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Increasing demands for water related services of the Columbia River and its tributaries create conflicts between users. During the 1970s, the conflict has centered around three major water uses - irrigation, hydroelectric power generation and fisheries. This study analyzes some of the output tradeoffs between upstream depletion of water for irrigation and downstream use of the water for production of aluminum, which depends on large blocks of inexpensive hydroelectric energy. The economic value of two projected increments of irrigated crops in 1985 and the consequent losses of economic value from less aluminum output due to reduced hydroelectric generation are analyzed in a theoretical 1985 multiregional input-output model of Washington, Oregon, and Idaho. The analysis estimates direct and indirect changes in output and employment by industry, state, and for the region. Two points regarding the analysis are stressed.

Feasibility of future irrigation development is not estimated in the study. The model is a compilation of data from several sources assembled to represent regional trade flows and may contain considerable error. Therefore, the conclusions should not be considered precise. Rather, they indicate general magnitude and direction of output tradeoffs.

Results of this analysis indicate that the 1985 incremental value of crop and food processing output from additional irrigation overshadows output losses in the regional aluminum industry. Neither the crop production increases nor the aluminum production losses are large compared to the projected 1985 regional economy. However, the production changes would be significant within each industry, probably having considerable impact in localities with new irrigated lands or where aluminum production is significant. Indirect or support output in trade, services, transportation, machinery, food processing, manufacture, and electric utilities are most affected by future irrigated crop output increases and aluminum output decreases. The net effect of crop output increases and aluminum production decreases is greatest in Washington, followed by Idaho and then Oregon.

SELECTED EFFECTS OF ADDITIONAL IRRIGATION IN THE COLUMBIA BASIN: A MULTIREGIONAL INTERINDUSTRY ANALYSIS

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A family who accepted my absence from home during much of this study deserves special credit.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

SELECTED EFFECTS OF ADDITIONAL IRRIGATION IN THE COLUMBIAN BASIN: A MULTIREGIONAL INTERINDUSTRY ANALYSIS

I. INTRODUCTION

The Columbia River system as modified, used and administered by man is a complex and heavily utilized natural resource. A significant number of man's activities in the region are closely linked to the river and its tributaries. Hydroelectric power, irrigation, transportation of bulk goods, recreation, waste assimilation, fisheries, and municipal and industrial water supply are all important river uses.

In the past it appeared that Columbia system water was adequate to meet all demands upon it. However, in recent years these perceptions have changed. Water supplies limited in time, place, or use are evident. Water is now the limiting natural resource in further irrigation development. Irrigation is the primary consumptive use of water in the region. East of the Cascades irrigation accounts for more than 95 percent of the consumption of withdrawn waters (PNRBC, Appendix V, 1970).

Upstream uses of a river system can cause downstream effects of various kinds and to varying degrees because most water is reused in some way. Because of this multiple use capability, an upstream water

diversion or quality deterioration may reduce the potential for downstream water related services. For example, industrial use can reduce water quantity, and especially quality, for downstream uses such as municipal, fisheries, or recreation. Consequently a downstream user may incur additional expenses of treating water prior to use or of obtaining water from alternative sources.

In the case of the Columbia River, one of the major downstream effects of upstream irrigation diversions is on hydroelectric power generation potential. A recent work estimated that an increase of three million acres of upstream irrigation by the year 2020 would cause an average annual downstream hydroelectric generation loss of 767 megawatts or 10 percent of the hydroelectric output generated for the Bonneville Power Administration in 1972, a year representative of hydroelectric generation (USCE, Appendix A, 1976).

Study Objectives, Setting and Scope

This study is designed to examine some of the economic impacts of upstream irrigation development on Washington, Oregon, and Idaho, emphasizing downstream hydroelectric generation and its effect on regional aluminum production. This is an issue of increasing importance in the Pacific Northwest. This research will supplement other studies related to the Columbia River by estimating some of the

direct and indirect economic effects and tradeoffs among the three states for two different levels of future regional irrigation development. The base year for the study is 1972. Analysis is for the year 1985.

The analysis will provide estimates of increased crop output values, decreased aluminum output values and estimates of the secondary or indirect output changes resulting in all other sectors (industries) of the economy. Employment effects will also be shown by sector and state.

Questions related to upstream-downstream water use tradeoffs have many facets. Selected economic aspects are emphasized in this study but they are only part of one facet. The study considers only the output effects of the related economic issues. There are many important instream and out-of-stream water uses as well as many institutional conditions which are affected by irrigation and hydroelectric generation. Their interrelations with irrigation and hydroelectric generation are, however, beyond the scope of this study. This study is limited to evaluating the economic tradeoffs between the aluminum industry and existing alternative irrigation plans and projections. It is not a benefit-cost study. It does not result in or recommend a development plan.

Water related issues in the region appear to fit within a conceptual framework described by Craine. These issues result from disconformities among water supply, demand and jurisdictional units. According to Craine the hydrologic unit is the water supply region, yet each water related service area forms a separate water demand unit different from the supply unit. The situation is further complicated by the presence of several levels of governments with jurisdictions over portions of the demand and supply units. Craine states that this situation is at the "heart of the institutional problem wherever public water management is undertaken." (Craine, 1969)

Using Craine's conceptual framework to view the region's water situation, the supply unit in the northwest is the drainage area or hydrologic area contributing flow to the Columbia River. The supply area covers most of Washington, Oregon, and Idaho; large parts of British Columbia and Montana; and smaller areas in Wyoming, Utah, and Nevada. It is this supply unit which imposes many of the quantity, time and place constraints on water use.

There are, on the other hand, several types of demand units in the northwest. Irrigation and hydroelectric demand units are two of the most significant and are emphasized in this study. The largest irrigation demand units are located in the Snake Plains of Idaho and in the Columbia Basin of Oregon and Washington. The irrigation

demand units were at one time limited to areas where water could be diverted from the river and moved to farms by gravity. However, these units have expanded significantly with the advent of sprinkler irrigation systems and modern pumps which deliver water considerable distances from the rivers.

The hydropower demand unit for aluminum production in the Northwest is more difficult to define because water is used to generate electricity which is then moved to populous load centers (the Puget-Willamette lowlands) and to aluminum processing plants. The aluminum demand unit may be defined as the aluminum plants (which are located mainly in downstream areas) and the attendant hydroelectric plants. The definition is further complicated because hydroelectric plants also supply power to other uses besides aluminum production and to the Southwest over the intertie.

There are several levels of jurisdictional units involved with the supply and demand units. There are two countries - Canada and the United States, several states, numerous counties as well as many utility and special purpose districts. The three States are the most important jurisdictional units to this study. Although there is some interstate cooperation in water matters, each State appears to place highest priority on its own welfare. This is demonstrated by their various and conflicting water development plans and by the lack of accord on an interstate water compact. For example, Idaho is an

upstream jurisdictional unit on the Snake River, and also part of the water supply unit while at the same time accounting for a considerable portion of the irrigation demand unit. But it has little in common with downstream aluminum related demand units. Washington and Oregon are downstream jurisdictional and supply units with keen interests in both the irrigation and aluminum water demand units.

In order to achieve more harmonious utilization of the Columbia River, water management institutions in the region must better accommodate the physical and economic characteristics of the hydrologic unit by attempting to deal with the externalities or "spillover" effects stemming from interdependencies among demand, supply, and jurisdictional units. This study attempts to quantify some of the externalities on a state basis.

Study Justification

A study of the impacts of alternative irrigation development levels will provide information to assist in equitable and efficient irrigation water use and allocation decisions, as issues are identified and solutions considered. Water planners, administrators, the courts, and legislators may then utilize these findings as a base for more reasoned plans and agreements on the three-state use of water.

Each of the three states is refining estimates of future water needs in separate state water plans. Much of the future demand results from increases in irrigated acreage. Washington recommended in 1978, as a means of assuring water for the future, that additional uses on the lower Snake River be subject to a minimum instream flow of 20,000 cfs (14,479,300 ac. ft. yr.) measured at Clarkston (Wash. DOE, 1978). However, Washington is studying the matter further to propose modified flow levels by March of 1979. Idaho expressed concern over the 1978 Washington proposal, saying that such restrictions would preclude planned irrigation use and in turn passed legislation setting 5,000 cfs (3,619,850 ac. ft. yr.) average daily minimum flow at Johnson Bar, just below Hells Canyon dam, above the Clearwater and Salmon Rivers and upstream from Clarkston, Washington (Idaho State Leg.). In addition, Oregon in 1970 made long-term policy claims on 1,710,000 additional acre feet per year of Snake River water (Oregon WRB, 1970). After more than 20 years of sporadic negotiations, no compact exists on the allocation of Columbia and Snake River water between the states.

Adequate water is not available to meet the projected requirements of all three states and still provide for other uses. Average annual flow at Weiser, Idaho in 1970 was 15,070 cfs. By the year 2020 OBERS[1] level C projected irrigation and other upstream

[1]A set of National projections developed by the Office of Business Economics of the Department of Commerce and the Economic Research Service of the U.S. Department of Agriculture.

developments could reduce the average annual flow at Weiser to a range of between 9,000 (PNRBC, Main Report, 1972) and 12,000 cfs (CRWMG, 1974). Simulated monthly flows of the river indicate even more serious depletions. July flows at Weiser could average less than 5,000 cfs, August flows 5,300 cfs, and September flows 7,200 cfs. The average monthly flows in 1970 were 10,300; 9,900; and 11,400 cfs respectively.

New irrigation requires pumping of water from aquifers or from surface sources. Irrigation pumping requires large amounts of electricity. In addition, irrigation withdrawals reduce hydroelectric generation downstream, depending on the time of year and point of withdrawal. The loss of hydropower generation capability must be replaced with more expensive thermal electric power. There is limited potential to increase hydroelectric generation in the Columbia System (NEPP, Final Report, 1978).

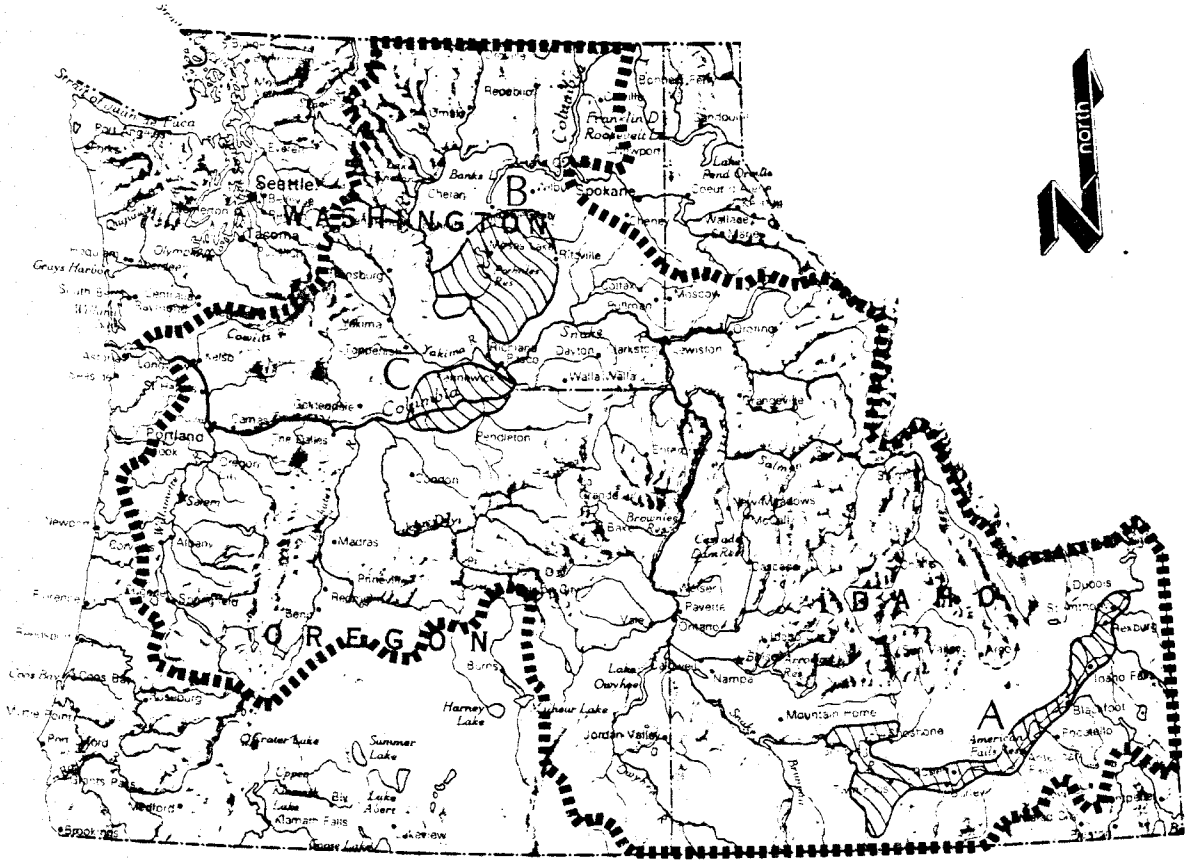
The Columbia River system is a regional resource, yet few studies approach it as such. Most studies deal with the interests of a single state, a river reach, a narrow or broad water issue or are largely descriptive. The Pacific Northwest River Basins Commission, which has responsibility to recommend regional priorities for water development is, in its Comprehensive Coordinated Joint Plan study, addressing regional problems, but is not making an economic tradeoff analysis for irrigation development (PNRBC, 1978).

The Columbia River and Tributaries (CR&T) study, under the leadership of the U.S. Army Corps of Engineers, is evaluating the Lower Columbia River as a system, to identify areas for further study, including irrigation and to recommend improved management for the river system (USCE, 1976). Some downstream physical and economic effects of alternative levels of future irrigation development are examined by the CR&T study.

However, there is no provision in these studies of the Columbia System, to analyze state level cost and benefit tradeoffs of alternative patterns of irrigation water use and hydropower effects.

Study and Evaluation Areas

The study area includes the Columbia River and its tributaries in Washington, Oregon, and Idaho except for the coastal drainages, the Oregon closed basin, and Northern Idaho (Fig. 1-1). As such, it includes the main stem of the Columbia River from its mouth to the Canadian border and the Snake River from its mouth to the Idaho-Wyoming border. The study area includes almost all of the region's irrigated area, covering 183,447 square miles or 117,406.3 thousand acres (PNRBC, Appendix IV, 1970).



Study area

Evaluation area (Wash., Ore., Ida.)

Primary areas of future irrigation development

A—Upper & Middle Snake River Basin

B—Big Bend

C—Horse Heaven Hills—Umatilla & Boardman

Figure 1-1 The Pacific Northwest Region

The impacts from additional irrigation in the study area, however, are evaluated for their economic effects on the entire three state area (Washington, Oregon, and Idaho) in which it functions. In other words, the economic effects from the study area are evaluated in the region which provides production inputs, food processing, shipping, and associated services. Thus, the evaluation area is similar to Craine's demand and jurisdiction units; the former because it includes secondary or indirect water uses related to irrigation and aluminum production through economic ties, while the latter encompasses the three major jurisdictional units on which the analysis is based. "Region" as used in this study refers to the three state evaluation area.

Physical Description of the Study Area

The Cascade Mountain range and the northern limit of the Cowlitz River form the western boundary of the study area in Washington. In Oregon the coast range forms a western boundary. The northern limit of the Oregon closed basins in Oregon and the southern Idaho boundary form the southern boundary of the study area. The Wyomide ranges of the Central Rocky Mountains form a study area limit in the southeast corner of Idaho separating the Bear River drainage from the Snake drainage. The eastern boundary of the study area is bounded on the northeast by the Idaho-Wyoming state line. The study area is bounded

on the northeast by the Bitterroot Mountains along the Idaho-Montana border. The study area northern boundary roughly parallels the Clark Fork of the Columbia, Coeur d' Alene, Spokane, and Pend Oreille Rivers to the Canadian-United States border where it follows the border to the Cascade range in northern Washington.

East of the Cascade range is found the Columbia basin in central and eastern Washington and Oregon, the scene of most recent irrigation development. Central highlands, lava plateaus and basin and range landforms dominate central and eastern Oregon. Lava plateaus and basin and range topography extend across Idaho near the southern boundary of the study area. The Snake Plains, the scene of much present and future irrigation development, carve a large crescent through this landscape across southern Idaho. The Snake Plain is technically a plateau with a gentle western dip from 6,000-3,500 feet in elevation (Highsmith, 1973). Extensive irrigated agriculture is found in the Columbia Basin of Washington and Oregon and in the Snake River Plains of Idaho. Isolated irrigated agriculture is found along other valleys and streams throughout the study area.

Natural vegetation of the study area can be summarized as extensive areas of forests in the higher elevations and major areas of grasslands and sagebrush in the lower elevations east of the Cascades. West of the Cascades, natural vegetation was a mosaic of

forest, woodland, and open savanna in the alluvial bottomland surrounded by pine and hemlock forests on the slopes of the Cascade and Coast ranges. Nearly all of the untimbered land in eastern Washington and Oregon and southern Idaho was once a vast bunchgrass area (PNRBC Appendix IX, 1971). However, this cover has been significantly altered by man's activities as was vegetation west of the Cascades. Irrigated and dryland farming in the study area has occurred in extensive areas once dominated by shrub/grass type vegetation such as blue bunch wheatgrass (Agropyron spicatum), Idaho fesque (Festuca Idahoensis), several species of sagebrush (Artemisia tridentata), and rabbit brush (Chrysothamnus nauseosus) (Highsmith, 1973). Soils found with this type of natural vegetation and now extensively farmed are generally silty or sandy, wind deposited or formed from rocky parent material (PNRBC Appendix IV, 1971). Such soils are ideally adapted to sprinkler irrigation.

Climate is one of the most important environmental factors which affects irrigation and its potential in the study area. The Pacific Northwest has many climates depending on elevation and location. The ocean, mountains, plateaus, and large gorges all exert pronounced control on air circulation which causes these climatic variations. However, the Cascade Mountain range is a line of demarcation for temperature, precipitation, and sunshine. It divides the region into two distinct climate zones - a relatively humid western side with wet

winters where temperatures are moderated by the Pacific Ocean, and a relatively arid eastern side where temperatures display continental influences. Average annual precipitation of 5 to 15 inches in the valleys and low lying plateaus east of the Cascades is inadequate for general crop production without irrigation. Since most of it falls in the autumn and winter months, irrigation is required during the summer to support more intensive agriculture.

Marine air masses generally keep winter temperatures relatively moderate in most of the region with temperature ranges significantly greater east of the Cascades. However, this influence is greatly modified by distance from the coast, elevation, and topographic barriers. Continental air masses characterized by dry, warm summers dominate the summer season. Average monthly temperatures in summer months are generally between 60 and 80 degrees Fahrenheit in most valley areas where irrigation is practiced. The growing season in the study area generally is related to elevation and is 100-180 days long. Some eastern portions of the basin at higher elevations have a growing season as short as 50 days.

Heavy snowfall in the mountains is characteristic of the winter season. Spring and summer melting of this snowpack feeds many of the region's streams. Accumulated mountain snow reaches a maximum in about April and begins to melt during spring or early summer depending on elevation.

Many major streams in the study area have qualities which facilitate their development and use. Large volumes of water, relatively small amounts of silt, fairly steep gradients, numerous sites suitable for dams and storage, maximum runoff during the dry season and passage through much of the arid portion of the region are examples. These characteristics have facilitated the construction and utilization of many dams, reservoirs and their attendant works.

The Columbia River rises from a lake on the west side of the Canadian Rockies 2,650 feet above sea level and flows northwest through mountain trenches and then heads south, entering the United States in northeastern Washington (Fig. 1-1). The river flows south, then west, and south again across central Washington before turning west into a magnificent gorge which dissects the Cascade range. Average annual discharge of the Columbia at its mouth is 180.1 million acre feet per year (248,700 cfs) ranking it second in the U.S. (Highsmith 1973). Further upstream at The Dalles, annual streamflow during the 1929-1958 period varied from a maximum of 238,583 cfs to a minimum of 127,495 cfs. A hydrograph for flows at The Dalles is shown in Figure 1-2. The yearly peak is usually in late May or early June due to the melting of accumulated snow. Low flows occur in September or October.

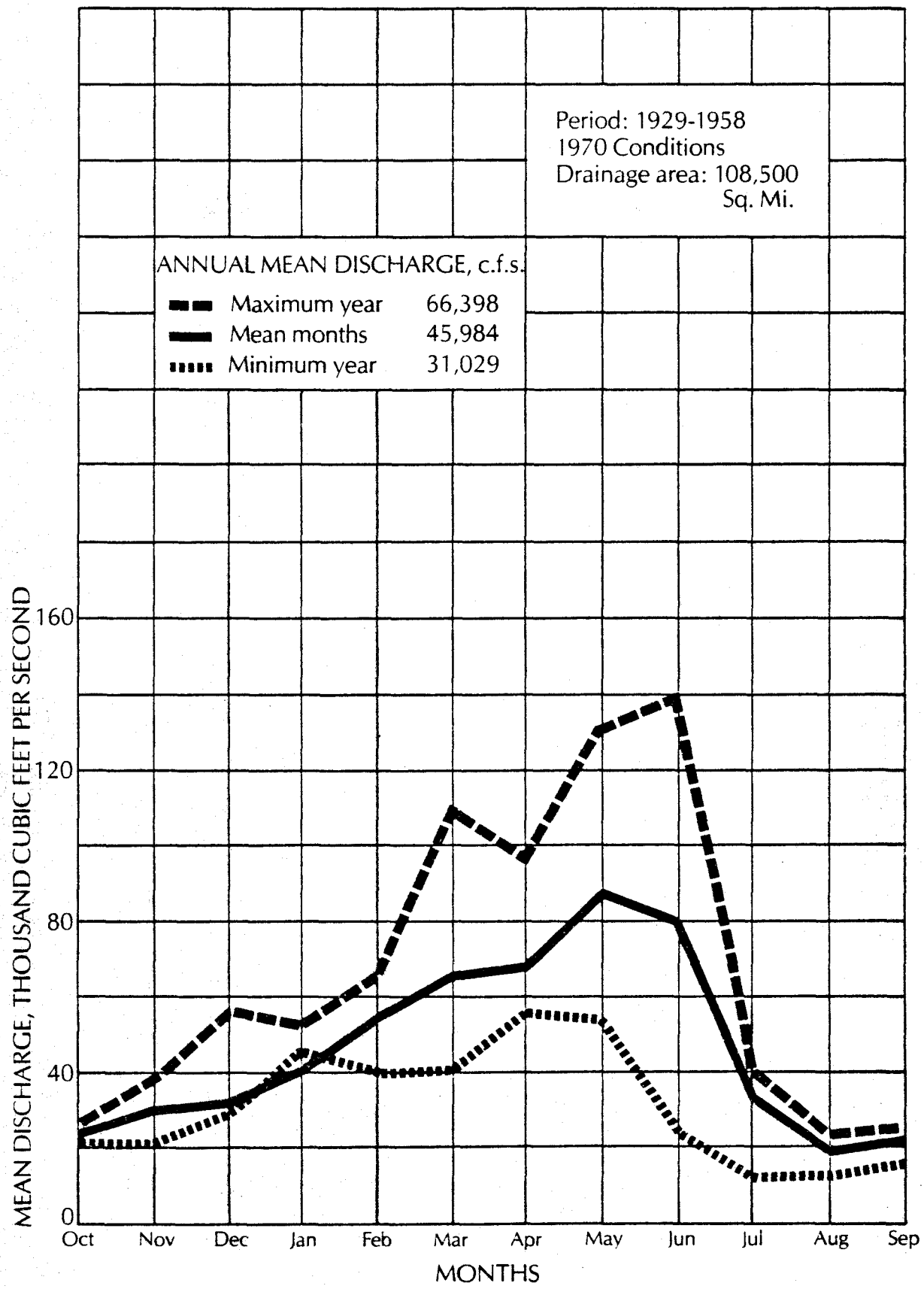


Figure 1-2 Monthly Discharge: Columbia River at the Dalles

The Snake River, the Columbia's main tributary, begins above Jackson Lake in northwestern Wyoming and flows through the agriculturally rich Snake Plains molding a great crescent across southern Idaho. It then turns north forming the Idaho-Oregon border. Part of this reach flows through Hells Canyon, America's deepest gorge. The Snake then arcs westward across the plains of southeastern Washington where it joins the Columbia River. The Snake River is about 1,000 miles long and drains about 109,000 square miles. Its average unadjusted discharge into the Columbia is 36.8 million acre feet per year (50,850 cfs) (Highsmith, 1973). A Snake River hydrograph of flows adjusted to 1970 conditions below Ice Harbor Dam (near Pasco, Washington) is shown in Figure 1-3. The Snake peaks in June in response to melting of the snowpack and then reaches minimum flows in August and September. The Snake River has water quality problems in some upper reaches. Lowered flow would further reduce its waste assimilation and carrying abilities.

The lack of summer precipitation and the characteristic runoff patterns of streams in the study area point out the need for irrigation and storage. A typical hydrograph for streams in semi-arid western areas of the United States fed by mountain snowpack is shown in Figure 1-4. The natural flow of the river is ample to meet irrigation requirements until the end of the flood season, about the middle of June. Then the natural river flow drops sharply below

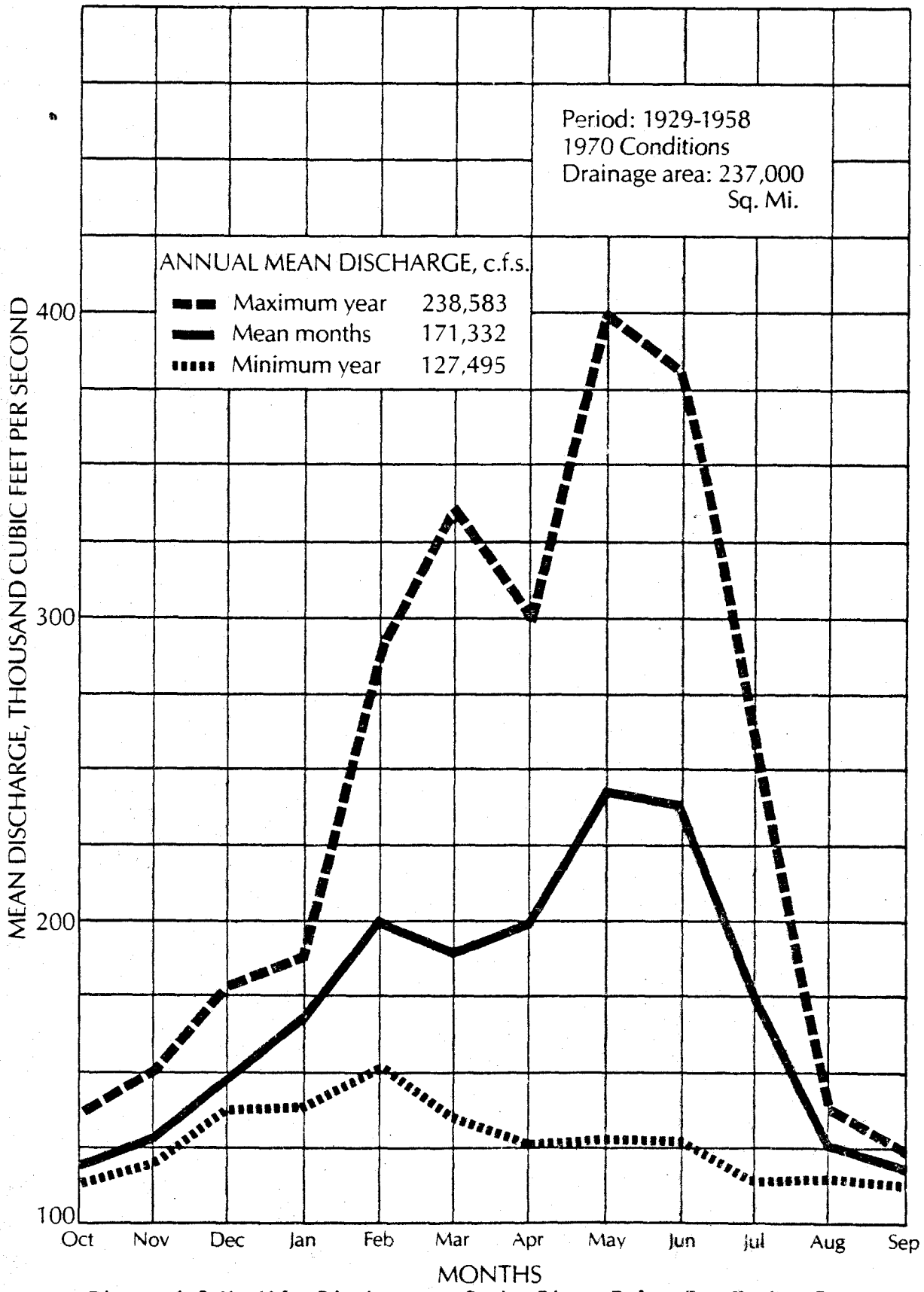


Figure 1-3 Monthly Discharge: Snake River Below Ice Harbor Dam

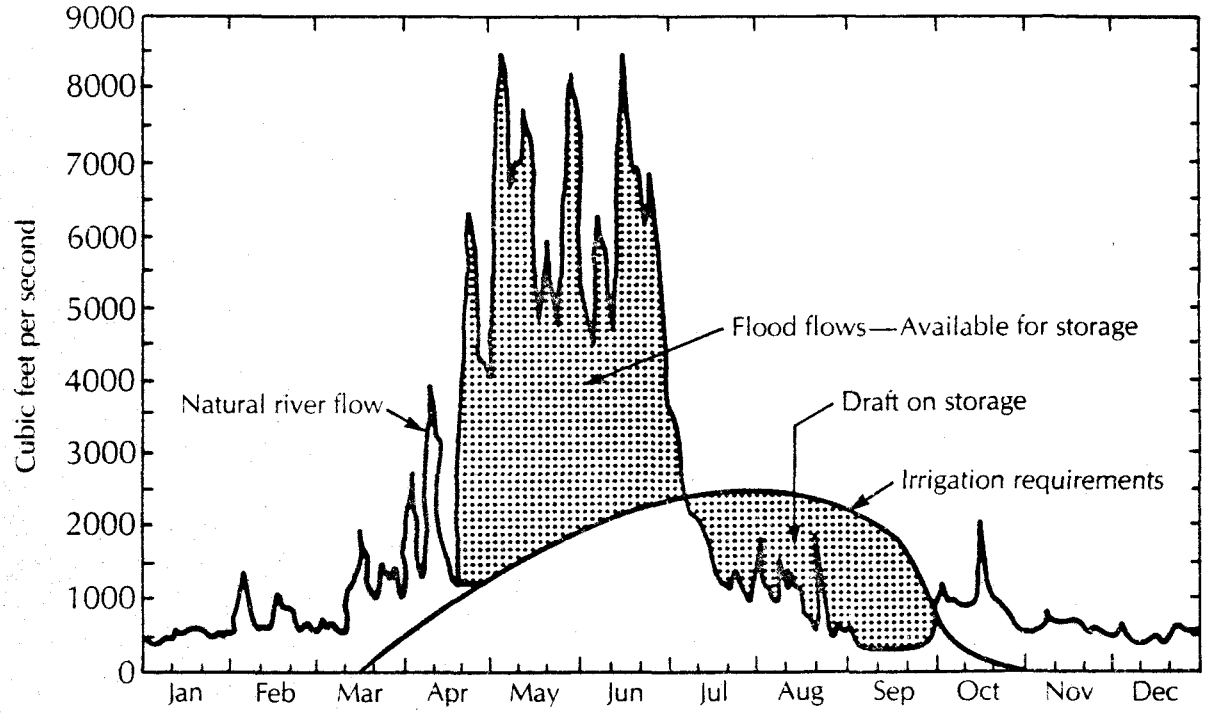


Figure 1-4 Typical Hydrograph of Semi-arid Western Streams

irrigation requirements. It is in response to conditions such as these that irrigators constructed water storage facilities. The "excess" water during flood stages is stored and released later in the year when natural flows are at a minimum (Golze', 1961). Thus the shape of the hydrograph is modified downstream from the point of storage.

In 1972 there were 194 storage reservoirs of capacity greater than 5,000 acre feet in the region with a total active capacity of about 42 million acre feet. While many storage reservoirs are multipurpose because they serve two or more purposes, hydropower production is the main purpose of most impoundments. Other important functions are flood control, recreation, irrigation, navigation, municipal and industrial water supply, and fishery enhancement (PNRBC, Main Report, 1972)

In 1970, 33.7 million acre feet of surface and ground water were used to irrigate about 7.5 million irrigated acres in the entire Pacific Northwest region including western Montana. About 90 percent of these irrigation uses come from surface sources (including storage) and 10 percent from ground water. Surface water diversions made up about 10 percent of total region discharge. Return flows amounted to 17.9 million acre feet, resulting in a net depletion of 15.8 million acre feet (PNRBC, Main Report 1972). Slightly smaller magnitudes of irrigated acreage and diversions are found in the study area.

Population and the Economy

Settlement of the region by whites has historically been in response to opportunities to develop its natural resources. Furs brought the trappers first. Gold in California and in the northwest further stimulated settlement. With miners and timbermen came shopkeepers, farmers, and cattlemen. Railroad land grants and Federal legislation to encourage land settlement were also important in populating the region. As development and population increased, the region's water resources were increasingly turned to man's use. Navigation, power production, and irrigation facilities were developed and expanded. Since World War II the historical dominance of the natural resource industries has been reduced by the growth of other industries such as aerospace, transportation equipment manufacture, tourism and services, thus creating a broader economic base. Nevertheless, resource based industries still provide a significant part of the region's economic base. In 1972 resource based output (crops, livestock, mining, forestry, fisheries, and electric power generation) amounted to 15 percent of total regional gross output. These activities employed six percent of the region's labor force. Processing the output of extractive resource industries (food processing, lumber, plywood, paper and chemicals) accounted for an additional 25 percent of regional output. These figures indicate that roughly 40 percent of regional output is based on extraction and processing of natural resources (NEPP, 1978).

Population of the region grew from 6,000 non-Indians in 1846 to over one million inhabitants by 1900 (Table 1-1). Steady population growth continued thereafter but slowed during the depression of the 1930s. A growth surge was prompted by industrial expansion associated with World War II. Population of the three states totalled 3.3 million in 1940, 4.5 million in 1950, and 5.3 million in 1960. By 1972, region population had increased to over 6 million or three percent of the U.S. population. The population has grown increasingly urban. In 1950, about one-third was urban. By 1970, the case had reversed itself with about two-thirds being urban dwellers.

Population is expected to increase from the 6.3 million in 1972 to 7.6 to 7.8 million in 1985 (Table 1-1). Washington and Oregon showed population growth rates of 20 and 23 percent from 1960-1972. Idaho had a growth of 13 percent during this period. For the period 1972-1985, Washington and Oregon are projected to grow in population about 20 percent each. Idaho, on the other hand, is projected to increase its population by 33 percent during this time. Idaho's higher growth rate is based on very rapid population increases caused by migration during recent years. Employment in the region grew from 1.7 million in 1950 to 2.5 million in 1970. By 1985, employment is projected to increase to 2.9 to 3.4 million.

Agricultural employment has made up a decreasing portion of total

Table 1-1 Historical and Projected Population and Employment - Pacific Northwest Region

	Thous							OBERS C	BPA	State Choice
	1900	1920	1940	1950	1960	1970	1972	1985	1985	1985
Population										
Washington	518.1	1356.6	1736.2	2378.9	2853.2	3409.2	3417.0	4213.5	4054.8	4023.0
Oregon	413.5	783.4	1089.7	1521.3	1768.7	2091.4	2182.0	2617.0	2636.7	2680.0
Idaho	161.8	431.9	524.8	588.6	667.2	712.6	756.0	759.0	1003.0	1061.7
Region	1093.4	2571.9	3350.7	4488.8	5289.1	6213.2	6355.0	7589.5	7694.5	7764.7
Employment										
Washington				890.7	1020.6	1283.6	1300.7	1652.1	1782.0	NA
Oregon				607.5	682.3	872.7	931.6	1016.0	1239.5	NA
Idaho				232.4	247.7	279.5	298.0	290.0	453.0	NA
Region				1730.6	1950.6	2435.7	2530.3	2958.1	3474.5	2987.9*

Sources: Population 1900-1970 (U.S. census, 1970)
Population 1972 (BPA)
Employment 1950-1972 and 1985 (BPA, 1976)
OBERS population and employment 1985 (USWRC, 1972)
State choice population (Ricks, 1977)

*State choice population x OBERS "C" Labor participation rate.

employment, falling from 14 percent in 1950 to six percent in 1970. By 1985 it will probably comprise even a smaller portion of total employment.

Irrigation Development

Irrigation has often been called the lifeblood of the West. Yet it was not the potential for irrigated agriculture which first brought settlers to the western and northwestern United States. Most came for furs or gold. Those who failed in their quest often turned to the soil to supply food for others. However, these early farmers found irrigation necessary for success in the arid and semi-arid areas of the West.

Dr. Marcus Whitman and his missionaries near the present city of Walla Walla, Washington, are often recognized as the first irrigators (Huffman, 1953). Whitman established his mission in 1837. Irrigation of gardens had been practiced by the Hudson Bay Company at Fort Walla Walla between 1830 and 1840. In 1837, a mission near Lewiston, Idaho, diverted water for irrigation from Lapwai Creek. Irrigation began in the Lemhi Basin of Idaho in 1855 (PNRBC Appendix V, 1970). Early attempts at irrigation were individual endeavors. However, irrigation

of larger areas proved most successful when groups of irrigators cooperated in constructing water delivery works.

As irrigation moved into larger and larger tracts and with the need for more extensive delivery systems many of those interested felt a need for government assistance. Irrigation development was made a part of Federal Western land disposal schemes in the late 1800's. Several Acts were passed to encourage private development and settlement of the West's arid lands. Some were successful. Some were less so.

The first attempt of the Federal government to promote irrigation was to surrender control of non-navigable streams of the 17 western states for irrigation.[2] The Act of July 26, 1866 left "to local customs, laws, and decisions of courts" the development of irrigation (Golze, 1961).

The Desert Land Act (1877) permitted a settler to purchase one section (640 acres) of land if he agreed to irrigate it within three years of filing. The settler paid 25 cents per acre at the time of

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[2]The reserved rights doctrine of the Federal government may not be entirely consistent with the July 1866 Act. The Federal government has claimed the right to reserve waters of a sufficient supply to serve Indian reservations, National forests, military reservations, recreation and wildlife areas, and other reserved governmental lands. Such reserved waters are not subject to State control (Van Ness, 1968).

filing application and an additional dollar per acre on proof of compliance - after which he was given title to the land. Abuses of the law were rampant. The law was modified in 1890 to restrict acreage to 320 acres and required among other things improvements worth three dollars per acre. Modifications to the Act also recognized that water could not be conducted directly to each tract. Therefore it permitted settlers to cooperate in constructing irrigation works for several entries and reserved land for ditches and canals (Huffman, 1953). Idaho entered 1.1 million acres under the Act betwen 1877 and 1949. Washington and Oregon entered 137 thousand and 357 thousand acres respectively (Golze', 1961).

The Desert Land Act had not been as successful as hoped in western land disposal and irrigation development. By the late 1880s the West agreed that a new approach to land reclamation was needed. A series of National Irrigation Congresses as well as zealous promotion of irrigation development by land companies, railroads and magazines persuaded Congress to pass the Carey Act of 1894.

The Act represented a change in philosophy from favoring private development to promoting state assisted development. The Act provided that the Federal Government donate up to a million acres each to certain western states. The states were then to cause the lands to be settled, irrigated, and partially cultivated. On compliance, the

Federal government would grant patents on the land to the state or directly to the assignees. Land disposed of in this manner was limited to 160 acres per person and was made only to those who had contracted for water rights on the land. The Act was later amended to grant additional land to Wyoming and Idaho. Overall, the Carey Act did not meet expectations. Idaho was an exception; by 1949 it had patented nearly 630,000 acres of land under the Act. Other states were less successful. Oregon had patented over 73,000 acres and Washington none (Golze, 1961). High costs, limited financial resources of the states, improper engineering surveys, and unscrupulous private promotion schemes caused western irrigation interests to look to the Federal government for "reclamation" assistance.

Probably one of the most influential Federal studies on Western irrigation was John Wesley Powell's "Report on Survey of the Rocky Mountain Region" printed as a house document in 1878. It published most of the available data on western irrigation and emphasized the need to gather additional water data to justify additional irrigation. The report opened the door to over 20 years of irrigation and emphasized the need to gather additional water data to justify additional irrigation surveys by the Geological Survey. These surveys in addition to pressure from irrigators, western Congressmen and President Theodore Roosevelt overcame Federal resistence to entry into irrigation development.

In 1902 the Reclamation Act, often called the Newlands Act in honor of Senator Francis G. Newlands of Nevada, was passed by Congress. It permitted the Federal government to locate and construct irrigation works in the Western States (McKinley, 1952). One year later the Reclamation Service was established and Federal irrigation development proceeded rapidly, albeit not always smoothly.

By 1890 irrigated area in the Northwest amounted to about half a million acres with the Upper Snake River, Hood River, Yakima, and Wenatchee valleys as centers of irrigation. By 1910 there were about 2.5 million irrigated acres. Nineteen thirty-nine saw over three million irrigated acres. There are presently about 7.5 million irrigated acres in the United States portion of the Columbia drainage (CNP, Main Report, 1971) and 6.5 million irrigated acres in the study area (USCE, 1976).

Recent irrigation growth in the study area is largely due to rapid adoption of center pivot sprinkler systems - a relatively new technology. Much of the land now under sprinkler irrigation was once classified as non-irrigable because of slope, sandy soils, wind erosion potential, and/or location relative to canals or ditches. Center pivot systems are able to irrigate sandy soils on uneven terrain with light and frequent applications of water. These conditions plus the availability of large blocks of undeveloped land led

to the rapid implementaton of center pivot irrigation. Other advantages of this new technology are the savings in labor and the ability to apply controlled amounts of agricultural chemicals and fertilizers (Muckleston and Highsmith, 1978). It is estimated that in 1975 in Oregon, over 97 thousand acres or five percent of all irrigated land was irrigated with center pivot systems, that in Washington 12 percent of all irrigated land or over 200 thousand acres were irrigated by these systems; while in Idaho center pivot irrigated lands totaled 178 thousand acres or five percent of all irrigated land (King, 1977).

Center pivot systems have grown almost entirely since the mid 1960s and are found primarily in the mid Columbia basin of Washington and Oregon and in the Snake River plains of Idaho. Most are supplied with water by huge pumping and pressurization stations on the Columbia and Snake Rivers.

Irrigated acres in the study area are expected to increase considerably in the future. Most of the increases are expected to take place in three areas; the upper and middle Snake areas of Idaho, the Big Bend area of Washington and the Horse Heaven Hills-Umatilla-Boardman areas adjacent to the Columbia River separating Oregon and Washington (Figure 1-1). Most of the new irrigated area will be sprinkler irrigated. Increases in the Big Bend area are to be served by the Second Bacon Siphon, a step in completion of the Bureau of

Reclamation's Columbia Basin Project. Newly irrigated lands in the Snake River and Horse Heaven Hills-Umatilla-Boardman areas are likely to be supplied from pump stations on the Columbia and Snake rivers.

There are varying projections of future irrigated acres in the study area. A national set of projections by the Office of Business Economics of the Department of Commerce and the Economic Research Service of U.S. Department of Agriculture, known as the OBERS Projections, project 1985 irrigated area at about 7.3 million acres and as high as 9.5 million acres by 2020 (USWRC, 1972). There are several series of OBERS Projected irrigated acreage based on varying assumptions concerning population and crop export levels. The OBERS level used in this study approximates level "C".[3]

The three states, however, project irrigated acreage in the study area to be greater than does OBERS; about 7.6 million acres of irrigated area in 1985 and 10.4 in 2020 (USCE, 1976) (Table 1-2).

The lower OBERS level of irrigated acres and the higher figures predicted by the states can be taken for planning purposes as ranges of future development (Table 1-2). Over half of the present irrigated

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[3]OBERS Series C projections assume a birth rate higher than Series E. At the beginning of the CR&T study, OBERS Series C appeared to better represent state irrigation projections than did Series E and were chosen as an alternative in the study.

Table 1-2 1970 and Projected Irrigated Acreage. Study area 1970-2020

Projections	1970	(Percent) (of region)	Increment 1970-1985	1985	(percent) (of region)	Increment 1985-2020	2020	(Percent) (of region)
	Thousand acres							
OBERS								
Washington	1499	(23)	334	1833	(25)	780	2613	(27)
Oregon	1275	(20)	123	1398	(19)	287	1685	(18)
Idaho	3657	(57)	434	4091	(56)	1113	5204	(55)
	6431		891	7322		2180	9502	
State Alternative								
Washington	1499	(23)	410	1909	(25)	958	2867	(27)
Oregon	1275	(20)	207	1482	(20)	483	1965	(19)
Idaho	3657	(57)	541	4198	(55)	1363	5561	(54)
	6431		1158	7589		2804	10,393	

Source: (USCE, 1976)

acreage is in Idaho, with Oregon and Washington sharing the remainder about equally. According to these projections, the state proportions should remain about the same in 1985 and 2020 as they are now. Therefore Idaho is projected to have the largest increase in irrigated area. Overall the projections are that between 1970 and 1985, 900,000 to 1.1 million new irrigated acres will be developed in the study area.

Electricity - Aluminum Development

The Pacific Northwest was endowed with plentiful sites and run-off conducive to the development of dams and reservoirs. Dams in the Pacific Northwest were first viewed as a single purpose means of irrigating additional land in the semi-arid areas or as a means of generating electric power for city utilities. Early dams were built on small rivers near cities to provide power for street lighting. Some of these dams date to the 1880s. The first dam on the Columbia River Mainstem was Rock Island below Wenatchee, Washington, built in 1932 by Puget Sound Power & Light (Springer, n.d.). After periods of debate in the 1930s about the wisdom of constructing very large hydroelectric facilities on the Columbia Mainstem, two huge dams, Bonneville and Grand Coulee, were constructed by Federal agencies on the Columbia River. Bonneville dam began operation in 1938 and Grand Coulee in 1941.

In 1937, after years of debate about whether the Corps of Engineers or the Bureau of Reclamation should market electric power from the Federal dams and whether power should be marketed through public or private companies, a provisional agency, the Bonneville Power Administration (BPA) was formed to market hydroelectric power. Bonneville Power, which attained permanent status in 1940, set out to "encourage the widest possible use of all electric energy." Part of its early effort at marketing was a study of potential industrial plant sites. These studies, and an abundance of electrical energy, combined with growing national concern about industrial production for defense, set the stage for the entry of aluminum production in the Northwest. By 1940, the Aluminum Company of America (ALCOA) had built a reduction plant at Vancouver. New plants (often government operated) and rising production followed. By March of 1943, at the peak of its war services, BPA was selling 500 million kilowatt-hours of its total sales of 830 million kilowatt-hours to aluminum plants. Northwest aluminum output increased from 22 percent of national output in 1941 to 41 percent in 1945 (USDI, 1953). After the war power sales to aluminum declined but still remained a significant part of BPA revenue (McKinley, 1952). In 1943, the War Production Board declared aluminum production much in excess of needs and ordered drastic cutbacks in production. To block this curtailment, a group of regional businessmen and public officials, assisted with information from BPA, pointed out the cost advantages of retaining the industry

in the Northwest. The War Production Board then reduced its cutback order and in 1945 allowed full production of private aluminum potlines. With construction of additional hydroelectric plants in the fifties and sixties, the aluminum industry seemed well established.

In 1976, the aluminum industry accounted for 25 percent of BPA revenues and 30 percent of electricity sold by BPA (BPA, 1977). However, with growing energy shortages there is increasing debate about the future role of the aluminum industry in the Northwest. The industry operates largely on interruptible power under contracts directly from BPA. These contracts expire between 1984-1988 and are not likely to be renewed in their present form. In consideration of these constraints it is expected that output of the aluminum industry will not increase substantially in the future.

Summary

An abundant water supply, development of which was amenable to man's activities, has been a key factor in development of the Pacific Northwest. The rivers have been dammed and diverted to irrigate semi-arid areas and to produce electricity for residential use and for industry, especially aluminum production. However, irrigators and aluminum producers, after a period of plentiful water and inexpensive electricity now find themselves in competition over a

finite water supply and for continued access to inexpensive hydropower. At the same time, both are competing with other water users such as interests favoring anadromous fishery mitigation and enhancement, municipalities, industry, recreationists who may favor either slack water or white water and those favoring increased inland water transportation. Each of these interests strives to assure water quality, quantity and timing which serve their individual needs. Demands for water and water related services from the Columbia System appear to have outstripped capabilities of existing water management institutions.

This problem is well documented by the present conflict between upstream irrigation interests and downstream producers of aluminum. This study examines some of the output effects resulting from use of the Columbia River by these two industries.

II. Construction of the Analytic Model

Introduction

The objective of this study is to quantify and analyze some of the direct and indirect output effects of irrigation development in the Northwest. Multiregional input-output analysis is compatible with such an objective because it shows spatial as well as sectoral output relationships.

Input-output (I-O) or interindustry analysis has become a useful and credible tool in economic analysis. It permits estimation of the output effects in all industries of an economy in response to a change in output of one industry. This is possible because I-O shows econonomic interdependence within the economy. Input-output is a system of static double entry accounting.

Historical Development of Input-Output

A review of input-output literature shows that its beginning was in 1758, when Francois Quesnay published his "Tableau Economique," which illustrated economic interdependence of economic activities. Quesnay's work graphically showed successive rounds of economic activity as a result of an output change in a single firm. The next

apparent step in the development of I-O came more than a century later, when, in 1874, Leon Walras published his "Elements d' Economic Politique Pure." Walras' work moved from partial equilibrium into general equilibrium as it considered the simultaneous determination of prices, production and consumer income in the economy using coefficients of production (Miernyk, 1967).

The most significant step in moving I-O from a theoretical basis to application with empirical content occurred during the 1930s when Professor Wassily Leontief, of Harvard, developed a general theory of production based on economic interdependence and then followed up by publishing the first input-output table of the U.S. economy (Miernyk, 1967). Since that time, several national I-O tables have been published. Input-output modeling has been adapted to regions, states, substate areas, and counties.

During the 1940s and 1950s, I-O techniques were expanded to include several geographic areas in a single table, with each area retaining its separate identity. These models are referred to as interregional or multiregional I-O models. Not only do they show purchasing and selling patterns within the economy, but also the importing and exporting patterns in economies with which it trades. In the early fifties and sixties, Lloyd Metzler, Professor Leontief,

Walter Isard and Leon Moses all published articles further expanding multiregional theory and procedure (Isard, 1951; Leontief, 1963; Metzler, 1950; Moses, 1955).

The most ambitious American undertaking relative to multiregional I-O is probably the Harvard Economic Research Project (HERP), where a 1963 national multiregional I-O model was constructed from existing state I-O tables and other data (Polenske, 1970). This national multregional I-O (MRIO) model has 44 regions and 79 sectors or industries. A 1963 multiregional I-O model was constructed for the 11 western states by Davis and Lofting, using existing I-O models and other secondary data (Davis and Lofting, 1972).

Input-Output Described

At this point, it may be useful to present a short description and mathematical summary of single area and multiarea input-output models.[4]

A basic I-O model can be explained in terms of three associated tables:

[4]Taken from Davis and Lofting

a. Table of Interindustry Transactions

b. Table of Direct Requirements

c. Table of Direct Plus Indirect Requirements

As a first step in the construction of the Transactions Table, the regional economy is segmented into sectors (or industries). The sectors chosen to represent the economy depend upon 1) the nature of the regional economy, 2) the nature of the problem, and 3) the data resources available. Each sector is generally defined in terms of the Standard Industrial Classification (SIC) codes (OMB, 1972). Every type of economic activity may be represented by an SIC code number at the 2, 3, or 4-digit level.

Transactions Table

However the sectors are defined, it is essential that, taken together, they encompass all economic activity within the region. For illustrative purposes, the following interindustry Transactions Table (2-1) contains only three sectors or industries.

Since each sector both buys from and sells to other sectors within the economy for further processing, each of the three sectors is listed both at the left of the table as a seller and at the top of the table as a purchaser. The 3 x 3 matrix formed by these sectors is referred to as the "processing" matrix.

Table 2-1 Transactions Table

($1,000)

	Purchasers			Final	Gross
	Agriculture	Manufacturing	Services	Demand	Output
Agriculture	10	5	5	50	70
Manufacturing	20	30	25	25	100
Services	5	10	10	55	80
Imports	5	15	5		
Value Added	30	40	35		
Gross Outlay	70	100	80		

The final demand sectors represent all sales that are made not for further processing within the region, but for final or terminal consumption by Households, Government, Investment, and Exports. If a farmer sells milk to a restaurant, the transaction is from Agriculture to Services; if the farmer sells milk to a household, the transaction is from Agriculture to Final Demand (Households). Thus, each sector's sales are recorded as satisfying either intermediate (processing) or final demand. Gross Output (total sales) of each sector is the sum of intermediate and final sales. Manufacturing, for example, sold $20,000 of its $100,000 total output to Agriculture, $30,000 to Manufacturing, $25,000 to Services, and the remaining $25,000 to Final Demand.

Reading down any of the first three columns shows how the particular sector purchased input. For example, Manufacturing purchased $5,000 from Agriculture, $30,000 from Manufacturing, $10,000 from Services, $15,000 from Imports (goods and services produced outside the region), and $40,000 from the Value Added sector (roughly wages and salaries, rents, interest, depreciation, dividends, and profit). Gross Outlay (total purchases) must equal Gross Output (total sales) as profits are considered to be the payment to management and thus serve as the balancing item. That is, total sales revenue is equal to total cost plus profit.

Table of Direct Requirements

The Table of Direct Requirements or technical coefficients is formed by dividing the entries in each column of the processing matrix by their respective column total (Gross Outlay). Table 2-2 shows the direct coefficients associated with Table 2-1.

Table 2-2 Table of Direct Requirements Per Dollar of Gross Outlay

	Agricultere	Manufacturing	Services
Agriculture	.14	.05	.06
Manufacturing	.29	.30	.31
Services	.07	.10	.12

Table 2-2 shows that for the average dollar spent by Agriculture during the period, 14 cents were spent on Agricultural inputs, 29 cents on inputs from Manufacturing, and 7 cents on Services. The remainder of the dollar was spent on final payments such as imports or value added, not included in the table of direct requirements. Under the assumption that the coefficients remain fixed, one can estimate the effect on the regional economy resulting from an increase in Final Demand.

To illustrate, assume that the export demand for the output of the manufacturing sector increases by $10,000. The manufacturing sector will increase its output by $10,000 to meet this rise in final demand and to do so will have to make the following purchases:

Agriculture	($10,000 X .05) = $ 500
Manufacturing	($10,000 X .30) = $3,000
Services	($10,000 X .10) = $1,000

However, in order to produce this supporting output, each sector will require additional inputs which will set off a third round of spending, etc. These rounds of spending will continue with each round becoming weaker due to leakage such as payments for imports. The accumulated increases in total sales of each sector resulting from the stimulus to the Manufacturing sector of $10,000 in export demand can be computed from the increase in sales of each round.

While such series of calculations are helpful in understanding the ripple effects throughout the regional economy from an initial effect, fortunately they are not necessary to determine the ultimate effects. The final changes in total sales (Gross Output) of each sector can be read directly from the third table of the I-O model, the table of direct-indirect requirements.

Table of Total (Direct Plus Indirect) Requirements

Generally, with the aid of a computer, a table of direct-indirect coefficients may be constructed through inversion of the transactions matrix. Table 2-3 shows the direct-indirect coefficients associated with the Transactions Tables.

Table 2-3 Direct Plus Indirect Requirements Per Dollar of Delivery to Final Demands*

	Agriculture	Manufacturing	Services
Agriculture	1.2117	0.5677	0.1637
Manufacturing	0.1042	1.5542	0.1861
Services	0.1237	0.5956	1.2210

*Transposed

Table 2-3 shows that if there is a $1 increase in the final demand for Agriculture, the total output of Agriculture will, after

all the interdependent transactions have worked themselves out, increase by $1.21. Manufacturing and Services in this case will rise $0.57 and $0.16 respectively. The Table shows the effects of a $10,000 increase in exports of manufacturing for example. Total sales of Agriculture would rise $1,000 ($10,000 X 0.10). Manufacturing sales would increase $15,500 ($10,000 X 1.55) and the output of the Services sector would expand by $1,900 ($10,000 X 0.19).

The Regional Interindustry Model in Mathematical Summary

As previously shown, the I-O model records each sale in the economy as "intermediate" or "final". Total sales or output of any sector of an n-sector model can thus be expressed as:

$$\sum_{j-1}^{n} x_{ij} + y_i = x_i \quad (i = 1, \ldots, n) \qquad (1)$$

where x_{ij} = the value of the output of sector i purchased by sector j.

y_i = the final demand for the output of sector i, and

x_i = the value of the total output of sector i.

The regional economy is thus expressed by n linear equations, each equation expressing the sales transactions of a particular sector with the processing sectors, and with final demands. Equation 1 represents the major portion of the Transactions Table. As such, it is a set of balance equations or accounting identities. Equation 2 completes the mathematical description of purchases in the Transactions Table.

$$\sum_{i=1}^{n} x_{ij} + p_j = x_j \qquad (j = i, \ldots, n) \qquad (2)$$

Where p_j = final payments (purchases of imports and other factors) by sector j.

x_j = total outlay (purchases) of sector j.

$$x_i = x_j \qquad \text{for all } i = j \qquad (3)$$

The second table of the 1-0 model, the Table of Direct Requirements, can be expressed as the matrix (a_{ij}) where

$$a_{ij} = \frac{x_{ij}}{x_j} \qquad (i, j = 1, \ldots\ldots, n) \qquad (4)$$

In other words, a direct coefficient is the result of dividing a transaction by the total outlay of its column.

Substituting (4) into (1) yields

$$x_i = \sum_{j=1}^{n} a_{ij}x_j + y_i \qquad (i = 1, \ldots., n) \qquad (5)$$

Which may be expressed more compactly in matrix notation as

$$X = AX + Y \tag{6}$$

where

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \cdot \\ \cdot \\ x_n \end{bmatrix}, \quad A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \cdot & \cdot & \cdots & \cdot \\ \cdot & \cdot & \cdots & \cdot \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}, \text{ and } Y = \begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \\ y_n \end{bmatrix} \tag{7}$$

It may now be shown that gross output minus intermediate use equals the <u>net</u> output of the system or final use.

$$X - AX = (I - A)X = Y \tag{8}$$

Where I is an n x n identity matrix. Given the exogenous or final demands on the economy, it is possible to solve the system for total outputs.

$$X = (I - A)^{-1}Y \tag{9}$$

Where $(I - A)^{-1}_T$ is the third table of the I-O model, the Table of Direct Plus Indirect Requirements. The matrix is sometimes transposed (T) to facilitate reading of the desired information along the rows rather than down the columns.

Multiregional Input-Output Models

Interregional or multiregional I-O extends the usefulness of a single state I-O model to two or more states, and illustrates the economic structure among states as well as within a state. Thus a spatial feature is included in such models. Where a single state I-O model has one transaction matrix, a multiregional I-O (MRIO) has transaction submatrices for each state as well as export and import submatrices, which show interstate trade estimates among industries of the states all within the MRIO matrix. Figure 2-1 is a diagram of the three state I-O model developed in this study. The three submatrices on the diagonal running from upper left to lower right represent in-state transactions of Washington, Oregon, and Idaho, respectively. Located horizontally from each instate transaction submatrix are two export submatrices. The submatrix just right of the Washington in-state submatrix shows Washington exports to Oregon by sector. Further to the right of the Washington submatrix is a submatrix showing Washington exports to Idaho. Oregon exports are shown horizontally to the left and right of the Oregon in-state transactions submatrix. Idaho exports are shown to the left of the Idaho in-state transactions submatrix. Just as any transaction in a simple I-O model shows sales when read horizontally and purchases when read vertically, any off diagonal submatrix in an MRIO shows

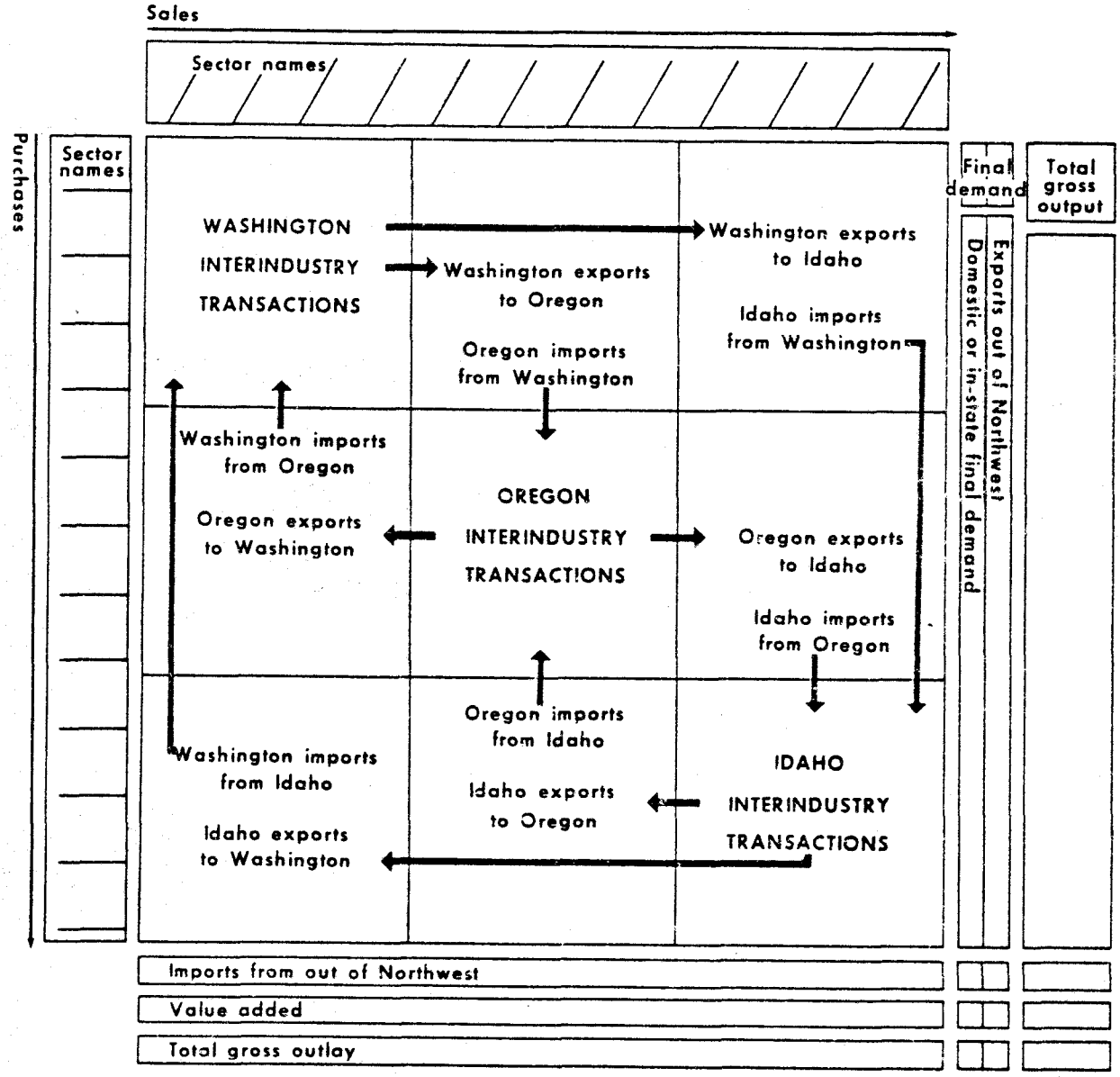

Figure 2-1 Diagram of Northwest Multiregional Input-Output Model

exports (sales) when read horizontally and imports (purchases) when read vertically. Thus, the two submatrices on the left side of the table directly below Washington show Washington imports from Oregon and Idaho. Oregon imports are shown above and below the Oregon instate transactions matrix in the center of the table. Idaho imports are represented by the two submatrices on the right side of the table above the Idaho in-state transactions submatrix in the lower right corner. Consequently, any off diagonal submatrix must at the same time, represent exports of one state and imports of another. For example, the submatrix at the center bottom of the table represents Idaho exports to Oregon as well as Oregon imports from Idaho.

The two long columns to the right of the MRIO matrix represent final demand and gross output. Final demand is made up of sales for terminal consumption such as exports out of the region, household consumption and capital and government purchases. Gross output, the extreme right column, is the total value of intermediate and final output in each sector. It is also shown on the bottom row of the table as total purchases. Final payments, at the bottom of the table, represent purchases of other inputs and are composed of imports from outside the Northwest and payments to other factors of production.

The Multiregional Model in Mathematical Summary

In an m-region, n-sector area, the Transactions Table of an interregional model may be represented mathematicly as

$$ {}^{r}X_{i} = \sum_{s=1}^{m} \sum_{j=1}^{n} {}^{rs}X_{ij} + {}^{r}Y_{i} \qquad \begin{matrix} (i=1,\ldots,n) \\ (r=1,\ldots,m) \end{matrix} \qquad (10) $$

where

${}^{r}X_{i}$ = the gross output of sector i in region r,

${}^{rs}X_{ij}$ = the output of sector i in region r sold to sector j in region s, and

${}^{r}X_{i}$ = the final demand for the output of sector i in region r.

The second table of an interregional model (the Table of Requirements), can be describe as

$$ {}^{rs}a_{ij} = \frac{{}^{rs}X_{ij}}{{}^{s}X_{j}} \qquad \begin{matrix} (i,j=1,\ldots,n) \\ (r,s=1,\ldots,m) \end{matrix} \qquad (11) $$

Substitution of (2) into (1) yields

$$ {}^{r}X_{i} = \sum_{s=1}^{m} \sum_{j=1}^{n} {}^{rs}a_{ij} \; {}^{s}x_{j} + {}^{r}y_{i} \qquad \begin{matrix} (i=1,\ldots,n) \\ (r=1,\ldots,n) \end{matrix} \qquad (12) $$

Letting $A^* = ({}_{rs}a_{ij})$, the interregional system is now treated in the same manner as is the regional system. The general solution is found through matrix inversion as

$$ {}_rX = (I - A^*)^{-1}{}_rY \qquad (r=1,\ldots,m) \qquad (13) $$

Through employment of the $(I-A^*)^{-1}$ matrix or its transpose, $(I-A^*)_T^{-1}$, the Table of Direct Plus Indirect Requirements, one can determine under the assumption of unchanged coefficients of regional production and interregional trade the resulting effects of an increase in the final demand for the output of any sector in any region on the outputs (sales) of all sectors in all regions.

Input-Output Models from Secondary Data

Input-output models require large amounts of data. Collection of primary data is time consuming and expensive. These characteristics prompted a movement among some users toward construction of I-O models from secondary or published data. The movement appears to have started from a 1955 paper by Moore and Peterson, where they describe construction of an I-O model for Utah using secondary data (Moore and Peterson, 1955). Utah sectoral output totals were es-

tablished from national totals on the basis of Utah's proportion of national employment by sector. National input coefficients were used to estimate Utah interindustry transactions.

Secondary data techniques developed over the past 20 years are commonly used to construct state I-O models from national models, to update older I-O models, or to modify the geographic area covered by an existing I-O model (Bargur, et.al., 1969; Drake, et.al., 1971). This is usually done by scaling components of an existing I-O model up or down to conform to adjusted sector output estimates. A computer program is commonly used. The technique is considerably less expensive, and faster than collecting new data to construct I-O models. It does not, of course, yield results as accurate as an I-O model constructed from reliable primary data.

An MRIO has been constructed from secondary data for Washington, Oregon, and Idaho for 1972, and projected to 1985. The model was developed as a regional economic tool to analyze the economic effects and tradeoffs of irrigation development and downstream hydroelectric generation capability, but can be used for many types of regional economic impact analyses. Each state in the model has 26 sectors based mainly on two-digit SIC codes. The entire MRIO table has 78 sectors.

Sector Aggregation-Disaggregation

The northwest multiregional I-O model (MWMRIO) is based on three existing state I-O models, each of which must have common SIC based sector definitions. The 1972 Washington state I-O model was aggregated from 51 sectors to 26 sectors which provided adequate detail for the problem to be analyzed (Bourque and Conway, 1977). Oregon and Idaho sectors were then adjusted to the same sector pattern. Table 2-4 details the sector SIC definitions.

Sector aggregation is relatively simple - merely adding sector rows and columns. However, sector disaggregation is more involved requiring individual transactions to be broken into two or more components. In order to fit the 68 sector 1963 Oregon I-O model (Watson and Allen, 1969) to the chosen 26 sector pattern, both aggregation and disaggregation were necessary. Most of the 1963 Oregon sectors were easily aggregated to an approximation of the chosen sector pattern. However, disaggregation was necessary in two cases. An aluminum row and column was separated from the nonferrous metals manufacturing sector. The utilities sector was disaggregated into rows and columns for electric utilities, natural gas utilities and other utilities.

Table 2-4 NWMRIO Sector Pattern and SIC Codes (OMB, 1972)

NWMRIO Sector	SIC CODE	Industry
1. Crops[1]	01	- Agricultural production-crops
2. Livestock[2]	02	- Agricultural production-livestock
3. Food processing	20	- Food and kindred products
4. Textiles and apparel	22	- Textile mill products
	23	- Apparel and other textile products
5. Mining	10	- Metal mining
	11	- Anthracite mining
	12	- Bituminous coal and lignite mining
	13	- Oil and gas extraction
	14	- Nonmetalic minerals, except fuels
6. Forestry and fishing	08	- Forestry
	09	- Fishing, hunting and trapping
7. Lumber and wood products	241	- Logging camps and logging contractors
	242	- Sawmills and planing mills
	243	- Millwork, plywood & structural members (execpt 2435, 2436)
	244	- Wood containers
	245	- Wood buildings and mobile homes
	249	- Miscellaneous wood products
8. Plywood	2435	- Hardwood veneer and plywood
	2436	- Softwood veneer and plywood
9. Pulp and paper products	26	- Paper and allied products

Table 2-4 NWMRIO Sector Pattern and SIC Codes (OMB, 1972) (continued)

NWMRIO Sector	SIC CODE	Industry
10. Chemicals	28	- Chemicals and allied products
11. Petroleum refining	29	- Petroleum and coal products
12. Stone, clay, glass & concrete products	32	- Stone, clay, and glass products
13. Iron and steel manufacture	331	- Blast furnace and basic steel products
	332	- Iron and steel foundries
	3398	- Metal heat treating
	3399	- primary metal products, not elsewhere classified
14. Non-ferrous metals manufacture	33	- Primary metal industries and all other
15. Aluminum	3334	- Primary aluminum
	3353	- Aluminum sheet, plate, and foil
	3354	- Aluminum extruded products
	3355	- Aluminum rolling and drawing, nec
	3361	- Aluminum foundries
16. Fabricated metals and machinery	34	- Fabricated metal products
	35	- Machinery, except electrical
17. Electrical equipment manufacture	36	- Electric and electronic equipment
18. Aircraft and aerospace	372	- Aircraft and parts
	376	- Guided missiles, space vehicles, parts

Table 2-4 NWMRIO Sector Pattern and SIC Codes (OMB, 1972) (continued)

NWMRIO Sector	SIC CODE	Industry
19. Transportation equipment & other manufacture[3]	37	- Transportation equipment, all other
	30	- Rubber and misc. plastics products
	31	- Leather and leather poducts
	38	- Instruments and related products
	39	- Miscellaneous manufacturing industries
	25	- Furniture and fixtures
	27	- Printing and publishing
20. Transportation services	40	- Railroad transportation
	41	- Local and interurban passenger transit
	42	- Trucking and warehousing
	43	- U. S. Postal Service
	44	- Water transportation
	45	- Transportation by air
	46	- Pipe lines, except natural gas
	47	- Transportation services
21. Electric utilities	491	- Electric services
	493	- (partial) Combination utility services
22. Gas utilities	492	- Gas production and distribution
	493	- (partial) Combination utility services
23. Other utilities	496	- Steam supply
	496	- Irrigation systems

Table 2-4 NWMRIO Sector Pattern and SIC Codes (OMB, 1972) (continued)

NWMRIO Sector	SIC CODE	Industry
24. Construction	15	- General building contractors
	16	- Heavy construction contractors
	17	- Special trade contractors
25. All trade	50	- Wholesale trade-durable goods
	51	- Wholesale trade-nondurable goods
	52	- Building materials & garden supplies
	53	- General merchandise stores
	54	- Food stores
	55	- Automotive dealers & service stations
	56	- Apparel and accessory stores
	57	- Furniture and home furnishings stores
	58	- Eating and drinking places
	59	- Miscellaneous retail

Table 2-4 NWMRIO Sector Pattern and SIC Codes (OMB, 1972) (continued)

NWMRIO Sector	SIC CODE	Industry
26. All services[4]	48	- Communication
	60	- Banking
	61	- Credit agencies other than banks
	62	- Security, commodity brokers & service
	63	- Insurance carriers
	64	- Insurance agents, brokers & service
	65	- Real estate
	66	- Combined real estate, insurance, etc.
	67	- Holding and other investment offices
	70	- Motels and other lodging places
	72	- Personal services
	73	- Business services
	75	- Auto repair, services, and garages
	78	- Motion pictures
	79	- Amusement & recreation services
	80	- Health services
	81	- Legal services
	82	- Educational services
	83	- Social services
	84	- Museums, botanical, zoological gardens
	86	- Membership organizations
	88	- Private households
	89	- Miscellaneous services
	074	- Veterinary services

[1]Includes crop services.
[2]Veterinary services included in sector 26, services.
[3]Also includes printing, furniture, rubber and leather manufacture.
[4]Includes communications, finance, insurance, and real estate (F. I. R. E.) Hospitals excluded.

A first approximation of the Oregon utility disaggregation was accomplished by using proportions from the Washington model. These numbers were then further refined by a matrix updating technique and by manual adjustment.

The 90 sector 1967 Idaho model (Rafsnider and Kunin, 1971) was aggregated to the 26 sector pattern. No disaggregation was required. Since the time the Idaho model was published, a small clothing manufacturing industry had grown in the state. Therefore, a row and column had to be incorporated for this sector. Rows and columns of zeros were left in the Idaho matrix for petroleum refining, iron and steel, aluminum and aircraft sectors for consistency, even though they do not exist in Idaho, but are present in the Oregon and Washington models.

None of the three source models on which this work is based had a households sector in the processing matrix. There is a paucity of data with which to construct and include households in the matrix. Therefore, in the NWMRIO, a households sector is exogenous to the processing matrix. It is included as indistinguishable portions of the value added row and the final demand column. The disadvantage of such an arrangement is that the income effects of an output change are precluded from the impact estimates; thus somewhat understating impacts.

Gross Output Estimates

After aggregating and disaggregating sectors of the three existing state I-O models to the chosen 26 sector pattern, the next step was to update sectoral output figures to 1972. The 1972 Washington model required no such updating. The Oregon sectoral output estimates were updated from 1963 to 1972 and the Idaho output figures updated from 1967 to 1972 using indices computed from several sources. Indices were used in most cases to update output figures, rather than attempting to find actual gross output figures consistent with the I-O definition of output. Value added from Census of Manufacture was used most often as a source of indices (U.S. Bureau of Census, 1976). Value added is probably the best available proxy for gross output. Historical data from the OBERS projections of output and earnings were used to estimate some indices (USWRC, 1972). As a last resort, payroll figures from "County Business Patterns" were used as updating indices (U.S. Bureau of Census, 1974). However, payroll changes are as likely to reflect wage changes as output changes. The outputs of gas and electric utilities were updated using BPA and trade association figures (BPA, 1972; ERS, 1973; U.S. Bureau of Mines, 1972) (EEI, 1972). Tables 2-5 to 2-7 show the original output figures, the updating index, source of the index and estimated 1972 sectoral output figures. In some cases, the output estimates were later modified

Table 2-5 Washington I-O Model Aggregation Pattern and Initial Output Estimates, 1972 and 1985

Sector Number	Sector Name	Original Sector Numbers	1972 Gross Output $Mill	Index for 1985	1985 Gross Output Projection
1	Crops	1, 2, 4	822.2	121	994.9
2	Livestock	3	353.6	115	406.6
3	Food Processing	6-11	1742.1	121	2107.9
4	Textile and Apparel	12, 13	154.8	198	306.5
5	Mining	14	76.4	164	115.3
6	Forestry and Fisheries	5, 15	299.6	118	353.5
7	Lumber and Wood Prodects	16,17,19	1682.4	150	2523.6
8	Plywood Manufacturing	18	353.2	150	528.3
9	Pulp and Paper Manufacturing	21-23	1017.5	172	1750.1
10	Chemicals	25,26	273.8	146	399.7
11	Petroleum Refining	27	588.0	100	588.0
12	Concrete, Stone, Clay & Glass	28,29	210.1	155	325.6
13	Iron and Steel	30	107.2	130	139.4
14	Nonferrous Metals	31	46.5	110	51.2
15	Aluminum	32	860.2	100	860.2
16	Fabricated Metals	33-37	607.7	195	1185.0
17	Electrical Machinery	38	113.8	219	249.2
18	Aircraft and Aerospace	39	1861.8	155	2885.8
19	Other Manufacture	20,24,40-42	1194.4	155	1851.3
20	Transportation Services	43	1295.6	156	2021.1
21	Electric Utilities	44	579.9	131	759.7
22	Natural Gas Utilities	45	220.0	89	195.8
23	Other Utilities	46	164.0	156	255.8
24	Construction	48	2324.0	159	3695.2
25	Trade	49	4200.0	153	6426.0
26	Services	47,50,51	4746.3	200	9492.6

Table 2-6 Oregon I-O Model Aggregation, Initial Output Updating and Projections, 1972 and 1985

Sector Number	Sector Name	Original Sector Numbers	1963 Gross Output	Index for 1972	Index Source	1972 gross Output Estimate[1]	Index for 1985	1985 Gross Output Projection[1]
						$Mill		
1	Crops	3,4	410.	154	Cash receipts-ERS	631.4	110	685.5
2	Livestock	1,2	318.	156	Cash receipts-ERS	496.1	106	524.9
3	Food Processing	10	575.	178	Value added-Census	1050.0	123	1349.5
4	Textile & Apparel	11,12	36.	147	Payrolls-CBP	52.9	137	72.5
5	Mining	7,8	65.		Actual Output	76.5	142	108.6
6	Forestry & Fisheries	5	28.	103	State Data	37.5	122	45.7
7	Lumber & Wood Pds.	13,14,16,17	1058.	213	Value Added-Census	2253.5	146	3248.1
8	Plywood Manuf.	15	592.	156	Value Added-Census	923.5	146	1416.0
9	Pulp & Paper Manuf.	20-22	205.	255	Value Added-Census	540.0	153	862.3
10	Chemicals	24-27	71.	213	Value Added-Census	151.2	186	267.2
11	Petroleum Refining	28	14.	166	Payrolls-CBP	23.2	100	23.2
12	Concrete, Stone & etc.	31,32	67.	186	Value added-Census	124.7	171	222.2
13	Iron and Steel	33	72.	235	Payrolls-CBP	123.0	150	184.8
14	Nonferrous Metals	pt. 34			Industry Reports	62.0	150	95.0
15	Aluminum	pt. 34	79.		2	165.1	100	164.1
16	Fabricated Metals	35-44	285.	265	Value added-Census	765.1	191	1476.5
17	Electrical Machinery	45-47	95.	98	Value added-Census	93.1	177	177.8
18	Aircraft & Aerospace	49	10.	190	Employment-CBP	24.7	155	37.3
19	Other Manufacture	18,19,23,29	255.	300	Value added-Census	385.0	190	688.5
22	Natural Gas Util.	pt. 57	314.	145	Ore. Util. Stat.	165.0	127	209.5
23	Other Utilities	pt. 57			2	74.6	143	104.7
24	Construction	9	275.	250	Value Bldg. Permits	687.5	170	1167.7
25	Trade	58	1289.	185	Retail Sales	2384.6	157	3614.8
26	Services	55,56,59-65	2026.	238	Receipts-Census	3100.0	214	6799.0

[1]May differ from figures in appendix tables and due to subsequent adjustments during MRIO table balancing.

[2]Oregon Sector employment x Washington Output per worker = estimate of Oregon output.

Table 2-7 Idaho I-O Model Aggregation, Initial Output Updating and Projections, 1972 and 1985

Sector Number	Sector Name	Original Sector Numbers	1963 Gross Output	Index for 1972	Index Source	1972 gross Output Estimate[1]	Index for 1985	1985 Gross Output Projection[1]
						$Mill		
1	Crops	4-8	299.2		Farm income, states	459.9	120	551.9
2	Livestock	1-3	222.6		Farm income, states	445.5	110	490.0
3	Food Processing	37-50	763.7	179	Value added-Census	875.0	131	1166.2
4	Textile & Apparel		N/A		Shipments-Census	6.3	145	9.1
5	Mining	11-29	109.2		Actual Output	106.2	106	112.6
6	Forestry & Fisheries	9	12.3	220	Index from Sector 7	27.1	138	39.4
7	Lumber & Wood Prod.	51-53,55	352.7	220	Value Added-Census	775.9	167	1245.7
8	Plywood Manuf.	54	32.4	336	Value Added-Census	108.9	167	180.8
9	Pulp & Paper Manuf.	56,57	63.4	189	Payrolls-CBP	119.7	174	205.3
10	Chemicals	60-62	251.2		Shipments-Census	260.9	162	387.6
11	Petroleum		N/A		N/A	N/A	N/A	N/A
12	Concrete, Stone, Clay and Glass	63-65	19.3	172	Value added-Census	33.2	160	53.1
13	Iron and Steel		N/A		N/A	N/A	N/A	N/A
14	Nonferrous Metals	66-68	266.0		Value of Shipments	272.9	123	330.7
15	Aluminum		N/A		N/A	N/A	N/A	N/A
16	Fabricated Metals	69-72	37.7	186	Value added-Census	70.2	160	112.3
17	Electrical Machinery	73	43.3	200	No. rptg. units-CBP	86.6	177	151.3
18	Aircraft & Aerospace		N/A		N/A	N/A	N/A	N/A
19	Other Manufacture	58,59,74-76	56.6	211	Payrolls-CBP	119.3	160	188.9
20	Transportation serv	77	167.4	143	Payrolls-CBP	239.4	143	388.3
21	Electric Utilities	80	84.9		BPA and EEI	141.2	165	225.8
22	Natural Gas Util.	81	22.0		Gas Facts	75.8	147	118.4
23	Other Utilities	82	2.0	148	Payroll-CBP	2.9	143	4.1
24	Construction	30-36	316.1	131	Payroll-CBP	414.1	147	564.7
25	Trade	83,84	422.3	139	Retail Sales	590.3	149	878.5
26	Services	10,78,79 85-90	362.1	179	Payroll-CBP	650.0	202	1300.0

[1]May differ from figures in appendix tables and due to subsequent adjustments during MRIO table balancing

to assist in balancing the model. Therefore, the output estimates in tables 2-5 to 2-7 may not agree with the output figures shown in appendix tables A-1 and A-2, the complete MRIO tables, which take precedence over these preliminary estimates.

The 1972 gross output figures were, except for electric and natural gas utilities, projected to 1985, using earnings and "gross product originating" factors by state and sector from series E of OBERS projections (USWRC, 1972). Again, some later modifications in the figures were required to facilitate row and column balancing. The output of petroleum refining and aluminum refining were left at the 1972 level for 1985 based on assumptions used by The Northwest Energy Policy Project (NEPP). The electric and natural gas utilities output projection indices were also obtained from early work of the NEPP. The low 1985 Washington index of natural gas gross output is explained by NEPP as a situation where natural gas is the most expensive home heating fuel in all three states, but that increasing electricity prices overtake gas prices by 1985 in Oregon and Idaho, but not in Washington, thereby making electricity more attractive than natural gas (Charles Rivers Associates, 1978). The 1985 models are expressed in 1972 dollars. The projected 1985 gross outputs are also shown in Tables 2-5 to 2-7.

Final Demand Estimates

In the process of constructing the 1972 Oregon and Idaho I-O models, it was necessary to have updated estimates of 1972 final demands. Final demand estimates were made by using the percent final demand was of gross output in the original I-O models and then multiplying 1972 estimated gross output by this percent. Table 2-8 shows the 1972 final demand estimates. Many final demands, however, were modified to varying degrees in the MRIO balancing process and therefore may not agree with those in the completed tables. The 1972 final demand estimates for Washington were available from the original model. The traditional final demand detail of households, governmental purchases, capital formation and exports were combined into a total final demand figure. Final demand estimates were later broken down into domestic or instate final demand and exports. Exports were further broken into exports to the Northwest by state and exports out of the Northwest.

Updating the Transactions Matrices

The next step in updating the Oregon and Idaho I-O models to 1972 was to bring the transactions matrices up to the year 1972. A computer version of the biproportional or RAS technique (LeComber, 1969) was used.

Table 2-8 Total Final Demand Estimates, Oregon and Idaho, 1972[1]

Sector Number	Sector Name	Oregon 1972	Idaho 1972
		$Mill	
1	Crops	454.6	221.2
2	Livestock	238.1	154.6
3	Food Processing	859.7	1037.6
4	Textile and Apparel	32.8	5.9
5	Mining	59.7	59.0
6	Forestry and Fisheries	4.1	.2
7	Lumber and Wood Products	1059.8	509.0
8	Plywood Manufacturing	1050.5	63.5
9	Pulp and Paper Manufacturing	371.1	113.1
10	Chemicals	16.8	134.9
11	Petroleum Refining	6.0	0.0
12	Concrete, Stone, Clay & Glass	61.1	7.3
13	Iron and Steel	42.3	0.0
14	Nonferrous Metals	56.1	216.4
15	Aluminum	135.0	0.0
16	Fabricated Metals	415.4	31.9
17	Electrical machinery	74.5	81.8
18	Aircraft and aerospace	14.8	0.0
19	Other Manufacture	451.3	102.6
20	Transportation Services	464.1	54.3
21	Electric Utilities	172.6	57.4
22	Natural Gas Utilities	39.9	19.5
23	Other Utilities	54.1	1.1
24	Construction	295.6	391.7
25	Trade	1859.9	427.4
26	Services	3375.3	417.9

[1]May differ from figures in Appendix tables A-1 and A-2 due to subsequent adjustments during MRIO table balancing.

The biproportional method iteratively adjusts matrix rows and columns to externally specified row and column totals. For the NWMRIO, the transactions matrix row totals for 1972 were estimated by sector as the difference between gross outputs and total final demands. The 1972 column totals for Oregon and Idaho were updated to 1972 using the same sectoral indices used to update their respective output figures. The Oregon 1972 row and column totals were then input into program NEWFLOW[5] along with the 1963 transactions matrix for Oregon. The 1967 Idaho transactions matrix was also input into NEWFLOW with the 1972 estimated row or column totals. The new NEWFLOW output is a 1972 matrix of transactions compatible with 1972 row and column totals. Schneider describes the biproportional technique (Schneider, 1965):

> The RAS method alters original coefficients to achieve consistency with projected matrix row and column sums for the later (projected) year . . . for balancing out a table, once the new row sums and column sums of the interindustry flows have been specified. The procedure is fairly staightforward. The 1947 coefficients are adjusted row by row, with factors that eliminate the discrepancy between implied intermediate demand and actual intermediate demand for 1958. Then these tentatively adjusted coefficients are multiplied, column by column, by factors that eliminate the discrepancy between tentatively implied intermediate input and actual intermediate input for 1958. But this second set of factors has distorted the equality of implied and actual intermediate demand, which was established in step one. Thus, a row by row readjustment must take place. And then a column by column readjustment. The iterations are repeated until an acceptably close approximation of A* (some desired matrix) is achieved.

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[5]A program which modified I-O transactions using the biproportional method.

An economic interpretation of the RAS adjustments can be seen more easily if, instead of the matrix equation, the equation of an individual element is written:

$$a^*_{ij} = r_i \, a_{ij} \, s_j.$$

Here it is clear that an individual coefficient is subject to two effects, one effect (r_i) uniform along row i, and the other effect (s_j) uniform along column j. The meaning of these effects was suggested by the Cambridge Growth Project in the following passage:

"We postulate two effects: (i) an <u>effect of substitution</u> (r_i), measured by the extent to which commodity i has been substituted for, or replaced by, other commodities as an intermediate input into industrial processes; and (ii) an <u>effect of fabrication</u> (s_j), measured by the extent to which commodity j has come to absorb a greater or smaller ratio of intermediate to primary inputs in its fabrication."

The output is in terms of net transactions - transactions of state produced goods and services net of imports.

Forming the 1972 State I-O Models

At this point in updating the Oregon and Idaho I-O Models to 1972, we have 1972 gross outputs, total final demands and transactions. The next step is to provide the remaining parts of a complete I-O table such as exports, value added and imports.

Sectoral total final demand, estimated earlier, was at this point separated into domestic final demand and exports. The separation was based on domestic final demands share of output in the original I-O

models. Domestic final demand is defined as consumption of state produced goods and services. It is an aggregation of household consumption, government purchases and capital expenditures. Program FLOW[6], along with estimates of domestic final demand and other data, makes estimates of sectoral exports as difference between the sum of intermediate demands plus final demands and gross output. In other words, exports are used by program FLOW to balance the rows of the I-O model.

Figures for the value added row were taken where available from 1972 census data. In other cases, value added figures were estimated by using value added as a percent of its respective gross output in the parent I-O model and applying that percent to the 1972 output figure. The 1972 Oregon and Idaho import rows were also estimated using percentage figures from the parent I-O models. Value added to final demand and imports to final demand were also estimated using proportions from the parent I-O models.

Estimation of these numbers provided all of the input data needed by program FLOW to form the complete 1972 state I-O tables. Several runs of program FLOW with intervening manual adjustments to output, final demand, value added, imports or transactions were necessary to get balanced state models. For example, energy purchases in the transactions matrices were manually adjusted to comform to available

[6]A FORTRAN technique for updating and forming complete I-O tables.

published 1972 data. In addition, progrom FLOW makes some adjustments in row and column figures, to achieve row and column balance. The program uses exports to balance rows and a row called statistical error to balance columns. Therefore manual adjustments required are usually minor. With the completion of this step, the three 1972 state I-O models were complete and ready to be incorporated into the multiregional format.

Projecting the 1985 State I-O Models

Many of the preceding steps were repeated in the process of projecting the 1972 state I-O models to 1985. The 1985 gross output projections were described and listed in an earlier section. Domestic final demands were projected to 1985 based on 1985 outputs and using the 1972 final demand proportion of 1972 sectoral gross output. The 1972 state models, the projected 1985 output and final demands were then input into program FLOW which updated and printed the 1985 state transaction matrices. Value added and imports in most cases are calculated for 1985 by program FLOW as the 1972 proportion of 1985 gross output. As with the 1972 state models, several computer runs with intervening manual adjustments to gross output, value added, imports or transactions were necessary to get balanced 1985 state models. Consequently, direct or technical coefficients will differ somewhat between 1972-1985. The 1985 models are expressed in 1972 dollars.

The tasks remaining to complete the multiregional input-output models were then to (1) determine the origins and destinations of exports and imports by state, (2) estimate the sectors in each state importing and exporting, and (3) fit the instate transaction submatrices and import-export submatrices into the MRIO format and balance the model; assure that all rows and columns equal respective gross outputs.

Imports and Exports

The 1972 Washington import and export totals, by sector, were available in the Washington table. Imports and exports for Oregon and Idaho were estimated by program FLOW. The exports column of final or finished goods is estimated by the program as any gross output greater than the horizontal sum of intermediate output plus domestic final demand. If the horizontal sum of intermediate output plus domestic final demand is less than estimated gross output for a sector, then the shortage is considered to be an import of finished goods for the sector.

Finished imports are different from imports of unfinished imports. Imports which are unfinished or intermediate goods and services for further use in production are estimated by the program as a fixed proportion of gross output.

Once the state final export and import columns and import rows were available, the next task was to determine their respective destinations and origins. Neither reliable nor comprehensive data on the trading patterns of states exists (Thompson, 1974). One is left with the choice of using what sparse data is available, or with using some method to theorize what the trading patterns might be. Both sparse data and theoretical methods were used to construct the NWMRIO trade flows.

Probably the most usable (but somewhat outdated) state trade data available are the 1963 trade flows estimated by the Harvard Economic Research Project (HERP) (Waldenhaug, et.al., 1972). The HERP trade flow estimates are for 79 goods among 44 regions of the U.S. (usually states). Sectoral trade flows were aggregated from a HERP trade flow data tape to the NWMRIO sector pattern for Washington, Oregon, Idaho, and the rest of the U.S. combined. The resulting trade flows show estimated 1963 exports and imports among the three northwest states and a grouping of the rest of the U.S. These flows were not used directly, but proportions of trade flows were used to allocate the previously estimated 1972 and 1985 state exports and imports between any one northwest state, the other two northwest states and the rest of the U.S. For example, the proportions were used to estimate Oregon exports to Idaho, Washington and the rest of the U.S. The proportions were also used to estimate origins of input imports for each state sector.

Since HERP did not provide trade data for service sectors, a probability method was used to estimate interstate service sector trade flows. The equation used was:

$$\frac{E_s}{E_{nw}} \times \frac{I_s}{I_{nw}}$$

where E_s is the exports of any northwest state (for the sector under consideration, sector i), E_{nw} is the total northwest regional exports in sector i, I_s is the imports of a state for sector i, and I_{nw} is total regional imports.[7] The left side of the equation estimates the probability of a state providing services for regional export. The right side estimates the probability of a state being a recipient of imported services. Multiplying values for the two sides of the equation for sector i gives an estimate of the probability that two northwest states will trade with each other. The trade probability is then multiplied by the dollar value of a service of sector i imported by a northwest state, and the results proportionately deducted from the exports of sector i of northwest states. The assumption here is that importing northwest states will obtain their service imports from exporting northwest states before obtaining them out of the region. After fulfilling Northwest import needs, any excess exports are assumed to leave the region. If imports of

[7]Adapted from Davis and Lofting.

services are not available in the Northwest, they are assumed to be imported from outside the region. The basis of the assumption is that it is more efficient to obtain services from adjacent states than from more distant states. This technique is simplified in that it does not explicitly consider distance as a factor in allocating trade flows. A distance variable could be included in the equation in more complex trading situations such as those involving several states or where more accurate trade data would warrant using a distance variable (Davis and Lofting, 1972).

The estimates of the service sectors input imports column (in contrast to column estimates discussed above) could not be allocated in the same manner as final goods exports and imports because no offsetting export figures were available. The data available provided for no regional trading situation, and the import figures have only a dollar value but are an unknown mix of goods and services. It was necessary to assume that service sector input imports came from outside the region. This assumption somewhat reduces regional interaction, and multiplier values in the service sectors.

The completion of this step produced three columns of "exports to" and three rows of "imports from" for each state. Tables 2-9 to 2-14 show the state export and import values as well as their estimated state destinations and origins. There may appear to be

contradictions in Tables 2-9 to 2-14 because one would expect that State A's exports to State B could match B's imports from A. This may not be the case in the tables. However, only the most reliable portions of the data were used as input to the NWMRIO. The rest was used only as backup in table balancing. The next section further expands this discussion and lists the data used as input and that used only for backup. These import-export estimates may not always agree with those in the MRIO transaction appendix tables A-1 and A-2 because of subsequent adjustments during balancing process. Data in tables A-1 and A-2 take precedence over those in tables 2-9 to 2-14.

Import-Export Submatrices

The next task was to expand the export columns and import rows into export and import submatrices, or to estimate with which of another state's sectors a state trades. Exports to and imports from the "rest of the world" were not broken into trade submatrices, but were listed in the MRIO table as part of final demand and final payments. Data on state trading patterns are almost nonexistent at the industry level of detail. Therefore, in order to estimate the import and export submatrices, it was necessary to assume that an importing state imports goods and services in the same pattern as its internal purchases and that an exporting state exports goods and services in the same pattern as the internal purchases of the

Table 2-9 Washington Import Estimates by Origin, 1972 and 1985

Sector Number	Sector Name	1972 Total Imports	1972 From Oregon	1972 From Idaho	1972 From Rest Of world	1985 Total Imports	1985 From Oregon	1985 From Idaho	1985 From Rest Of World
		Millions of 1972 Dollars							
1	Crops	86.5	9.7	7.1	69.7	104.7	11.7	8.6	84.4
2	Livestock	67.3	24.5	4.8	37.9	77.4	28.2	5.6	43.6
3	Food Processing	392.7	37.7	25.1	329.9	484.0	46.5	31.0	406.6
4	Textile and Apparel	73.7	7.1	.1	64.3	146.0	18.5	.1	127.3
5	Mining	18.3	.5	0.0	17.8	30.0	.8	0.0	29.2
6	Forestry & Fisheries	8.2	0.0	0.0	8.2	11.3	0.0	0.0	11.3
7	Lumber & Wood Products	212.5	116.2	43.8	52.5	371.5	203.2	76.5	91.8
8	Plywood Manufacturing	69.6	38.1	14.3	17.2	105.7	57.8	21.8	26.1
9	Pulp and Paper Manuf.	228.5	38.6	8.5	181.4	399.6	67.5	14.8	317.3
10	Chemicals	51.7	1.7	.6	49.4	77.6	2.6	.8	74.1
11	Petroleum Refining	435.3	11.7	0.0	423.5	437.2	11.8	0.0	425.4
12	Concrete, Stone, etc.	33.0	5.6	.5	26.9	52.4	8.9	.8	42.6
13	Iron and Steel	21.3	1.0	0.0	20.2	28.1	1.4	0.0	26.7
14	Nonferrous Metals	11.5	.4	.1	11.1	15.4	.3	.1	14.9
15	Aluminum	385.0	0.0	0.0	385.0	385.0	0.0	0.0	385.0
16	Fabricated Metals	202.5	8.9	.2	193.4	395.5	17.4	.4	377.7
17	Electrical Machinery	40.6	.3	0.0	40.3	88.9	.7	0.0	88.2
18	Aircraft & Aerospace	875.8	1.7	0.0	874.0	1358.0	2.7	0.0	1355.3
19	Other Manufacture	426.5	12.4	.4	413.7	661.2	19.2	.7	641.4
20	Transportation Svs.	143.6	0.0	0.0	143.6	224.1	0.0	0.0	224.1
21	Electrical Utilities	33.4	0.0	0.0	33.4	43.9	0.0	0.0	43.9
22	Natural Gas Utilities	62.3	0.0	0.0	62.3	68.8	0.0	0.0	68.8
23	Other Utilities	4.1	0.0	0.0	4.1	6.5	0.0	0.0	6.5
24	Construction	603.7	0.0	0.0	603.7	959.9	0.0	0.0	959.9
25	Trade	234.7	0.0	0.0	234.7	360.9	0.0	0.0	360.9
26	Services	315.7	0.0	0.0	315.4	634.5	0.0	0.0	634.5

Table 2-10 Oregon Import Estimates by Origin, 1972 and 1985

Sector Number	Sector Name	1972 Total Imports	1972 From Wash.	1972 From Idaho	1972 From Rest Of world	1985 Total Imports	1985 From Wash.	1985 From Idaho	1985 From Rest Of World
		Millions of 1972 Dollars							
1	Crops	70.7	10.4	8.5	51.7	76.5	11.2	9.2	56.0
2	Livestock	132.6	15.4	14.2	103.0	140.1	16.2	15.0	108.8
3	Food Processing	150.6	15.4	5.3	130.0	193.8	19.8	6.8	167.2
4	Textile and Apparel	20.4	3.	0.0	20.1	27.9	.4	0.0	27.4
5	Mining	16.4	3.1	0.0	13.3	23.3	4.4	0.0	18.8
6	Forestry & Fisheries	2.5	0.0	0.0	2.5	3.2	0.0	0.0	3.2
7	Lumber & Wood Products	150.1	37.2	20.6	92.3	222.4	55.1	30.5	136.8
8	Plywood Manufacturing	108.6	26.9	14.9	66.8	162.4	40.3	22.3	99.9
9	Pulp and Paper Mfg.	41.9	3.4	2.0	36.4	67.8	5.5	3.3	58.9
10	Chemicals	44.5	2.2	.4	41.9	79.3	3.9	.7	74.7
11	Petroleum Refining	8.3	.4	0.0	7.9	8.4	.4	0.0	8.0
12	Concrete, Stone, etc.	13.4	.4	.2	12.8	24.2	.7	.4	23.1
13	Iron and Steel	14.4	0.8	0.0	13.5	27.2	1.6	0.0	25.6
14	Nonferrous Metals	31.7	10.0	0.3	21.4	49.2	15.4	.5	33.2
15	Aluminum	74.5	0.0	0.0	74.5	74.5	0.0	0.0	74.5
16	Fabricated Metals	245.2	12.7	.2	232.2	487.9	25.4	.5	462.0
17	Electrical Machinery	25.7	.1	0.0	25.5	50.0	.3	0.0	49.7
18	Aircraft & Aerospace	9.1	2.9	0.0	6.2	13.8	4.4	0.0	9.4
19	Other Manufacture	175.9	4.7	.2	171.1	308.1	8.3	.3	299.5
20	Transportation Svs.	96.2	0.0	0.0	96.2	132.7	0.0	0.0	132.7
21	Electrical Utilities	25.0	0.0	0.0	25.0	45.1	0.0	0.0	45.1
22	Natural Gas Utilities	97.6	0.0	0.0	97.6	125.3	0.0	0.0	125.3
23	Other Utilities	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
24	Construction	140.2	0.0	0.0	140.2	239.9	0.0	0.0	239.9
25	Trade	79.8	0.0	0.0	79.8	118.4	0.0	0.0	118.4
26	Services	324.4	0.0	0.0	324.4	703.3	0.0	0.0	703.3

Table 2-11 Idaho Import Estimates by Origin, 1972 and 1985

Sector Number	Sector Name	1972 Total Imports	1972 From Oregon	1972 From Wash.	1972 From Rest Of world	1985 Total Imports	1985 From Oregon	1985 From Wash.	1985 From Rest Of World
		Millions of 1972 Dollars							
1	Crops	93.4	8.1	10.9	74.3	110.4	9.6	12.9	87.9
2	Livestock	47.2	18.9	5.2	23.1	49.0	19.6	5.4	24.0
3	Food Processing	168.0	6.0	19.8	142.1	205.4	7.4	24.2	173.8
4	Textile and Apparel	1.4	0.0	0.0	1.4	2.0	0.0	0.0	2.0
5	Mining	31.4	.1	1.4	29.8	32.7	.1	1.5	31.1
6	Forestry & Fisheries	14.3	0.0	0.0	14.8	21.3	0.0	0.0	21.3
7	Lumber & Wood Products	241.5	7.0	41.8	192.7	375.3	10.9	64.9	299.5
8	Plywood Manufacturing	23.7	.7	4.1	18.9	38.0	1.1	6.6	30.3
9	Pulp and Paper Mfg.	56.1	2.3	15.5	38.2	94.5	4.0	26.2	64.3
10	Chemicals	71.1	2.7	10.6	57.8	103.9	3.9	15.5	84.5
11	Petroleum Refining	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Concrete, Stone, etc.	7.1	.1	.1	6.8	10.5	.2	.2	10.1
13	Iron and Steel	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Nonferrous Metals	143.2	.4	84.9	57.8	171.9	.5	101.9	69.4
15	Aluminum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Fabricated Metals	30.3	1.5	2.7	26.0	48.2	2.4	4.4	41.4
17	Electrical Machinery	39.1	.1	.3	38.7	68.1	.2	.5	67.4
18	Aircraft & Aerospace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Other Manufacture	51.6	.7	1.4	49.5	81.2	1.0	2.2	77.9
20	Transportation Svs.	58.1	0.0	0.0	58.1	77.9	0.0	0.0	77.9
21	Electrical Utilities	7.6	0.0	0.0	7.6	11.5	0.0	0.0	11.5
22	Natural Gas Utilities	45.1	0.0	0.0	45.1	70.3	0.0	0.0	70.3
23	Other Utilities	.2	0.0	0.0	.2	.3	0.0	0.0	.3
24	Construction	132.9	0.0	0.0	132.9	178.4	0.0	0.0	178.4
25	Trade	101.2	0.0	0.0	101.2	149.3	0.0	0.0	149.3
26	Services	91.4	0.0	0.0	91.4	182.0	0.0	0.0	182.0

Table 2-12 Washington Export Estimates by Destinations, 1972 and 1985

Sector Number	Sector Name	1972 Total Exports	1972 To Oregon	1972 To Idaho	1972 To Rest Of world	1985 Total Exports	1985 To Oregon	1985 To Idaho	1985 To Rest Of World
		Millions of 1972 Dollars							
1	Crops	480.2	49.9	15.4	414.9	584.2	60.7	18.7	504.7
2	Livestock	31.6	3.6	2.8	25.2	23.1	2.6	2.1	18.4
3	Food Processing	823.8	133.4	79.1	611.2	991.6	160.6	95.2	735.8
4	Textile and Apparel	115.1	6.6	.9	107.6	231.3	13.2	1.8	216.3
5	Mining	12.5	9.7	.8	1.9	29.7	23.1	2.0	4.6
6	Forestry & Fisheries	13.1	0.	6.1	7.2	0.0	0.	0.	0.0
7	Lumber & Wood Prds.	1079.3	2.1	6.5	1070.7	1594.2	3.2	9.6	1581.4
8	Plywood Manufacturing	276.7	0.0	0.0	276.7	410.2	0.0	0.0	410.2
9	Pulp and Paper Mfg.	759.0	12.1	12.1	734.7	1331.0	21.3	21.3	1288.4
10	Chemicals	60.1	3.1	4.4	52.6	86.3	4.5	6.3	75.5
11	Petroleum Refining	248.7	23.4	17.2	208.2	171.4	16.1	11.8	143.5
12	Concrete, Stone, etc.	10.4	.4	.1	9.9	17.6	.6	.1	16.8
13	Iron and Steel	36.0	5.4	1.6	29.0	19.5	2.9	.8	15.7
14	Nonferrous Metals	38.0	2.0	1.1	34.8	38.2	2.6	1.4	43.6
15	Aluminum	719.1	0.0	1.7	717.4	703.0	0.0	2.1	700.9
16	Fabricated Metals	311.3	32.4	17.1	261.8	699.7	72.8	38.5	588.4
17	Electrical Machinery	74.9	1.6	.4	72.9	171.2	3.6	1.0	166.6
18	Aircraft & Aerospace	1393.1	100.3	11.1	1281.6	2157.7	155.3	17.3	1985.1
19	Other Manufacture	542.2	24.4	8.1	509.7	835.6	37.6	12.5	785.5
20	Transportation Svs.	612.5	0.0	45.1	567.4	968.6	0.0	0.0	968.6
21	Electrical Utilities	38.5	0.0	.3	38.2	8.2	0.0	0.0	8.2
22	Natural Gas Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Other Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Trade	1114.0	0.0	0.0	1114.0	1696.6	0.0	0.0	1696.6
26	Services	456.6	21.9	0.0	434.7	1329.4	0.0	0.0	1329.4

Table 2-13 Oregon Export Estimates by Destination, 1972 and 1985

Sector Number	Sector Name	1972 Total Exports	1972 To Wash.	1972 To Idaho	1972 To Rest Of world	1985 Total Exports	1985 To Wash.	1985 To Idaho	1985 To Rest Of World
		Millions of 1972 Dollars							
1	Crops	424.8	51.4	14.9	358.5	433.6	52.5	15.2	365.9
2	Livestock	227.9	104.8	69.7	53.3	195.6	90.0	59.8	45.8
3	Food Processing	394.4	121.1	15.4	257.9	532.6	163.5	20.8	348.3
4	Textile and Apparel	16.3	6.1	.1	10.1	19.6	7.3	.1	12.1
5	Mining	60.1	42.7	1.1	16.2	80.6	57.3	1.5	21.8
6	Forestry & Fisheries	3.1	0.0	1.4	1.7	0.0	0.	0.	0.0
7	Lumber & Wood Prds.	1190.4	11.9	1.2	1177.3	1680.5	16.8	1.7	1662.0
8	Plywood Manufacturing	758.0	0.0	0.0	758.0	1129.0	0.0	0.0	1129.0
9	Pulp and Paper Mfg.	372.8	36.5	3.0	333.3	599.8	58.8	4.8	536.0
10	Chemicals	76.7	9.6	4.0	63.1	146.3	18.3	7.6	120.4
11	Petroleum Refining	1.3	1.0	0.0	.3	0.0	0.0	0.0	0.0
12	Concrete, Stone, etc.	26.1	10.0	.3	15.8	59.1	22.6	.6	35.9
13	Iron and Steel	2.1	.4	0.0	1.7	0.0	0.0	0.0	0.0
14	Nonferrous Metals	46.2	2.3	0.0	43.8	69.2	3.5	.1	65.6
15	Aluminum	130.6	0.0	.3	130.3	117.0	.3	0.0	116.7
16	Fabricated Metals	278.6	38.2	8.9	231.5	622.4	85.3	19.9	517.2
17	Electrical Machinery	55.0	2.4	.2	52.4	109.8	4.8	.3	104.6
18	Aircraft & Aerospace	15.5	2.8	.1	12.5	23.3	4.3	.2	18.8
19	Other Manufacture	439.9	59.4	5.3	375.2	760.7	102.7	9.1	648.9
20	Transportation Svs.	103.6	0.0	7.6	95.9	80.2	0.0	0.0	80.2
21	Electrical Utilities	7.0	0.0	.1	6.9	16.8	0.0	0.0	16.8
22	Natural Gas Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Other Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Construction	283.1	0.0	0.0	283.1	503.4	0.0	0.0	503.4
25	Trade	304.7	0.0	0.0	304.7	338.2	0.0	0.0	338.2
26	Services	0.0	0.0	0.0	0.0	674.7	0.0	0.0	674.7

Table 2-14 Idaho Export Estimates by Destination, 1972 and 1985

Sector Number	Sector Name	1972 Total Exports	1972 To Oregon	1972 To Wash.	1972 To Rest Of world	1985 Total Exports	1985 To Oregon	1985 To Wash.	1985 To Rest Of World
		Millions of 1972 Dollars							
1	Crops	234.0	24.6	17.5	191.9	276.9	29.1	20.8	227.0
2	Livestock	162.9	16.4	15.3	131.1	140.7	14.2	13.2	113.3
3	Food Processing	687.2	33.7	92.8	560.7	837.0	41.0	113.0	683.0
4	Textile and Apparel	5.9	0.0	.2	5.6	8.6	0.0	.4	8.2
5	Mining	61.7	.1	.1	61.5	58.3	0.0	.1	58.1
6	Forestry & Fisheries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Lumber & Wood Products	526.2	2.6	14.7	508.8	844.8	4.2	23.6	816.9
8	Plywood Manufacturing	66.6	0.0	0.0	66.6	112.4	0.0	0.0	0.0
9	Pulp and Paper Mfg.	103.7	16.5	12.2	75.0	181.7	28.9	21.4	131.4
10	Chemicals	190.6	12.0	18.1	160.5	286.5	18.0	27.0	241.2
11	Petroleum Refining	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Concrete, Stone, etc.	4.6	.4	.6	3.6	20.7	1.7	2.6	16.4
13	Iron and Steel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	Nonferrous Metals	221.4	2.0	3.5	215.9	267.8	2.4	4.3	261.1
15	Aluminum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Fabricated Metals	9.2	.2	.4	8.5	26.0	.7	1.1	24.1
17	Electrical Machinery	77.2	0.0	0.0	77.2	134.7	0.0	0.0	134.7
18	Aircraft & Aerospace	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Other Manufacture	80.7	2.0	5.2	73.4	128.3	3.2	8.3	116.7
20	Transportation Svs.	0.0	0.0	0.0	0.0	2.2	0.0	0.0	2.2
21	Electrical Utilities	0.0	0.0	0.0	0.0	6.1	0.0	0.0	6.1
22	Natural Gas Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Other Utilities	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Construction	113.7	0.0	0.0	113.7	120.6	0.0	0.0	120.6
25	Trade	11.4	0.0	0.0	11.4	31.9	0.0	0.0	31.9
26	Services	117.8	5.7	0.0	112.1	307.6	0.0	0.0	307.6

receiving state. For example, if, in Oregon, three percent of all crop sector purchases were purchases of electricity, then it is assumed that Oregon crop sector imports from Washington would be made up of three percent electricity purchases. The shortcomings of the assumption should be evident and demonstrate a major weakness of the techniques and model. Nevertheless, an alternative method of estimating sectoral makeup of interstate trade is not apparent in current literature and is beyond the scope of this study.

Export and import submatrices were estimated by multiplying import rows by the importing state direct coefficient matrix, thus creating import submatrices. A somewhat different procedure was necessary to estimate export submatrices. The interindustry transactions of a receiving state were first divided horizontally by respective sectoral gross outputs to create a matrix of output or sales coefficients. This resulting matrix was then multiplied row by row by the respective export figures to create export submatrices.

Each diagonal trade submatrix in the MRIO matrix represents at the same time exports (sales) and imports (purchases). Each trade submatrix was estimated from an exports as well as from an imports approach as mentioned earlier. Six of these submatrices were used as input to the MRIO and the remaining six were used only as backup in balancing the MRIO. The four submatrices representing Washington's imports from and exports to Oregon and Idaho were used because of the

greater reliability of both the Washington export and import vectors on which the four submatrices are based, and the submatrices showing Idaho imports from Oregon and Oregon imports from Idaho were used. Import submatrices were chosen over export submatrices because the import estimates on which they are based may be more reliable than the export estimates. The six trade matrices used only as backup for MRIO balancing were: Idaho exports to Oregon, Idaho exports to Washington, Oregon exports to Washington, Oregon exports to Idaho, Oregon imports form Washington and Idaho imports from Washington.

Balancing the NWMRIO

A balancing process is required to assure that rows - interstate and interstate sales, exports and domestic final demand add horizontally to equal gross output in each sector and to assure that columns - intrastate and interstate purchases, value added and imports sum vertically to equal sectoral gross outlay. Now that the state submatrices, trade submatrices and all other components of the MRIO are available, they must be fitted into the MRIO format and balanced as a group. In the row and column balancing process, one must choose which components of the MRIO will be modified and which components will not be adjusted. Due to the already present uncertainties introduced into the trade submatrices from the assumption concerning distribution of imports and exports among sectors, adjustments in

these submatrices would be more appropriate than in the three state transaction submatrices which are based on more reliable techniques. Adjustments of individual entries in the trade submatrices were made based on the six backup trade matrices mentioned earlier. Adjustments to final demand, value added, imports, or gross output were based on the reliability of the data source. To illustrate, adjustments were not made in value added figures when they were taken from U.S. Census Sources. However, value added or imports based on less precise techniques such as proportions taken from other I-O models were adjusted as necessary.

Columns were first balanced to total within about five percent of the respective gross outputs. Then rows were balanced to make them equal to respective gross output figures. This, of course, disturbed some column balances, which were readjusted. Since this MRIO is based on secondary data, it would be specious to pretend that the model is perfectly balanced or without error. Therefore, a row designated "statistical error" was reserved along the bottom of the table in final payments as a place to list small unaccounted-for differences in columm totals and a column was reserved in the final demand portion of the table to list small discrepancies in row totals. It was then not necessary to adjust row and column totals to complete balance. Entries in the error vectors were kept to a minumum - generally below five percent of gross output. It was also

necessary to include several dummy entries of .01 in the blank rows and columns of the Idaho portion of the MRIO to assure that the matrix would avoid being singular and hence unable to invert.

The final step in balancing, and an excellent step to assure internal mathematical consistency of the model, was to multiply the inverted transaction matrix by total final demand using Program RUTH to see that the product equaled gross output. The 1972 and 1985 models both met this criterion. However, this step cannot offset the fact that the model is a compilation of data from several sources which have been assembled to represent regional trade flows. Even though the model "balances", it may still contain considerable error which is passed on to the results and conclusions.

Employment Coefficients

One requirement of the analytic system devised for this study was that it provide estimates of employment changes resulting from alternative output levels. Multiregional I-O models are amenable to this use through the use of employment coefficients. Employment coefficients as used in this study relate the level of output by sector to employment in that sector in a linear fashion. They express employment changes as man-years of employment per million dollars of gross output. In Table 2-15, employment coefficients for 1972 and

Table 2-15 Sectoral emplayment Coefficients, Northwest States, 1972 and 1985

Washington			Oregon			Idaho		
Sector Number	1972	1985	Sector Number	1972	1985	Sector Number	1972	1985
	Man years/Mill $ Output							
1	51.34	36.58	27	45.90	32.99	53	53.09	35.98
2	51.16	38.37	28	38.94	28.73	54	36.54	27.02
3	16.01	14.99	29	23.81	18.60	55	18.03	15.35
4	46.51	30.83	30	105.86	92.41	56	63.49	60.44
5	35.99	33.07	31	30.51	29.61	57	30.96	42.74
6	8.34	12.59	32	37.33	37.42	58	11.07	10.91
7	24.43	14.96	33	22.71	14.09	59	15.28	9.27
8	23.85	17.87	34	26.98	16.19	60	24.08	14.12
9	17.89	10.11	35	17.57	11.83	61	9.19	7.06
10	20.82	18.76	36	13.89	11.23	62	6.13	6.71
11	2.72	2.72	37	25.86	25.86	63	0.0	0.0
12	27.13	22.27	38	27.26	23.18	64	33.13	33.89
13	31.72	31.72	39	33.28	35.15	65	0.0	0.0
14	40.86	48.43	40	24.19	25.64	66	4.76	5.14
15	9.88	12.55	41	10.29	16.26	67	0.0	0.0
16	29.78	27.01	42	24.05	19.98	68	22.79	48.08
17	51.84	38.32	43	105.26	103.49	69	8.08	10.90
18	22.24	21.36	44	40.48	44.91	70	0.0	0.0
19	27.63	26.98	45	35.69	30.89	71	52.89	55.76
20	37.08	26.84	46	30.58	25.59	72	30.51	30.33
21	11.73	9.91	47	16.81	10.91	73	17.60	15.45
22	5.45	6.23	48	11.05	10.10	74	9.16	8.23
23	7.23	4.77	49	11.00	9.09	75	163.79	162.68
24	24.51	24.46	50	84.29	57.65	76	42.79	51.31
25	71.56	67.37	51	90.93	85.85	77	112.30	130.06
26	65.43	51.69	52	70.05	49.19	78	93.51	83.73

1985 are shown for all 78 sectors of the MRIO. When used for employment impact analysis, they show the backward linked or input related change in employment in all sectors in response to a change in final demand in one or several sectors. The employment figures were taken from 1972 data compiled by and projected to 1985 by the Bonneville Power Administration.

The coefficients were calculated by dividing BPA sectoral employment estimates by sectoral gross output estimates in the base and projected years. Hence differences in the coefficients in any given sector over the 1972-1985 time period are a rough approximation of technological change. In most cases, the 1985 coefficients are lower than their 1972 counterparts, indicating a less labor intensive economy in the future.

MRIO Application

The general procedure for application of an I-O model as a tool to measure economic impacts is to introduce some change in the final demand of one or several sectors and multiply the change by the inverted transaction matrix to obtain the estimated output changes in all sectors of the model. Proper use of an I-O model to measure impacts involves several steps. A physical effect, such as an increase in crop output, must be transformed into an economic effect - in terms of dollars over a one year period of time. This is a

manual procedure done outside the model. It must then be determined where this economic effect will first be felt in the economy - and in what form. An increase in crop output for example, may initially be felt as an increase in crop sector output. However, one must be careful at this point. An increase in crop output may be exported, which makes it a change in final demand, or it may be used as a substitute for inputs presently imported in which case interindustry transactions should be changed to reflect this import substitution. Once the industry of initial impact and the type of output change is identified, the change must be introduced into the I-O model as a change in final demand - not as a change in output. This is a requirement of the I-O algorithm which is designed to react to demand changes. Detailed application directions for I-O models are beyond the scope of this study but are well covered in a publication of USDA's Economics, Statistics & Cooperatives Service (USDA, 1978).

Model Limitations

Some limitations of the NWMRIO have been mentioned in other sections - they are reviewed here and others noted. Most limitations stem from using secondary data for model construction.

A significant limitation of input-output systems is linearity of its equations. Input-output technical relations are assumed to

extend in a straight line manner without regard to scale economies, price changes, substitution of inputs or the availability of inputs. This is, of course, not the case in the real world. Substitutions, price changes, and input limitations do occur. Nevertheless, it can be assumed that the linear relations in an I-O model are applicable within a limited range. Therefore, small changes in final demand should be introduced into an I-O model.

Input-output shows the indirect economic outputs from what are called backward linkages. That is, they show the inputs behind or supporting production of a unit of output prior to its entering final demand. Multipliers, as used in this study, do not automatically show forward linkages after production is complete. For example, the indirect economic impacts of an increase in crop production will show backward linked impacts (purchases) in fertilizer, machinery, labor, etc., but not forward linked impacts (after the crop is sold) such as transportation, storage, processing, and retailing. However, in this study, major agricultural forward links are manually introduced into the model. Furthermore, I-O will not show changes in the structure of the economy, such as diversification or externalities, as a result of large production changes.

Most of the data in the NWMRIO are not available through published sources, so rigorous verification of the model is difficult.

Based on prior experience with I-O application and on comparisons with the Washington model, the NWMRIO model appears to give reasonable results. The Washington portions of the 1972 model are quite dependable since they are based primarily on survey data and were constructed by an experienced staff. The Oregon and Idaho portions of the model appear reasonable, but certainly are not as reliable as the Washington portion because they are based only on secondary data and on computational techniques. The import and export submatrices are based on the outdated HERP data and on theoretical methods, but appear to perform adequately in estimating interstate impacts. The 1985 model is, of course, less reliable than the 1972 model due to the uncertainties of projecting into the future. Overall, the models are judged suitable for decision making on a broad or macro-level since they give a direction and general magnitude of economic and spatial impacts. They are not appropriate for single industry nor for micro-level matters. As far as describing the buying and selling patterns of the Northwest, the models may show general patterns, but are certainly not precise. In fact, the author is reluctant to release the export and import submatrices because the preceeding caution is likely to be ignored and the models misused.

There is not agreement among economists on the credibility of input-output models constructed from secondary data. Many economists construct and apply only primary data-based models. Probably a

greater number utilize secondary data models because they consider them adequate for broad level planning studies and because they are markedly less expensive to construct. Both sides of this issue are represented in two papers which empirically tested primary versus secondary data models.

Schaffer and Chu conclude that:

> In themselves the nonsurvey methods may prove useful supplements to survey studies. But it seems that, at the moment, there is still no acceptable substitute for a good survey-based study (Schaffer and Chu, 1969).

On the other hand, Boster and Martin conclude that:

> On the basis of both statistical analysis and projection comparisons, it cannot be argued that the more aggregative components of either model are "better" than the aggregative components of the other.
>
> If, as is usually the case in regional interindustry analysis, one is interested in the overall structural view of the economy and the interdependent relationships resulting therefrom, rather than individual input-output coefficients, a model developed from secondary data sources is quite adequate and vastly less expensive than a model developed from primary data. Thus, to the extent that policy questions can be answered from less expensive secondary data source studies with reasonable assurances of reliability, decision-makers would be wise to spend those resources that would have been spent on primary data procurement on other matters of importance (Boster and Martin, n.d.).

Secondary data I-O models require markedly less time and funds to construct than primary data I-O models, but at the expense of pre-

cision. Primary data I-O models, however, are essential where precision of results is required. Business decisions at the level of the firm, for example, should not be made on the basis of secondary data I-O models. Primary data models are required in order to construct secondary data models. Primary data models and techniques to construct I-O models from secondary data have made it possible to construct secondary data models for substate and multistate areas and, consequently, have permitted regional economic analysis which otherwise would not have been possible. The place of secondary data models in economic analysis would appear to be in broad level analysis where general trends and magnitudes of impacts are sufficient, such as in policy or planning studies similar to this study. It is the author's conclusion that both types of I-O models are useful - and credible - when applied and interpreted properly.

The Northwest Multiregional Input-Output Tables

Tables A-1 and A-2 in Appendix A show the 1972 and 1985 transactions as estimated in this study. Each table is composed of nine separate sections - three in-state transaction submatrices and six trade submatrices. These nine submatrices can be arranged into the multiregional format by using the small diagram in the upper left corner of each page as a guide. When arranged in MRIO form, the first 26 rows and columns show Washington transactions. The second set of

26 sectors (27-50) represent Oregon transactions and the third set of 26 (53-78) show Idaho transactions. Trade submatrices are not shown for 1985, even though they were developed, because the data are projected and based only on theoretical techniques. They are highly speculative.

Rows of the tables show interindustry sales, exports, and final demand just as in a conventional single area I-O model. Columns show interindustry purchases, imports, and final payments. Transactions are in millions of 1972 dollars in both sets of tables.

III. ANALYSIS

When man uses water in upstream reaches of a drainage basin, that use may impair other uses of the water downstream. Impairments may be due to water quality or quantity changes brought on by the upstream use. Such effects are often called externalities or "spillover" effects. There are such spillover effects in the Columbia River drainage. When Columbia Basin water is diverted to irrigate crops, it reduces flow at all downstream points. In this study, the downstream water related service under consideration is hydroelectric generation which is reduced by upstream irrigation depletions. The amount and significance of the reduction depends on the time of year and the amount and place of upstream depletion.

This chapter describes how data on the primary or initial effects of upstream irrigation and downstream hydroelectric generation were obtained and adapted for use in the MRIO model. The next chapter discusses and displays results of the analysis.

Use of the I-O model, as most economic models, requires that a physical change be expressed in dollars. Consequently, the problem in this analysis is one of expressing in dollars the additional crop output resulting from increased water diversion and expressing in dollars the effects of impaired downstream hydroelectric generation on the aluminum industry. The downstream hydroelectric generation

losses are taken a step beyond the value of electricity lost and shown as a dollar value of aluminum output lost. This step is required because electricity is only an intermediate service, used heavily as an input in aluminum production. Aluminum is a "final" or end product exported from the region. In addition, since the aluminum industry buys interruptible electrical energy, it is the first regional industry to be affected by reductions in available power.

Crop value figures and resulting downstream hydroelectric reductions are taken from the Columbia River and Tributaries (CR&T) study and modified for analysis in the NWMRIO model. The objective of this study is to extend the CR&T values one step further - to estimate the indirect economic impacts on the three state region.

The CR&T Study

Since much of this analysis is based on data and results of the Columbia River and Tributaries (CR&T) study, it is useful at this point to summarize some of the methods and assumptions of that study.

Three levels of irrigated acres were evaluated by the CR&T study; the 1970 level, a year 2020 OBERS C level and a 2020 state choice level. The effects on several water related services were evaluated in the CR&T study based on the difference between 1970 irrigated

acres and the two alternative levels of 2020 irrigated acres. However the CR&T analysis emphasizes agriculture and hydroelectric effects. A summary of relevant irrigation assumptions of the CR&T study are:

(1) Future irrigated areas will be located primarily in the upper and middle Snake plains of Idaho, in the Big Bend area of Washington and in the Horse Heaven Hills-Umatilla and Boardman areas of Oregon and Washington (Figure 1-1).

(2) Surface water would be the major source of future irrigation water.

(3) The 1970 crop mix is based on the irrigated crop figures from the 1969 census of agriculture and is assumed to remain about the same in 2020 except for a more intensive crop mix in the Big Bend, Umatilla, Bruneau and Palouse-Lower Snake areas.

(4) Only crop output increases are considered in this study. Livestock output increases from additional irrigation are not input to the analysis.

(5) The per acre depletion rate is held constant throughout the basin at about 2.8 acre feet per acre per year (USCE, 1976).

Irrigation Effects

The CR&T study contains estimates of irrigated acres in the year 2020 and electric power losses due to increased upstream irrigation. The staff which developed and analyzed data for that study provided 1985 estimates for the present study (Olsen, 1977).

The CR&T 1970 base acreage data was used to represent 1972 in this study. The base level of irrigated acreage as well as the 1985 and 2020 alternative levels are shown in Table 1-1 of Chapter I. From a base of about 6.4 million irrigated acres in the study area in the early 1970s, 7.3 to 7.6 million acres are expected in 1985 and 9.5 to 10.3 million acres in 2020. The OBERS alternative used by CR&T approximate OBERS Series C projections. The alternative labeled "State choice" represents choices of the three individual states as to future irrigated acreage totals.

Several calculations and adjustments were made from the 1985 estimates to arrive at crop values suitable for analysis in the MRIO. First, the base year total crop values for the study area of each

state were summed from subregional CR&T figures. The base year crop values are:

	acres	dollars
Washington	1,499,000	$ 465,757,100
Oregon	1,275,000	273,121,450
Idaho	3,657,000	646,498,220
Total	6,431,000	$1,385,376,770

The per acre crop values for 1985 were estimated from the base year and 2020 subregional acreage values in the CR&T study and then adjusted to 1972 dollars using indices of prices received by farmers[8] rather than use the unusually high 1974 values in the CR&T study. The estimated 1985 crop values per acre (expressed in 1972 dollars) by state are: Washington - $370.96, Oregon - $237.77, and Idaho - $195.33. Note that per acre crop values are highest in Washington, reflecting specialty irrigated crops, and lowest in Idaho, reflecting more extensive agriculture. The 1974 Census of Agriculture, for example, also shows a higher value per acre in Washington and a lower value for Idaho (U.S. Bureau of Census, 1977). The per acre dollar values were then multiplied by the alternative projected crop acreages by state to estimate 1985 crop values as follows.

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[8]Indices of crop prices received by farmers 1967-1976 were: 1967=100, 1970=100, 1972=115, 1973=214, 1974=213, 1975=201, and 1976=198 (USDA, various years).

	1985 OBERS acreage	x	value/acre	=	State Value
Washington	1,833,000		$370.96	$	679,969,680
Oregon	1,398,000		237.77		332,402,460
Idaho	4,091,000		195.35		799,176,850
Total	7,322,000				$1,811,548,990

	1985 State Choice Acreage	x	value/acre	=	State Value
Washington	1,909,000		$370.96	$	708.162.640
Oregon	1,482,000		237.77		352,375,140
Idaho	4,198,000		195.35		820,079,930
Total	7,589,000				$1,880,617,710

The next step was to subtract the base year values from the 1985 total values so as to get the average 1972-1985 incremental state values. The calculations were as follows.

	1985 OBERS state crop value	less	base year state crop value	= Incremental value
Washington	$679,969,680		$465,757,100	$214,212,580
Oregon	332,402,460		273,121,450	59,281,010
Idaho	799,176,850		646,498,220	152,678,630
Total				$426,172,220

	1985 State Choice crop value	less	base year state crop value	= Incremental value
Washington	$708,162,640		$465,757,100	$242,405,540
Oregon	352,375,140		273,121,450	79,253,690
Idaho	820,079,930		646,498,220	173,611,710
Total				$495,270,940

The calculations indicate that the OBERS level of 1985 crop output will be worth 426 million dollars more than the base year value in the study area. The state choice level of crop output is worth

495 million dollars more than the base year level. A warning concerning these crop values which is expressed in the CR&T study, should be repeated here. "Gross crop values and comparison thereof should not be used as indicators of irrigation development feasibility" (USCE, 1976). A primary reason for this warning is that neither land development costs nor cost of production is considered in the CR&T study, nor in the present study. Land development for irrigation is very expensive and may preclude new irrigation development in all but years of favorable crop prices. Prices of production inputs also markedly influence land development feasibility. Therefore this analysis implies nothing about new irrigation feasibility. It merely assesses the output and employment impacts of irrigation development.

The 1972-1985 incremental crop value estimate is analyzed in the the MRIO with a portion of the output going for export and part being sold to regional food processing with a consequent increase in food processing output. The calculations and analysis used to arrive at the amount sold to food processing is a way of manually using the MRIO to consider some forward linked impacts of irrigation development. This was necessary because omission of the step would assume that all crop production was exported (which it is not) and as a result only the backward linked impacts of crop production would result from MRIO analysis.

The portions of the crop value in each state going to export and to food processing can be estimated from the 1985 MRIO table. In each of the three states' crop sectors, the sales row shows crop sales to food processing, exports and all other uses. For example, Appendix Table A-2 projects that in 1985 the Washington crops sector will produced $822.2 million worth of output and that $175.5 million worth will be sold to Washington food processing. In other words, 21 percent of Washington crop output will be sold to food processing in Washington.[9] Similar estimates were obtained for Oregon and Idaho as shown in the calculations below. Any crops not sold to food processing were assumed to be exported from the region or used in domestic final demand. The MRIO shows, however, that some crops were sold to the livestock sector and very minor amounts to a few other sectors. These sales were not considered. Nevertheless, the analysis technique depicts the general situation. Calculations for this step of the analysis were as follows:

State crop Alternative	1972-1985 crop output Increment	x	Percent sold to food proc	=	Amount sold sold to food processing	Remainder for final demand export
	$Mill				$Mill	$Mill
Washington						
OBERS	214.2		.21		45.0	169.2
State choice	242.4		.21		50.9	191.5
Oregon						
OBERS	59.3		.14		8.3	51.0
State choice	79.2		.14		11.1	68.1
Idaho						
OBERS	152.7		.23		35.1	117.6
State choice	173.6		.23		39.9	133.7

[9]The food processing sector of the MRIO is an aggregation of crop, livestock, and fishery product processing. Therefore some inaccuracies are inevitable by introducing only crops into food processing in this analysis. See Chapter IV.

The amount of crops exported is easily dealt with in I-O analysis as an increase in final demand exports. The amount sold to food processing, however, is more difficult to analyze. An increase in sales of crops to food processing (conversely, increased purchases of crops by food processing) will increase the gross output of food processing. Methods of estimating this increase is an area of current debate in I-O application. Detailed treatment of this debate is beyond the scope of this study. Footnote ten discusses one theoretical method of handling the problem. However, this method was not used because of apparent conflicts with real world conditions. Rather than developing or expanding some existing or novel technique, this study took an empirical approach to the problem of estimating output changes in response to interindustry transaction increases.

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[10]State gross outputs for 1985 food processing could be divided by their purchases from crops to obtain a factor to estimate the food processing output increases. For example, in the projected 1985 Washington economy, for every dollar of crop sales to food processing there is output of $9.92 of food processing output. The increased transaction could be multiplied by this factor to the estimate output increase.

This line of reasoning is in accordance with input-output mathematics but presents problems from the standpoint of application and real world economics. First, input-output models are constructed to respond to demand changes. However, by assigning a portion of crop output increase to the crop-food processing transaction and consequently increasing food processing output, one is forcing a supply increase on the model and assuming that it will be demanded. Even though it is mathematically acceptable to increase food processing output by 9.92 times crop-food processing transactions in Washington it is not certain that food processing would actually accommodate this amount in a real world situation because it may not have the capacity to process increased input or because Washington food processing may not have a market share large enough to sell the output at a reasonable price. In view of these limitations the analysis was not used.

The food processing output increase was taken from the I-O models as the difference between base year and 1985 food processing output. The reasoning here is that the I-O estimates of food processing output changes are superior to any theoretical method of arriving at the increase.

The incremental food processing gross output increases estimated in the above analysis and used in MRIO analysis are as follows:

$Million

	OBERS	State choice
Washington	365.8	413.7
Oregon	299.5	317.5
Idaho	291.2	326.1

The state choice level of food processing increases are, of course, larger than the OBERS level. The 1985 output increases amount to about 22 percent over the 1972 level in Washington, 28 percent in Oregon, and 35 percent in Idaho.

Electricity and Aluminum Effects

The problem of transforming a transaction change to a final demand change doesn't arise in analyzing the effects of upstream irrigation on aluminum production. Aluminum is, for the most part, exported from the region in the form of ingots or as processed stock. Therefore, it is acceptable from theoretical as well as from a real world point of view to analyze changes in aluminum output as changes in final demand in the form of exports.

Upstream irrigation affects the hydropower system in two ways. First, irrigation reduces flows which in turn reduce the generation of electricity at downstream hydroelectric plants. Secondly, additional electricity is required to pump the irrigation water from the river and distribute it onto the land, thus increasing demands on the system. This study, however, is limited to assessing the impact of future irrigation water withdrawals on the power generation capability

of the Columbia River hydropower system and does not assess pumping requirements.[11]

The estimates of megawatts (MW) lost due to additional upstream irrigation in 1985 was made by the CR&T staff interpolating from 1980-2020 data. These estimates are compatible with the crop value estimates, in that they are a base year 1985 increment. An average annual energy loss was used in this analysis because it more accurately reflects aluminum electricity load patterns and because

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[11]Hydropower losses and pumping requirements for electricity are summarized in a volume by the Northwest Energy Policy Project (Charles Rivers, 1978). It was estimated that diversions from the river at Palisades dam in Wyoming cause downstream losses of 1573 Kwhr per acre foot. These values decrease downstream. Diversions at Hells Canyon cause losses of 772 Kwhr per acre foot, Chief Joseph, 734 Kwhr per acre foot, Wanapum, 432 Kwhr per acre foot and Bonneville 30 Kwhr per acre foot. Also included in the volume was a table showing losses as well as pumping and distribution electricity requirements and costs. This table is reproduced below.

Estimated Energy Lost per Acre Foot for Irrigation Water at Several Projects

Location of Diversion	Hydro Power Loss (Kwhr/A.F)	Energy Consumed[2] Pumping & Distributing (Kwhr/A.F)	Total Energy (Kwhr/A.F)	Energy Cost[1] ($A.F)
John Day	228	735-1385	963-1613	27.07-46.57
McNary	288	605-1766	893-2054	24.49-59.32
Ice Harbor	348	149-604	497-952	12.13-25.78
Grand Coulee	939	535-648	1474-1637	36.71-41.60
Palisades	1573	500-1700[2]	2073-3273	49.61-85.61

[1]Hydropower loss valued at 22 mills per Kwh, pumping electricity at 30 mills per Kwh.

[2]Assumed range based on pumping and distributing energy reported for other projects.

it is a common term of measurement. Average annual energy is an expression of the average output of a generating plant or average usage over a one year period.

The alternative levels of irrigation in 1985 could cause a 230 to 290 MW loss, about 3 percent of the power generated for Bonneville Power Administration in 1972 at Federal hydroelectric projects. This loss is equivalent to about one quarter of the generation of an average near term future thermal electric plant.

Similar to the food processing analysis, the task here is one of manually adapting forward linked electricity impacts into the MRIO algorithm. Electricity is an intermediate service. A reduction in its output extends beyond the electric utility industry. The effect extends or is transmitted to the users of electricity and their output levels. This forward linked impact is easier to estimate than that in food processing because there is a well defined relationship between the use of electric energy and aluminum output.

The Northwest aluminum industry is primarily on interruptible power, because of its contract agreements with the Bonneville Power Administration. It is the first to have its electricity curtailed

during a shortage. Therefore it is in the aluminum industry where shortage of electrical energy is first felt in the region.

The average annual megawatt loss due to upstream irrigation as estimated by CR&T must be transformed into tons of aluminum which is then valued in dollars. Two alternative reaction estimates are made. The first is based on the reaction of the Northwest aluminum industry to the 25 percent curtailment of BPA electricity during the 1976 and 1977 water shortage. The second is based on a more direct electricity-aluminum relationship where no alternative electricity is available. During the 1976-77 shortage, the national and regional aluminum industry appeared to be in a fairly stable position. Average prices and output were continuing on an upward trend.

Several steps are necessary to arrive at dollar values lost in aluminum output. The first step in estimating the response of the aluminum industry to energy shortages is to obtain production capacity figures for the industry. Data from the Bureau of Mines shows the 1977 capacity was 1,196,000 tons per year (TPY) in Washington's six plants and 220,000 tons per year in Oregon's two plants or 1,416,000 tons per year for the region (Stamper, 1977).

The aluminum industry does not publish nor offer information on its output levels. Therefore organizations such as BPA, which have an interest in these figures must obtain them from other sources such as trade journals and newspapers. The BPA has attempted to keep a file of this data. These files indicate that up until the 1976-1977 energy shortage the industry operated at about 90 percent of capacity (BPA, 1978). The files also contain estimates of the production cutback of each northwestern aluminum plant during the 1976-1977 water and electricity shortage. Estimates are that Washington's plants reduced output by 171,000 tons, or to 86 percent of the pre-shortage levels. In Oregon, plants reduced output by 33,000 tons, or to 83 percent of the preshortage levels. These figures indicate that the reduction in output amounted to about 16 percent of previous levels in response to a 25 percent electricity curtailment to the industry. "Metals Week" estimated the reduction at 15 percent (Metals Week, 1977). In other words, for every one percent reduction in electric power there was a .66 percent reduction in output. This less than direct proportion occurred for at least two reasons. First, the industry can purchase provisional power from BPA - that is, it can borrow limited amounts of BPA power against the future. The aluminum industry did so for about a month after the curtailment became effective. Second, the industry can purchase more expensive

power elsewhere such as from British Columbia, California, or in the region. The industry purchased some non-BPA power during the remainder of the curtailment period.

However, these alternate sources may not be available in 1985. Electric power delivery contracts between BPA and the aluminum industry expire between 1984 and 1988 and, at least under current thinking, are not likely to be renewed in their present form. Furthermore, excess power which has been available from the British Columbia Hydropower Authority is not expected to be available to the Northwest in the 1980s. Therefore, one might expect that in 1985 the aluminum industry's reaction to a decreased supply of inexpensive interruptible electricity may be more pronounced than it was during the 1976-77 shortage. However, the entire situation is in flux with many courses of action possible. Most BPA forecasts of electricity availability are based on critical or minimum flow water years. These estimates are not valid in average or high water years. The aluminum industry is presently planning to continue operations after the expiration of BPA contracts by contracting for the excess power from the early years of each of a series of planned thermal plants. Yet, thermal plant construction schedules often slip. Another possible means of continuing aluminum production in the region is the "Jackson Bill" presently before Congress. The bill would provide firm

long run power to the aluminum industry but at increased cost.[12] These many uncertainties plus litigation over access to BPA power make an orderly analysis difficult. Therefore, two kinds of probable reactions by the aluminum industry to an energy shortage are analyzed. The first reaction is that based on the 1976-77 water electricity shortage where some replacement electricity is available. The second is a direct reaction such that a 25 percent reduction in energy causes a 25 percent reduction in aluminum output. That is, no alternate electricty is available.

The CR&T estimated average annual MW losses from 1985 irrigation depletions are 230 and 290 megawatts or 8.1 and 10.2 percent of an average of 1972-1976 aluminum electricity use (2827 MW). With an estimate of the percent electricity loss one can, using the earlier estimate of the industries reaction to shortages, estimate the percent loss in aluminum output. Multiplying 8.1 and 10.2 percent power losses by .66 output reaction factor gives an estimate of 5.4 and 6.8 percent reductions in aluminum output. Multiplied by Washington's aluminum output of 1,081,184 TPY this means that 69,000-75,500 tons of aluminum would be foregone. Employing the same approach to Oregon's 198,880 TPY output reduced likewise shows losses of nearly 11,000 TPY and 13,500 TPY. Thus, a total of 80,000-89,000 tons are foregone in

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[12] S.3418. Pacific Northwest Electric Power Planning and Conservation Act.

the region. Valued at 28.2 cents per pound[13] or $563 per ton, this output loss is valued at 32.8 million dollars in Washington and 6.1 million dollars in Oregon at the OBERS level of irrigation, and valued at 41.4 million dollars in Washington and 7.6 million dollars in Oregon at the state choice level of irrigation. The Washington figures must be increased to include an estimated value beyond the value of ingots to account for further manufacture of sheet, bars, and extrusion. No such processing takes place in Oregon.

A factor to increase the value of Washington ingot production to account for further processing is obtained by comparing the value of 1972 Washington ingot production ($550.6 million) to the total output estimated for the industry in the 1972 Washington I-O model ($860.2 million). The reasoning here is that the difference between ingot production value and total industry output value is due to processing beyond the ingot stage. Therefore the Washington losses are multiplied by 1.56 ($860.2/$550.6) to account for processing losses. The Washington loss value at the OBERS level is $50.6 Mill and $63.8 Mill at the state choice level of irrigation.

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[13]The 1976 price in 1972 dollars. The 1976 price per pound in ingot form was 44.6 cents (Bureau of Mines, 1978) x .631 (price deflator 1972-1976) (Econ. Rpt. of Pres. 1977) = 28.2 cents per pound.

The alternative method of estimating aluminum output losses due to upstream irrigation assumes that losses will be in direct proportion to electricity shortages. This method assumes that the aluminum industry will be operating at about present levels in 1985, and that there will be no alternative to whatever sources of electricity the aluminum industry may have arranged by 1985. One should keep in mind, however, the "unknowns" surrounding future operation of the aluminum industry.

A rule of thumb in the Northwest is that it takes about 2 KW (kilowatts) of electricity to produce a ton of aluminum (BPA, 1978). Using this rule 230 fewer MW of electricity would reduce aluminum output by 115,000 TPY and 290 fewer MW would reduce aluminum output by 145,000 TPY. Valuing these quantities at $563 per ton, the regional loss totals $64.7 million and $81.6 million at the OBERS and state choice levels of irrigation respectively. The regional losses were then divided between Washington and Oregon based on their shares of industry capacity - 84 percent in Washington and 16 percent in Oregon. At the OBERS level, Washington losses amount to $54.4 million and Oregon's at $10.3 million. The state choice level of irrigation brings on aluminum losses of $68.5 million in Washington and $13.1 million in Oregon. Washington's reduced production is then adjusted to account for processing reductions. The total loss in Washington is estimated at $84.9 and $106.9 million yearly for OBERS and state choice, respectively.

The above estimates are based on an average water year. However, in a low water year, irrigation effects on aluminum production are likely to be much greater. Estimates were made of the effects of the 1939 water year, the eighth lowest on record, on aluminum production under the assumption that in 1985 irrigators will not reduce diversions of water and that alternative sources of electricity are not available. This analysis shows the sensitivity of aluminum production to river flow under the techniques and assumptions of this study. The CR&T staff of the Corps of Engineers provided estimates of 1985 average annual megawatt losses of 741 MW for the OBERS level and 933 MW for the state choice level of irrigation for a low water year equivalent to 1939 (Vining, 1978).

The megawatt losses were expressed in dollars of aluminum lost, using the same procedure as for the case of no alternative source of electricity. Megawatts lost divided by 2, multiplied by 1,000 equals tons of aluminum production lost multiplied by $563 per ton equals total value, split .84 to Washington and .16 to Oregon based on state output capacities. The Washington losses were then modified to account for processing losses. The estimates were that, under an OBERS level of irrigation in a representative low water year (1939), $273.1 million would be lost in Washington and $33.3 million in Oregon. For the state choice level of irrigation, $343.9 million would be lost in Washington and $42.0 million lost in Oregon. These loss estimates are about five times greater than those in an average water year when

replacement electricity is not available and three times greater than the loss in an average water year with the partial availability of replacement electricity.

MRIO Analysis

Output changes developed in this chapter are sufficient for MRIO analysis. Table 3-1 shows the different computer runs made using these output change estimates. The first column of Table 3-1 lists the computer run number. The second column describes the run. The sector of initial impact is listed in the third column with its respective sector number listed next. The column labeled "Gross output change estimate" lists the output changes estimated in this chapter and assigned to a particular run. The right hand column shows the gross output estimates reduced to final demand level for MRIO analysis.

Runs 1 and 2 of the table list the first round or direct crop output effects in Washington only. These output changes will have secondary effects on most other industries of Washington, Oregon, and Idaho. Chapter 4 discusses and displays these impacts. Runs 3 and 4 show the crop effects in Oregon and runs 5 and 6 show the Idaho crop effects. Runs 7 and 8 analyze the total regional crop output effects. Runs 9-12 show the aluminum production loss effects, with runs 9 and 10 showing the OBERS and state choice level of irrigation response if

Table 3-1 Irrigation Alternative Ouput Estimates for Computer Runs, 1985

Run No.	Description	Sector	MRIO Sector No.	Gross output change estimate	Final Demand change
				$Mill	$Mill
1	Wash. OBERS Level Irrigation	crops	1	169.2	115.8
		food proc.	3	365.8	334.7
2	Wash. State Level Irrigation	crops	1	191.5	131.1
		food proc.	3	413.7	378.5
3	Oreg. OBERS Level Irrigation	crops	27	51.0	24.4
		food proc	29	299.5	267.3
4	Oreg. State Level Irrigation	crops	27	68.1	39.4
		food proc.	29	317.5	283.3
5	Idaho OBERS Level Irrigation	crops	53	117.6	66.1
		food proc	55	291.2	262.9
6	Idaho State Level Irrigation	crops	53	133.7	76.0
		food proc	55	326.1	294.4
7	Region OBERS Level Irrigation	WA crops	1	169.2	103.4
		WA food proc.	3	365.8	319.1
		OR crops	27	51.0	18.9
		OR food proc.	29	299.5	264.5
		ID crops	53	117.6	63.1
		ID food proc.	55	291.2	261.2

Table 3-1 Irrigation Alternative Ouput Estimates for Computer Runs, 1985 (Continued)

Run No.	Description	Sector	MRIO Sector No.	Gross output change estimate	Final Demand change
				$Mill	$Mill
8	Region State Level Irrigation	WA crops	1	191.5	117.6
		WA food proc.	3	413.7	361.6
		OR crops	27	68.1	33.2
		OR food proc.	29	317.5	280.1
		ID crops	53	133.7	72.6
		ID food proc.	55	326.1	292.5
9	Region OBERS Level Aluminum reduction alt. electricity avail.	Wash.	15	-50.6	-42.6
		Oreg.	41	-6.1	-5.2
10	Region State Level Aluminum reducion Alt. electricity avail.	Wash.	15	-63.8	-53.8
		Oreg.	41	-7.8	-6.5
11	Region OBERS Level Aluminum reduction No alt. electricity	Wash.	15	-84.9	-71.5
		Oreg.	41	-10.3	-8.7
12	Region State Level Aluminum reduction no alt. electricity	Wash	15	-106.9	-90.0
		Oreg.	41	-13.1	-11.0

Table 3-1 Irrigation Alternative Ouput Estimates for Computer Runs, 1985 (Continued)

Run No.	Description	Sector	MRIO Sector No.	Gross output change estimate	Final Demand change
				$Mill	$Mill
13	Region OBERS Level Irrigation & Aluminum alt. electricity	WA crops	1	169.2	103.2
		WA food proc.	3	365.8	319.1
		WA alum.	15	-50.6	-43.0
		OR crops	27	51.0	38.1
		OR food proc.	29	299.5	264.4
		OR alum.	41	-6.1	-5.4
		ID crops	53	117.6	63.0
		ID food proc.	55	291.2	261.2
14	Region State Level Irrigation & Aluminum alt. electricity	WA crops	1	191.5	117.4
		WA food proc.	3	413.7	361.5
		WA alum.	15	-63.8	-54.2
		OR crops	27	68.1	53.5
		OR food proc.	29	317.5	280.1
		OR alum.	41	-7.8	-6.7
		ID crops	53	133.7	72.5
		ID food proc.	55	326.1	292.5
15	Region OBERS Level Irrigation & Aluminum. no alt. electricity	WA crops	1	169.2	103.2
		WA food proc	3	365.8	319.1
		WA alum.	15	-84.9	-71.9
		OR crops	27	51.0	38.1
		OR food proc.	29	299.5	264.4
		OR alum.	41	-10.3	-8.8
		ID crops	53	117.6	63.0
		ID food proc.	55	291.2	261.2

Table 3-1 Irrigation Alternative Ouput Estimates for Computer Runs, 1985 (Continued)

Run NO.	Description	Sector	MRIO Sector No.	Gross output change estimate	Final Demand change
				$Mill	$Mill
16	Region State Level Irrigation Aluminum. no alt. electricity	WA crops	1	191.5	117.4
		WA food proc.	3	413.7	361.5
		WA alum.	15	-106.9	-90.5
		OR crops	27	68.1	53.5
		OR food proc.	29	317.5	280.1
		OR alum.	41	-13.1	-11.2
		ID crops	53	133.7	72.5
		ID food proc.	55	326.1	292.5
17	Region OBERS Level Aluminum reduction Low water year. no alt. electricity	WA	15	-273.1	-230.1
		OR	41	-33.3	-28.0
18	Region State Level Aluminum reduction Low water year. no alt. electricity	WA	15	-343.9	-289.7
		OR	41	-42.0	-35.3

alternative sources of electricity are available to the aluminum industry. Runs 11 and 12 show the same effects, but under the assumption of no availability of alternative electricity. Runs 13-16 show the regional effects when crop and food processing production gains are combined with aluminum production losses. These four runs show a range of regional effects, beginning with the least pronounced - OBERS levels of irrigation and the availability of alternative electricity for the aluminum industry, to the most pronounced - the state choice level of irrigation and no alternative electricity for the aluminum industry. Runs 17 and 18 show estimated aluminum output reduction effects for the eighth lowest water year on record combined with 1985 irrigation depletions when no alternative source of electrical energy is available.

Since I-O models are designed to respond to demand changes, rather than output or supply changes, the output changes must be reduced to a final demand level prior to analysis in the MRIO. The reduction is carried out using program SIMSOL which simultaneously reduces two or more output changes to final demand changes by iteratively solving a set of simultaneous equations using the Gauss-Seidel method. The program divides each output by its respective direct-indirect coefficient (Chapter II) to reduce it to a final demand level as well as including in the estimate interindustry transaction induced effects between the changed sectors. For example, in a run where crop output and food processing output are both reduced, SIMSOL reduces the

outputs to a final demand level based on the relation between output and final demand in each sector as well as transactions between the two sectors. Direct-indirect coefficients for each involved sector and between involved sectors are used as constants in the set of simultaneous equations. Final demands are the dependent variables in the equations and are shown in the right hand column of Table 3-1.

During the subsequent MRIO computer runs with program RUTH the final demand figures are then increased back to their initial gross output levels in response to interindustry trade relationships. Introducing gross output changes into the MRIO before reduction would overstate the impacts (USDA, 1978).

IV. FINDINGS AND CONCLUSIONS

The computations in Chapter III show the direct production gains in irrigated agriculture and the direct production losses in aluminum as a result of additional irrigation depletions. The purpose of the analysis in this chapter is to estimate the indirect output effects of future irrigation levels of a state on itself and on the other two states as well as to estimate the direct and indirect employment effects of additional irrigation. The indirect effects are triggered by a change in the output of an "industry of initial impact." The industry of initial impact creates waves or ripples of economic effects in all other industries from which it purchases production inputs. For example, an increase in crop output creates an economic ripple in the chemicals industry which sells herbicides and chemical fertilizer for crop production.

The computer runs which estimate the effects of crop production increases have two industries of initial impact in each state - crops and food processing. These two industries are sectors one and three in Washington, sectors 27 and 29 in Oregon, and sectors 53 and 55 in Idaho. The computer runs which analyze the effects of decreased aluminum production have only one industry of initial impact-aluminum; sector number 15 in Washington and sector number 41 in Oregon. Idaho has no aluminum industry. All of the above listed sectors act simultaneously as industries of initial impact in the computer runs which

estimate the combined effects of increased crop production and decreased aluminum production. The computer outputs show the indirect effect in each sector, the total effect in each state and the total regional effect. Direct effects - those in the industries of initial impact - are manually summed and subtracted from total effects to obtain indirect effects. In other words, total effects are the sum of direct and indirect effects.

Computer program RUTH which is used to estimate the indirect effects does so by inverting the transactions matrix along with the changed final demands estimated in Chapter III. The inversion process simulates a series of rounds or ripples of respending the final demand changes, each ripple getting smaller as goods are exported or otherwise leak from the economy until the last round is infinitely small. The total effects estimated by the program are the sum of the simulated respending rounds.

The input-output algorithm estimates backward linked effects, but not forward linked effects of crop production input such as fertilizer, electricity, or machinery which are purchased in order to produce a crop. Forward linked effects, those occurring after harvest is complete, such as processing, transportation and marketing, are not estimated by the model. However, in order to more accurately simulate

real world conditions, a portion of crop output was estimated as going to food processing (as explained in Chapter III) and input into the model as a primary or initial impact. Thus a major forward linked effect is manually introduced into the model.

A modification to the computer results should be noted. The indirect effects on livestock sectors are omitted from the results due to an unanticipated shortcoming in the food processing sector in the NWMRIO. The food processing sector is a combination of crop products and livestock products processing. Consequently, when the final demand of food processing is increased in the I-O model, it shows demand for considerable input from crops as well as from the livestock sector. It is reasonable, in this analysis, to expect a large response in crop output, but not in livestock output because livestock was not an industry of initial impact nor does it provide major inputs to the processing of crops. Therefore, livestock indirect effects are manually deducted from the indirect impacts (Appendix B). This problem would not have come up if there had been a separate crop food processing sector and a separate livestock food processing sector in the I-O model.

Table 4-1 summarizes estimated output and employment effects as a result of the 1985 OBERS level of irrigation development. Table 4-2 summarizes the effects of the higher state choice level of irrigations development. Computer summary sheets for each of the 18 output

situations described in Chapter III are located in Appendix B. These printouts show output and employment impacts in detail. Output changes are in terms of average annual jobs. Employment changes are in terms of thousands of average annual jobs.

Tables 4-1 and 4-2 show separate impact estimates for irrigation in each of the three states, a regional total for irrigation, aluminum effects with an alternative source of electricity, aluminum effects without an alternate source of electricity, a combination of irrigation and aluminum with an alternative source of electricity, irrigation, and aluminum with no alternative source of electricity, and aluminum effects in a low water year without replacement electricity. These patterns of runs were made to isolate the effects of irrigation output increases occurring simultaneously. Runs 13-16 show these combined effects. The analysis and results are based on a projected 1985 regional economy and an average annual 1928-1968 flow of the river system adjusted to 1985 OBERS and state choice levels of irrigation.

Agricultural Effects

The approximately one million new irrigated acreage projected for the study area is estimated to generate about $713 million worth of new output in all industries in Washington, $514 million in Oregon, and $548 million in Idaho by 1985 when averaging OBERS and state choice effects. However, the overall regional impact of irrigation

Table 4-1 Summary of Output and Employment Impacts, OBERS Level of Irrigation Development* PNW, 1985

Run no.	Run Description	Unit	Total	Direct	Indirect
1	Washington Irrigation				
	Output	$ Mill	681.0	535.0	146.0
	Employment	Thous. Jobs	16.8	11.7	5.1
3	Oregon Irrigation				
	Output	$ Mill	488.0	350.5	137.5
	Employment	Thous. Jobs	12.5	7.2	5.2
5	Idaho Irrigation				
	Output	$ Mill	565.4	408.7	156.7
	Employment	Thous. Jobs	16.6	8.7	7.9
7	Regional Irrigation				
	Output	$ Mill	1673.8	1294.2	379.6
	Employment	Thous. Jobs	44.1	27.6	16.5
9	Regional Aluminum Alt. Electricity				
	Output	$ Mill	-64.0	-57.0	-7.0
	Employment	Thous. Jobs	-.9	-.7	-.2
11	Regional Aluminum No Alt. Electricity				
	Output	$ Mill	-107.1	-95.2	-11.9
	Employment	Thous. Jobs	-1.5	-1.2	-.3

Table 4-1 Summary of Output and Employment Impacts, OBERS Level of Irrigation Development* PNW, 1985 (Continued)

Run no.	Run Description	Unit	Total	Direct	Indirect
13	Regional Irrig. & Alum. Alt. Electricity				
	Output	$ Mill	1617.0	1237.4	379.6
	Employment	Thous. Jobs	43.6	27.0	16.6
15	Regional Irrig. & Alum. No Alt. Electricity				
	Output	$ Mill	1573.9	1167.9	405.9
	Employment	Thous. Jobs	43.0	26.5	16.5
17	Regional Aluminum Low Water Year				
	Output	$ Mill	-344.6	-306.4	-38.3
	Employment	Thous. Jobs	-4.8	-3.9	-.9

*891 Thousand New Acres - Region
334 Thousand New Acres - Washington
123 Thousand New Acres - Oregon
434 Thousand New Acres - Idaho
Table may not add due to minor rounding.

Table 4-2 Summary of Output and Employment Impacts, State Choice Level of Irrigation Development* PNW, 1985 (Continued)

Run no.	Run Description	Unit	Total	Direct	Indirect
2	Washington Irrigation				
	Output	$ Mill	770.3	605.2	165.2
	Employment	Thous. Jobs	18.9	13.2	5.7
4	Oregon Irrigation				
	Output	$ Mill	53.2	385.6	137.5
	Employment	Thous. Jobs	13.9	8.1	5.8
6	Idaho Irrigation				
	Output	$ Mill	635.8	459.7	176.0
	Employment	Thous. Jobs	18.7	10.2	8.5
8	Regional Irrigation				
	Output	$ Mill	1876.6	1450.5	426.1
	Employment	Thous. Jobs	49.7	31.1	18.5
10	Regional Aluminum Alt. Electricity				
	Output	$ Mill	-80.0	-71.0	-9.0
	Employment	Thous. Jobs	-1.1	-.9	-.2
12	Regional Aluminum No Alt. Electricity				
	Output	$ Mill	-134.9	-119.9	-14.9
	Employment	Thous. Jobs	-1.9	-1.5	-.4

Table 4-2 Summary of Output and Employment Impacts, OBERS Level of Irrigation Development*
PNW, 1985 (Continued)

Run no.	Run Description	Unit	Total	Direct	Indirect
14	Regional Irrig. & Alum. Alt. Electricity				
	Output	$ Mill	1803.6	1331.9	471.6
	Employment	Thous. Jobs	49.0	30.9	18.1
16	Regional Irrig. & Alum. No Alt. Electricity				
	Output	$ Mill	1749.3	1283.6	465.7
	Employment	Thous. Jobs	48.2	31.0	17.1
18	Regional Aluminum Low Water Year				
	Output	$ Mill	-434.0	-385.8	-48.1
	Employment	Thous. Jobs	-6.1	-4.9	-1.2

*1158 Thousand New Acres - Region
410 Thousand New Acres - Washington
207 Thousand New Acres - Oregon
541 Thousand New Acres - Idaho
Table may not add due to minor rounding.

on the entire economy is not great. The state choice level of irrigation created additional output effects of only two percent of 1985 regional gross output. The employment impacts amount to a little over one percent of expected 1985 regional employment. However, the impacts within the crop and food processing sectors are considerable. The output levels for 1985 for both crop production and food processing are about 20 percent above the 1972 levels. Furthermore, the impacts of new irrigation on a local area could be even more substantial as purchases or irrigation systems, farm machinery, fertilizer, transportation, and labor increase. Such economic activity may broaden the economic base of a local area and induce population increase.

Increased crop output values in Washington, for example, at the OBERS level of 1985 irrigation (334,000 new acres) create direct output effects of $535 million - $169.2 million in crop exports and $365.8 million in food processing. These direct effects bring on an additional $146.0 million of secondary or indirect output for the suppliers of inputs to crop productions and food processing. The total regional output effect of the Washington 1985 OBERS level of output is $681 million and nearly 17,000 jobs. Most of the jobs (11,700) are in crop production and food processing in Washington. Many of the jobs in crop production and food processing may be seasonal.

Table 4-2 shows the effects of state choice level of irrigation. Because the Washington state choice is based on 410,000 new acres rather than 334,000 acres under OBERS, the effects created are greater than under OBERS. Runs 7 and 8, shown in Tables 4-1 and 4-2, summarize the effects when all three states increase irrigation simultaneously. The total regional output effect at the OBERS level is $1,674 million while at the state choice level it is $1,877 million. Employment regionwide due to the OBERS and state choice levels in 1985 are estimated at 44.1 and 49.7 thousand jobs respectively.

According to the model, irrigation crop exports and regional food processing creates an output multiplier effect of 1.29[14] in the region. For every dollar's worth of primary or new output, 29 cents worth of output is created in industries which supply inputs. Indirect impacts occurring in response to additional crop and food processing output are felt mainly in services, trade, transportation, machinery, chemicals, and utilities. For example, in Idaho at the state choice level of irrigation (541,000 additional irrigated acres), secondary or indirect output created from $460 million worth of direct effects in crop and food processing amounts to $27 million in trade, $25 million in transportation, $22 million in services, $6 million in chemicals, $6 million in electric utilities, $6 million in fabricated metals and machinery, $4 million in natural gas

[14] $1 + \frac{\text{indirect effects}}{\text{direct effects}}$ = output multiplier.

utilities, and $3 million in other manufacturing (Appendix B). The remainder of indirect effects are scattered throughout other sectors. These indirect output increases amount to no more than 7 percent of the original output levels in these industries.

Employment effects occur in about the same pattern as the output effects. Again using the 1985 Idaho state choice level of irrigation as an example, the results indicate that indirect employment effects are 3,600 new jobs in trade, 1,900 in services, under 800 in transportation services, less than 300 in fabricated metals and machinery, and over 100 in construction (Appendix B). The jobs created in the industries of initial impact, crops and food processing, are estimated at 4,800 and 5,000 respectively. However, many of these direct effect jobs are apt to be seasonal, concentrated during planting and harvest time for crops and during the fall food processing season. The total employment impact here is estimated to be about 1,700 new jobs in Idaho, or 31 new jobs of all types for each additional one thousand irrigated acres. Looked at in another way, each additional center pivot irrigation system (assuming 136 acres per circle) brings on 4.3 new jobs of all types.

An increase in farm output in any one state has impacts on the other two states due to interstate trade connections reflected in the MRIO. Impacts which cross state boundaries effect primarily the crops, food processing, fabricated metal-machinery, transportation, trade, and service industries.

The total output effect of one state's irrigation levels on another is summarized in Tables 4-3 and 4-4. The effects shown in the tables are read horizontally. Table 4-3 shows that $653.8 million of increased output in Washington brings on $17 million additional output in Oregon and $10.2 million additional output in Idaho at the OBERS level of irrigation development. The major Washington induced output impacts in Oregon and Idaho are estimated in descending order as: $4.1 million in Oregon crops, $2.9 million in Oregon services, $2.5 million in Idaho crops, $2.4 million in Oregon food processing, $1.8 million in Oregon trade, $1.8 million in Idaho chemicals, and $1.2 million in both Idaho food processing and services. The Idaho chemical industry, which is primarily the production of phosphate fertilizer, is considerably impacted by a crop output increase in any northwest state. A $68 million Oregon crop output increase stimulates an estimated $1 million output increase in Idaho chemical (phosphate) output. Oregon production increases of $452.7 million bring on $30.3 million additional output in Washington and $5 million in Idaho. The state choice level of output shows a larger, but similar pattern of interstate effects. The multiplier effects of one state on another are between 1.01-1.06. The largest interstate output multiplier effects on an adjacent state are those of Oregon on Washington and Idaho on Oregon: 1.06. That is, for every additional dollar of crop production and food processing output in Idaho, 6 cents of additional output is created in Oregon. The smallest interstate effect is that of Washington on Idaho: 1.01.

Table 4-3 Interstate Distribution of Agricultural Output Effects PNW, 1985

Impact Origin	$ Million OBERS Level Washington	Oregon	Idaho
Washington	653.8	17.0	10.2
Oregon	30.3	452.7	5.0
Idaho	24.6	32.6	508.1
	State Choice Level		
Washington	739.5	19.3	11.5
Oregon	32.6	498.9	5.7
Idaho	27.6	36.6	571.5

Table 4-4 Interstate Distribution of Agricultural Employment Effects PNW, 1985

Impact Origin	Thousand Jobs OBERS Level Washington	Oregon	Idaho
Washington	15.7	.6	.4
Oregon	.8	11.4	.2
Idaho	.6	1.0	15.6
	State Choice Level		
Washington	17.8	.7	.5
Oregon	.8	12.8	.2
Idaho	.7	1.1	16.9

Table 4-4 shows interstate employment effects. It is read in the same manner as table 4-3. At the OBERS level of irrigation, the creation of 15,700 new jobs in Washington is associated with 600 new jobs in Oregon and 400 in Idaho. The interstate employment multiplier effects are almost identical to the interstate output multipliers. That is, ranging between 1.01-1.06 with the largest effect being that of Idaho on Oregon and the smallest effect that of Oregon on Idaho. For every 100 new jobs created in one state, one to six new jobs are created in the other northwestern states.

Approximately one million additional irrigated acres have been projected for the study area by the year 1985. This analysis estimates that $1.8 billion of additional output in all industries would result from the new acreage. Direct output in crops and food processing is estimated to be $1.4 billion and indirect output effects in other supporting industries are $0.4 billion. These increases are not large when compared to the 1985 economywide total gross output estimate of $75 billion. However, they represent sizeable increases in 1985 crop output and in food processing output. The crop value increase was estimated to be $460 million, $365 million of which was estimated to be exported from the region and $95 million sold to regional food processing. The crop value increase makes up about 20 percent of the expected total 1985 value of $2,232 million. Total output effects as a result of crop and food processing output gains averaage $1,750 per new acre developed and $625 per acre foot of water

depleted. This projected new irrigated acreage is equivalent to about 7,500 new center pivot irrigation systems (136 acres per circle), each of which would support about $235,000 of output throughout the regional economy.

A million additional acres are estimated to create 47,000 new jobs in the region in all industries. This averages 44 jobs per thousand new acres, about 16 jobs per thousand acre feet of water depleted or an average of six and one quarter jobs for each new center pivot irrigation circle, assuming all the new land was irrigated by center pivat system.

Effects on Aluminum Production

This part of the analysis simulates the effect of 1985 upstream irrigation on downstream electricity generation and how it is passed on to the aluminum industry. The analysis is made under three sets of conditions. First, it is assumed that in 1985 the aluminum industry will be able to obtain alternative electricity - that is, it can obtain some higher cost non-BPA power as it did during the 1977 water shortage. Secondly, it is assumed that the aluminum industry will not be able to obtain electricity from alternative sources and that production will decrease in proportion to electricity reductions. The loss of hydroelectric energy in an average water year due to upstream irrigation is estimated to be 230 average MW at the OBERS level of irrigation and 290 MW of average energy at the state choice level of

irrigation. This amount is about one quarter of the annual output of a typical near term future thermal plant, not a great deal of electricity compared to recent yearly generation for BPA of 9,200 MW. Last, the analysis is made under conditions of a low water year with reduced flows and with irrigation diverting water to fully meet its needs.

Aluminum production losses during an average water year are shown in Runs 9-12 of Tables 4-1 and 4-2 and Tables 4-5 and 4-6. At the OBERS level of irrigation, the resulting estimated loss of output is $64 million in the region, $57 million of it in the aluminum industry (a 5.5 percent reduction from expected 1985 levels) and $7 million in supporting industries, assuming the industry can partially replace the lost electricity (run 9). If the industry can't replace the lost electricity (run 11), losses are greater - $107 million total for the region - $95 million in the aluminum industry (7.8 percent of the expected 1985 levels), plus $12 million in supporting industries. At the state choice level of irrigation (Runs 10 and 12), the effects are even greater, amounting to $135 million where replacement electricity is not available.

From the standpoint of employment losses, if partial replacement of electricity is available, the OBERS level of irrigation is estimated to cause a loss of 900 jobs, over 700 in aluminum production and less than 200 elsewhere. If replacement energy is not available, there

Table 4-5 Output effects on the Aluminum Industry of Irrigation, average water year, PNW 1985

Alternative	Total	Direct	Indirect
	$ Mill		
OBERS			
Alternative Electricity	- 63.8	-56.7	- 7.1
No Alternative Electricity	-107.1	-95.2	-11.9
State Choice			
Alternative Electricity	- 80.5	-71.6	- 8.9
No Alternative Electricity	-134.9	-119.9	-14.9

Table 4-6 Employment effects on the Aluminum Industry of Irrigation, average water year, PNW 1985

Alternative	Total	Direct	Indirect
	Thousand Jobs		
OBERS			
Alternative Electricity	- .89	-.73	-.16
No Alternative Electricity	-1.13	-.93	-.20
State Choice			
Alternative Electricity	-1.51	-1.21	-.31
No Alternative Electricity	-1.91	-1.52	-.38

will be a loss of 1500 jobs, 1200 in aluminum production, and 300 in other industries. These employment losses amount to three to seven percent of expected 1985 employment in the aluminum industry with partial replacement power, and 7 to 12 percent without replacement power.

Results indicate that when electricity can be partially replaced, direct output losses in the regional aluminum industry average about $63 per additional acre developed for irrigation and about $22 for each additional acre foot of water depleted for irrigation. Direct plus indirect output losses average $70 per acre of new irrigated land and $25 per acre foot of water. Aluminum production losses are more pronounced when replacement electricity is not available. Direct output losses average $105 per acre developed and $37 per acre foot of water depleted. Total output losses in aluminum and supporting industries average $118 per new irrigated acre and $42 per acre foot depleted.

Losses of indirect output caused by a reduction in aluminum output are felt mainly in the electric utility industry, trade and services and machinery sectors. For example, at the state choice level of irrigation without replacement electricity, the most severe case, a reduction of $106.9 million in Washington's aluminum output and $13.1 million in Oregon's aluminum output brings on other output reduction of $6 million in Washington electric utilities, $1.8 million in Washington transportation, $1.7 million in Washington services, $0.8 million in Washington trade, $0.8 million in Oregon electric utilities

and $0.6 million in Washington fabricated metals and machinery (Appendix B). Other sectors show smaller losses.

Results of the computer runs also indicate that aluminum output reductions would be borne unevenly by the three states. Losses of aluminum output in Washington and Oregon create no output losses in Idaho because Idaho produces no aluminum and because aluminum production in the region purchases almost no inputs from Idaho, thus having no economic links to transmit production changes in Idaho. Washington loses more value from reduced aluminum production than Oregon because it not only produces more, but also because it processes some of its production. Oregon does not process aluminum output.

The regional output multiplier effect of aluminum losses is low - 1.12. For every dollar lost in aluminum output, 12 cents of output is lost in industries which supply inputs to aluminum production.

The foregoing analysis is based on average annual water conditions. A brief consideration of the effects of low and high water conditions is intended to place the findings in a better perspective.

Flow of the Columbia River at The Dalles in an average water

year (over the period 1928-1968) is estimated at 177,900 cfs (CRWMG, 1973). However, in the year 1939, the eighth lowest water year on record for this period, flows were 148,800 cfs, 16 percent below normal. The effects of these low flows on the 1985 regional aluminum industry have been estimated under the assumption that 1985 irrigation depletions are fully supplied. According to estimates by the CR&T staff of the Army Corps of Egineers, average MW losses would be more than three times the losses in an average water year (Vining, 1978). Under the OBERS level of 1985 irrigation, 741 average MWs would be lost. Under the state choice level of 1985 irrigation, 933 MWs would be lost. Table 4-7 summarizes output and employment losses under various assumptions about the availability of replacement energy, the amount of new irrigated land and flow levels of the Columbia River.

Table 4-7 Aluminum Industry Output and Employment Losses Under Three Conditions PNW 1985

	Output $Mill. 1972		Employment av. yearly jobs	
	OBERS	State Choice	OBERS	State Choice
Partial Replacement electricity available, average water year.	64.0	80.0	900	1100
No Replacement electricity available, average water year.	107.1	134.9	1500	1900
Low Water Year, no replacement electricity	344.6	434.0	4800	6100

The table shows that under conditions of the eighth lowest water year, aluminum output and employment losses are five times greater than the loss where partial replacement electricity is available and three times greater than where no replacement electricity is available. Estimated aluminum output reductions as a result of the low water year amount to 33 and 42 percent of projected 1985 output levels under OBERS and state choice irrigation levels. During the 40-year period of record, flows were as low as, or lower than, the low water year used in Table 4-7, eight times, or 20 percent of the years.

On the other hand, a high water year would ameliorate the effects of upstream irrigation on downstream aluminum production. The OBERS level of 1985 irrigation is estimated to deplete 2,491,800 acre feet per year from Columbia flows. This is equivalent to 3,442 cfs per year.[15] Water year 1957-1958, with flows at The Dalles of 181,300 cfs, (1.9 percent above average), would approximately offset the 1985 OBERS level depletion (CRWMG, 1973). Water year 1945-1946, with flows of 183,500 cfs at The Dalles (2.5 percent above average), would roughly offset the state choice level of depletions of 3,242,400 acre feet per year. During the 40-year period of record, the volume of runoff would have offset the 1985 OBERS level of depletion 19 times;

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[15] $\frac{\text{acre feet per year}}{723.9699}$ = cubic feet per second (USGS, 1973)

while the 1985 state choice level of depletions would have been offset 18 times - about half the time (CRWMG, 1973).

The probability (at the 95 degree confidence level) of a flow year as low as or lower than 1939 occurring is 18 percent; while the probabilities of flows high enough to offset the 1985 OBERS level of depletion and the state choice level of depletion are 46 percent and 44 percent respectively. Thus, as flows increase above annual averages, there are less effects from irrigation on the aluminum industry and as flows drop below average annual levels, the effects of irrigation on aluminum production worsen.[16]

Combined Irrigation-Aluminum Effects

The preceeding discussions deal with irrigation and aluminum impacts separately. The more realistic situation is represented by a simultaneous increase in irrigated crop output and reduction in aluminum output. Tables 4-8 and 4-9 summarize these combined, or net, results with and without replacement electricity during average water years.

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[16]It should also be noted that under any flow conditions upstream irrigation reduces the region's ability to generate electrical power. This is because it is a river management goal to run all Columbia River and tributaries water through the hydroelectric generating plants - that is, to spill no water so as to make maximum use of hydropower to offset more expensive thermal power.

Total changes in regional output resulting from 1 million acres of new irrigation and aluminum losses range from $1.6-1.8 billion, but, nevertheless, make up no more than two percent of projected regional 1985 gross output of $75.3 billion. Despite the largest losses from reduced aluminum output, most of the direct and indirect effects occur in Washington (over $600 million) even though Idaho may develop more irrigated acres by 1985. This is because Washington is expected to continue a more intensive agriculture than Idaho. Where partial replacement electricity for the aluminum industry is available, greater effects occur in Washington and Oregon than when no replacement electricity is available because aluminum output losses are minimized. Consequently it is in the region's interest to minimize the effect of additional irrigation on the aluminum industry. Oregon output effects range from $489-538 million depending on the level of irrigation and on the availability of replacement electricity. Idaho's share of regional output effects ranges from $516-581 million. Idaho is not influenced by the availability of replacement electricity for the aluminum industry because it neither has such an industry nor does it supply inputs to the industry.

Idaho, as the upstream state, enjoys economic advantages. It suffers no negative economic tradeoffs from irrigation development. However, Oregon, and especially Washington, will forfeit aluminum

Table 4-8 Combined (net) Irrigation-Aluminum Output Effects on PNW Economy, 1985

	$Million 1972			$Output				
	Total	Direct	Indirect	Wash.	Oregon	Idaho	Output /acre	Output/ac. Ft. water
OBERS with repl. electr.	1617.0	1237.4	379.6	611.7	488.9	516.3	1814.81	648.93
S.C.[1] with repl. electr.	1803.6	1331.9	471.6	684.4	538.3	580.9	1557.57	556.30
OBERS without repl. electr.	1573.9	1167.9	405.9	573.3	484.2	516.3	1766.40	631.63
S.C. without repl. electr.	1749.3	1283.6	465.7	636.2	532.3	580.9	1510.62	539.51

Table 4-9 Combined (net) Irrigation-Aluminum Employment effects on PNW Economy, 1985

	Thousand jobs annually							
	Total	Direct	Indirect	Wash.	Oregon	Idaho	Jobs /1000 acre	Jobs /1000 ac. Ft. water
OBERS with repl. electr.	43.6	27.0	16.6	15.3	12.9	15.4	49.0	17.0
S.C. with repl. electr.	49.0	30.9	18.1	17.2	14.4	17.4	42.0	15.0
OBERS without repl. electr.	43.0	26.5	16.5	14.7	12.8	15.4	48.0	17.0
S.C. without repl. electr.	48.2	31.0	17.1	16.5	14.3	17.4	42.0	15.0

[1]State Choice

output as a consequence of developing additional irrigated areas instate and also as a result of irrigation development in Idaho.[17]

Table 4-9 summarizes employment effects. New jobs created by 1985 range from under 44 thousand to just over 48 thousand, again depending on the amount of new irrigated acres developed and on the availability of replacement electricity. These new jobs are distributed fairly evenly among the three states. Idaho's employment level receives slight relative advantage when replacement electricity is not available because it feels no negative effects from aluminum reduction. On the average, for each ten direct jobs created (crop production and food processing), five-six indirect or support jobs are created elsewhere in the regional economy. Most of the additional jobs are in trade, services, transportation, chemicals, fabricated metals and machinery. There are job losses in aluminum manufacture. New jobs range from 42-49 per acre developed and 15-17 per acre foot used for irrigation.

Analysis indicates that for every dollar of crop derived output gained, a little over four cents of aluminum may be lost, assuming partial replacement of the lost electicity. If no replacement electricity is available, the aluminum loss may be six-seven cents

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[17]In addition, both Washington and Oregon may be adversely affected by degraded water quality resulting from irrigation water depletions and return flows. Conversely, Idaho may lose benefits from anadromous fisheries by reduced flows in the middle and lower Columbia caused by additional irrigation in all three states.

for each dollar gained in crops and food processing output. On the average, for every new acre brought under irrigation, about $1,750 is gained due to crop export and processing and $70 may be lost in aluminum related output, assuming partial replacement of electricity. If it is assumed that electricity lost cannot be partially replaced, then the aluminum related loss per additional upstream acre irrigated averages $118.

For each acre foot of water depleted, an average of $628 worth of output is gained from crop export and food processing activities and $25 may be lost in aluminum output with partial replacement of electricity. Forty-two dollars worth of aluminum output is lost per acre foot of water depleted if it is not possible to partially replace the lost electricity.

It should be noted that these estimates are more suitable for ordinal rather than cardinal comparisons. The per acre and per acre foot values should be taken only as rough estimates because the MRIO and the analysis are based only on secondary data or averages. The estimates are gross output figures, not including costs of development nor costs of production. For each new acre developed, output effects range from $1,511-1,815. On the basis of acre feet of water depleted, output effects range from $539-649 per acre foot. Employment created amounts to 43-49 thousand new jobs. While the employment impacts make up only slightly over one percent of expected 1985

regional employment, they can have significant impacts at the local level. For each 1000 acres developed, 42-49 new jobs may be expected, most of them in crops, food processing, trade, services, transportation, or machinery manufacture. For each additional acre foot of water depleted for irrigation, 15-17 new jobs may be created in the region.

Conclusions

It is stressed that the conclusions and numerical findings of the study should be tempered with consideration of the previously discussed limitations of the model from which they were drawn.

The major conclusion of this study is that the crop output value of additional irrigation in the Pacific Northwest overshadows output losses induced in the regional aluminum industry. Although neither the irrigation gains nor the aluminum losses during the period 1972-1985 are large compared to the magnitude of the total regional economy in 1985, gains and losses within the agriculture and aluminum industries are significant. The 1972-1985 crop value increment amounts to nearly 20 percent in the regional farm crop sector while losses in aluminum production make up six-eight percent of projected 1985 output levels.

The model shows that for each MW of hydroelectric generation lost for use in aluminum production, four-seven jobs and $275-476 thousand output may be lost in the economy. These losses may be traded for, or offset by, 170-190 new jobs (some of which will be seasonal) and $6.5-7.2 million of output in the economy per MW as a result of increased upstream irrigated crop production.

Estimated losses of hydroelectric energy generation caused by upstream irrigation are not great, amounting to 230-290 average MW in an average water year, or two-three percent of power annually generated for BPA during the mid to late 1970s.

Low water years intensify the negative effect of upstream irrigation on downstream hydroelectric generation used for aluminum production. High water years ameliorate the effects. A 16 percent reduction in average flows tripled MW losses in this analysis. On the other hand, a two-three percent increase in flows offsets 1985 irrigation depletions. Based on a 40-year period of record, there is an 18 percent chance of flows equal to, or less than, the 1939 flows and a 45 percent chance of flows great enough to offset estimated 1985 irrigation depletions.

Idaho, as the upstream state without aluminum plants, appears to hold economic advantages in the development of new irrigated lands.

It can reap the benefits of irrigation, yet bear no offsetting reductions in its industrial output as do Washington and Oregon. Idaho, like Washington and Oregon, may, however, suffer adverse environmental effects from degraded water quality resulting from irrigation depletions and return flows.

According to the model, industries of the regional economy most likely to gain from additional crop production are food processing, trade, services, transportation and machinery manufacturing. Other industries share smaller benefits from crop output. Industries most affected by aluminum production losses are electric utilities, trade, and services. The secondary economic effects of one state's actions on another do not appear to be large, but they are present. The study results demonstrate that when the existing flow of water is modified by regional irrigation, then the existing economy is also modified.

It must be kept in mind that this study does not assess many important social, physical, ecological, and institutional factors interrelated with regional water use. Neither does it assess several important economic factors such as the feasibility or profitability of new irrigation nor the equity of subsidized electrical energy for irrigation (Whittlesey, 1976; Hamilton, 1978).

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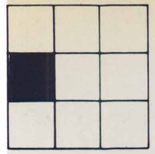
APPENDIX A

Table A-1. Estimated Northwest Transactions, 1972

Table A-1

1972 Washington Transactions

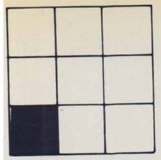
	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26							
Crops	27.4	74.4	175.5			.8														.2	.1			1.7		.8	280.9						
Livestock		33.9	217.1	.2																							251.2						
Food Proc.		38.4	119.8			.8		.3		.6								.3	.6	3.8	2.2				.4	6.6	173.8						
Textile-Apparel	2.2		.5	.6		.6								.3					.5	.2	.1			.1	.5	1.9	7.5						
Mining	.5		.5		1.0				.4	.2	.1	16.0		.5				.4		.2	18.0			22.0		.1	59.9						
Forest-Fish			35.1			9.5	235.1	4.0													.1						283.8						
Lumber-Wood	1.0		1.0		.3	.7	331.3	76.6	82.3	.2	.1	.3	.3	.2	.3	.7	.2	.7	6.6	.4	1.0			75.3	1.6	.2	581.3						
Plywood							18.0	11.6	9.3										2.0					29.9	.8		71.6						
Pulp-Paper	1.6	.3	35.9	1.9	.2		2.0	1.3	103.6	3.1	.3	2.5			.2	.4	.4	3.1	14.7	.5	1.5	.1	.1	.7	20.7	11.3	206.4						
Chemicals	25.1	3.3	1.9		.3	.9	1.3	3.3	20.9	12.5	1.5	.2	.4	.2	.6	1.7	.3	1.1	4.1	.2	.2		.2	3.6	3.6	4.7	92.1						
Petrol. Ref.	5.7	1.8	1.8	.1	.5	2.9	3.7	.2	14.3	.7	3.9	1.6	.1	.4	3.0	.6		1.8	1.7	38.4	.6	.2	1.0	37.9	11.4	7.8	142.1						
Concrete etc.	.3	.1	20.1		1.5	.4				.1	.1	28.9	.2	.1	.3	.8		.2	.4	.1	.1			132.2	.2	.4	186.5						
Iron-Steel	.5	.1			.2		.4	.1	.4		.2		1.5	.3	.5	24.1	.3	.7	9.6	.1	.1			30.0		.1	69.1						
Non Ferrous Met.						.1			.5		.1		.1	.1	1.8	1.1			1.2		.1			3.8		.1	9.0						
Aluminum	.1						.5				.1			1.1	135.4	10.1	.6	.4	1.6					6.8			156.7						
Fab. Met.-Mach.	.7	.3	59.2	.1	.4	.4	8.5	.8	2.7	2.0	.7	.4	1.6	.2	3.3	31.8	2.8	12.1	10.0	.6	2.1	.1		73.0	2.7	8.1	224.6						
Electr. Mach.			.2				.4	.1		.3					.5	1.2	1.5	2.0	.7		.3			4.9	.1	2.7	14.9						
Aircraft-Aerosp.																	2.5	16.0		1.5							20.0						
Other Manuf.	.1		3.3		.2	2.6	1.0	.3	.3	.8	.1	.1	.2	.1	.1	1.9	1.6	4.1	17.7	2.8	1.3	.4	.3	10.7	78.7	88.8	217.5						
Transp. Serv.	7.5	7.0	31.5	.3	.5	4.2	40.6	14.2	29.9	4.0	4.5	9.4	1.7	1.6	12.5	3.5	.3	.5	9.4	96.0	3.1	.3	.4	40.0	30.0	30.2	383.1						
Electr. Utilities	3.4	1.5	6.5	.4	1.2	.4	5.6	1.7	13.4	4.3	2.8	3.1	2.5	.6	36.8	2.6	.4	3.9	3.5	6.7	138.0	.5	2.2	2.0	44.5	44.6	333.1						
N. Gas Utilities			10.6	.2	.1		.6	1.3	19.3	7.4	9.6	4.1	1.5	1.6	4.0	1.5		1.8	.6	.4	.4	76.2	.2	.1	6.0	9.0	156.5						
Other Utilities	4.8	1.5	1.2	.1	.2		1.0	.1	4.1	.4	.8	.2	.1		.4	.5	.1	1.2	.6	.4	.2	.1	12.4	.8	7.0	6.8	45.0						
Construction	8.4	2.5	.9	.1	.4	2.0	3.6	.2	4.5	1.7	1.7	1.1	.2		1.0	1.4	.2	.8	1.7	6.0	.5	.1	1.6	.5	15.6	31.2	87.9						
Trade	32.6	12.4	46.8	1.9	1.0	6.7	43.6	12.4	23.1	3.9	1.8	4.1	4.8	.7	5.7	10.3	2.1	4.2	19.9	15.0	1.9	.5	.7	118.7	40.0	61.4	476.2						
Services	36.7	7.9	46.2	2.9	2.5	4.0	46.3	6.9	27.7	15.8	7.9	3.2	3.4	.8	8.3	21.2	2.9	67.3	33.5	56.2	23.7	2.8	5.4	103.2	301.5	538.3	1376.5						
Subtotal: Purchases	158.6	185.4	815.6	8.8	10.5	37.0	743.5	135.4	356.7	58.0	36.3	75.2	18.6	8.8	214.7	115.4	16.2	122.6	140.6	229.7	195.6	81.3	24.5	697.9	565.3	855.1							



1972 Wash Imports fm Oregon
Oreg. exports to Wash.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26							
Crops	1.7	9.8	8.1																								19.6						
Livestock		14.5	45.0	.2																							59.7						
Food Proc.		25.1	85.5					.1											.1								110.8						
Textile-Apparel	.1			.5																							.6						
Mining												1.2															1.2						
Forest-Fish																																	
Lumber-Wood	.1						31.8	11.5	4.9							.1			.6								49.0						
Plywood							2.8	3.3	1.0										.2								7.3						
Pulp-Paper	.1		2.7	1.5			.3	.4	18.2	.1	.1	.2							1.3						3.7		28.6						
Chemicals	1.5		.1				.2	.9	2.3	.4	.5					.1			.4								6.4						
Petrol. Ref.	.3		.1	.1			.6	.1	.5		.3	.1							.1								2.2						
Concrete etc.			.9									2.1				.1								3.0			6.1						
Iron-Steel							.1	.1			.1		.1			1.9			.8								3.1						
Non Ferrous Met.									.1							.1			.1								.3						
Aluminum							.1									.7			.1								.9						
Fab. Met.-Mach.			12.7	.1			1.3	.2	.3	.1	.2		.1			5.5	.1	.2	1.9						12.0		34.6						
Electr. Mach.							.1									.1			.1								.2						
Aircraft-Aerosp.																		.2									.2						
Other Manuf.			.2				.2	.1								.2		.1	1.6					3.0	21.0	24.0	50.4						
Transp. Serv.	.5	.9	1.5	.2			6.4	4.0	3.2	.1	1.5	.7	.1	.1		.3			.8								20.3						
Electr. Utilities	.2	.2	.3	.3			.9	.5	1.4	.1	.9	.2	.1			.2			.3								5.6						
N. Gas Utilities			.5	.2			.1	.4	.1	.2	.1	.3	.1	.1		.1			.1								2.3						
Other Utilities																																	
Construction	.2	.3		.1			.6	.1			.5	.1				.1			.2								2.3						
Trade	2.0	1.6	2.2	1.5			6.8	3.5	2.5	.1	.6	.3	.3			.8		.1	1.8								24.1						
Services	2.2	1.0	2.1	2.5	.1		7.2	1.9	3.0	.5	2.5	.2	.2			1.6	.1	.9	2.9								28.9						
Subtotal: Purchases	8.9	53.4	161.9	7.2	.1		59.5	27.1	37.5	1.6	7.3	5.5	1.0	.2		11.9	.2	1.5	13.4					6.0	36.7	24.0							

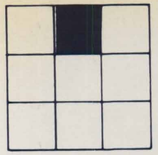
1972 Wash. Imports fm Oregon
Oregon Exports to Wash.



1972 Wash Imports fm Idaho
Idaho exports to Wash

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Crops	1.2	4.9	10.4																								16.5
Livestock		.9	6.7	7.0								.1														3.0	14.6
Food Proc.		21.0	63.7																	2.0							89.7
Textile-Apparel	.1																										.1
Mining																											.1
Forest-Fish			1.1				.8					.1															1.9
Lumber-Wood							19.5	8.1	2.0																		29.6
Plywood							1.1	1.2	.2																		2.5
Pulp-Paper	.1		1.1				.1	.1	2.5																		3.9
Chemicals	4.9	.1	.1				.1	.4	4.5	2.1																1.0	13.2
Petrol. Ref.																											.8
Concrete etc.			.6									.2															
Iron-Steel																											.1
Non Ferrous Met.																			.1								2.6
Aluminum																.1											
Fab. Met.-Mach.			1.8				.5	.1	.1																		.2
Electr. Mach.																											6.2
Aircraft-Aerosp.																											.5
Other Manuf.			.1				.1																				1.7
Transp. Serv.	.3	.2	1.0				2.4	1.5	.7			.1															
Electr. Utilities	.1		.2					.2																			.8
N. Gas Utilities			.3					.1	.5	.8																	7.7
Other Utilities																											7.5
Construction	.4	.1					.2		.1										.1								
Trade	1.5	.3	1.4				2.6	1.3	.5																	4.0	
Services	1.6	.2	1.4				2.7	.7	.7	.2																	
Subtotal: Purchases	10.2	27.7	89.9	7.0			30.1	13.7	11.8	3.1		.4				.1			.2	2.0							4386.2
Imports: Non NW	62.9	4.9	200.5	57.3	17.8	8.2	80.2	18.3	169.4	47.4	427.5	26.9	20.2	11.1	385.0	190.4	40.3	874.0	412.7	141.6	33.4	62.3	4.1	600.7	201.7	287.4	14949.1
Value added	577.1	100.9	533.8	72.3	47.6	254.4	726.4	147.2	432.3	164.1	116.4	101.9	67.3	26.2	260.5	289.8	57.0	863.4	627.3	922.3	350.9	76.4	135.4	1022.4	3400.0	3575.8	-14.2
Adjustments	4.5	-18.7	-59.6	2.2	.4		42.7	10.5	9.2	-.4	.5	.2	.1	.2		.1	.1	.3	.2					-3.0	-3.7		25893.8
Gross Outlays	822.2	353.6	1742.1	154.8	76.4	299.6	1682.4	352.2	1017.2	273.8	588.0	210.1	107.2	46.5	860.2	607.7	113.8	1861.8	1194.4	1295.6	579.9	220.0	164.0	2324.0	4200.0	4746.3	

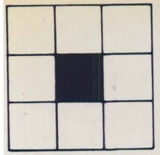
1972 Wash. Imports fm Idaho
Idaho exports to Wash.



1972 Wash exports to Oreg.
Oreg. imports fm Wash

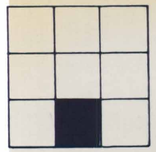
	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Crops	6.5	12.5	4.9	.3		.7	1.1	.6												.1						3.3	30.1
Livestock	.5	.6	2.4																							.1	3.6
Food Proc.		26.9	7.1			.6			.8	.3									.5	1.6					10.6	5.2	53.6
Textile-Apparel	.5		.3	3.5		.1	.1												.5	.1					.7	1.0	6.8
Mining					.7		.1		.9	.4	.4	3.2	.7								.1			1.9		1.2	9.6
Forest-Fish																											
Lumber-Wood							1.3	.4	.3																		2.0
Plywood																											
Pulp-Paper		.3	2.6			.1	.1	.1	2.9	.3		.6			.4	.2	.1		1.3	.1				.1	1.7	1.2	12.1
Chemicals	.6		.1				.4	.3	.3	.2		.1			.1				.1					.4	.1	.3	2.9
Petrol. Ref.	3.6					.3	5.7	1.5	1.0	.6	.2	.3									.5	.2	.9		6.4	2.0	23.2
Concrete etc.												.1												.1			.2
Iron-Steel										.1			1.3		.1	2.8	.2		.4					.4			5.3
Non Ferrous Met.									.2	.1		.1	.5			.3			.3	.2				.1	.1	.1	2.0
Aluminum																											
Fab. Met.-Mach.	1.1	.2	3.9		.3	.1	3.3	.7	.8	.3		.2	.7	.1	1.3	8.9	.6	.1	1.1	.3	.2			6.2	1.3	.8	32.5
Electr. Mach.							.1									.3	.2		.2	.1				.2	.1	.2	1.4
Aircraft-Aerosp.																		4.3		.6					44.9	6.6	56.4
Other Manuf.	.1		.4	.1		.1	6.6	.7	.5							.4	.2		1.9	1.1				.3	2.2	9.5	24.1
Transp. Serv.																											
Electr. Utilities																											
N. Gas Utilities																											
Other Utilities																											
Construction																											
Trade																											
Services	1.4	.4	.6			.1	2.0	.9	.2							.1			.3	1.1	.1			.1	5.8	8.6	21.8
Subtotal: Purchases	14.3	40.9	22.3	3.9	1.0	2.1	20.8	5.2	7.9	2.3	.6	4.6	3.2	.1	1.9	13.0	1.3	4.4	6.6	5.3	.9	.2	.9	9.8	73.9	40.1	

1972 Wash. Exports to Oreg.
Oreg. Imports fm Wash.



1972 Oregon Transactions

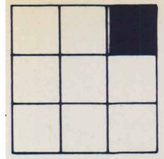
	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Crops	19.1	36.8	73.5	.9		2.1	3.2	1.6												.5						9.6	147.3
Livestock	31.2	38.7	155.9			1.3																				7.9	235.0
Food Proc.		31.1	100.7			.7			.9	.3									.3	1.9					12.3	6.0	154.2
Textile-Apparel	1.3		.7	10.1		.2	.2												1.3	.1					2.0	3.0	18.9
Mining					1.2		.1		1.4	.6	.7	5.3	1.2								.2			3.1		2.0	15.8
Forest-Fish			2.3			.3	27.9	1.2																			31.7
Lumber-Wood	1.2		.8				439.9	128.8	105.5			.2							11.6	.2				10.1	1.6	.4	700.3
Plywood	.7		.2				6.1	50.1	9.1										9.9	.2				5.8	.9	.2	83.2
Pulp-Paper		2.8	25.0	.4		.6	1.2	.9	28.3	2.6		5.6	.3		1.5	1.9	1.2		12.8	1.0	.3			1.3	16.9	11.6	116.2
Chemicals	9.4	.1	1.5		.3		7.6	5.6	5.9	3.6		.9	.5		1.4	.3			1.9	.5				7.1	1.7	4.7	53.0
Petrol. Ref.	2.5					.2	3.9	1.0	.7	.4	.2	.2	.2								.3	.1	.6		4.4	1.4	16.1
Concrete etc.	.4		3.2		.3		6.5	4.2	1.6	.3	.1	12.2	2.0	.1	.6	2.3	.4		.7		.3			15.7	3.3	3.1	57.3
Iron-Steel					.3		.2	.2		1.2		.2	27.7	.1	.7	59.6	3.8	.1	9.2	.3	1.0			8.0	.1	.4	113.2
Non Ferrous Met.			.3						1.0	.8		.4	3.1	.2		1.7			1.8	1.4	.3			.5	.6	.7	12.8
Aluminum															25.9	5.0								3.0			33.9
Fab. Met.-Mach.	9.3	1.8	31.7		2.2	.6	27.4	5.9	6.6	2.5	.2	1.4	6.1	.7		73.0	4.7	.7	9.1	2.0	1.6			51.1	10.4	6.8	255.8
Electr. Mach.	.1				.1		1.0	.1				.2	.2			3.8	2.7	.1	1.6	1.2	.1			2.5	1.2	2.7	17.6
Aircraft-Aerosp.																		1.8		2.7					4.1	.6	9.2
Other Manuf.	1.3	.2	4.0	.7	.2	.7	62.4	6.9	5.0		.2	.3	.3			4.2	1.5	.3	17.7	10.9	.2		.1	2.7	21.1	90.7	231.6
Transp. Serv.	6.1	4.6	43.0	.3	1.7	.1	171.8	42.9	4.0	2.9	1.0	7.2	8.7	.2	2.4	9.7	1.2		11.8	52.2	6.6	.7	.9	12.4	8.6	25.2	462.2
Electr. Utilities	2.6	1.1	3.7	.1	1.8		17.1	9.2	12.1	1.9		1.6	3.2	2.0	7.1	2.5	.3		2.7	4.3	79.3		.9	1.0	43.4	32.0	229.9
N. Gas Utilities			3.1	.1			7.3	6.7	10.2	3.4	.8	3.0	2.3	6.3		2.2	.1		.4	.4	.3	17.1		.1	7.6	9.5	81.1
Other Utilities	2.9	.9	.5		.2		1.7	.7	1.0	.1	.5	.1	.1			.4	.1		.2	.2	.1		6.0		5.5	4.4	25.6
Construction	13.8	6.1	5.0				6.5	18.3	2.7				1.2				.2		1.1	40.6	3.7	.9	1.5		22.8	29.9	154.3
Trade	24.1	15.8	34.4	1.7	1.8	.5	85.4	77.6	18.3	2.4	.6	3.5	4.6	.2		17.8	2.7	.1	17.0	21.9	2.8	.9	1.0	48.6	30.7	74.9	489.3
Services	88.2	26.1	36.2	.6	2.2	4.7	119.1	57.3	10.2	2.5		3.3	2.1	.1		8.8	1.8		18.8	65.5	4.9	.7	1.2	4.9	350.4	523.6	1332.8
Subtotal: Purchases	214.2	166.1	525.7	14.9	12.3	12.0	996.5	419.2	224.5	25.5	4.3	45.6	63.8	9.9	39.6	193.2	20.7	3.1	129.9	208.0	102.0	20.4	12.2	177.9	549.6	851.3	



1972 Oreg. Imports fm Idaho
Idaho Exports to Oreg.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Crops	3.8	6.2	12.7				.1	.1																		1.6	24.5
Livestock	1.2	3.3	10.6																								15.1
Food Proc.		6.7	22.0																								28.7
Textile-Apparel	.1																										.1
Mining																											
Forest-Fish							.1																				.1
Lumber-Wood							8.8	4.6	.9																		14.3
Plywood							.1	1.8	.1																		2.0
Pulp-Paper		.2	.3						.3																		.8
Chemicals	2.1						1.1	1.2	1.0	.1																1.0	6.5
Petrol. Ref.																											
Concrete etc.							.1	.2				.1															.4
Iron-Steel																											
Non Ferrous Met.																											
Aluminum																											
Fab. Met.-Mach.	.4	.2	.3				.6	.2	.1							.1											1.9
Electr. Mach.																											
Aircraft-Aerosp.																											
Other Manuf.	.1						1.2	.2																			1.5
Transp. Serv.	.2	.4	.4				3.4	1.5		.1																	6.0
Electr. Utilities	.1	.1					.1		.1																		.4
N. Gas Utilities							.1	.2	.1					.2													.6
Other Utilities																											
Construction	.5	.5	.1				.1	.7																			1.9
Trade	1.0	1.4	.3				1.7	2.8	.2																		7.4
Services	3.5	2.2	.4				2.4	2.0	.1																		10.6
Subtotal: Purchases	13.0	21.2	47.1				19.9	15.5	2.9	.2		.1		.2		.1										2.6	
Imports: Non NW	47.0	96.0	88.1	19.1	13.3	2.5	109.3	66.8	36.4	41.9	7.9	10.8	13.5	24.4	74.5	232.2	23.5	6.2	171.1	125.2	29.0	97.6		140.2	79.8	327.8	1884.1
Value added	339.1	195.9	417.9	17.2	47.4	22.8	1048.3	443.5	298.3	70.4	11.1	70.8	45.3	26.0	54.7	340.3	52.3	11.6	473.3	614.7	234.8	48.2	61.0	371.2	1676.4	2002.6	8995.1
Adjustments	3.8	-24.0	-51.1	-2.2	2.5	-1.9	78.6	-.2	-29.3	4.9	-.7	-7.2	-2.6	1.4	-5.6	-13.6	-4.7	-.6	-15.9	-6.1	18.3	-1.4	.5	11.6	4.9	-124.4	-165.0
Gross Outlays	631.4	496.1	1050.0	52.9	76.5	37.5	2253.5	950.0	540.7	151.2	23.2	124.7	123.2	62.0	165.1	765.2	93.1	24.7	765.0	947.1	385.0	165.0	74.6	687.5	2384.6	3100.0	16129.8

1972 Oreg. Imports fm Idaho
Idaho Exports to Oreg.

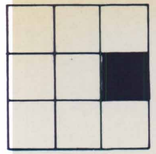


1972 Wash. exports to Idaho

Idaho imports fm Wash

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops	.7	7.8	6.6				.1																			.2	15.4	61.1	434.9	496.0		822.2
Livestock	.2	1.0	1.6																								2.8	70.8	25.2	96.0		353.6
Food Proc.	.1	23.3	13.6						.2	.3									.1	.3					.8	.3	39.0	744.5	731.2	1475.7		1742.1
Textile-Apparel	.2			.1										.4													.7	32.2	107.6	139.8		154.8
Mining					.1									.6													.7	4.0	1.9	5.9	.3	76.4
Forest-Fish			1.8				4.3																				6.1	2.5	7.2	9.7		299.6
Lumber-Wood							5.3	.6	.2										.1					.2			6.4	21.8	1070.7	1092.5	.2	1682.4
Plywood																												3.9	276.7	280.6		352.2
Pulp-Paper			4.6						4.1	.1							.3		.1								9.5	52.1	737.7	789.8	-.3	1017.5
Chemicals	1.4		.1						.3	2.2				.3													4.3	121.6	52.6	174.2	.3	273.8
Petrol. Ref.	2.7						4.4	1.1	.8	.4		.2		.2							.3		.3		4.6	1.4	16.4	197.2	208.2	405.4	.9	588.0
Concrete etc.																								.1			.1	13.2	9.9	23.1	.2	210.1
Iron-Steel																												2.0	30.6	32.6	.2	107.2
Non Ferrous Met.														1.1													1.1	-.5	34.8	34.3	.1	46.5
Aluminum																												-15.6	719.1	703.5		860.2
Fab. Met.-Mach.	1.8	.1	3.8		1.2											1.4			.7					7.7	.2		16.9	71.8	261.8	333.6	.1	607.7
Electr. Mach.																	.3									.1	.4	24.0	72.9	96.9	.2	113.8
Aircraft-Aerosp.																												448.7	1336.7	1785.4		1861.8
Other Manuf.	.1		4.0				.1												2.3	.1					.2	1.3	8.1	434.7	509.7	944.4	.3	1194.4
Transp. Serv.	1.5	3.9	12.4		.6		4.9	1.2	1.2	1.5		.7		1.9		.2	.2		.4	4.3	.6	.1		3.1	.9	.3	39.9	300.0	572.4	872.4	.2	1295.6
Electr. Utilities										.1																.1	.2	208.3	38.2	246.5	.1	579.9
N. Gas Utilities																												63.5		63.5		220.0
Other Utilities																												119.0		119.0		164.0
Construction																												2236.1		2236.1		2324.0
Trade																												2609.8	1114.0	3723.8		4200.0
Services																												2913.2	434.7	3347.9	.1	4746.3
Subtotal: Purchases	8.7	36.1	48.5	.1	1.9		19.1	2.9	6.8	4.6		.9		4.5		1.6	.8		3.7	4.7	.9	.1	.3	11.1	6.7	3.7		10739.9	8788.7	19528.6	2.9	25893.8

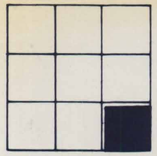
1972 Wash. exports to Idaho
Idaho Imports fm Wash.



1972 Oreg. Exports to Idaho
Idaho Imports fm Oreg.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non-NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops	.7	7.4	6.2				.1																				14.4	60.3	389.5	449.8	.3	631.4
Livestock	5.7	24.2	38.8																								68.7	34.7	99.3	134.0	-1.3	496.1
Food Proc.		2.0	.9																								2.9	501.5	280.7	782.2	-.1	1050.0
Textile-Apparel																												21.2	12.1	33.3	.1	52.9
Mining	.1									.1				.1													.3	.5	58.2	58.7	.5	76.5
Forest-Fish			.1				.5																				.6	2.7	1.7	4.4	-.2	37.5
Lumber-Wood							5.0	.3	.7										.1								6.1	362.8	1135.3	1498.1		2253.5
Plywood							.3	.3											.1								.7	108.9	750.0	858.9	-.1	950.0
Pulp-Paper			1.9						1.4																		3.3	49.7	340.9	390.6	2.0	540.7
Chemicals	1.3								.2	1.1																	2.6	24.3	63.1	87.4	2.0	151.2
Petrol. Ref.																												5.8	.3	6.1	-1.4	23.2
Concrete etc.																												38.2	19.8	58.0	3.3	124.7
Iron-Steel																												3.9	1.7	5.6	1.3	123.2
Non Ferrous Met.										.1																	.1	3.0	45.8	48.8		62.0
Aluminum																												5.9	124.2	130.1	.2	165.1
Fab. Met.-Mach.	.3		2.1													.8			.1					4.0			7.3	225.5	236.5	462.0	5.5	765.2
Electr. Mach.																												20.5	55.4	75.9	-.6	93.1
Aircraft-Aerosp.																													14.5	14.5	.8	24.7
Other Manuf.			2.1																.2							1.0	3.3	93.3	386.4	479.7		765.0
Transp. Serv.	.3	.8	.7				.4		.3	.2						.1											2.8	395.1	95.9	491.0	6.8	947.1
Electr. Utilities	.3	.4					.1		.2	.7																	1.7	144.9	6.9	151.8	-4.0	385.0
N. Gas Utilities			.1						.1	.2																	.4	82.8		82.8	-1.6	165.0
Other Utilities																												47.0		47.0	2.0	74.6
Construction	.2	.1																									.3	250.2	280.1	530.3	.3	687.5
Trade	.9	1.0	.7				.3		.2	.2						.3											3.7	1590.5	276.9	1867.4	.1	2384.6
Services	6.3	.9	.2				.3		.1	.1						.2											8.2	1700.8	30.3	1731.1	1.0	3100.0
Subtotal: Purchases	16.1	36.8	53.8				7.0	.6	3.2	2.7				.1		1.4			.7					4.0		1.0		5774.0	4705.5	10479.5	16.9	16129.8

1972 Oreg Exports to Idaho
Idaho Imports fm **Oreg.**



1972 Idaho Transactions

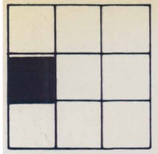
	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest. Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops	9.4	111.7	93.8			.2	1.9													.2				.1		2.2	219.5	6.4	191.9	198.3	1.1	459.9
Livestock	22.9	92.7	149.4			1.6																				1.0	267.6	15.1	134.1	149.2	-1.0	445.5
Food Proc.	.1	30.3	69.9			.4			.2	.4									.1	.3					1.0	.3	103.0	84.7	569.7	654.4	-.8	875.0
Textile-Apparel	.1					.1								.1													.3		5.6	5.6	.2	6.3
Mining	.7				6.4					2.5		1.3		30.0										2.1			43.6	1.5	61.5	63.0	.1	106.2
Forest-Fish			6.8			.1	19.1																				27.0	.1		.1	-1.0	27.1
Lumber-Wood			.2		1.1		198.5	21.1	9.5	.1		.1				.1			3.2					7.8	.3		242.0	7.7	482.1	489.8	.2	775.9
Plywood							13.9	20.9											3.8					2.8			41.4	1.0	62.1	63.1	.2	108.9
Pulp-Paper			10.0	.1					5.4	.1							.4		.1								16.1		98.0	98.0	.9	119.7
Chemicals	17.4	.4	.9		.5		.4		3.1	26.7		.1		3.3			.3		.4	.1	.1			.5	.3	.2	54.7	15.6	170.5	186.1	.4	260.9
Petrol. Ref.																																
Concrete etc.					.9		.1					1.0												21.2	.4	.2	23.8	6.1	2.6	8.7	-.5	33.2
Iron-Steel																																
Non Ferrous Met.										1.6				49.7			.1										51.4		221.4	221.4	-.1	272.9
Aluminum																																
Fab. Met.-Mach.	4.8	.2			3.2		.1					.2				3.8			1.9					20.2	.6		35.0	16.0	14.5	30.5	.2	70.2
Electr. Mach.																	3.4		.1	.1					.1	.6	4.3	5.0	77.2	82.2	.1	86.6
Aircraft-Aerosp.																																
Other Manuf.	.1		7.5				.1												4.3	.1					.4	2.5	15.0	23.3	78.4	101.7	.9	119.3
Transp. Serv.	4.5	12.0	53.7		1.8	.6	15.1	3.8	3.6	4.6		2.0		5.7		.7	.5		1.3	13.2	1.8	.3		9.6	2.8	1.0	138.6	87.6		87.6	1.0	239.4
Electr. Utilities	3.5	5.5	4.0		7.0		3.3	1.8	2.4	15.5		.3		4.3		.2	1.1		.9	1.8	12.0	.1	.1	1.7	14.1	14.6	94.2	46.0		46.0	-1.4	141.1
N. Gas Utilities	.1	.1	8.2		.2		1.0	.2	1.2	3.5				1.9		.1	.1			.3	2.8	13.6		.2	1.3	1.4	36.8	38.6		38.6	-1.9	75.8
Other Utilities	.5		.3		.1		.1		.2	.1										.1			.1		.2	.2	1.8	.8		.8	.3	2.9
Construction	2.4	2.0	1.3		.3		1.2	.2	.5	.4				.3					.1	2.2	1.0	.2			.6	7.6	20.3	277.2	113.7	390.9	.2	414.1
Trade	12.5	15.0	53.0		2.0	.8	10.0	2.7	2.4	4.5		.6		3.0		1.4	2.5		1.9	3.9	.4	.1		20.1	6.3	6.3	149.4	414.7	11.4	426.1	-.3	
Services	30.4	13.8	15.8	.1	1.9	1.5	12.7	1.0	1.2	2.6		.5		1.3		1.0	1.2		2.3	7.4	1.2	.4		5.6	19.5	90.9	212.3	319.8	99.4	419.2	.4	650.0
Subtotal: Purchases	109.4	283.7	474.8	.2	25.4	5.3	277.5	51.7	29.7	62.6		6.1		99.6		7.3	9.6		20.4	29.7	19.3	14.7	.2	92.0	47.9	129.0		1367.2	2394.1	3761.3	-1.6	5881.2
Imports: Non NW	65.9	5.1	63.3	1.4	29.8	14.0	202.7	18.9	42.2	77.8		6.8		142.8		26.0	38.7		49.5	58.1	7.6	45.1	.2	128.9	101.2	90.4	1216.4					
Value added	259.8	106.3	257.3	4.9	49.7	8.2	233.0	35.9	33.1	106.2		20.8		25.6		33.7	36.8		46.0	151.5	110.1	20.1	2.4	161.0	441.0	436.8	2580.2					
Adjustments		-22.5	-22.7	-.3	-.6	-.4	36.5	-1.1	4.7	7.0		-1.4		.3		.2	.7		-1.0	-4.6	3.2	-4.2	.2	17.1	-6.5	-10.9	-6.3					
Gross Outlays	459.9	445.5	875.0	6.3	106.2	27.1	775.9	108.9	119.7	260.9		33.2		272.9		70.2	86.6		119.3	239.4	141.1	75.8	2.9	414.1	590.3	650.0	5881.2					

Table A-2. Estimated Northwest Transactions, 1985

Table A-2

1985 Washington Transactions
Mill '72$

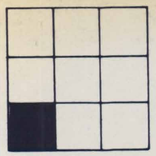
	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp	Other Manuf.	Transp. Serv.	Electr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26							
Crops	33.2	85.6	212.4			.9														.3	.1			2.7		1.6	336.8						
Livestock		39.0	262.7	.4																							302.1						
Food Proc.		44.2	145.0			.9		.5		.9								.5	.9	5.9	2.9				.6	13.2	215.5						
Textile-Apparel	2.7		.6	1.2		.7								.3					.8	.3	.1			.2	.8	3.8	11.5						
Mining	.6		.6		1.5				.7	.3	.1	24.8		.6				.6		.3	23.6			35.0		.2	88.9						
Forest-Fish			35.4			9.4	295.1	5.0													.1						345.0						
Lumber-Wood	1.2		1.2		.5	.8	496.9	114.9	141.6	.3	.1	.5	.4	.2	.3	1.4	.4	1.1	10.2	.6	1.3			119.7	2.5	.4	896.5						
Plywood							27.0	17.4	16.0										3.1					47.5	1.2		112.2						
Pulp-Paper	1.9	.3	43.3	3.8	.3		3.0	2.0	178.2	4.5	.3	3.9			.2	.8	.9	4.8	22.8	.8	2.0	.1	.2	1.1	31.7	22.6	329.6						
Chemicals	30.3	3.8	2.3		.4	1.1	1.9	4.9	35.9	18.3	1.5	.3	.5	.2	.6	3.3	.7	1.7	6.4	.3	.3		.3	5.7	5.5	9.4	135.6						
Petrol. Ref.	5.7	1.8	1.8	.1	.5	2.9	3.7	.2	14.3	.7	3.9	1.6	.1	.4	3.0	.6		1.8	1.7	38.4	.6	.2	1.0	37.9	11.4	7.8	142.1						
Concrete etc.	.4	.1	24.3		2.3	.5				.2	.1	44.8	.3	.1	.3	1.6		.3	.6	.2	.1			210.2	.3	.8	287.5						
Iron-Steel	.6	.1			.3		.6	.1	.7		.2		1.9	.3	.5	47.0	.7	1.1	14.9	.2	.1			47.7		.2	117.2						
Non Ferrous Met.						.1			.9		.1		.1	.1	1.8	2.2			1.9		.1			6.0		.2	13.5						
Aluminum	.1				.6		.8				.1			1.2	135.4	19.7	1.3	.6	2.5					10.8			173.1						
Fab. Met.-Mach.	.8	.3	71.6	.2		.5	12.7	1.2	4.6	2.9	.7	.6	2.1	.2	3.3	62.0	6.1	18.8	15.5	.9	2.7	.1		116.1	4.1	16.2	344.2						
Electr. Mach.			.2				.6	.2		.4					.5	2.3	3.3	3.1	1.1		.4			7.8	.2	5.4	25.5						
Aircraft-Aerosp.																	5.5	24.8		2.3							32.6						
Other Manuf.	.1		4.0		.3	3.1	1.5	.4	.5	1.2	.1	.2	.3	.1	.1	3.7	3.5	6.4	27.4	4.4	1.7	.4	.5	17.0	120.4	177.6	374.9						
Transp. Serv.	9.1	8.0	38.1	.6	.8	4.5	60.9	21.3	51.4	5.8	4.5	14.6	2.2	1.8	12.5	6.8	.7	.8	14.6	149.8	4.1	.3	.6	63.6	45.9	60.4	583.7						
Electr. Utilities	4.1	1.7	7.9	.8	1.8	.5	8.4	2.6	23.1	6.3	2.8	4.8	3.3	.7	36.8	5.1	.9	6.0	5.4	10.5	180.8	.5	3.4	3.2	68.1	89.2	478.7						
N. Gas Utilities			10.3	.3	.1		.7	1.6	26.7	8.7	7.7	5.1	1.6	1.4	3.2	2.3		2.2	.8	.5	.4	54.5	.3	.1	7.4	14.4	150.3						
Other Utilities	5.8	1.7	1.5	.2	.3		1.5	.1	7.0	.6	.8	.3	.1		.4	1.0	.2	1.9	.9	.6	.3	.1	19.3	1.3	10.7	13.6	69.8						
Construction	10.1	2.9	1.1	.2	.6	2.4	5.4	.3	7.7	2.5	1.7	1.7	.3		1.0	2.7	.4	1.2	2.6	9.3	.6	.1	2.5	.8	23.8	62.3	144.2						
Trade	39.4	14.3	56.6	3.8	1.5	7.9	65.4	18.6	39.7	5.7	1.8	6.4	6.2	.8	5.7	20.1	4.6	6.5	30.8	23.4	2.5	.5	1.1	188.7	61.2	122.8	736.0						
Services	44.4	9.1	55.9	5.7	3.8	4.7	69.4	10.3	47.6	23.1	7.9	5.0	4.4	.9	8.3	41.3	6.4	104.3	51.9	87.7	31.1	2.5	8.4	164.1	461.3	1076.6	2336.1						
Subtotal: Purchases	190.5	212.9	976.9	17.3	15.6	40.9	1055.5	201.6	596.6	82.4	34.4	114.6	23.8	9.3	213.9	223.9	35.6	188.5	216.8	336.7	255.9	59.3	37.6	1087.2	857.1	1698.7							



1985 Wash. Imports fm Oreg.
Oreg. Exports to Wash.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Crops																											23.4
Livestock																											18.1
Food Proc.																											12.9
Textile-Apparel																											1.6
Mining																											2.1
Forest-Fish																											
Lumber-Wood																											70.8
Plywood																											12.3
Pulp-Paper																											29.9
Chemicals																											10.2
Petrol. Ref.																											
Concrete etc.																											4.9
Iron-Steel																											
Non Ferrous Met.																											.5
Aluminum																											1.8
Fab. Met.-Mach.																											14.0
Electr. Mach.																											.5
Aircraft-Aerosp.																											.5
Other Manuf.																											3.6
Transp. Serv.																											32.4
Electr. Utilities																											9.4
N. Gas Utilities																											
Other Utilities																											
Construction																											4.4
Trade																											39.5
Services																											47.5
Subtotal: Purchases	10.8	27.6	43.7	17.6	.6		94.2	39.6	53.0	2.2	7.2	8.3	1.1	.1		13.5	.6	2.6	17.6								

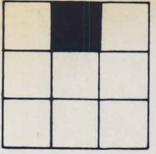
1985 Wash. Imports fm Oreg.
Oreg. Exports to Wash.



1985 Wash. Imports fm Idaho
Idaho Exports to Wash.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fab. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Crops																											10.4
Livestock																											9.3
Food Proc.																											5.8
Textile-Apparel																											.1
Mining																											.2
Forest-Fish																											
Lumber-Wood																											26.7
Plywood																											4.2
Pulp-Paper																											6.3
Chemicals																											10.3
Petrol. Ref.																											
Concrete etc.																											.8
Iron-Steel																											
Non Ferrous Met.																											1.0
Aluminum																											
Fab. Met.-Mach.																											3.5
Electr. Mach.																											
Aircraft-Aerosp.																											
Other Manuf.																											1.4
Transp. Serv.																											10.1
Electr. Utilities																											2.0
N. Gas Utilities																											
Other Utilities																											
Construction																											1.1
Trade																											11.9
Services																											9.8
Subtotal: Purchases	15.0	5.4	29.4				36.1	14.9	11.4	.6		.3		1.0		.2			.6								
Imports: Non NW	78.2	44.0	410.5	127.8	29.2	11.3	242.2	50.3	334.5	74.6	429.3	43.3	26.9	11.7	385.8	381.7	88.2	1355.7	643.0	224.1	43.9	68.8	6.5	959.9	360.9	634.5	7066.5
Value added	698.3	116.0	645.9	143.2	71.8	300.2	1089.6	220.8	743.6	239.6	116.4	157.9	87.5	28.8	260.5	565.1	124.8	1338.3	972.3	1438.8	459.7	68.0	211.2	1625.6	5202.0	7151.6	24077.5
Adjustments	2.1	.7	1.5	.6	-1.9	1.1	6.0	1.1	11.0	.3	.7	1.2	.1	.6		.6		.7	1.0	21.5	.2	-.3	.5	22.5	6.0	8.3	86.1
Gross Outlays	994.9	406.6	2107.9	306.5	115.3	353.5	2523.6	528.3	1750.1	399.7	588.0	325.6	139.4	51.5	860.2	1185.0	249.2	2885.8	1851.3	2021.1	759.7	195.8	255.8	3695.2	6426.0	9492.6	40468.6

1985 Wash. Imports fm Idaho
Idaho Exports to Wash.

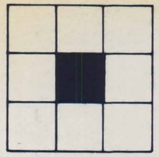


1985 Oreg. Import fm Wash.
Wash. exports to Oreg

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.- Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	
Crops																											
Livestock																											59.9
Food Proc.																											2.6
Textile-Apparel																											85.6
Mining																											11.2
Forest-Fish																											16.1
Lumber-Wood																											
Plywood																											3.2
Pulp-Paper																											
Chemicals																											21.4
Petrol. Ref.																											4.5
Concrete etc.																											23.5
Iron-Steel																											.5
Non Ferrous Met.																											2.7
Aluminum																											2.7
Fab. Met.-Mach.																											
Electr. Mach.																											68.7
Aircraft-Aerosp.																											3.5
Other Manuf.																											91.4
Transp. Serv.																											37.4
Electr. Utilities																											
N. Gas Utilities																											
Other Utilities																											
Construction																											
Trade																											
Services																											
Subtotal: Purchases	13.0	40.1	73.0	4.9	1.9	2.2	25.3	6.1	12.0	3.8	.8	7.1	3.6	.2	2.2	27.6	2.7	5.9	10.8	6.7	1.4	.2	.9	16.5	100.8	65.3	

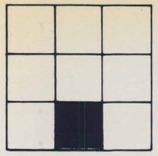
1985 Oreg Imports fm Wash.

Wash. exports to Oregon



1985 Oregon Transactions Mill '72 $

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales						
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52							
Crops	20.8	38.9	94.5	1.2		2.5	4.6	2.4												.6						21.1	186.6						
Livestock	33.9	40.9	200.3			1.6																				17.4	294.1						
Food Proc.		32.9	129.4			.8			1.4	.5									.5	2.6					18.6	13.3	200.0						
Textile-Apparel	1.5		.9	13.8		.2	.3												2.3	.2					3.1	6.5	28.8						
Mining					1.7		.2		2.3	1.1	.7	9.4	1.8								.3			5.3		4.5	27.3						
Forest-Fish			2.5			.3	34.6	1.5																			38.9						
Lumber-Wood	1.3		1.0				634.1	192.0	168.2			.3							20.3	.2				17.1	2.4	.8	1037.7						
Plywood	.7		.2				8.8	74.6	14.5	4.5									17.3	.2				9.9	1.4	.4	132.5						
Pulp-Paper		3.0	32.1	.5		.7	1.8	1.3	45.2			9.9	.4		1.5	3.6	2.2		22.4	1.4	.6			2.2	25.6	25.5	179.9						
Chemicals	10.2	.1	1.9		.4		11.0	8.3	9.5	6.3		1.7	.8	.1	1.4	.5			3.4	.7				12.1	2.6	10.4	81.4						
Petrol. Ref.	2.1					.2	4.4	1.2	.8	.5	.1	.2	.3								.5	.1	.7		5.2	2.4	18.7						
Concrete etc.	.4		4.2		.4		9.3	6.2	2.6	.6	.1	21.7	3.1	.1	.6	4.5	.7		1.1		.6			26.6	5.1	6.8	94.7						
Iron-Steel					.4		.2	.2		1.9		.3	36.2	.1	.8	100.2	6.3	.2	14.0	.4	1.6			11.8	.2	.7	175.5						
Non Ferrous Met.			.5						1.5	1.5		.7	4.7	.3		3.2			3.2	1.9	.5			.9	.9	1.6	21.4						
Aluminum															26.0	8.0											34.0						
Fab. Met.-Mach.	10.0	2.0	40.7		3.2	.7	39.5	8.8	10.5	4.5	.2	2.4	9.2	1.0		140.9	9.0	1.0	15.8	2.8	2.9			86.9	15.8	14.8	422.6						
Electr. Mach.	.1				.1		1.5	.1				.4	.4			7.4	5.1	.1	2.8		.1			4.2	1.8	6.0	31.8						
Aircraft-Aerosp.																		2.7		3.8					6.2	1.3	14.0						
Other Manuf.	1.4	.2	5.1	1.0	.2	.9	89.9	10.4	8.0		.2	.5	.5			8.1	2.8	.5	30.7	15.2	.4		.1	4.6	31.9	199.0	411.6						
Transp. Serv.	6.7	4.8	55.2	.5	2.4	.2	247.6	63.9	6.4	5.2	1.0	12.8	13.0	.3	2.4	18.6	2.4		20.6	72.4	11.8	.9	1.2	21.0	13.0	55.2	639.5						
Electr. Utilities	2.8	1.1	4.8	.2	2.6		28.9	13.8	19.3	3.4		2.9	4.8	3.1	7.5	4.8	.6		4.7	5.9	141.8		1.3	1.8	65.7	79.0	400.8						
N. Gas Utilities			3.6	.1			9.5	8.9	14.6	5.3	.7	4.8	3.1	8.6		3.8	.2		.7	.6	.4	19.5		.1	10.3	18.7	113.5						
Other Utilities	3.1	.9	.7		.4		2.5	1.0	1.6	.2	.5	.2	.1			.7	.3		.4	.3	.1		8.4	.1	8.3	9.6	39.4						
Construction	15.0	6.5	6.4				9.3	27.2	4.3				1.9				.3		1.9	56.3	6.6	1.1	2.1		34.6	65.5	239.0						
Trade	26.2	16.8	44.3	2.3	2.6	.6	123.0	115.7	29.2	4.2	.6	6.3		.2		34.4	5.1	.1	29.6	30.4	4.9	1.1	1.5	82.6	46.5	164.3	779.3						
Services	95.8	27.6	46.5	.9	3.1	5.8	171.6	85.4	16.2	4.5	4.1	5.8	3.1	.2		17.0	3.5		32.8	90.8	8.8	.9	1.6	8.3	531.2	1148.5	2309.9						
Subtotal: Purchases	232.0	175.7	674.8	20.5	17.5	14.5	1432.6	622.9	356.1	44.2	4.1	80.3	90.2	14.0	40.2	355.7	38.5	4.6	224.5	288.4	181.9	23.6	16.9	295.5	830.4	1873.3							

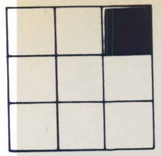


1985 Idaho exports to Oregon

Oreg. Imports fm Idaho

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales						
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52							
Crops																											5.2						
Livestock																											6.8						
Food Proc.																											4.1						
Textile-Apparel																											.1						
Mining																											.1						
Forest-Fish																																	
Lumber-Wood																											11.5						
Plywood																											3.0						
Pulp-Paper																											1.2						
Chemicals																											8.1						
Petrol. Ref.																																	
Concrete etc.																											.5						
Iron-Steel																																	
Non Ferrous Met.																											1.0						
Aluminum																																	
Fab. Met.-Mach.																											2.5						
Electr. Mach.																																	
Aircraft-Aerosp.																																	
Other Manuf.																											2.6						
Transp. Serv.																											9.0						
Electr. Utilities																											1.4						
N. Gas Utilities																																	
Other Utilities																																	
Construction																											2.5						
Trade																											9.9						
Services																											8.5						
Subtotal: Purchases	13.9	13.9	6.7				20.5	17.7	3.1	.5		.4		1.1		.2																	
Imports: Non NW	51.2	109.8	67.3	26.4	18.8	3.2	146.7	104.4	50.1	74.9	8.0	7.1	25.6	42.5	74.5	462.1	44.7	9.4	299.5	172.7	55.1	125.3		229.9	118.4	703.3	3030.9						
Value added	368.1	207.3	537.1	23.6	67.3	25.8	1591.0	661.0	455.7	139.7	11.1	127.9	67.9	35.2	54.4	656.3	97.7	17.5	824.6	852.4	440.3	61.2	85.6	630.5	2541.2	4092.2	14672.6						
Adjustments	7.3	-21.9	-9.4	-2.9	3.1		32.0	3.9	-14.7	4.1	-.8	-.6	-2.5	2.0	-7.2	-25.4	-5.8	-.1	-27.3	-6.9	9.8	-.6	1.3	-4.7	24.0	64.9	21.6						
Gross Outlays	685.5	524.9	1349.5	72.5	108.6	45.7	3248.1	1416.0	862.3	267.2	23.2	222.2	184.8	95.0	164.1	1476.5	177.8	37.3	1332.1	1313.3	688.5	209.5	104.7	1167.7	3614.8	6799.0	26190.8						

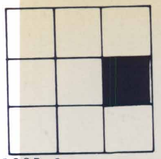
1985 Idaho exports to Oregon
Oregon imports from Idaho



1985 Wash exports to Idaho
Idaho Imports fm Wash

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest-Fish	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops																											18.8	73.9	504.7	578.6	.8	994.9
Livestock																											2.1	81.4	18.4	99.8		406.6
Food Proc.																											33.2	900.9	872.8	1773.7	-.1	2107.9
Textile-Apparel																											1.9	63.7	218.3	282.0		306.5
Mining																											2.0	5.6	3.6	9.2	-.9	115.3
Forest-Fish																												8.3		8.3		353.5
Lumber-Wood																											19.6	32.8	1571.4	1604.2	.1	2523.6
Plywood																												5.9	410.2	416.1		528.3
Pulp-Paper																											15.3	89.6	1294.4	1384.0	-.2	1750.1
Chemicals																											6.1	177.5	76.0	253.5	.1	399.7
Petrol. Ref.																											16.7	197.2	208.2	405.4	.3	588.0
Concrete etc.																											.1	20.4	16.8	37.2	.3	325.6
Iron-Steel																												2.6	16.5	19.1	.4	139.4
Non Ferrous Met.																											1.3	-.5	34.6	34.1	-.1	51.5
Aluminum																												-15.6	703.5	687.9	.8	860.2
Fab. Met.-Mach.																											38.4	140.1	592.4	732.5	1.2	1185.0
Electr. Mach.																											1.0	52.6	166.6	219.2		249.2
Aircraft-Aerosp.																												695.5	2066.4	2761.9	-.1	2885.8
Other Manuf.																											12.4	640.9	785.5	1426.4	.2	1851.3
Transp. Serv.																												468.1	968.6	1436.7	.7	2021.1
Electr. Utilities																												272.9	8.2	281.1	-.1	759.7
N. Gas Utilities																												45.4		45.4	.1	195.8
Other Utilities																												185.5		185.5	.5	255.8
Construction																												3550.8		3550.8	.2	3695.2
Trade																												3993.1	1696.6	5689.7	.3	6426.0
Services																												5826.6	1329.4	7156.0	.5	9492.6
Subtotal: Purchases	9.7	21.6	47.7	.4	2.5	.8	22.8	2.0	10.1	4.3		.5		3.9		3.9	1.4		6.0	.5	.3		.6	18.1	6.7	5.1		17515.2	13563.1	31078.3	5.0	40468.6

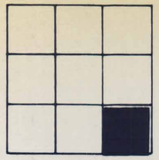
1985 Wash exports to Idaho
Idaho imports fm Wash.



1985 Oreg. exports to Idaho
Idaho imports fm Oreg.

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol. Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops																											10.0	65.2	400.2	465.4	.1	685.5
Livestock																											10.7	35.2	166.9	202.1	-.1	524.9
Food Proc.																											3.2	616.8	516.4	1133.2	.2	1349.5
Textile-Apparel																												24.1	18.1	42.2	-.1	72.5
Mining																											46.4	.8	31.8	32.6	.2	108.6
Forest-Fish																												6.7		6.7	.1	45.7
Lumber-Wood																											9.8	529.7	1600.0	2129.7	.1	3248.1
Plywood																											1.1	158.9	1116.0	1274.9	-4.8	1416.0
Pulp-Paper																											2.8	76.0	567.2	643.2	6.5	862.3
Chemicals																											3.6	39.6	132.4	172.0		267.2
Petrol. Ref.																												4.5		4.5		23.2
Concrete etc.																												65.3	54.1	119.4	3.2	222.2
Iron-Steel																												7.7		7.7	1.6	184.8
Non Ferrous Met.																											.4	4.5	68.4	72.9	-.2	95.0
Aluminum																												5.9	120.7	126.6	1.7	164.1
Fab. Met.-Mach.																											78.9	421.2	529.2	950.4	10.6	1476.5
Electr. Mach.																											.1	36.3	109.1	145.4	.1	177.8
Aircraft-Aerosp.																													22.8	22.8		37.3
Other Manuf.																											95.2	159.6	661.9	821.5	.2	1332.1
Transp. Serv.																											3.9	586.4	44.2	630.6	6.9	1313.3
Electr. Utilities																											2.3	275.3	5.8	281.1	-5.1	688.5
N. Gas Utilities																												96.2		96.2	-.2	209.5
Other Utilities																												61.6		61.6	3.6	104.7
Construction																											.5	425.3	498.4	923.7	.1	1167.7
Trade																											4.5	2490.1	303.2	2793.3	-1.8	3614.8
Services																											5.2	3814.5	621.7	4436.2	.2	6799.0
Subtotal: Purchases	17.5	19.5	71.0		12.0		10.1	1.1	3.8	3.8		.1		39.4		10.2	.1		29.9					38.0		22.0		100074	7588.5	17595.9	23.1	26190.8

1985 Oreg. exports to Idaho
Idaho imports fm Oregon



1985 Idaho Transactions
Mill '72 $

	Crops	Livestock	Food Proc.	Textile-Apparel	Mining	Forest.-Fish.	Lumber-Wood	Plywood	Pulp-Paper	Chemicals	Petrol.-Ref.	Concrete etc.	Iron-Steel	Non Ferrous Met.	Aluminum	Fabr. Met.-Mach.	Electr. Mach	Aircraft-Aerosp.	Other Manuf.	Transp. Serv.	Eletr. Utilities	N. Gas Utilities	Other Utilities	Construction	Trade	Services	Subtotal: Sales	Domestic Final Demand	Exports: Non NW	Total Final Demand	Adjustments	Gross Outlays
	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78						
Crops	11.3	122.8	125.1			.2	3.1													.3				.1		4.4	267.3	7.7	261.0	268.7	.3	551.9
Livestock	27.5	101.9	199.2			2.2																				1.9	332.7	16.6	124.5	141.1	.1	490.0
Food Proc.	.1	33.4	93.1			.6			.3	.5									.1	.5					1.6	.7	130.9	198.3	827.1	1025.4	.1	1166.3
Textile-Apparel	.1			.1		.1								.2													.5		8.4	8.4		9.1
Mining	.9				6.8					3.7		2.0		36.3										2.8			52.5	1.6	58.1	59.7	.1	112.6
Forest-Fish			9.9			.2	29.2																				39.3	.1		.1		39.4
Lumber-Wood		.1	.2		1.1		318.8	35.0	16.3	.1		.1				.2			5.1					10.7	.4		388.2	12.8	806.3	819.1	.2	1245.7
Plywood							22.3	34.6											5.9					3.8			66.6	1.7	105.2	106.9	.1	180.8
Pulp-Paper			13.3	.1					9.2	.1							.6		.2								23.5		174.1	174.1	.2	205.3
Chemicals	20.1	.4	1.2		.6		.6		5.4	39.7		.1		4.0			.6		.6	.1	.1			.7	.5	.4	75.1	25.3	268.1	293.4	.7	387.6
Petrol. Ref.																																
Concrete etc.					.9		.1					1.5												28.9	.5	.4	32.3	2.6	16.4	19.0	.5	53.1
Iron-Steel																																
Non Ferrous Met.										2.4				60.3			.1										62.8		265.1	265.1	.8	330.7
Aluminum																																
Fab. Met.-Mach.	5.7	.2	13.3		3.4		.1					.3				6.1			3.0					27.5	.9	.1	60.6	25.6	19.8	45.4	.3	112.3
Electr. Mach.							.1										5.9		.1	.2					.1	1.3	7.7	8.9	134.7	143.6		151.3
Aircraft-Aerosp.																																
Other Manuf.	.2		10.0				.2									.1			6.8	.2				.1	.7	5.1	23.4	37.3	124.4	161.7	.2	188.9
Transp. Serv.	5.4	13.2	71.7		1.9	.9	24.2	6.4	6.3	6.9		3.3		6.9		1.2	.9		2.0	18.7	2.8	.5		13.2	4.2	2.1	192.7	124.8	2.2	127.0	-.5	338.3
Electr. Utilities	4.2	6.1	5.3	.1	7.4		5.3	3.0	4.2	23.0		.5		5.2		.3	1.9		1.4	2.6	19.2	.1	.1	2.4	20.9	29.2	142.4	77.5	2.7	80.2	-.2	225.8
N. Gas Utilities	.1	.1	10.9		.2		1.6	.3	2.0	5.2		.1		2.3		.1	.2		.1	.4	4.6	21.2		.2	2.0	2.8	54.4	64.1		64.1	-.1	118.4
Other Utilities	.6		.4		.1		.1		.4	.1										.1	.1			.1	.3	.5	2.8	1.1		1.1	.2	4.1
Construction	2.9	2.2	1.8		.3		1.9	.3	.8	.6		.1		.4		.1	.1		.1	3.1	1.7	.4			.8	15.1	32.7	411.4	116.4	527.8	.6	564.7
Trade	15.0	16.5	70.6	.1	2.1	1.1	16.0	4.5	4.1	6.7		.9		3.7		2.2	4.3		3.1	5.5	.6	.2		27.4	9.4	12.5	206.7	625.2	26.0	651.2	-1.2	878.5
Services	36.5	15.2	21.1	.2	2.0	2.3	20.4	1.7	2.0	3.8		.8		1.6		1.6	2.1		3.7	10.4	2.0	.6		7.6	28.9	181.9	346.4	636.0	300.6	936.6	-1.3	1300.0
Subtotal: Purchases	130.6	312.1	647.1	.6	26.8	7.6	444.0	85.8	51.0	92.8		9.7		120.9		11.9	16.7		32.2	42.1	31.1	23.0	.1	125.5	71.2	258.4		2278.6	3641.1	5919.7	1.1	8654.8
Imports: Non NW	79.9	24.0	90.0	2.0	19.1	20.3	398.8	30.3	79.5	114.7		10.1		130.1		33.1	67.4		48.9	77.9	11.5	70.3	.3	158.4	149.3	162.0	1777.9					
Value added	311.8	127.9	342.9	6.3	52.7	12.3	374.1	59.6	56.8	157.8		33.3		31.0		53.9	64.3		72.8	214.1	176.2	31.0	3.7	229.6	656.3	873.6	3942.0					
Adjustments	2.4	-15.1	-53.5	-.2	-.5	-.6	-4.7	2.0	4.1	14.2		-.6		5.4		-.7	1.4		-.9	3.7	6.7	-5.9		-4.9	-5.0	-21.1	-73.8					
Gross Outlays	551.9	490.0	1166.3	9.1	112.6	39.4	1245.7	180.8	205.3	387.6		53.1		330.7		112.3	151.3		188.9	338.3	225.8	118.4	4.1	564.7	878.5	1300.0	8654.8					

APPENDIX B

Table B-1 Detailed Impacts of Washington OBERS Level Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	11.2018859	.0112593	409.8770610	.0112593
2	WA LIVESTOCK	-.0000000	2.3283118	.0049085	77.8263484	.0049085
3	WA FOOD PROCESS	-.0000000	10.7561362	.0051028	161.2345531	.0051028
4	WA TEXTILE APPAREL	-.0000000	.2658627	.0008674	8.1965603	.0008674
5	WA MINING	-.0000000	.1282598	.0011126	4.2423234	.0011126
6	WA FOREST FISH	-.0000000	.2109924	.0005969	2.6563730	.0005969
7	WA LUMBER WOOD	-.0000000	.2037401	.0000807	3.0477381	.0000807
8	WA PLYWOOD	-.0000000	.0189737	.0000359	.3390345	.0000359
9	WA PULP PAPER	-.0000000	1.4376479	.0008215	14.5332706	.0008214
10	WA CHEMICALS	-.0000000	.5552540	.0013892	10.4159918	.0013891
11	WA PETROL REF	-.0000000	.4035059	.0006862	1.0975255	.0006862
12	WA CONCR GLASS ETC	-.0000000	.1805018	.0005544	4.0196223	.0005543
13	WA IRON STEEL	-.0000000	.1453740	.0010429	4.6133599	.0010427
14	WA NONFERROUS	-.0000000	.0384045	.0007457	1.8604397	.0007458
15	WA ALUM	-.0000000	.0582732	.0000677	.7312072	.0000677
16	WA FABR MET MACH	-.0000000	2.7346940	.0023078	73.8507036	.0023073
17	WA ELECTR MACH	-.0000000	.0290234	.0001165	1.1122653	.0001165
18	WA ACFT AEROSP	-.0000000	.4510363	.0001563	9.6343117	.0001563
19	WA OTHER MANUF	-.0000000	.3748642	.0002025	10.1139397	.0002025
20	WA TRANSP SERV	-.0000000	.4878892	.0002414	13.0947009	.0002414
21	WA ELECTR UTILIT	-.0000000	.2340520	.0003081	2.3193829	.0003081
22	WA N GAS UTILIT	-.0000000	.1490056	.0007610	.9282695	.0007610
23	WA OTHER UTILIT	-.0000000	.1039718	.0004065	.4959404	.0004065
24	WA CONSTR	-.0000000	.1721495	.0000466	4.5446894	.0000466
25	WA TRADE	-.0000000	.9691179	.0001508	65.2885447	.0001508
26	WA SERVICES	-.0000000	1.3195994	.0001390	63.2086618	.0001390
27	OR CROPS	39.4000000	68.0993866	.0993427	2248.6418329	.0993427
28	OR LIVESTOCK	-.0000000	55.0325419	.1047867	1503.2230420	.1047867
29	OR FOOD PROC	283.3000000	317.4807354	.2352581	5905.1427215	.2352581
30	OR TEXTILE APPAREL	-.0000000	.5309345	.0073241	49.0693026	.0073241
31	OR MINING	-.0000000	.1671854	.0015395	4.9518592	.0015399
32	OR FOREST FISH	-.0000000	.6331216	.0138539	23.6914441	.0138539
33	OR LUMBER WOOD	-.0000000	2.8593529	.0008803	40.2894985	.0008803
34	OR PLYWOOD	-.0000000	.3972189	.0002805	6.4311019	.0002805
35	OR PULP PAPER	-.0000000	8.8501158	.0102634	104.7008304	.0102638
36	OR CHEMICALS	-.0000000	1.8215716	.0068173	20.4513019	.0068156
37	OR PETROL REF	-.0000000	.2751976	.0118620	7.1165781	.0118619
38	OR CONCRETE ETC	-.0000000	1.4517706	.0065336	33.6768544	.0065334
39	OR IRON STEEL	-.0000000	1.2520172	.0067750	43.9961409	.0067749
40	OR NONFERROUS	-.0000000	.2470528	.0026006	6.3351864	.0026009

Table B-1 Detailed Impacts of Washington OBERS Level Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.0331113	.0002018	.4222601	.0001583
42	OR FABR MET MACH	-.0000000	1.1240850	.0007613	22.5209345	.0007634
43	OR ELECTR MACH	-.0000000	.0189247	.0001064	1.9505686	.0001065
44	OR AIRCRAFT AEROSP	-.0000000	.0070954	.0001902	.3188324	.0001903
45	OR OTHER MANUF	-.0000000	.2824647	.0002120	8.7295837	.0002121
46	OR TRANSP SERV	-.0000000	.9960287	.0007584	25.5184837	.0007593
47	OR ELECTR UTILIT	-.0000000	.4147945	.0006025	4.5119796	.0006007
48	OR N GAS UTILIT	-.0000000	.0646346	.0003085	.6531954	.0003087
49	OR OTHER UTILIT	-.0000000	.1593708	.0015222	1.4519058	.0015222
50	OR CONSTR	-.0000000	.4276881	.0003663	24.6590679	.0003663
51	OR TRADE	-.0000000	1.8101659	.0005008	155.4155842	.0005008
52	OR SERVICES	-.0000000	2.8939622	.0004265	142.6584964	.0004266
53	ID CROPS	-.0000000	2.5380369	.0045987	91.3185682	.0045987
54	ID LIVESTOCK	-.0000000	2.4609243	.0850223	66.4941751	.0850223
55	ID FOOD PROCESS	-.0000000	1.2367078	.0010604	18.9834658	.0010604
56	ID TEXTILE APPAREL	-.0000000	.0250649	.0027544	1.5149214	.0027544
57	ID MINING	-.0000000	.0438825	.0003897	1.8755467	.0003897
58	ID FORESTR FISH	-.0000000	.0129631	.0003290	.1414274	.0003290
59	ID LUMBER WOOD	-.0000000	.0999963	.0000803	.9269748	.0000803
60	ID PLYWOOD	-.0000000	.0106645	.0000590	.1505844	.0000590
61	ID PULP PAPER	-.0000000	.3124104	.0015217	2.2056190	.0015217
62	ID CHEMICALS	-.0000000	1.7933288	.0046268	12.0153032	.0046268
63	ID PETROL REF	-.0000000	.0000300	.0000000	.0000300	.0000000
64	ID CONCR GLASS ETC	-.0000000	.1562515	.0029426	5.2969374	.0029426
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0152564	.0000461	.0778094	.0000461
67	ID ALUM	-.0000000	.0021259	.0425178	.0000213	.0425178
68	ID FABR MET MACH	-.0000000	.4901224	.0043644	23.5651119	.0043644
69	ID ELECTR MACH	-.0000000	.0042940	.0000284	.0468045	.0000284
70	ID ACFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	.0459097	.0002430	2.5599306	.0002430
72	ID TRANSP SERV	-.0000000	.6008209	.0017760	18.2229128	.0017760
73	ID ELECTR UTILIT	-.0000000	.3396326	.0015041	5.2473267	.0015041
74	ID N GAS UTILIT	-.0000000	.0649294	.0005484	.5343692	.0005484
75	ID OTHER UTILIT	-.0000000	.0060738	.0014814	.9880795	.0014814
76	ID CONSTR	-.0000000	.1558186	.0002759	7.9950528	.0002759
77	ID TRADE	-.0000000	1.0095678	.0011492	131.3044461	.0011492
78	ID SERVICES	-.0000000	1.2435754	.0009566	104.1246011	.0009566

Table B-2 Detailed Impacts of Washington State Choice Level of Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	131.1000000	191.4973859	.1924790	7006.8893967	.1924790
2	WA LIVESTOCK	~~-.0000000~~	~~57.1924332~~	.1406604	~~2194.4762182~~	.1406604
3	WA FOOD PROCESS	378.5000000	413.6790900	.1962518	6201.0496205	.1962518
4	WA TEXTILE APPAREL	-.0000000	.6831135	.0022288	21.0604004	.0022288
5	WA MINING	-.0000000	.9106293	.0078979	30.1150190	.0079980
6	WA FORESTR FISH	-.0000000	7.3990633	.0209309	93.1542067	.0209309
7	WA LUMBER WOOD	-.0000000	1.9292768	.0007645	28.8619651	.0007645
8	WA PLYWOOD	-.0000000	.1703009	.0003224	3.0432737	.0003224
9	WA PULP PAPER	-.0000000	10.4662356	.0059804	105.8134945	.0059804
10	WA CHEMICALS	-.0000000	7.5815231	.0189680	142.2293065	.0189680
11	WA PETROL REF	-.0000000	2.9827114	.0050726	8.1129775	.0050726
12	WA CONCR GLASS ETC	-.0000000	5.9118709	.0181569	131.6573609	.0181569
13	WA IRON STEEL	-.0000000	.8330991	.0059763	26.4426293	.0059763
14	WA NONFERROUS	-.0000000	.0490884	.0009532	2.3779897	.0009532
15	WA ALUM	-.0000000	.3518233	.0004090	4.4153789	.0004090
16	WA FABR MET MACH	-.0000000	15.5499555	.0131223	420.0037031	.0131223
17	WA ELECTR MACH	-.0000000	.1176264	.0004720	4.5075415	.0004720
18	WA ACFT AREOSP	-.0000000	.0669120	.0000232	1.4293739	.0000232
19	WA OTHER MANUF	-.0000000	2.0322335	.0010977	54.8297304	.0010977
20	WA TRANSP SERV	-.0000000	12.7309481	.0062990	341.6986390	.0062990
21	WA ELECTR UTILIT	-.0000000	4.8406505	.0063710	47.9649015	.0063710
22	WA N GAS UTILIT	-.0000000	3.6065360	.0184195	22.4687177	.0184195
23	WA OTHER UTILIT	-.0000000	1.9613866	.0076677	9.3558140	.0076677
24	WA CONSTR	-.0000000	3.1613073	.0008555	83.4585117	.0008555
25	WA TRADE	-.0000000	22.6887064	.0035308	1528.5381452	.0035308
26	WA SERVICES	-.0000000	28.3235295	.0029837	1464.0432296	.0029837
27	OR CROPS	-.0000000	4.6707393	.0068136	154.2278792	.0068136
28	OR LIVESTOCK	~~-.0000000~~	~~4.2386697~~	.0036028	~~120.6952867~~	.0040020
29	OR FOOD PROC	-.0000000	2.7350590	.0020267	50.8721907	.0020267
30	OR TEXTILE APPAREL	-.0000000	.0705456	.0009730	6.5191944	.0009731
31	OR MINING	-.0000000	.0845925	.0007789	2.5057196	.0007792
32	OR FOREST FISH	-.0000000	.0092493	.0002024	.3461453	.0002024
33	OR LUMBER WOOD	-.0000000	.3740891	.0001152	5.2721342	.0001152
34	OR PLYWOOD	-.0000000	.0481011	.0000340	.7788818	.0000340
35	OR PULP PAPER	-.0000000	.7752184	.0008990	9.1748180	.0008994
36	OR CHEMICALS	-.0000000	.6248168	.0023384	7.0160585	.0023382
37	OR PETROL REF	-.0000000	.0230551	.0009938	.5962374	.0009938
38	OR CONCRETE ETC	-.0000000	.3760913	.0016926	8.7314389	.0016952
39	OR IRON STEEL	-.0000000	.1276151	.0006906	4.5020136	.0006937
40	OR NONFERROUS	-.0000000	.0210680	.0002218	.5408385	.0002220

Table B-2 Detailed Impacts of Washington State Choice Level of Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.0374478	.0002282	.4775687	.0001790
42	OR FABR MET MACH	-.0000000	1.2712412	.0008610	25.4692011	.0009633
43	OR ELECTR MACH	-.0000000	.0214035	.0001204	2.2173648	.0001205
44	OR AIRCRAFT AEROSP	-.0000000	.0080253	.0002152	.3606180	.0002153
45	OR OTHER MANUF	-.0000000	.3194703	.0002398	9.8732420	.0002399
46	OR TRANSP SERV	-.0000000	1.1265048	.0008578	28.8613099	.0008588
47	OR ELECTR UTILIT	-.0000000	.4691703	.0006814	5.1034607	.0006794
48	OR N GAS UTILIT	-.0000000	.0731057	.0003490	.7388042	.0003492
49	OR OTHER UTILIT	-.0000000	.1802901	.0017220	1.6424856	.0017228
50	OR CONSTR	-.0000000	.4837811	.0004143	27.8932014	.0004144
51	OR TRADE	-.0000000	2.0474928	.0005664	175.7917829	.0005665
52	OR SERVICES	-.0000000	3.2801563	.0004824	161.3614730	.0004825
53	ID CROPS	-.0000000	2.8704117	.0052010	103.2774154	.0052010
54	ID LIVESTOCK	-.0000000	2.7829875	.0056796	75.1963235	.0056796
55	ID FOOD PROCESS	-.0000000	1.3985527	.0011992	21.4677843	.0011992
56	ID TEXTILE APPAREL	-.0000000	.0283634	.0031169	1.7142852	.0031169
57	ID MINING	-.0000000	.0496473	.0004409	2.1219328	.0004409
58	ID FORESTR FISH	-.0000000	.0146600	.0003721	.1599413	.0003721
59	ID LUMBER WOOD	-.0000000	.1131032	.0000908	1.0484768	.0000908
60	ID PLYWOOD	-.0000000	.0120621	.0000667	.1703183	.0000667
61	ID PULP PAPER	-.0000000	.3533105	.0017209	2.4943744	.0017209
62	ID CHEMICALS	-.0000000	2.0294426	.0052359	13.5972659	.0052359
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.1767073	.0033278	5.9903874	.0033278
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0172640	.0000522	.0880485	.0000522
67	ID ALUM	-.0000000	.0024060	.0481198	.0000241	.0481198
68	ID FABR MET MACH	-.0000000	.5542774	.0049357	26.6496645	.0049357
69	ID ELECTR MACH	-.0000000	.0048569	.0000321	.0529406	.0000321
70	ID ACFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	.0519218	.0002749	2.8951644	.0002749
72	ID TRANSP SERV	-.0000000	.6795539	.0020087	20.6108863	.0020087
73	ID ELECTR UTILIT	-.0000000	.3842257	.0017016	5.9362907	.0017016
74	ID N GAS UTILIT	-.0000000	.0734561	.0006204	.6045438	.0006204
75	ID OTHER UTILIT	-.0000000	.0068698	.0016756	1.1175850	.0016756
76	ID CONSTR	-.0000000	.1762896	.0003122	9.0454214	.0003122
77	ID TRADE	-.0000000	1.1420021	.0012999	148.5288580	.0012999
78	ID SERVICES	-.0000000	1.4067274	.0010821	117.7853213	.0010821

Table B-3 Detailed Impacts of Oregon OBERS Level Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	HA CROPS	-.0000000	10.4022036	.0104555	380.6166788	.0104555
2	HA LIVESTOCK	-.0000000	1.8393464	.0046713	72.8779350	.0046713
3	HA FOOD PROCESS	-.0000000	10.0967710	.0047900	151.3506613	.0047900
4	HA TEXTILE APPAREL	-.0000000	.2335053	.0007618	7.1989822	.0007618
5	HA MINING	-.0000000	.1158142	.0010045	3.8306720	.0010046
6	HA FORESTR FISH	-.0000000	.1979968	.0005601	2.4927604	.0005601
7	HA LUMBER WOOD	-.0000000	.1907449	.0000756	2.8533469	.0000756
8	HA PLYWOOD	-.0000000	.0177686	.0000336	.3175020	.0000336
9	HA PULP PAPER	-.0000000	1.3500358	.0007714	13.6476229	.0007713
10	HA CHEMICALS	-.0000000	.5038729	.0012606	9.4521306	.0012606
11	HA PETROL REF	-.0000000	.3405606	.0005792	.9263151	.0005792
12	HA CONCR GLASS ETC	-.0000000	.1690287	.0005191	3.7641292	.0005191
13	HA IRON STEEL	-.0000000	.1343266	.0009636	4.2527775	.0009634
14	HA NONFERROUS	-.0000000	.0355440	.0006902	1.7218619	.0006902
15	HA ALUM	-.0000000	.0538979	.0000627	.6763066	.0000626
16	HA FABR MET MACH	-.0000000	2.5299038	.0021349	68.3204090	.0021346
17	HA ELECTR MACH	-.0000000	.0263242	.0001056	1.0088259	.0001056
18	HA AGRT AREOSP	-.0000000	.4070062	.0001410	8.6938119	.0001410
19	HA OTHER MANUF	-.0000000	.3416815	.0001846	9.2186605	.0001846
20	HA TRANSP SERV	-.0000000	.4555232	.0002254	12.2260173	.0002254
21	HA ELECTR UTILIT	-.0000000	.2176307	.0002865	2.1566534	.0002865
22	HA N GAS UTILIT	-.0000000	.1384074	.0007069	.8622454	.0007069
23	HA OTHER UTILIT	-.0000000	.0966712	.0003779	.4611167	.0003779
24	HA CONSTR	-.0000000	.1593194	.0000433	4.2218196	.0000433
25	HA TRADE	-.0000000	.9031321	.0001405	60.8431590	.0001405
26	HA SERVICES	-.0000000	1.2272141	.0001293	63.4333803	.0001293
27	OR CROPS	24.4000000	51.0083648	.0744105	1684.2962830	.0744105
28	OR LIVESTOCK	-.0000000	5.1676218	.0374807	1471.8450224	.0374807
29	OR FOOD PROC	267.3000000	299.4892364	.2219261	5570.4998983	.2219261
30	OR TEXTILE APPAREL	-.0000000	.4621464	.0063744	42.7070332	.0063744
31	OR MINING	-.0000000	.1504512	.0013858	4.4562158	.0013858
32	OR FOREST FISH	-.0000000	.5966818	.0130565	22.3278633	.0130565
33	OR LUMBER WOOD	-.0000000	2.6471139	.0008150	37.2989228	.0008150
34	OR PLYWOOD	-.0000000	.3538731	.0002499	5.7293193	.0002499
35	OR PULP PAPER	-.0000000	8.3200719	.0096467	98.4299910	.0096490
36	OR CHEMICALS	-.0000000	1.5053676	.0056339	16.9007385	.0056323
37	OR PETROL REF	-.0000000	.2164337	.0093290	5.5969453	.0093290
38	OR CONCRETE ETC	-.0000000	1.3455747	.0060557	31.2129095	.0060601
39	OR IRON STEEL	-.0000000	1.1494656	.0062201	40.3920939	.0062236
40	OR NONFERROUS	-.0000000	.2286394	.0024067	5.8629941	.0024070

Table B-3 Detailed Impacts of Oregon OBERS Level Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.1037571	.0006323	.9076689	.0003402
42	OR FABR MET MACH	-.0000000	12.0070452	.0081321	239.9831201	.0081349
43	OR ELECTR MACH	-.0000000	.1537592	.0008648	15.9152834	.0008649
44	OR AIRCRAFT AEROSP	-.0000000	.0828219	.0022204	3.7198104	.0022206
45	OR OTHER MANUF	-.0000000	2.8237109	.0021197	87.2545575	.0021198
46	OR TRANSP SERV	-.0000000	15.2239710	.0115922	389.6294051	.0115936
47	OR ELECTR UTILIT	-.0000000	3.0841922	.0044796	33.5983984	.0044729
48	OR N GAS UTILIT	-.0000000	1.3481532	.0064351	13.6168052	.0064353
49	OR OTHER UTILIT	-.0000000	.6521738	.0062290	5.9413463	.0062290
50	OR CONSTR	-.0000000	4.3880395	.0037578	252.9733147	.0037579
51	OR TRADE	-.0000000	15.9834794	.0044217	1372.1971197	.0044217
52	OR SERVICES	-.0000000	29.3535696	.0043173	1443.9131860	.0043174
53	ID CROPS	-.0000000	1.1137742	.0020181	40.0735973	.0020181
54	ID LIVESTOCK	-.0000000	1.4113693	.0028863	38.1351962	.0028831
55	ID FOOD PROCESS	-.0000000	.7494158	.0006426	11.5035322	.0006426
56	ID TEXTILE APPAREL	-.0000000	.0083820	.0009211	.5066104	.0009211
57	ID MINING	-.0000000	.0139729	.0001241	.5972120	.0001241
58	ID FORESTR FISH	-.0000000	.0079209	.0002010	.0864173	.0002010
59	ID LUMBER WOOD	-.0000000	.0637268	.0000512	.5907535	.0000512
60	ID PLYWOOD	-.0000000	.0099065	.0000548	.1398304	.0000548
61	ID PULP PAPER	-.0000000	.1259788	.0006136	.8894102	.0006136
62	ID CHEMICALS	-.0000000	.7758399	.0020017	5.1981264	.0020017
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.0244152	.0004598	.8276928	.0004598
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0100560	.0000304	.0512373	.0000304
67	ID ALUM	-.0000000	.0001307	.0026139	.0000013	.0026139
68	ID FABR MET MACH	-.0000000	.1929959	.0017186	9.2792685	.0017186
69	ID ELCTR MACH	-.0000000	.0012658	.0000084	.0137971	.0000084
70	ID AGRT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	.0322898	.0001709	1.8004822	.0001709
72	ID TRANSP SERV	-.0000000	.3494553	.0010330	10.5989905	.0010330
73	ID ELECTR UTILIT	-.0000000	.1376345	.0006095	2.1264552	.0006095
74	ID N GAS UTILIT	-.0000000	.0310325	.0002621	.2553978	.0002621
75	ID OTHER UTILIT	-.0000000	.0027857	.0006794	.4531787	.0006794
76	ID CONSTR	-.0000000	.1451108	.0002570	7.4456370	.0002570
77	ID TRADE	-.0000000	.5244218	.0005970	68.2063406	.0005970
78	ID SERVICES	-.0000000	.6799212	.0005230	56.9298207	.0005230

Table B-4 Detailed Impacts of Oregon State Choice Level of Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	115.8000000	169.2037381	.1700711	6191.1648177	.1700711
2	WA LIVESTOCK	~~-.0630080~~	~~-56.5741739~~	~~-.1243331~~	~~1943.5313330~~	~~-.1243331~~
3	WA FOOD PROCESS	334.7000000	365.8081276	.1735415	5483.4638867	.1735415
4	WA TEXTILE APPAREL	-.0000000	.6036973	.0019696	18.6119975	.0019696
5	WA MINING	-.0000000	.8051018	.0069827	26.6251651	.0069828
6	WA FORESTR FISH	-.0000000	6.5428037	.0185086	82.3738979	.0185086
7	WA LUMBER WOOD	-.0000000	1.7056939	.0006759	25.5171674	.0006759
8	WA PLYWOOD	-.0000000	.1505646	.0002850	2.6905878	.0002850
9	WA PULP PAPER	-.0000000	9.2546650	.0052881	93.5645330	.0052881
10	WA CHEMICALS	-.0000000	6.6998709	.0167622	125.6895190	.0167622
11	WA PETROL REF	-.0000000	2.6364825	.0044838	7.1712348	.0044838
12	WA CONCR GLASS ETC	-.0000000	5.2275869	.0160552	116.4183573	.0160552
13	WA IRON STEEL	-.0000000	.7365753	.0052839	23.3789842	.0052839
14	WA NONFERROUS	-.0000000	.0434032	.0008428	2.1025840	.0008428
15	WA ALUM	-.0000000	.3110801	.0003616	3.9040523	.0003616
16	WA FABR MET MACH	-.0000000	13.7502677	.0116036	371.3942053	.0116036
17	WA ELECTR MACH	-.0000000	.1040005	.0004173	3.9853837	.0004173
18	WA AGRI AEROSP	-.0000000	.0591575	.0000205	1.2637237	.0000205
19	WA OTHER MANUF	-.0000000	1.7967577	.0009705	48.4766396	.0009705
20	WA TRANSP SERV	-.0000000	11.2561552	.0055693	302.1151981	.0055693
21	WA ELECTR UTILIT	-.0000000	4.2789125	.0056324	42.4040236	.0056324
22	WA N GAS UTILIT	-.0000000	3.1889938	.0162870	19.8674300	.0162870
23	WA OTHER UTILIT	-.0000000	1.7335355	.0067769	8.2689645	.0067769
24	WA CONSTR	-.0000000	2.7939922	.0007561	73.7613933	.0007561
25	WA TRADE	-.0000000	20.0575066	.0031213	1351.2742171	.0031213
26	WA SERVICES	-.0000000	25.0381491	.0026376	1294.2219200	.0026376
27	OR CROPS	-.0000000	4.1299563	.0060247	136.3712163	.0060247
28	OR LIVESTOCK	~~-.0010000~~	~~3.7145494~~	~~.0670767~~	~~106.7190149~~	~~.0670767~~
29	OR FOOD PROC	-.0000000	2.4185514	.0017922	44.9851388	.0017922
30	OR TEXTILE APPAREL	-.0000000	.0623517	.0008600	5.7619836	.0008600
31	OR MINING	-.0000000	.0747908	.0006687	2.2153846	.0006689
32	OR FOREST FISH	-.0000000	.0081786	.0001790	.3060735	.0001790
33	OR LUMBER WOOD	-.0000000	.3307616	.0001018	4.6515083	.0001019
34	OR PLYWOOD	-.0000000	.0425304	.0000300	.6896785	.0000300
35	OR PULP PAPER	-.0000000	.6854679	.0007949	8.1126074	.0007953
36	OR CHEMICALS	-.0000000	.5522361	.0020668	6.2010502	.0020666
37	OR PETROL REF	-.0000000	.0203844	.0006786	.5271692	.0006787
38	OR CONCRETE ETC	-.0000000	.3325591	.0014967	7.7207809	.0014930
39	OR IRON STEEL	-.0000000	.1128386	.0006106	3.9807254	.0006133
40	OR NONFERROUS	-.0000000	.0186269	.0001961	.4781730	.0001963

Table B-4 Detailed Impacts of Oregon State Choice Level of Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.1137480	.0006932	.9995160	.0003746
42	OR FABR MET MACH	-.0000000	13.0129539	.0088134	260.0895040	.0088165
43	OR ELECTR MACH	-.0000000	.1711128	.0009624	17.7114895	.0009626
44	OR AIRCRAFT AEROSP	-.0000000	.0902661	.0024200	4.0541569	.0024202
45	OR OTHER MANUF	-.0000000	3.1177080	.0023404	96.3392704	.0023405
46	OR TRANSP SERV	-.0000000	16.3494116	.0124491	418.4345261	.0124507
47	OR ELECTR UTILIT	-.0000000	3.4097073	.0049524	37.1450231	.0049451
48	OR N GAS UTILIT	-.0000000	1.4493401	.0069181	14.6388432	.0069183
49	OR OTHER UTILIT	-.0000000	.7706541	.0073606	7.0207063	.0073606
50	OR CONSTR	-.0000000	5.0126968	.0042928	288.9851412	.0042928
51	OR TRADE	-.0000000	17.6315383	.0048776	1513.6889215	.0048777
52	OR SERVICES	-.0000000	33.6914313	.0049554	1657.2938221	.0049554
53	ID CROPS	-.0000000	1.2160237	.0022033	43.7525349	.0022033
54	ID LIVESTOCK	-.0000000	1.5416123	.0031461	41.6543657	.0031461
55	ID FOOD PROCESS	-.0000000	.8027912	.0006884	12.3228445	.0006884
56	ID TEXTILE APPAREL	-.0000000	.0101542	.0011158	.6137181	.0011158
57	ID MINING	-.0000000	.0169665	.0001507	.7251587	.0001507
58	ID FORESTR FISH	-.0000000	.0085353	.0002166	.0931199	.0002166
59	ID LUMBER WOOD	-.0000000	.0702200	.0000564	.6509464	.0000564
60	ID PLYWOOD	-.0000000	.0115777	.0000640	.1634779	.0000640
61	ID PULP PAPER	-.0000000	.1342642	.0006540	.9479055	.0006540
62	ID CHEMICALS	-.0000000	.9946506	.0025667	6.6654981	.0025667
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.0271853	.0005120	.9216013	.0005120
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0120740	.0000365	.0615794	.0000365
67	ID ALUM	-.0000000	.0001407	.0028148	.0000814	.0028148
68	ID FABR MET MACH	-.0000000	.2151209	.0019156	10.3430436	.0019156
69	ID ELECTR MACH	-.0000000	.0014266	.0000094	.0155506	.0000094
70	ID AEFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	.0359491	.0001903	2.0045304	.0001903
72	ID TRANSP SERV	-.0000000	.3837858	.0011345	11.6402343	.0011345
73	ID ELECTR UTILIT	-.0000000	.1632170	.0007228	2.5217044	.0007228
74	ID N GAS UTILIT	-.0000000	.0365642	.0003088	.3009234	.0003088
75	ID OTHER UTILIT	-.0000000	.0031125	.0007592	.5063457	.0007592
76	ID CONSTR	-.0000000	.1684270	.0002983	8.6419905	.0002983
77	ID TRADE	-.0000000	.5880693	.0006694	76.4843386	.0006694
78	ID SERVICES	-.0000000	.7755979	.0005966	64.9408278	.0005966

Table B-5 Detailed Impacts of Idaho OBERS Level Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	HA CROPS	-.0000000	4.8888963	.0049140	178.8846999	.0049140
2	HA LIVESTOCK	-.0000000	1.4802573	.0036406	56.7974619	.0036406
3	HA FOOD PROCESS	-.0000000	7.1190572	.0033773	106.7146424	.0033773
4	HA TEXTILE APPAREL	-.0000000	.1594316	.0005202	4.9152741	.0005202
5	HA MINING	-.0000000	.0434062	.0003765	1.4353869	.0003764
6	HA FORESTR FISH	-.0000000	.1581314	.0004473	1.9908519	.0004473
7	HA LUMBER WOOD	-.0000000	.2874502	.0001139	4.3000395	.0001139
8	HA PLYWOOD	-.0000000	.0274170	.0000519	.4899160	.0000519
9	HA PULP PAPER	-.0000000	2.1082112	.0012046	21.3127340	.0012046
10	HA CHEMICALS	-.0000000	.7314940	.0018301	13.7222949	.0018300
11	HA PETROL REF	-.0000000	.7133031	.0012131	1.9401688	.0012131
12	HA CONCR GLASS ETC	-.0000000	.1146123	.0003520	2.5522514	.0003520
13	HA IRON STEEL	-.0000000	.1886124	.0013530	5.9856547	.0013528
14	HA NONFERROUS	-.0000000	.0207008	.0004020	1.0026988	.0004019
15	HA ALUM	-.0000000	.0806173	.0000937	1.0116282	.0000937
16	HA FABR MET MACH	-.0000000	3.8525817	.0032511	104.0453809	.0032507
17	HA ELECTR MACH	-.0000000	.0251818	.0001011	.9649721	.0001011
18	HA AGRT AEROSP	-.0000000	.0388145	.0000135	.8290702	.0000135
19	HA OTHER MANUF	-.0000000	1.6038195	.0008663	43.2709849	.0008663
20	HA TRANSP SERV	-.0000000	.3783287	.0001872	10.1540882	.0001872
21	HA ELECTR UTILIT	-.0000000	.1944624	.0002560	1.9270448	.0002560
22	HA N GAS UTILIT	-.0000000	.1498024	.0007651	.9332333	.0007650
23	HA OTHER UTILIT	-.0000000	.0623821	.0002439	.2975569	.0002439
24	HA CONSTR	-.0000000	.1054766	.0000285	2.7945208	.0000285
25	HA TRADE	-.0000000	.6454059	.0001004	43.4800398	.0001004
26	HA SERVICES	-.0000000	.9405189	.0000991	48.6139326	.0000991
27	OR CROPS	-.0000000	2.0368909	.0029714	67.2531181	.0029714
28	OR LIVESTOCK	-.0000000	2.4026205	.0345773	63.0272725	.0345773
29	OR FOOD PROC	-.0000000	.8703568	.0006449	16.1886015	.0006449
30	OR TEXTILE APPAREL	-.0000000	.0387990	.0005352	3.5854049	.0005352
31	OR MINING	-.0000000	.0604317	.0005565	1.7893929	.0005565
32	OR FOREST FISH	-.0000000	.0079036	.0001729	.2957258	.0001729
33	OR LUMBER WOOD	-.0000000	.5630424	.0001733	7.9323145	.0001733
34	OR PLYWOOD	-.0000000	.1984597	.0001402	3.2129732	.0001402
35	OR PULP PAPER	-.0000000	.9323272	.0010812	11.0262572	.0010809
36	OR CHEMICALS	-.0000000	.4864882	.0018207	5.4587240	.0018192
37	OR PETROL REF	-.0000000	.0141512	.0006100	.3658673	.0006098
38	OR CONCRETE ETC	-.0000000	.0859787	.0003869	1.9353388	.0003874
39	OR IRON STEEL	-.0000000	.8500718	.0046000	29.8548621	.0046000
40	OR NONFERROUS	-.0000000	.0786273	.0008277	2.0159997	.0008277

Table B-5 Detailed Impacts of Idaho OBERS Level Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.0592521	.0003611	.2218025	.0000831
42	OR FABR MET MACH	-.0000000	8.0026208	.0054200	159.9329350	.0054214
43	OR ELECTR MACH	-.0000000	.0775750	.0004363	8.0292310	.0004364
44	OR AIRCRAFT AEROSP	-.0000000	.0066914	.0001794	.3004895	.0001794
45	OR OTHER MANUF	-.0000000	12.2204923	.0091739	377.6132775	.0091739
46	OR TRANSP SERV	-.0000000	1.0625620	.0008091	27.1872318	.0008090
47	OR ELECTR UTILIT	-.0000000	.4815562	.0006994	5.2197348	.0006949
48	OR N GAS UTILIT	-.0000000	.1027699	.0004905	1.0378931	.0004905
49	OR OTHER UTILIT	-.0000000	.0525030	.0005015	.4783426	.0005015
50	OR CONSTR	-.0000000	.2846245	.0002437	16.4063916	.0002437
51	OR TRADE	-.0000000	1.5489486	.0004285	132.9773550	.0004285
52	OR SERVICES	-.0000000	2.4975000	.0003673	122.8495660	.0003673
53	ID CROPS	66.1000000	117.5495393	.2129907	4229.4342234	.2129907
54	ID LIVESTOCK	-.0000000	70.4546603	.1437850	1904.6849243	.1437850
55	ID FOOD PROCESS	262.9000000	291.1460228	.2496446	4469.1221497	.2496446
56	ID TEXTILE APPAREL	-.0000000	.0330405	.0036308	1.9969705	.0036308
57	ID MINING	-.0000000	.2819461	.0025040	12.0503733	.0025040
58	ID FORESTR FISH	-.0000000	2.5038937	.0635506	27.3174798	.0635506
59	ID LUMBER WOOD	-.0000000	.7034353	.0005647	6.5208333	.0005647
60	ID PLYWOOD	-.0000000	.1412826	.0007814	1.9349081	.0007814
61	ID PULP PAPER	-.0000000	3.5035456	.0170655	24.7350278	.0170655
62	ID CHEMICALS	-.0000000	5.5641986	.0143555	37.2801285	.0143555
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.1293993	.0024369	4.3866370	.0024369
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0458079	.0001385	.2336201	.0001385
67	ID ALUM	-.0000000	.0000614	.0012285	.0000006	.0012285
68	ID FABR MET MACH	-.0000000	5.0341913	.0448281	242.0439211	.0448281
69	ID ELECTR MACH	-.0000000	.0394257	.0002606	.4297400	.0002606
70	ID AGFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	2.7433499	.0145228	152.9691843	.0145228
72	ID TRANSP SERV	-.0000000	22.8588908	.0675699	693.3101449	.0675699
73	ID ELECTR UTILIT	-.0000000	5.2273912	.0231505	80.7631903	.0231505
74	ID N GAS UTILIT	-.0000000	3.7872546	.0319869	31.1691051	.0319869
75	ID OTHER UTILIT	-.0000000	.2824513	.0388906	45.9491705	.0388906
76	ID CONSTR	-.0000000	1.9365753	.0034294	99.3656740	.0034294
77	ID TRADE	-.0000000	24.5592089	.0279558	3194.1706583	.0279558
78	ID SERVICES	-.0000000	20.0380549	.0154139	1677.7862946	.0154139

Table B-6 Detailed Impacts of Idaho State Choice Level of Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	HA CROPS	-.0000000	5.4815412	.0355096	200.5695763	.0055036
2	HA LIVESTOCK	-.0000000	1.6592742	.0640889	63.6663393	.0043889
3	HA FOOD PROCESS	-.0000000	7.9773355	.0037845	119.5802303	.0037845
4	HA TEXTILE APPAREL	-.0000000	.1803564	.0005864	5.5503859	.0005864
5	HA MINING	-.0000000	.0438792	.0004239	1.6163639	.0004239
6	HA FORESTR FISH	-.0000000	.1771889	.0005012	2.2307830	.0005012
7	HA LUMBER WOOD	-.0000000	.3220480	.0001276	4.8175953	.0001276
8	HA PLYWOOD	-.0000000	.0307136	.0000581	.5488236	.0000581
9	HA PULP PAPER	-.0000000	2.3613069	.0013492	23.8713700	.0013492
10	HA CHEMICALS	-.0000000	.8270567	.0020692	15.5149853	.0020691
11	HA PETROL REF	-.0000000	.8081537	.0013744	2.1981604	.0013744
12	HA CONCR GLASS ETC	-.0000000	.1284796	.0003946	2.8610567	.0003946
13	HA IRON STEEL	-.0000000	.2119734	.0015206	6.7270212	.0015204
14	HA NONFERROUS	-.0000000	.0232602	.0004517	1.1266691	.0004516
15	HA ALUM	-.0000000	.0906196	.0001053	1.1371429	.0001053
16	HA FABR MET MACH	-.0000000	4.3311497	.0036550	116.9698851	.0036545
17	HA ELECTR MACH	-.0000000	.0283015	.0001136	1.0845180	.0001136
18	HA AGFT AREOSP	-.0000000	.0436554	.0000151	.9324710	.0000151
19	HA OTHER MANUF	-.0000000	1.7970704	.0009707	48.4848867	.0009707
20	HA TRANSP SERV	-.0000000	.4242703	.0002099	11.3871296	.0002099
21	HA ELECTR UTILIT	-.0000000	.2182746	.0002873	2.1630137	.0002873
22	HA N GAS UTILIT	-.0000000	.1682935	.0008595	1.0493656	.0008594
23	HA OTHER UTILIT	-.0000000	.0699650	.0002735	.3337266	.0002735
24	HA CONSTR	-.0000000	.1183477	.0000320	3.1243108	.0000320
25	HA TRADE	-.0000000	.7238039	.0001126	48.7615915	.0001126
26	HA SERVICES	-.0000000	1.0553339	.0001112	54.5516389	.0001112
27	OR CROPS	-.0000000	2.2873344	.0033367	75.5277611	.0033367
28	OR LIVESTOCK	-.0000000	2.7012102	.0051462	77.6859830	.0051462
29	OR FOOD PROC	-.0000000	.9762161	.0007234	18.1575815	.0007234
30	OR TEXTILE APPAREL	-.0000000	.0435149	.0006002	4.0212062	.0006002
31	OR MINING	-.0000000	.0684055	.0006299	2.0254966	.0006299
32	OR FOREST FISH	-.0000000	.0088574	.0001938	.3314141	.0001938
33	OR LUMBER WOOD	-.0000000	.6308520	.0001942	8.6876296	.0001942
34	OR PLYWOOD	-.0000000	.2223431	.0001570	3.5996351	.0001570
35	OR PULP PAPER	-.0000000	1.0446687	.0012115	12.3548514	.0012111
36	OR CHEMICALS	-.0000000	.5512622	.0020631	6.1855672	.0020614
37	OR PETROL REF	-.0000000	.0159068	.0006856	.4112549	.0006855
38	OR CONCRETE ETC	-.0000000	.0965998	.0004347	2.2418098	.0004353
39	OR IRON STEEL	-.0000000	.9554057	.0051699	33.5541889	.0051700
40	OR NONFERROUS	-.0000000	.0883128	.0009296	2.2643324	.0009296

Table B-6 Detailed Impacts of Idaho State Choice Level of Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.0666395	.0004061	.2489295	.0000933
42	OR FABR MET MACH	-.0000000	9.0007443	.0060960	179.8803603	.0060975
43	OR ELECTR MACH	-.0000000	.0871279	.0004900	9.0179829	.0004901
44	OR AIRCRAFT AEROSP	-.0000000	.0075213	.0002016	.3377570	.0002016
45	OR OTHER MANUF	-.0000000	13.6892636	.0102765	422.9983166	.0102765
46	OR TRANSP SERV	-.0000000	1.1934255	.0009087	30.5355070	.0009086
47	OR ELECTR UTILIT	-.0000000	.5421680	.0007875	5.8767547	.0007824
48	OR N GAS UTILIT	-.0000000	.1155371	.0005515	1.1668305	.0005514
49	OR OTHER UTILIT	-.0000000	.0591476	.0005649	.5388288	.0005649
50	OR CONSTR	-.0000000	.3203277	.0002743	18.4643974	.0002743
51	OR TRADE	-.0000000	1.7418425	.0004819	149.5372821	.0004819
52	OR SERVICES	-.0000000	2.8138074	.0004139	138.4083960	.0004138
53	ID CROPS	76.0000000	133.6911722	.2422380	4810.2083753	.2422380
54	ID LIVESTOCK	-.0000000	~~79.0283844~~	~~.1612824~~	~~2435.3469445~~	.1612824
55	ID FOOD PROCESS	294.4000000	326.0434132	.2795656	5004.7663926	.2795656
56	ID TEXTILE APPAREL	-.0000000	.0374523	.0041156	2.2636163	.0041156
57	ID MINING	-.0000000	.3202272	.0028439	13.6865111	.0028439
58	ID FORESTR FISH	-.0000000	2.8040198	.0711680	30.5918556	.0711680
59	ID LUMBER WOOD	-.0000000	.7886389	.0006331	7.3106694	.0006331
60	ID PLYWOOD	-.0000000	.1584121	.0008762	2.2367763	.0008762
61	ID PULP PAPER	-.0000000	3.9235154	.0191111	27.7000140	.0191111
62	ID CHEMICALS	-.0000000	6.3180510	.0163004	42.3309391	.0163004
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.1457883	.0027455	4.9422257	.0027455
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0519728	.0001572	.2650610	.0001572
67	ID ALUM	-.0000000	.0000689	.0013774	.0000007	.0013774
68	ID FABR MET MACH	-.0000000	5.6610888	.0504104	272.1851540	.0504104
69	ID ELCTR MACH	-.0000000	.0443605	.0002932	.4835297	.0002932
70	ID AGFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	3.0735562	.0162708	171.3814898	.0162708
72	ID TRANSP SERV	-.0000000	25.6270887	.0757526	777.2595862	.0757526
73	ID ELECTR UTILIT	-.0000000	5.8849305	.0260626	90.9221721	.0260626
74	ID N GAS UTILIT	-.0000000	4.2444022	.0358480	34.9314299	.0358480
75	ID OTHER UTILIT	-.0000000	.3168309	.0777636	51.8674068	.0777636
76	ID CONSTR	-.0000000	2.1827755	.0038654	111.9982088	.0038654
77	ID TRADE	-.0000000	27.5684468	.0313813	3585.5521436	.0313813
78	ID SERVICES	-.0000000	22.6080686	.0173908	1892.9735427	.0173908

Table B-7 Detailed Economic Impacts of Region OBERS Level Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	HA CROPS	103.4000000	169.1454824	.1700125	6189.0332696	.1700125
2	HA LIVESTOCK	-.0000000	51.5586962	.1268845	1973.3072852	.1268845
3	HA FOOD PROCESS	319.1000000	365.7918961	.1735338	5483.2206115	.1735338
4	HA TEXTILE APPAREL	-.0000000	.9356636	.0030527	28.8465282	.0030527
5	HA MINING	-.0000000	.9147036	.0079332	30.2502950	.0079335
6	HA FOREST FISH	-.0000000	6.5881033	.0186368	82.9441793	.0186368
7	HA LUMBER WOOD	-.0000000	2.0819799	.0008250	31.1460012	.0008250
8	HA PLYWOOD	-.0000000	.1867258	.0003534	3.3367397	.0003534
9	HA PULP PAPER	-.0000000	12.2278203	.0069869	123.6206641	.0069868
10	HA CHEMICALS	-.0000000	7.3602183	.0184144	138.0765994	.0184142
11	HA PETROL REF	-.0000000	3.4725924	.0059058	9.4454284	.0059058
12	HA CONCR GLASS ETC	-.0000000	5.2555460	.0161411	117.0407066	.0161411
13	HA IRON STEEL	-.0000000	1.0140701	.0072745	32.1850431	.0072742
14	HA NONFERROUS	-.0000000	.0964805	.0018734	4.6737025	.0018735
15	HA ALUM	-.0000000	.4274807	.0004970	5.3646530	.0004969
16	HA FABR MET MACH	-.0000000	19.3843151	.0163581	523.5451457	.0163573
17	HA ELECTR MACH	-.0000000	.1488805	.0005974	5.7052637	.0005975
18	HA ADFT AREOSP	-.0000000	.4992238	.0001695	10.4500806	.0001695
19	HA OTHER MANUF	-.0000000	3.6216374	.0019563	97.7119143	.0019563
20	HA TRANSP SERV	-.0000000	11.4703258	.0056753	307.8630650	.0056753
21	HA ELECTR UTILIT	-.0000000	4.4292334	.0058302	43.8935616	.0058302
22	HA N GAS UTILIT	-.0000000	3.3140380	.0169256	20.6463882	.0169256
23	HA OTHER UTILIT	-.0000000	1.7619459	.0068880	8.4044716	.0068860
24	HA CONSTR	-.0000000	2.8447280	.0007698	75.1007054	.0007698
25	HA TRADE	-.0000000	20.3443605	.0031659	1370.5977808	.0031659
26	HA SERVICES	-.0000000	25.5876543	.0026955	1322.6230881	.0026955
27	OR CROPS	18.9000000	50.9740343	.0743604	1683.1627286	.0743604
28	OR LIVESTOCK	-.0000000	56.2460368	.1071557	1615.9466861	.1071557
29	OR FOOD PROC	264.5000000	299.4951055	.2219304	5570.6091053	.2219304
30	OR TEXTILE APPAREL	-.0000000	.5376098	.0074153	49.6806573	.0074153
31	OR MINING	-.0000000	.2755915	.0025377	8.1523784	.0025383
32	OR FOREST FISH	-.0000000	.6057691	.0132553	22.6679142	.0132554
33	OR LUMBER WOOD	-.0000000	3.4707880	.0010686	48.9045370	.0010686
34	OR PLYWOOD	-.0000000	.5789317	.0004089	9.3730322	.0004089
35	OR PULP PAPER	-.0000000	9.7972146	.0113617	115.9046860	.0113621
36	OR CHEMICALS	-.0000000	2.3884153	.0089387	26.8124540	.0089355
37	OR PETROL REF	-.0000000	.2296890	.0099004	5.9396703	.0099002
38	OR CONCRETE ETC	-.0000000	1.7230133	.0077543	39.9750982	.0077613
39	OR IRON STEEL	-.0000000	2.0715017	.0112094	72.7906199	.0112155
40	OR NONFERROUS	-.0000000	.3197788	.0033661	8.2003323	.0033666

Table B-7 Detailed Economic Impacts of Region OBERS Level Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.1911072	.0011646	1.5034542	.0005635
42	OR FABR MET MACH	-.0000000	20.7389562	.0140460	414.5431558	.0140521
43	OR ELECTR MACH	-.0000000	.2436663	.0013705	25.2226173	.0013708
44	OR AIRCRAFT AREOSP	-.0000000	.0943011	.0025282	4.2354782	.0025284
45	OR OTHER MANUF	-.0000000	15.1486121	.0113720	468.0953711	.0113721
46	OR TRANSP SERV	-.0000000	16.9758813	.0129261	434.4843396	.0129283
47	OR ELECTR UTILIT	-.0000000	3.8629033	.0056106	42.0489979	.0055979
48	OR N GAS UTILIT	-.0000000	1.4886190	.0071056	15.0357806	.0071059
49	OR OTHER UTILIT	-.0000000	.8151844	.0077859	7.4264029	.0077860
50	OR CONSTR	-.0000000	4.8843574	.0041829	281.5864778	.0041829
51	OR TRADE	-.0000000	18.7822781	.0051959	1612.4858636	.0051960
52	OR SERVICES	-.0000000	33.2370701	.0048885	1634.9487065	.0049886
53	ID CROPS	63.1000000	117.6134498	.2131064	4231.7319250	.2131065
54	ID LIVESTOCK	-.0000000	~~23.5517549~~	~~.1501056~~	~~1887.1664195~~	~~.1501056~~
55	ID FOOD PROCESS	261.2000000	291.1684428	.2496621	4469.4355971	.2496621
56	ID TEXTILE APPAREL	-.0000000	.0630517	.0069288	3.8108464	.0069288
57	ID MINING	-.0000000	.3280444	.0029134	14.0206370	.0029134
58	ID FORESTR FISH	-.0000000	2.5076669	.0636464	27.3586459	.0636464
59	ID LUMBER WOOD	-.0000000	.8540408	.0006856	7.9169616	.0006856
60	ID PLYWOOD	-.0000000	.1595649	.0008825	2.2530561	.0008825
61	ID PULP PAPER	-.0000000	3.9020533	.0190066	27.5484942	.0190066
62	ID CHEMICALS	-.0000000	7.7568761	.0200126	51.9710673	.0200126
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.2996460	.0056431	10.1580288	.0056431
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0680473	.0002058	.3470443	.0002058
67	ID ALUM	-.0000000	.0021252	.0425031	.0000213	.0425031
68	ID FABR MET MACH	-.0000000	5.6242275	.0500822	270.4129111	.0500822
69	ID ELCTR MACH	-.0000000	.0441613	.0002919	.4813568	.0002919
70	ID ACFT AREOSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	2.7935075	.0148148	156.0447860	.0148148
72	ID TRANSP SERV	-.0000000	23.5812655	.0697052	715.2197949	.0697052
73	ID ELECTR UTILIT	-.0000000	5.5992419	.0247974	86.5082891	.0247974
74	ID N GAS UTILIT	-.0000000	3.8481469	.0325012	31.6702487	.0325012
75	ID OTHER UTILIT	-.0000000	.2857543	.0596962	46.4565038	.0696962
76	ID CONSTR	-.0000000	2.1882892	.0038751	112.2811181	.0038751
77	ID TRADE	-.0000000	25.7675091	.0293313	3351.3222703	.0293313
78	ID SERVICES	-.0000000	21.5060643	.0165431	1800.7027709	.0165431

Table B-8 Detailed Economic Impacts of Region State Choice Level Irrigation, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	117.3000000	191.4723709	.1924539	7005.9741314	.1924539
2	WA LIVESTOCK	-.0633339	5.8235228	.1433436	2236.3388848	.1433436
3	WA FOOD PROCESS	361.3000000	413.7353199	.1962784	6201.8925435	.1962784
4	WA TEXTILE APPAREL	-.0000000	1.0624790	.0034665	32.7562490	.0034665
5	WA MINING	-.0000000	1.0337450	.0089657	34.1871137	.0089660
6	WA FORESTR FISH	-.0000000	7.4503075	.0210758	93.7993261	.0210758
7	WA LUMBER WOOD	-.0000000	2.3442747	.0009289	35.0698860	.0009289
8	WA PLYWOOD	-.0000000	.2101764	.0003978	3.7557962	.0003978
9	WA PULP PAPER	-.0000000	13.7380012	.0078498	138.8883103	.0078497
10	WA CHEMICALS	-.0000000	8.3372335	.0206589	156.4064124	.0206587
11	WA PETROL REF	-.0000000	3.9561948	.0067282	10.7608245	.0067292
12	WA CONCR GLASS ETC	-.0000000	5.9436169	.0182544	132.3640132	.0182543
13	WA IRON STEEL	-.0000000	1.1409262	.0081845	36.2112915	.0081842
14	WA NONFERROUS	-.0000000	.1072748	.0020830	5.1966016	.0020831
15	WA ALUM	-.0000000	.4809323	.0005592	6.0360732	.0005591
16	WA FABR MET MACH	-.0000000	21.8003793	.0183969	588.8003268	.0183961
17	WA ELECTR MACH	-.0000000	.1677179	.0006730	6.4271338	.0006730
18	WA AGRI AEROSP	-.0000000	.5439261	.0001885	11.6185533	.0001885
19	WA OTHER MANUF	-.0000000	4.0724811	.0021998	109.8756933	.0021998
20	WA TRANSP SERV	-.0000000	12.9704814	.0064175	348.1271906	.0064175
21	WA ELECTR UTILIT	-.0000000	5.0079790	.0065920	43.6289155	.0065920
22	WA N GAS UTILIT	-.0000000	3.7467675	.0191357	23.3422858	.0191356
23	WA OTHER UTILIT	-.0000000	1.9932326	.0077922	9.5077083	.0077921
24	WA CONSTR	-.0000000	3.2183037	.0008709	84.9630927	.0008709
25	WA TRADE	-.0000000	23.0109004	.0035809	1550.2423871	.0035809
26	WA SERVICES	-.0000000	28.9399844	.0030487	1495.9147310	.0030487
27	OR CROPS	33.2000000	68.0718902	.0993025	2247.7339434	.0993025
28	OR LIVESTOCK	-.0000000	60.7338177	.1157848	1744.8596798	.1157848
29	OR FOOD PROC	280.1000000	317.4473100	.2352333	5904.5201270	.2352333
30	OR TEXTILE APPAREL	-.0000000	.6162214	.0084996	56.9451704	.0084996
31	OR MINING	-.0000000	.3089679	.0028450	9.1508958	.0028457
32	OR FOREST FISH	-.0000000	.6432640	.0140758	24.0709765	.0140758
33	OR LUMBER WOOD	-.0000000	3.7856014	.0011655	53.3403994	.0011655
34	OR PLYWOOD	-.0000000	.6497592	.0004589	10.5197459	.0004589
35	OR PULP PAPER	-.0000000	10.5116343	.0121902	124.3567220	.0121906
36	OR CHEMICALS	-.0000000	2.6235868	.0105673	31.6984025	.0105638
37	OR PETROL REF	-.0000000	.2901960	.0125084	7.5043726	.0125083
38	OR CONCRETE ETC	-.0000000	1.8786230	.0084546	43.5861738	.0084624
39	OR IRON STEEL	-.0000000	2.2890452	.0123866	80.4353620	.0123934
40	OR NONFERROUS	-.0000000	.3495504	.0036795	8.9638177	.0036800

Table B-8 Detailed Economic Impacts of Region State Choice Level Irrigation, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-.0000000	.2122419	.0012934	1.6724106	.0006268
42	OR FABR MET MACH	-.0000000	22.8404704	.0154693	456.5521299	.0154761
43	OR ELECTR MACH	-.0000000	.2722341	.0015311	28.1797553	.0015315
44	OR AIRCRAFT AEROSP	-.0000000	.1032155	.0027672	4.6358732	.0027674
45	OR OTHER MANUF	-.0000000	16.9266564	.0127067	523.0373180	.0127068
46	OR TRANSP SERV	-.0000000	18.3234916	.0139523	468.9779038	.0139546
47	OR ELECTR UTILIT	-.0000000	4.2889740	.0362294	46.6869453	.0062154
48	OR N GAS UTILIT	-.0000000	1.6075564	.0076733	16.2371344	.0076737
49	OR OTHER UTILIT	-.0000000	.9553515	.0091247	8.7033334	.0091247
50	OR CONSTR	-.0000000	5.5737915	.0047733	321.3327553	.0047734
51	OR TRADE	-.0000000	20.7913406	.0057517	1784.9670868	.0057518
52	OR SERVICES	-.0000000	38.0817643	.0056011	1873.2612532	.0056011
53	ID CROPS	72.5000000	133.7225822	.2422949	4811.3385114	.2422949
54	ID LIVESTOCK	-.0000000	~~82.4668750~~	~~.1683406~~	~~2228.7953640~~	~~.1683406~~
55	ID FOOD PROCESS	292.5000000	326.0492946	.2795707	5004.8566718	.2795707
56	ID TEXTILE APPAREL	-.0000000	.0721746	.0079313	4.3622353	.0079313
57	ID MINING	-.0000000	.3736792	.0033186	15.9710702	.0033186
58	ID FORESTR FISH	-.0000000	2.8081074	.0712718	30.6364516	.0712718
59	ID LUMBER WOOD	-.0000000	.9574383	.0007686	8.8754569	.0007686
60	ID PLYWOOD	-.0000000	.1735022	.0009928	2.5345711	.0009928
61	ID PULP PAPER	-.0000000	4.3669965	.0212713	30.8309930	.0212713
62	ID CHEMICALS	-.0000000	8.9232624	.0230218	59.7858557	.0230218
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.3382626	.0063703	11.4671327	.0063703
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0776903	.0002355	.3972441	.0002355
67	ID ALUM	-.0000000	.0024057	.0481135	.0000241	.0481135
68	ID FABR MET MACH	-.0000000	6.3266060	.0563367	304.1932744	.0563367
69	ID ELCTR MACH	-.0000000	.0497254	.0003287	.5420078	.0003287
70	ID AGFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	3.1357027	.0165998	174.8467889	.0165998
72	ID TRANSP SERV	-.0000000	26.4359689	.0781436	801.8029486	.0781436
73	ID ELECTR UTILIT	-.0000000	6.3144360	.0279647	97.5580378	.0279647
74	ID N GAS UTILIT	-.0000000	4.3152654	.0364465	35.5146342	.0364465
75	ID OTHER UTILIT	-.0000000	.3225527	.0786714	52.4728709	.0786714
76	ID CONSTR	-.0000000	2.4724058	.0043783	126.8591416	.0043783
77	ID TRADE	-.0000000	28.9346736	.0329365	3763.2436941	.0329365
78	ID SERVICES	-.0000000	24.2794131	.0186765	2032.9152639	.0186765

Table B-9 Detailed Economic Impacts of OBERS Level of Region Aluminum Reductions With Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0031656	-.0000032	-.1235535	-.0000034
2	WA LIVESTOCK	-.0000000	-.0022378	-.0000056	-.0916924	-.0000059
3	WA FOOD PROCESS	-.0000000	-.0165154	-.0000078	-.2580774	-.0000082
4	WA TEXTILE APPAREL	-.0000000	-.0017692	-.0000058	-.0563986	-.0000060
5	WA MINING	-.0000000	-.0960539	-.0008331	-3.2661642	-.0008556
6	WA FORESTR FISH	-.0000000	-.0054381	-.0000154	-.0585249	-.0000154
7	WA LUMBER WOOD	-.0000000	-.0391651	-.0000155	-.5894952	-.0000155
8	WA PLYWOOD	-.0000000	-.0020185	-.0000038	-.0358442	-.0000038
9	WA PULP PAPER	-.0000000	-.0465303	-.0000266	-.4561712	-.0000258
10	WA CHEMICALS	-.0000000	-.0467520	-.0001170	-.8699174	-.0001160
11	WA PETROL REF	-.0000000	-.2131898	-.0003626	-.5803782	-.0003629
12	WA CONCR GLASS ETC	-.0000000	-.0303607	-.0000932	-.6766778	-.0000933
13	WA IRON STEEL	-.0000000	-.0464147	-.0003330	-1.4533718	-.0003353
14	WA NONFERROUS	-.0000000	-.1076215	-.0020897	-5.2339208	-.0020980
15	WA ALUM	-42.5000000	-50.5675165	-.0587858	-634.6217005	-.0587857
16	WA FABR MET MACH	-.0000000	-.2947947	-.0002488	-7.8726712	-.0002460
17	WA ELECTR MACH	-.0000000	-.0326437	-.0001310	-1.2622457	-.0001322
18	WA ACFT AEROSP	-.0000000	-.0022674	-.0000008	-.0594007	-.0000011
19	WA OTHER MANUF	-.0000000	-.0404170	-.0000218	-1.1099054	-.0000222
20	WA TRANSP SERV	-.0000000	-.8353215	-.0004133	-22.4198841	-.0004133
21	WA ELECTR UTILIT	-.0000000	-2.8724237	-.0037810	-28.4660478	-.0037810
22	WA N GAS UTILIT	-.0000000	-.2791498	-.0014257	-1.7330081	-.0014256
23	WA OTHER UTILIT	-.0000000	-.0302007	-.0001181	-.1440683	-.0001181
24	WA CONSTR	-.0000000	-.0751263	-.0000203	-1.9834529	-.0000203
25	WA TRADE	-.0000000	-.3888356	-.0000605	-26.1967400	-.0000605
26	WA SERVICES	-.0000000	-.7954986	-.0000838	-41.1209021	-.0000838
27	OR CROPS	-.0000000	-.0004251	-.0000006	-.0256750	-.0000011
28	OR LIVESTOCK	-.0000000	-.0003726	-.0000007	-.0103396	-.0000012
29	OR FOOD PROC	-.0000000	-.0007715	-.0000006	-.0304104	-.0000012
30	OR TEXTILE APPAREL	-.0000000	-.0001199	-.0000017	-.0229631	-.0000034
31	OR MINING	-.0000000	-.0028522	-.0000263	-.2466602	-.0000767
32	OR FOREST FISH	-.0000000	-.0001893	-.0000041	-.0136594	-.0000090
33	OR LUMBER WOOD	-.0000000	-.0173709	-.0000053	-.4728501	-.0000103
34	OR PLYWOOD	-.0000000	-.0015183	-.0000011	-.0475686	-.0000021
35	OR PULP PAPER	-.0000000	-.0635819	-.0000737	-1.5013368	-.0001472
36	OR CHEMICALS	-.0000000	-.0563420	-.0002109	-.5634878	-.0001678
37	OR PETROL REF	-.0000000	-.0005824	-.0000251	-.0204441	-.0000341
38	OR CONCRETE ETC	-.0000000	-.0262645	-.0001182	-3.0379061	-.0005898
39	OR IRON STEEL	-.0000000	-.0439085	-.0002376	-4.4726840	-.0006891
40	OR NONFERROUS	-.0000000	-.0021560	-.0000227	-.1462161	-.0000600

Table B-9 Detailed Economic Impacts of OBERS Level of Region Aluminum Reductions With Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-5.2000000	-6.1796926	-.0376581	-84.5681613	-.0316941
42	OR FABR MET MACH	-.0000000	-.0097399	-.0000066	-7.5143410	-.0002547
43	OR ELECTR MACH	-.0000000	-.0005569	-.0000031	-.3290504	-.0000179
44	OR AIRCRAFT AREOSP	-.0000000	-.0004066	-.0000109	-.0536179	-.0000320
45	OR OTHER MANUF	-.0000000	-.0041458	-.0000031	-.3649464	-.0000089
46	OR TRANSP SERV	-.0000000	-.1158780	-.0000882	-9.0732956	-.0002700
47	OR ELECTR UTILIT	-.0000000	-.3669228	-.0005329	-1.5818122	-.0002106
48	OR N GAS UTILIT	-.0000000	-.0046181	-.0000220	-.1140016	-.0000539
49	OR OTHER UTILIT	-.0000000	-.0006201	-.0000059	-.0118481	-.0000124
50	OR CONSTR	-.0000000	-.0101527	-.0000087	-1.1607420	-.0000172
51	OR TRADE	-.0000000	-.0149356	-.0000041	-3.3112727	-.0000107
52	OR SERVICES	-.0000000	-.0274110	-.0000040	-3.0158030	-.0000090
53	ID CROPS	-.0000000	-.0001166	-.0000002	-.0045885	-.0000002
54	ID LIVESTOCK	-.0000000	-.0001185	-.0000002	-.0035014	-.0000083
55	ID FOOD PROCESS	-.0000000	-.0000649	-.0000001	-.0010925	-.0000001
56	ID TEXTILE APPAREL	-.0000000	-.0000021	-.0000002	-.0001377	-.0000003
57	ID MINING	-.0000000	-.0003603	-.0000032	-.0169194	-.0000035
58	ID FORESTR FISH	-.0000000	-.0000179	-.0000005	-.0002499	-.0000006
59	ID LUMBER WOOD	-.0000000	-.0007365	-.0000006	-.0087868	-.0000008
60	ID PLYWOOD	-.0000000	-.0000942	-.0000005	-.0016324	-.0000006
61	ID PULP PAPER	-.0000000	-.0002023	-.0000010	-.0018206	-.0000013
62	ID CHEMICALS	-.0000000	-.0001766	-.0000005	-.0013209	-.0000005
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0000599	-.0000011	-.0040512	-.0000023
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0025920	-.0000078	-.0135087	-.0000080
67	ID ALUM	-.0000000	-.0000000	-.0000008	-.0000000	-.0000008
68	ID FABR MET MACH	-.0000000	-.0001216	-.0000011	-.0093734	-.0000017
69	ID ELECTR MACH	-.0000000	-.0000018	-.0000000	-.0000510	-.0000000
70	ID ACFT AREOSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0000444	-.0000002	-.0035211	-.0000003
72	ID TRANSP SERV	-.0000000	-.0003705	-.0000011	-.0138763	-.0000014
73	ID ELECTR UTILIT	-.0000000	-.0001678	-.0000007	-.0031433	-.0000009
74	ID N GAS UTILIT	-.0000000	-.0000371	-.0000003	-.0003349	-.0000003
75	ID OTHER UTILIT	-.0000000	-.0000019	-.0000005	-.0003685	-.0000006
76	ID CONSTR	-.0000000	-.0000394	-.0000001	-.0024521	-.0000001
77	ID TRADE	-.0000000	-.0003167	-.0000004	-.0512435	-.0000004
78	ID SERVICES	-.0000000	-.0003471	-.0000003	-.0349376	-.0000003

Table B-10 Detailed Economic Impacts of State Choice Level of Region Aluminum Reductions With Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0039959	-.0000040	-.1558650	-.0000043
2	WA LIVESTOCK	-.0690688	-.0826883	-.0000871	-.1155981	-.0008974
3	WA FOOD PROCESS	-.0000000	-.0208504	-.0000099	-.3256875	-.0000103
4	WA TEXTILE APPAREL	-.0000000	-.0022339	-.0000073	-.0711869	-.0000075
5	WA MINING	-.0000000	-.1212902	-.0010520	-4.1231435	-.0010813
6	WA FORESTR FISH	-.0000000	-.0068645	-.0000194	-.0864979	-.0000194
7	WA LUMBER WOOD	-.0000000	-.0494354	-.0000196	-.7384100	-.0000196
8	WA PLYWOOD	-.0000000	-.0025467	-.0000048	-.0452256	-.0000048
9	WA PULP PAPER	-.0000000	-.0585345	-.0000334	-.5739709	-.0000324
10	WA CHEMICALS	-.0000000	-.0589925	-.0001476	-1.0977629	-.0001464
11	WA PETROL REF	-.0000000	-.2692277	-.0004579	-.7329268	-.0004583
12	WA CONCR GLASS ETC	-.0000000	-.0383239	-.0001177	-.8542653	-.0001178
13	WA IRON STEEL	-.0000000	-.0585590	-.0004201	-1.8713725	-.0004230
14	WA NONFERROUS	-.0000000	-.1359112	-.0026391	-6.6094577	-.0026494
15	WA ALUM	-53.8000000	-63.8622446	-.0742412	-801.4703802	-.0742411
16	WA FABR MET MACH	-.0000000	-.3713962	-.0003134	-9.9192437	-.0003099
17	WA ELECTR MACH	-.0000000	-.0412235	-.0001654	-1.5938571	-.0001659
18	WA AGFT AREOSP	-.0000000	-.0028567	-.0000010	-.0872301	-.0000014
19	WA OTHER MANUF	-.0000000	-.0510335	-.0000276	-1.4012022	-.0000281
20	WA TRANSP SERV	-.0000000	-1.0549185	-.0005220	-28.3138327	-.0005219
21	WA ELECTR UTILIT	-.0000000	-3.6275997	-.0047750	-35.9499242	-.0047751
22	WA N GAS UTILIT	-.0000000	-.3525304	-.0018005	-2.1961456	-.0018004
23	WA OTHER UTILIT	-.0000000	-.0381386	-.0001491	-.1819347	-.0001491
24	WA CONSTR	-.0000000	-.0948734	-.0000257	-2.5048046	-.0000257
25	WA TRADE	-.0000000	-.4910371	-.0000764	-33.0822825	-.0000764
26	WA SERVICES	-.0000000	-1.0045882	-.0001058	-51.9291389	-.0001058
27	OR CROPS	-.0000000	-.0005339	-.0000008	-.0321751	-.0000014
28	OR LIVESTOCK	-.0000000	-.0004581	-.0000089	-.0229548	-.0000045
29	OR FOOD PROC	-.0000000	-.0009662	-.0000007	-.0380495	-.0000015
30	OR TEXTILE APPAREL	-.0000000	-.0001504	-.0000021	-.0287578	-.0000043
31	OR MINING	-.0000000	-.0035738	-.0000329	-.3085777	-.0000960
32	OR FOREST FISH	-.0000000	-.0002369	-.0000052	-.0171317	-.0000100
33	OR LUMBER WOOD	-.0000000	-.0217314	-.0000067	-.5913644	-.0000129
34	OR PLYWOOD	-.0000000	-.0019000	-.0000013	-.0594947	-.0000026
35	OR PULP PAPER	-.0000000	-.0794857	-.0000922	-1.8767701	-.0001840
36	OR CHEMICALS	-.0000000	-.0704338	-.0002636	-.7044315	-.0002348
37	OR PETROL REF	-.0000000	-.0007281	-.0000314	-.0255587	-.0000426
38	OR CONCRETE ETC	-.0000000	-.0328376	-.0001478	-3.7975476	-.0007373
39	OR IRON STEEL	-.0000000	-.0548877	-.0002970	-5.5909306	-.0006614
40	OR NONFERROUS	-.0000000	-.0026960	-.0000284	-.1827941	-.0000750

Table B-10 Detailed Economic Impacts of State Choice Level of Region Aluminum Reductions With Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-6.5000000	-7.7246220	-.0470727	-105.7102887	-.0396176
42	OR FABR MET MACH	-.0000000	-.0121942	-.0000083	-9.3933284	-.0003184
43	OR ELECTR MACH	-.0000000	-.0006970	-.0000039	-.4114043	-.0000224
44	OR AIRCRAFT AREOSP	-.0000000	-.0005086	-.0000136	-.0670366	-.0000400
45	OR OTHER MANUF	-.0000000	-.0051872	-.0000039	-.4563369	-.0000111
46	OR TRANSP SERV	-.0000000	-.1448695	-.0001103	-11.3421884	-.0003375
47	OR ELECTR UTILIT	-.0000000	-.4586684	-.0006662	-1.9774252	-.0002633
48	OR N GAS UTILIT	-.0000000	-.0057735	-.0000276	-.1425119	-.0000674
49	OR OTHER UTILIT	-.0000000	-.0007773	-.0000074	-.0148297	-.0000155
50	OR CONSTR	-.0000000	-.0126973	-.0000109	-1.4512397	-.0000216
51	OR TRADE	-.0000000	-.0186896	-.0000052	-4.1408217	-.0000133
52	OR SERVICES	-.0000000	-.0343111	-.0000050	-3.7720868	-.0000113
53	ID CROPS	-.0000000	-.0001472	-.0000003	-.0057855	-.0000003
54	ID LIVESTOCK	-.0000003	-.0001496	-.0000003	-.0044149	-.0000003
55	ID FOOD PROCESS	-.0000000	-.0000818	-.0000001	-.0013769	-.0000001
56	ID TEXTILE APPAREL	-.0000000	-.0000027	-.0000003	-.0001737	-.0000033
57	ID MINING	-.0000000	-.0004547	-.0000040	-.0213372	-.0000044
58	ID FORESTR FISH	-.0000000	-.0000225	-.0000006	-.0003140	-.0000007
59	ID LUMBER WOOD	-.0000000	-.0009268	-.0000007	-.0110403	-.0000010
60	ID PLYWOOD	-.0000000	-.0001186	-.0000007	-.0020521	-.0000038
61	ID PULP PAPER	-.0000000	-.0002541	-.0000012	-.0022850	-.0000016
62	ID CHEMICALS	-.0000000	-.0002224	-.0000006	-.0016616	-.0000026
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0000754	-.0000014	-.0050814	-.0000028
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0032729	-.0000099	-.0170536	-.0000101
67	ID ALUM	-.0000000	-.0000001	-.0000010	-.0000000	-.0000011
68	ID FABR MET MACH	-.0000000	-.0001530	-.0000014	-.0117653	-.0000022
69	ID LECTR MACH	-.0000000	-.0000022	-.0000000	-.0000639	-.0000030
70	ID AOFT AREOSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0000558	-.0000003	-.0044205	-.0000004
72	ID TRANSP SERV	-.0000000	-.0004666	-.0000014	-.0174526	-.0000017
73	ID ELECTR UTILIT	-.0000000	-.0002113	-.0000009	-.0039539	-.0000011
74	ID N GAS UTILIT	-.0000000	-.0000468	-.0000004	-.0004221	-.0000004
75	ID OTHER UTILIT	-.0000000	-.0000024	-.0000006	-.0004637	-.0000007
76	ID CONSTR	-.0000000	-.0000496	-.0000001	-.0030836	-.0000001
77	ID TRADE	-.0000000	-.0003988	-.0000005	-.0644362	-.0000006
78	ID SERVICES	-.0000000	-.0004371	-.0000003	-.0439427	-.0000004

Table B-11 Detailed Economic Impacts of OBERS Level of Region Aluminum Reductions Without Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0053123	-.0000053	-.2073017	-.0000057
2	WA LIVESTOCK	-.0000000	-.0038894	-.0000094	-.1537897	-.0000039
3	WA FOOD PROCESS	-.0000000	-.0277166	-.0000131	-.4330585	-.0000137
4	WA TEXTILE APPAREL	-.0000000	-.0029692	-.0000097	-.0946433	-.0000100
5	WA MINING	-.0000000	-.1612100	-.0013982	-5.4812283	-.0014375
6	WA FORESTR FISH	-.0000000	-.0091260	-.0000258	-.1149948	-.0000258
7	WA LUMBER WOOD	-.0000000	-.0657239	-.0000260	-.9816986	-.0000260
8	WA PLYWOOD	-.0000000	-.0033869	-.0000064	-.0601436	-.0000064
9	WA PULP PAPER	-.0000000	-.0780021	-.0000446	-.7647595	-.0000432
10	WA CHEMICALS	-.0000000	-.0784476	-.0001963	-1.4597157	-.0001947
11	WA PETROL REF	-.0000000	-.3578136	-.0006085	-.9740928	-.0006091
12	WA CONCR GLASS ETC	-.0000000	-.0509517	-.0001565	-1.1356072	-.0001566
13	WA IRON STEEL	-.0000000	-.0778784	-.0005587	-2.4888742	-.0005625
14	WA NONFERROUS	-.0000000	-.1806302	-.0035074	-8.7844189	-.0035213
15	WA ALUM	-71.5000000	-84.8727022	-.0986662	-1065.1513557	-.0986661
16	WA FABR MET MACH	-.0000000	-.4944119	-.0004172	-13.2039333	-.0004125
17	WA ELECTR MACH	-.0000000	-.0547883	-.0002199	-2.1184562	-.0002218
18	WA ADFT AREOSP	-.0000000	-.0038028	-.0000013	-.1163105	-.0000019
19	WA OTHER MANUF	-.0000000	-.0678322	-.0000366	-1.8626593	-.0000373
20	WA TRANSP SERV	-.0000000	-1.4019993	-.0006937	-37.6294192	-.0006937
21	WA ELECTR UTILIT	-.0000000	-4.8210805	-.0063460	-47.7774576	-.0063461
22	WA N GAS UTILIT	-.0000000	-.4685216	-.0023929	-2.9187303	-.0023927
23	WA OTHER UTILIT	-.0000000	-.0506881	-.0001982	-.2418004	-.0001982
24	WA CONSTR	-.0000000	-.1260905	-.0000341	-.3289855	-.0000341
25	WA TRADE	-.0000000	-.6526117	-.0001016	-43.9679380	-.0010016
26	WA SERVICES	-.0000000	-1.3351449	-.0001407	-69.0162831	-.0001407
27	OR CROPS	-.0000000	-.0007123	-.0000010	-.0429898	-.0000019
28	OR LIVESTOCK	-.0000000	-.0006244	-.0000012	-.0386511	-.0000020
29	OR FOOD PROC	-.0000000	-.0012916	-.0000010	-.0508924	-.0000020
30	OR TEXTILE APPAREL	-.0000000	-.0002006	-.0000028	-.0384413	-.0000057
31	OR MINING	-.0000000	-.0047755	-.0000440	-.4127857	-.0001284
32	OR FOREST FISH	-.0000000	-.0003169	-.0000069	-.0229233	-.0000134
33	OR LUMBER WOOD	-.0000000	-.0290701	-.0000089	-.7912854	-.0000173
34	OR PLYWOOD	-.0000000	-.0025412	-.0000018	-.0796000	-.0000035
35	OR PULP PAPER	-.0000000	-.1063808	-.0001234	-2.5118929	-.0002462
36	OR CHEMICALS	-.0000000	-.0942671	-.0003528	-.9427880	-.0003142
37	OR PETROL REF	-.0000000	-.0009744	-.0000420	-.0342060	-.0000570
38	OR CONCRETE ETC	-.0000000	-.0439454	-.0001978	-5.0827187	-.0009868
39	OR IRON STEEL	-.0000000	-.0734632	-.0003975	-7.4831756	-.0011530
40	OR NONFERROUS	-.0000000	-.0036076	-.0000380	-.2446407	-.0001004

Table B-11 Detailed Economic Impacts of OBERS Level of Region Aluminum Reductions Without Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-8.7000000	-10.3391037	-.0530049	-141.4990750	-.0530266
42	OR FABR MET MACH	-.0000000	-.0163035	-.0000110	-12.5722365	-.0004262
43	OR ELECTR MACH	-.0000000	-.0009321	-.0000052	-.5505543	-.0000299
44	OR AIRCRAFT AEROSP	-.0000000	-.0006804	-.0000182	-.0897127	-.0000536
45	OR OTHER MANUF	-.0000000	-.0069383	-.0000052	-.6106469	-.0000148
46	OR TRANSP SERV	-.0000000	-.1938819	-.0001476	-15.1805562	-.0004517
47	OR ELECTR UTILIT	-.0000000	-.6138962	-.0008916	-2.6465594	-.0003523
48	OR N GAS UTILIT	-.0000000	-.0077268	-.0000369	-.1907376	-.0000901
49	OR OTHER UTILIT	-.0000000	-.0010384	-.0000099	-.0198308	-.0000208
50	OR CONSTR	-.0000000	-.0169889	-.0000145	-1.9421642	-.0000289
51	OR TRADE	-.0000000	-.0249967	-.0000069	-5.5407281	-.0000179
52	OR SERVICES	-.0000000	-.0458802	-.0000067	-5.0466329	-.0000151
53	ID CROPS	-.0000000	-.0001957	-.0000004	-.0076975	-.0000004
54	ID LIVESTOCK	-.0000000	-.0001389	-.0000004	-.0058739	-.0000004
55	ID FOOD PROCESS	-.0000000	-.0001088	-.0000001	-.0018324	-.0000001
56	ID TEXTILE APPAREL	-.0000000	-.0000335	-.0000004	-.0002311	-.0000004
57	ID MINING	-.0000000	-.0006046	-.0000054	-.0283850	-.0000059
58	ID FORESTR FISH	-.0000000	-.0000300	-.0000008	-.0004188	-.0000010
59	ID LUMBER WOOD	-.0000000	-.0012348	-.0000010	-.0147244	-.0000013
60	ID PLYWOOD	-.0000000	-.0001580	-.0000009	-.0027359	-.0000011
61	ID PULP PAPER	-.0000000	-.0003389	-.0000017	-.0030499	-.0000021
62	ID CHEMICALS	-.0000000	-.0002362	-.0000008	-.0022143	-.0000009
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0001005	-.0000019	-.0067852	-.0000038
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0043502	-.0000132	-.0226703	-.0000134
67	ID ALUM	-.0000000	-.0000001	-.0000013	-.0000008	-.0000014
68	ID FABR MET MACH	-.0000000	-.0002038	-.0000018	-.0157024	-.0000029
69	ID ELECTR MACH	-.0000000	-.0000030	-.0000000	-.0000854	-.0000001
70	ID AIRCRAFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0000744	-.0000004	-.0058990	-.0000006
72	ID TRANSP SERV	-.0000000	-.0006213	-.0000018	-.0232604	-.0000023
73	ID ELECTR UTILIT	-.0000000	-.0002814	-.0000012	-.0052692	-.0000015
74	ID N GAS UTILIT	-.0000000	-.0000622	-.0000005	-.0005616	-.0000006
75	ID OTHER UTILIT	-.0000000	-.0000032	-.0000008	-.0006178	-.0000009
76	ID CONSTR	-.0000000	-.0000660	-.0000001	-.0041101	-.0000001
77	ID TRADE	-.0000000	-.0005310	-.0000006	-.0858919	-.0000008
78	ID SERVICES	-.0000000	-.0005821	-.0000004	-.0585650	-.0000005

Table B-12 Detailed Economic Impacts of State Choice Level of Region Aluminum Reductions Without Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0066918	-.0000067	-.2611940	-.0000672
2	WA LIVESTOCK	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
3	WA FOOD PROCESS	-.0000000	-.0349119	-.0000166	-.5455655	-.0000173
4	WA TEXTILE APPAREL	-.0000000	-.0037399	-.0000122	-.1192228	-.0000126
5	WA MINING	-.0000000	-.2030455	-.0017610	-6.9043862	-.0018138
6	WA FORESTR FISH	-.0000000	-.0114958	-.0000325	-.1448565	-.0000325
7	WA LUMBER WOOD	-.0000000	-.0827923	-.0000328	-1.2366360	-.0000328
8	WA PLYWOOD	-.0000000	-.0042672	-.0000081	-.0757744	-.0000080
9	WA PULP PAPER	-.0000000	-.0983854	-.0000562	-.9645309	-.0000545
10	WA CHEMICALS	-.0000000	-.0388327	-.0002473	-1.8339776	-.0002453
11	WA PETROL REF	-.0000000	-.4506526	-.0037664	-1.2268369	-.0007671
12	WA CONCR GLASS ETC	-.0000000	-.0641796	-.0001971	-1.4304330	-.0001973
13	WA IRON STEEL	-.0000000	-.0981207	-.0007039	-3.1358621	-.0007087
14	WA NONFERROUS	-.0000000	-.2274963	-.0044174	-11.0637838	-.0044350
15	WA ALUM	-90.0500000	-106.8921350	-.1242643	-1341.4949585	-.1242642
16	WA FABR MET MACH	-.0000000	-.6232591	-.0005260	-16.6444067	-.0005200
17	WA ELECTR MACH	-.0000000	-.0690043	-.0002769	-2.6682271	-.0002794
18	WA ACFT AEROSP	-.0000000	-.0047937	-.0000017	-.1467523	-.0000024
19	WA OTHER MANUF	-.0000000	-.0854367	-.0000461	-2.3462338	-.0000470
20	WA TRANSP SERV	-.0000000	-1.7657463	-.0008737	-47.3923238	-.0008737
21	WA ELECTR UTILIT	-.0000000	-6.0718741	-.0079925	-60.1729869	-.0079926
22	WA N GAS UTILIT	-.0000000	-.5900820	-.0030137	-3.6760098	-.0030135
23	WA OTHER UTILIT	-.0000000	-.0638400	-.0002496	-.3045401	-.0002436
24	WA CONSTR	-.0000000	-.1588063	-.0000430	-4.1927357	-.0000430
25	WA TRADE	-.0000000	-.8219432	-.0001279	-55.3761943	-.0001279
26	WA SERVICES	-.0000000	-1.6815711	-.0001771	-86.9237530	-.0001772
27	OR CROPS	-.0000000	-.0008990	-.0000013	-.0543029	-.0000024
28	OR LIVESTOCK	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
29	OR FOOD PROC	-.0000000	-.0016319	-.0000012	-.0643259	-.0000026
30	OR TEXTILE APPAREL	-.0000000	-.0002535	-.0000035	-.0485693	-.0000072
31	OR MINING	-.0000000	-.0060325	-.0000555	-.5217512	-.0001623
32	OR FOREST FISH	-.0000000	-.0004005	-.0000088	-.0289787	-.0001009
33	OR LUMBER WOOD	-.0000000	-.0367439	-.0000113	-1.0003144	-.0000219
34	OR PLYWOOD	-.0000000	-.0032116	-.0000023	-.1096219	-.0000044
35	OR PULP PAPER	-.0000000	-.1344992	-.0001560	-3.1758930	-.0003113
36	OR CHEMICALS	-.0000000	-.1191841	-.0004460	-1.1919849	-.0003972
37	OR PETROL REF	-.0000000	-.0012319	-.0000531	-.0432467	-.0000721
38	OR CONCRETE ETC	-.0000000	-.0555586	-.0002500	-6.4263203	-.0012477
39	OR IRON STEEL	-.0000000	-.0928831	-.0005026	-9.4614380	-.0014578
40	OR NONFERROUS	-.0000000	-.0045687	-.0000480	-.3093085	-.0001278

Table B-12 Detailed Economic Impacts of State Choice Level of Region Aluminum Reductions Without Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-11.0000000	-13.0724260	-.0796613	-178.8941770	-.0670451
42	OR FABR MET MACH	-.0000000	-.0206012	-.0000140	-15.8956736	-.0005388
43	OR ELECTR MACH	-.0000000	-.0011780	-.0000066	-.6960572	-.0000378
44	OR AIRCRAFT AREOSP	-.0000000	-.0008601	-.0000231	-.1134207	-.0000677
45	OR OTHER MANUF	-.0000000	-.0087694	-.0000066	-.7719837	-.0000188
46	OR TRANSP SERV	-.0000000	-.2451240	-.0001866	-19.1934422	-.0005711
47	OR ELECTR UTILIT	-.0000000	-.7761810	-.0011274	-3.3461221	-.0004455
48	OR N GAS UTILIT	-.0000000	-.0097689	-.0000466	-.2411562	-.0001140
49	OR OTHER UTILIT	-.0000000	-.0013115	-.0000125	-.0250609	-.0000263
50	OR CONSTR	-.0000000	-.0214760	-.0000184	-2.4553714	-.0000365
51	OR TRADE	-.0000000	-.0315921	-.0000087	-7.0044096	-.0000226
52	OR SERVICES	-.0000000	-.0579791	-.0000085	-6.3793058	-.0000191
53	ID CROPS	-.0000000	-.0002466	-.0000004	-.0097005	-.0000035
54	ID LIVESTOCK	-.0000000	-.0033505	-.0000065	-.0374024	-.0000036
55	ID FOOD PROCESS	-.0000000	-.0001371	-.0000001	-.0023097	-.0000031
56	ID TEXTILE APPAREL	-.0000000	-.0000045	-.0000005	-.0002912	-.0000035
57	ID MINING	-.0000000	-.0007616	-.0000068	-.0357687	-.0000074
58	ID FORESTR FISH	-.0000000	-.0000378	-.0000010	-.0005284	-.0000012
59	ID LUMBER WOOD	-.0000000	-.0015573	-.0000013	-.0185807	-.0000016
60	ID PLYWOOD	-.0000000	-.0001993	-.0000011	-.0034517	-.0000014
61	ID PULP PAPER	-.0000000	-.0004277	-.0000021	-.0038503	-.0000027
62	ID CHEMICALS	-.0000000	-.0003735	-.0000010	-.0027930	-.0000011
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0001267	-.0000024	-.0065678	-.0000048
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0054791	-.0000166	-.0285561	-.0000169
67	ID ALUM	-.0000000	-.0000001	-.0000017	-.0000000	-.0000018
68	ID FABR MET MACH	-.0000000	-.0002571	-.0000023	-.0198226	-.0000037
69	ID ELECTR MACH	-.0000000	-.0000037	-.0000000	-.0001079	-.0000001
70	ID AIRFT AREOSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0000938	-.0000005	-.0074463	-.0000007
72	ID TRANSP SERV	-.0000000	-.0007833	-.0000023	-.0293410	-.0000029
73	ID ELECTR UTILIT	-.0000000	-.0003547	-.0000016	-.0066464	-.0000019
74	ID N GAS UTILIT	-.0000000	-.0000784	-.0000007	-.0007081	-.0000007
75	ID OTHER UTILIT	-.0000000	-.0000041	-.0000010	-.0007791	-.0000012
76	ID CONSTR	-.0000000	-.0000833	-.0000001	-.0051848	-.0000002
77	ID TRADE	-.0000000	-.0006695	-.0000008	-.1083544	-.0000009
78	ID SERVICES	-.0000000	-.0007339	-.0000006	-.0738743	-.0000007

Table B-13 Detailed Economic Impacts of Combined Region OBERS Level Irrigation and Aluminum With Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	103.2000000	169.1675306	.1700347	6189.8321473	.1700345
2	WA LIVESTOCK	-.0000000	51.5621447	.1268129	1870.4356345	.1268127
3	WA FOOD PROCESS	319.0000000	365.7398535	.1735091	5482.4297826	.1735088
4	WA TEXTILE APPAREL	-.0000000	.9591252	.0031293	23.5679630	.0031291
5	WA MINING	-.0000000	.8250673	.0071558	27.1946927	.0071322
6	WA FORESTR FISH	-.0000000	6.5821482	.0186199	82.8691441	.0186193
7	WA LUMBER WOOD	-.0000000	2.0436572	.0008098	30.5736181	.0008098
8	WA PLYWOOD	-.0000000	.1847977	.0103498	3.3025152	.0003498
9	WA PULP PAPER	-.0000000	12.1864976	.0069633	123.2173644	.0069640
10	WA CHEMICALS	-.0000000	7.3349721	.0183512	137.6102468	.0183520
11	WA PETROL REF	-.0000000	3.3150145	.0056378	9.0163046	.0056374
12	WA CONCR GLASS ETC	-.0000000	5.2249723	.0160472	116.3592699	.0160471
13	WA IRON STEEL	-.0000000	.9709826	.0069654	30.8070551	.0069627
14	WA NONFERROUS	-.0000000	-.0111517	-.0002165	-.5611300	-.0002249
15	WA ALUM	-63.0000000	-50.6134007	-.0588391	-635.1977695	-.0588391
16	WA FABR MET MACH	-.0000000	19.1555336	.0161650	517.4567232	.0161671
17	WA ELECTR MACH	-.0000000	.1174577	.0004713	4.4895947	.0004701
18	WA AGRT AEROSP	-.0000000	.5146391	.0001783	10.9715909	.0001780
19	WA OTHER MANUF	-.0000000	3.5977836	.0019434	97.0485170	.0019433
20	WA TRANSP SERV	-.0000000	10.6288085	.0052589	285.2768811	.0052589
21	WA ELECTR UTILIT	-.0000000	1.5319150	.0020165	15.1807990	.0020164
22	WA N GAS UTILIT	-.0000000	3.0342610	.0154967	18.9034732	.0154968
23	WA OTHER UTILIT	-.0000000	1.7319218	.0067706	8.2612454	.0067706
24	WA CONSTR	-.0000000	2.7698498	.0007496	73.1237997	.0007496
25	WA TRADE	-.0000000	19.9551331	.0031054	1344.3745972	.0031054
26	WA SERVICES	-.0000000	24.7934759	.0026119	1281.5703441	.0026119
27	OR CROPS	38.1000000	70.8686935	.1033825	2340.0725193	.1033820
28	OR LIVESTOCK	-.0000000	57.6263082	.1092823	1646.6347798	.1092818
29	OR FOOD PROC	264.4000000	299.4733611	.2219143	5570.1882991	.2219137
30	OR TEXTILE APPAREL	-.0000000	.5956855	.0082164	55.0353311	.0082146
31	OR MINING	-.0000000	.2835240	.0026107	8.2320215	.0025600
32	OR FOREST FISH	-.0000000	.6063765	.0132686	22.6839033	.0132647
33	OR LUMBER WOOD	-.0000000	3.5282538	.0010863	49.4817981	.0010812
34	OR PLYWOOD	-.0000000	.6086746	.0004299	9.8311505	.0004288
35	OR PULP PAPER	-.0000000	9.7744446	.0113353	114.8720400	.0112609
36	OR CHEMICALS	-.0000000	2.6503580	.0099190	29.8244449	.0099393
37	OR PETROL REF	-.0000000	.2939929	.0126721	7.5970829	.0126628
38	OR CONCRETE ETC	-.0000000	1.7320109	.0077948	37.7092296	.0073213
39	OR IRON STEEL	-.0000000	2.0739780	.0112228	69.8921165	.0107683
40	OR NONFERROUS	-.0000000	.3241807	.0034124	8.2205598	.0033749

Table B-13 Detailed Economic Impacts of Combined Region OBERS Level Irrigation and Aluminum With Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-5.3000000	-6.1021247	-.0371854	-84.6382761	-.0317203
42	OR FABR MET MACH	-.0000000	21.1296260	.0143106	414.8930068	.0140639
43	OR ELECTR MACH	-.0000000	.2545833	.0014319	26.0759493	.0014171
44	OR AIRCRAFT AEROSP	-.0000000	.0973787	.0026107	4.3376774	.0025894
45	OR OTHER MANUF	-.0000000	15.3202831	.0115009	473.1587313	.0114951
46	OR TRANSP SERV	-.0000000	17.1553184	.0130628	432.8538292	.0128797
47	OR ELECTR UTILIT	-.0000000	3.6873088	.0053556	42.5986976	.0056711
48	OR N GAS UTILIT	-.0000000	1.5124211	.0072192	15.2075594	.0071871
49	OR OTHER UTILIT	-.0000000	.9268821	.0088527	8.4376535	.0088462
50	OR CONSTR	-.0000000	5.3856094	.0046122	309.8973769	.0046035
51	OR TRADE	-.0000000	19.7405652	.0054610	1692.6877672	.0054545
52	OR SERVICES	-.0000000	36.8572114	.0054210	1811.3247146	.0054159
53	ID CROPS	63.0000000	117.5534778	.2130068	4229.7536341	.2130068
54	ID LIVESTOCK	-.0000000	73.6086077	.1502216	1983.9842782	.1502216
55	ID FOOD PROCESS	261.2000000	291.1792605	.2496714	4469.6015506	.2496714
56	ID TEXTILE APPAREL	-.0000000	.0647976	.0071206	3.9163544	.0071206
57	ID MINING	-.0000000	.3304705	.0029349	14.1227762	.0029346
58	ID FORESTR FISH	-.0000000	2.5078344	.0636506	27.3604173	.0636505
59	ID LUMBER WOOD	-.0000000	.8569712	.0006879	7.9421297	.0006878
60	ID PLYWOOD	-.0000000	.1609799	.0008904	2.2727284	.0008903
61	ID PULP PAPER	-.0000000	3.9027355	.0190099	27.5529104	.0190096
62	ID CHEMICALS	-.0000000	7.9946809	.0206261	53.5642194	.0206261
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.3013324	.0056748	10.2131372	.0056737
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0673845	.0002038	.3433693	.0002036
67	ID ALUM	-.0000000	.0021254	.0425087	.0000213	.0425086
68	ID FABR MET MACH	-.0000000	5.6376702	.0502019	271.0556441	.0502012
69	ID ELCTR MACH	-.0000000	.0442067	.0002926	.4824751	.0002926
70	ID AIRFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	2.8008056	.0146269	156.1718617	.0148268
72	ID TRANSP SERV	-.0000000	23.5980081	.0697547	715.7249064	.0697544
73	ID ELECTR UTILIT	-.0000000	5.9217826	.0248972	86.8559817	.0248970
74	ID N GAS UTILIT	-.0000000	3.8530872	.0325430	31.7108772	.0325429
75	ID OTHER UTILIT	-.0000000	.2858470	.0697188	46.5015384	.0697187
76	ID CONSTR	-.0000000	2.2080990	.0039102	113.2971182	.0039102
77	ID TRADE	-.0000000	25.8087295	.0293782	3356.6731549	.0293781
78	ID SERVICES	-.0000000	21.5740785	.0165954	1806.3916109	.0165954

Table B-14 Detailed Economic Impacts of State Choice Level of Irrigation and Aluminum With Partial Availability of Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	117.4000000	191.5117408	.1924935	7007.4047242	.1924932
2	WA LIVESTOCK	-.0000000	58.2083186	.1433554	2236.5175943	.1433551
3	WA FOOD PROCESS	361.5000000	413.6871399	.1962556	6201.1567864	.1962552
4	WA TEXTILE APPAREL	-.0000000	1.0870435	.0035466	33.5111858	.0035464
5	WA MINING	-.0000000	.9193341	.0079734	30.2880698	.0079434
6	WA FOREST FISH	-.0000000	7.4430873	.0210554	93.7063469	.0210554
7	WA LUMBER WOOD	-.0000000	2.2958405	.0009097	34.3464806	.0009098
8	WA PLYWOOD	-.0000000	.2077344	.0003932	3.7124495	.0003932
9	WA PULP PAPER	-.0000000	13.6853860	.0078198	138.3746776	.0078206
10	WA CHEMICALS	-.0000000	8.3016290	.0207696	155.7465347	.0207707
11	WA PETROL REF	-.0000000	3.7461176	.0063709	10.1887675	.0063705
12	WA CONCR GLASS ETC	-.0000000	5.9052267	.0181364	131.5083546	.0181363
13	WA IRON STEEL	-.0000000	1.6858996	.0077898	34.4516160	.0077865
14	WA NONFERROUS	-.0000000	-.0285825	-.0005550	-1.4110333	-.0005656
15	WA ALUM	-54.2000000	-63.8545413	-.0742322	-801.3739390	-.0742322
16	WA FABR MET MACH	-.0000000	21.4988962	.0181425	580.7723618	.0181453
17	WA ELECTR MACH	-.0000000	.1278119	.0005129	4.8833322	.0005114
18	WA AGRT AREOSP	-.0000000	.5704789	.0001977	12.1587137	.0001973
19	WA OTHER MANUF	-.0000000	4.0391500	.0021818	108.9513627	.0021813
20	WA TRANSP SERV	-.0000000	11.3099216	.0058928	319.6619425	.0058928
21	WA ELECTR UTILIT	-.0000000	1.3558169	.0017847	13.4355626	.0017846
22	WA N GAS UTILIT	-.0000000	3.3938319	.0173332	21.1436179	.0173332
23	WA OTHER UTILIT	-.0000000	1.9554255	.0076444	9.3273540	.0076443
24	WA CONSTR	-.0000000	3.1239458	.0008454	82.4718897	.0008454
25	WA TRADE	-.0000000	22.5207294	.0035046	1517.2183811	.0035046
26	WA SERVICES	-.0000000	27.9386177	.0029432	1444.1419942	.0029432
27	OR CROPS	53.5000000	89.1165387	.1300022	2942.6132503	.1300016
28	OR LIVESTOCK	-.0000000	61.8445440	.1179054	1778.6481558	.1179048
29	OR FOOD PROC	280.1000000	317.5426198	.2353039	5906.2722032	.2353031
30	OR TEXTILE APPAREL	-.0000000	.6777563	.0093484	62.6163074	.0093461
31	OR MINING	-.0000000	.3168156	.0029173	9.1743638	.0028530
32	OR FOREST FISH	-.0000000	.6441020	.0140941	24.0938162	.0140832
33	OR LUMBER WOOD	-.0000000	3.8437233	.0011834	53.8654885	.0011770
34	OR PLYWOOD	-.0000000	.6810125	.0004809	10.9361288	.0004797
35	OR PULP PAPER	-.0000000	10.4774428	.0121506	122.9872808	.0120564
36	OR CHEMICALS	-.0000000	3.0891433	.0115612	34.7696033	.0115873
37	OR PETROL REF	-.0000000	.3581149	.0154360	9.2538205	.0154243
38	OR CONCRETE ETC	-.0000000	1.8831230	.0084749	40.5621533	.0078752
39	OR IRON STEEL	-.0000000	2.2828500	.0123531	76.4433996	.0117783
40	OR NONFERROUS	-.0000000	.3538388	.0037246	8.9566533	.0036771

Table B-14 Detailed Economic Impacts of State Choice Level of Irrigation and Aluminum with Partial Availability of Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-6.7000000	-7.7444070	-.0471932	-107.2342659	-.0401887
42	OR FABR MET MACH	-.0000000	23.2561585	.0157509	455.4314587	.0154381
43	OR ELECTR MACH	-.0000000	.2837158	.0015957	29.0184604	.0015770
44	OR AIRCRAFT AEROSP	-.0000000	.1064152	.0028530	4.7340342	.0028260
45	OR OTHER MANUF	-.0000000	17.1083393	.0128431	528.3462894	.0128358
46	OR TRANSP SERV	-.0000000	18.4946923	.0140826	465.4923701	.0138509
47	OR ELECTR UTILIT	-.0000000	4.0271061	.0058491	46.9471351	.0062500
48	OR N GAS UTILIT	-.0000000	1.6322708	.0077913	16.3999946	.0077507
49	OR OTHER UTILIT	-.0000000	1.0735279	.0102534	9.7719368	.0102451
50	OR CONSTR	-.0000000	6.1031210	.0052266	351.1074112	.0052157
51	OR TRADE	-.0000000	21.8072998	.0060328	1869.5739176	.0060245
52	OR SERVICES	-.0000000	41.9134666	.0061647	2059.5950611	.0061583
53	ID CROPS	72.5000000	133.6708630	.2422012	4809.4771484	.2422012
54	ID LIVESTOCK	-.0021120	82.5479116	.1684651	3230.4441864	.1684654
55	ID FOOD PROCESS	292.5000000	326.0610618	.2795808	5005.0371736	.2795808
56	ID TEXTILE APPAREL	-.0000000	.0740254	.0081347	4.4740829	.0081346
57	ID MINING	-.0000000	.3761895	.0033409	16.0763982	.0033405
58	ID FORESTR FISH	-.0000000	2.8032844	.0712763	30.6383122	.0712761
59	ID LUMBER WOOD	-.0000000	.9604130	.0007710	8.9005089	.0007708
60	ID PLYWOOD	-.0000000	.1909828	.0010010	2.5550886	.0010009
61	ID PULP PAPER	-.0000000	4.3677320	.0212749	30.8356798	.0212745
62	ID CHEMICALS	-.0000000	9.1752147	.0236719	61.4737586	.0236718
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.3400476	.0064039	11.5250430	.0064025
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0766537	.0002318	.3906153	.0002316
67	ID ALUM	-.0000000	.0024062	.0481234	.0000241	.0481233
68	ID FABR MET MACH	-.0000000	6.3409405	.0564643	304.8579357	.0564635
69	ID ELCTR MACH	-.0000000	.0498377	.0003294	.5431904	.0003294
70	ID AOFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	3.1381402	.0166127	174.9813563	.0166126
72	ID TRANSP SERV	-.0000000	26.4538248	.0781963	802.3411186	.0781960
73	ID ELECTR UTILIT	-.0000000	6.3383812	.0280708	97.9272816	.0280706
74	ID N GAS UTILIT	-.0000000	4.3205035	.0364907	35.5577060	.0364907
75	ID OTHER UTILIT	-.0000000	.3226589	.0786973	52.4900755	.0786972
76	ID CONSTR	-.0000000	2.4934382	.0044155	127.9377577	.0044155
77	ID TRADE	-.0000000	26.9786053	.0329865	3768.9445015	.0329863
78	ID SERVICES	-.0000000	24.3520193	.0187323	2038.9870160	.0187323

Table B-15 Detailed Economic Impacts of Combined Region OBERS Level of Irrigation and Aluminum Without Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	MA CROPS	103.2000000	169.1801430	.1700474	6190.2884348	.1700470
2	MA LIVESTOCK	-.0000000	51.5757017	.1266463	1973.9532444	.1269459
3	MA FOOD PROCESS	319.1000000	365.8379359	.1735556	5483.8929629	.1735551
4	MA TEXTILE APPAREL	-.0000000	.9580074	.0031256	29.5322526	.0031253
5	MA MINING	-.0000000	.7601116	.0065925	24.9862483	.0065530
6	MA FORESTR FISH	-.0000000	6.5804044	.0186150	82.8471492	.0186150
7	MA LUMBER WOOD	-.0000000	2.0175204	.0007995	30.1832276	.0007995
8	MA PLYWOOD	-.0000000	.1834666	.0003473	3.2788809	.0003473
9	MA PULP PAPER	-.0000000	12.1576787	.0069468	122.9355975	.0069481
10	MA CHEMICALS	-.0000000	7.3041210	.0182740	137.0362910	.0182755
11	MA PETROL REF	-.0000000	3.1708918	.0053927	8.6239530	.0053921
12	MA CONCR GLASS ETC	-.0000000	5.2058996	.0159886	115.9341531	.0159885
13	MA IRON STEEL	-.0000000	.9397077	.0067411	29.8075449	.0067368
14	MA NONFERROUS	-.0000000	-.0841487	-.0016340	-4.1110601	-.0016479
15	MA ALUM	-71.9000000	-84.9185015	-.1987195	-1065.7263598	-.0987194
16	MA FABR MET MACH	-.0000000	18.9599583	.0160000	512.2346313	.0160039
17	MA ELECTR MACH	-.0000000	.0953404	.0003826	3.6344288	.0003806
18	MA AGRT AEROSP	-.0000000	.5131184	.0001778	10.9249935	.0001772
19	MA OTHER MANUF	-.0000000	3.5708233	.0019268	96.3060359	.0019282
20	MA TRANSP SERV	-.0000000	10.0650735	.0049800	270.1463312	.0049800
21	MA ELECTR UTILIT	-.0000000	-.4157441	-.0005472	-4.1207236	-.0005473
22	MA N GAS UTILIT	-.0000000	2.8457900	.0145342	17.7293629	.0145342
23	MA OTHER UTILIT	-.0000000	1.7117167	.0066916	8.1648597	.0066916
24	MA CONSTR	-.0000000	2.7193215	.0007359	71.7897731	.0007359
25	MA TRADE	-.0000000	19.6958319	.0030650	1326.9048779	.0030650
26	MA SERVICES	-.0000000	24.2592248	.0025556	1253.9538411	.0025556
27	OR CROPS	38.1000000	70.8695638	.1033638	2340.0934243	.1033829
28	OR LIVESTOCK	-.0000000	57.3211608	.1892040	1646.8241579	.1592631
29	OR FOOD PROC	264.4000000	299.4735619	.2219145	5570.1812242	.2219134
30	OR TEXTILE APPAREL	-.0000000	.5956151	.0082154	55.0208215	.0082124
31	OR MINING	-.0000000	.2816197	.0025932	8.0664579	.0025085
32	OR FOREST FISH	-.0000000	.6062513	.0132659	22.6747667	.0132594
33	OR LUMBER WOOD	-.0000000	3.5166431	.0010827	49.1646523	.0010743
34	OR PLYWOOD	-.0000000	.6076633	.0004291	9.7993059	.0004274
35	OR PULP PAPER	-.0000000	9.7318391	.0112859	113.8637735	.0111620
36	OR CHEMICALS	-.0000000	2.6125237	.0097774	29.4461639	.0098132
37	OR PETROL REF	-.0000000	.2936062	.0126554	7.5834593	.0126401
38	OR CONCRETE ETC	-.0000000	1.7144264	.0077157	35.6666551	.0069248
39	OR IRON STEEL	-.0000000	2.0444547	.0110631	66.8827298	.0103052
40	OR NONFERROUS	-.0000000	.3227339	.0033972	8.1222568	.0033345

Table B-15 Detailed Economic Impacts of Combined Region OBERS Level of Irrigation and Aluminum Without Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-8.9000000	-10.2615266	-.0625322	-141.5590755	-.0530528
42	OR FABR MET MACH	-.0000000	21.1233853	.0143064	409.8415795	.0138927
43	OR ELECTR MACH	-.0000000	.2542132	.0014298	25.8549668	.0014051
44	OR AIRCRAFT AEROSP	-.0000000	.0971067	.0026034	4.3016631	.0025679
45	OR OTHER MANUF	-.0000000	15.3175652	.0114988	472.9153369	.0114892
46	OR TRANSP SERV	-.0000000	17.0775808	.0130036	426.7533898	.0126982
47	OR ELECTR UTILIT	-.0000000	3.4404370	.0049970	41.5350548	.0055295
48	OR N GAS UTILIT	-.0000000	1.5093287	.0072044	15.1309880	.0071509
49	OR OTHER UTILIT	-.0000000	.9264964	.0088491	8.4299675	.0088381
50	OR CONSTR	-.0000000	5.3788716	.0046064	309.1216250	.0045920
51	OR TRADE	-.0000000	19.7309401	.0054584	1690.4957471	.0054474
52	OR SERVICES	-.0000000	36.8334439	.0054184	1809.3294054	.0054100
53	ID CROPS	63.0000000	117.5591005	.2139080	4229.7757749	.2130079
54	ID LIVESTOCK	-.0000000	~~73.6032583~~	~~.1502230~~	~~1988.9216566~~	~~.1502229~~
55	ID FOOD PROCESS	261.2000000	291.1795849	.2496717	4469.6064643	.2496717
56	ID TEXTILE APPAREL	-.0000000	.0647992	.0071208	3.9164492	.0071208
57	ID MINING	-.0000000	.3302341	.0029328	14.1116469	.0029323
58	ID FOREST FISH	-.0000000	2.5078260	.0636504	27.3602892	.0636502
59	ID LUMBER WOOD	-.0000000	.8564978	.0006876	7.9364229	.0006873
60	ID PLYWOOD	-.0000000	.1609188	.0008900	2.2716633	.0008898
61	ID PULP PAPER	-.0000000	3.9026832	.0190097	27.5523116	.0190092
62	ID CHEMICALS	-.0000000	7.9947577	.0206263	53.5646415	.0206262
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.3013366	.0056749	10.2119208	.0056730
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0656283	.0001985	.3342175	.0001982
67	ID ALUM	-.0000000	.0021256	.0425118	.0000213	.0425118
68	ID FABR MET MACH	-.0000000	5.6377307	.0502024	271.0561755	.0502013
69	ID ELECTR MACH	-.0000000	.0442665	.0002926	.4824521	.0002925
70	ID AC&T AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	2.8007884	.0148268	156.1701936	.0148267
72	ID TRANSP SERV	-.0000000	23.5979113	.0697544	715.7201944	.0697540
73	ID ELECTR UTILIT	-.0000000	5.6217355	.0248970	86.8548831	.0248967
74	ID N GAS UTILIT	-.0000000	3.8530744	.0325429	31.7107519	.0325428
75	ID OTHER UTILIT	-.0000000	.2858472	.0697188	46.5015364	.0697187
76	ID CONSTR	-.0000000	2.2080999	.0039102	113.2968754	.0039102
77	ID TRADE	-.0000000	25.8087413	.0293782	3356.6679134	.0293780
78	ID SERVICES	-.0000000	21.5741171	.0165955	1606.3908913	.0165954

Table B-16 Detailed Economic Impacts of Combined Region State Choice Level of Irrigation and Aluminum Without Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	117.4000000	191.5090484	.1924908	7007.2995247	.1924903
2	WA LIVESTOCK	-.0000000	58.2863653	.1433586	2236.1396478	.1433581
3	WA FOOD PROCESS	361.5000000	413.6730972	.1962469	6200.9371894	.1962462
4	WA TEXTILE APPAREL	-.0000000	1.0855395	.0035417	33.4632125	.0035413
5	WA MINING	-.0000000	.8376899	.0072653	27.5105033	.0072650
6	WA FORESTR FISH	-.0000000	7.4384621	.0210423	93.6500648	.0210423
7	WA LUMBER WOOD	-.0000000	2.2625271	.0008965	33.8489040	.0008966
8	WA PLYWOOD	-.0000000	.2060160	.0003900	3.6819389	.0003900
9	WA PULP PAPER	-.0000000	13.6455689	.0077970	137.9844592	.0077966
10	WA CHEMICALS	-.0000000	8.2618391	.0206701	155.0062624	.0206720
11	WA PETROL REF	-.0000000	3.5649418	.0060628	9.6955350	.0060621
12	WA CONCR GLASS ETC	-.0000000	5.8794103	.0180572	130.9329522	.0180569
13	WA IRON STEEL	-.0000000	1.0463870	.0075064	33.1886862	.0075010
14	WA NONFERROUS	-.0000000	-.1200417	-.0023309	-5.8592633	-.0023487
15	WA ALUM	-90.4000000	-106.8250818	-.1241863	-1340.6536760	-.1241862
16	WA FABR MET MACH	-.0000000	21.2472972	.0179302	574.0543265	.0179354
17	WA ELECTR MACH	-.0000000	.1000692	.0004016	3.8104213	.0003990
18	WA AGRT AREOSP	-.0000000	.5685439	.0001970	12.0992352	.0001963
19	WA OTHER MANUF	-.0000000	4.0047934	.0021632	108.0075876	.0021624
20	WA TRANSP SERV	-.0000000	11.2000726	.0055416	300.6097221	.0055416
21	WA ELECTR UTILIT	-.0000000	-1.0850874	-.0014283	-10.7540833	-.0014294
22	WA N GAS UTILIT	-.0000000	3.1566069	.0161216	19.6657887	.0161217
23	WA OTHER UTILIT	-.0000000	1.9297593	.0075440	9.2049167	.0075440
24	WA CONSTR	-.0000000	3.0601007	.0008281	80.7862758	.0008281
25	WA TRADE	-.0000000	22.1902771	.0034532	1494.9550472	.0034532
26	WA SERVICES	-.0000000	27.2625634	.0028720	1409.1953812	.0028720
27	OR CROPS	53.5000000	89.1161738	.1300017	2942.5911299	.1300006
28	OR LIVESTOCK	-.0000000	61.8892243	.1179348	1778.0323912	.1179347
29	OR FOOD PROC	260.1000000	317.5419542	.2353034	5906.2459258	.2353020
30	OR TEXTILE APPAREL	-.0000000	.6776533	.0093469	62.5965008	.0093431
31	OR MINING	-.0000000	.3143577	.0028946	8.9612133	.0027868
32	OR FOREST FISH	-.0000000	.6439384	.0140906	24.0819699	.0140822
33	OR LUMBER WOOD	-.0000000	3.8287124	.0011788	53.4565614	.0011650
34	OR PLYWOOD	-.0000000	.6797011	.0004800	10.9550047	.0004779
35	OR PULP PAPER	-.0000000	10.4224301	.0120868	121.6881669	.0119290
36	OR CHEMICALS	-.0000000	3.0403936	.0113787	34.2820565	.0114249
37	OR PETROL REF	-.0000000	.3576111	.0154143	9.2361327	.0153948
38	OR CONCRETE ETC	-.0000000	1.8604027	.0083726	37.9333956	.0073649
39	OR IRON STEEL	-.0000000	2.2448547	.0121475	72.5728998	.0111820
40	OR NONFERROUS	-.0000000	.3519741	.0037050	8.8301491	.0036252

Table B-16 Detailed Economic Impacts of Combined Region State Choice Level of Irrigation and Aluminum Without Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-11.2000000	-13.0922104	-.0797819	-180.4181463	-.0676163
42	OR FABR MET MACH	-.0000000	23.2477533	.0157452	448.9291500	.0152177
43	OR ELECTR MACH	-.0000000	.2832349	.0015930	28.7338159	.0015616
44	OR AIRCRAFT AREOSP	-.0000000	.1060637	.0028435	4.6876514	.0027984
45	OR OTHER MANUF	-.0000000	17.1047576	.0128404	528.0306566	.0128281
46	OR TRANSP SERV	-.0000000	18.3944399	.0140063	457.6411680	.0136173
47	OR ELECTR UTILIT	-.0000000	3.7095948	.0053879	45.5784527	.0060678
48	OR N GAS UTILIT	-.0000000	1.6282756	.0077722	16.3013512	.0077040
49	OR OTHER UTILIT	-.0000000	1.0729939	.0102483	9.7617073	.0102344
50	OR CONSTR	-.0000000	6.0943428	.0052191	350.1033732	.0052007
51	OR TRADE	-.0000000	21.7943991	.0060292	1866.7104869	.0060152
52	OR SERVICES	-.0000000	41.8898028	.0061612	2056.9880542	.0061505
53	ID CROPS	72.5000000	133.6707637	.2422011	4809.4732378	.2422010
54	ID LIVESTOCK	-.0000000	~~82.5478107~~	~~.1684649~~	~~2239.4412941~~	~~.1684649~~
55	ID FOOD PROCESS	292.5000000	326.0610065	.2795807	5005.0362419	.2795607
56	ID TEXTILE APPAREL	-.0000000	.0740236	.0081345	4.4739656	.0081344
57	ID MINING	-.0000000	.3758831	.0033382	16.0619838	.0033375
58	ID FORESTR FISH	-.0000000	2.8082691	.0712759	30.6380979	.0712756
59	ID LUMBER WOOD	-.0000000	.9597830	.0007705	8.8929736	.0007701
60	ID PLYWOOD	-.0000000	.1809022	.0010006	2.5536901	.0010003
61	ID PULP PAPER	-.0000000	4.3675586	.0212740	30.8341154	.0212734
62	ID CHEMICALS	-.0000000	9.1750637	.0236715	61.4726282	.0236714
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	.3399964	.0064029	11.5215582	.0064005
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	.0744604	.0002252	.3791282	.0002248
67	ID ALUM	-.0000000	.0024061	.0481227	.0000241	.0481226
68	ID FABR MET MACH	-.0000000	6.3408365	.0564634	304.8598128	.0564628
69	ID ELECTR MACH	-.0000000	.0498362	.0003294	.5431465	.0003293
70	ID AIRFT AREOSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	3.1381022	.0166125	174.9783322	.0166123
72	ID TRANSP SERV	-.0000000	26.4535085	.0781954	802.3292399	.0781949
73	ID ELECTR UTILIT	-.0000000	6.3382380	.0280701	97.9245913	.0280698
74	ID N GAS UTILIT	-.0000000	4.3204720	.0364905	35.5574203	.0364904
75	ID OTHER UTILIT	-.0000000	.3226572	.0786969	52.4897605	.0786967
76	ID CONSTR	-.0000000	2.4934045	.0044154	127.9356581	.0044154
77	ID TRADE	-.0000000	28.9703348	.0329862	3768.9006181	.0329860
78	ID SERVICES	-.0000000	24.3517228	.0187321	2038.9571090	.0187320

Table B-17 Detailed Economic Impacts of OBERS Level of Aluminum Reduction, Low Water Year Without Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0170961	-.0000172	-.6671392	-.0000183
2	WA LIVESTOCK	-.0000000	-.0123561	-.0000364	-.4946380	-.0000317
3	WA FOOD PROCESS	-.0000000	-.0891971	-.0000423	-1.3936675	-.0000441
4	WA TEXTILE APPAREL	-.0000000	-.0095556	-.0000312	-.3045804	-.0000322
5	WA MINING	-.0000000	-.5188037	-.0044996	-17.6396361	-.0046262
6	WA FORESTR FISH	-.0000000	-.0293692	-.0000831	-.3700753	-.0000832
7	WA LUMBER WOOD	-.0000000	-.2115122	-.0000838	-3.1592950	-.0000837
8	WA PLYWOOD	-.0000000	-.0106996	-.0000206	-.1935541	-.0000205
9	WA PULP PAPER	-.0000000	-.2510313	-.0001434	-2.4611929	-.0001391
10	WA CHEMICALS	-.0000000	-.2524600	-.0006316	-4.6976539	-.0006265
11	WA PETROL REF	-.0000000	-1.1515094	-.0019583	-3.1348088	-.0019600
12	WA CONCR GLASS ETC	-.0000000	-.1639723	-.0005036	-3.6545391	-.0005040
13	WA IRON STEEL	-.0000000	-.2506285	-.0017979	-8.0097036	-.0018103
14	WA NONFERROUS	-.0000000	-.5813009	-.0112874	-28.2698711	-.0113322
15	WA ALUM	-230.1000000	-273.1357874	-.3175259	-3427.8507323	-.3175256
16	WA FABR MET MACH	-.0000000	-1.5911318	-.0013427	-42.4932874	-.0013276
17	WA ELECTR MACH	-.0000000	-.1763188	-.0007075	-6.8175839	-.0007139
18	WA AGRT AREOSP	-.0000000	-.0122382	-.0000042	-.3743195	-.0000061
19	WA OTHER MANUF	-.0000000	-.2182965	-.0001179	-5.9943900	-.0001200
20	WA TRANSP SERV	-.0000000	-4.5118092	-.0022324	-121.0983257	-.0022324
21	WA ELECTR UTILIT	-.0000000	-15.5191141	-.0204227	-153.7565497	-.0204229
22	WA N GAS UTILIT	-.0000000	-1.5077879	-.0077007	-9.3930067	-.0077002
23	WA OTHER UTILIT	-.0000000	-.1631235	-.0006377	-.7781579	-.0006377
24	WA CONSTR	-.0000000	-.4057822	-.0001098	-10.7132839	-.0001098
25	WA TRADE	-.0000000	-2.1002239	-.0003268	-141.4968692	-.0003268
26	WA SERVICES	-.0000000	-4.2967404	-.0004526	-222.1070258	-.0004527
27	OR CROPS	-.0000000	-.0022924	-.0000033	-.1383559	-.0000061
28	OR LIVESTOCK	-.0000000	-.0120096	-.0000838	-.0966775	-.0006065
29	OR FOOD PROC	-.0000000	-.0041567	-.0000031	-.1637907	-.0000065
30	OR TEXTILE APPAREL	-.0000000	-.0006463	-.0000089	-.1237175	-.0000185
31	OR MINING	-.0000000	-.0153692	-.0001415	-1.3284987	-.0004131
32	OR FOREST FISH	-.0000000	-.0010198	-.0000223	-.0737758	-.0000431
33	OR LUMBER WOOD	-.0000000	-.0935586	-.0000288	-2.5466587	-.0000556
34	OR PLYWOOD	-.0000000	-.0081784	-.0000058	-.2561829	-.0000112
35	OR PULP PAPER	-.0000000	-.3423748	-.0003970	-8.0842502	-.0007925
36	OR CHEMICALS	-.0000000	-.3033881	-.0011354	-3.0342584	-.0010112
37	OR PETROL REF	-.0000000	-.0031360	-.0001352	-.1100883	-.0001835
38	OR CONCRETE ETC	-.0000000	-.1414332	-.0006365	-16.3581707	-.0031760
39	OR IRON STEEL	-.0000000	-.2364331	-.0012794	-24.0837816	-.0037108
40	OR NONFERROUS	-.0000000	-.0116186	-.0001222	-.7873467	-.0003232

Table B-17 Detailed Economic Impacts of OBERS Level of Aluminum Reduction, Low Water Year Without Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-28.0000000	-33.2752761	-.2027744	-455.3671355	-.1706603
42	OR FABR MET MACH	-.0000000	-.0524706	-.0000355	-40.4623594	-.0013716
43	OR ELECTR MACH	-.0000000	-.0029999	-.0000169	-1.7719285	-.0000963
44	OR AIRCRAFT AEROSP	-.0000000	-.0021899	-.0000587	-.2887382	-.0001724
45	OR OTHER MANUF	-.0000000	-.0223300	-.0000168	-1.9652963	-.0003477
46	OR TRANSP SERV	-.0000000	-.6239871	-.0004751	-48.8569470	-.0014538
47	OR ELECTR UTILIT	-.0000000	-1.9757574	-.0028697	-8.5176582	-.0011339
48	OR N GAS UTILIT	-.0000000	-.0248677	-.0001187	-.6138678	-.0002901
49	OR OTHER UTILIT	-.0000000	-.0033419	-.0000319	-.0638228	-.0000669
50	OR CONSTR	-.0000000	-.0546766	-.0000468	-6.2506332	-.0000929
51	OR TRADE	-.0000000	-.0804486	-.0000223	-17.8321812	-.0000575
52	OR SERVICES	-.0000000	-.1476592	-.0000217	-16.2419737	-.0000486
53	ID CROPS	-.0000000	-.0006298	-.0000011	-.0247721	-.0000012
54	ID LIVESTOCK	-.0000000	-.0006400	-.0000013	-.0189335	-.0000014
55	ID FOOD PROCESS	-.0000000	-.0003502	-.0000003	-.0058972	-.0000003
56	ID TEXTILE APPAREL	-.0000000	-.0000114	-.0000013	-.0007436	-.0000014
57	ID MINING	-.0000000	-.0019456	-.0000173	-.0913490	-.0000190
58	ID FORESTR FISH	-.0000000	-.0000965	-.0000024	-.0013477	-.0000031
59	ID LUMBER WOOD	-.0000000	-.0039739	-.0000032	-.0473874	-.0000041
60	ID PLYWOOD	-.0000000	-.0005086	-.0000028	-.0088048	-.0000034
61	ID PULP PAPER	-.0000000	-.0010908	-.0000053	-.0098154	-.0000068
62	ID CHEMICALS	-.0000000	-.0009532	-.0000025	-.0071262	-.0000027
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0003233	-.0000061	-.0218368	-.0000121
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0139996	-.0000423	-.0729572	-.0000433
67	ID ALUM	-.0000000	-.0000002	-.0000043	-.0000000	-.0000046
68	ID FABR MET MACH	-.0000000	-.0006559	-.0000058	-.0505352	-.0000094
69	ID ELECTR MACH	-.0000000	-.0000095	-.0000001	-.0002748	-.0000002
70	ID AIRCRAFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0002393	-.0000013	-.0169847	-.0000018
72	ID TRANSP SERV	-.0000000	-.0019995	-.0000059	-.0748581	-.0000073
73	ID ELECTR UTILIT	-.0000000	-.0009055	-.0000040	-.0169577	-.0000049
74	ID N GAS UTILIT	-.0000000	-.0002302	-.0000017	-.0018679	-.0000019
75	ID OTHER UTILIT	-.0000000	-.0000104	-.0000025	-.0019881	-.0000030
76	ID CONSTR	-.0000000	-.0002125	-.0000004	-.0132275	-.0000005
77	ID TRADE	-.0000000	-.0017090	-.0000019	-.2764233	-.0000024
78	ID SERVICES	-.0000000	-.0018733	-.0000014	-.1884776	-.0000017

Table B-18 Detailed Economic Impacts of State Choice Level of Aluminum Reduction, Low Water Year Without Replacement Electricity, 1985

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
1	WA CROPS	-.0000000	-.0215257	-.0000216	-.8400618	-.0000231
2	WA LIVESTOCK	-.0000000	-.0155572	-.0000393	-.6228578	-.0000399
3	WA FOOD PROCESS	-.0000000	-.1123057	-.0000533	-1.7548229	-.0000555
4	WA TEXTILE APPAREL	-.0000000	-.0120310	-.0000393	-.3835000	-.0000406
5	WA MINING	-.0000000	-.6531354	-.0056652	-22.2098406	-.0058248
6	WA FORESTR FISH	-.0000000	-.0369787	-.0001046	-.4659618	-.0001047
7	WA LUMBER WOOD	-.0000000	-.2663164	-.0001055	-3.9778824	-.0001054
8	WA PLYWOOD	-.0000000	-.0137246	-.0000260	-.2437181	-.0000258
9	WA PULP PAPER	-.0000000	-.3162150	-.0001807	-3.1001946	-.0001752
10	WA CHEMICALS	-.0000000	-.3178878	-.0007953	-5.9150421	-.0007688
11	WA PETROL REF	-.0000000	-1.4497794	-.0024656	-3.9668078	-.0024677
12	WA CONCR GLASS ETC	-.0000000	-.2064539	-.0006341	-4.6014306	-.0006346
13	WA IRON STEEL	-.0000000	-.3155873	-.0022639	-10.0957702	-.0022795
14	WA NONFERROUS	-.0000000	-.7318719	-.0142111	-35.5926376	-.0142675
15	WA ALUM	-289.7000000	-343.8828359	-.3997708	-4315.7253049	-.3997704
16	WA FABR MET MACH	-.0000000	-2.0039024	-.0016911	-53.5162474	-.0016720
17	WA ELECTR MACH	-.0000000	-.2219903	-.0008908	-8.5836341	-.0008989
18	WA ACFT AREOSP	-.0000000	-.0154130	-.0000053	-.4715698	-.0000077
19	WA OTHER MANUF	-.0000000	-.2748459	-.0001485	-7.5474042	-.0001511
20	WA TRANSP SERV	-.0000000	-5.6805616	-.0028106	-152.4652901	-.0028106
21	WA ELECTR UTILIT	-.0000000	-19.5338158	-.0257125	-193.5823454	-.0257128
22	WA N GAS UTILIT	-.0000000	-1.8983396	-.0096955	-11.8260098	-.0096948
23	WA OTHER UTILIT	-.0000000	-.2053770	-.0008029	-.9797224	-.0008029
24	WA CONSTR	-.0000000	-.5108902	-.0001383	-13.4982998	-.0001383
25	WA TRADE	-.0000000	-2.6442388	-.0004115	-178.1483980	-.0004115
26	WA SERVICES	-.0000000	-5.4097120	-.0005699	-279.6387495	-.0005699
27	OR CROPS	-.0000000	-.0028883	-.0000042	-.1743695	-.0000077
28	OR LIVESTOCK	-.0000000	-.0025318	-.0000648	-.1243566	-.0000832
29	OR FOOD PROC	-.0000000	-.0052392	-.0000039	-.2064702	-.0000082
30	OR TEXTILE APPAREL	-.0000000	-.0008144	-.0000112	-.1559342	-.0000233
31	OR MINING	-.0000000	-.0193701	-.0001784	-1.6746781	-.0005208
32	OR FOREST FISH	-.0000000	-.0012855	-.0000281	-.0930050	-.0000544
33	OR LUMBER WOOD	-.0000000	-.1179380	-.0000363	-3.2104302	-.0000701
34	OR PLYWOOD	-.0000000	-.0103091	-.0000073	-.3229493	-.0000141
35	OR PULP PAPER	-.0000000	-.4316310	-.0005006	-10.1918594	-.0009991
36	OR CHEMICALS	-.0000000	-.3824811	-.0014314	-3.8252819	-.0012748
37	OR PETROL REF	-.0000000	-.0039535	-.0001704	-.1387874	-.0002313
38	OR CONCRETE ETC	-.0000000	-.1783019	-.0008024	-20.6228623	-.0040040
39	OR IRON STEEL	-.0000000	-.2980731	-.0016129	-30.3627139	-.0046783
40	OR NONFERROUS	-.0000000	-.0146370	-.0001541	-.9926047	-.0004075

Table B-18 Detailed Economic Impacts of State Choice Level of Aluminum Reduction, Low Water Year Without Replacement Electricity, 1985 (Continued)

SECTOR NO.	NAME	CHANGE IN FINAL DEMAND	CHANGE IN GROSS OUTPUT	% CHANGE IN GROSS OUTPUT	CHANGE IN EMPLOYMENT	% CHANGE IN EMPLOYMENT
41	OR ALUMINUM	-35.3000000	-41.9506115	-.2556405	-574.0877912	-.2151539
42	OR FABR MET MACH	-.0000000	-.0661367	-.0000448	-51.0111891	-.0017292
43	OR ELECTR MACH	-.0000000	-.0037814	-.0000213	-2.2338307	-.0001214
44	OR AIRCRAFT AEROSP	-.0000000	-.0027606	-.0000740	-.3639962	-.0002173
45	OR OTHER MANUF	-.0000000	-.0281482	-.0000211	-2.4775679	-.0000602
46	OR TRANSP SERV	-.0000000	-.7866539	-.0005990	-61.5942472	-.0018328
47	OR ELECTR UTILIT	-.0000000	-2.4908550	-.0036178	-10.7382199	-.0014296
48	OR N GAS UTILIT	-.0000000	-.0313504	-.0001496	-.7739049	-.0003657
49	OR OTHER UTILIT	-.0000000	-.0042116	-.0000402	-.0834484	-.0000843
50	OR CONSTR	-.0000000	-.0689270	-.0000590	-7.8799384	-.0001171
51	OR TRADE	-.0000000	-.1014085	-.0000281	-22.4800573	-.0000724
52	OR SERVICES	-.0000000	-.1861224	-.0000274	-20.4748323	-.0000612
53	ID CROPS	-.0000000	-.0007930	-.0000014	-.0311952	-.0000016
54	ID LIVESTOCK	-.0000000	-.0000659	-.0000016	-.0238049	-.0000018
55	ID FOOD PROCESS	-.0000000	-.0004409	-.0000004	-.0374267	-.0000004
56	ID TEXTILE APPAREL	-.0000000	-.0000144	-.0000016	-.0009364	-.0000017
57	ID MINING	-.0000000	-.0024497	-.0000218	-.1150316	-.0000239
58	ID FORESTR FISH	-.0000000	-.0001215	-.0000031	-.0016979	-.0000040
59	ID LUMBER WOOD	-.0000000	-.0050056	-.0000040	-.0597017	-.0000052
60	ID PLYWOOD	-.0000000	-.0006406	-.0000035	-.0110920	-.0000043
61	ID PULP PAPER	-.0000000	-.0013742	-.0000067	-.0123679	-.0000085
62	ID CHEMICALS	-.0000000	-.0012006	-.0000031	-.0099767	-.0000035
63	ID PETROL REF	-.0000000	.0000000	.0000000	.0000000	.0000000
64	ID CONCR GLASS ETC	-.0000000	-.0004072	-.0000077	-.0275177	-.0000153
65	ID IRON STEEL	-.0000000	.0000000	.0000000	.0000000	.0000000
66	ID NONFERROUS	-.0000000	-.0176261	-.0000533	-.0918591	-.0000545
67	ID ALUM	-.0000000	-.0000003	-.0000054	-.0000300	-.0000358
68	ID FABR MET MACH	-.0000000	-.0008262	-.0000074	-.0636760	-.0000118
69	ID ELECTR MACH	-.0000000	-.0000120	-.0000001	-.0003464	-.0000002
70	ID ACFT AEROSP	-.0000000	.0000000	.0000000	.0000000	.0000000
71	ID OTHER MANUF	-.0000000	-.0003015	-.0000016	-.0239208	-.0000023
72	ID TRANSP SERV	-.0000000	-.0025183	-.0000074	-.0942985	-.0000092
73	ID ELECTR UTILIT	-.0000000	-.0011405	-.0000051	-.0213613	-.0000061
74	ID N GAS UTILIT	-.0000000	-.0002521	-.0000021	-.0022768	-.0000023
75	ID OTHER UTILIT	-.0000000	-.0000131	-.0000032	-.0025042	-.0000038
76	ID CONSTR	-.0000000	-.0002676	-.0000005	-.0166629	-.0000006
77	ID TRADE	-.0000000	-.0021524	-.0000025	-.3482198	-.0000030
78	ID SERVICES	-.0000000	-.0023594	-.0000018	-.2374243	-.0000022