIR TRANSPORT	8.300%
PIPE LINES	na
TELEPHONE	7.900%
RADIO/TELEVISION	37.500%
ELECTRIC UTILITIES	5.900%
GAS UTILITIES	14.700%
WATER/SANITATION UTILITIES	63.100%
WHOLESALE TRADE	30.700%
BUILDING/GARDEN RETAIL	47.200%
DEPT STORE RETAIL	14.600%
GROCERIES RETAIL	10.300%
AUTO DEALER RETAIL	46.400%
APPAREL RETAIL	44.000%
FURNITURE RETAIL	53.600%
RESTAURANT RETAIL	52.300%
RETAIL NEC	46.800%
FINANCE/INSURANCE/REAL ESTATE	52.100%
LODGING SERVICES	25.200%
PERSONAL SERVICES	48.400%
BUSINESS SERVICES	15.500%
DATA PROCESSING SERVICES	6.300%
DETECTIVE SERVICES	29.200%
AUTO SERVICES	43.600%
REPAIR SERVICES	61.200%
AMUSEMENTS	35.000%
HEALTH SERVICES	23.600%
PROFESSIONAL SERVICES	3.900%
EDUCATION	na
SOCIAL SERVICES	30.700%
ASSOCIATIONS	19.600%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

1/ This percentage pertains only to locally owned water transport, not to barging.

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape.  
Agricultural sectors by assumption.

## APPENDIX V: Idaho State - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	95.600%
NURSERY/LANDSCAPE	68.600%
COMMERCIAL FISHING	100.000%
AG SERVICE	72.200%
METAL MINE	57.100%
MINES NEC	20.900%
COAL MINES	na
GAS EXTRACTION	100.000%
SAND & GRAVEL	66.200%
NEW RESIDENTIAL CONSTRUCTION	88.200%
NEW INDUSTRIAL CONSTRUCTION	88.200%
NEW UTILITY CONSTRUCTION	15.700%
NEW ROAD CONSTRUCTION	15.700%
NEW FARM BUILDINGS	88.200%
NEW EXTRACTION CONSTRUCTION	15.700%
NEW GOVERNMENT CONSTRUCTION	15.700%
MAINTENANCE RESIDENTIAL	67.400%
MAINTENANCE NEC	67.400%
MEAT PROCESSING	43.700%
DAIRY PRODUCTION	22.800%
CAN/FREEZE	2.800%
FOODS PROCESSING NEC	6.200%
GRAIN PROCESSING	11.100%
MFG NEC	51.500%
TEXTILES	64.000%
LOGGING	22.300%
SAWMILLS	7.800%
WOOD PRODUCTS	23.600%
PAPER MILLS	1.700%
PAPER PRODUCTS	10.300%
PRINT/PUBLISH	82.800%
CHEMICALS	35.700%
REFINING	0.000%
RUBBER PRODUCTS	53.400%
CLAY PRODUCTS	60.500%
PRIMARY METALS	100.000%
PRIMARY ALUMINUM	100.000%
SECONDARY ALUMINUM	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

## APPENDIX V: Idaho State - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
FABRICATED METALS	35.600%
MACHINERY	70.300%
COMPUTERS	13.600%
ELECTRICAL PRODUCTS	16.000%
ELECTRONIC PRODUCTS	2.100%
VEHICLES	11.100%
AIRCRAFT	48.400%
MARINE EQUIPMENT	100.000%
INSTRUMENTS	68.300%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	77.600%
TRUCKING/WAREHOUSING	96.600%
WATER TRANSPORT	71.400% 1/
AIR TRANSPORT	57.600%
PIPE LINES	97.000%
TELEPHONE	0.000%
RADIO/TELEVISION	50.100%
ELECTRIC UTILITIES	22.300%
GAS UTILITIES	53.500%
WATER/SANITATION UTILITIES	60.300%
WHOLESALE TRADE	27.500%
BUILDING/GARDEN RETAIL	74.500%
DEPT STORE RETAIL	85.600%
GROCERIES RETAIL	23.600%
AUTO DEALER RETAIL	68.900%
APPAREL RETAIL	95.500%
FURNITURE RETAIL	86.000%
RESTAURANT RETAIL	0.000%
RETAIL NEC	92.700%
FINANCE/INSURANCE/REAL ESTATE	38.800%
LODGING SERVICES	33.200%
PERSONAL SERVICES	88.100%
BUSINESS SERVICES	61.400%
DATA PROCESSING SERVICES	0.000%
DETECTIVE SERVICES	31.900%
AUTO SERVICES	80.800%
REPAIR SERVICES	98.600%
AMUSEMENTS	100.000%
HEALTH SERVICES	47.200%
PROFESSIONAL SERVICES	90.000%
EDUCATION	na
SOCIAL SERVICES	80.700%
ASSOCIATIONS	40.900%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

1/ This percentage applies only to locally owned water transport, not to barging.

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape.  
Agricultural sectors by assumption.

## APPENDIX VI: Oregon State - Estimated Ownership Composition by Sector

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	80.000%
NURSERY/LANDSCAPE	47.400%
COMMERCIAL FISHING	98.400%
AG SERVICE	78.900%
METAL MINE	80.600%
MINES NEC	77.700%
COAL MINES	18.400%
GAS EXTRACTION	96.000%
SAND & GRAVEL	64.500%
NEW RESIDENTIAL CONSTRUCTION	90.300%
NEW INDUSTRIAL CONSTRUCTION	90.300%
NEW UTILITY CONSTRUCTION	41.800%
NEW ROAD CONSTRUCTION	16.400%
NEW FARM BUILDINGS	90.300%
NEW EXTRACTION CONSTRUCTION	41.800%
NEW GOVERNMENT CONSTRUCTION	41.800%
MAINTENANCE RESIDENTIAL	73.400%
MAINTENANCE NEC	73.400%
MEAT PROCESSING	13.200%
DAIRY PRODUCTION	15.800%
CAN/FREEZE	6.900%
FOODS PROCESSING NEC	21.100%
GRAIN PROCESSING	9.400%
MFG NEC	48.400%
TEXTILES	27.200%
LOGGING	63.400%
SAWMILLS	10.100%
WOOD PRODUCTS	10.400%
PAPER MILLS	1.300%
PAPER PRODUCTS	40.000%
PRINT/PUBLISH	31.300%
CHEMICALS	30.900%
REFINING	29.600%
RUBBER PRODUCTS	34.000%
CLAY PRODUCTS	40.600%
PRIMARY METALS	1.800%
PRIMARY ALUMINUM	5.300%
SECONDARY ALUMINUM	5.300%

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

**APPENDIX VI: Oregon State - Estimated Ownership Composition by Sector**

Sector Name	Ownership Composition (% local)
FABRICATED METALS	38.800%
MACHINERY	34.600%
COMPUTERS	5.800%
ELECTRICAL PRODUCTS	71.400%
ELECTRONIC PRODUCTS	3.900%
VEHICLES	8.300%
AIRCRAFT	5.300%
MARINE EQUIPMENT	21.600%
INSTRUMENTS	5.800%
RAILROAD TRANSPORT	24.900%
TRANSPORTATION NEC	16.100%
TRUCKING/WAREHOUSING	30.200%
WATER TRANSPORT	14.600%
AIR TRANSPORT	12.200%
PIPE LINES	0.000%
TELEPHONE	16.800%
RADIO/TELEVISION	43.400%
ELECTRIC UTILITIES	5.900%
GAS UTILITIES	12.700%
WATER/SANITATION UTILITIES	66.500%
WHOLESALE TRADE	44.500%
BUILDING/GARDEN RETAIL	63.100%
DEPT STORE RETAIL	8.400%
GROCERIES RETAIL	24.300%
AUTO DEALER RETAIL	47.800%
APPAREL RETAIL	29.000%
FURNITURE RETAIL	73.000%
RESTAURANT RETAIL	57.200%
RETAIL NEC	59.500%
FINANCE/INSURANCE/REAL ESTATE	36.300%
LODGING SERVICES	33.600%
PERSONAL SERVICES	66.000%
BUSINESS SERVICES	31.800%
DATA PROCESSING SERVICES	34.000%
DETECTIVE SERVICES	46.600%
AUTO SERVICES	75.800%
REPAIR SERVICES	80.000%
AMUSEMENTS	47.100%
HEALTH SERVICES	26.300%
PROFESSIONAL SERVICES	57.000%
EDUCATION	na
SOCIAL SERVICES	38.600%
ASSOCIATIONS	61.800%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

**APPENDIX VII: Washington State - Estimated Ownership Composition by Sector**

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	74.400%
NURSERY/LANDSCAPE	57.300%
COMMERCIAL FISHING	57.800%
AG SERVICE	48.300%
METAL MINE	28.600%
MINES NEC	54.300%
COAL MINES	1.000%
GAS EXTRACTION	23.200%
SAND & GRAVEL	59.700%
NEW RESIDENTIAL CONSTRUCTION	84.900%
NEW INDUSTRIAL CONSTRUCTION	84.900%
NEW UTILITY CONSTRUCTION	35.700%
NEW ROAD CONSTRUCTION	35.700%
NEW FARM BUILDINGS	84.900%
NEW EXTRACTION CONSTRUCTION	35.700%
NEW GOVERNMENT CONSTRUCTION	35.700%
MAINTENANCE RESIDENTIAL	66.500%
MAINTENANCE NEC	66.500%
MEAT PROCESSING	7.100%
DAIRY PRODUCTION	14.000%
CAN/FREEZE	13.700%
FOODS PROCESSING NEC	14.800%
GRAIN PROCESSING	13.600%
MFG NEC	33.400%
TEXTILES	28.700%
LOGGING	54.600%
SAWMILLS	6.900%
WOOD PRODUCTS	26.400%
PAPER MILLS	1.300%
PAPER PRODUCTS	11.600%
PRINT/PUBLISH	29.000%
CHEMICALS	19.600%
REFINING	3.800%
RUBBER PRODUCTS	34.100%
CLAY PRODUCTS	27.700%
PRIMARY METALS	13.700%
PRIMARY ALUMINUM	0.000%
SECONDARY ALUMINUM	0.000%

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

**APPENDIX VII: Washington State - Estimated Ownership Composition by Sector**

Sector Name	Ownership Composition (% local)
FABRICATED METALS	23.700%
MACHINERY	41.400%
COMPUTERS	4.900%
ELECTRICAL PRODUCTS	27.500%
ELECTRONIC PRODUCTS	13.600%
VEHICLES	24.900%
AIRCRAFT	1.000%
MARINE EQUIPMENT	7.300%
INSTRUMENTS	7.500%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	23.400%
TRUCKING/WAREHOUSING	37.700%
WATER TRANSPORT	10.300%
AIR TRANSPORT	7.800%
PIPE LINES	0.000%
TELEPHONE	6.800%
RADIO/TELEVISION	26.400%
ELECTRIC UTILITIES	6.200%
GAS UTILITIES	9.500%
WATER/SANITATION UTILITIES	41.000%
WHOLESALE TRADE	51.100%
BUILDING/GARDEN RETAIL	53.400%
DEPT STORE RETAIL	3.800%
GROCERIES RETAIL	19.100%
AUTO DEALER RETAIL	49.600%
APPAREL RETAIL	24.100%
FURNITURE RETAIL	55.100%
RESTAURANT RETAIL	49.200%
RETAIL NEC	55.100%
FINANCE/INSURANCE/REAL ESTATE	31.300%
LODGING SERVICES	27.400%
PERSONAL SERVICES	59.300%
BUSINESS SERVICES	36.900%
DATA PROCESSING SERVICES	17.300%
DETECTIVE SERVICES	48.800%
AUTO SERVICES	77.700%
REPAIR SERVICES	73.300%
AMUSEMENTS	39.500%
HEALTH SERVICES	20.500%
PROFESSIONAL SERVICES	37.500%
EDUCATION	na
SOCIAL SERVICES	36.200%
ASSOCIATIONS	51.100%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape. Agricultural sectors by assumption.

**APPENDIX VIII: 3 Subregions Combined - Estimated  
Ownership Composition by Sector**

Sector Name	Ownership Composition (% local)
DAIRY/POUL	100.000%
CATTLE	100.000%
MEAT ANIMALS NEC	100.000%
LIVESTOCK NEC	100.000%
FOOD GRAIN	100.000%
FEED GRAIN	100.000%
HAY	100.000%
CROPS NEC	100.000%
FRUIT/NUTS	100.000%
VEGETABLES	100.000%
SUGAR CROP	100.000%
OIL CROPS	100.000%
FORESTRY	5.200%
NURSERY/LANDSCAPE	19.900%
COMMERCIAL FISHING	100.000%
AG SERVICE	33.400%
METAL MINE	3.200%
MINES NEC	85.200%
COAL MINES	na
GAS EXTRACTION	na
SAND & GRAVEL	13.500%
NEW RESIDENTIAL CONSTRUCTION	70.400%
NEW INDUSTRIAL CONSTRUCTION	70.400%
NEW UTILITY CONSTRUCTION	47.300%
NEW ROAD CONSTRUCTION	47.300%
NEW FARM BUILDINGS	70.400%
NEW EXTRACTION CONSTRUCTION	47.300%
NEW GOVERNMENT CONSTRUCTION	47.300%
MAINTENANCE RESIDENTIAL	47.700%
MAINTENANCE NEC	47.700%
MEAT PROCESSING	0.000%
DAIRY PRODUCTION	100.000%
CAN/FREEZE	4.600%
FOODS PROCESSING NEC	62.700%
GRAIN PROCESSING	17.900%
MFG NEC	32.700%
TEXTILES	70.700%
LOGGING	76.100%
SAWMILLS	8.400%
WOOD PRODUCTS	11.200%
PAPER MILLS	0.000%
PAPER PRODUCTS	8.000%
PRINT/PUBLISH	30.500%
CHEMICALS	1.700%
REFINING	100.000%
RUBBER PRODUCTS	59.300%
CLAY PRODUCTS	37.300%
PRIMARY METALS	7.000%
PRIMARY ALUMINUM	na
SECONDARY ALUMINUM	na

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape.  
Agricultural sectors by assumption.

**APPENDIX VIII: 3 Subregions Combined - Estimated  
Ownership Composition by Sector**

Sector Name	Ownership Composition (% local)
FABRICATED METALS	20.700%
MACHINERY	34.900%
COMPUTERS	na
ELECTRICAL PRODUCTS	0.000%
ELECTRONIC PRODUCTS	34.700%
VEHICLES	100.000%
AIRCRAFT	1.000%
MARINE EQUIPMENT	90.800%
INSTRUMENTS	21.300%
RAILROAD TRANSPORT	na
TRANSPORTATION NEC	32.300%
TRUCKING/WAREHOUSING	49.800%
WATER TRANSPORT	94.900% 1/
AIR TRANSPORT	16.700%
PIPE LINES	na
TELEPHONE	9.100%
RADIO/TELEVISION	26.300%
ELECTRIC UTILITIES	11.000%
GAS UTILITIES	33.500%
WATER/SANITATION UTILITIES	58.200%
WHOLESALE TRADE	42.500%
BUILDING/GARDEN RETAIL	65.300%
DEPT STORE RETAIL	15.800%
GROCERIES RETAIL	19.400%
AUTO DEALER RETAIL	55.500%
APPAREL RETAIL	55.400%
FURNITURE RETAIL	79.200%
RESTAURANT RETAIL	44.400%
RETAIL NEC	57.700%
FINANCE/INSURANCE/REAL ESTATE	54.000%
LODGING SERVICES	36.500%
PERSONAL SERVICES	55.600%
BUSINESS SERVICES	21.800%
DATA PROCESSING SERVICES	8.400%
DETECTIVE SERVICES	35.300%
AUTO SERVICES	59.000%
REPAIR SERVICES	69.500%
AMUSEMENTS	37.900%
HEALTH SERVICES	22.700%
PROFESSIONAL SERVICES	4.600%
EDUCATION	na
SOCIAL SERVICES	41.000%
ASSOCIATIONS	27.800%
STATE AND LOCAL GOVERNMENT	na
GOVERNMENT ELECTRICAL	na
POSTAL SERVICES	na
GOVERNMENT NEC	na
ERROR	na
HOUSEHOLDS	na

1/ This percentage applies only to locally owned water transport, not to barging.

Source: Confidential Quarterly Unemployment Insurance Address File (Form ES-202) data tape.  
Agricultural sectors by assumption.

**APPENDIX IX**  
**Detailed Journey-to-Work Data for the Three Study Subregions**

**Column Headings:**

- column 1 - state and county fips code for place of residence
- column 2 - name of county of residence
- column 3 - name of state of residence
- column 4 - state and county fips code for place of work
- column 5 - name of county where work
- column 6 - name of state where work
- column 7 - industry code
- column 8 - industry sector description
- column 9 - number of jobs in 1980
- column 10 - number of jobs in 1990
- column 11 - average annual wage 1980
- column 12 - average annual wage 1990

FOR	RESCTY	RST	POW	WORKCTY	WST	COMP	COMPDESC	WORKERS80	WORKERS90	AVGWAGE80	AVGWAGE90
02090	FAIRBANKS NORTH	AK	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	13	0	6967	0
16001	ADA	ID	53003	ASOTIN	WA	100000	INDUSTRY NOT	25	0	13689	0
16009	BENEWAH	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	32	42	7830	14180
16009	BENEWAH	ID	53075	WHITMAN	WA	210000	SERVICES	7	22	705	7700
16017	BONNER	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	15	8	11605	12978
16035	CLEARWATER	ID	53003	ASOTIN	WA	100000	INDUSTRY NOT	8	11	10005	13673
16035	CLEARWATER	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	0	5	0	8416
16055	KOOTENAI	ID	53001	ADAMS	WA	100000	INDUSTRY NOT	0	19	0	17976
16055	KOOTENAI	ID	53075	WHITMAN	WA	030000	SELF EMPLOYED	0	21	0	18675
16055	KOOTENAI	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	11	17	12778	15198
16055	KOOTENAI	ID	53075	WHITMAN	WA	140000	CONSTRUCTION	0	28	0	24643
16057	LATAH	ID	53003	ASOTIN	WA	100000	INDUSTRY NOT	28	25	5975	15723
16057	LATAH	ID	53075	WHITMAN	WA	030000	SELF EMPLOYED	48	30	5547	5732
16057	LATAH	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	24	28	9538	10180
16057	LATAH	ID	53075	WHITMAN	WA	110000	FARM	26	15	5113	13320
16057	LATAH	ID	53075	WHITMAN	WA	140000	CONSTRUCTION	12	53	12088	18054
16057	LATAH	ID	53075	WHITMAN	WA	150000	MANUFACTURING	40	17	27205	8424
16057	LATAH	ID	53075	WHITMAN	WA	160000	TRANS-COMM-PUBLIC	79	51	15524	24257
16057	LATAH	ID	53075	WHITMAN	WA	170000	WHOLESALE-RETAIL	134	204	9892	14255
16057	LATAH	ID	53075	WHITMAN	WA	210000	SERVICES	107	196	6548	15982
16057	LATAH	ID	53075	WHITMAN	WA	311000	FED CIVILIAN GOVT	65	63	11208	11395
16057	LATAH	ID	53075	WHITMAN	WA	313000	STATE AND LOCAL	437	893	11585	23141
16061	LEWIS	ID	53003	ASOTIN	WA	100000	INDUSTRY NOT	8	9	2378	18833
16069	NEZ PERCE	ID	53003	ASOTIN	WA	030000	SELF EMPLOYED	102	71	11329	12870
16069	NEZ PERCE	ID	53003	ASOTIN	WA	100000	INDUSTRY NOT	0	15	0	9750

16069	NEZ PERCE	ID	53003	ASOTIN	WA	140000	CONSTRUCTION	105	68	12598	18033
16069	NEZ PERCE	ID	53003	ASOTIN	WA	150000	MANUFACTURING	65	107	13393	19445
16069	NEZ PERCE	ID	53003	ASOTIN	WA	160000	TRANS-COMM-PUBLIC	80	33	17564	18235
16069	NEZ PERCE	ID	53003	ASOTIN	WA	170000	WHOLESALE-RETAIL	159	235	5160	10703
16069	NEZ PERCE	ID	53003	ASOTIN	WA	190000	FINANCE-INSUR-R	34	29	9920	15538
16069	NEZ PERCE	ID	53003	ASOTIN	WA	210000	SERVICES	78	275	6912	11588
16069	NEZ PERCE	ID	53003	ASOTIN	WA	311000	FED CIVILIAN GOVT	0	27	0	68303
16069	NEZ PERCE	ID	53003	ASOTIN	WA	313000	STATE AND LOCAL	41	84	11127	19063
16069	NEZ PERCE	ID	53023	GARFIELD	WA	100000	INDUSTRY NOT	0	16	0	19188
16069	NEZ PERCE	ID	53023	GARFIELD	WA	311000	FED CIVILIAN GOVT	26	10	22005	16500
16069	NEZ PERCE	ID	53075	WHITMAN	WA	100000	INDUSTRY NOT	0	45	0	20223
16069	NEZ PERCE	ID	53075	WHITMAN	WA	140000	CONSTRUCTION	32	10	28755	14550
16069	NEZ PERCE	ID	53075	WHITMAN	WA	170000	WHOLESALE-RETAIL	0	25	0	13965
16069	NEZ PERCE	ID	53075	WHITMAN	WA	313000	STATE AND LOCAL	11	32	17005	14706
41005	CLACKAMAS	OR	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	17	20	68315	16118
41005	CLACKAMAS	OR	53071	WALLA WALLA	WA	170000	WHOLESALE-RETAIL	0	20	0	6475
41049	MORROW	OR	53001	ADAMS	WA	100000	INDUSTRY NOT	0	9	0	13751
41049	MORROW	OR	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	15	8	26705	14661
41059	UMATILLA	OR	53013	COLUMBIA	WA	100000	INDUSTRY NOT	0	14	0	6000
41059	UMATILLA	OR	53013	COLUMBIA	WA	110000	FARM	23	13	2989	6154
41059	UMATILLA	OR	53013	COLUMBIA	WA	150000	MANUFACTURING	0	20	0	10000
41059	UMATILLA	OR	53071	WALLA WALLA	WA	030000	SELF EMPLOYED	39	79	6159	16418
41059	UMATILLA	OR	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	6	17	3005	6759
41059	UMATILLA	OR	53071	WALLA WALLA	WA	110000	FARM	94	205	8983	5314
41059	UMATILLA	OR	53071	WALLA WALLA	WA	140000	CONSTRUCTION	121	20	17552	9250
41059	UMATILLA	OR	53071	WALLA WALLA	WA	150000	MANUFACTURING	201	285	13034	20411
41059	UMATILLA	OR	53071	WALLA WALLA	WA	160000	TRANS-COMM-PUBLIC	41	97	13340	19411

41059	UMATILLA	OR	53071	WALLA WALLA	WA	170000	WHOLESALE-RETAIL	231	179	11873	17834
41059	UMATILLA	OR	53071	WALLA WALLA	WA	190000	FINANCE-INSUR-R	28	21	10510	20210
41059	UMATILLA	OR	53071	WALLA WALLA	WA	210000	SERVICES	168	316	9181	12669
41059	UMATILLA	OR	53071	WALLA WALLA	WA	311000	FED CIVILIAN GOVT	27	154	14816	26112
41059	UMATILLA	OR	53071	WALLA WALLA	WA	313000	STATE AND LOCAL	112	180	8304	23402
41061	UNION	OR	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	0	11	0	14161
41063	WALLOWA	OR	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	2	2	16005	30000
53005	BENTON	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	10	0	0	0
53005	BENTON	WA	53071	WALLA WALLA	WA	110000	FARM	0	48	0	8650
53005	BENTON	WA	53071	WALLA WALLA	WA	140000	CONSTRUCTION	145	67	26865	28585
53005	BENTON	WA	53071	WALLA WALLA	WA	150000	MANUFACTURING	278	465	15196	27721
53005	BENTON	WA	53071	WALLA WALLA	WA	160000	TRANS-COMM-PUBLIC	7	33	4205	24987
53005	BENTON	WA	53071	WALLA WALLA	WA	170000	WHOLESALE-RETAIL	10	116	12005	19443
53005	BENTON	WA	53071	WALLA WALLA	WA	210000	SERVICES	77	15	18383	23788
53005	BENTON	WA	53071	WALLA WALLA	WA	311000	FED CIVILIAN GOVT	17	27	2565	49337
53005	BENTON	WA	53071	WALLA WALLA	WA	313000	STATE AND LOCAL	30	51	18158	22243
53007	CHELAN	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	4	7	13505	16286
53011	CLARK	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	0	21	0	17319
53017	DOUGLAS	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	0	10	0	14750
53017	DOUGLAS	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	0	10	0	11406
53021	FRANKLIN	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	12	65	20178	19862
53021	FRANKLIN	WA	53001	ADAMS	WA	110000	FARM	83	26	9098	9645
53021	FRANKLIN	WA	53001	ADAMS	WA	160000	TRANS-COMM-PUBLIC	55	11	16884	17945
53021	FRANKLIN	WA	53001	ADAMS	WA	170000	WHOLESALE-RETAIL	23	29	6737	8379
53021	FRANKLIN	WA	53001	ADAMS	WA	210000	SERVICES	28	21	1075	8593
53021	FRANKLIN	WA	53001	ADAMS	WA	313000	STATE AND LOCAL	20	14	16381	14826
53021	FRANKLIN	WA	53013	COLUMBIA	WA	100000	INDUSTRY NOT	4	18	10405	13889

53021	FRANKLIN	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	15	18	2005	42156
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	110000	FARM	48	135	9722	7536
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	120000	AG	0	26	0	9119
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	140000	CONSTRUCTION	58	7	13033	32000
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	150000	MANUFACTURING	363	507	14254	22402
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	170000	WHOLESALE-RETAIL	41	99	10883	15322
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	210000	SERVICES	0	31	0	11391
53021	FRANKLIN	WA	53071	WALLA WALLA	WA	313000	STATE AND LOCAL	38	29	5227	23219
53025	GRANT	WA	53001	ADAMS	WA	030000	SELF EMPLOYED	66	59	6758	17880
53025	GRANT	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	31	37	18849	21618
53025	GRANT	WA	53001	ADAMS	WA	110000	FARM	56	121	7332	11480
53025	GRANT	WA	53001	ADAMS	WA	150000	MANUFACTURING	141	154	7712	23364
53025	GRANT	WA	53001	ADAMS	WA	170000	WHOLESALE-RETAIL	62	88	14926	16479
53025	GRANT	WA	53001	ADAMS	WA	210000	SERVICES	22	21	7606	10665
53025	GRANT	WA	53001	ADAMS	WA	313000	STATE AND LOCAL	56	36	10979	10805
53025	GRANT	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	2	20	8505	23441
53033	KING	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	13	29	8005	23065
53033	KING	WA	53071	WALLA WALLA	WA	160000	TRANS-COMM-PUBLIC	28	0	19034	0
53037	KITTITAS	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	11	10	10005	16160
53041	LEWIS	WA	53071	WALLA WALLA	WA	030000	SELF EMPLOYED	30	0	6866	0
53041	LEWIS	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	15	0	11005	0
53043	LINCOLN	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	27	53	25805	18660
53043	LINCOLN	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	10	10	18469	40466
53051	PEND OREILLE	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	19	0	16468	0
53061	SNOHOMISH	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	4	16	725	26000
53063	SPOKANE	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	8	28	7005	13014
53063	SPOKANE	WA	53023	GARFIELD	WA	100000	INDUSTRY NOT	0	2	0	15000

53063	SPOKANE	WA	53023	GARFIELD	WA	140000	CONSTRUCTION	28	0	23320	0
53063	SPOKANE	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	39	23	5558	25214
53063	SPOKANE	WA	53071	WALLA WALLA	WA	140000	CONSTRUCTION	11	25	8005	31491
53063	SPOKANE	WA	53071	WALLA WALLA	WA	313000	STATE AND LOCAL	44	0	4089	0
53063	SPOKANE	WA	53075	WHITMAN	WA	030000	SELF EMPLOYED	46	32	12847	25009
53063	SPOKANE	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	0	23	0	10830
53063	SPOKANE	WA	53075	WHITMAN	WA	140000	CONSTRUCTION	60	41	18355	23259
53063	SPOKANE	WA	53075	WHITMAN	WA	150000	MANUFACTURING	21	21	8574	23400
53063	SPOKANE	WA	53075	WHITMAN	WA	170000	WHOLESALE-RETAIL	14	31	5919	26229
53063	SPOKANE	WA	53075	WHITMAN	WA	210000	SERVICES	17	25	3205	25091
53063	SPOKANE	WA	53075	WHITMAN	WA	313000	STATE AND LOCAL	17	66	7076	12273
53065	STEVENS	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	0	6	0	26703
53065	STEVENS	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	27	0	9008	0
53065	STEVENS	WA	53075	WHITMAN	WA	313000	STATE AND LOCAL	25	0	4005	0
53077	YAKIMA	WA	53001	ADAMS	WA	100000	INDUSTRY NOT	23	0	10861	0
53077	YAKIMA	WA	53001	ADAMS	WA	110000	FARM	24	11	10885	7616
53077	YAKIMA	WA	53001	ADAMS	WA	120000	AG	23	7	3735	9000
53077	YAKIMA	WA	53001	ADAMS	WA	140000	CONSTRUCTION	33	0	9735	0
53077	YAKIMA	WA	53071	WALLA WALLA	WA	100000	INDUSTRY NOT	12	25	32005	19879
53077	YAKIMA	WA	53071	WALLA WALLA	WA	140000	CONSTRUCTION	31	0	33489	0
53077	YAKIMA	WA	53071	WALLA WALLA	WA	313000	STATE AND LOCAL	37	0	7342	0
53077	YAKIMA	WA	53075	WHITMAN	WA	100000	INDUSTRY NOT	4	7	12005	18680

FOR	RESCTY	RST	POW	WORKCTY	WST	COMP	COMPDESC	WORKERS80	WORKERS90	AVGWAGE80	AVGWAGE90
41067	WASHINGTON	OR	41027	HOOD RIVER	OR	030000	SELF EMPLOYED	0	26	0	6185
53025	GRANT	WA	53021	FRANKLIN	WA	030000	SELF EMPLOYED	51	0	11754	0
53071	WALLA WALLA	WA	41059	UMATILLA	OR	030000	SELF EMPLOYED	26	61	11041	28098
53071	WALLA WALLA	WA	53005	BENTON	WA	030000	SELF EMPLOYED	16	22	-205	9543
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	030000	SELF EMPLOYED	44	28	16923	20135
53033	KING	WA	53005	BENTON	WA	030000	SELF EMPLOYED	33	24	11578	15533
53011	CLARK	WA	53059	SKAMANIA	WA	030000	SELF EMPLOYED	15	20	14005	13180
53077	YAKIMA	WA	53005	BENTON	WA	030000	SELF EMPLOYED	81	31	7558	1839
53015	COMLITZ	WA	53059	SKAMANIA	WA	030000	SELF EMPLOYED	23	0	3304	0
53001	ADAMS	WA	53021	FRANKLIN	WA	030000	SELF EMPLOYED	4	35	30005	23436
16057	LATAH	ID	53021	FRANKLIN	WA	100000	INDUSTRY NOT	0	17	0	14436
16061	LEWIS	ID	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	4	0	31000
16001	ADA	ID	41059	UMATILLA	OR	100000	INDUSTRY NOT	5	9	2795	13000
16017	BONNER	ID	53005	BENTON	WA	100000	INDUSTRY NOT	4	4	0	17000
16069	NEZ PERCE	ID	53005	BENTON	WA	100000	INDUSTRY NOT	19	14	18442	14205
16069	NEZ PERCE	ID	53021	FRANKLIN	WA	100000	INDUSTRY NOT	20	0	21805	0
16075	PAYETTE	ID	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	7	0	11000
41051	MULTNOMAH	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	39	12	35448	27076
41051	MULTNOMAH	OR	41049	MORROW	OR	100000	INDUSTRY NOT	20	0	22783	0
41051	MULTNOMAH	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	23	10	13722	9000
41051	MULTNOMAH	OR	41065	WASCO	OR	100000	INDUSTRY NOT	0	27	0	142008
41051	MULTNOMAH	OR	53005	BENTON	WA	100000	INDUSTRY NOT	29	8	20026	34000
41031	JEFFERSON	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	4	0	13750
41031	JEFFERSON	OR	41065	WASCO	OR	100000	INDUSTRY NOT	26	36	10480	13405
41039	LANE	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	9	6	15005	25000
41039	LANE	OR	41049	MORROW	OR	100000	INDUSTRY NOT	24	4	20370	45000

41039	LANE	OR	53005	BENTON	WA	100000	INDUSTRY NOT	27	0	10107	0
41041	LINCOLN	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	0	20	0	43700
41061	UNION	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	33	54	9201	17652
41061	UNION	OR	53005	BENTON	WA	100000	INDUSTRY NOT	2	9	34005	28311
41063	WALLOWA	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	12	17	6240	20529
41067	WASHINGTON	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	12	11	2705	5798
41067	WASHINGTON	OR	41065	WASCO	OR	100000	INDUSTRY NOT	26	30	19463	22368
41001	BAKER	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	29	27	5176	18052
41003	BENTON	OR	41065	WASCO	OR	100000	INDUSTRY NOT	6	6	3005	5389
41003	BENTON	OR	53059	SKAMANIA	WA	100000	INDUSTRY NOT	32	0	13771	0
41005	CLACKAMAS	OR	41021	GILLIAM	OR	100000	INDUSTRY NOT	23	0	17570	0
41005	CLACKAMAS	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	51	33	17056	37218
41005	CLACKAMAS	OR	41049	MORROW	OR	100000	INDUSTRY NOT	4	9	10005	47538
41005	CLACKAMAS	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	16	0	19035	0
41005	CLACKAMAS	OR	41065	WASCO	OR	100000	INDUSTRY NOT	27	32	7761	33051
41005	CLACKAMAS	OR	53005	BENTON	WA	100000	INDUSTRY NOT	23	10	19527	41000
41035	KLAMATH	OR	53005	BENTON	WA	100000	INDUSTRY NOT	20	0	7605	0
41005	CLACKAMAS	OR	53039	Klickitat	WA	100000	INDUSTRY NOT	12	17	28005	22133
41007	CLATSOP	OR	41021	GILLIAM	OR	100000	INDUSTRY NOT	0	9	0	8616
41009	COLUMBIA	OR	53059	SKAMANIA	WA	100000	INDUSTRY NOT	27	0	16508	0
41023	GRANT	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	6	13	21078	20000
41067	WASHINGTON	OR	53039	Klickitat	WA	100000	INDUSTRY NOT	22	0	15187	0
41067	WASHINGTON	OR	53059	SKAMANIA	WA	100000	INDUSTRY NOT	11	1	6005	27000
41069	WHEELER	OR	41021	GILLIAM	OR	100000	INDUSTRY NOT	12	24	19593	13923
41069	WHEELER	OR	41049	MORROW	OR	100000	INDUSTRY NOT	2	4	10005	18500
41069	WHEELER	OR	41065	WASCO	OR	100000	INDUSTRY NOT	2	3	2005	41000
41043	LINN	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	9	0	52941

41045	MALHEUR	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	37	19	14002	12816
41045	MALHEUR	OR	53021	FRANKLIN	WA	100000	INDUSTRY NOT	5	0	5489	0
41047	MARION	OR	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	0	15	0	16333
41047	MARION	OR	41049	MORROW	OR	100000	INDUSTRY NOT	0	9	0	30000
41047	MARION	OR	41059	UMATILLA	OR	100000	INDUSTRY NOT	28	19	18612	17869
41051	MULTNOMAH	OR	53039	KLICKITAT	WA	100000	INDUSTRY NOT	0	39	0	30808
41051	MULTNOMAH	OR	53059	SKAMANIA	WA	100000	INDUSTRY NOT	23	25	15868	17343
41053	POLK	OR	41065	WASCO	OR	100000	INDUSTRY NOT	0	31	0	15439
53047	OKANOGAN	WA	53005	BENTON	WA	100000	INDUSTRY NOT	10	0	17945	0
53023	GARFIELD	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	8	0	23562
53023	GARFIELD	WA	53005	BENTON	WA	100000	INDUSTRY NOT	12	3	14405	32000
53025	GRANT	WA	53005	BENTON	WA	100000	INDUSTRY NOT	7	23	8648	28557
53071	WALLA WALLA	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	11	17	8005	15618
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	23	9	8666	18333
53071	WALLA WALLA	WA	53039	KLICKITAT	WA	100000	INDUSTRY NOT	0	11	0	12342
53033	KING	WA	41065	WASCO	OR	100000	INDUSTRY NOT	23	5	27614	35857
53033	KING	WA	53005	BENTON	WA	100000	INDUSTRY NOT	0	18	0	27333
53033	KING	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	0	16	0	22875
53011	CLARK	WA	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	11	43	13505	27229
53025	GRANT	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	24	48	16234	20945
53011	CLARK	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	20	0	13484
53011	CLARK	WA	41065	WASCO	OR	100000	INDUSTRY NOT	13	6	40005	15091
53011	CLARK	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	17	15	15005	29860
53011	CLARK	WA	53039	KLICKITAT	WA	100000	INDUSTRY NOT	26	10	23605	-6499
53011	CLARK	WA	53059	SKAMANIA	WA	100000	INDUSTRY NOT	29	37	20626	20070
53013	COLUMBIA	WA	53005	BENTON	WA	100000	INDUSTRY NOT	13	6	4685	42900
53013	COLUMBIA	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	14	4	9705	27000

53075	WHITMAN	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	13	6	12005	24167
53075	WHITMAN	WA	53005	BENTON	WA	100000	INDUSTRY NOT	24	13	3193	12153
53075	WHITMAN	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	45	26	4618	13826
53077	YAKIMA	WA	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	0	18	0	19953
53077	YAKIMA	WA	41055	SHERMAN	OR	100000	INDUSTRY NOT	0	12	0	5600
53077	YAKIMA	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	15	0	47267
53077	YAKIMA	WA	53005	BENTON	WA	100000	INDUSTRY NOT	0	7	0	10282
53077	YAKIMA	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	13	25	15505	34084
53077	YAKIMA	WA	53039	Klickitat	WA	100000	INDUSTRY NOT	14	26	9005	37038
53061	SNHOMISH	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	0	19	0	23648
53061	SNHOMISH	WA	53005	BENTON	WA	100000	INDUSTRY NOT	34	12	18550	43000
53061	SNHOMISH	WA	53059	SKAMANIA	WA	100000	INDUSTRY NOT	5	13	13005	13518
53063	SPOKANE	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	14	0	19719	0
53063	SPOKANE	WA	53005	BENTON	WA	100000	INDUSTRY NOT	20	6	14303	30000
53063	SPOKANE	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	15	28	1805	25714
53065	STEVENS	WA	53005	BENTON	WA	100000	INDUSTRY NOT	0	8	0	24750
53065	STEVENS	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	4	5	20005	36000
53037	KITTITAS	WA	53005	BENTON	WA	100000	INDUSTRY NOT	4	2	30145	14340
53043	LINCOLN	WA	53005	BENTON	WA	100000	INDUSTRY NOT	5	1	20605	26000
53043	LINCOLN	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	7	14	32005	20514
53067	THURSTON	WA	53005	BENTON	WA	100000	INDUSTRY NOT	25	4	7425	41000
53051	PEND OREILLE	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	6	2	26005	21000
53003	ASOTIN	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	9	0	6938	0
53007	CHELAN	WA	53005	BENTON	WA	100000	INDUSTRY NOT	0	25	0	19647
53007	CHELAN	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	27	26	1928	24885
53015	COWLITZ	WA	53059	SKAMANIA	WA	100000	INDUSTRY NOT	27	18	19269	33444
53053	PIERCE	WA	53005	BENTON	WA	100000	INDUSTRY NOT	49	24	32460	24825

53053	PIERCE	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	6	16	25005	24968
53001	ADAMS	WA	41059	UMATILLA	OR	100000	INDUSTRY NOT	12	3	28325	21000
53001	ADAMS	WA	53005	BENTON	WA	100000	INDUSTRY NOT	26	52	10255	29212
53001	ADAMS	WA	53021	FRANKLIN	WA	100000	INDUSTRY NOT	27	30	18931	16141
53057	SKAGIT	WA	41027	HOOD RIVER	OR	100000	INDUSTRY NOT	0	6	0	60163
53071	WALLA WALLA	WA	41059	UMATILLA	OR	110000	FARM	147	119	8751	9961
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	110000	FARM	11	49	16005	22333
53077	YAKIMA	WA	41027	HOOD RIVER	OR	110000	FARM	0	24	0	8633
53077	YAKIMA	WA	53005	BENTON	WA	110000	FARM	223	413	3701	10354
53077	YAKIMA	WA	53021	FRANKLIN	WA	110000	FARM	27	32	5205	8613
53001	ADAMS	WA	53021	FRANKLIN	WA	110000	FARM	95	92	9020	11586
53071	WALLA WALLA	WA	41059	UMATILLA	OR	120000	AG	0	30	0	11593
41051	MULTNOMAH	OR	41027	HOOD RIVER	OR	140000	CONSTRUCTION	5	34	26235	22429
41039	LANE	OR	53059	SKAMANIA	WA	140000	CONSTRUCTION	28	0	31934	0
41061	UNION	OR	41059	UMATILLA	OR	140000	CONSTRUCTION	2	21	17505	20715
41067	WASHINGTON	OR	41027	HOOD RIVER	OR	140000	CONSTRUCTION	20	0	16085	0
41029	JACKSON	OR	41027	HOOD RIVER	OR	140000	CONSTRUCTION	21	0	13119	0
41047	MARION	OR	41049	MORROW	OR	140000	CONSTRUCTION	22	0	7355	0
41051	MULTNOMAH	OR	53059	SKAMANIA	WA	140000	CONSTRUCTION	60	7	23336	37000
53025	GRANT	WA	53005	BENTON	WA	140000	CONSTRUCTION	85	1	17958	39900
53071	WALLA WALLA	WA	41059	UMATILLA	OR	140000	CONSTRUCTION	54	0	15838	0
53071	WALLA WALLA	WA	53005	BENTON	WA	140000	CONSTRUCTION	128	59	27555	31266
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	140000	CONSTRUCTION	30	19	20005	14603
53033	KING	WA	53005	BENTON	WA	140000	CONSTRUCTION	48	25	18728	71092
53025	GRANT	WA	53021	FRANKLIN	WA	140000	CONSTRUCTION	60	0	17037	0
53011	CLARK	WA	53005	BENTON	WA	140000	CONSTRUCTION	24	0	28280	0
53011	CLARK	WA	53059	SKAMANIA	WA	140000	CONSTRUCTION	359	0	19771	0

53077	YAKIMA	WA	53005	BENTON	WA	140000	CONSTRUCTION	998	132	21923	26579
53077	YAKIMA	WA	53021	FRANKLIN	WA	140000	CONSTRUCTION	25	6	22285	32000
53061	SNOHOMISH	WA	53005	BENTON	WA	140000	CONSTRUCTION	22	8	16564	50000
53063	SPOKANE	WA	53005	BENTON	WA	140000	CONSTRUCTION	81	18	20136	23389
53063	SPOKANE	WA	53021	FRANKLIN	WA	140000	CONSTRUCTION	56	14	15261	16357
53067	THURSTON	WA	53005	BENTON	WA	140000	CONSTRUCTION	24	0	33370	0
53053	PIERCE	WA	53005	BENTON	WA	140000	CONSTRUCTION	20	0	29255	0
53001	ADAMS	WA	53005	BENTON	WA	140000	CONSTRUCTION	20	0	23653	0
41005	CLACKAMAS	OR	41059	UMATILLA	OR	150000	MANUFACTURING	29	0	17122	0
53025	GRANT	WA	53005	BENTON	WA	150000	MANUFACTURING	23	6	6614	33767
53071	WALLA WALLA	WA	41059	UMATILLA	OR	150000	MANUFACTURING	155	150	9977	16598
53071	WALLA WALLA	WA	53005	BENTON	WA	150000	MANUFACTURING	85	46	19804	27162
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	150000	MANUFACTURING	66	74	12568	21138
53033	KING	WA	53005	BENTON	WA	150000	MANUFACTURING	50	6	18506	22000
53011	CLARK	WA	53059	SKAMANIA	WA	150000	MANUFACTURING	0	40	0	21441
53077	YAKIMA	WA	53005	BENTON	WA	150000	MANUFACTURING	652	480	13731	27457
53077	YAKIMA	WA	53021	FRANKLIN	WA	150000	MANUFACTURING	0	25	0	19720
53077	YAKIMA	WA	53039	Klickitat	WA	150000	MANUFACTURING	0	32	0	24526
53001	ADAMS	WA	53021	FRANKLIN	WA	150000	MANUFACTURING	30	83	10455	17106
16075	PAYETTE	ID	41059	UMATILLA	OR	160000	TRANS-COMM-PUBLIC	22	0	2085	0
41051	MULTNOMAH	OR	41059	UMATILLA	OR	160000	TRANS-COMM-PUBLIC	0	24	0	42933
53025	GRANT	WA	53005	BENTON	WA	160000	TRANS-COMM-PUBLIC	35	0	15412	0
53071	WALLA WALLA	WA	41059	UMATILLA	OR	160000	TRANS-COMM-PUBLIC	26	65	12799	25768
53071	WALLA WALLA	WA	53005	BENTON	WA	160000	TRANS-COMM-PUBLIC	80	52	16296	35125
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	160000	TRANS-COMM-PUBLIC	138	55	19001	28967
53033	KING	WA	53005	BENTON	WA	160000	TRANS-COMM-PUBLIC	24	0	23413	0
53033	KING	WA	53021	FRANKLIN	WA	160000	TRANS-COMM-PUBLIC	0	20	0	21623

53077	YAKIMA	WA	53005	BENTON	WA	160000	TRANS-COMM-PUBLIC	236	182	20164	32822
53077	YAKIMA	WA	53021	FRANKLIN	WA	160000	TRANS-COMM-PUBLIC	28	25	8648	27679
53063	SPOKANE	WA	53005	BENTON	WA	160000	TRANS-COMM-PUBLIC	0	21	0	18905
53063	SPOKANE	WA	53021	FRANKLIN	WA	160000	TRANS-COMM-PUBLIC	14	25	24005	31484
53071	WALLA WALLA	WA	41059	UMATILLA	OR	170000	WHOLESALE-RETAIL	151	103	9581	10803
53071	WALLA WALLA	WA	53005	BENTON	WA	170000	WHOLESALE-RETAIL	30	51	15821	7541
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	170000	WHOLESALE-RETAIL	178	153	12467	11099
53033	KING	WA	53005	BENTON	WA	170000	WHOLESALE-RETAIL	29	15	22771	30200
53077	YAKIMA	WA	53005	BENTON	WA	170000	WHOLESALE-RETAIL	255	185	12178	14256
53063	SPOKANE	WA	53005	BENTON	WA	170000	WHOLESALE-RETAIL	29	16	21522	31317
53001	ADAMS	WA	53021	FRANKLIN	WA	170000	WHOLESALE-RETAIL	24	73	7114	23522
53077	YAKIMA	WA	53005	BENTON	WA	190000	FINANCE-INSUR-R	28	16	6634	16188
41051	MULTNOMAH	OR	41027	HOOD RIVER	OR	210000	SERVICES	35	26	9087	15105
41051	MULTNOMAH	OR	41059	UMATILLA	OR	210000	SERVICES	30	0	3181	0
41031	JEFFERSON	OR	41065	WASCO	OR	210000	SERVICES	15	37	8685	7270
41005	CLACKAMAS	OR	41027	HOOD RIVER	OR	210000	SERVICES	29	44	24348	17929
53071	WALLA WALLA	WA	41059	UMATILLA	OR	210000	SERVICES	22	147	10335	18063
53071	WALLA WALLA	WA	53005	BENTON	WA	210000	SERVICES	103	103	17795	17861
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	210000	SERVICES	73	52	4552	18364
53033	KING	WA	53005	BENTON	WA	210000	SERVICES	0	33	0	13867
53077	YAKIMA	WA	53005	BENTON	WA	210000	SERVICES	221	337	19530	32039
53077	YAKIMA	WA	53021	FRANKLIN	WA	210000	SERVICES	0	58	0	37045
41051	MULTNOMAH	OR	41027	HOOD RIVER	OR	311000	FED CIVILIAN GOVT	0	24	0	37586
41005	CLACKAMAS	OR	41027	HOOD RIVER	OR	311000	FED CIVILIAN GOVT	0	32	0	26703
41023	GRANT	OR	41059	UMATILLA	OR	311000	FED CIVILIAN GOVT	0	55	0	17018
53025	GRANT	WA	53005	BENTON	WA	311000	FED CIVILIAN GOVT	4	29	22215	33556
53071	WALLA WALLA	WA	53005	BENTON	WA	311000	FED CIVILIAN GOVT	22	68	4003	34035

53011	CLARK	WA	53059	SKAMANIA	WA	311000	FED CIVILIAN GOVT	77	10	13107	12100
53077	YAKIMA	WA	53005	BENTON	WA	311000	FED CIVILIAN GOVT	168	288	15954	33252
53077	YAKIMA	WA	53021	FRANKLIN	WA	311000	FED CIVILIAN GOVT	23	0	14577	0
53011	CLARK	WA	53059	SKAMANIA	WA	312000	FED MILITARY GOVT	45	0	18120	0
41051	MULTNOMAH	OR	41027	HOOD RIVER	OR	313000	STATE AND LOCAL	0	36	0	15990
41051	MULTNOMAH	OR	53059	SKAMANIA	WA	313000	STATE AND LOCAL	0	26	0	29091
53071	WALLA WALLA	WA	41059	UMATILLA	OR	313000	STATE AND LOCAL	86	84	9714	17813
53071	WALLA WALLA	WA	53005	BENTON	WA	313000	STATE AND LOCAL	26	59	13697	20371
53071	WALLA WALLA	WA	53021	FRANKLIN	WA	313000	STATE AND LOCAL	91	92	10530	21696
53011	CLARK	WA	53059	SKAMANIA	WA	313000	STATE AND LOCAL	0	68	0	20855
53075	WHITMAN	WA	53005	BENTON	WA	313000	STATE AND LOCAL	27	0	10020	0
53077	YAKIMA	WA	53005	BENTON	WA	313000	STATE AND LOCAL	209	125	13046	22219
53077	YAKIMA	WA	53021	FRANKLIN	WA	313000	STATE AND LOCAL	20	10	12005	18000
53063	SPOKANE	WA	53005	BENTON	WA	313000	STATE AND LOCAL	35	0	14633	0
53001	ADAMS	WA	53021	FRANKLIN	WA	313000	STATE AND LOCAL	0	34	0	9157

FOR	RESCTY	RST	POW	WORKCTY	WST	COMP	COMPDESC	WORKERS80	WORKERS90	AVGWAGE80	AVGWAGE90
16001	ADA	ID	16037	CUSTER	ID	100000	INDUSTRY NOT	0	13	0	18090
16001	ADA	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	0	32	0	41095
16001	ADA	ID	16049	IDAHO	ID	140000	CONSTRUCTION	0	22	0	20818
16001	ADA	ID	16069	NEZ PERCE	ID	140000	CONSTRUCTION	22	0	20466	0
16001	ADA	ID	16069	NEZ PERCE	ID	160000	TRANS-COMM-PUBLIC	26	0	32598	0
16001	ADA	ID	16085	VALLEY	ID	100000	INDUSTRY NOT	30	61	19733	14674
16003	ADAMS	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	11	10	9787	22100
16003	ADAMS	ID	16085	VALLEY	ID	100000	INDUSTRY NOT	21	70	8037	18309
16003	ADAMS	ID	16085	VALLEY	ID	170000	WHOLESALE-RETAIL	12	29	3538	7963
16003	ADAMS	ID	16085	VALLEY	ID	210000	SERVICES	15	25	6612	6613
16009	BENEWAH	ID	16057	LATAH	ID	100000	INDUSTRY NOT	9	30	14505	16202
16011	BINGHAM	ID	16037	CUSTER	ID	100000	INDUSTRY NOT	22	18	12626	34613
16011	BINGHAM	ID	16059	LEMHI	ID	100000	INDUSTRY NOT	14	0	31965	0
16011	BINGHAM	ID	16059	LEMHI	ID	150000	MANUFACTURING	28	0	23900	0
16013	BLAINE	ID	16037	CUSTER	ID	100000	INDUSTRY NOT	4	2	3605	4507
16013	BLAINE	ID	16059	LEMHI	ID	100000	INDUSTRY NOT	0	12	0	12595
16015	BOISE	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	13	3	9013	36848
16017	BONNER	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	28	0	22387	0
16017	BONNER	ID	16057	LATAH	ID	100000	INDUSTRY NOT	0	13	0	3767
16017	BONNER	ID	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	14	20	25005	12340
16019	BONNEVILLE	ID	16037	CUSTER	ID	100000	INDUSTRY NOT	0	13	0	34846
16019	BONNEVILLE	ID	16059	LEMHI	ID	100000	INDUSTRY NOT	0	10	0	7066
16023	BUTTE	ID	16037	CUSTER	ID	100000	INDUSTRY NOT	15	6	17438	10467
16027	CANYON	ID	16085	VALLEY	ID	030000	SELF EMPLOYED	21	4	15005	6000
16027	CANYON	ID	16085	VALLEY	ID	100000	INDUSTRY NOT	0	10	0	9957
16041	FRANKLIN	ID	16069	NEZ PERCE	ID	150000	MANUFACTURING	40	0	9558	0

16055	KOOTENAI	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	3	0	11005	0
16055	KOOTENAI	ID	16049	IDAHO	ID	150000	MANUFACTURING	20	0	25005	0
16055	KOOTENAI	ID	16057	LATAH	ID	100000	INDUSTRY NOT	18	40	2505	18236
16055	KOOTENAI	ID	16057	LATAH	ID	313000	STATE AND LOCAL	28	3	15005	20000
16055	KOOTENAI	ID	16059	LEMHI	ID	100000	INDUSTRY NOT	0	4	0	27982
16055	KOOTENAI	ID	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	0	13	0	12567
16055	KOOTENAI	ID	16069	NEZ PERCE	ID	140000	CONSTRUCTION	12	22	26005	28000
16055	KOOTENAI	ID	16069	NEZ PERCE	ID	150000	MANUFACTURING	20	4	24205	25332
16075	PAYETTE	ID	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	11	0	16823	0
16079	SHOSHONE	ID	16085	VALLEY	ID	100000	INDUSTRY NOT	0	21	0	18918
16085	VALLEY	ID	16049	IDAHO	ID	100000	INDUSTRY NOT	21	2	14214	31621
(bad data deleted)											
30081	RAVALLI	MT	16059	LEMHI	ID	100000	INDUSTRY NOT	0	9	0	16029
41023	GRANT	OR	41063	WALLOWA	OR	100000	INDUSTRY NOT	0	4	0	22000
41059	UMATILLA	OR	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	7	7	16005	92351
41059	UMATILLA	OR	41063	WALLOWA	OR	100000	INDUSTRY NOT	20	7	7275	10069
41061	UNION	OR	41063	WALLOWA	OR	100000	INDUSTRY NOT	17	45	3217	14959
49057	WEBER	UT	16037	CUSTER	ID	100000	INDUSTRY NOT	15	0	13805	0
53003	ASOTIN	WA	16049	IDAHO	ID	100000	INDUSTRY NOT	17	11	20315	17951
53003	ASOTIN	WA	16057	LATAH	ID	100000	INDUSTRY NOT	10	44	8189	21273
53003	ASOTIN	WA	16057	LATAH	ID	210000	SERVICES	0	53	0	11845
53003	ASOTIN	WA	16061	LEWIS	ID	100000	INDUSTRY NOT	14	8	30005	22425
53003	ASOTIN	WA	16069	NEZ PERCE	ID	030000	SELF EMPLOYED	157	166	17248	34348
53003	ASOTIN	WA	16069	NEZ PERCE	ID	110000	FARM	21	9	6005	7667
53003	ASOTIN	WA	16069	NEZ PERCE	ID	120000	AG	18	26	16172	18934
53003	ASOTIN	WA	16069	NEZ PERCE	ID	140000	CONSTRUCTION	167	85	12901	33416
53003	ASOTIN	WA	16069	NEZ PERCE	ID	150000	MANUFACTURING	1125	943	16213	28380

53003	ASOTTIN	WA	16069	NEZ PERCE	ID	160000	TRANS-COMM-PUBLIC	292	128	15622	21093
53003	ASOTTIN	WA	16069	NEZ PERCE	ID	170000	WHOLESALE-RETAIL	953	875	9372	15882
53003	ASOTTIN	WA	16069	NEZ PERCE	ID	190000	FINANCE-INSUR-R	135	161	9351	21650
53003	ASOTTIN	WA	16069	NEZ PERCE	ID	210000	SERVICES	458	625	10001	15581
53003	ASOTTIN	WA	16069	NEZ PERCE	ID	311000	FED CIVILIAN GOVT	46	24	24160	26240
53003	ASOTTIN	WA	16069	NEZ PERCE	ID	313000	STATE AND LOCAL	187	243	8442	19267
53005	BENTON	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	23	21	28440	51108
53023	GARFIELD	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	29	44	15092	16946
53047	OKANOGAN	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	14	3	14005	48800
53047	OKANOGAN	WA	16069	NEZ PERCE	ID	110000	FARM	20	0	7505	0
53063	SPOKANE	WA	16057	LATAH	ID	100000	INDUSTRY NOT	19	20	21563	15500
53063	SPOKANE	WA	16057	LATAH	ID	140000	CONSTRUCTION	35	0	15684	0
53063	SPOKANE	WA	16057	LATAH	ID	170000	WHOLESALE-RETAIL	26	0	10456	0
53063	SPOKANE	WA	16061	LEWIS	ID	100000	INDUSTRY NOT	0	16	0	18625
53063	SPOKANE	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	49	14	16391	57143
53063	SPOKANE	WA	16069	NEZ PERCE	ID	140000	CONSTRUCTION	53	19	24069	29026
53063	SPOKANE	WA	16069	NEZ PERCE	ID	150000	MANUFACTURING	20	0	23369	0
53071	WALLA WALLA	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	4	0	35005	0
53071	WALLA WALLA	WA	16069	NEZ PERCE	ID	150000	MANUFACTURING	21	0	32005	0
53075	WHITMAN	WA	16049	IDAHO	ID	100000	INDUSTRY NOT	32	0	8596	0
53075	WHITMAN	WA	16057	LATAH	ID	030000	SELF EMPLOYED	61	26	7570	18945
53075	WHITMAN	WA	16057	LATAH	ID	100000	INDUSTRY NOT	8	21	7649	15834
53075	WHITMAN	WA	16057	LATAH	ID	110000	FARM	10	20	9509	23940
53075	WHITMAN	WA	16057	LATAH	ID	140000	CONSTRUCTION	32	17	10400	19756
53075	WHITMAN	WA	16057	LATAH	ID	150000	MANUFACTURING	30	26	19234	22519
53075	WHITMAN	WA	16057	LATAH	ID	160000	TRANS-COMM-PUBLIC	21	20	24386	10220
53075	WHITMAN	WA	16057	LATAH	ID	170000	WHOLESALE-RETAIL	166	159	6087	10482

53075	WHITMAN	WA	16057	LATAH	ID	210000	SERVICES	130	145	6878	15535
53075	WHITMAN	WA	16057	LATAH	ID	313000	STATE AND LOCAL	145	167	14184	19265
53075	WHITMAN	WA	16069	NEZ PERCE	ID	100000	INDUSTRY NOT	56	49	10249	18514
53075	WHITMAN	WA	16069	NEZ PERCE	ID	150000	MANUFACTURING	5	31	14005	19800

## APPENDIX X

### Grain and Field Bean Wholesalers (Including Grain Elevators): Washington

UNION ELEVATOR & WHSE CO  
L & 1ST  
LIND  
WA 99341  
509-677-3441

WASHTUCNA GR GROWERS INC  
HWY 260  
WASHTUCNA  
WA 99371  
509-646-3223

RITZVILLE WAREHOUSE CO  
201 E 1ST AVE  
RITZVILLE  
WA 99169  
509-659-0130

GEARHEART BROTHERS INC  
895 BROADWAY  
OTHELLO  
WA 99344  
509-488-5242

STEGNER GRAIN & SEED CO  
2051 WILMA DRIVE  
CLARKSTON  
WA 99403  
208-746-8000

PENDELTON GRAIN  
8TH & BENNETT  
PROSSER  
WA 99350  
509-786-3031

RIVER GRAIN INC  
206 N BENTON  
KENNEWICK  
WA 99336  
509-736-0533

M & E SEED & GRAIN  
500 7TH STREET  
PROSSER  
WA 99350  
509-786-3446

COLUMBIA COUNTY GRAIN  
210 E MAIN  
DAYTON  
WA 99328  
509-382-2571

CONNELL GRAIN GROWERS  
433 N COLUMBIA AVE  
CONNELL  
WA 99326  
509-234-4061

LOUIS DREYFUS  
5252 BURR CANYON RD  
PASCO

WA 99301  
2033578444

EPPICH GRAIN INC  
151 CANAL BLVD  
MESA  
WA 99343  
509-269-4693

POMEROY GRAIN GROW INC  
W 910 MAIN ST  
POMEROY  
WA 99347

COLUMBIA BEAN & PRODUCE  
RD O  
MOSES LAKE  
WA 98837  
509-765-8893

TOUCHET VALLEY GRAIN GWR  
112 E FRONT  
WAITSBURG  
WA 99361  
509-337-6633

WALLA WALLA GR GRWRS INC  
850 N 4TH ST  
WALLA WALLA  
WA 99362  
509-525-6510

TOMCO SEED CO INC  
819 COUNTRY CLUB RD  
WALLA WALLA  
WA 99362  
509-749-2237

WOLF GRAIN & HAY  
1065 MERRY LANE RT 6  
BURBANK  
WA 99352  
509-545-1466

CARGILL INCORPORATED  
100 BLOCK SOUTH MAIN  
COLFAX  
WA 99111

THE GARFIELD UNION WHSE  
3RD & MAIN  
GARFIELD  
WA 99130  
509-635-1104

LA CROSSE GR GROWERS INC  
UNKNOWNEN  
LA CROSSE  
WA 99143

PALOUSE GRAIN  
110 MAIN ST  
PALOUSE

WA 99161  
509-878-1621

UNIONTOWN COOP ASSN  
101 OWEN ST  
UNIONTOWN  
WA 99179  
509-229-3828

WHEAT GROWERS ENDICOTT I  
PO BOX 415  
ENDICOTT  
WA 99125

ALMOTA ELEVATOR CO/  
SOUTH 120 MAIN  
COLFAX  
WA 99111  
509-397-3456

WALLACE GRAIN & PEA CO  
620 SPOKANE AVE  
PALOUSE  
WA 99161  
509-878-1561

AUVIL WARNER CO  
P O BOX 14  
BELMONT  
WA 99104  
509-285-4251

E C HAY AND SON INC  
S 107 CROSBY ST  
TEKOA  
WA 99033

STATE LINE PROCESSORS  
N 148 CROSBY ST  
TEKOA  
WA 99033  
509-284-4101

INLAND EMPIRE MILLING CO  
P O BOX 118  
ST JOHN  
WA 99171  
206-648-3366

WHITMAN COUNTY  
N 204 MAIN ST  
COLFAX  
WA 99111  
509-397-4381

BUNGE CORPORATION  
612 N MAIN  
COLFAX  
WA 99111  
314-872-3030

SCHIERMAN ELEVATOR CO  
RT 1 BOX L  
ST JOHN  
WA 99171  
509-648-3713

S & R GRAIN CO  
RT 3 BOX 68  
COLFAX  
WA 99111  
509-397-4653

COLUMBIA GRAIN INTERNATI  
S 320  
COLFAX  
WA 99111  
503-224-8624

L R AND STANLEY STROTHER  
PARKATO RD  
PARKER  
WA 98939  
509-877-3511

SOURCE: Form ES-202 Washington State Datafile

**APPENDIX XI**  
**Reservoir Subregion Angler Spending Survey**  
**(The Recreation Survey is similar)**



9. Expenditures made by your group while traveling to the Lower Snake River fishing site.

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

10. Expenditures made by your group while at the Lower Snake River fishing site.

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

11. Expenditures made by your group on the return trip back home.

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

**APPENDIX XII**  
**IMPLAN Spending Calibrations for Construction Sectors**

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW RESIDENTIAL STRUCTURES

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 36)	.0001
FEED GRAIN ( 39)	.0001
HAY/PASTUR ( 48)	.0000
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY ( 64)	.0000
NURSERY LA ( 27)	.0004
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 56)	.0000
COAL MINES	.0000
SAND & GRV ( 61)	.0000
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 29)	.0004
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 58)	.0000
FOODS NEC ( 63)	.0000
GRAIN PROD	.0000
TEXTILES ( 50)	.0000
LOGGING ( 33)	.0002
SAWMILLS ( 5)	.0283
WOOD PROD ( 8)	.0166
MFG NEC ( 32)	.0002
PAPER PROD ( 69)	.0000
PRINT/PUBL ( 38)	.0001
CHEMICALS ( 52)	.0000
RUBBER PRO ( 62)	.0000
CLAY PRODS ( 43)	.0001
PRI METALS ( 54)	.0000
ALUMINUM ( 65)	.0000
FAB METLAS ( 41)	.0001
MACHINERY ( 34)	.0002
ELECTRIC ( 24)	.0007
ELECTRONIC ( 49)	.0000

VEHICLES ( 59)	.0000
AIRCRAFT ( 67)	.0000
BOATS ( 68)	.0000
INSTRUMENT ( 53)	.0000
RAILROADS ( 23)	.0007
TRANS NEC ( 44)	.0001
TRUCK WH ( 14)	.0059
WATER TRAN ( 51)	.0000
AIR TRAN ( 42)	.0001
PIPELINES ( 60)	.0000
TELEPHONE ( 22)	.0008
RADIO TV ( 35)	.0001
ELECT UTIL ( 40)	.0001
GAS UTIL ( 46)	.0000
WATER/SANI ( 30)	.0003
WHOLESALE ( 7)	.0170
BLD MATERI ( 16)	.0035
DEPT STORE ( 12)	.0066
GROCERIES ( 9)	.0119
AUTO DLRS ( 4)	.0508
APPAREL ( 19)	.0016
FURNITURE ( 17)	.0029
RESTAURANT ( 25)	.0005
RETAIL NEC ( 10)	.0118
F-I-R-E ( 13)	.0059
LODGING ( 21)	.0008
PERS SERV ( 45)	.0000
BUS SERV ( 15)	.0051
DATA PROC	.0000
DETECTIVE ( 55)	.0000
AUTO SERV ( 20)	.0015
REPAIR SER ( 18)	.0024
AMUSEMENTS ( 47)	.0000
HEALTH SER ( 66)	.0000
PROF SERV ( 11)	.0084
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS ( 57)	.0000
S & L GOVT ( 31)	.0003
GOV ELECTR ( 26)	.0005
POSTAL SER ( 37)	.0001
GOVT NEC	.0000
HOUSEHOLDS ( 1)	.4338
IND-BUS-TX ( 6)	.0234
PROFITS ( 3)	.1124
IMPORTS ( 2)	.2425

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW INDUSTRIAL AND COMMERCIAL BUILDINGS

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 39)	.0001
FEED GRAIN ( 42)	.0001
HAY/PASTUR ( 49)	.0000
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY ( 63)	.0000
NURSERY LA ( 30)	.0003
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 51)	.0000
COAL MINES	.0000
SAND & GRV ( 58)	.0000
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 26)	.0003
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 56)	.0000
FOODS NEC ( 62)	.0000
GRAIN PROD	.0000
TEXTILES ( 47)	.0000
LOGGING ( 54)	.0000
SAWMILLS ( 13)	.0023
WOOD PROD ( 7)	.0076
MFG NEC ( 20)	.0006
PAPER PROD ( 68)	.0000
PRINT/PUBL ( 57)	.0000
CHEMICALS ( 50)	.0000
RUBBER PRO ( 64)	.0000
CLAY PRODS ( 40)	.0001
PRI METALS ( 48)	.0000
ALUMINUM ( 61)	.0000
FAB METLAS ( 29)	.0003
MACHINERY ( 32)	.0002
ELECTRIC ( 17)	.0009
ELECTRONIC ( 43)	.0001

VEHICLES ( 55)	.0000
AIRCRAFT ( 66)	.0000
BOATS ( 67)	.0000
INSTRUMENT ( 37)	.0001
RAILROADS ( 25)	.0003
TRANS NEC ( 46)	.0000
TRUCK WH ( 10)	.0041
WATER TRAN ( 52)	.0000
AIR TRAN ( 33)	.0002
PIPELINES ( 59)	.0000
TELEPHONE ( 19)	.0007
RADIO TV	.0000
ELECT UTIL ( 41)	.0001
GAS UTIL ( 45)	.0000
WATER/SANI ( 24)	.0003
WHOLESALE ( 6)	.0133
BLD MATERI ( 28)	.0003
DEPT STORE ( 22)	.0005
GROCERIES ( 15)	.0010
AUTO DLRS ( 9)	.0041
APPAREL ( 36)	.0001
FURNITURE ( 31)	.0002
RESTAURANT ( 27)	.0003
RETAIL NEC ( 16)	.0010
F-I-R-E ( 8)	.0056
LODGING ( 18)	.0009
PERS SERV ( 38)	.0001
BUS SERV ( 14)	.0013
DATA PROC	.0000
DETECTIVE ( 53)	.0000
AUTO SERV ( 12)	.0024
REPAIR SER ( 11)	.0028
AMUSEMENTS ( 44)	.0000
HEALTH SER ( 65)	.0000
PROF SERV ( 4)	.0296
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS ( 60)	.0000
S & L GOVT ( 35)	.0001
GOV ELECTR ( 23)	.0004
POSTAL SER ( 34)	.0001
GOVT NEC	.0000
HOUSEHOLDS ( 1)	.6038
IND-BUS-TX ( 5)	.0291
PROFITS ( 3)	.0971
IMPORTS ( 2)	.1863

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW UTILITY STRUCTURES

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 38)	.0001
FEED GRAIN ( 41)	.0001
HAY/PASTUR ( 47)	.0000
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY ( 64)	.0000
NURSERY LA ( 37)	.0001
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 48)	.0000
COAL MINES	.0000
SAND & GRV ( 57)	.0000
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 27)	.0003
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 55)	.0000
FOODS NEC ( 51)	.0000
GRAIN PROD	.0000
TEXTILES ( 52)	.0000
LOGGING ( 58)	.0000
SAWMILLS ( 16)	.0011
WOOD PROD ( 8)	.0055
MFG NEC ( 43)	.0001
PAPER PROD	.0000
PRINT/PUBL ( 61)	.0000
CHEMICALS ( 49)	.0000
RUBBER PRO ( 65)	.0000
CLAY PRODS ( 42)	.0001
PRI METALS ( 36)	.0001
ALUMINUM ( 66)	.0000
FAB METLAS ( 30)	.0002
MACHINERY ( 19)	.0007
ELECTRIC ( 25)	.0003
ELECTRONIC ( 53)	.0000

VEHICLES ( 59)	.0000
AIRCRAFT ( 62)	.0000
BOATS ( 67)	.0000
INSTRUMENT ( 32)	.0002
RAILROADS ( 29)	.0002
TRANS NEC ( 46)	.0000
TRUCK WH ( 10)	.0037
WATER TRAN ( 50)	.0000
AIR TRAN ( 34)	.0001
PIPELINES ( 54)	.0000
TELEPHONE ( 24)	.0004
RADIO TV	.0000
ELECT UTIL ( 40)	.0001
GAS UTIL ( 45)	.0000
WATER/SANI ( 26)	.0003
WHOLESALE ( 6)	.0099
BLD MATERI ( 21)	.0005
DEPT STORE ( 17)	.0010
GROCERIES ( 12)	.0018
AUTO DLRS ( 7)	.0078
APPAREL ( 28)	.0002
FURNITURE ( 22)	.0004
RESTAURANT ( 39)	.0001
RETAIL NEC ( 13)	.0018
F-I-R-E ( 9)	.0041
LODGING ( 20)	.0005
PERS SERV ( 33)	.0001
BUS SERV ( 14)	.0018
DATA PROC	.0000
DETECTIVE ( 56)	.0000
AUTO SERV ( 15)	.0017
REPAIR SER ( 11)	.0028
AMUSEMENTS ( 44)	.0000
HEALTH SER ( 63)	.0000
PROF SERV ( 4)	.0592
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS ( 60)	.0000
S & L GOVT ( 35)	.0001
GOV ELECTR ( 23)	.0004
POSTAL SER ( 31)	.0002
GOVT NEC	.0000
HOUSEHOLDS ( 1)	.5013
IND-BUS-TX ( 5)	.0284
PROFITS ( 2)	.2207
IMPORTS ( 3)	.1405

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW HIGHWAYS AND STREETS

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 28)	.0004
FEED GRAIN ( 31)	.0004
HAY/PASTUR ( 42)	.0001
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY ( 63)	.0000
NURSERY LA ( 14)	.0033
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 30)	.0004
COAL MINES	.0000
SAND & GRV ( 39)	.0002
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 26)	.0005
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 57)	.0000
FOODS NEC ( 64)	.0000
GRAIN PROD	.0000
TEXTILES ( 53)	.0000
LOGGING ( 55)	.0000
SAWMILLS ( 15)	.0014
WOOD PROD ( 13)	.0036
MFG NEC ( 44)	.0001
PAPER PROD	.0000
PRINT/PUBL ( 59)	.0000
CHEMICALS ( 47)	.0001
RUBBER PRO ( 65)	.0000
CLAY PRODS ( 22)	.0008
PRI METALS ( 54)	.0000
ALUMINUM ( 66)	.0000
FAB METLAS ( 27)	.0005
MACHINERY ( 50)	.0001
ELECTRIC ( 41)	.0002
ELECTRONIC ( 46)	.0001

VEHICLES ( 56)	.0000
AIRCRAFT ( 62)	.0000
BOATS ( 60)	.0000
INSTRUMENT ( 52)	.0001
RAILROADS ( 21)	.0010
TRANS NEC ( 49)	.0001
TRUCK WH ( 5)	.0206
WATER TRAN ( 45)	.0001
AIR TRAN ( 38)	.0002
PIPELINES ( 48)	.0001
TELEPHONE ( 19)	.0010
RADIO TV	.0000
ELECT UTIL ( 43)	.0001
GAS UTIL ( 51)	.0001
WATER/SANI ( 25)	.0005
WHOLESALE ( 7)	.0158
BLD MATERI ( 32)	.0004
DEPT STORE ( 24)	.0007
GROCERIES ( 16)	.0013
AUTO DLRS ( 12)	.0055
APPAREL ( 40)	.0002
FURNITURE ( 33)	.0003
RESTAURANT ( 34)	.0003
RETAIL NEC ( 17)	.0013
F-I-R-E ( 10)	.0096
LODGING ( 18)	.0012
PERS SERV ( 36)	.0003
BUS SERV ( 11)	.0061
DATA PROC	.0000
DETECTIVE ( 58)	.0000
AUTO SERV ( 8)	.0116
REPAIR SER ( 9)	.0107
AMUSEMENTS ( 35)	.0003
HEALTH SER ( 61)	.0000
PROF SERV ( 4)	.0562
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS	.0000
S & L GOVT ( 37)	.0002
GOV ELECTR ( 23)	.0007
POSTAL SER ( 29)	.0004
GOVT NEC	.0000
HOUSEHOLDS ( 1)	.3622
IND-BUS-TX ( 6)	.0192
PROFITS ( 3)	.1574
IMPORTS ( 2)	.3010

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW FARM STRUCTURES

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 33)	.0003
FEED GRAIN ( 38)	.0002
HAY/PASTUR ( 49)	.0001
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY	.0000
NURSERY LA ( 23)	.0010
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 52)	.0000
COAL MINES	.0000
SAND & GRV ( 56)	.0000
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 27)	.0008
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 53)	.0000
FOODS NEC	.0000
GRAIN PROD	.0000
TEXTILES ( 43)	.0001
LOGGING ( 34)	.0003
SAWMILLS ( 6)	.0353
WOOD PROD ( 7)	.0185
MFG NEC ( 35)	.0003
PAPER PROD	.0000
PRINT/PUBL ( 58)	.0000
CHEMICALS ( 42)	.0001
RUBBER PRO ( 60)	.0000
CLAY PRODS ( 41)	.0001
PRI METALS ( 46)	.0001
ALUMINUM ( 59)	.0000
FAB METLAS ( 24)	.0010
MACHINERY ( 39)	.0002
ELECTRIC ( 19)	.0012
ELECTRONIC ( 54)	.0000

VEHICLES ( 57)	.0000
AIRCRAFT	.0000
BOATS	.0000
INSTRUMENT ( 51)	.0001
RAILROADS ( 20)	.0012
TRANS NEC ( 47)	.0001
TRUCK WH ( 11)	.0133
WATER TRAN ( 48)	.0001
AIR TRAN ( 44)	.0001
PIPELINES ( 50)	.0001
TELEPHONE ( 17)	.0023
RADIO TV	.0000
ELECT UTIL ( 40)	.0002
GAS UTIL ( 45)	.0001
WATER/SANI ( 25)	.0009
WHOLESALE ( 5)	.0360
BLD MATERI ( 22)	.0010
DEPT STORE ( 18)	.0019
GROCERIES ( 15)	.0035
AUTO DLRS ( 10)	.0147
APPAREL ( 31)	.0005
FURNITURE ( 26)	.0008
RESTAURANT ( 37)	.0003
RETAIL NEC ( 16)	.0034
F-I-R-E ( 12)	.0115
LODGING ( 29)	.0007
PERS SERV ( 36)	.0003
BUS SERV ( 13)	.0058
DATA PROC	.0000
DETECTIVE ( 55)	.0000
AUTO SERV ( 8)	.0154
REPAIR SER ( 14)	.0036
AMUSEMENTS	.0000
HEALTH SER ( 61)	.0000
PROF SERV ( 4)	.0365
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS	.0000
S & L GOVT ( 32)	.0003
GOV ELECTR ( 21)	.0011
POSTAL SER ( 30)	.0006
GOVT NEC	.0000
HOUSEHOLDS ( 2)	.2189
IND-BUS-TX ( 9)	.0151
PROFITS ( 3)	.0652
IMPORTS ( 1)	.4839

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW MINERAL EXTRACTION FACILITIES

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 22)	.0000
FEED GRAIN ( 23)	.0000
HAY/PASTUR ( 29)	.0000
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY	.0000
NURSERY LA	.0000
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC	.0000
COAL MINES	.0000
SAND & GRV	.0000
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 19)	.0001
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 12)	.0004
FOODS NEC	.0000
GRAIN PROD	.0000
TEXTILES	.0000
LOGGING	.0000
SAWMILLS ( 17)	.0001
WOOD PROD	.0000
MFG NEC ( 30)	.0000
PAPER PROD	.0000
PRINT/PUBL ( 15)	.0001
CHEMICALS ( 13)	.0002
RUBBER PRO	.0000
CLAY PRODS	.0000
PRI METALS ( 25)	.0000
ALUMINUM	.0000
FAB METLAS ( 21)	.0000
MACHINERY ( 31)	.0000
ELECTRIC	.0000
ELECTRONIC	.0000

VEHICLES	.0000
AIRCRAFT	.0000
BOATS	.0000
INSTRUMENT	.0000
RAILROADS ( 8)	.0010
TRANS NEC	.0000
TRUCK WH ( 7)	.0019
WATER TRAN ( 32)	.0000
AIR TRAN ( 26)	.0000
PIPELINES ( 33)	.0000
TELEPHONE ( 10)	.0007
RADIO TV ( 14)	.0001
ELECT UTIL ( 20)	.0001
GAS UTIL ( 24)	.0000
WATER/SANI ( 34)	.0000
WHOLESALE ( 4)	.0088
BLD MATERI	.0000
DEPT STORE	.0000
GROCERIES	.0000
AUTO DLRS ( 35)	.0000
APPAREL	.0000
FURNITURE	.0000
RESTAURANT	.0000
RETAIL NEC	.0000
F-I-R-E ( 5)	.0034
LODGING ( 27)	.0000
PERS SERV	.0000
BUS SERV ( 6)	.0020
DATA PROC ( 28)	.0000
DETECTIVE	.0000
AUTO SERV ( 36)	.0000
REPAIR SER ( 18)	.0001
AMUSEMENTS	.0000
HEALTH SER	.0000
PROF SERV	.0000
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS	.0000
S & L GOVT ( 16)	.0001
GOV ELECTR ( 11)	.0005
POSTAL SER	.0000
GOVT NEC	.0000
HOUSEHOLDS ( 1)	.7006
IND-BUS-TX ( 9)	.0008
PROFITS ( 2)	.2363
IMPORTS ( 3)	.0423

INDUSTRY PURCHASE COEFFICIENTS  
FOR NEW GOVERNMENT FACILITIES

DOWNRIVER

NAME (RANK)	PURCHASES
DAIRY/POUL	.0000
CATTLE	.0000
MEAT ANIMA	.0000
LVSTK NEC	.0000
FOOD GRAIN ( 29)	.0005
FEED GRAIN ( 31)	.0004
HAY/PASTUR ( 47)	.0002
OTHER CROP	.0000
FRUIT/NUTS	.0000
VEGETABLES	.0000
OIL CROPS	.0000
FORESTRY ( 61)	.0000
NURSERY LA ( 20)	.0018
FISHING	.0000
AG SERVICE	.0000
METAL MINE	.0000
MINES NEC ( 43)	.0002
COAL MINES	.0000
SAND & GRV ( 52)	.0001
NEW RESI	.0000
NEW INDUST	.0000
NEW UTILI	.0000
NEW ROADS	.0000
NEW FARM	.0000
NEW EXTRAC	.0000
NEW GOVT	.0000
RESI MAINT	.0000
MAINT NEC ( 24)	.0011
MEAT PROC	.0000
DAIRY PROD	.0000
CAN/FREEZE ( 55)	.0000
FOODS NEC ( 64)	.0000
GRAIN PROD ( 66)	.0000
TEXTILES ( 41)	.0002
LOGGING ( 53)	.0001
SAWMILLS ( 10)	.0148
WOOD PROD ( 8)	.0173
MFG NEC ( 45)	.0002
PAPER PROD ( 67)	.0000
PRINT/PUBL ( 58)	.0000
CHEMICALS ( 46)	.0002
RUBBER PRO ( 65)	.0000
CLAY PRODS ( 34)	.0003
PRI METALS ( 54)	.0001
ALUMINUM ( 59)	.0000
FAB METLAS ( 26)	.0007
MACHINERY ( 40)	.0003
ELECTRIC ( 39)	.0003
ELECTRONIC ( 48)	.0001

VEHICLES ( 57)	.0000
AIRCRAFT ( 62)	.0000
BOATS ( 63)	.0000
INSTRUMENT ( 44)	.0002
RAILROADS ( 23)	.0011
TRANS NEC ( 50)	.0001
TRUCK WH ( 7)	.0233
WATER TRAN ( 42)	.0002
AIR TRAN ( 33)	.0004
PIPELINES ( 51)	.0001
TELEPHONE ( 19)	.0023
RADIO TV	.0000
ELECT UTIL ( 38)	.0003
GAS UTIL ( 49)	.0001
WATER/SANI ( 25)	.0010
WHOLESALE ( 6)	.0253
BLD MATERI ( 27)	.0007
DEPT STORE ( 22)	.0013
GROCERIES ( 17)	.0023
AUTO DLRS ( 14)	.0099
APPAREL ( 36)	.0003
FURNITURE ( 28)	.0006
RESTAURANT ( 35)	.0003
RETAIL NEC ( 18)	.0023
F-I-R-E ( 12)	.0118
LODGING ( 15)	.0030
PERS SERV ( 37)	.0003
BUS SERV ( 13)	.0105
DATA PROC	.0000
DETECTIVE ( 56)	.0000
AUTO SERV ( 5)	.0258
REPAIR SER ( 11)	.0122
AMUSEMENTS	.0000
HEALTH SER ( 60)	.0000
PROF SERV ( 2)	.1538
EDUCATION	.0000
SOC SERV	.0000
ASSOCIATNS	.0000
S & L GOVT ( 32)	.0004
GOV ELECTR ( 21)	.0015
POSTAL SER ( 30)	.0005
GOVT NEC	.0000
HOUSEHOLDS ( 3)	.1188
IND-BUS-TX ( 9)	.0172
PROFITS ( 4)	.1077
IMPORTS ( 1)	.4231

**APPENDIX XIII**  
**Upriver Subregion Recreation Spending Survey**  
**(The angler survey is similar)**

0001

OUTDOOR RECREATION SURVEY

Expires

9/30/1998

**General Information Questions**

1. What is your ZIP code? \_\_\_\_\_
2. What was the year of your most recent recreation trip to the Central Idaho region? 19 \_\_\_\_
3. How many recreation trips to the Central Idaho region did you take in the last 12 months? \_\_\_\_\_ trips

**The remaining questions refer to the trip when you were contacted in Central Idaho and agreed to help with this survey.**

4. What was your method of travel to the Central Idaho region? (Please check as many as apply)

- |     |                              |     |                   |
|-----|------------------------------|-----|-------------------|
| < > | Personal car/van/truck       | < > | Bus               |
| < > | Rented car/van/truck         | < > | Tour Bus          |
| < > | Personal Camper/RV           | < > | Tour Boat         |
| < > | Rented Camper/Mobile Home/RV | < > | Other, (describe) |
| < > | Airplane                     |     | _____             |

5. How many nights were you away from home on this trip? \_\_\_\_\_ nights
6. When you left home what was your primary destination? \_\_\_\_\_
7. How many miles did you travel (one-way) from your home to your recreation site in Central Idaho? \_\_\_\_\_ miles
8. How many people were in your travel group? \_\_\_\_\_ persons

9. What recreation activities were important to you and your group on this trip?  
Please rank each activity 1 to 5, where 1 is very important and 5 is not important.

- |     |                         |     |                   |
|-----|-------------------------|-----|-------------------|
| < > | steelhead fishing       | < > | rafting           |
| < > | smallmouth bass fishing | < > | kayaking          |
| < > | trout fishing           | < > | canoeing          |
| < > | sturgeon fishing        | < > | hiking            |
| < > | bull trout fishing      | < > | bird watching     |
| < > | jet boating             | < > | wildlife watching |
| < > | camping                 | < > | sightseeing       |
| < > | other, describe _____   | < > | biking            |
|     |                         | < > | nature viewing    |

**A map is enclosed that shows the Central Idaho region. Please use the map to identify local stopping points on your trip when answering the questions on the following pages.**

10. Expenditures made by your group while **traveling to the Central Idaho recreation site.**

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

11. Expenditures made by your group while **at the Central Idaho recreation site.**

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

12. Expenditures made by your group **on the return trip back home.**

Type of Business	Dollar Amount	Name of Town or Nearest Major Town
County Government permits/licenses/fees		
State Government permits/licenses/fees		
Federal Government permits/licenses/fees		
Bus or Taxi Service		
Tour Boat		
Airline		
Car, P.U. or RV Rental		
Service Station (1)		
Service Station (2)		
Food Store		
Auto Dealer		
Clothing Store		
Boat/Marine Store		
Sporting Goods Store		
Hardware Store		
Restaurant		
Dept. Store		
Other Retail (describe)		
Motels & Lodging		
Guide Services		
Equipment Rental		
Parking and Car Wash		
Auto Repair		
Other Repair (describe)		
Entertainment		
Health Services		
Other (describe)		
Other (describe)		

**Please make your best estimate for each category, enter zero if no expenditure.**

**APPENDIX XIV  
ACCESS POINTS ON SNAKE RIVER RESERVOIRS SHOWN IN FIGURE 5**

<u>Code</u>	<u>Access Point</u>
413	McCoy Canyon
412	Walker Landing
411	Above Ice Harbor Dam
410	Ice Harbor Boat Ramp
409	Charbonneau Landing
408	Levey Park Landing
407	Dalton Lake
406	Fish Hook Landing Pond
405	Fish Hook Landing
404	Emma Lake
403	Windust Landing
402	Matthews Landing
401	Below Lower Monumental Dam
311	Above Lower Monumental Dam
310	Devil's Bench Landing
309	Ayer Landing
308	Lyon's Ferry Marina
307	Lyon's Ferry Landing
306	Tucannon River confluence
305	Choke Cherry Road
304	Texas Rapids Landing
303	McGuire Shoal Road
302	Riparia Landing
301	Below Little Goose Dam
212	Almota
211	Above Little Goose Dam
210	Pond Above Little Goose Dam
209	Little Goose Landing
208	Dead Man's Bay Access
207	Port of Garfield Landing
206	Central Ferry Landing
205	Willow Bar Landing
204	Illia Landing (undeveloped)
203	Illia Landing
202	Boyer Park
201	Below Lower Granite Dam
118	Above Lower Granite Dam
117	Offfield Landing
116	Wawawai Pond
115	Wawawai Landing
114	Blyton Landing
113	Nisqually John Landing
112	Steptoe Gulch
111	Chief Timothy Landing
110	Shore Ramp, Chief Timothy HMU
109	Highway 12 Outdoor recreation Ponds
108	Red Wolf Landing
107	Chief Looking Glass Park
106	Hells Gate
105	Swallows Nest
104	Lower Lewiston Landing
103	Levy Ponds, Lewiston
102	Greenbelt
101	Clearwater Landing

**APPENDIX XV**  
**BASELINE 1994 SALES AND EMPLOYMENT FOR THE**  
**ECONOMIC REGIONS AND SUBREGIONS**

**BASELINE TOTAL SALES BY SECTOR  
DOWNRIVER SUBREGION 1994 (dollars)**

1 DAIRY/POUL	20010990.	48 ELECTRIC	7020840.
2 CATTLE	83347344.	49 ELECTRONIC	12447000.
3 MEAT ANIMA	2491880.	50 VEHICLES	40955160.
4 LVSTK NEC	4627750.	51 AIRCRAFT	1353660.
5 FOOD GRAIN	187180000.	52 BOATS	11852610.
6 FEED GRAIN	146355984.	53 INSTRUMENT	39755528.
7 HAY/PASTUR	52246040.	54 RAILROADS	167640000.
8 OTHER CROP	45186948.	55 TRANS NEC	26386892.
9 FRUIT/NUTS	192959712.	56 TRUCK WH	176333824.
10 VEGETABLES	239493584.	57 WATER TRAN	5543070.
11 OIL CROPS	274330.	58 AIR TRAN	26144160.
12 FORESTRY	93346896.	59 PIPELINES	6391890.
13 NURSERY LA	33053460.	60 TELEPHONE	196730208.
14 FISHING	10450700.	61 RADIO TV	42955020.
15 AG SERVICE	79642184.	62 ELECT UTIL	134958528.
16 METAL MINE	5592740.	63 GAS UTIL	29043510.
17 MINES NEC	4764130.	64 WATER/SANI	100295144.
18 COAL MINES	2670230.	65 WHOLESALE	559621696.
19 SAND & GRV	4107750.	66 BLD MATERI	42494332.
20 NEW RESI	189748592.	67 DEPT STORE	106455432.
21 NEW INDUST	172946784.	68 GROCERIES	127011608.
22 NEW UTILI	50307600.	69 AUTO DLRS	195913552.
23 NEW ROADS	59891500.	70 APPAREL	20869730.
24 NEW FARM	3447300.	71 FURNITURE	35697980.
25 NEW EXTRAC	1062900.	72 RESTAURANT	310101760.
26 NEW GOVT	69141696.	73 RETAIL NEC	97003200.
27 RESI MAINT	74579992.	74 F-I-R-E	1261147392.
28 MAINT NEC	332968960.	75 LODGING	108774824.
29 MEAT PROC	349733280.	76 PERS SERV	56187324.
30 DAIRY PROD	2672040.	77 BUS SERV	101753824.
31 CAN/FREEZE	962670912.	78 DATA PROC	119008184.
32 FOODS NEC	178489456.	79 DETECTIVE	4394780.
33 GRAIN PROD	45735768.	80 AUTO SERV	100433360.
34 TEXTILES	19787352.	81 REPAIR SER	47260740.
35 LOGGING	118427624.	82 AMUSEMENTS	89674704.
36 SAWMILLS	207836976.	83 HEALTH SER	436920800.
37 WOOD PROD	161324640.	84 PROF SERV	2020932096.
38 MFG NEC	72946112.	85 EDUCATION	28771890.
39 PAPER PROD	135850.	86 SOC SERV	58470600.
40 PRINT/PUBL	53383348.	87 ASSOCIATNS	83219608.
41 CHEMICALS	213754416.	88 S & L GOVT	81154608.
42 RUBBER PRO	421061.	89 GOV ELECTR	748679680.
43 CLAY PRODS	22025940.	90 POSTAL SER	51469960.
44 PRI METALS	106796376.	91 GOVT NEC	740759040.
45 ALUMINUM	293143776.	93 HOUSEHOLDS	5992244224.
46 FAB METLAS	28172484.		
47 MACHINERY	32836840.		

**BASELINE EMPLOYMENT BY SECTOR  
DOWNRIVER SUBREGION 1994 (jobs)**

1 DAIRY/POUL	.14799990E+03	48 ELECTRIC	.53999540E+02
2 CATTLE	.10930010E+04	49 ELECTRONIC	.80000000E+02
3 MEAT ANIMA	.11099910E+03	50 VEHICLES	.33100050E+03
4 LVSTK NEC	.23100250E+03	51 AIRCRAFT	.89997340E+01
5 FOOD GRAIN	.42790000E+04	52 BOATS	.12199910E+03
6 FEED GRAIN	.19010000E+04	53 INSTRUMENT	.29100020E+03
7 HAY/PASTUR	.22860020E+04	54 RAILROADS	.11680010E+04
8 OTHER CROP	.10680010E+04	55 TRANS NEC	.72100250E+03
9 FRUIT/NUTS	.40710020E+04	56 TRUCK WH	.20530010E+04
10 VEGETABLES	.20319990E+04	57 WATER TRAN	.26999860E+02
11 OIL CROPS	.59984690E+01	58 AIR TRAN	.22199970E+03
12 FORESTRY	.37700000E+03	59 PIPELINES	.18000250E+02
13 NURSERY LA	.91499890E+03	60 TELEPHONE	.88900000E+03
14 FISHING	.12100000E+03	61 RADIO TV	.35099940E+03
15 AG SERVICE	.43569990E+04	62 ELECT UTIL	.39099980E+03
16 METAL MINE	.38999580E+02	63 GAS UTIL	.63000020E+02
17 MINES NEC	.46999310E+02	64 WATER/SANI	.55400020E+03
18 COAL MINES	.69992920E+01	65 WHOLESALE	.66759990E+04
19 SAND & GRV	.44999450E+02	66 BLD MATERI	.10030010E+04
20 NEW RESI	.24540000E+04	67 DEPT STORE	.32619980E+04
21 NEW INDUST	.26050000E+04	68 GROCERIES	.40179970E+04
22 NEW UTILI	.59900000E+03	69 AUTO DLRS	.34630010E+04
23 NEW ROADS	.55000000E+03	70 APPAREL	.66799460E+03
24 NEW FARM	.15000000E+02	71 FURNITURE	.92200460E+03
25 NEW EXTRAC	.20000000E+02	72 RESTAURANT	.92979990E+04
26 NEW GOVT	.93000000E+02	73 RETAIL NEC	.49010000E+04
27 RESI MAINT	.85599990E+03	74 F-I-R-E	.68130020E+04
28 MAINT NEC	.33490010E+04	75 LODGING	.25840000E+04
29 MEAT PROC	.92399990E+03	76 PERS SERV	.19830010E+04
30 DAIRY PROD	.89994610E+01	77 BUS SERV	.32469980E+04
31 CAN/FREEZE	.53880010E+04	78 DATA PROC	.15300000E+04
32 FOODS NEC	.95899930E+03	79 DETECTIVE	.25599880E+03
33 GRAIN PROD	.13600020E+03	80 AUTO SERV	.14319990E+04
34 TEXTILES	.28799930E+03	81 REPAIR SER	.81099900E+03
35 LOGGING	.63099960E+03	82 AMUSEMENTS	.27659940E+04
36 SAWMILLS	.12180000E+04	83 HEALTH SER	.82029980E+04
37 WOOD PROD	.10830000E+04	84 PROF SERV	.27122990E+05
38 MFG NEC	.80001220E+03	85 EDUCATION	.82999680E+03
39 PAPER PROD	.99889710E+00	86 SOC SERV	.18960000E+04
40 PRINT/PUBL	.10049970E+04	87 ASSOCIATNS	.22940000E+04
41 CHEMICALS	.94900050E+03	88 S & L GOVT	.51199940E+03
42 RUBBER PRO	.49995370E+01	89 GOV ELECTR	.25730000E+04
43 CLAY PRODS	.20300040E+03	90 POSTAL SER	.69799950E+03
44 PRI METALS	.46000030E+03	91 GOVT NEC	.24546000E+05
45 ALUMINUM	.11589990E+04	93 HOUSEHOLDS	.00000000E+00
46 FAB METLAS	.22699910E+03		
47 MACHINERY	.30400220E+03		
		TOTAL EMPLOYMENT	.17854410E+06

**BASELINE SALES BY SECTOR  
STATE OF IDAHO 1994 (dollars)**

1 DAIRY/POUL	403741632.	51 MACHINES	438679104.
2 CATTLE	577673472.	52 COMPUTERS	1790674944.
3 MEAT ANIMA	23335460.	53 ELECTRIC G	52859088.
4 LVSTK NEC	50496920.	54 ELECTRONIC	1377885056.
5 FOOD GRAIN	287774496.	55 VEHICLES	256241088.
6 FEED GRAIN	291282176.	56 AIRCRAFT	17600070.
7 HAY/PASTUR	231419760.	57 AIR PARTS	3410300.
8 GRASS SEED	136171728.	58 BOAT BLDV	3794140.
9 FRUIT/NUTS	30759890.	59 INSTRUMENT	61560920.
10 VEGETABLES	617898496.	60 RAILROADS	283256480.
11 SUGAR CROP	257068224.	61 TRANSP NEC	107638976.
12 OIL CROPS	7421640.	62 TRUCK/WH	996898304.
13 FORESTRY	61256008.	63 WATER TRAN	51423048.
14 NURSERY/LA	119457984.	64 AIR TRANSP	175219136.
15 FISHING	4353410.	65 PIPE LINES	13158500.
16 AG SERVICE	208488864.	66 TELEPHONE	489273312.
17 COPPER MIN	178879504.	67 RADIO/TV	156389104.
18 MINES NEC	156906656.	68 ELECTRIC	581706112.
19 COAL MINES	1059050.	69 GAS DIST	142149696.
20 GAS EXTRAC	626550.	70 WATER/SANI	152875392.
21 SAND/GRAVE	71587616.	71 WHOLESALE	2336272384.
22 NEW RESI	546590592.	72 BLDG MATER	255042528.
23 NEW INDUST	486444160.	73 DEPT STORE	343695392.
24 NEW UTILLI	281813216.	74 GROCERIES	541977344.
25 NEW ROADS	559173120.	75 AUTO DLRS	715534400.
26 NEW FARM	111104096.	76 APPAREL	112393408.
27 NEW EXTRAC	38856300.	77 FURNITURE	190638704.
28 NEW GOVT	1673746304.	78 RESTAURANT	1073261312.
29 RESI MAINT	303972416.	79 RETAIL NEC	411855616.
30 MAINT NEC	1774996736.	80 F-I-R-E	5251166208.
31 MEAT PROC	531049344.	81 LODGING	305431968.
32 DAIRY PROC	450996992.	82 PER SERV	252622048.
33 CAN/FREEZE	1666453504.	83 BUS SERV	550882048.
34 FOODS NEC	1051336192.	84 DATA PROC	133319872.
35 GRAIN PROC	58651100.	85 DETECTIVE	53524848.
36 MFG NEC	305483008.	86 AUTO SERV	463278144.
37 TEXTILES	60667464.	87 REPAIR SER	171202112.
38 LOGGING	749812352.	88 AMUSEMENTS	354397120.
39 SAWMILLS	1578723328.	89 HEALTH SER	1903154176.
40 WOOD PROD	795341696.	90 PROF SERV	1506599168.
41 PAPER MILL	677910400.	91 EDUCATION	252679248.
42 PAPER PROD	80493952.	92 SOC SERV	207848608.
43 PRINT/PUBL	396537984.	93 ASSOCIATNS	238969904.
44 CHEMICALS	1017401344.	94 S & L GOV	212813216.
45 REFINING	7756070.	95 ELECT GOV	29568710.
46 RUBBER PRO	2885490.	96 POSTAL SER	175113440.
47 CLAY PRODS	181327264.	97 GOVT NEC	2647371264.
48 PRIM METAL	38382528.	99 HOUSEHOLDS	20560752640.
49 ALUMINUM	2956370.		
50 FAB METALS	325975744.		

**BASELINE EMPLOYMENT BY SECTOR  
STATE OF IDAHO 1994 (jobs)**

1 DAIRY/POUL	.21160000E+04	51 MACHINES	.33750010E+04
2 CATTLE	.49520010E+04	52 COMPUTERS	.67410000E+04
3 MEAT ANIMA	.93999840E+03	53 ELECTRIC G	.47799990E+03
4 LVSTK NEC	.10930030E+04	54 ELECTRONIC	.70450000E+04
5 FOOD GRAIN	.52230000E+04	55 VEHICLES	.16550010E+04
6 FEED GRAIN	.34450000E+04	56 AIRCRAFT	.12299980E+03
7 HAY/PASTUR	.68850010E+04	57 AIR PARTS	.32000000E+02
8 GRASS SEED	.33479960E+04	58 BOAT BLDV	.35998480E+02
9 FRUIT/NUTS	.52100150E+03	59 INSTRUMENT	.52100010E+03
10 VEGETABLES	.33119990E+04	60 RAILROADS	.19160010E+04
11 SUGAR CROP	.27930020E+04	61 TRANSP NEC	.26340020E+04
12 OIL CROPS	.16899860E+03	62 TRUCK/WH	.12985000E+05
13 FORESTRY	.34899950E+03	63 WATER TRAN	.29999970E+03
14 NURSERY/LA	.39680030E+04	64 AIR TRANSP	.16100000E+04
15 FISHING	.12899730E+03	65 PIPE LINES	.27000000E+02
16 AG SERVICE	.11079000E+05	66 TELEPHONE	.21420000E+04
17 COPPER MIN	.12839990E+04	67 RADIO/TV	.13269990E+04
18 MINES NEC	.70499980E+03	68 ELECTRIC	.20370000E+04
19 COAL MINES	.79996220E+01	69 GAS DIST	.32300000E+03
20 GAS EXTRAC	.98992100E+02	70 WATER/SANI	.10300010E+04
21 SAND/GRAVE	.58399850E+03	71 WHOLESALE	.29437010E+05
22 NEW RESI	.90810000E+04	72 BLDG MATER	.59720030E+04
23 NEW INDUST	.97900000E+04	73 DEPT STORE	.10648000E+05
24 NEW UTILL	.46009990E+04	74 GROCERIES	.15778000E+05
25 NEW ROADS	.62929990E+04	75 AUTO DLRS	.14489000E+05
26 NEW FARM	.52899990E+03	76 APPAREL	.41110000E+04
27 NEW EXTRAC	.86600000E+03	77 FURNITURE	.49199950E+04
28 NEW GOVT	.24649990E+04	78 RESTAURANT	.34363010E+05
29 RESI MAINT	.43339990E+04	79 RETAIL NEC	.22968000E+05
30 MAINT NEC	.22072000E+05	80 F-I-R-E	.37709000E+05
31 MEAT PROC	.18050000E+04	81 LODGING	.87810020E+04
32 DAIRY PROC	.12460000E+04	82 PER SERV	.11032010E+05
33 CAN/FREEZE	.92749970E+04	83 BUS SERV	.22567010E+05
34 FOODS NEC	.56080010E+04	84 DATA PROC	.20170040E+04
35 GRAIN PROC	.27999910E+03	85 DETECTIVE	.18879950E+04
36 MFG NEC	.35950000E+04	86 AUTO SERV	.78120020E+04
37 TEXTILES	.10939980E+04	87 REPAIR SER	.37719980E+04
38 LOGGING	.35990010E+04	88 AMUSEMENTS	.10705000E+05
39 SAWMILLS	.91300020E+04	89 HEALTH SER	.34581000E+05
40 WOOD PROD	.57289980E+04	90 PROF SERV	.25923000E+05
41 PAPER MILL	.17800000E+04	91 EDUCATION	.79820010E+04
42 PAPER PROD	.44999920E+03	92 SOC SERV	.76789970E+04
43 PRINT/PUBL	.56490030E+04	93 ASSOCIATNS	.63879970E+04
44 CHEMICALS	.40890010E+04	94 S & L GOV	.14609990E+04
45 REFINING	.20999920E+02	95 ELECT GOV	.13000000E+03
46 RUBBER PRO	.29997820E+02	96 POSTAL SER	.26420040E+04
47 CLAY PRODS	.14190000E+04	97 GOVT NEC	.10312200E+06
48 PRIM METAL	.21700020E+03	99 HOUSEHOLDS	.00000000E+00
49 ALUMINUM	.29998680E+02	TOTAL EMPLOYMENT	.65608200E+06
50 FAB METALS	.27890000E+04		

**BASELINE SALES BY SECTOR  
STATE OF OREGON 1994 (dollars)**

1 DAIRY/POUL	270400448.	50 SEC ALUMIN	188897888.
2 CATTLE	303553536.	51 FAB METALS	1610345472.
3 MEAT ANI N	24420210.	52 MACHINERY	1967610624.
4 LVSTK NEC	39032984.	53 COMPUTERS	1198838528.
5 FOOD GRAIN	174875040.	54 ELECTRICAL	254824736.
6 FEED GRAIN	259934736.	55 ELECTRONIC	3674049024.
7 HAY	196746528.	56 VEHICLES	3113543680.
8 CROPS NEC	277232384.	57 AIRCRAFT	309018304.
9 FRUIT/NUTS	297700864.	58 MARINE EQU	216708704.
10 VEGETABLES	251121184.	59 INSTRUMENT	1406121472.
11 SUGAR CROP	29900850.	60 RAILROADS	497612352.
12 OIL CROPS	2142810.	61 TRANS NEC	554030080.
13 FORESTRY	700122752.	62 TRUCK/WARE	3090843392.
14 NURS/LNDSC	521974464.	63 WATER TRAN	496435872.
15 FISHING	220077360.	64 AIR TRANSP	800026112.
16 AG SERVICE	282268192.	65 PIPE LINES	10787800.
17 METAL MINE	83194016.	66 TELEPHONE	2024496512.
18 MINES NEC	90199496.	67 RADIO/TV	456697536.
19 COAL MINES	6947160.	68 ELECTRICIT	1582571776.
20 GAS EXTRAC	7058950.	69 GAS	562956032.
21 SAND & GRA	88172112.	70 WATER/SANI	173183616.
22 NEW RESI	1731488640.	71 WHOLESALE	8596973568.
23 NEW INDUST	1751266560.	72 BLDG GARDE	514545984.
24 NEW UTILIT	409514784.	73 DEPT STORE	1161982208.
25 NEW ROADS	662111488.	74 GROCERIES	1289777664.
26 NEW FARM B	40687504.	75 AUTO DLRS	1778810624.
27 NEW EXTRAC	9376700.	76 APPAREL	468362688.
28 NEW GOVT	674104960.	77 FURNITURE	516675808.
29 MAINT RESI	883254720.	78 RESTAURANT	3432827904.
30 MAINT NEC	4098116608.	79 RETAIL NEC	1226457600.
31 MEAT PROC	442501952.	80 F-I-R-E	20608104448.
32 DAIRY PROD	639057536.	81 LODGING	896631296.
33 CAN/FREEZE	2218287360.	82 PERS SERVI	906339328.
34 FOODS NEC	1498615808.	83 BUS SERVI	2313516544.
35 GRAIN PROC	580419520.	84 DATA PROCE	1348439936.
36 MFG NEC	1884681472.	85 DETECTIVE	111352944.
37 TEXTILES	468727968.	86 AUTO SERVI	1452822272.
38 LOGGING	1993435648.	87 REPAIR SER	560699264.
39 SAWMILLS	3605829120.	88 AMUSEMENTS	1310518144.
40 WOOD PRODU	3852027648.	89 HEALTH SER	7081851904.
41 PAPER MILL	1512477184.	90 PROF SERVI	3839553024.
42 PAPER PROD	897244672.	91 EDUCATION	1018345984.
43 PRINT/PUBL	1613969152.	92 SOC SERVIC	832213312.
44 CHEMICALS	759206912.	93 ASSOCIATNS	969016000.
45 REFINING	174823056.	94 S & L GOVT	925025984.
46 RUBBER PRO	93548944.	95 GOV ELECTR	1507358464.
47 CLAY PRODU	508076160.	96 POSTAL SER	598157696.
48 PRIM METAL	1395680768.	97 GOVT NEC	7199898624.
49 PRI ALUMIN	237108272.	99 HOUSEHOLDS	62991134720.

**BASELINE EMPLOYMENT BY SECTOR  
STATE OF OREGON 1994 (jobs)**

1 DAIRY/POUL	.23650010E+04	51 FAB METALS	.13425000E+05
2 CATTLE	.56030020E+04	52 MACHINERY	.14818050E+05
3 MEAT ANI N	.16370010E+04	53 COMPUTERS	.53349980E+04
4 LVSTK NEC	.24969990E+04	54 ELECTRICAL	.20449990E+04
5 FOOD GRAIN	.39980050E+04	55 ELECTRONIC	.21445000E+05
6 FEED GRAIN	.38299990E+04	56 VEHICLES	.92330020E+04
7 HAY	.11073000E+05	57 AIRCRAFT	.19600000E+04
8 CROPS NEC	.13538000E+05	58 MARINE EQU	.22919990E+04
9 FRUIT/NUTS	.73089990E+04	59 INSTRUMENT	.96450030E+04
10 VEGETABLES	.24570030E+04	60 RAILROADS	.32549990E+04
11 SUGAR CROP	.55000270E+03	61 TRANS NEC	.11065000E+05
12 OIL CROPS	.46000220E+02	62 TRUCK/WARE	.34310440E+05
13 FORESTRY	.55119990E+04	63 WATER TRAN	.21950000E+04
14 NURS/LNDSC	.14095000E+05	64 AIR TRANSP	.59519990E+04
15 FISHING	.44079990E+04	65 PIPE LINES	.18000000E+02
16 AG SERVICE	.14598000E+05	66 TELEPHONE	.88929980E+04
17 METAL MINE	.43399960E+03	67 RADIO/TV	.33869980E+04
18 MINES NEC	.78800000E+03	68 ELECTRICIT	.46440000E+04
19 COAL MINES	.19000440E+02	69 GAS	.12670000E+04
20 GAS EXTRAC	.93999340E+02	70 WATER/SANI	.10829990E+04
21 SAND & GRA	.84299910E+03	71 WHOLESALE	.93516020E+05
22 NEW RESI	.24142000E+05	72 BLDG GARDE	.12538000E+05
23 NEW INDUST	.28420990E+05	73 DEPT STORE	.33900010E+05
24 NEW UTILIT	.53450000E+04	74 GROCERIES	.42898990E+05
25 NEW ROADS	.63950000E+04	75 AUTO DLRS	.34040010E+05
26 NEW FARM B	.17900000E+03	76 APPAREL	.15340000E+05
27 NEW EXTRAC	.16700000E+03	77 FURNITURE	.12836000E+05
28 NEW GOVT	.93799430E+03	78 RESTAURANT	.10100900E+06
29 MAINT RESI	.10692000E+05	79 RETAIL NEC	.61923980E+05
30 MAINT NEC	.43545930E+05	80 F-I-R-E	.11461200E+06
31 MEAT PROC	.21310000E+04	81 LODGING	.22605990E+05
32 DAIRY PROD	.18600000E+04	82 PERS SERVI	.31701010E+05
33 CAN/FREEZE	.13265000E+05	83 BUS SERVI	.79886980E+05
34 FOODS NEC	.56410000E+04	84 DATA PROCE	.14965000E+05
35 GRAIN PROC	.32999990E+04	85 DETECTIVE	.64189970E+04
36 MFG NEC	.17202000E+05	86 AUTO SERVI	.19787990E+05
37 TEXTILES	.63070020E+04	87 REPAIR SER	.95300030E+04
38 LOGGING	.10022000E+05	88 AMUSEMENTS	.32383000E+05
39 SAWMILLS	.25469000E+05	89 HEALTH SER	.11480800E+06
40 WOOD PRODU	.27522010E+05	90 PROF SERVI	.64004000E+05
41 PAPER MILL	.52340000E+04	91 EDUCATION	.28910000E+05
42 PAPER PROD	.38230000E+04	92 SOC SERVIC	.29392000E+05
43 PRINT/PUBL	.18762000E+05	93 ASSOCIATNS	.28241010E+05
44 CHEMICALS	.30039990E+04	94 S & L GOVT	.66020000E+04
45 REFINING	.45999990E+03	95 GOV ELECTR	.30319990E+04
46 RUBBER PRO	.81399950E+03	96 POSTAL SER	.85740000E+04
47 CLAY PRODU	.46410010E+04	97 GOVT NEC	.23914000E+06
48 PRIM METAL	.78049990E+04	99 HOUSEHOLDS	.00000000E+00
49 PRI ALUMIN	.92999950E+03	TOTAL EMPLOYMENT	.17935450E+07
50 SEC ALUMIN	.97000040E+03		

**BASELINE SALES BY SECTOR  
RESERVOIR SUBREGION 1994 (dollars)**

1 DAIRY/POUL	17593660.	48 COMPUTERS	38062304.
2 CATTLE	110635136.	49 ELECTRIC	631360.
3 MEAT ANIMA	4077360.	50 ELECTRONIC	614810.
4 LVSTK NEC	1662530.	51 VEHICLES	2328250.
5 FOOD GRAIN	215934816.	52 BOAT BLD	6312890.
6 FEED GRAIN	112056768.	53 INSTRUMENT	23626390.
7 HAY/PASTUR	13389690.	54 RAILROADS	7240620.
8 CROPS NEC	24816590.	55 TRANS NEC	6694250.
9 FRUIT/NUTS	43221848.	56 TRUCK/WH	67150176.
10 VEGETABLES	125599392.	57 WATER TRAN	4300960.
11 OIL CROPS	438880.	58 AIR TRAN	9925090.
12 FORESTRY	71808384.	59 TELEPHONE	49083640.
13 NURSERY LA	7317520.	60 RADIO TV	10371281.
14 FISHING	2752500.	61 ELECTRIC	74534256.
15 AG SERVICE	18219030.	62 GAS DIST	14052470.
16 METAL MINE	2994970.	63 WATER/SANI	2385780.
17 MINES NEC	3531203.	64 WHOLESALE	159704272.
18 SAND & GRA	1481140.	65 BLD MAT	15213910.
19 NEW RESIDE	48612096.	66 DEPT STORE	23361550.
20 NEW INDUST	42550400.	67 GROCERIES	59066712.
21 NEW UTIL	12795100.	68 AUTO DLRS	49671232.
22 NEW ROADS	14899900.	69 APPAREL	5303190.
23 NEW FARM	875473.	70 FURNITURE	12079230.
24 NEW EXTRAC	261300.	71 RESTAURANT	114498048.
25 NEW GOVT	20336956.	72 RETAIL NEC	51249328.
26 RESI MAINT	18073320.	73 F-I-R-E	457903808.
27 MAINT NEC	80283016.	74 LODGING	30342620.
28 MEAT PROC	35215928.	75 PERS SERV	14052340.
29 DIARY PROD	171642960.	76 BUS SERV	57809808.
30 CAN/FREEZE	308739328.	77 DATA PROC	7269130.
31 FOODS NEC	50840448.	78 DETECTIVE	130230.
32 GRAIN PROD	12151670.	79 AUTO SERV	28121220.
33 TEXTILES	1745630.	80 REPAIR SER	11067840.
34 LOGGING	16378140.	81 AMUSEMENTS	29124432.
35 SAWMILLS	51498368.	82 HEALTH SER	244822112.
36 WOOD PROD	3337220.	83 PROF SERV	59850804.
37 MFG NEC	10207340.	84 EDUCATION	79536512.
38 PAPER MILL	124731888.	85 SOC SERV	28339700.
39 PAPER PROD	20296560.	86 ASSOCIATNS	34733328.
40 PRINT/PUBL	31175260.	87 S & L GOVT	27554680.
41 CHEMICALS	18311590.	88 POSTAL SER	20161860.
42 REFINING	2647160.	89 FED ELECTR	35623680.
43 RUBBER PRO	3051330.	90 GOVT NEC	513293536.
44 CLAY PROD	4734970.	92 HOUSEHOLDS	2218179072.
45 PRIM METAL	5270200.		
46 FAB METALS	75486272.		
47 MACHINERY	58845028.		

**BASELINE EMPLOYMENT BY SECTOR  
RESERVOIR SUBREGION 1994 (jobs)**

1 DAIRY/POUL	.63000210E+02	48 COMPUTERS	.18099950E+03
2 CATTLE	.96899950E+03	49 ELECTRIC	.40003800E+01
3 MEAT ANIMA	.32999680E+02	50 ELECTRONIC	.15000240E+02
4 LVSTK NEC	.33998570E+02	51 VEHICLES	.17996520E+02
5 FOOD GRAIN	.27279990E+04	52 BOAT BLD	.65998850E+02
6 FEED GRAIN	.75999980E+03	53 INSTRUMENT	.18800710E+03
7 HAY/PASTUR	.34099970E+03	54 RAILROADS	.53000140E+02
8 CROPS NEC	.48099980E+03	55 TRANS NEC	.17700130E+03
9 FRUIT/NUTS	.37599960E+03	56 TRUCK/WH	.83999970E+03
10 VEGETABLES	.57500090E+03	57 WATER TRAN	.24000340E+02
11 OIL CROPS	.49986330E+01	58 AIR TRAN	.90998990E+02
12 FORESTRY	.28199950E+03	59 TELEPHONE	.23199970E+03
13 NURSERY LA	.19497920E+03	60 RADIO TV	.86000660E+02
14 FISHING	.23000000E+02	61 ELECTRIC	.21999960E+03
15 AG SERVICE	.90400150E+03	62 GAS DIST	.29000140E+02
16 METAL MINE	.14999850E+02	63 WATER/SANI	.15999870E+02
17 MINES NEC	.34055970E+02	64 WHOLESALE	.19469990E+04
18 SAND & GRA	.19000510E+02	65 BLD MAT	.36099790E+03
19 NEW RESIDE	.70699990E+03	66 DEPT STORE	.70999850E+03
20 NEW INDUST	.73000000E+03	67 GROCERIES	.17920000E+04
21 NEW UTIL	.17700140E+03	68 AUTO DLRS	.92500050E+03
22 NEW ROADS	.15100000E+03	69 APPAREL	.15699970E+03
23 NEW FARM	.30408930E+01	70 FURNITURE	.29799830E+03
24 NEW EXTRAC	.50000000E+01	71 RESTAURANT	.35569950E+04
25 NEW GOVT	.28749480E+02	72 RETAIL NEC	.23940010E+04
26 RESI MAINT	.22900020E+03	73 F-I-R-E	.25610000E+04
27 MAINT NEC	.88700020E+03	74 LODGING	.82100050E+03
28 MEAT PROC	.93999810E+02	75 PERS SERV	.56199360E+03
29 DIARY PROD	.52899990E+03	76 BUS SERV	.14859980E+04
30 CAN/FREEZE	.19170010E+04	77 DATA PROC	.10700190E+03
31 FOODS NEC	.20200020E+03	78 DETECTIVE	.19852130E+02
32 GRAIN PROD	.35999610E+02	79 AUTO SERV	.42299880E+03
33 TEXTILES	.42000720E+02	80 REPAIR SER	.21100080E+03
34 LOGGING	.93999080E+02	81 AMUSEMENTS	.84400090E+03
35 SAWMILLS	.29800040E+03	82 HEALTH SER	.49730000E+04
36 WOOD PROD	.49000290E+02	83 PROF SERV	.10609980E+04
37 MFG NEC	.10700040E+03	84 EDUCATION	.22800000E+04
38 PAPER MILL	.54500040E+03	85 SOC SERV	.10800000E+04
39 PAPER PROD	.11900040E+03	86 ASSOCIATNS	.99899790E+03
40 PRINT/PUBL	.43500080E+03	87 S & L GOVT	.16900110E+03
41 CHEMICALS	.10299990E+03	88 POSTAL SER	.28399800E+03
42 REFINING	.89998650E+01	89 FED ELECTR	.61000310E+02
43 RUBBER PRO	.27000270E+02	90 GOVT NEC	.17699000E+05
44 CLAY PROD	.43998790E+02	92 HOUSEHOLDS	.00000000E+00
45 PRIM METAL	.71998630E+02		
46 FAB METALS	.26400060E+03		
47 MACHINERY	.43999870E+03		
		TOTAL EMPLOYMENT	.66202660E+05

**BASELINE SALES BY SECTOR  
LOWER SNAKE RIVER REGION 1994  
(3 SUBREGIONS COMBINED) (dollars)**

1 DAIRY/POUL	46138552.	49 MACHINERY	112317784.
2 CATTLE	241524528.	50 COMPUTERS	38062440.
3 MEAT ANIM	10137240.	51 ELECT GOOD	8878590.
4 LVSTK NEC	7544660.	52 ELECTRONIC	13061730.
5 FOOD GRAIN	471730272.	53 VEHICLES	47546272.
6 FEED GRAIN	317517120.	54 AIRCRAFT	2588570.
7 HAY	111244064.	55 MARINE EQU	20153140.
8 OTHER CROP	94317248.	56 INSTRUMENT	64725384.
9 FRUIT/NUTS	238112032.	57 RAILROADS	184797248.
10 VEGETABLES	396671200.	58 OTHER TRAN	41536792.
11 OIL CROPS	713190.	59 TRUCK/WARE	359040768.
12 FORESTRY	184732000.	60 WATER TRAN	33380530.
13 NURS/LNDSC	49202660.	61 AIR TRANSP	52475136.
14 FISHING	14581070.	62 PIPELINES	6391860.
15 AG SERVICE	114376336.	63 TELEPHONE	316054944.
16 METAL MINE	72824920.	64 RADIO/TV	72491040.
17 OTHER MINE	11033110.	65 ELECTRICIT	251021120.
18 COAL MINE	2670540.	66 GAS	43096012.
19 SAND & GRA	36058584.	67 WATER/SANI	123258384.
20 NEW RESI B	282678208.	68 WHOLESALE	951085824.
21 NEW IND &	254724192.	69 BLDG & GAR	85312776.
22 NEW UTIL	84887800.	70 DEPT STORE	173753216.
23 NEW ROADS	118733296.	71 GROCERIES	241867168.
24 NEW FARM	13193000.	72 AUTO DLRS	317989952.
25 NEW EXTRAC	4271401.	73 APPAREL	36179000.
26 NEW GOVT	220849808.	74 FURNITURE	66735268.
27 MAINT RESI	117281200.	75 RESTAURANT	556446144.
28 MAINT NEC	555765120.	76 RETAIL NEC	198231808.
29 MEAT PROC	388479936.	77 F-I-R-E	2226515968.
30 DAIRY PROD	185602912.	78 LODGING	195132704.
31 CAN/FREEZE	1312914432.	79 PER SERVIC	99121648.
32 OTHER FOOD	229745024.	80 BUS SERVIC	178367552.
33 GRAIN PROC	57887340.	81 DATA PROCE	132998200.
34 TEXTILES	23757852.	82 DETECTIVE	7384330.
35 LOGGING	479975680.	83 AUTO SERVI	175170784.
36 SAWMILLS	639266880.	84 REPAIR SER	78024176.
37 WOOD PRODU	240415440.	85 AMUSEMENTS	162374736.
38 MFG NEC	105182904.	86 HEALTH SER	923988608.
39 PAPER MILL	801937280.	87 PROF SERVI	2138514176.
40 PAPER PROD	23233000.	88 EDUCATION	118589200.
41 PRINT/PUBL	112733024.	89 SOC SERVIC	114584208.
42 CHEMICALS	238454112.	90 ASSOCIATNS	158933248.
43 REFINING	4007960.	91 S & L GOVT	130475968.
44 RUBBER PRO	3472520.	92 GOV ELECTR	784303232.
45 CLAY PROD	34751720.	93 POSTAL SER	92704976.
46 PRIM METAL	114035808.	94 GOVT NEC	1667937280.
47 PRI ALUMIN	293144000.	96 HOUSEHOLDS	10318804992.
48 FAB METALS	226453696.		

**BASELINE EMPLOYMENT BY SECTOR  
LOWER SNAKE RIVER REGION 1994  
(3 SUBREGIONS COMBINED) (jobs)**

1 DAIRY/POUL	.24799970E+03	49 MACHINERY	.94300070E+03
2 CATTLE	.26730000E+04	50 COMPUTERS	.18100020E+03
3 MEAT ANIM	.24000090E+03	51 ELECT GOOD	.65999920E+02
4 LVSTK NEC	.29800240E+03	52 ELECTRONIC	.94999490E+02
5 FOOD GRAIN	.80290100E+04	53 VEHICLES	.37500050E+03
6 FEED GRAIN	.32849980E+04	54 AIRCRAFT	.19000510E+02
7 HAY	.38540020E+04	55 MARINE EQU	.20699940E+03
8 OTHER CROP	.20840030E+04	56 INSTRUMENT	.48999840E+03
9 FRUIT/NUTS	.44680000E+04	57 RAILROADS	.12909990E+04
10 VEGETABLES	.27559990E+04	58 OTHER TRAN	.11170000E+04
11 OIL CROPS	.10998300E+02	59 TRUCK/WARE	.43600020E+04
12 FORESTRY	.78900000E+03	60 WATER TRAN	.18500130E+03
13 NURS/LNDSC	.14629960E+04	61 AIR TRANSP	.47099940E+03
14 FISHING	.17799960E+03	62 PIPELINES	.18000170E+02
15 AG SERVICE	.60897360E+04	63 TELEPHONE	.14580000E+04
16 METAL MINE	.39900010E+03	64 RADIO/TV	.60600040E+03
17 OTHER MINE	.97000960E+02	65 ELECTRICIT	.77299950E+03
18 COAL MINE	.70001050E+01	66 GAS	.92000030E+02
19 SAND & GRA	.31900070E+03	67 WATER/SANI	.71200050E+03
20 NEW RESI B	.39310000E+04	68 WHOLESALE	.11744000E+05
21 NEW IND &	.41710010E+04	69 BLDG & GAR	.20709950E+04
22 NEW UTIL	.11530000E+04	70 DEPT STORE	.53520010E+04
23 NEW ROADS	.12120010E+04	71 GROCERIES	.77110020E+04
24 NEW FARM	.61000000E+02	72 AUTO DLRS	.59149970E+04
25 NEW EXTRAC	.94000020E+02	73 APPAREL	.12050030E+04
26 NEW GOVT	.31800000E+03	74 FURNITURE	.17179990E+04
27 MAINT RESI	.14500000E+04	75 RESTAURANT	.17233000E+05
28 MAINT NEC	.60619990E+04	76 RETAIL NEC	.10121000E+05
29 MEAT PROC	.10340000E+04	77 F-I-R-E	.12624000E+05
30 DAIRY PROD	.56699970E+03	78 LODGING	.51320020E+04
31 CAN/FREEZE	.74890020E+04	79 PER SERVIC	.38050020E+04
32 OTHER FOOD	.11700000E+04	80 BUS SERVIC	.54810040E+04
33 GRAIN PROC	.17199920E+03	81 DATA PROCE	.17479990E+04
34 TEXTILES	.37800240E+03	82 DETECTIVE	.43599580E+03
35 LOGGING	.23550000E+04	83 AUTO SERVI	.26260000E+04
36 SAWMILLS	.36750000E+04	84 REPAIR SER	.14880000E+04
37 WOOD PRODU	.15920000E+04	85 AMUSEMENTS	.48820010E+04
38 MFG NEC	.12240010E+04	86 HEALTH SER	.18114000E+05
39 PAPER MILL	.23230000E+04	87 PROF SERVI	.29361000E+05
40 PAPER PROD	.13800060E+03	88 EDUCATION	.34820000E+04
41 PRINT/PUBL	.19559990E+04	89 SOC SERVIC	.41040040E+04
42 CHEMICALS	.10860000E+04	90 ASSOCIATNS	.44630010E+04
43 REFINING	.13000190E+02	91 S & L GOVT	.82400040E+03
44 RUBBER PRO	.32001110E+02	92 GOV ELECTR	.26340000E+04
45 CLAY PROD	.32200020E+03	93 POSTAL SER	.12889980E+04
46 PRIM METAL	.56200010E+03	94 GOVT NEC	.58796010E+05
47 PRI ALUMIN	.11590000E+04	96 HOUSEHOLDS	.00000000E+00
48 FAB METALS	.14070000E+04	TOTAL EMPLOYMENT	.32221180E+06

**BASELINE SALES BY SECTOR  
UPRIVER SUBREGION 1994 (dollars)**

1 DAIRY/POUL	8534010.	44 MACHINES	20635970.
2 CATTLE	47542232.	45 ELECTRIC	1226540.
3 MEAT ANIMA	3567870.	46 AIRCRAFT	1234900.
4 LVSTK NEC	1249170.	47 BOAT BLD	1987310.
5 FOOD GRAIN	68615008.	48 TRANS EQUI	4262380.
6 FEED GRAIN	59104500.	49 INSTRUMENT	1344680.
7 HAY/PASTUR	45608420.	50 RAILROADS	9916740.
8 CROPS NEC	24313470.	51 TRANSP NEC	8455800.
9 FRUIT/NUTS	1930460.	52 TRUCK/WH	115556720.
10 VEGETABLES	31578270.	53 WATER TRAN	23536340.
11 FORESTRY	19576264.	54 AIR TRAN	16405700.
12 NURSERY/LA	8830990.	55 TELEPHONE	70248944.
13 FISHING	1377900.	56 RADIO/TV	19164760.
14 AG SERVICE	16529050.	57 ELECTRIC	41528208.
15 METAL MINE	64237152.	58 WATER/SANI	20586390.
16 MINES NEC	2743460.	59 WHOLESALE	231759728.
17 SAND/GRVL	30469690.	60 BLDG MATER	27604932.
18 NEW RESIDE	44317500.	61 DEPT STORE	43937100.
19 NEW INDUST	39226900.	62 GROCERIES	55788660.
20 NEW UTILIT	21785100.	63 AUTO DLRS	72405248.
21 NEW ROADS	43941800.	64 APPAREL	10005870.
22 NEW FARM	8882000.	65 FURNITURE	18958270.
23 NEW EXTRAC	2947200.	66 RESTAURANT	131845984.
24 NEW GOVT	132608592.	67 RETAIL NEC	49979668.
25 RESI MAINT	24627912.	68 F-I-R-E	507464896.
26 MAINT NEC	142513536.	69 LODGING	56015300.
27 MEAT PROC	3530560.	70 PERS SERV	28881928.
28 DAIRY PROC	11287820.	71 BUS SERV	18803560.
29 FOODS NEC	415040.	72 DATA PROC	6721100.
30 FEED PROC	41504680.	73 DETECTIVE	2858410.
31 MFG NEC	2224730.	74 AUTO SERV	46616152.
32 LOGGING	345169792.	75 REPAIR SER	19695610.
33 SAWMILLS	379931456.	76 AMUSEMENTS	43575664.
34 WOOD PROD	75753344.	77 HEALTH SER	242245536.
35 PAPER MILL	677205376.	78 PROF SERV	57731040.
36 PAPER PROD	2800390.	79 EDUCATION	10280790.
37 PRINT/PUBL	28174570.	80 SOC SERV	27773900.
38 CHEMICALS	6387900.	81 ASSOCIATNS	40980168.
39 REFINING	1360750.	82 S & L GOVT	21766730.
40 RUBBER PRO	22030520.	83 POSTAL SER	21073230.
41 CLAY PRODS	7990750.	84 GOVT NEC	413884800.
42 PRIM METAL	1969040.	86 HOUSEHOLDS	2108380928.
43 FAB METALS	122795072.		

**BASELINE EMPLOYMENT BY SECTOR  
UPRIVER SUBREGION 1994 (jobs)**

1	DAIRY/POUL	.36999610E+02	45	ELECTRIC	.80002610E+01
2	CATTLE	.61100160E+03	46	AIRCRAFT	.10000810E+02
3	MEAT ANIMA	.95999190E+02	47	BOAT BLD	.18998180E+02
4	LVSTK NEC	.32865030E+02	48	TRANS EQUI	.25999270E+02
5	FOOD GRAIN	.10220020E+04	49	INSTRUMENT	.10999840E+02
6	FEED GRAIN	.62400000E+03	50	RAILROADS	.69998870E+02
7	HAY/PASTUR	.12270000E+04	51	TRANSP NEC	.21900000E+03
8	CROPS NEC	.53499710E+03	52	TRUCK/WH	.14670000E+04
9	FRUIT/NUTS	.20998480E+02	53	WATER TRAN	.13399970E+03
10	VEGETABLES	.14899940E+03	54	AIR TRAN	.15799900E+03
11	FORESTRY	.12999780E+03	55	TELEPHONE	.33703810E+03
12	NURSERY/LA	.35299960E+03	56	RADIO/TV	.16900050E+03
13	FISHING	.34000000E+02	57	ELECTRIC	.16200000E+03
14	AG SERVICE	.82944910E+03	58	WATER/SANI	.14206200E+03
15	METAL MINE	.34500030E+03	59	WHOLESALE	.31210000E+04
16	MINES NEC	.16000350E+02	60	BLDG MATER	.70700340E+03
17	SAND/GRVL	.25500080E+03	61	DEPT STORE	.13800280E+04
18	NEW RESIDE	.76999820E+03	62	GROCERIES	.19009990E+04
19	NEW INDUST	.83600000E+03	63	AUTO DLRS	.15269990E+04
20	NEW UTILIT	.37700000E+03	64	APPAREL	.38000270E+03
21	NEW ROADS	.51099880E+03	65	FURNITURE	.49800190E+03
22	NEW FARM	.43000000E+02	66	RESTAURANT	.43780000E+04
23	NEW EXTRAC	.69000000E+02	67	RETAIL NEC	.28260100E+04
24	NEW GOVT	.19800000E+03	68	F-I-R-E	.32500000E+04
25	RESI MAINT	.36500020E+03	69	LODGING	.17270000E+04
26	MAINT NEC	.18260000E+04	70	PERS SERV	.12600060E+04
27	MEAT PROC	.15999820E+02	71	BUS SERV	.74799840E+03
28	DAIRY PROC	.29000050E+02	72	DATA PROC	.11100000E+03
29	FOODS NEC	.90008670E+01	73	DETECTIVE	.16000060E+03
30	FEED PROC	.18400040E+03	74	AUTO SERV	.77100090E+03
31	MFG NEC	.48000650E+02	75	REPAIR SER	.46600020E+03
32	LOGGING	.16300010E+04	76	AMUSEMENTS	.12720050E+04
33	SAWMILLS	.21590000E+04	77	HEALTH SER	.49379990E+04
34	WOOD PROD	.45999910E+03	78	PROF SERV	.11770010E+04
35	PAPER MILL	.17780000E+04	79	EDUCATION	.37199970E+03
36	PAPER PROD	.17999940E+02	80	SOC SERV	.11280000E+04
37	PRINT/PUBL	.51600310E+03	81	ASSOCIATNS	.11699990E+04
38	CHEMICALS	.33999470E+02	82	S & L GOVT	.14300020E+03
39	REFINING	.40001470E+01	83	POSTAL SER	.30700190E+03
40	RUBBER PRO	.31700170E+03	84	GOVT NEC	.16551000E+05
41	CLAY PRODS	.74999530E+02	86	HOUSEHOLDS	.00000000E+00
42	PRIM METAL	.29997560E+02			
43	FAB METALS	.91599980E+03			
44	MACHINES	.19900070E+03			
				TOTAL EMPLOYMENT	.74935460E+05

**BASELINE SALES BY SECTOR  
STATE OF WASHINGTON 1994 (dollars)**

1 DAIRY/POUL	735922432.	51 MACHINERY	1889320192.
2 CATTLE	570638656.	52 COMPUTERS	1588562176.
3 MEAT ANIM	11662580.	53 ELECT GOOD	504309728.
4 LVSTK NEC	57052896.	54 ELECTRONIC	1427288960.
5 FOOD GRAIN	455379744.	55 VEHICLES	2196623360.
6 FEED GRAIN	263220512.	56 AIRCRAFT	16074426368.
7 HAY	165231776.	57 AIR PARTS	1067268480.
8 OTHER CROP	224550144.	58 MARINE MFG	571949824.
9 FRUIT/NUTS	1267306752.	59 INSTRUMENT	2076881920.
10 VEGETABLES	542619584.	60 RAILROADS	785774464.
11 OIL CROPS	3588530.	61 OTHER TRAN	1212729088.
12 FORESTRY	623331968.	62 TRUCK/WARE	3713747712.
13 NURS/LNDSC	560513152.	63 WATER TRAN	2017962496.
14 FISHING	1685262080.	64 AIR TRANSP	2085454208.
15 AG SERVICE	417992832.	65 PIPE LINES	44881688.
16 METAL MINE	195005824.	66 TELEPHONE	5097722880.
17 OTHER MINE	132413768.	67 RADIO/TV	705747072.
18 COAL MINE	156027040.	68 ELECTRICIT	1108039936.
19 GAS EXTRAC	8425061.	69 GAS	1119531776.
20 SAND & GRA	108940352.	70 WATER/SANI	426577504.
21 NEW RESI B	4250344960.	71 WHOLESALE	15412575232.
22 NEW IND &	3797057536.	72 BLDG & GAR	1109444864.
23 NEW UTIL	1150075904.	73 DEPT STORE	1764675968.
24 NEW ROADS	1283663360.	74 GROCERIES	2753665024.
25 NEW FARM	63031496.	75 AUTO DLRS	3220650496.
26 NEW EXTRAC	24029600.	76 APPAREL	1305518080.
27 NEW GOVT	1536914688.	77 FURNITURE	1222751232.
28 MAINT RESI	1568601344.	78 RESTAURANT	6146983936.
29 MAINT NEC	6929819648.	79 RETAIL NEC	2660737536.
30 MEAT PROC	1141225856.	80 F-I-R-E	36544565248.
31 DAIRY PROD	629835840.	81 LODGING	1566241280.
32 CAN/FREEZE	3848796160.	82 PER SERVIC	1629958400.
33 OTHER FOOD	1845755520.	83 BUS SERVIC	3402548480.
34 GRAIN PROC	959612416.	84 DATA PROCE	5172963328.
35 TEXTILES	889972224.	85 DETECTIVE	163011120.
36 LOGGING	1765825536.	86 AUTO SERVI	2503414784.
37 SAWMILLS	3501954816.	87 REPAIR SER	1106012928.
38 WOOD PRODU	1418654464.	88 AMUSEMENTS	2778387968.
39 MFG NEC	2299375104.	89 HEALTH SER	12448737280.
40 PAPER MILL	3038155776.	90 PROF SERVI	10256179200.
41 PAPER PROD	1201825024.	91 EDUCATION	1624301312.
42 PRINT/PUBL	2355849984.	92 SOC SERVIC	1326428416.
43 CHEMICALS	1464008192.	93 ASSOCIATNS	1798718592.
44 REFINING	2306939392.	94 S & L GOVT	2184003072.
45 RUBBER PRO	59654736.	95 GOV ELECTR	3272155904.
46 CLAY PRODU	1189152384.	96 POSTAL SER	1033613696.
47 PRIM METAL	659541888.	97 GOVT NEC	15701917696.
48 PRI ALUMIN	1297549312.	99 HOUSEHOLDS	121548546048.
49 SEC ALUMIN	548171840.		
50 FAB METALS	1822483456.		

**BASELINE EMPLOYMENT BY SECTOR  
STATE OF WASHINGTON 1994 (jobs)**

1 DAIRY/POUL	.61079990E+04	51 MACHINERY	.14541000E+05
2 CATTLE	.58649990E+04	52 COMPUTERS	.71630010E+04
3 MEAT ANIM	.37499610E+03	53 ELECT GOOD	.31060000E+04
4 LVSTK NEC	.29100000E+04	54 ELECTRONIC	.92840000E+04
5 FOOD GRAIN	.80599990E+04	55 VEHICLES	.63909980E+04
6 FEED GRAIN	.28330000E+04	56 AIRCRAFT	.85490980E+05
7 HAY	.85429990E+04	57 AIR PARTS	.81069960E+04
8 OTHER CROP	.64079980E+04	58 MARINE MFG	.56550000E+04
9 FRUIT/NUTS	.27639990E+05	59 INSTRUMENT	.12966000E+05
10 VEGETABLES	.49190000E+04	60 RAILROADS	.55050000E+04
11 OIL CROPS	.97998090E+02	61 OTHER TRAN	.20836000E+05
12 FORESTRY	.34919990E+04	62 TRUCK/WARE	.43016980E+05
13 NURS/LNDSC	.17680000E+05	63 WATER TRAN	.94950020E+04
14 FISHING	.14671000E+05	64 AIR TRANSP	.14946000E+05
15 AG SERVICE	.20812010E+05	65 PIPE LINES	.92999980E+02
16 METAL MINE	.77300010E+03	66 TELEPHONE	.19081000E+05
17 OTHER MINE	.10899980E+04	67 RADIO/TV	.48610010E+04
18 COAL MINE	.64399940E+03	68 ELECTRICIT	.30830000E+04
19 GAS EXTRAC	.24600180E+03	69 GAS	.24260000E+04
20 SAND & GRA	.10930000E+04	70 WATER/SANI	.25260000E+04
21 NEW RESI B	.54695000E+05	71 WHOLESALE	.15531500E+06
22 NEW IND &	.56307010E+05	72 BLDG & GAR	.22739000E+05
23 NEW UTIL	.13660000E+05	73 DEPT STORE	.44153000E+05
24 NEW ROADS	.11601000E+05	74 GROCERIES	.71470980E+05
25 NEW FARM	.26500000E+03	75 AUTO DLRS	.49792010E+05
26 NEW EXTRAC	.40700000E+03	76 APPAREL	.26700000E+05
27 NEW GOVT	.20570000E+04	77 FURNITURE	.23911010E+05
28 MAINT RESI	.17731000E+05	78 RESTAURANT	.16948200E+06
29 MAINT NEC	.69302010E+05	79 RETAIL NEC	.11020200E+06
30 MEAT PROC	.41420000E+04	80 F-I-R-E	.21345500E+06
31 DAIRY PROD	.17800000E+04	81 LODGING	.31419010E+05
32 CAN/FREEZE	.21705000E+05	82 PER SERVIC	.53587020E+05
33 OTHER FOOD	.79929980E+04	83 BUS SERVIC	.10958600E+06
34 GRAIN PROC	.52930000E+04	84 DATA PROCE	.38488000E+05
35 TEXTILES	.11292000E+05	85 DETECTIVE	.97390070E+04
36 LOGGING	.86349980E+04	86 AUTO SERVI	.32273000E+05
37 SAWMILLS	.22508010E+05	87 REPAIR SER	.15669000E+05
38 WOOD PRODU	.13420000E+05	88 AMUSEMENTS	.60121000E+05
39 MFG NEC	.21213000E+05	89 HEALTH SER	.20396600E+06
40 PAPER MILL	.11579000E+05	90 PROF SERVI	.13851200E+06
41 PAPER PROD	.56540000E+04	91 EDUCATION	.44934010E+05
42 PRINT/PUBL	.28141000E+05	92 SOC SERVIC	.44904010E+05
43 CHEMICALS	.59020010E+04	93 ASSOCIATNS	.49240990E+05
44 REFINING	.20100000E+04	94 S & L GOVT	.16230000E+05
45 RUBBER PRO	.53600030E+03	95 GOV ELECTR	.10409000E+05
46 CLAY PRODU	.94740030E+04	96 POSTAL SER	.14901000E+05
47 PRIM METAL	.33630000E+04	97 GOVT NEC	.49387890E+06
48 PRI ALUMIN	.53000010E+04	99 HOUSEHOLDS	.00000000E+00
49 SEC ALUMIN	.22370000E+04	TOTAL EMPLOYMENT	.30997300E+07
50 FAB METALS	.13617000E+05		

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