EXHIBIT A

Assessment of Relative Economic Consequences of Curtailment of Eastern Snake Plain Aquifer Ground Water Irrigation Rights

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John Church Affidavit Appendix A

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Executive Summary

Conflicts between ground water and surface/spring irrigation water users diverting from hydraulically connected water supplies of the Eastern Snake River Plain have been years in the making and are attributable to many factors. One of the seeds of the conflict was sown in the 1880's when surface water irrigators began diverting large amounts of water from the Snake River to flood irrigate lands overlying in the Eastern Snake Plain Aquifer (ESPA). From the 1880s to about the 1950s, most of the excess water that was diverted soaked through the surface soils into the ESPA. As a result, ground water levels across the 10,000 square-mile area of the ESPA increased about 60 to 100 feet, and cumulative spring discharges in the Thousand Springs reach of the Snake River increased from about 4,200 cfs to around 6,800 cfs between the early 1900s and the 1950s, respectively. Beginning in the 1950s, three factors emerged that set the stage for the current crisis. First, surface water users shifted from flood to sprinkler irrigation thereby reducing the amount of incidental recharge to the ESPA by perhaps as much as a million acre feet annually. Second, with the advent of deep well pump technology and low cost power, ground water pumping from the ESPA accelerated. Finally, in the 1960s and 1970s, aquaculture facilities were developed in the Thousand Springs area and were issued water rights based upon the significantly enhanced spring flows. The combination of these three factors coupled with extended drought have now resulted in the current situation where there is insufficient water to satisfy all of the existing water rights from the connected water supplies.

Over the past nine months, the Natural Resources Interim Committee has led an effort to find a solution to the controversy. As might be expected, there is not universal agreement on the cause of the shortage, the applicable legal principles, or the economic consequences of curtailment of junior irrigation ground water rights. Because of the lack of agreement over the extent of the economic consequences of curtailment of junior irrigation ground water rights, separate economic studies were done on behalf of the ground water users and surface water users and made available to the Committee. The ground water users' study prepared by William Hazen and Robert M. Ohlensehlen entitled "Economic Implication of Curtailing Groundwater Pumping" considered the economic impacts arising from the curtailment of ground water within a four county area. This study suggested that the economic consequences of curtailment of junior irrigation ground water rights would be enormous. The surface/spring irrigation water users commissioned an economic study by Joel R. Hamilton entitled "Economic Importance of ERSPA—Dependant Springflow to the Economy of Idaho," which focused on a larger twelve county area. This study focused primarily on the benefits from spring dependent uses and suggested that the economic effects of curtailment of junior irrigation ground water rights is not likely to be significant because "*senior water rights holders are already experiencing the economic effects of a curtailed water supply.*" Hamilton's logic is that the consequences of curtailment of junior irrigation ground water rights will be offset by the added economic benefits of a full water supply to senior water right holders. While each economic report incrementally added to the understanding of the conflicts, the Natural Resources Interim Committee determined that it should commission an independent economic analysis to provide an assessment of the relative economic consequences to the regional and state economies arising from the curtailment of junior irrigation ground water rights versus gains to senior/spring water rights.

This study compares the likely positive economic impacts that will accrue to senior surface/spring water right holders (i.e., surface irrigated agriculture and aquaculture) as a result of curtailment with the likely negative economic impacts of curtailment for junior irrigation ground water right holders. We acknowledge that there will be other economic effects inside and outside of the geographic area of the study that might be impacted as a result of curtailment; however, it was not within the scope of this study to conduct a detailed benefit-cost analyses of all economic effects. Rather, the objective was to isolate the relative economic impacts to the region and the state based on implementation of curtailment under a delivery call by senior surface/spring irrigation water right holders.

Three groups are considered as ***directly*** impacted parties: [1] senior surface/spring irrigation water right holders, [2] senior aquaculture water right holders, and [3] junior ground water irrigators diverting from the ESPA. Impacts to tax revenues collected by local, county, and state governments are another area of impacts but are considered within each of the three groups identified above. Other interests are treated as externalities for purposes of this study.

The geographic focus for the present analyses is a 10,000 square mile area in Idaho characterized as the ESPA which includes all or parts of sixteen counties: Bannock, Blaine, Bingham, Bonneville, Butte, Cassia, Clark, Fremont, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Power, and Twin Falls.

Two curtailment scenarios were modeled. The first curtailment scenario assumes all ground water rights junior in priority to January 1, 1949, are curtailed. The first scenario illustrates the economic effects of ground water and surface/spring water from redistribution of ESPA-connect water supplies as if ground water rights from the ESPA junior to 1949 had never been established. While there was some appropriation of ground water prior to January 1, 1949, the level of diversions under such rights is less than approximately 10 percent of the total diversions of ground water from the ESPA. Therefore, the 1949 curtailment scenario is representative of essentially total curtailment of ground water diversions.

The second scenario assumes all ground water rights junior in priority to January 1, 1961, are curtailed. The second scenario illustrates the economic impacts of redistribution of water had approximately one-half of the ground water rights within the ESPA never been established. This scenario is representative of a curtailment of all ground water rights junior to the most senior aquaculture water rights in the Thousands Springs reach area.

Total acreage under irrigation in the ESPA is approximately 2 million acres. Acreage lost to ground water right holders is estimated to be 990,000 acres under the 1949 curtailment scenarios and 660,000 under the 1961 curtailment. The balance of acreage, approximately 1,015,500 acres, will be acreage benefitting from enhanced surface/spring flows. Average per acre diversions for surface/spring water right holders would be near .8 acre feet/acre, with only a portion of that available for on-site irrigation uses. On the average, this would raised per acre deliveries (as opposed to diversions) between .25 and .5 acre feet/acre.

A widely available commercial input-output model (IMPLAN) was adopted in estimating the economic impacts from the two curtailment scenarios. IMPLAN is the most widely available and commonly used input-output model in the United States. Some adjustments were made to ensure that the model provided results consistent with actual values available from state and federal government sources.

There are two principle categories of impacts that are represented in this study. The first is that associated with ***value added***, which represents the sum of [1] labor income, [2] other property type income, and [3] indirect business taxes. Details related to these categories are included in these analyses. The second category of interest is ***job numbers***.

Summary of Net Effects of Curtailment Scenarios

<u>1949 Curtailments Effects for the ESPA and State of Idaho</u>

Figures I and II are provided to facilitate a comparison between the directly impacted parties. Each horizontal line in these figures represents a different type of user. The ESPA-wide impacts are represented by the blue bars, while the state-wide impacts are represented by red bars. The striped bars reflect the net values (adding all the positive and negative impacts together) for different parties directly impacted. The three user groups included in these analyses (reading from the bottom of the graph up) include (1) aquaculture water right holders, (2) surface/spring irrigation water right holders, and (3) junior irrigation ground water right holders. Also included in each of the subsequent graphs are the *net effects* corresponding to each broad impact type.

Figure I reflects the value added (lost) for each of the parties identified above. The scale is the same across the axis. Positive effects are shown to the right of zero, while negative values are shown to the left. These values are expressed in ***millions of dollars***. The value added attributable to aquaculture is $6 million for the ESPA and $7

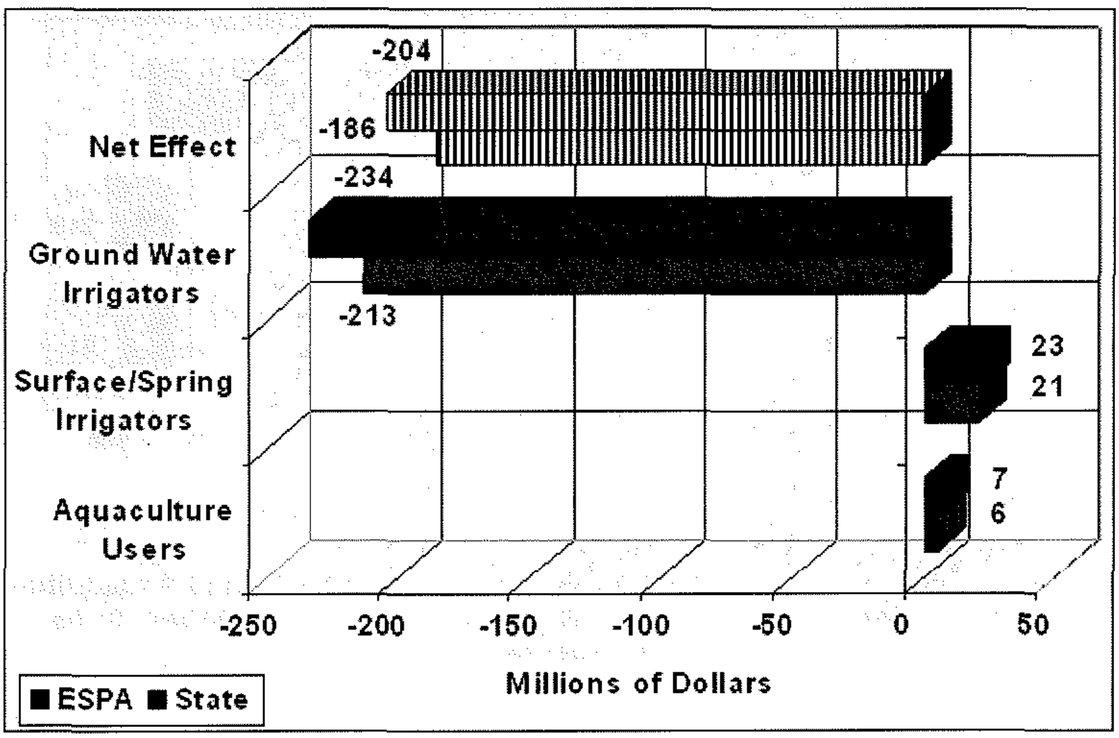

Figure I. Net *Value Added* Gains and Losses for Senior Irrigation and Aquaculture and Junior Irrigation Ground Water Right Holders in the ESPA and State for a 1949 Curtailment Date.

million for the state. Even though the gross value of output is estimated to be an additional $15 million, the value added portion is less than half that number. Value added to surface/spring irrigation water right holders are in excess $20 million for both the ESPA and state. Losses to ground irrigation water right holders are in excess of $213 million for the ESPA and over $234 million for the state. The net effects are highly negative at -$186 and -$204 million, respectively, for the ESPA and state.

Figure II represents the number of jobs gained (and lost) for all of the parties included in this assessment. The increase in jobs for aquaculture and surface/spring irrigation water right holders totaled almost 400 new job at the ESPA level, but almost 475 at the state level. However, job losses attributed to ground water right holders exceeded 3,000 for the ESPA level and 3,600 for the state level analyses. Net effects were substantial at the ESPA and state levels at -2,600 jobs and nearly -3,170 jobs, respectively.

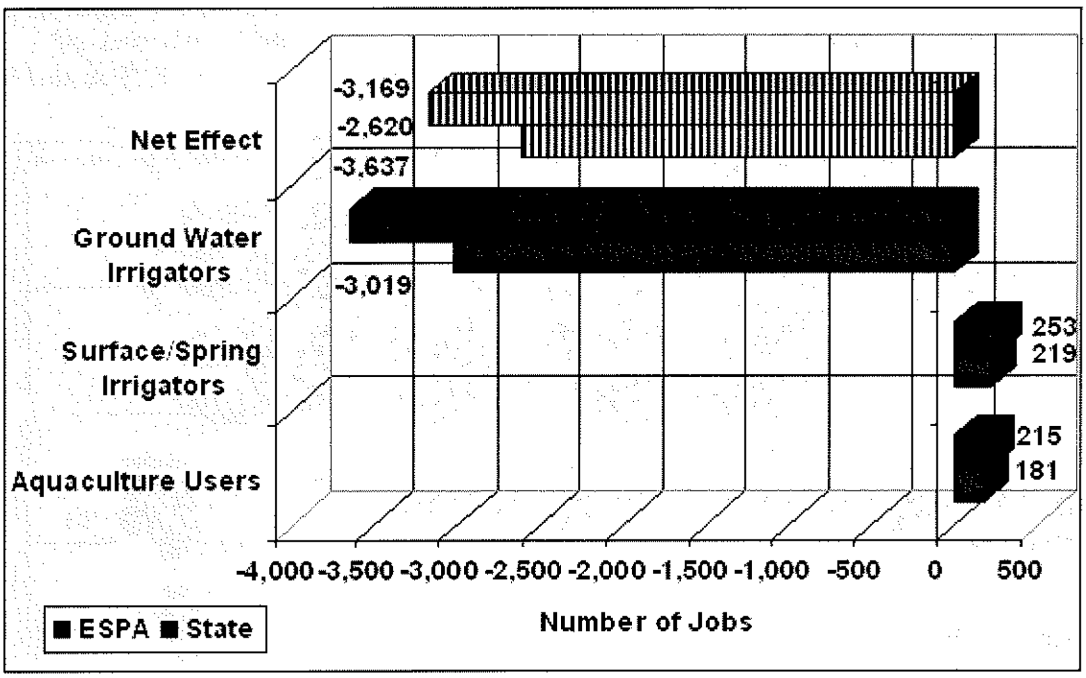

Figure II. *Job Number* Gains and Losses for Senior Irrigation and Aquaculture and Junior Irrigation Ground Water Right Holders in the ESPA and State for a 1949 Curtailment Date.

These two figures show the net result of ground water rights curtailment consistent with 1949 scenarios would result in a significant net loss to the ESPA region, as well as to the State of Idaho.

1961 Curtailments Effects for the ESPA and State of Idaho

Figure III reflects the value added (lost) for all of the parties identified above. The value added attributable to aquaculture is $4 million for the ESPA and state level analyses. Value added to surface/spring irrigation water right holders are in excess $20 million for both the ESPA and state. Losses to ground water right holders were in excess of $140 million for the ESPA and over $158 million for the state. The net effects were still highly negative at -$118 and -$130 million, respectively, for the ESPA and state.

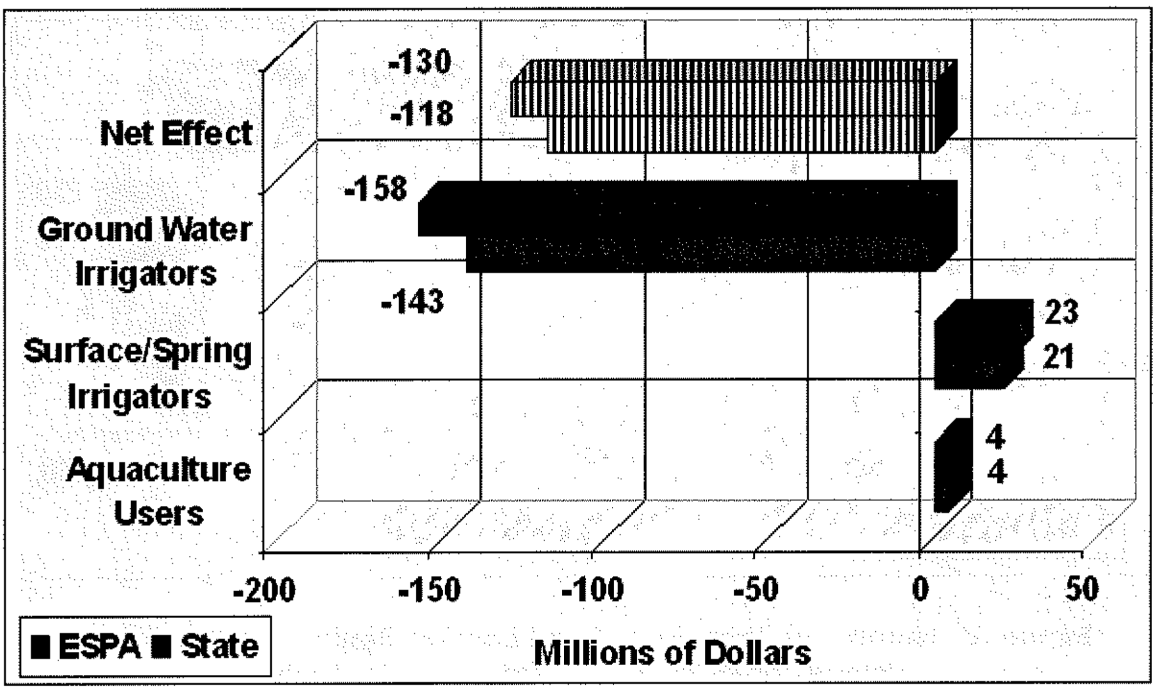

Figure III. *Value Added* Gains and Losses for Senior Irrigation and Aquaculture and Junior Irrigation Ground Water Right Holders in the ESPA and State for a 1961 Curtailment Date.

Figure IV represents the number of jobs gained (and lost) for all parties included in this assessment. The increase in jobs for aquaculture and surface/spring irrigation water right holders total almost 350 new jobs. However, job losses attributed to ground water right holders exceed 2,000 for the ESPA and almost 2,400 for the state. Net effects were sizeable at the ESPA and state at -1,700 jobs and -2,050 jobs, respectively.

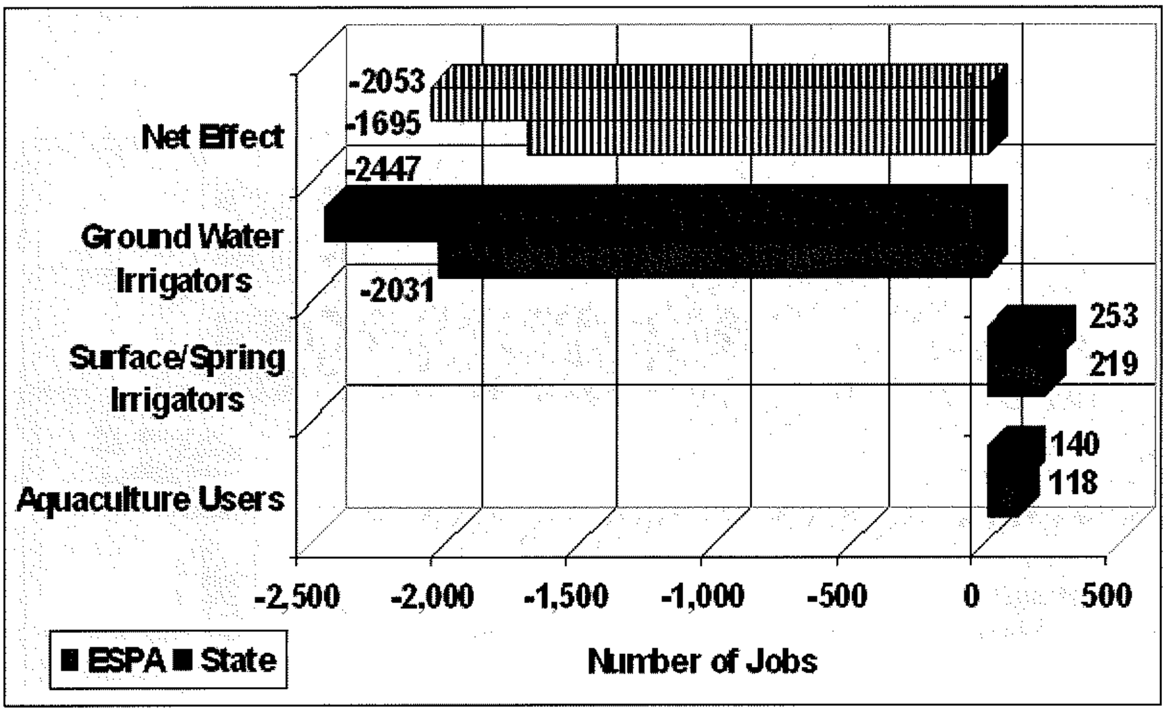

Figure IV. Number of Jobs Gained and Lost for Senior Irrigation and Aquaculture and Junior Irrigation Ground Water Right Holders in the ESPA and State for a 1961 Curtailment Date.

These two figures show the net result of a 1961 ground water right curtailment would be negative for both the ESPA and the State of Idaho.

Summary of Relative Differences

The relative difference between those who would gain and those who would lose are provided in Table I and discussed in the following sections. The chart is separated into the 1949 and 1961 scenarios. The upper portion of Table I provides a summary listing of the various measures of value added. Finally, the number of jobs gained (or lost) is provided in the far right column. The lower portion of the table reflects the gain to surface/spring irrigation and aquaculture users in terms of a proportion of losses to junior irrigation ground water right holders for both curtailment dates. These values are discussed below.

Table 1. Net Gains and Losses and Percentage of <u>Gains</u> by Senior Surface/Spring Water Right Holders Relative to <u>Losses</u> by Junior Irrigation Ground Water Right Holders.*

	User Impacts	Area	Labor Income	Other Property Type Income	Indirect Business Taxes	Total Value Added	Number of Jobs
	Dollar Value of Im0pacts by Impact Category						
1949	Aquaculture Users	ESPA	4,918,000	756,000	516,000	6,190,000	181
		State	5,237,000	1,120,000	561,000	6,918,000	215
	Surface/Spring Users	ESPA	11,051,000	8,577,000	1,299,000	20,927,000	219
		State	12,312,000	9,352,000	1,404,000	23,084,000	253
	Groundwater Users	ESPA	-107,405,000	-92,440,000	-12,812,000	-212,657,000	-3,019
		State	-120,401,000	-99,928,000	-13,837,000	-234,348,000	-3,637
	Net Effects	ESPA	-91,435,000	-83,108,000	-10,998,000	-185,541,000	-2,620
		State	-102,853,000	-89,456,000	-11,872,000	-204,346,000	-3,169
1961	Aquaculture Users	ESPA	3,197,000	491,000	335,000	4,024,000	118
		State	3,404,000	728,000	365,000	4,497,000	140
	Upriver Surface Users	ESPA	11,051,000	8,577,000	1,299,000	20,927,000	219
		State	12,312,000	9,352,000	1,404,000	23,084,000	253
	Groundwater Users	ESPA	-72,266,000	-62,197,000	-8,620,000	-143,084,000	-2,031
		State	-81,010,000	-67,235,000	-9,310,000	-157,678,000	-2,447
	Net Effects	ESPA	-58,017,000	-53,129,000	-6,986,000	-118,133,000	-1,695
		State	-65,294,000	-57,155,000	-7,541,000	-130,096,000	-2,053
	Percentage of Surface/Spring and Aquaculture Impacts Relative to Ground Water Impacts						
1949	Aquaculture Users	ESPA	5%	1%	3%	3%	6%
		State	4%	1%	3%	3%	6%
	Surface/Spring Users	ESPA	10%	9%	10%	10%	7%
		State	10%	9%	10%	10%	7%
	Combined Users	ESPA	15%	10%	13%	13%	13%
		State	15%	10%	13%	13%	13%
1961	Aquaculture Users	ESPA	4%	1%	3%	3%	6%
		State	4%	1%	3%	3%	6%
	Surface/Spring Users	ESPA	15%	14%	15%	15%	11%
		State	15%	14%	15%	15%	10%
	Combined Users	ESPA	20%	15%	18%	17%	17%
		State	20%	15%	18%	17%	16%

* Columns may not add up due to rounding.

1949 Curtailment Date

Aquaculture Water Right Holders

The gain in labor income (which is a total of employee compensation and proprietor income) for aquaculture is 5 percent of the loss for junior irrigation ground water right holders within the ESPA and 4 percent for state levels of analyses. The gain for aquaculture in other property type income is only 1 percent of the loss for ground water right holders at both the ESPA and state levels. The gain in indirect business taxes for aquaculture is 3 percent of the loss for junior irrigation ground water right holders at ESPA and state levels. For aquaculture, the gain in total value added is 3 percent of the loss for junior irrigation ground water right holders within the ESPA and for the state-level analyses. The gain in job numbers is estimated to be 6 percent of the loss for junior irrigation ground water right holders within the ESPA and state-level analyses.

Senior Surface/Spring Irrigation Water Right Holders

The gains in senior surface/spring water right holders are compared to losses in junior irrigation ground water right holders. Labor income is estimated at 10% per the ESPA and the state. Other property income for surface/spring irrigation water right holders is estimated to be 9% of the loss to junior irrigation ground water right holders. Indirect business taxes and total value added levels for senior surface water right holders are 10 percent of junior irrigation ground water right holders losses for both ESPA- and state-level analyses. Gains in job numbers for senior surface water right holders (up river within the ESPA) average 7 percent of the loss in job numbers for junior irrigation ground water right holders within ESPA and state levels of analyses. Even if the production of speciality crops to remain at 70 to 80 per of current levels, total value added and jobs numbers gains for surface/spring water right holders would be less than 50 percent of the loss to ground water right holders under a 1949 curtailment date.

Combined Surface/Spring Irrigation and Aquaculture Water Right Holders

The gains in labor income to senior surface/spring irrigation and aquaculture water right holders are 15 percent of the losses to ground water right holders. For other property income, the values are 10 percent and 11 percent, respectively, for the ESPA and state. Indirect business taxes gains to surface/spring irrigation and aquaculture water right holders average 13 percent of the loss to junior irrigation ground water right holders. Total value added and job number gains for the surface/spring irrigation water right holders average 13% for both the ESPA and state.

Losses to Junior Irrigation Ground Water Right Holders

An alternative way of viewing these data would be to couch relative differences of ground water right losses in relation to surface/spring irrigation water right holder gains. Junior irrigation ground water right holders would lose more than 6 times the gains in all other examined users in relationship to labor income. Losses in other property type income to ground water right holders would be over 8 times greater than the gains in surface/spring irrigation water right holders. Indirect business tax losses for ground water right holders is more than 7 times larger than the gains to surface/spring irrigation water right holders. With respect to value added, the losses to ground water right holders are expected to be 7 times larger than the gains to surface/spring irrigation water right holders for a 1949 curtailment date.

1961 Curtailment Date

Aquaculture Water Right Holders

The gain in labor income for aquaculture is 4 percent of the loss for junior irrigation ground water right holders within ESPA- and state-level analyses. The gain in other property type income is about 1 percent of the loss for junior irrigation ground water right holders at ESPA and state levels. The gain in indirect business taxes for aquaculture is approximately 3 percent of the loss for junior irrigation ground water right holders within the ESPA and state levels. The gain in total value added is slightly over 3 percent of the loss for junior irrigation ground water right holders within the ESPA and for the state-level analyses. The gain in job numbers is estimated to be 6 percent of the loss for ground water right holders within the ESPA and state levels of analyses.

Senior Surface/Spring Irrigation Water Right Holders

Senior surface/spring irrigation water right holders' labor income, other property type income, indirect business taxes, and total value added levels are between 14 to 16 percent of junior irrigation ground water right holders losses. Gains in job numbers for senior surface/spring irrigation water right holders averaged 11 percent of the loss in job numbers for junior irrigation ground water right holders within the ESPA and 10 percent for state-level analyses. Even if the current acreage were 50% in specialty crops, which is not likely to happen due to rotational and other constraints as noted above, the losses to ground water right holders would still exceed the gains to surface/spring water users.

Combined Surface/Spring Irrigation and Aquaculture Water Right Holders

The gains in labor income to senior surface/spring Irrigation and aquaculture water right holders are 20 percent of the losses to ground water right holders for the ESPA and state levels of analyses. For other property income, the values are 15 percent for ESPA and state level analyses. Indirect business taxes gains to surface/spring Irrigation and aquaculture water right holders average 18 percent of the loss to junior irrigation ground water right holders within ESPA and state levels of analyses. Total value added for the surface/spring water right holders average 18% for the ESPA and the state. Job number gains are 17 and 16 percent of the losses to junior irrigation ground water users within the ESPA and state, respectively.

Losses to Junior Irrigation Ground Water Right Holders

Junior irrigation ground water right holders would lose more than 5 times the combined gains from all other examined users in relationship to labor income. Losses in other property type income to ground water right holders would still be 5-6 times greater than the gains in combined surface/spring water right holders. Indirect business tax losses for ground water right holders are more than 5 times larger than the combined gains to surface/spring water right holders. With respect to value added, the losses to ground water right holders are expected to be at least 5 times larger than the combined gains to surface/spring water right holders.

Conclusions

The economic impacts of curtailment of junior irrigation ground water rights under either of the curtailment scenarios, assuming steady state conditions, are anticipated to be 5 times larger than combined gains enjoyed by surface/spring water holders. The reality is that the positive impacts to combined surface/spring irrigation and aquaculture water rights from curtailment of junior irrigation ground water rights will occur over a relatively long period. The initial positive impacts of curtailment to the senior surface/spring water right holders will be much less than the amount predicted to occur at steady state. For example, as shown in Appendix A, the positive economic impacts in the form of gross sales to all senior surface/spring water right holders is estimated to be only $0.9 million in the first year of curtailment. The total value of output impact on ground water right holders, however, remains constant at $211 M. Thus, in the first year of curtailment, the relative net economic impact is estimated to be in excess of -$210 million.

In order to provide a perspective on the relative magnitude of curtailment, per acre crop values on the remaining acreage would have to be nearly $1,200/acre to offset negative impacts felt by ground water right holders as a result of the 1949 curtailment. For a 1961 curtailment date, average per acre returns on the remaining acreage would have to average more than $805/acre. For the reasons previously given, it is highly unlikely that such per acre values would occur on the remaining acreage.

Assessment of Relative Economic Consequences of Curtailment of Eastern Snake Plain Aquifer Ground Water Irrigation Rights

Part I: Brief Background

Scope of Work

Over the past nine months, the Natural Resources Interim Committee led an effort to find a solution to the controversy. There is not universal agreement on the cause of the shortage, the applicable legal principles or the economic consequences of curtailment of junior ground water rights. Because of the lack of agreement over the extent of the economic consequences of curtailment of junior ground water rights, ground water users and surface water users each commissioned and submitted their own economic studies to the Committee. The ground water users' study prepared by William Hazen and Robert M. Ohlensehlen entitled "Economic Implication of Curtailing Groundwater Pumping" considered the economic impacts arising from the curtailment of ground water within a four county area. This study suggests that the economic consequences of a curtailment of junior ground water rights would be substantial. The combined surface/spring water users commissioned an economic study by Joel R.Hamilton entitled "Economic Importance of ERSPA — Dependant Springflow to the Economy of Idaho," which focused on a larger twelve county area. This study focused primarily on the positive impacts from spring dependent uses and suggested that the economic effects of curtailment of junior ground water rights was not likely to be significant because "senior water rights holders were already experiencing the economic effects of a curtailed water supply." Hamilton's conclusion was that the consequences of curtailment of junior ground water rights would essentially be offset by the added positive economic impacts of a full water supply to senior water right holders. This view was based on the notion that senior surface/spring water right holders could use any additional water on new acres. While each economic report incrementally added to the understanding of the conflict, the Natural Resources Interim Committee determined that it should commission an independent economic analysis to assess the relative economic consequences to the regional and state economies arising from the curtailment of junior ground water rights.

This study compares the likely positive economic impacts that will accrue to combined senior surface/spring irrigation and aquaculture water right holders as a result of curtailment, with the likely negative economic impacts imposed on junior ground water right holders. We acknowledge that due to the hydraulic connection between the Snake River and the ESPA, other water right holders inside and outside of the geographic area of the study might be impacted as a result of curtailment; however, it is not within the scope of this study to conduct a detailed cost-benefit analysis of all economic impacts. Rather, the objective is to isolate the relative economic impacts to the primarily impacted parties within the region and the state based on implementation of curtailment under a delivery call by combined senior surface/spring water right holders.

Three groups are considered as ***directly*** impacted parties: [1] senior surface/spring irrigation water right holders, [2] senior aquaculture water right holders, and [3] ground water users diverting from the ESPA. Impacts to tax revenues collected by local, county, and state governments are considered within the three groups identified above. Indirect business taxes (which consist primarily of sales and property taxes) are the primary taxes included in these analyses. All other water users are treated as externalities for purposes of this study.

Two curtailment scenarios were modeled. The first curtailment scenario assumed all ground water rights junior in priority to January 1, 1949, were curtailed. This scenario is intended to illustrate the economic effects on ground water and surface water from redistribution of ESPA-connect water supplies had ground water rights from the ESPA junior to 1949 never been established. This scenario is premised on curtailment as a result of a delivery call from the most senior surface water rights.

The second scenario assumes all ground water rights junior in priority to January 1, 1961, are curtailed. This scenario is intended to illustrate the economic impacts of redistribution of water had approximately one-half of the ground water rights within the ESPA never been established. This scenario is premised on a curtailment to satisfy a delivery call from the most senior aquaculture water rights in the Thousands Springs reach.

After considering alternative methodologies, we concluded that the input-output approach would best meet the requirements inherent in the scope of work. A more abstract and less informative approach could be based upon comparing gross sales. Analyses based upon gross sales, however, do not account for the cost of resources imported from outside of the region such at utilized by Hamilton. A more definitive approach would involve collecting and analyzing individual firm-level and household-level data. We acknowledge that this approach, typically referred to as "willingness-to-pay," would provide additional detail with respect to those who gain and lose. This study, however, was never intended as a benefit-cost analysis. In our professional opinion, the conclusions of such studies would not differ in the aggregate from those obtained in our analyses. The approach undertaken in this study, i.e., input-output analysis, has been widely adopted by regional economists in assessing impacts on both the supply side (i.e., changes in industries) as well as on the demand side (i.e., changes in household income).[1]

An aspect to keep in mind in reviewing the data included in this study is that relative values are of the greatest worth in input/output and related analyses. What is more important than any given dollar amount is the magnitude of one impact compared to the magnitude of other impacts. For example, if the losses to one party were estimated at $90M, while the gains to another party were estimated at $30M, the relative difference in values (i.e., -3 to 1) is more important than either the 90 million in losses or the 30 million in gains.

This study should not be used to used to attribute gains or losses to the value of water. It would be incorrect to divide the impact values by the quantity of water made available. This would have the effect of attributing the value of the curtailment scenarios all to water, which would be a gross overstatement of the actual value of water used in any of these production processes. The values resulting from these analyses actually should be attributed to <u>all</u> inputs, i.e., labor, buildings, land and natural resources, management, etc.

Given the modeling approach that was adopted and ensuing assumptions made, the results of these analyses will provide an assessment of positive and negative impacts attributable to curtailment of ground irrigation water right holders. This was intentional to avoid understating effects to any single party. Hence, for junior and senior spring water-right holders, including both agriculture and aquaculture, the gains are the maximum that could be expected under any reasonably foreseeable condition.

We recognize that input-output modeling provides a snapshot of economic conditions at a single point in time, which means that substitution of inputs or technological change is not allowed for. It is recognized that technologies will most certainly change over time and that producers will substitute between inputs if possible, as witnessed by past technological changes and input substitutions. It is very difficult to predict the nature and scope of such changes. Hence, all of our calculations are based upon current levels of technology, which are unlikely to change in the near term.

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[1] Input-Output modeling has been used extensively in these types of analyses. There is a broad base of support for utilizing input-output modeling, even on the supply side. For a small sample of similar studies, see Blum (1995), Leones and Charney (1995), Miller (1995), Tanjuakio, Hastings, and Tytus (1996), Broomhall (1996), Goldman and Brown (1996), Anderson (1996), Robinson, McKetta, and Peterson (1996), McWilliams and Goldman (1996), Hemmer and Boyle (1996), Miller and Voth, Ailery (1997), Leones, Colby, and Dennis (1997), Pulkrabek (1997), Schallau, Maki, and McKillop (1997), Lewandrowski and Ingram (1998), Fox (1998), Morse and Lindall (1998), Thompson (1998), Jones (1998), Creason and Podolsky (1998), Goldman, McWilliams, and Pradhan (1998), Kraybill and Gabe (1998), Josephson (1998), Templeton, Brown, and Goldman (1999), Green (2000), Brock (2000), Hodges and Mulkey (2000), Kielkopf (2000), Cioni, et al (2000), Lazarus (2002), Kalra (2002) and Spurlock (2003),

Geographic Study Area

The geographic focus for the present analysis is an area in Idaho comprised of Bannock, Blaine, Bingham, Bonneville, Butte, Cassia, Clark, Fremont, Gooding, Jefferson, Jerome, Lincoln, Madison, Minidoka, Power, and Twin Falls counties. For discussion purposes, this region will be referred to as the Eastern Snake Plain Aquifer (ESPA) as illustrated in Figure 1.1. This study pertains to both surface water and ground water rights within the ESPA, with primary emphasis on groundwater resources and their impact on other water resources. The ESPA region represents a core part of the State of Idaho and its largest agricultural producing region. Its population is approximately 440,000, which represents approximately one-third of the population of the state. Personal income generated in the region totaled over $10.5 billion, which represents over 30 percent of the state's personal income.

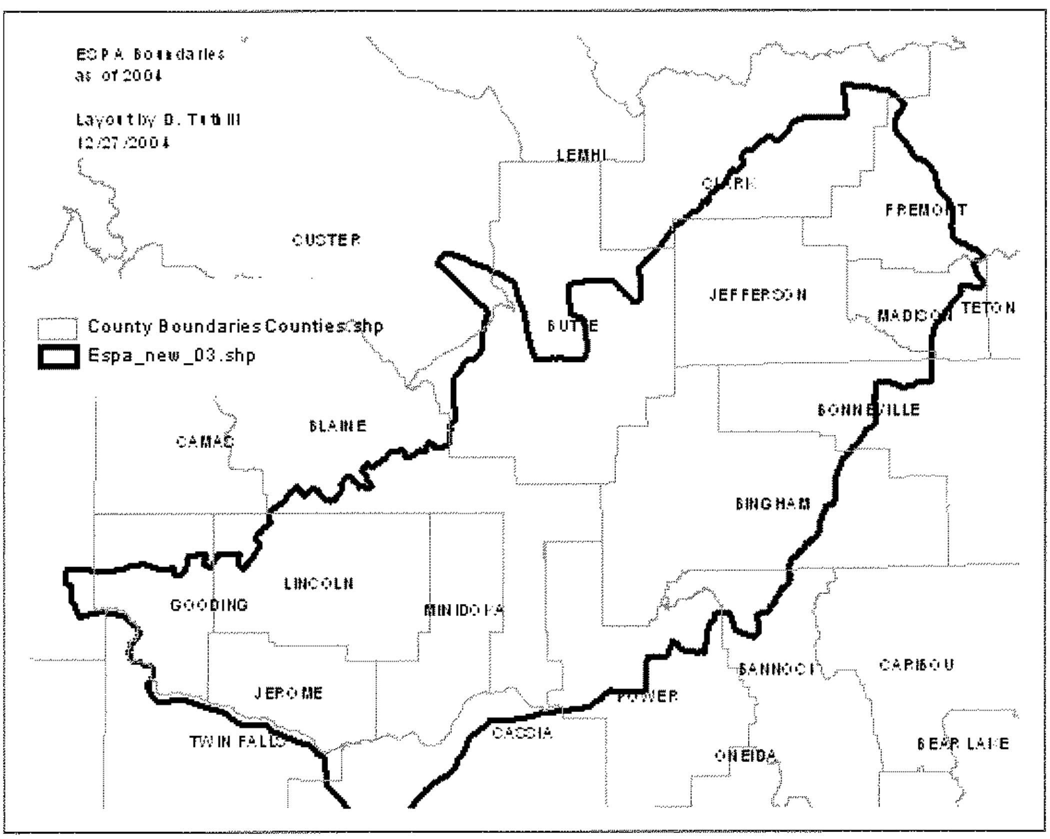

Figure 1-1. Outline of the Eastern Snake Plain Aquifer.

Idaho Agriculture and Aquaculture

Idaho has a substantial agricultural sector–one of the largest in the West. Thus, any measurable changes to segments of this sector could be expected to have a significant impact on the ESPA's and state's economy. Table 1-1 includes summary gross sales data for various commodities produced in Idaho. This table is not all inclusive and is provided solely for comparative purposes. The total value of all cattle sales was over $1.9 billion and the value for milk sales was $921 million in 2003. Other commodities with large gross sales include, hay ($426 million), wheat ($310 million), sugar beets ($212 million), and barley ($152 million). The value of gross sales when these crops are combined totaled $555 million for 2003. Other commodities in the mid-range of sales includes corn silage ($70 million), potatoes ($60 million), and vegetables ($58 million). Commodities with even smaller levels of gross sales include corn grain ($20.6 million), apples ($18.3 million), sheep ($17.5 million), corn silage ($12.8 million), eggs ($11 million), hogs ($6.8 million), honey ($6.2 million), oats ($2.4 million), and poultry ($2 million). While total crop sales have exceeded $1 billion, aquaculture sales have averaged $40 million over the past 7 years. It makes sense that changes in crop production are likely to have a significant impact on the area's economy.

Table 1-1. Value of Gross Output by Commodity for the State of Idaho, 2003.

Commodity Sold	Gross Value	Commodity Sold	Gross Value
Cattle	$1,970,000,000	Wheat	300,543,000
Hogs	$6,800,000	Corn	20,650,000
Sheep	$17,500,000	Corn Silage	70,200,000
Milk	$921,000,000	Oats	2,438,000
Poultry	$2,000,000	Barley	152,064,000
Eggs	$11,000,000	Sugar Beets	212,286,000
Apples	$18,300,000	Honey	6,210,000
Vegetables	$58,680,000	Hay	425,910,000
Potatoes	$384,560,700	Aquaculture[1]	$40,000,000

Sources: Agricultural Statistics 2004 and [1]Trout Production, 1995-2003, U.S. Department of Agriculture, National Agricultural Statistical Service, Government Printing Office, Washington, D.C.

An alternative way of looking at these values is illustrated in Figure 1-2, where gross sales are broken out by percentages. Cattle and milk comprise the largest share of output (e.g., approximately 61 percent) for Idaho's agricultural commodities, as is typical for many of the Intermountain states. In percentage terms, potatoes provides the next largest segment at 11 percent, followed by hay at 8 percent. When compared to this mix of livestock and crop commodities, aquaculture production is less than 1 percent of total livestock and crop sales.

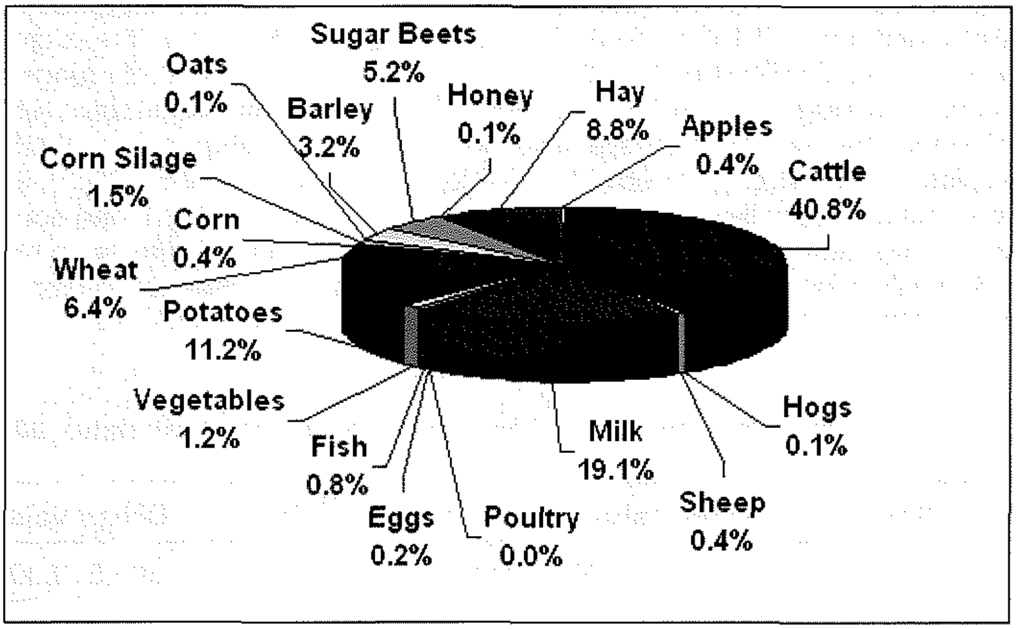

Figure 1-2. Distribution of Agricultural Commodities and Aquaculture by Gross Sales for the State of Idaho.

Since livestock enterprises use a relatively small amount of water, it is anticipated that these enterprises will find an alternative water supply and continue as presently constituted, even in the event of any curtailment of individual ground water right holders.

A second comparison excluding livestock enterprises is provided in Figure 1-3. Under this comparison, hay is the largest sector (31 percent), followed by wheat (23 percent) and sugar beets (15 percent). Vegetables, potatoes, corn silage, and barley each representing larger percentages than aquaculture production (which comprises 3 percent of the total value) for this grouping. Honey and oat enterprises represent a very small fraction of total sales.

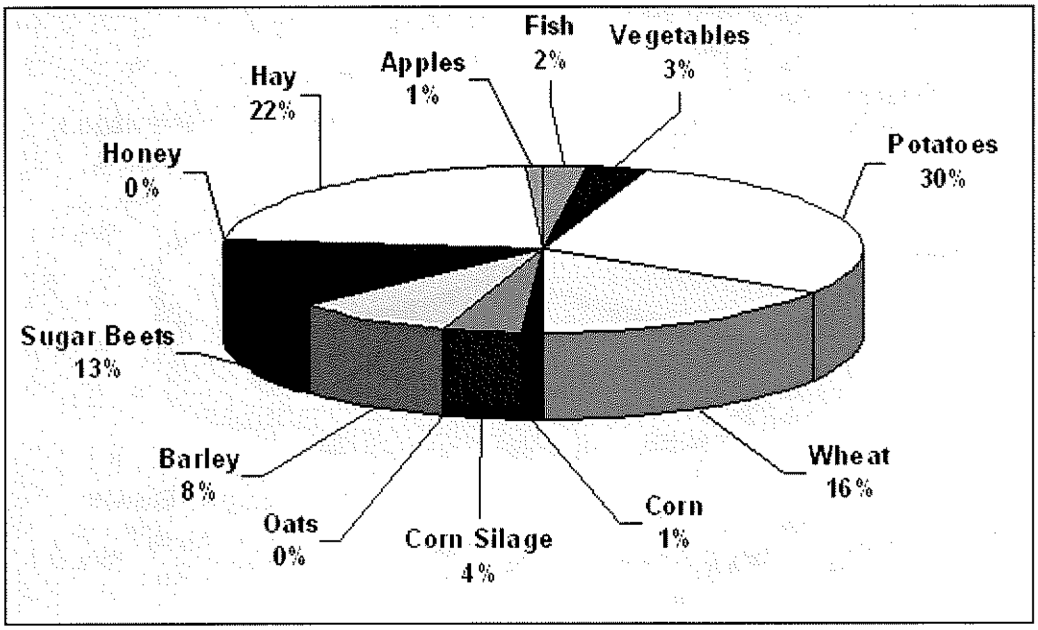

Figure 1-3. Distribution of Crop and Aquaculture Values for the State of Idaho.

Within the ESPA (Figure 1-4), the percentages differ relative to those shown in Figure 1-3 for Idaho. Potatoes are the highest gross revenue-earning crop, followed by hay, sugar beets, and wheat. Aquaculture receipts comprise approximately 4 percent of the gross value represented by this mix of industry sectors.

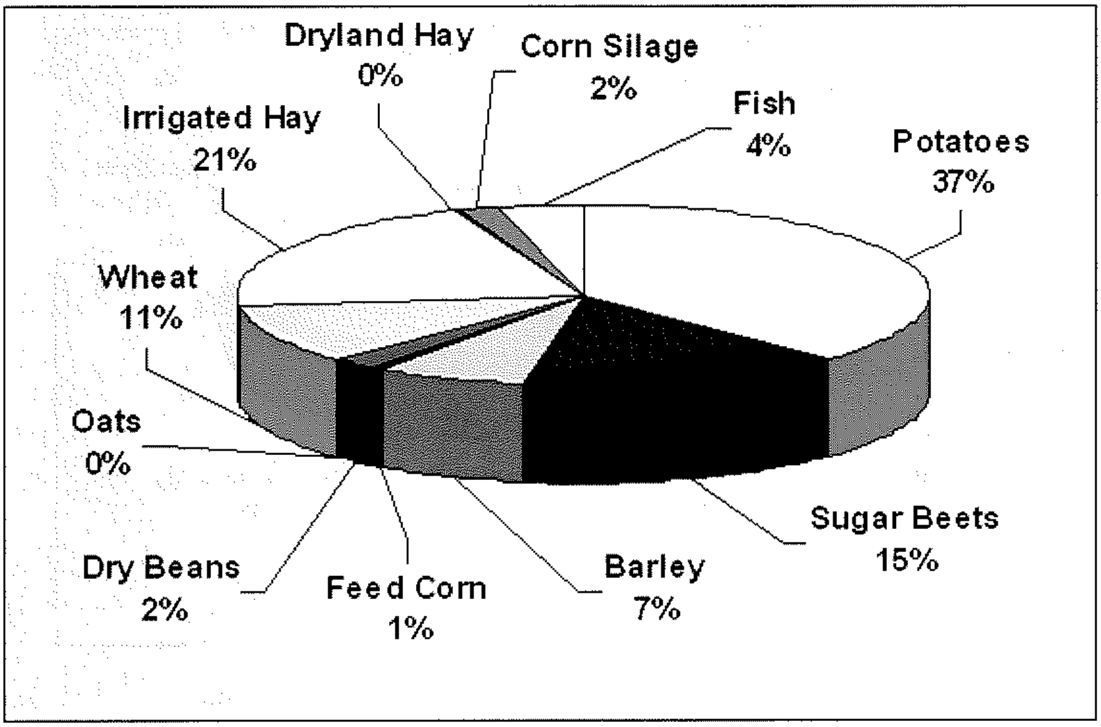

Figure 1-4. Distribution of Crop and Aquaculture Values for the ESPA Region.

History of ESPA Water Development

The Eastern Snake River Plain lies entirely within the Snake River Basin above King Hill and is drained by the Snake River and its tributaries. The Eastern Snake River Plain is about 170 miles long, 60 miles wide, and covers 10,000 square miles. The plain extends from Mud Lake in the northeast to King Hill in the southwest. The ESPA lies below the plain and is comprised mostly of fractured basalt that is over 3,000 feet thick at the center of the plain and only a few hundred feet thick along the margins. The basalt is highly hydraulically conductive and is characterized by rubble and clinker zones at flow interfaces and large fractures. The aquifer is hydraulically connected to various reaches of the Snake River and both gains water from and loses water to the river.

Spring flows in the American Falls reach contribute to the river flows above Milner Dam. From Milner to King Hill, the Snake River is entrenched in a steep basalt canyon as much as 700 feet deep. Spring flows from the north side of the canyon, along with a few streams from the south side, rebuild the flow in the Snake River below Milner. While there is limited reliable data on the discharge of springs in the American Falls reach, historical data show that the spring flows in the Thousand Springs reach were about 4,800 cubic feet per second (cfs) as recorded in the early 1900s.

In the late 1800s, settlers began diverting surface water supplies from the Snake River and its tributaries for uses on the Eastern Snake River Plain. Diversions of surface water have been used for agriculture, domestic, municipal, and industrial purposes, but primarily for agriculture (95%). The farming areas were initially flood irrigated. Surface water diverted for irrigation was generally well in excess of crop consumptive use. Excess water not directly returning to the Snake River percolated downward, recharging the aquifer, thus enhancing spring discharges. As a result of incidental recharge from surface water irrigation from the Snake River and its various tributaries, the ground water levels across the ESPA rose generally about 60 feet to 100 feet and spring flows in the Thousand Springs Reach increased to approximately 6,800 cfs by the 1950s.

Elevated flows of the Thousand Springs allowed aquaculture producers to establish water rights beginning in 1960 and extending through the 1970s. These rights for aquaculture were established based upon the significantly enhanced flows resulting from incidental recharge from surface water irrigation. The perfection of larger water rights for aquaculture primarily occurred after the acquisition of surface water rights on the Eastern Snake River Plain, and prior to approximately one-half of water rights granted for ground water withdrawals from the ESPA. In addition, upstream surface irrigation water right holders gradually shifted from flood irrigation to sprinkler irrigation due to added efficiencies in water application, increased awareness of water conservation, and labor needs. While sprinkler irrigation systems are much more efficient in water and labor use, they result in less incidental recharge to the aquifer and less return flow to the river. This conversion from flood irrigation to sprinkler irrigation largely resulted in reductions in surface water diversions in the upper Snake River Basin of nearly 1,000,000 acre-feet annually.

Beginning in about 1950 and extending through the 1980s, deep well technology improved such that ground water rights were acquired by farmers and other users within the ESPA. In some instances, irrigators changed from the use of surface water to ground water because of the convenience and economic efficiencies associated with such conversions. As a result, discharges from the springs in the Thousand Springs and related areas began declining and are now about 5,000 cfs.

Because of legal uncertainty regarding the application of the prior appropriation doctrine to ground water prior to the Ground Water Management Act of 1953 and the absence of any apparent conflict between surface and ground water rights prior to the decline of spring flows beginning in the 1960s, conjunctive administration of these rights was not an issue. The Swan Falls (1984) controversy, however, brought the issue to the surface and periods of extended drought have only served to make the need for resolution of the issue more imperative.

Parties Considered for Study Purposes

The parties considered for purposes of this study affected by the postulated redistribution of water include:

[1] *ESPA Senior Surface/Spring Irrigation Water Right Holders*: Agriculture is the largest water user in the up-river area of the ESPA. The senior surface/spring irrigation water right holders typically hold water rights having the earliest priority dates on the Eastern Snake River Plain. There has been some impact on surface/spring irrigation water right holders whose rights are associated with spring flows (Personal communication with V. Alberti, T. Diehl, and R. Bingham on December 23, 2004 and L. Harmon on December 28, 2004). Reduction in ground water diversions would have a positive effect on senior surface/spring irrigation water users.

[2] *ESPA Area Aquaculture Industry Senior Water Right Holders*: The aquaculture industry utilizes spring flows in their production and, to a more limited extent, processing operations. The spring flow from the ESPA is exceptional, both in terms of temperature and quality. The fish produced in this water environment are also of high quality. Even though the industry withdraws and reuses some water for production and processing facilities, the actual fish production operations are limited in the water that can be re-circulated due to fish health and sanitation standards. Still, there is evidence that some substitution of inputs has allowed these fisheries to maintain near historical levels of production even with reduced water levels, e.g., moving from earthen ponds to concrete runways (NASS, 1995-2003; Gary Fornshell, 2004). The most senior priority of the large water rights for aquaculture are senior to about one-half of the ground water rights within the ESPA and are included in this study as a potentially impacted party. A reduction in upstream groundwater pumping would likely have a positive impact on the aquaculture industry.

[3] *ESPA Junior Irrigation Ground Water Right Holders*: This group includes agricultural users that rely exclusively or extensively on deep-well water pumps for all water needs. Agricultural crops utilize 95 percent of the ground water withdrawn (USGS, 2004). Since these agricultural irrigators use the majority of the ground water diverted, they are consequently considered part of the directly impacted group for this analysis. It is hypothesized that curtailment of groundwater pumping for agriculture would have a negative impact on these producers primarily by severely limiting crop production or changing the crop mix.

Changes in the way water is allocated will have an impact on business activity, which may subsequently impact several forms of tax revenue. These taxes, in turn, impact the provision of public services, including public school operations, road construction and maintenance, solid waste removal, etc. To the extent possible, these impacts are included in the analyses as part of the impacts for these other three parties.

Other Externally Impacted Parties

Those interests that might receive a positive or negative externality from curtailment, include DMI users, livestock producers, sugarbeet or potato processing, the hydropower industry, down-river junior water right holders of surface water, and public uses of water.

[1] *Domestic, Municipal, and Industrial Users*: While these users may be impacted if they have to purchase water to replace the ground water supplies that are curtailed or condemn senior water rights, these added costs are considered incidental to the major economic impacts and are likely to be spread across a larger group of individuals and firms. Furthermore, it is extremely difficult to assess water costs or benefits to these entities within a macro analytical framework. Some parties may gain; others may lose.

[2] *Livestock (Beef and Dairy) Producers*: Even though the existing beef and dairy operations heavily rely on local water and regional hay and grain production, impacts resulting from a reduction in the region's crop production are not assumed to impact livestock operations because the amount of water required to continue production is relatively small and producers are likely to acquire alternative water supplies, albeit at higher prices than at present.

[3] *Sugarbeet and Potato Processing Industries*: These users may be impacted if local production is displaced by more distant production, as would be expected with the magnitude of land going out of production due to curtailment. However, it is anticipated that these firms, to the extent desired, can contract from a larger area. This will be necessitated by the relatively Furthermore, there has recently been movement of potato processing into the international scene (e.g., primarily Canada and China). Sugarbeet production faces difficulties of another kind in that the industry exists to a significant degree due to subsidies paid for domestic production. With changes within the USDA to move to a more market-oriented agricultural system, it is questionable if the sugarbeet industry will continue in its present form.

[4] ESPA Area Electric Power Industry: In a relative and historical sense, a small component of total water flows is actually withdrawn from stream and river flows for hydro-produced power. The water is mainly considered as a flow-through product and pursuant to the Swan Falls Agreement, the Idaho Power Company's hydropower water rights were subordinated down to an average daily flow of 3,900 cfs from April 1 to October 31 and 5,600 cfs from November 1 to March 31 at the Murphy gaging station. Therefore, any added economic value to Idaho Power Company due to increased flows is considered an externality within the present study framework.

[5] *Down-River, Main Stem Snake River Junior Priority Water Right Holders*: Down-river main stem surface/spring water right holders typically have a junior priority date relative to up-stream ground water right holders and, therefore, these impacts are not modeled in this analysis. Just as these analyses ignore firm-level impacts to crop and

livestock production (such as increased hay and water costs for dairies), firm-level cost impacts to downstream users are also ignored. Any gains (or losses) are considered as externalities to the primarily impacted parties.

[6] *Public Uses*: Wildlife refuges, state fish hatcheries, and other in-stream uses, will possibly be impacted through a curtailment of upstream groundwater pumping. It is likely that there will be a trade-off between the various public interests or uses (fishing, sightseeing, endangered species preservation, etc.). These impacts are extremely difficult to measure and are considered beyond the scope of this analysis consistent with Hazen and Ohlensehlen's (2004) and Hamilton's (2004) views. It should be noted, however, such impacts could be both positive or negative depending on the location of the resource.

Part II: Modeling Economic Impacts

Introduction

Economic impact modeling is often utilized where economic trade-offs are expected to occur. Information has to be available that would allow an estimate of inputs used, outputs produced, and their respective costs and prices. Inputs are typically aggregated into the following categories for analytical purposes: labor, entrepreneurship or management, physical capital, and land or related natural resources. Outputs are generally in the form of goods and services. Some aggregation occurs in any modeling approach. An economic model is just that–a model. It is used to capture the major impacts associated with changes in business and household activity. There are several techniques that could be used to project impacts including input-output modeling, enterprise or industry budgeting, production function estimation, linear or nonlinear programming, etc.

This analysis has utilized an *input-output* modeling approach to identify *relative* impacts. Given the costs associated with developing an input-output model *unique* to the ESPA, a previously developed, commercially available input-output model (e.g., IMPLAN from the Minnesota IMPLAN Group, Inc.) was utilized for this study.[2]

IMPLAN

IMPLAN is an input-output model with county-level data capable of demonstrating the relative impacts associated with changes in industry activity or changes in final demand by households or consumers (MIG, Inc., 2001). IMPLAN is the most widely used impact modeling system in the U.S. The data and basic model structure are updated annually by the MIG, Inc. staff, though some adjustments in the model coefficients are often needed to reflect localized economic conditions. (See Appendix B for a more in-depth discussion of input-output models, in general, and IMPLAN, more specifically.)

IMPLAN describes, on a very broad scale, the inflows and outflows for each industrial sector modeled. To facilitate a review of the impacts associated with this issue, the 500 plus sectors of IMPLAN are typically aggregated into a much smaller set of more broadly defined sectors to highlight the sectors of primary importance to the study under consideration.

In dollar values, the "requirements" from each industry segment are included in the model, as are the "outflows" from each industrial sector. Hence the name "input-output" model. The IMPLAN model provides a fairly complete picture of what businesses exist

[2]An input-output model unique to Idaho was initially utilized in estimate the relative impacts to various parties, but when the number of counties potentially impacted increased, we had to move to the only model capable of estimating impacts for the larger area, i.e., IMPLAN.

within an area and how those businesses interact with other businesses on a macro scale. Since it does not reflect firm level changes, it is the **relative** impacts that are of the most value from such models.

There are several components of IMPLAN output including labor income, other property-type income, indirect business taxes, and total value added (the sum of the three previous measures). These all reflect *value added* within a community. It may seem awkward to think of taxes as adding value, but taxes reflect a portion of the value added within a community or region, even if they are collected by government. They are used to provide goods and services to regional or state populations. Thus, even taxes reflect added value. All of these activities reflect locally produced goods and services which translates into income. These measures are different from and of more value than those reflected in *gross output* or *gross sales* (Hamilton, 2004), another output measure provided by IMPLAN.[7] Even though *gross output* is occasionally discussed in this presentation, it is provided only for comparative purposes and does not reflect a useful measure of economic activity.

Of primary concern in this analysis is value added, either within the ESPA or state-wide. The difference between value added and gross sales reflects the cost of goods and services purchased (imported) from outside the region under study. In a macro sense, it is a *cost* to the local or state economy and is not relevant to local incomes and employment.

An estimate of job numbers is also provided by IMPLAN, but it must be remembered that job number data reflect the total number of jobs created or lost, both full- and part-time. These values can be changed into the number of full-time equivalent workers by using locally available wage and employment data.

For this study, it was assumed that the base industries (i.e., agriculture and aquaculture) would be the primary change agents (at least where feasible) since changes in the base industries will automatically track through the rest of the model's economy and show resulting impacts or changes in each other affected sector. As is customary, the large number of sectors were aggregated into a smaller number of sectors to facilitate analysis, discussion, and review. Appendix C describes the aggregations used in this analysis, but an abbreviated list is provided in Table 2-1. While different aggregations are possible, the final value of total impacts would not change.

[7]The value of gross sales includes the cost of goods purchased outside the region under consideration, in addition to the *value added* within the region.

Table 2-1. List of Aggregated Sectors for IMPLAN Used in ESPA Analysis.

Other Crops	Dairy Manufacturing
Nursery, Fruits, and Vegetables	Meat Processing
Sugar Beets	Seafood Processing/Packaging
Hay and Silage	Wholesale Trade
Cattle	Transportation
Poultry and Eggs	Retail
Aquaculture	FIRE
Logging, Hunting, and Trapping	Services
Ag Support Industries	Households
Mining	Federal Government
Private Power Supply	State and Local Government
Construction	State and Local Utilities
Other Manufacturing	Owner-Occupied Dwellings
Other Food Manufacturing	Foreign Trade
Sugar Manufacturing	Domestic Trade

For purposes of this study, several aspects of food manufacturing were considered separate from the others. For example, fish processing and manufacturing were separated from other food manufacturing in order to identify impacts more specifically. Some sectors in IMPLAN are comprised of a smaller number of unique industry sectors. For instance, the "cattle sector" includes both beef and dairy cattle. One must be cognizant of such aggregations and ensure that the results are consistent with local or regional enterprise budget information.

The actual net impact of a change in business activity will depend on the dollar cost of goods and services imported from outside of the region or state versus those adding value within the region or state and are represented by **regional purchase coefficients** (or **RPC**s). For instance, hay and silage have large RPCs (> 90 percent); whereas fruits and vegetables in the study area have relatively small RPCs (< 10 percent). The RPCs are larger at the state level than for any subregion of the state. Higher RPCs result in higher locally added value. While the results presented do not reflect a detailed benefit-cost analysis, they can be used to approximate relative gains and losses.

Study Assumptions

Studies such as this require simplifying assumptions. In this section, the general assumptions are laid out with respect to the model, primarily impacted parties, data input, and analyses outcomes. Since models are only representations of reality, there is likely to be some discrepancy between the model's results and actual real-world results. It is important to understand that **relative** values have much more significance than **absolute** values in analyses such as these.

General Assumptions

- Water right priorities were divided between pre-1949 (prior to most ground water development) and post 1961 (about the earliest priority for the larger aquaculture rights) for analytical purposes.

- Gains to down-river spring users and upstream surface water right holders are assumed to occur immediately, as are losses to ground water right holders. This overestimates the positive impacts to surface/spring water right holders because they would actually have to phase in their production consistent with actual spring accruals.

Assumptions Specific to Aquaculture Production and Value

- When historical data were available, they were averaged to ensure a reasonable data estimate, i.e., ten years of price data were averaged to determine a price to use in calculating the initial value of changes (NASS, 1994-2003). The price of fish include white (82 percent) and red (18 percent) meat, with the white meat selling for approximately 10¢/pound less than red meat. The average per pound value of fish was estimated to be $0.80/pound of fish product produced. This likely overstates the impacts to the aquaculture sector as local price information suggests that the average is higher than the prices actually received (Fornshell, 2004).

- The price of fish also included consideration of "kill and gut" producers (65 percent) and "kill, cut, and process" producers (35 percent).

- Aquaculture production expands in a linear fashion according to equation (2-1) as noted by numerous authors.[8] Local discussions confirmed the use of this equation (Fornshell, 2004):

$$\text{Fish Production} = \text{cfs} \times 20{,}000 \text{ pounds of fish} \qquad (2\text{-}1)$$

Assumptions Specific to Irrigated and Nonirrigated Crops:

- The general crop mix averaged across counties included in the ESPA was adjusted for senior surface/spring irrigation users in the ESPA by allowing producers to marginally move to higher valued and more water intensive crops,

[8]West Virginia University Extension, Southern Regional Aquaculture Center, North Carolina Department of Agriculture and Consumer Sciences, North Central Regional Aquaculture Center, North Carolina Cooperative Extension, and Iowa State University.

i.e., alfalfa, potatoes, and sugar beets on lands within their existing place of use. The final crop mix will depend, to a substantial degree, on crop rotation considerations and the type of markets available, rather than on water availability. There would be significant problems moving the remaining acreage to high proportions of high valued crops. (See the introduction of Part 3 for a discussion of these mitigating factors.

- Irrigated crop losses or gains are allowed only on **existing** cropland.[9]

- As irrigation water is lost to groundwater pumpers, they are assumed to switch to dryland alfalfa production and livestock grazing, which will obviously change the crop mix within the ESPA study area. The impact of this assumption on the final relative values remains an empirical question. It is estimated that approximately 69 percent of their land has sufficient moisture to produce either a dryland alfalfa or food and feed grain crop (Contour, 2004). The other 31 percent of the land of necessity could be used only in grazing activities.

[9] Under Idaho state law, use of an irrigation water right is limited to a specific place of use. Therefore, application of water is restricted to existing acres only.

Part III. Impacts to Senior Surface/Spring Irrigation Water Right Holders

Introduction

For purposes of this analyses, we assume that almost a million acres will be withdrawn from production for the 1949 curtailment date and well over one-half a million acres will be withdrawn from production for the 1961 curtailment date. These lands produce a wide variety of crops: hay, silage, sugarbeets, potatoes, and several different types of feed and food grains. The cropping pattern for the region has been quite stable for some time, suggesting that an equilibrium has been reached with respect to crop rotations and market conditions.

Since these analyses are focused on a limited set of primarily impacted parties, it is difficult to predict what the new crop rotation pattern will be under such a large reduction in farmed acreage. We believe that some substitution of crops in production will occur, i.e., more high income crops will replace lower valued grain crops; however, due to crop rotation constraints and uncertainty with respect to a continuation of both potato and sugarbeet processing in the region, only marginal changes to the existing crop rotation pattern were modeled. By acknowledging that a different cropping pattern may occur, we also wish to point out that the final conclusion of these analyses, i.e., impact losses to ground water right holders will be greater than gains to surface/spring water right holders, will hold even if existing cropping patterns were to change substantially. That is, there will still be a net loss in the regional economy were either curtailment date to occur. For instance, if even 70 to 80 percent of the existing sugarbeet and potato acreage were still produced on the remaining million acres (a reduction from the existing 2 million acres), the loss to ground water right holders would still be at least twice the gains to all surface/spring water right holders.

It is doubtful that a 70 to 80 percent of the existing acreage in sugarbeets and potatoes can be produced on the remaining acreage for several reasons. First, such a split in acreage would not allow sufficient acreage for proper crop rotations as a maintenance of existing acres of land in sugarbeets and potatoes would comprise nearly 50 percent of the remaining irrigated acres. Second, potato processors have begun to move to other areas throughout the world (i.e., Canada and China are recent examples) and their continued existence in the region long-term is suspect. Third, sugarbeet processing has come under increasing financial pressures as the subsidy for sugar is being scrutinized by the federal government. It is uncertain whether sugarbeets will continue to be processed in the long run. Fourth, the additional amount of water that will eventually become available is not that significant, i.e., an increase of .3 to .6 acre feet per acre available for actual application following an additional diversion of .82 acre feet. Fifth, in the intervening years between when junior ground water right holder curtailment and the time when the additional water would become available (often up to 20 years), the processing facilities would have had to move to other production areas anyway to maintain operating capacities. It is uncertain that they would move back into the ESPA for additional production when water levels rise sufficiently to increase irrigation applications. Sixth, there are other profitable industries in the area that rely on alfalfa hay, barley, and wheat production. While it may be argued that these industries could import these goods, the same argument could also be made for the sugarbeet refineries and potato processing companies.

Even though it is recognized that producers (and processors) will substitute production sources to match existing market conditions, their ability to adjust given know factors precludes a more dramatic shift in crops and land use. Just as it was assumed that dairies, cheese plants, and similar processing entities will find alternative sources of inputs, parallel logic suggests that we assume that potato and sugar beet processing will locate and acquire alternative supplies.

Crop Impact Calculations

In order to determine the impacts associated with a gain in spring flows that could be used to irrigate *existing* surface acreage, the existing crop mix in the ESPA region was *defined as noted in Table 3-1. Row 1 provides a listing of major crops.* Row 2 shows recent acreage (NASS, 2004). Row 3 lists the value of a numerical weighting by crop. Row 4 provides the average gross value of sales on a per acre basis. The values in Row 5 were obtained by multiplying the percentages found in Row 3 by the price given in Row 4, yielding a *weighted value* per acre. Row 6 provides a breakout by crop type as required by IMPLAN. The resulting average irrigated crop acreage within the ESPA is approximately 28 percent for hay and silage, 16 percent for "vegetables," 5 percent for sugarbeets, and 51 percent for dry beans and grain of various types. The resulting average per acre value of farm products is $587 as noted in Row 7.

Table 3-1. Crop Mix Pre- Groundwater Curtailment for ESPA.

Row	Crop Mix Pre-Groundwater Curtailment									
	Crop Type	Hay and Silage		Vegetables	Sugarbeets	Irrigated Grains				
1	Crop	Alfalfa	Corn for Silage	Potatoes	Sugarbeets	Beans	Corn for Grain	Oats	Barley	Wheat
2	Acres	544,852	32,000	327,593	108,109	84,832	15,521	13,100	513,826	406,437
3	percent Total Irrigated Acres	27	2	16	5	4	1	1	25	20
4	Average Gross Value/Acre	475	400	1,754	1,078	404	366	93	173	268
5	Value x percent	126	6	281	57	17	3	1	43	53
6	Sum of percent by Crop Type		28%	16%	5%					51%
7	*Estimate Per Acre Gross Sales*						*$587*			

For the additional water that would accrue as a result of curtailment, the proportions of alfalfa hay, potatoes, and sugar beet acreage were increased in the ESPA crop mix (i.e., hay and silage increased from 28 percent to 30 percent, vegetables increased from 16 percent to 18 percent, sugarbeets were increased from 5 percent to 7 percent, and irrigated grains were reduced from 51 percent to 44 percent). Taking a weighted average of the new crop mix and associated prices, a new per acre gross sales value was obtained as shown in Table 3-2. In order to determine if sufficient water would be freed up from curtailment of junior ground water pumping, seasonal consumptive use rates were examined for Idaho using data from the Bureau of Reclamation.[10] For the upper reaches of the ESPA, sufficient water was recaptured to provide additional water for 1,010,000 acres. For below the rim senior/surface spring irrigation water right holders, there are another 5,500 acres, for a total impact on 1,015,500 acres.[11] These two entities will be treated as one in the following analyses.

Table 3-2. Crop Mix Post- Groundwater Curtailment for ESPA.

Row	Crop Mix Pre-Groundwater Curtailment									
	Crop Type	**Hay and Silage**		**Vegetables**	**Sugarbeets**	**Irrigated Grains**				
1	**Crop**	Alfalfa	Corn for Silage	Potatoes	Sugarbeets	Beans	Corn for Grain	Oats	Barley	Wheat
3	**percent Total Irrigated Acres**	**28**	**2**	**18**	**7**	**4**	**1**	**0**	**20**	**20**
4	**Average Gross Value/Acre**	**475**	**400**	**1,754**	**1,078**	**404**	**366**	**93**	**173**	**268**
5	**Value x percent**	**133**	**6**	**316**	**75**	**14**	**2**	**1**	**34**	**55**
6	**Sum of percent by Crop Type**		**30%**	**18%**	**7%**					**44%**
7	**Estimate Per Acre Gross Sales**						**$635**			

*The columns may not add up exactly due to rounding errors. Values in **red** indicate changes from Table 3-1.

The increases in acreage for alfalfa, potatoes, and sugarbeets represent +5 percent, +12 percent, and +32 percent, respectively. The change in grain crop acreage represents a 12 percent decline.

[10] http://www.usbr.gov/pn/agrimet/ETtotals.html

[11] The 1,010,000 acres of surface irrigated acres that could benefit from a curtailment of junior ground water rights consists of the following lands: (1) 510,000 acres of land lying above the ESPA and (2) 500,000 acres associated with Twin Falls Company south on the Snake River. This would allow for an additional .81 acre foot per acre increase to their existing diversion (Contor, 2005). As noted by Hamilton (2004), there are an addition 5,500 acres below the rim. If curtailment were to occur, more water would become available for these acres as well.

To represent the gain that would accrue to senior surface/spring water right holders, either upstream or below the rim within the ESPA, the difference between the final calculated value in Table 3-1 was subtracted from the final value given in Table 3-2. The difference in average prices between the existing rotation and the rotation assumed under the added water scenario was approximately $48/acre as illustrated in Table 3-3.

Table 3-3. Additional Gross Revenue Allowed per Acre for New Crop Mix under Post-Curtailment Conditions.

Condition	$/Acre Gross Value
Value of Gross Sales *Pre-Curtailment* Conditions	$587
Value of Gross Sales *Post-Curtailment* Conditions	$635
Net Difference in Gross Sales per Acre	$48

There are 1,010,000 acres of surface irrigated acres that would benefit from a curtailment of junior ground water rights consisting of the following lands: (1) 510,000 acres of land lying above the ESPA and (2) 500,000 acres associated with Twin Falls Company south on the Snake River. This would allow for an additional .81 acre foot per acre increase to their existing diversion (Contor, 2005). As noted by Hamilton (2004), there are an addition 5,500 acres below the rim. If curtailment were to occur, more water would become available for these acres as well. Total acreage that would benefit from additional water supplies would be 1,015,500.

The value from Table 3-3, i.e., $48, was multiplied by available surface acreage in order to obtain a measure of gross value gained due to curtailment.[12]

$$1{,}015{,}500 \text{ acre feet} \times \$48 = \$48{,}744{,}000 \qquad (3\text{-}1)$$

The irrigation districts operate under some uncertainly when they prepare to make allocations into various canals and to various users. They have some knowledge of the water supply (as much of it depends on the snow pack and associated spring run-off). In contacts made with irrigation district managers, they indicated that it was an

[12]Joel Hamilton, *Economic Importance of ERSPA-Dependent Springflow to the Economy of Idaho* (December 2, 2004). The number of actual acres in the Snake River Canyon between Twin Falls and the Malad River may be larger than assumed; however, the shortages are likely substantially less than assumed by this study. Personal communication with David Tuthill, Idaho Department of Water Resources Adjudication Bureau Chief (personal communication, January 28, 2005). Since the number of irrigated acres below the rim constitute a relative small percentage of the total irrigated acres, neither of these two factors will have any significant effect on the modeling results.

increasingly efficient irrigation system (from source to crop) that had allowed a reduction in water use except for the most recent drought year.[13] When asked what the district would do if more water were made available, they indicated that there would likely be a slight increase in the crops that required more reliable water deliveries. Hence, the shift into fewer grains and more alfalfa hay, vegetables (represented by potatoes), and sugarbeets assumed is consistent with these analyses.

The same calculation was applied to the 1961 curtailment scenario since sufficient water would be freed up to irrigate the same surface/spring acreage regardless of the priority date. These data (as well as the data for the 1961 curtailment) were used in IMPLAN. The gross sales measure was then used to determine the various components of value added: labor income, other property type income, and indirect business taxes. The individual categories are discussed below for the 1949 and 1961 priority dates.

1949 and 1961 ESPA-Level Curtailment Impacts

The values for ESPA-level "gains" are reflected below for the 1949 and 1961 curtailment dates. The various value added components are shown in Figure 3-1. Labor income gains were estimated to be over $11million at full curtailment. Other property type income was a little less than labor income at approximately $8.5 million. Indirect business taxes were slightly above $1 million. The last three bars summed equal total value added (e.g., $21 million) as reflected in Figure 3-2. Also given in Figure 3-2 are the gross value of sales projected for the surface/spring water right holders given 1949 and 1961 priority curtailment dates. Total gross sales were estimated to be $52 million through the process previously described. The difference between the two measures reflects the cost of goods and services imported into the region, i.e., approximately $32 million. This illustrates the fallacy of relying on gross sales as a measure of economic impacts.

Throughout the remainder of this report, estimated positive and negative impacts will be shown graphically. Even though these values are shown to the dollar, it is highly unlikely that the model can be that accurate in predicting impacts. Hence, it would be better to view these graphics in terms of hundreds of thousands or even millions of dollars. Such a view would more closely match the models ability to predict impacts.

[13]Personal communication with Vince Alberti, Ted Diehl, Randy Bingham on December 23, 2004, and Lynn Harmon on December 28, 2004.

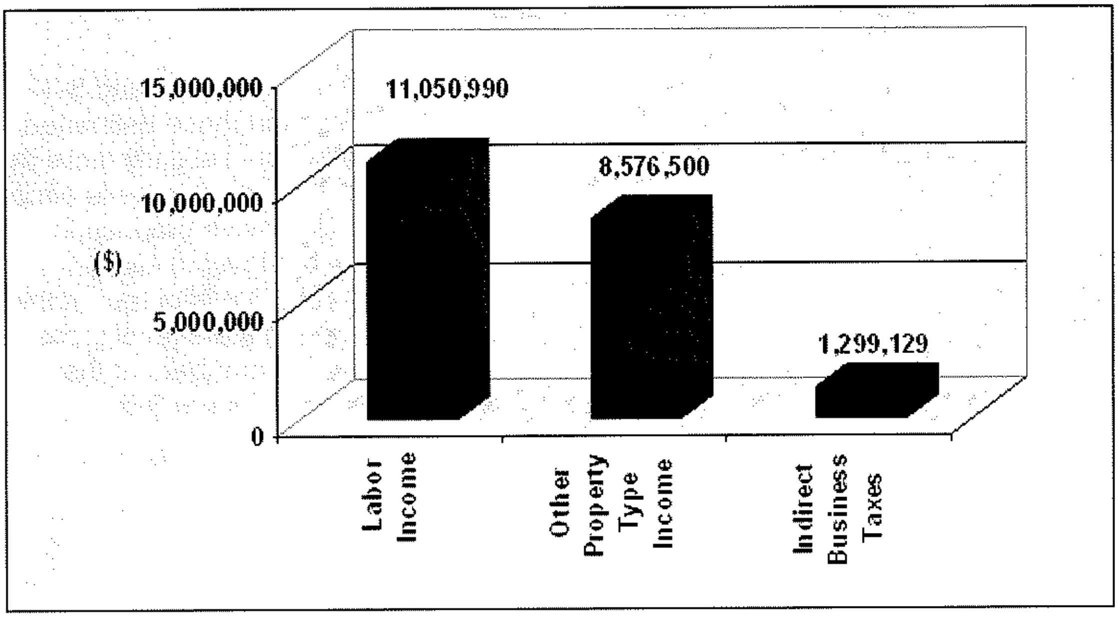

Figure 3-1. Value Added Component Gains to Senior Surface/Spring Irrigation Water Right Holders in the ESPA for 1949 and 1961 Curtailment Dates.

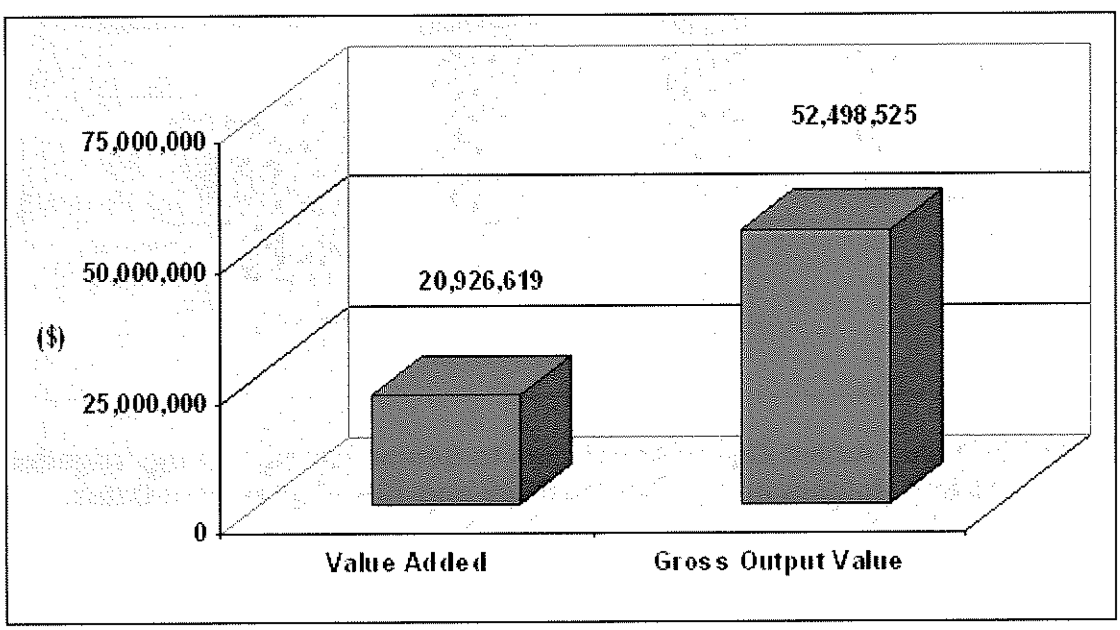

Figure 3-2. Value Added and Gross Value of Output for Senior Surface/Spring Irrigation Water Right Holders in the ESPA for 1949 and 1961 Curtailment Dates.

1949 and 1961 State-Level Curtailment Impacts

State-level "gains" for a 1949 curtailment date are illustrated in Figures 3-3 and 3-4. State-level gains are larger (between $1 million and $2 million) than those estimated for the ESPA. Total labor income, at a positive $12.3 million, comprising slightly more than 50 percent of the total value added ($23 million). Other property-type income is almost as large as labor income, which would be expected for a land-intensive production process such as found in crop agriculture. The values at the state-level would be approximately 9 percent higher than at the ESPA Regional level. Gross output at the state-level was estimated to be over $54 million. More than half of state-level gross output (57 percent) comes from outside the state. The gain in job numbers at the ESPA- and state-level is 219 and 253, respectively, as provided in Figure 3-5.

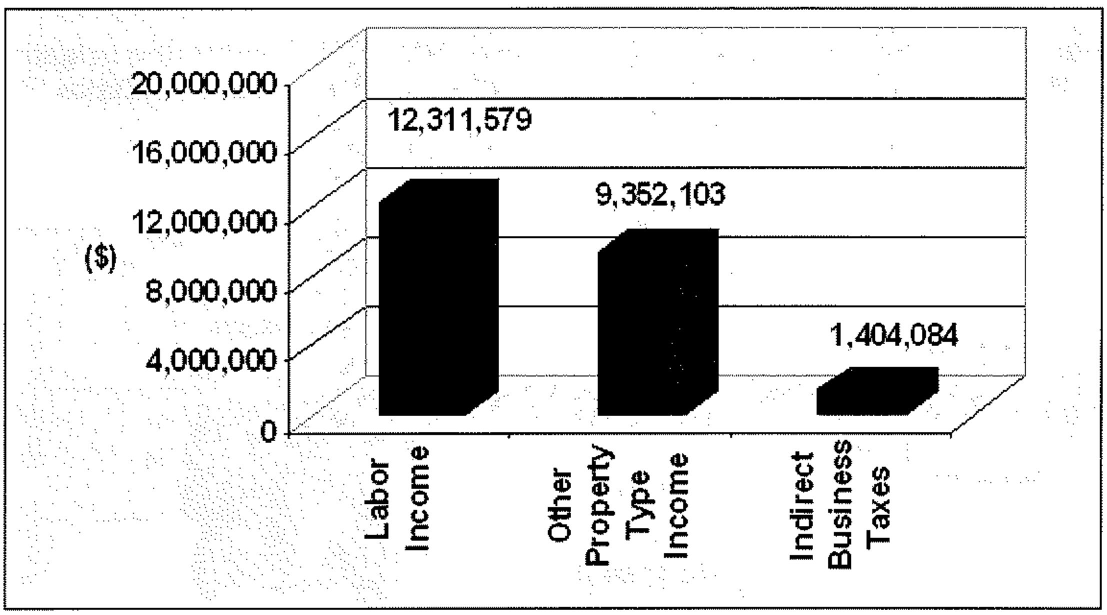

Figure 3-3. Value Added Component Gains to Senior Surface/Spring Irrigation Water Right Holders in the State for 1949 and 1961 Curtailment Dates.

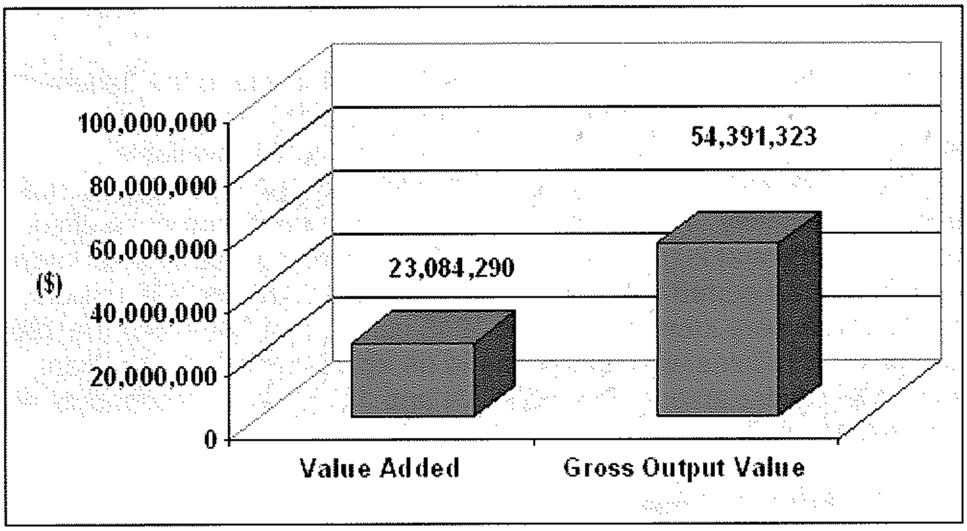

Figure 3-4. Value Added and Gross Value of Output for Senior Surface/Spring Irrigation Water Right Holders in the State for 1949 and 1961 Curtailment Dates.

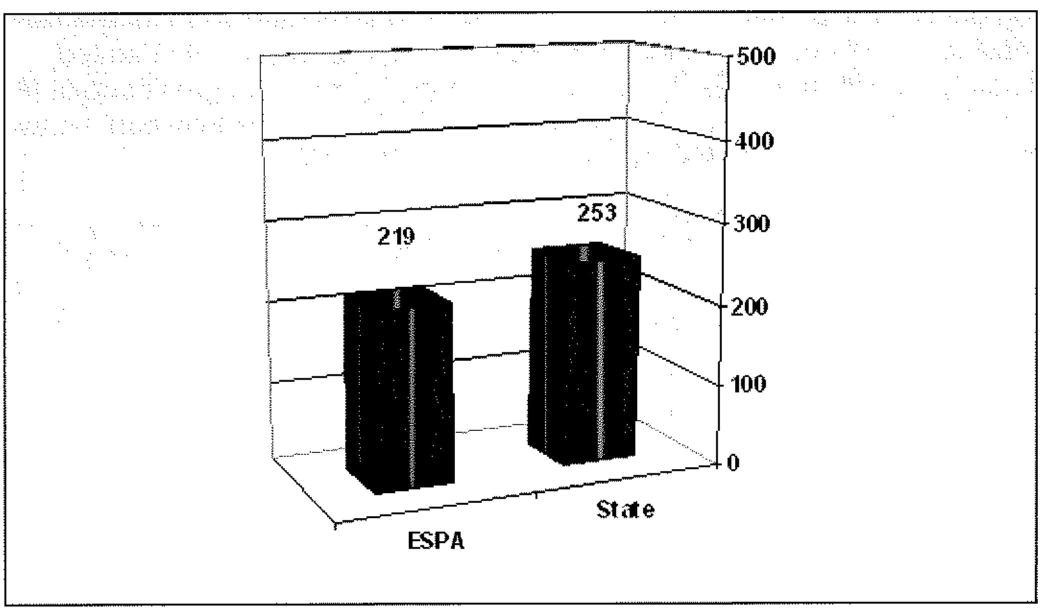

Figure 3-5. ESPA- and State-Level Job Numbers for Senior Surface/Spring Irrigation Water Right Holders for 1949 and 1961 Curtailment Dates.

Part IV. Impacts to Senior Aquaculture Water Right Holders

Introduction

It is estimated that an additional 563 cfs will eventually be available to the fisheries for the January 1, 1949 curtailment date, but only 366 cfs for the January 1, 1961 curtailment date (Cosgrove, 2004). Note that this water will not be available immediately. However, for modeling purposes, it is assumed that full water accrual would be available immediately. For this analysis, it was assumed that each cfs of water would allow an additional 20,000 pounds of trout. Given a price of $0.80/pound, each cfs would generate an added $16,000. From these calculations, $16 million dollars in gross fish sales were identified for the 1949 curtailment date. For the 1961 curtailment date, gross fish sales were estimated to be approximately $10 million. These gross sale values were entered into IMPLAN and the various components of value added then estimated.

1949 ESPA-Level Curtailment Impacts

Gains in labor income of almost $5 million per year were estimated as reflected in Figure 4-1. Other property type income generated enhanced value added by almost $0.76 million. Note that "other property type income" is a much smaller percentage of labor income (16 percent) and total value added (8 percent) than occurred for production agriculture, primarily due to the need for a smaller land base for the fishery. Indirect business taxes contributed an additional $0.5 million. Total value added (approximately $6 million) was estimated to be nearly 40 percent of gross output ($15.8 million), similar to those shown for crop production. The difference between the two represents intermediate purchases by firms outside of the region.

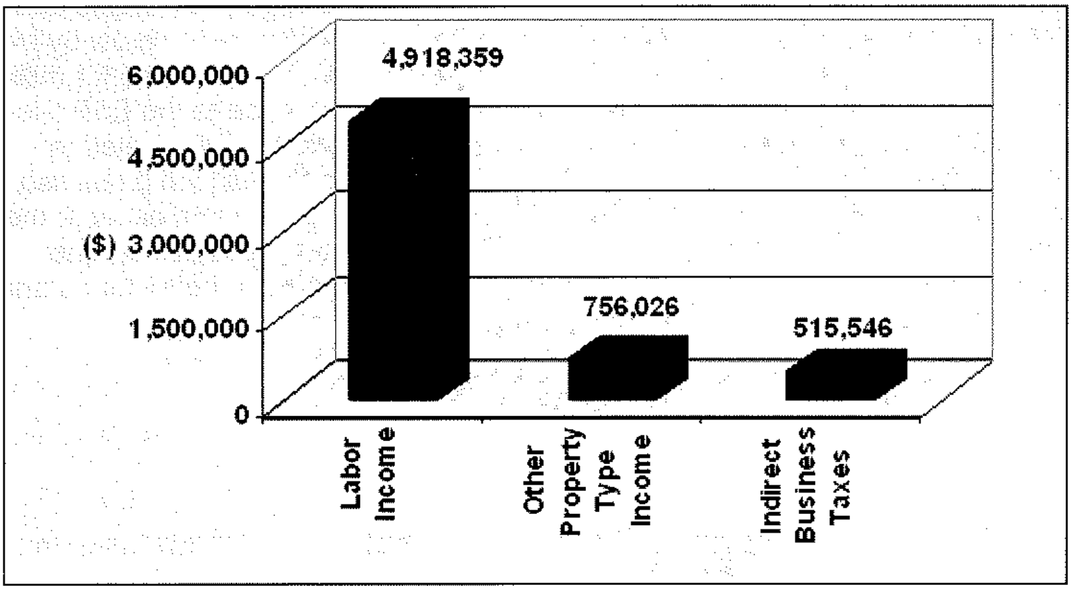

Figure 4-1. Value Added Components Gains for Senior Aquaculture Water Right Holders in the ESPA for a 1949 Curtailment Date.

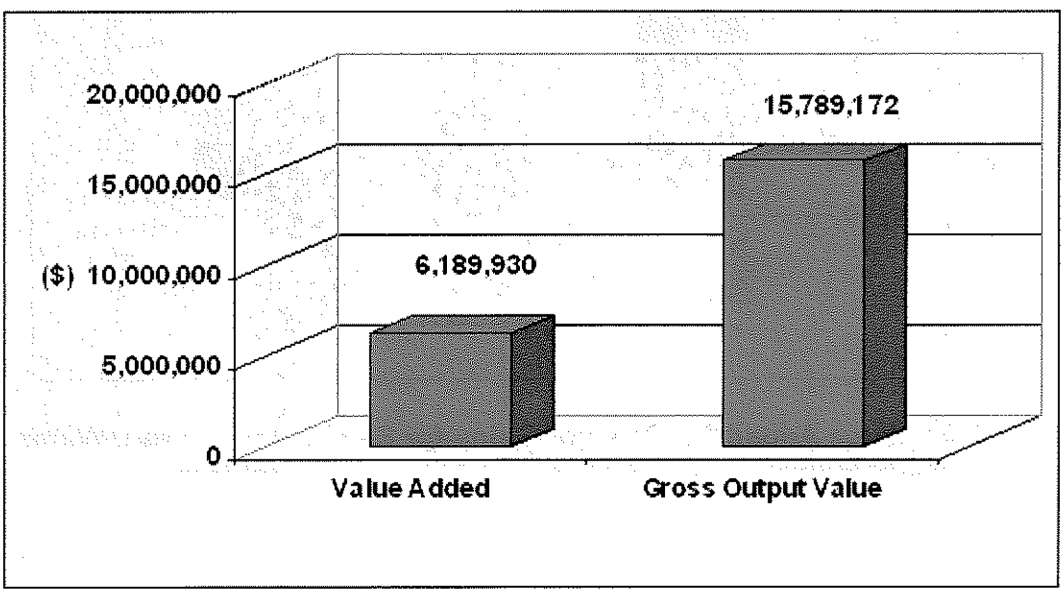

Figure 4-2. Value Added and Gross Value of Output for Senior Aquaculture Water Right Holders in the ESPA for a 1949 Curtailment Date.

1949 State-Level Curtailment Impacts

State-level impacts for the 1949 priority curtailment date were larger than found within the ESPA as expected. Labor income at the state level was estimated to grow by over $5.2 million, while other property type income was expected to increase by $1.1 million as revealed in Figure 4-3. Indirect business tax increased in relation to the ESPA-level impacts at $0.56 million. Total value added was almost $7 million as illustrated in Figure 4-4. Gross output was shown as $17.4 million. For an increase in gross fish sales of $17 million, only $6.9 of that actually was added within the state either in the form of labor income, other property type income, or indirect business taxes. The growth in job numbers for a 1949 curtailment date were estimated to be 181 jobs and 215 jobs for the ESPA and state, respectively (Figure 4-5).

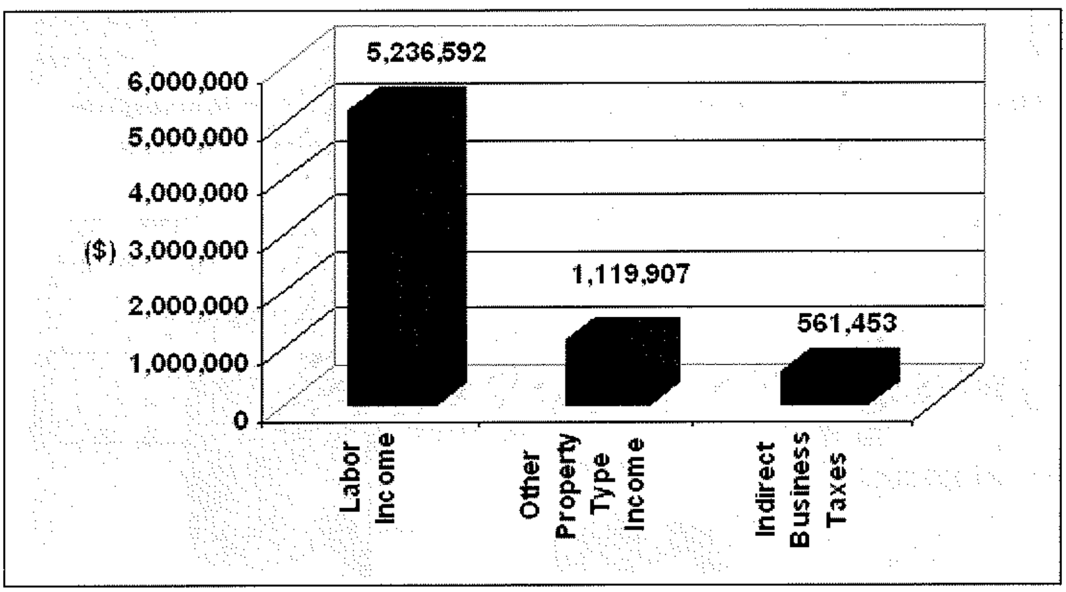

Figure 4- 3. Value Added Component Gains for Senior Aquaculture Water Right Holders in the State for a 1949 Curtailment Date.

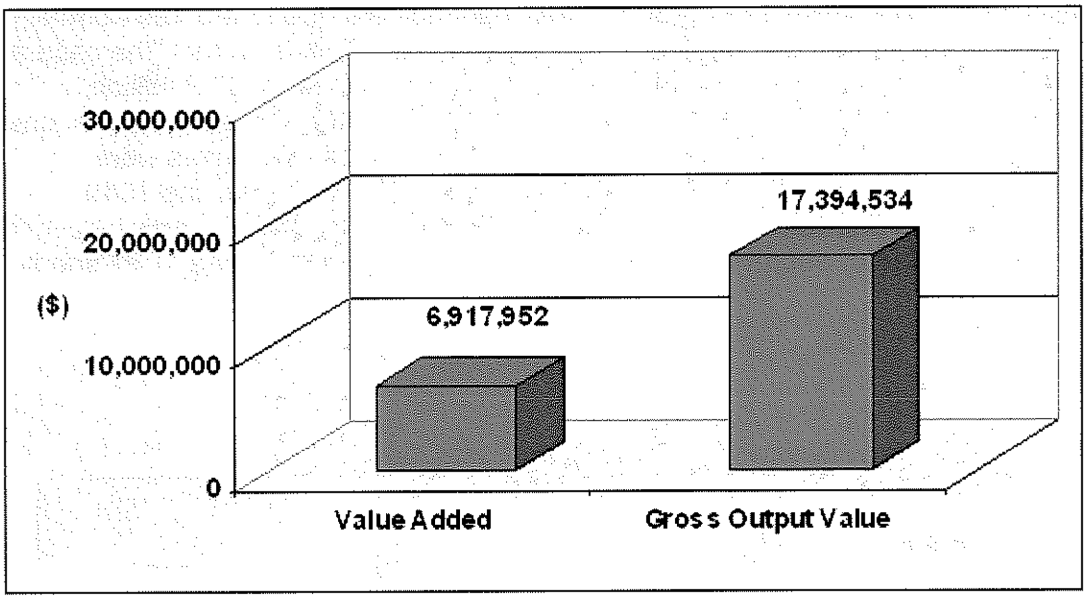

Figure 4-4. Value Added and Gross Value of Output for Senior Aquaculture Water Right Holders in the State for a 1949 Curtailment Date.

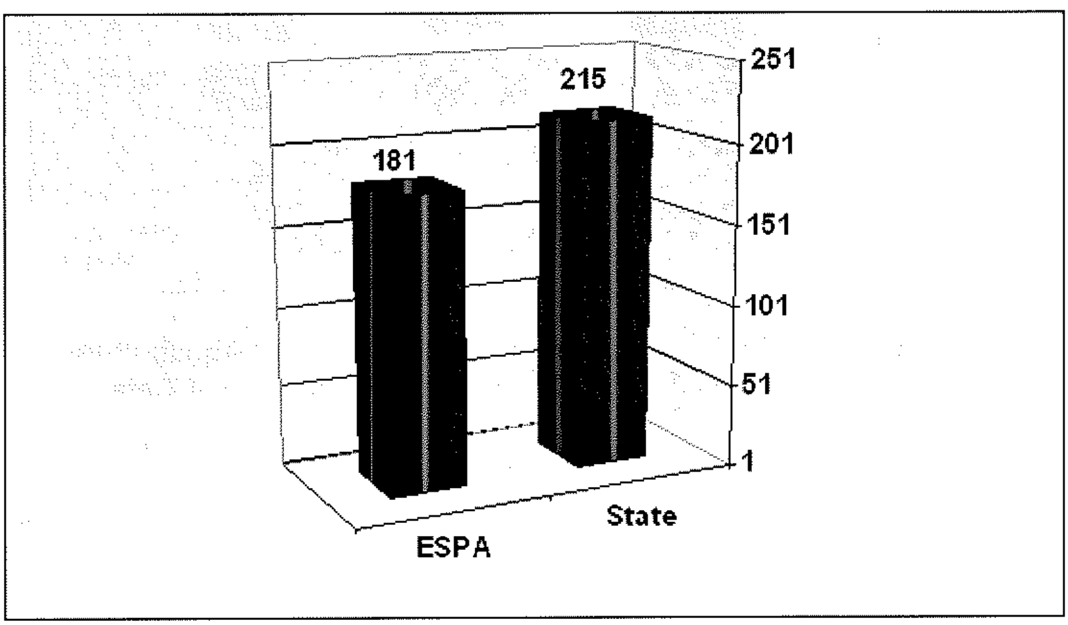

Figure 4-5. ESPA- and State-Level Job Numbers for Senior Aquaculture Water Right Holders for a 1949 Curtailment Date.

1961 ESPA-Level Curtailment Impacts

With less water taken away from ground water right holders due to the 1961 curtailment date, it is anticipated that the impacts would also be less. This is, in fact, the case as illustrated in Figure 4-5. Labor income is estimated to increase by $3.2 million (compared to $4.9 million for the 1949 curtailment date). Other property type income would be expected to rise by nearly $0.5 million. Indirect business taxes were estimated to increase by $0.3 million, compared to $0.5 million under the 1949 curtailment date. Total value added, as reflected in Figure 4-6, would grow by over $4 million. Gross value of output would expand by over $10.3 million for a 1961 priority curtailment date.

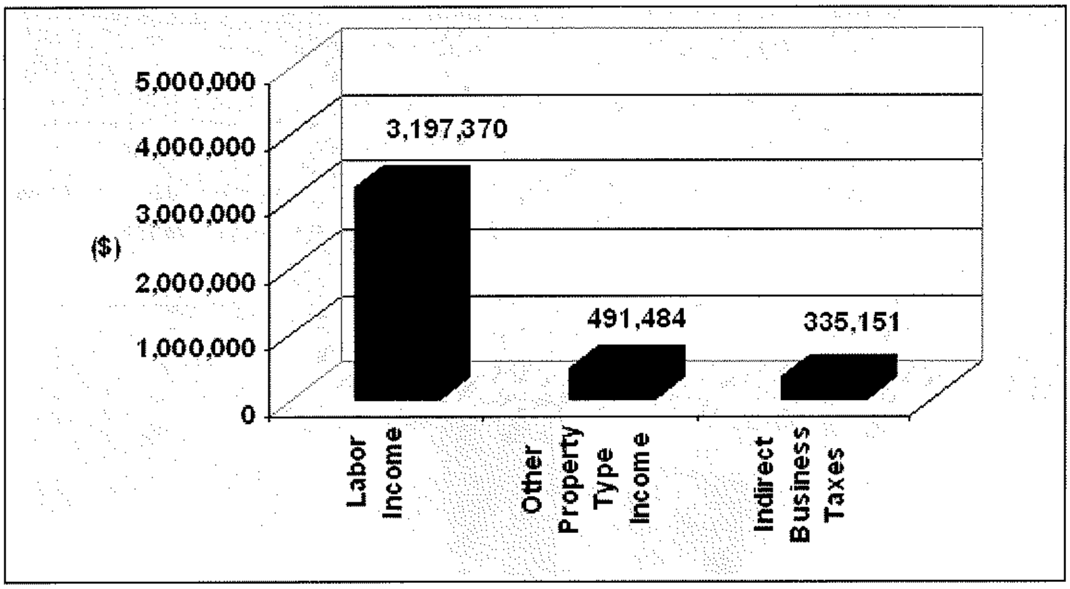

Figure 4-6. Value Added Component Gains for Senior Aquaculture Water Right Holders in the ESPA for a 1961 Curtailment Date.

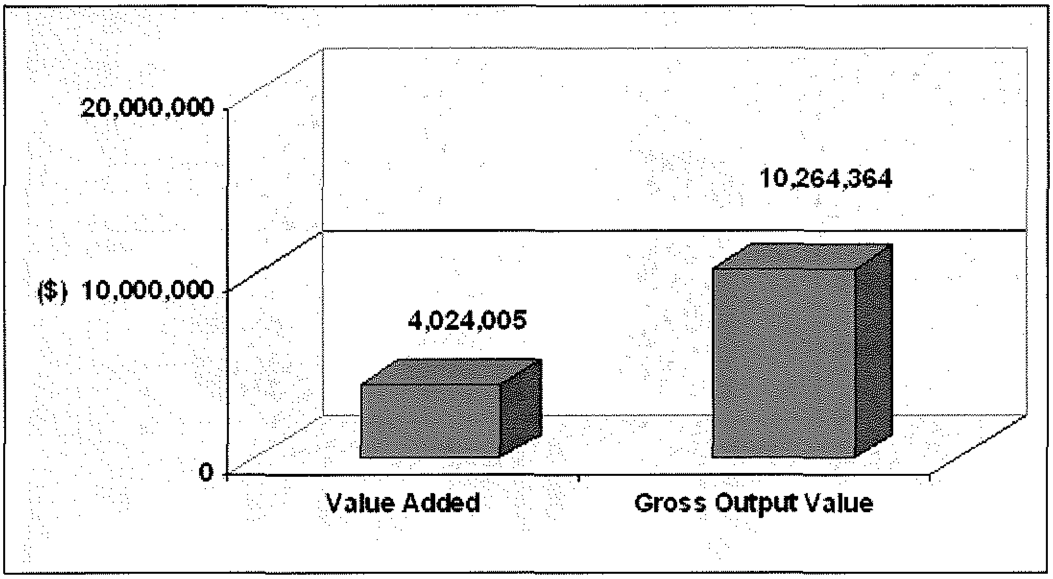

Figure 4-7. Value Added and Gross Value of Output for Senior Aquaculture Water Right Holders in the ESPA for a 1961 Curtailment Date.

1961 State-Level Curtailment Impacts

The state-level impacts are again larger than for the ESPA, but are still much smaller than shown for the 1949 priority curtailment date. For instance, labor income impacts are shown as a gain of $3.4 million, with other property type income increasing by *almost $0.73 million (Figure 4-7). Indirect business taxes increase by $0.36 million.* Likewise, total value added and total gross value were estimated to be two-thirds of the 1949 curtailment dates (Figure 4-8). Total value added comprised only 38 percent of gross value of output at $4.5 million. The number of jobs under a 1961 curtailment date were 118 and 140, respectively, for ESPA- and state-level analyses (Figure 4-10).

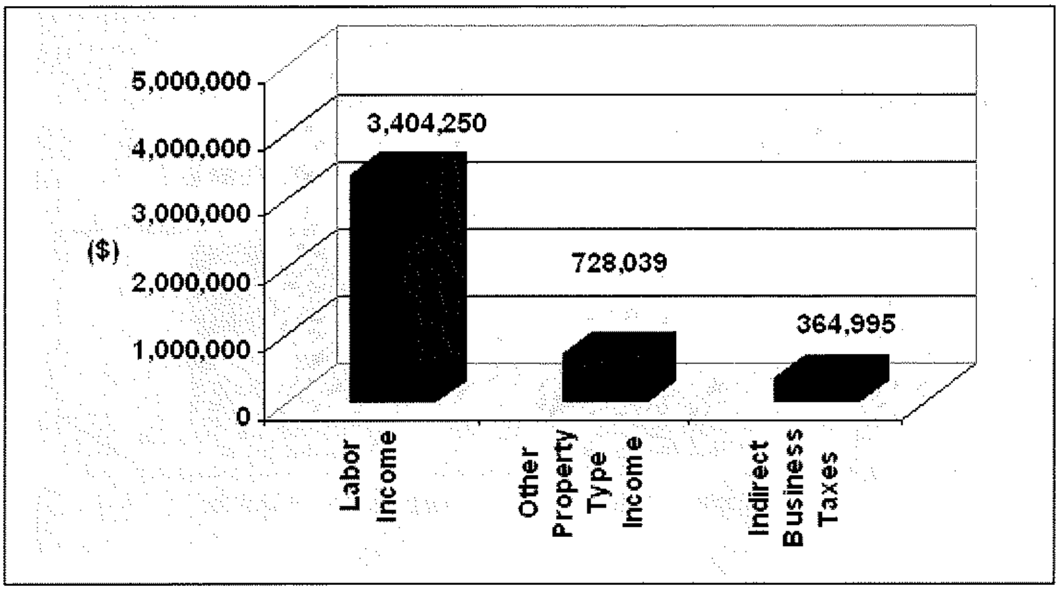

Figure 4-8. Value Added Component Gains for Senior Aquaculture Water Right Holders in the State for a 1961 Curtailment Date.

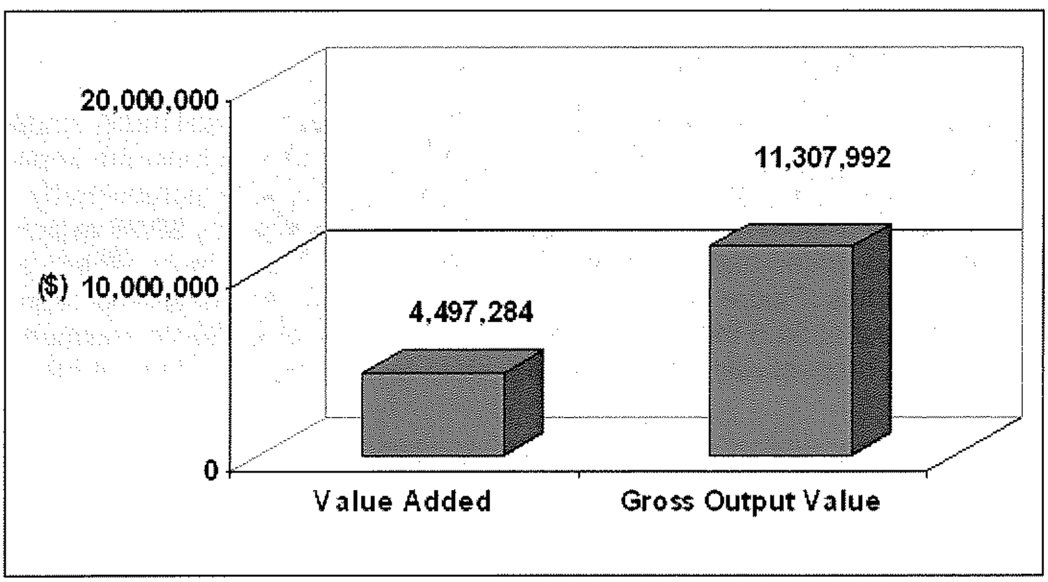

Figure 4-9. Value Added and Gross Value of Output for Senior Aquaculture Water Right Holders in the State for a 1961 Curtailment Date.

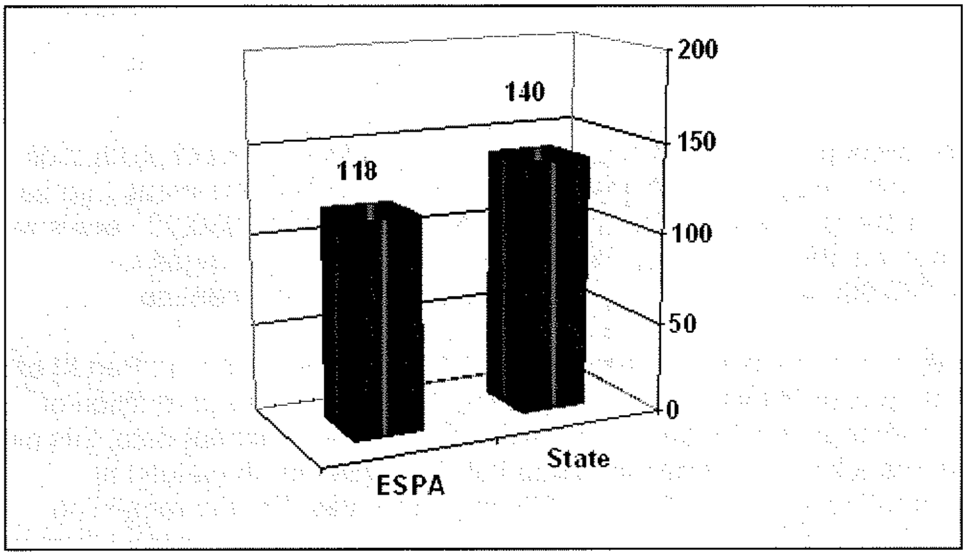

Figure 4-10. ESPA- and State-Level Job Numbers for Senior Aquaculture Water Right Holders for a 1961 Curtailment Date.

Part V. Impact to Existing Junior Irrigation Ground Water Right Holders

Introduction

There is a large amount of irrigated acreage that would be taken out of production should either a 1949 priority curtailment date or a 1961 priority curtailment date be implemented. In the former situation, it is expected that a total of 990,000 acres will be moved from irrigated status to dryland status, while the number changes to approximately 660,000 acres under the 1961 priority curtailment scenario.

The current crop mix has a per acre gross value of $587 as discussed in Part III of this report. Only 69 percent of this land has sufficient irrigation to allow production of dryland alfalfa and/or grain (Contor, 2005).[14] For the 1949 curtailment date, this means that 683,100 acres will be converted to dryland alfalfa and/or grain (valued at $122/acre), generating a loss of $317,641,500 in gross sales. For the remaining acreage, the decline in gross value is estimated to be $580/acre as previously irrigated acres would only be used for livestock grazing.[15] Applying this value per acre to the remaining acres (e.g., $580 x 306,900) yields a loss of $178,002,000. When combined, the total loss in gross sales would be $495,643,500. For the 1961 curtailment date, 445,400 acres would be impacted by a shift to dryland alfalfa and feed or food grains for a total loss of $207,227,031. Acreage that could not support even dryland crops (i.e., 204,600 acres) would return to livestock grazing uses and would generate losses of $118,668,000. In total, losses to irrigation ground water right holders would total $325,779,000. These gross sales values were utilized in IMPLAN to obtain an estimate of loss in labor income, other property type income, indirect business taxes, and total value added. The difference in value for such changes is shown In Table 5-1.

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[14]These percentages are based on data from Widstoe (1920), who assumed a minimum of 10 inches of moisture annually would be necessary to produce a dryland crop. Both Contor (2005) and Harper and Klarpel (http://www.geocities.com/dyancy3/mennhis.html) suggest that a more accurate figure would be 12 inches of precipitation if one were going to produce dryland crops. We will hold to the 10 inches indicated by Widstoe in order to be more conservative in estimating losses to junior ground water right holders.

[15]State Farm Service Agency's average grazing cost per acre is $7.20/acre (Rimbey, 2005). Jerome, Gooding, and Twin Falls counties average approximately $6.00/acre. The state-wide per acre grazing cost is used in this analysis due to slightly higher productivity on grazing land in the eastern Idaho counties and the fact that specific parcels of land have not been identified where grazing would occur.

Table 5-1. Acreage Taken Out of Production by Junior Ground Water Right Holders for 1949 and 1961 Curtailment Dates.

Priority Date	Acreage Impacted	Cost/Acre of Loss	Total Gross Loss
1949	683,100	$465	$317,642,000
	306,900	$580	$178,002,000
	990,000		$495,644,000
1961	445,400	$465	$207,111,000
	204,600	$580	$118,668,000
	660,000		325,779,000

1949 ESPA-Level Curtailment Impacts

A loss in labor income of over $107 million would be expected (Figure 5-1). Other property type income losses would be just about as great at $92 million. The relationship between labor and other property type income is as expected for a land-intensive operation such as crop production. The decline in total value added is estimated to be in excess of $212 million. Total gross value losses would be in excess of $530 million (Figure 5-2). Less than 40 percent of the final gross value of output is valued added within the ESPA. The balance has to be purchased outside of the study area.

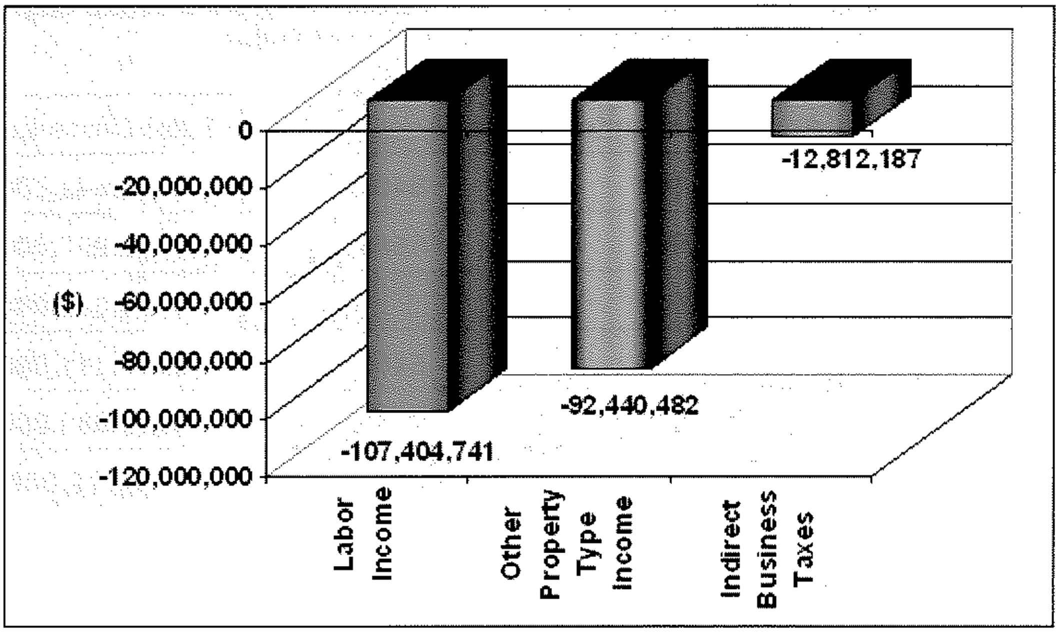

Figure 5-1. Value Added Component Losses for Junior Irrigation Ground Water Right Holders in the ESPA for a 1949 Curtailment Date.

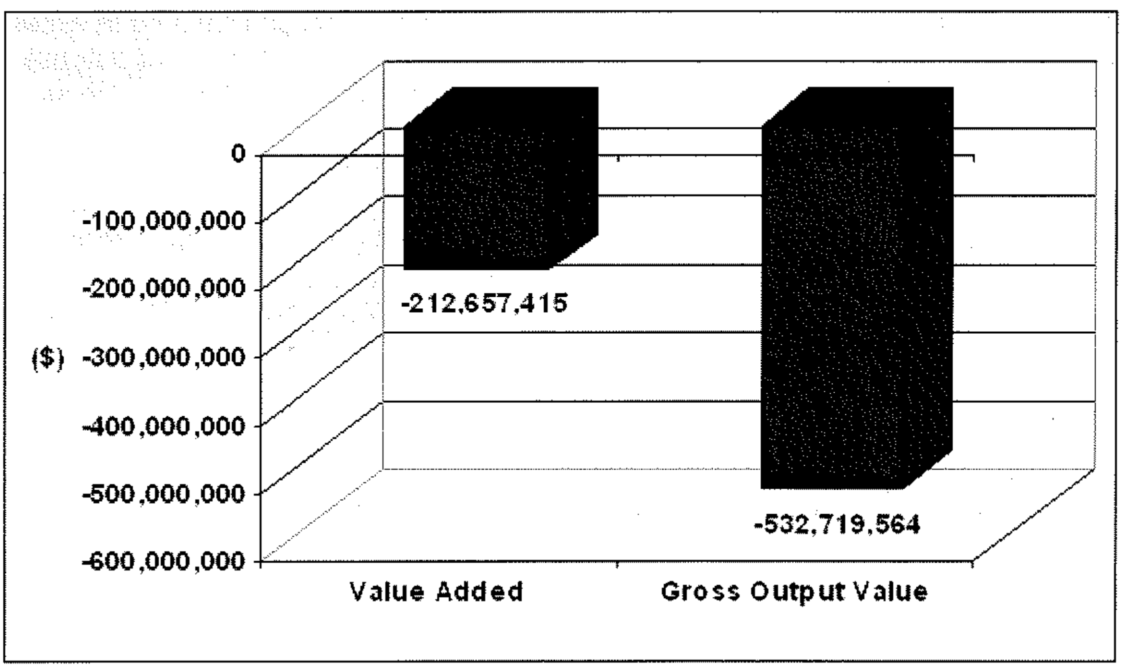

Figure 5-2. Added Value and Gross Output Net Losses for Junior Irrigation Ground Water Right Holders in the ESPA for a 1949 Curtailment Date.

1949 State-Level Curtailment Impacts

State-level impacts for the 1949 priority curtailment date are larger than found within the ESPA as expected. Labor income at the state level is expected to decline by over $120 million, while other property type income losses are estimated to be approximately $100 million (Figure 5-3). Indirect business tax losses are estimated to be nearly $14 million dollars.

Total local value lost is estimated to be in excess of $234 million, while the value of gross output or sales is expected to be in excess of $548 million (Figure 5-4). As far as job number changes, a loss of over 3,000 jobs is expected to occur within the ESPA and over 3,600 job losses are expected to occur state-wide under the 1949 curtailment scenario.

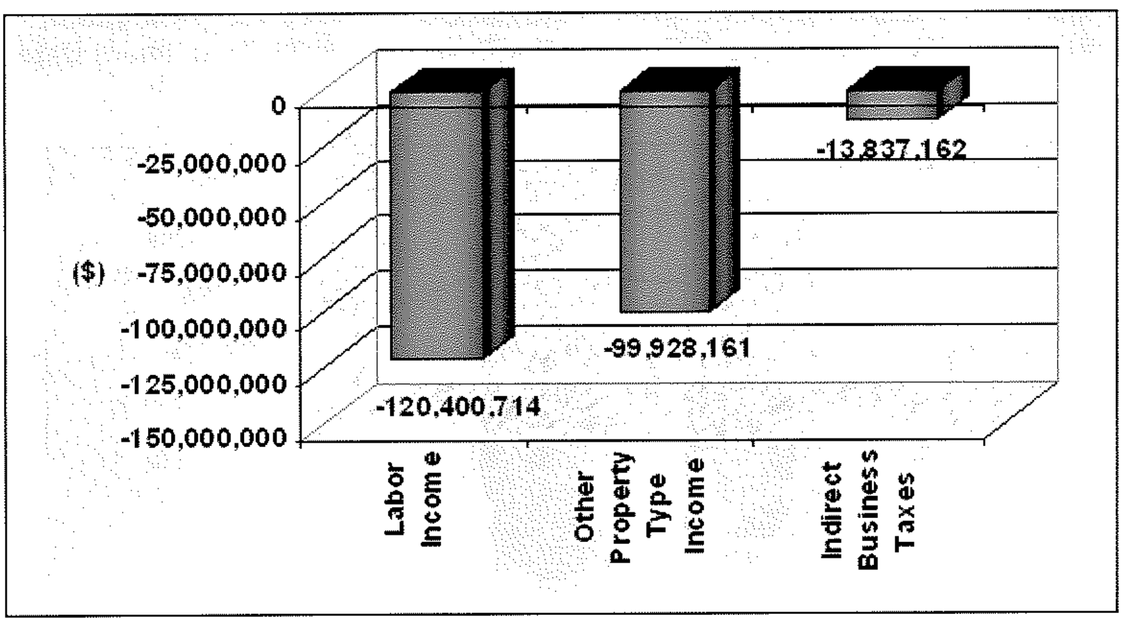

Figure 5-3. Value Added Component Losses for Junior Irrigation Ground Water Right Holder in the State for a 1949 Curtailment Date.

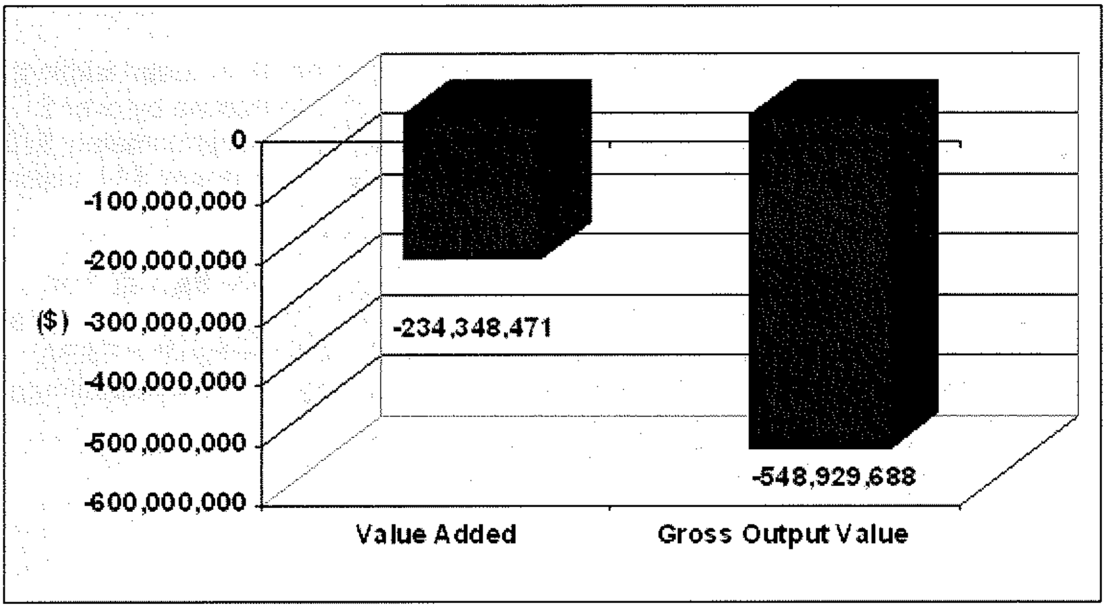

Figure 5-4. Added Value and Gross Value of Output Net Losses for Junior Irrigation Ground Water Right Holders in the State for a 1949 Curtailment Date.

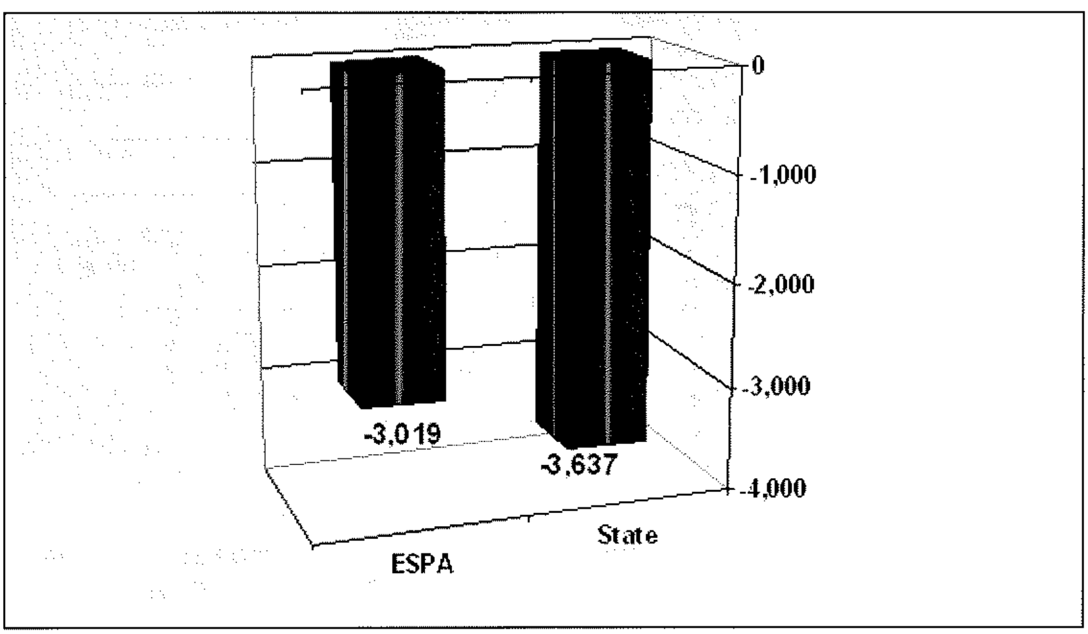

Figure 5-5. ESPA- and State-Level Job Number Losses for Junior Irrigation Ground Water Right Holders for a 1949 Curtailment Date.

1961 ESPA-Level Curtailment Impacts

With less water taken away from more junior ground water right holders due to a later priority date, impacts would also be less for the 1961 period, as illustrated in Figure 5-6. Labor income losses are estimated at over $72 million. Other property type income losses are almost as large at nearly $62 million. Indirect business tax losses are anticipated to be in excess of $8.6 million.

Value lost within the ESPA is anticipated to be in excess of $143 million, while gross output value is estimated at over $358 million. Purchases from out-of-region are 60 percent of the final costs of good and services sold.

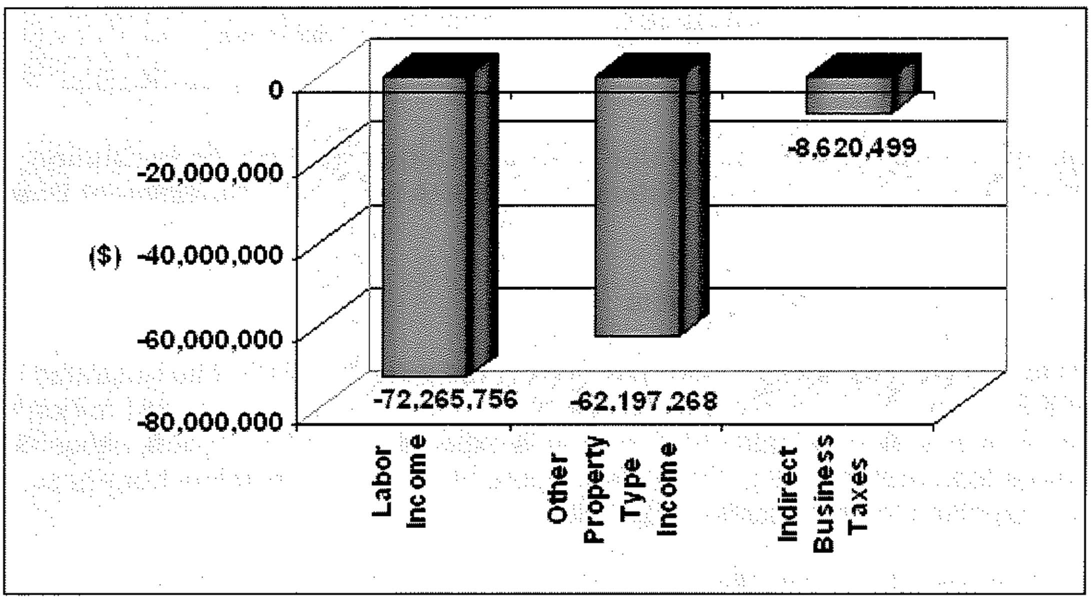

Figure 5-6. Value Added Component Losses for Junior Irrigation Ground Water Right Holders in the ESPA for a 1961 Curtailment Date.

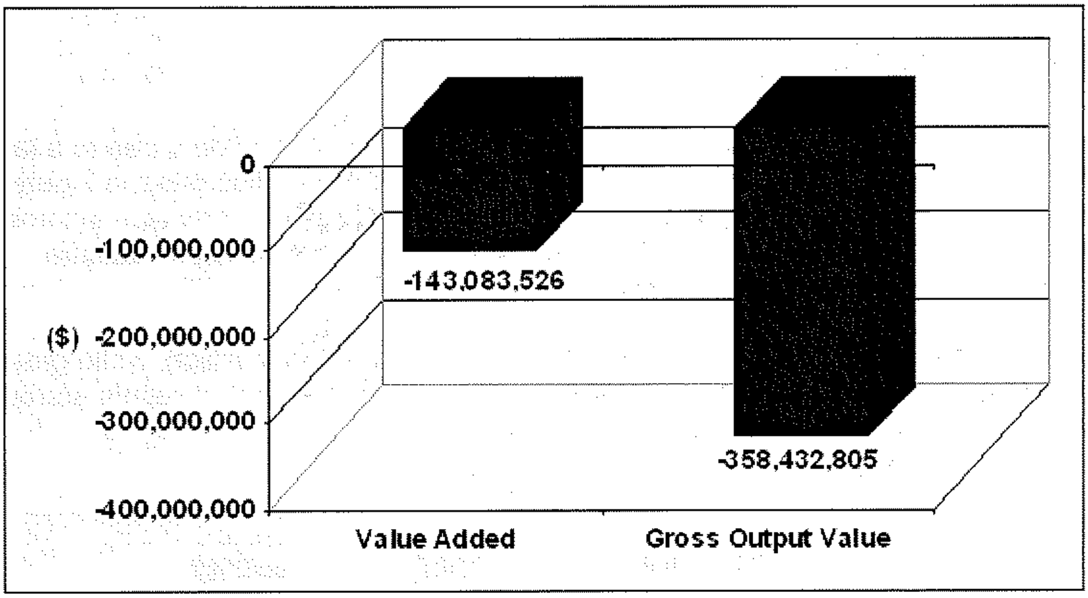

Figure 5-7. Added Value and Value of Gross Output Net Losses for Junior Irrigation Ground Water Right Holders in the ESPA for a 1961 Curtailment Date.

1961 State-Level Curtailment Impacts

State-wide, the impacts are larger than those realized within the ESPA as illustrated in Figures 5-8 through 5-10. Labor income losses are estimated to be over $81 million for the state, whereas other property type income is expected to be $67 million, almost $5 million more than realized within the ESPA (Figure 5-8). Losses in indirect business taxes are expected to be in excess of $9 million.

Total value losses at the state level are estimated to be in excess of $157 million (Figure 5-9). The loss in gross output value is estimated at over $369 million. Only 43 percent of the gross output value is added within the state. Employment at the ESPA- and state-level are in excess of 2,000 at the ESPA level, but almost 2,500 at the state level (Figure 5-10).

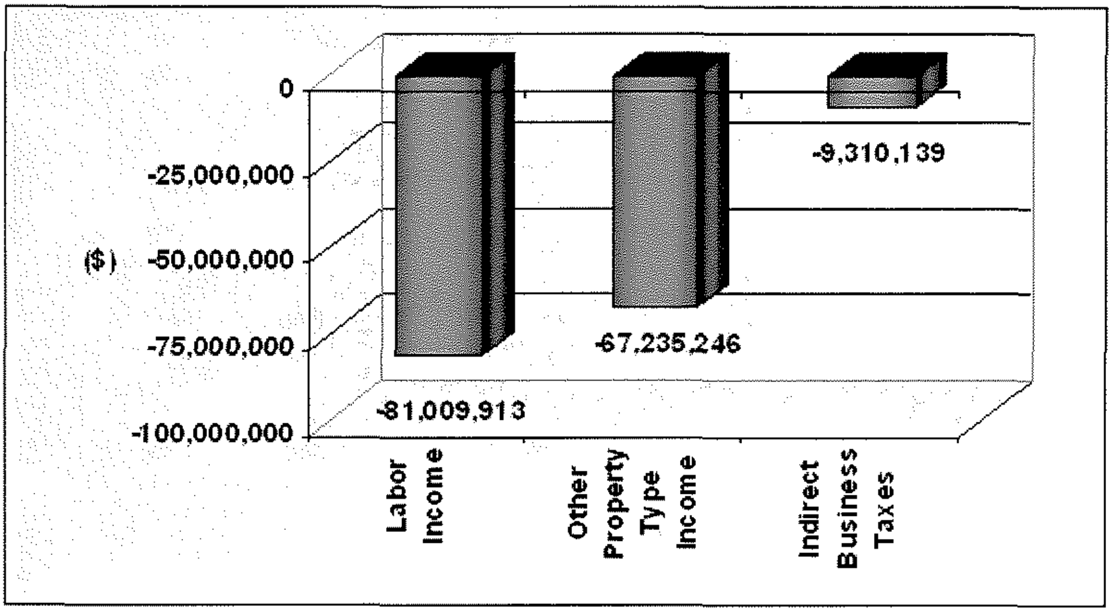

Figure 5-8. Value Added Component Losses for Junior Irrigation Ground Water Right Holders in the State for a 1961 Curtailment Date.

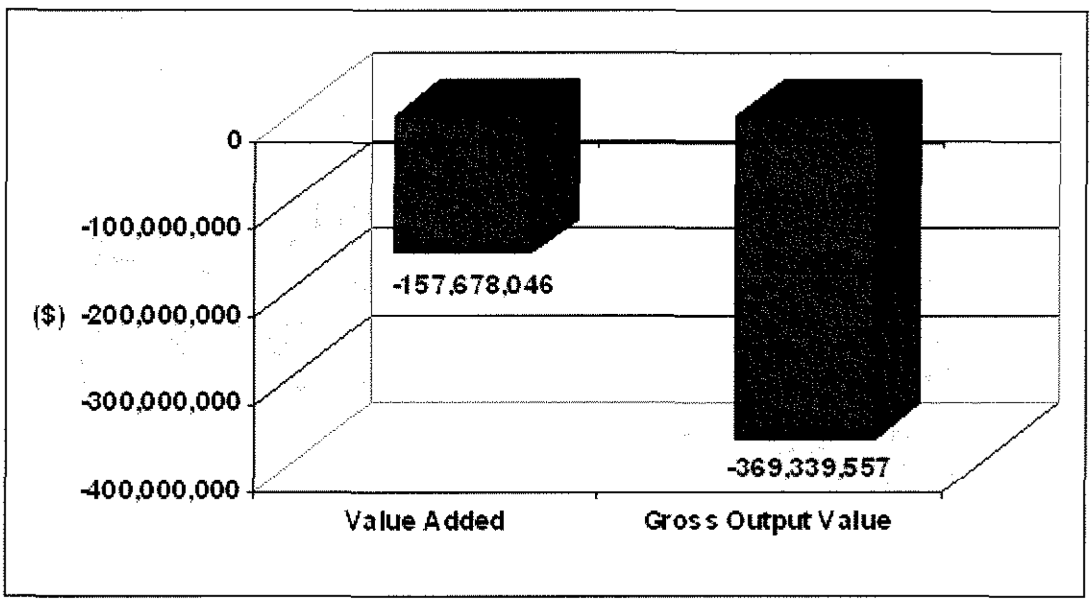

Figure 5-9. Added Value and Gross Value of Output Net Losses for Junior Irrigation Ground Water Right Holders in the State for a 1961 Curtailment Date.

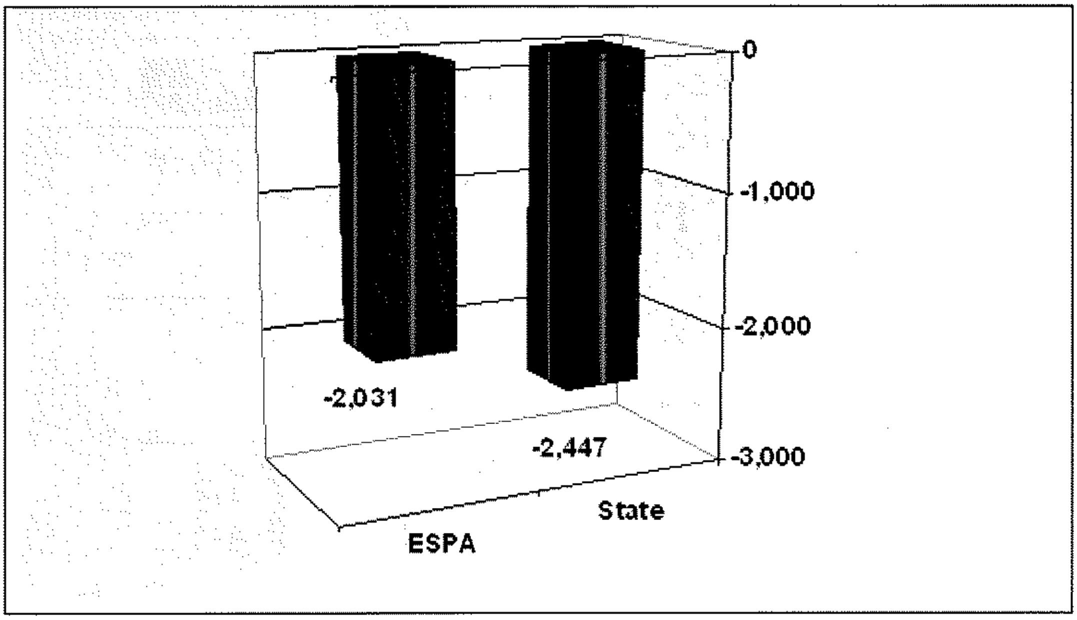

Figure 5-10. ESPA- and State-Level Job Numbers for Junior Irrigation Ground Water Right Holders for a 1961 Curtailment Date.

Part VI: Net Impacts

Introduction

Under each of the curtailment scenarios we have subtracted the total losses from total gains and provided that difference in the following sections. We have focused on the three primary components of income: labor income, other property type income, and indirect business taxes. These net impacts were calculated both for the ESPA and for the State of Idaho. Summing the results from each of the impacted groups included in these analyses suggests the following net impacts.

1949 ESPA-Level Net Curtailment Impacts

When the estimated gains from curtailing ground water rights junior to 1949 are added to the expected losses, the results for both the ESPA and the state are negative. The various components of value added range from a -$10.9 million of indirect businesses taxes to -$91.4 million. Losses in other property type income is nearly as large at over $83 million for labor income (Figure 6-1.). There is a net loss in total value added, as illustrated Figure 6-2, of more than -$185 million. Gross output declined by over $464 million.

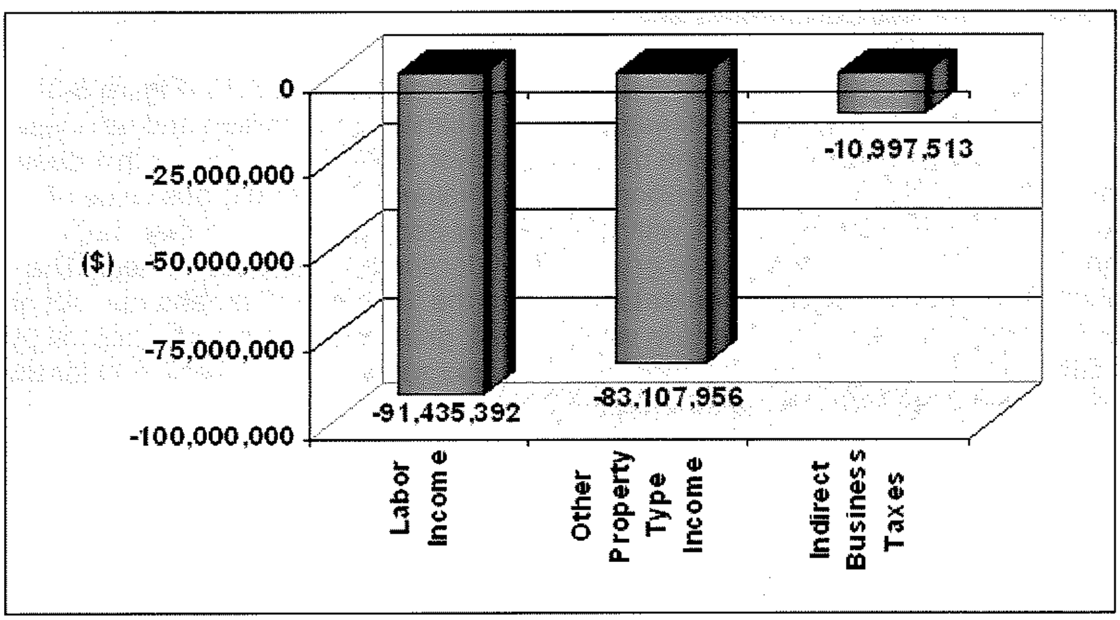

Figure 6-1. Value Added Component Losses for the ESPA for a 1949 Curtailment Date.

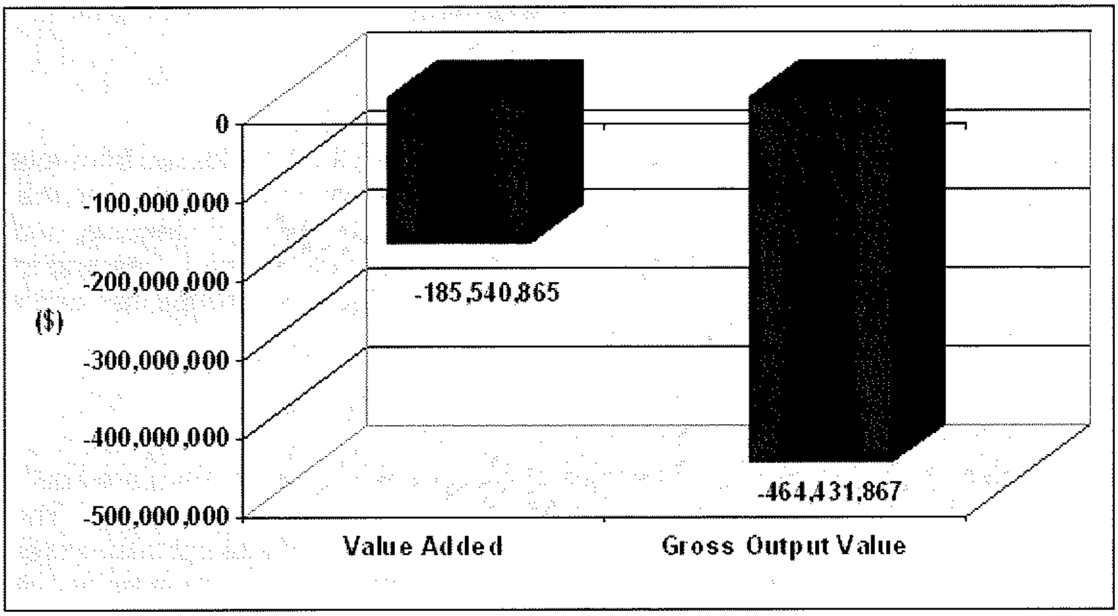

Figure 6-2. Added Value and Gross Value of Output Net Losses in the ESPA for a 1949 Curtailment Date.

1949 State-Level Net Curtailment Impacts

As anticipated, the state's net losses are even larger than for the ESPA (Figure 6-3). Net losses in labor income were estimated to reach almost $103 million and net losses in other property type income likewise declined by over $89 million. Losses in indirect business taxes totaled almost $12 million. The net value added and gross value of output are larger than for the ESPA with value added declining by more than $204 million (Figure 6-4). The net value of gross output decline by over $477 million. The distributional effects of curtailing water based upon the 1949 cut-off means that out of the $141 million in state-wide losses in value-added, gross value of output declines by over $464 million. The net loss in job numbers is also substantial at over 2,600 for the ESPA and over 3,150 for the state (Figure 6-5).

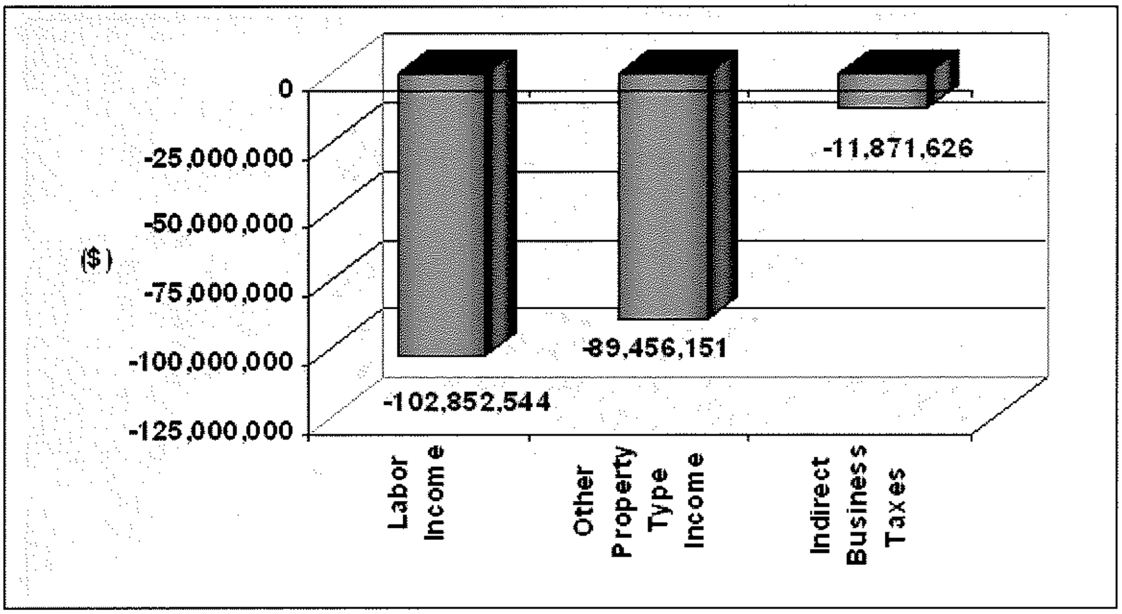

Figure 6-3. Value Added Component Net Losses in the State for a 1949 Curtailment Date.

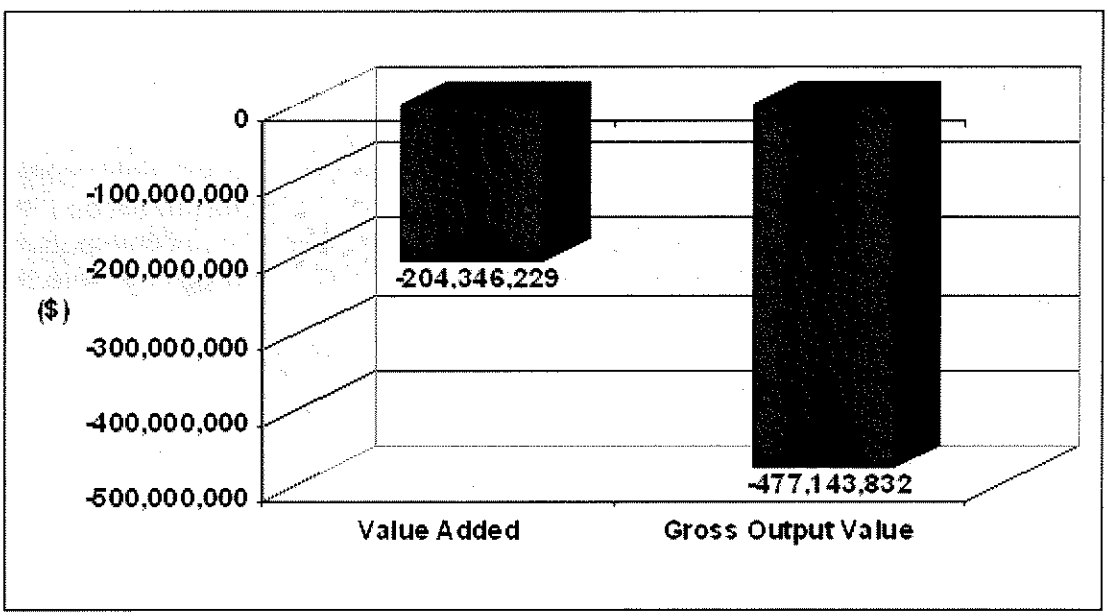

Figure 6-4. Added Value and Gross Value of Output Net Losses in the State for a 1949 Curtailment Date.

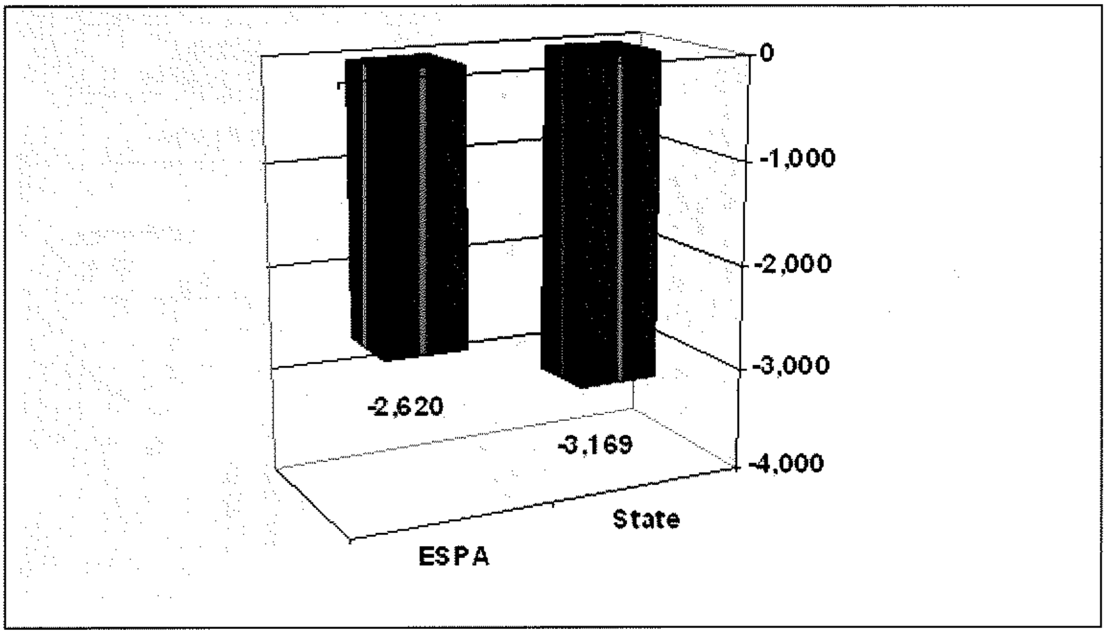

Figure 6-5. ESPA- and State-Level Job Number Net Losses for a 1949 Curtailment Date.

1961 ESPA-Level Net Curtailment Impacts

Under the 1961 curtailment date, labor income for the junior ground water right holders declines by almost $59 million. Net declines in other property type income exceed $53 million and losses to indirect business taxes are almost $7 million. Total value added declines by over $118 for the ESPA, while the gross value of output drops by more than $295 million.

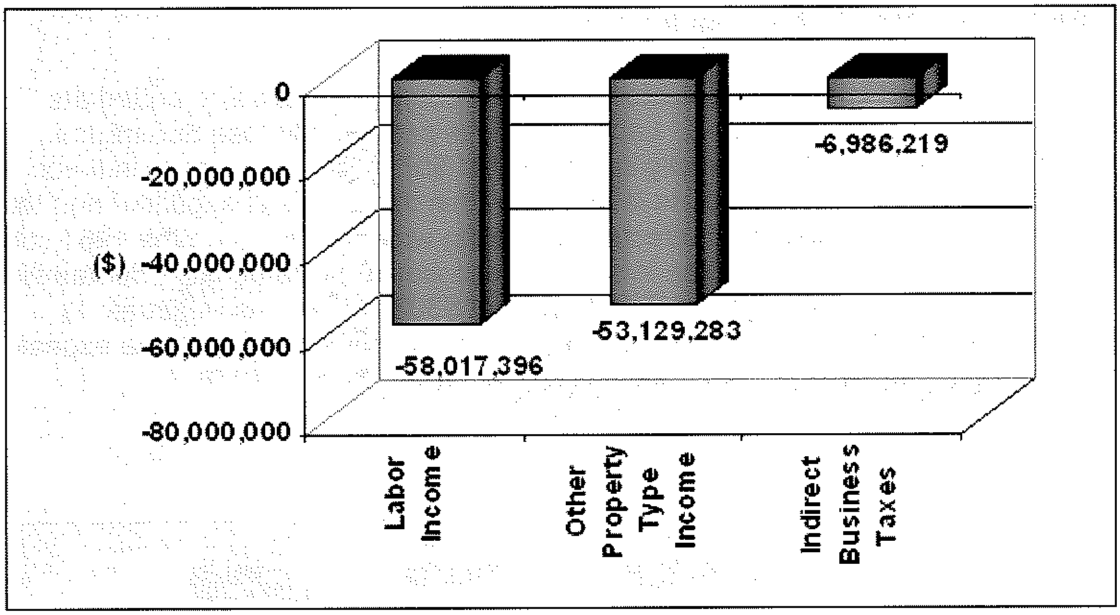

Figure 6-6. Value Added Component Net Losses in the ESPA for a 1961 Curtailment Date.

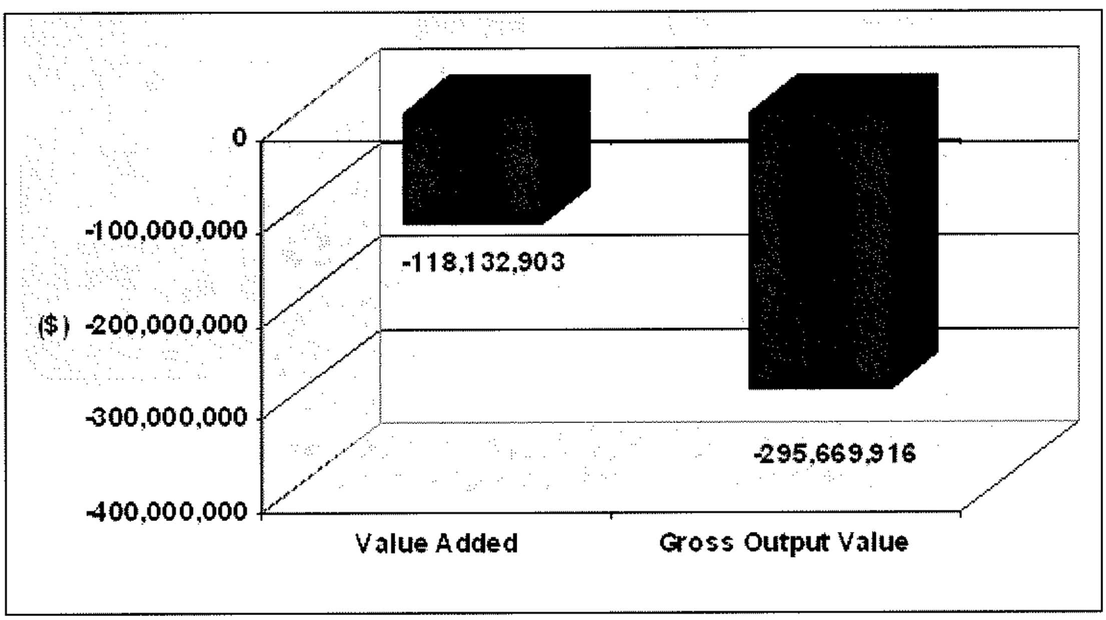

Figure 6-7. Added Value and Gross Value of Output Net Losses in the ESPA for a 1961 Curtailment Date.

1961 State-Level Net Curtailment Impacts

At the state level, net impacts associated with each component of value added are negative as illustrated in Figure 6-8. Labor income is projected to lose $65 million. Other property type losses are equally substantial at $57 million. Losses in indirect business taxes are higher at the state level than within the ESPA as expected and total over $7 million. The distributional effects of curtailing water based upon the 1961 cut-off means that there are $130 million in state-wide losses in value adding opportunities (Figure 6-9). Gross output value is also negative at $303 million. As illustrated in Figure 6-10, job losses for the ESPA under a 1961 curtailment date would be expected to occur (-1,695), but smaller than for state-level analyses (over -2,050).

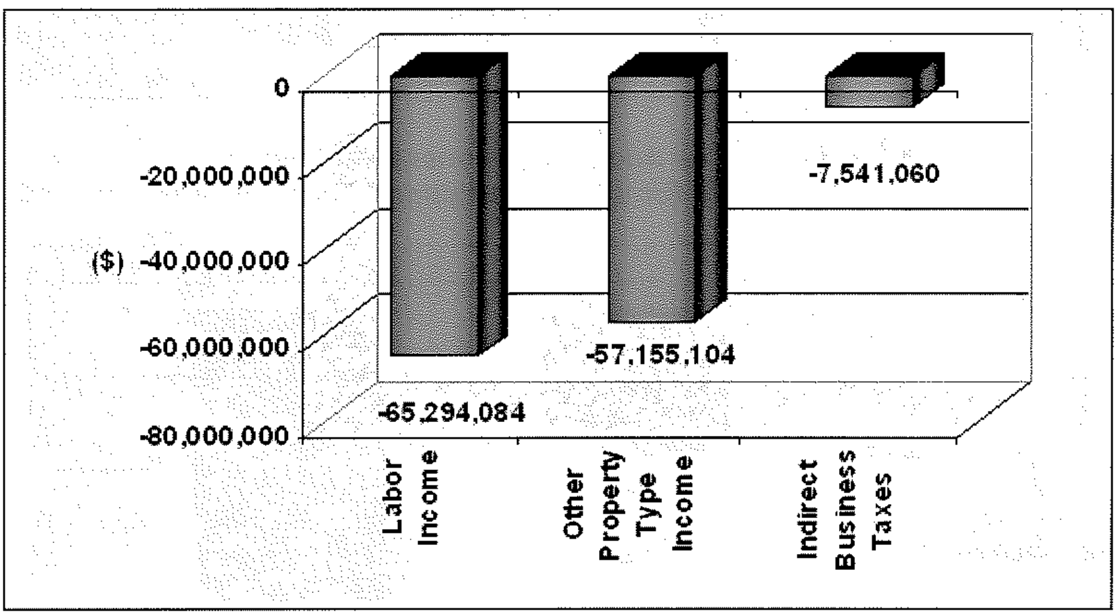

Figure 6-8. Value Added Component Net Lossesin the State for a 1961 Curtailment Date.

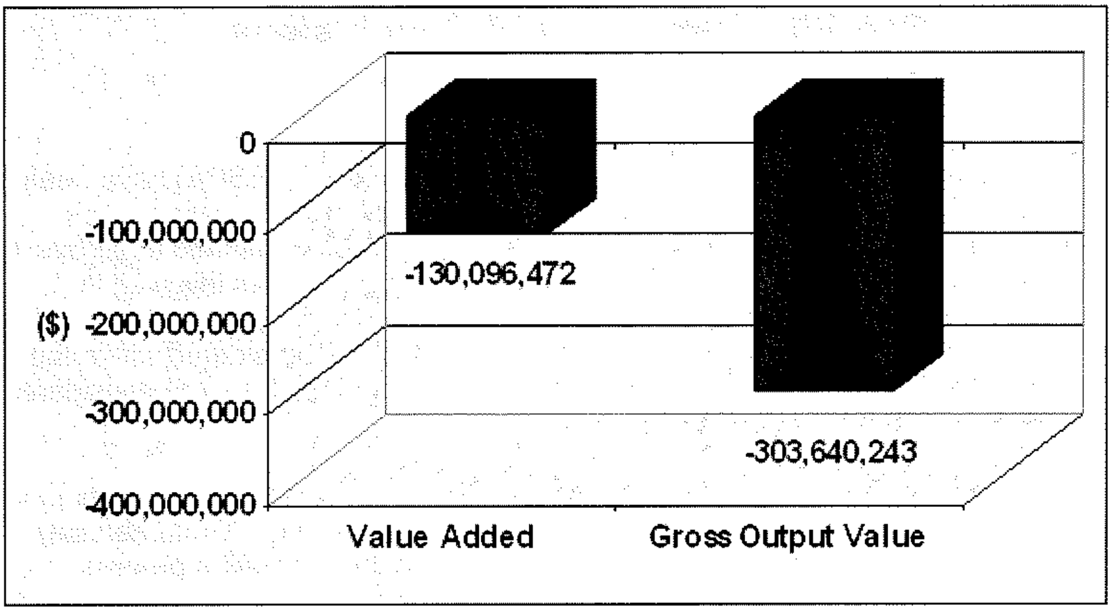

Figure 6-9. Added Value and Gross Value of Output Net Losses in the State for a 1961 Curtailment Date.

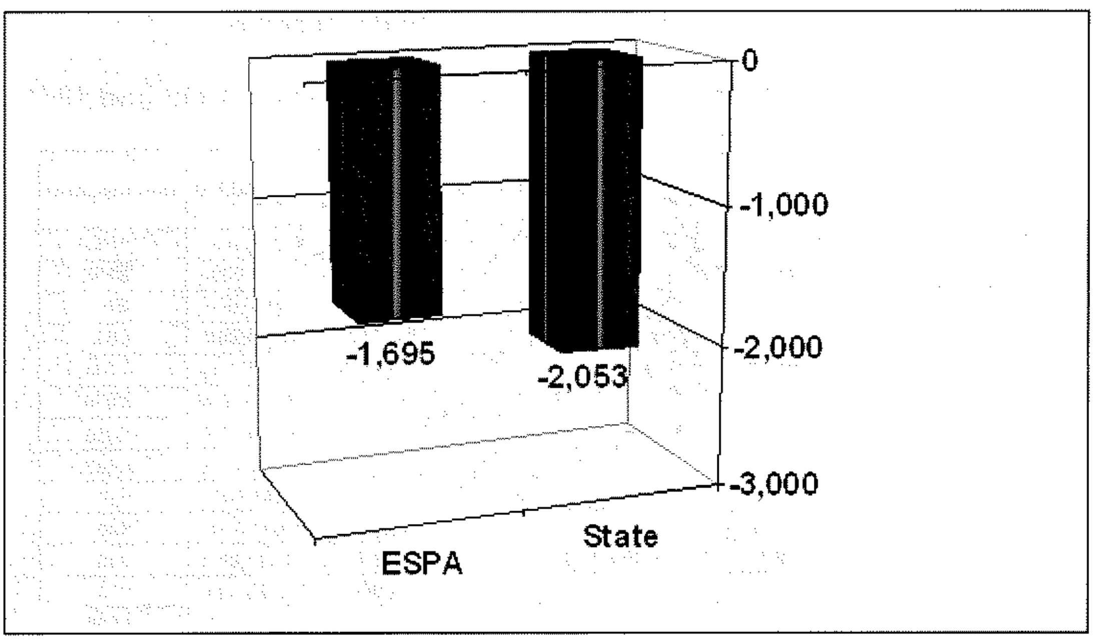

Figure 6-10. ESPA- and State-Level Job Number Net Losses for a 1961 Curtailment Date.

Part VII: Summary and Conclusions

Summary

Various business components of the Eastern Snake Plain Aquifer (ESPA) have been examined in this analysis. The study began with the identification of those parties directly impacted through the present conflict. Three parties are assumed to be directly impacted, including senior surface/spring irrigation water right holders involved in production agriculture, aquaculture water right holders, and junior ground water right holders involved in production agriculture. Tax recipients were considered within the analyses of these three parties. All other potentially impacted parties were considered as externalities for the present analyses.

Major study assumptions are identified, as well as calculations leading to the estimation of impacts. The approach adopted is that of input-output modeling. A commercially available input-output model, i.e., IMPLAN, was utilized in the estimation process. Gross crop production values and aquaculture values were used as the main frame-of-reference for the model. Various impacts were then estimated at the ESPA- and state-level. The most important feature of this modeling approach has been the measurement of relative changes in impacts, both to those who gain and to those who lose as a result of 1949 and 1961 curtailment dates. Measures of particular concern in these analyses have been labor income, other property type income, and indirect business taxes, which equal total value added when summed together.

Table 7-1. Summary of Impacts to Primarily Impacted Parties, 1949 and 1961.

Year	User Impacts	Area	Labor Income	Other Property Type Income	Indirect Business Taxes	Value Added	Employment
1949	Aquaculture Users	ESPA	4,918,000	756,000	516,000	6,190,000	181
		State	5,237,000	1,120,000	561,000	6,918,000	215
	Surface/Spring Irrigators	ESPA	11,051,000	8,577,000	1,299,000	20,927,000	219
		State	12,312,000	9,352,000	1,404,000	23,084,000	253
	Ground Water Irrigators	ESPA	-107,942,000	-92,903,000	-12,876,000	-213,721,0	-3,034
		State	-121,003,000	-100,428,000	-13,906,000	-235,520,000	-3,656
	Net Effects	ESPA	-91,972,000	-83,570,000	-11,062,000	-186,604,000	-2,635
		State	-103,455,000	-89,956,000	-11,941,000	-205,518,000	-3,187
1961	Aquaculture Users	ESPA	3,197,000	491,000	335,000	4,024,000	118
		State	3,404,000	728,000	365,000	4,497,000	140
	Upriver Surface Irrigators	ESPA	11,051,000	8,577,000	1,299,000	20,927,000	219
		State	12,312,000	9,352,000	1,404,000	23,084,000	253
	Ground Water Irrigators	ESPA	-73,299,000	-63,087,000	-8,744,000	-145,130,000	-2,060
		State	-82,168,000	-68,197,000	-9,443,000	-159,933,000	-2,482
	Net Effects	ESPA	-59,051,000	-54,019,000	-7,109,000	-120,179,000	-1,724
		State	-66,453,000	-58,117,000	-7,674,000	-132,351,000	-2,088

In order to provide a summary overview for these measures and conditions, Figures 7-1 through 7-4 are provided below. The first two figures reflect relative changes for the 1949 curtailment date. Since predicted changes depend on not only any actual proposed change in water allocation, but also overall economic trends that cannot be forecasted, it is important to focus on the relative magnitude of changes in total value added and employment.

In Figure 7-1, relative changes in value added are illustrated for each of the primarily impacted parties for the 1949 curtailment date. Rather than focus on the actual values, these figures are provided in order to illustrate the relative magnitudes of the impacts. It can be seen that the losses to junior ground water right holders are estimated to be much more significant than the gains to any of the other primarily impacted parties. The scale is the same on both sides (left side losses, right side gains) of the graph. Losses for the more junior water right holders are 5 times larger than for combined gains.

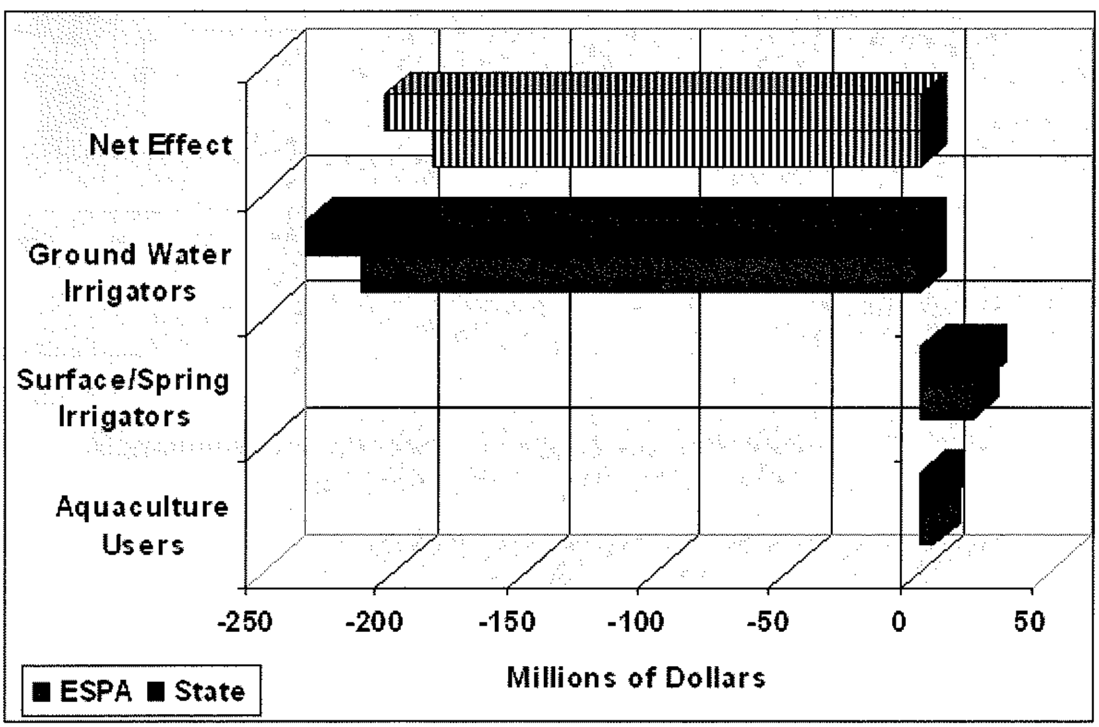

Figure 7-1. ESPA- and State-Level Impacts to Value Added by User for the 1949 Curtailment Date.

Figure 7-2 reflects the relative changes in employment for the 1949 curtailment date for primarily impacted parties. The net loss in jobs ranges between 2,700 and 3,250 for ESPA and state levels of analyses, respectively. Net losses to junior irrigation water right holders are at least 5 times larger than the combined gains to senior surface/spring water right holders.

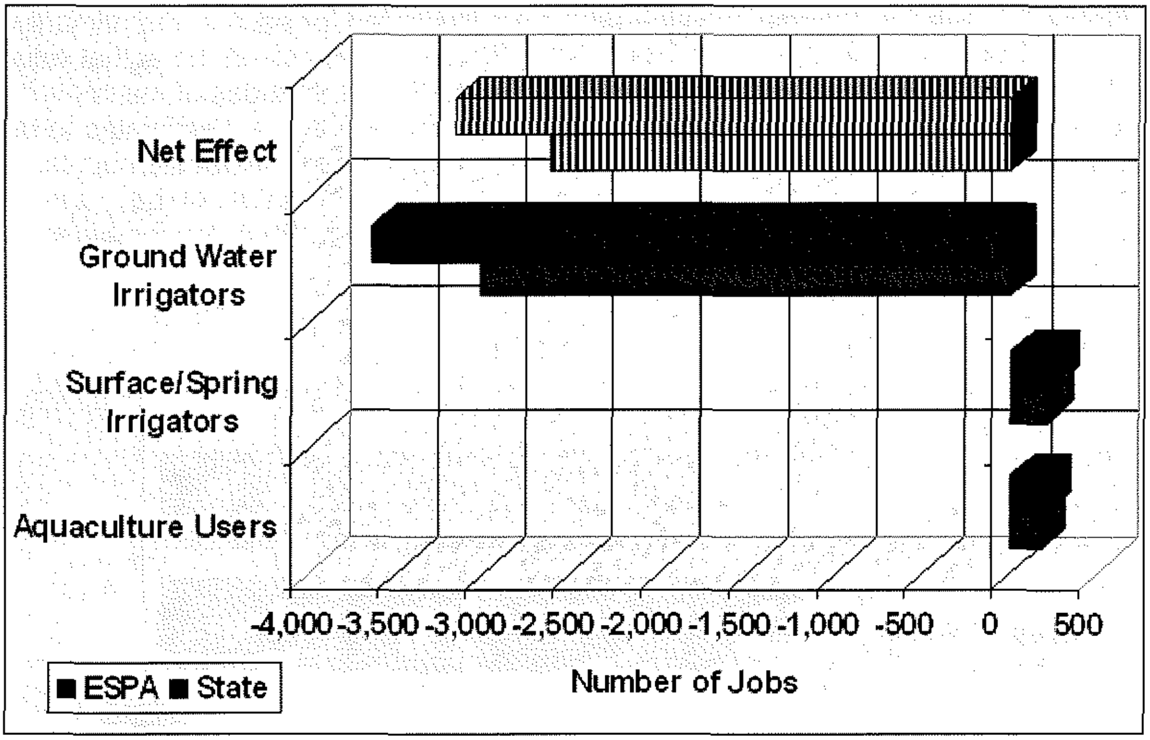

Figure 7-2. ESPA- and State-Level Impacts on Job Numbers by User for the 1949 Curtailment Date.

Figure 7-3 reflects the relative magnitudes of changes in total value added within the ESPA and state for the 1961 curtailment date. Losses to junior irrigation ground water right holders is at least 5 times larger than the gains to considered surface/spring water right holders. Net losses for the study area range between $125 and $140 million.

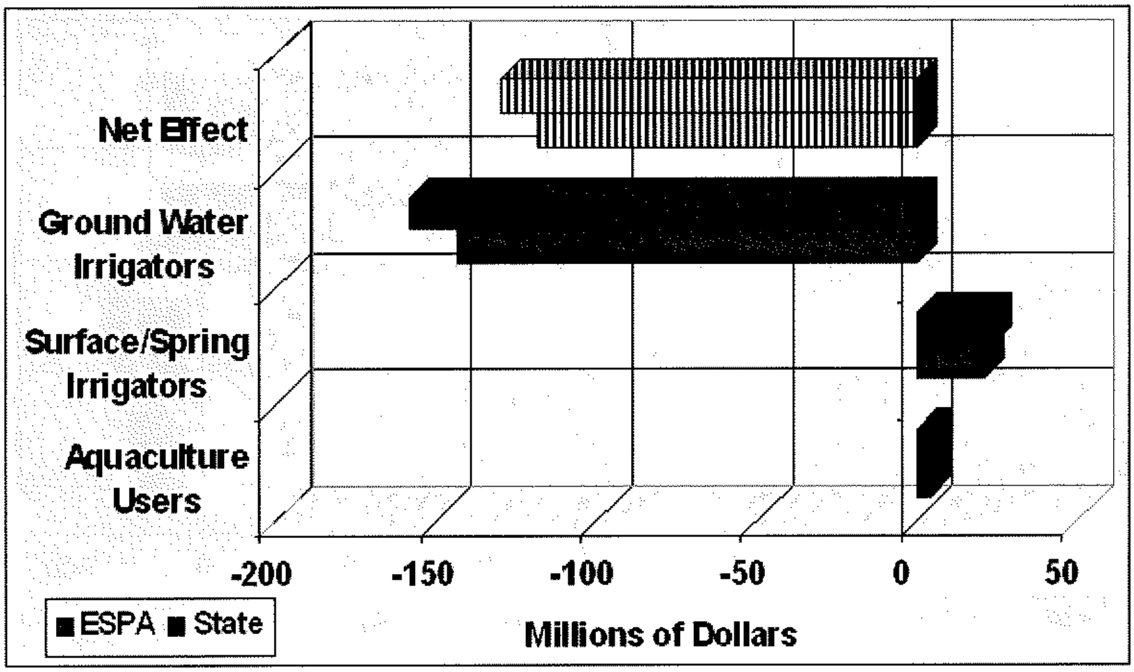

Figure 7-3. ESPA- and State-Level Impacts to Value Added by User for the 1961 Curtailment Date.

For the 1961 curtailment date, levels of employment for the ESPA and the state are shown in Figure 7-4. Even though the absolute value of job number losses is reduced, the relative magnitude still favors more junior ground water right holders, with net impacts ranging from between 1,800 jobs and 2,100 jobs.

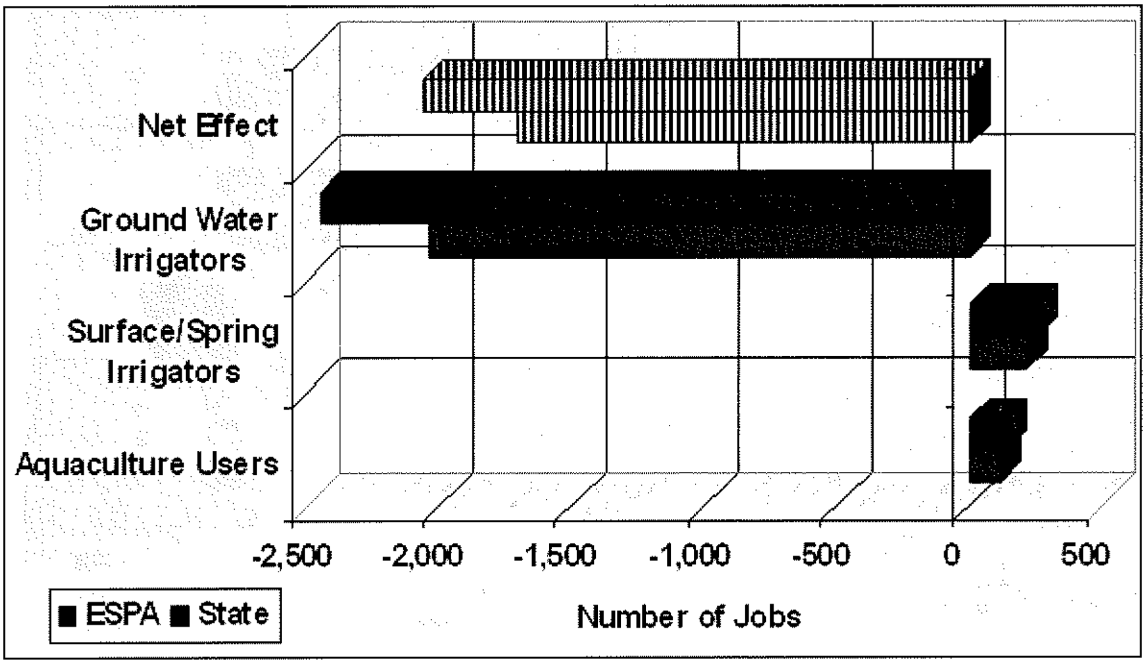

Figure 7-4. ESPA- and State-Level Impacts on Job Numbers by User for the 1961 Curtailment Date.

These analyses have attempted to identify the relative magnitude of primarily impacted parties, with other parties being treated as externalities to the main issue of water curtailment. In every category, the losses resulting from a curtailment of junior ground water right holders are between 5 and 7 times larger than the gains to surface/spring water right holders and aquaculture water right holders. The relative impacts suggest that a negotiated solution between junior and senior water right holders involving the transfer of water rights and acceptable mitigation payments is in the interest of the ESPA region, as well as the State as a whole.

Suggestions for Further Analysis

The above analyses correctly identify the potential scope of impacts, both negative and positive by junior and senior water right holders. It would be prudent for the State to advance the work of this report by building the capacity for estimating representative firm level models for different reaches. These models can address the issue of profitability, and may also feed into a larger regional impact model such as the one used in these analyses. The result will be a more precise estimate of the gains and losses by conflicted parties and third parties. Of course, the cost of such analyses must be weighed against the benefits realized from conducting such a study.

Appendix A
Comparison of Gain and Loss Flows over 10 Years.

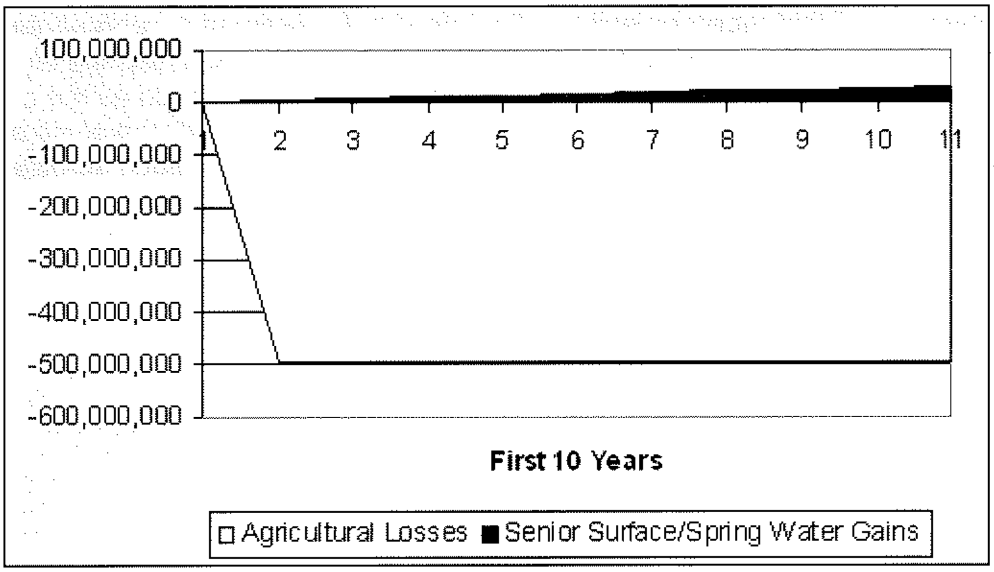

Figure A-1. Comparison of the Flow of Senior Surface/Spring Gains Relative to Junior Irrigation Losses for a 1949 Curtailment Date for 10 Years.

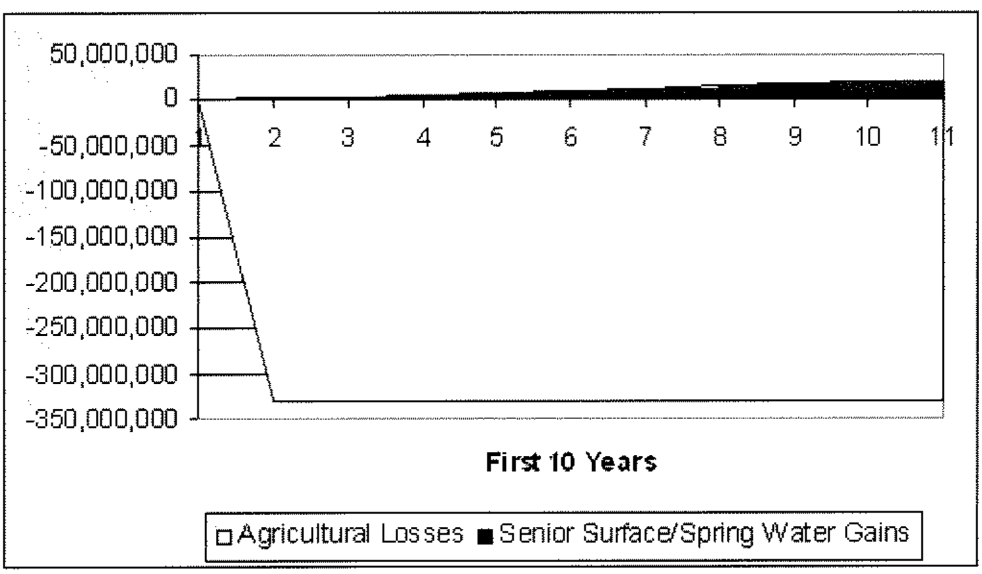

Figure A-2. Comparison of the Flow of Senior Surface/Spring Gains Relative to Junior Irrigation Agricultural Losses for a 1961 Curtailment Date for 10 Years.

APPENDIX B:
IMPLAN MODEL DESCRIPTION, INPUTS, AND OUTPUTS

A number of different modeling approaches can be used to estimate the impacts of a change on various sectors of a region's economy. The one selected for the analysis of the Long-term MP Contract alternatives is input-output analysis. Input-output analysis is commonly used for regional impact analysis. Below, a brief explanation of input-output analysis and the IMPLAN model are provided, followed by information on the inputs to and outputs from the model.

Description of Input-Output Analysis and the IMPLAN Model

Input-output (I/O) analysis is used to examine relationships between commodities and industries within an economy. These relationships include those between businesses, and between businesses and consumers. The goal is to capture all monetary transactions within a given period. Capturing the monetary data to determine relationships allows an examination of the effects of a change in one economic activity on the entire economy.

IMPLAN is the most popular software package used to conduct input-output analysis. IMPLAN was developed for the Forest Service with assistance from the University of Minnesota and has been in use for several decades for estimating impacts associated with changes in industry sectors. IMPLAN is a proprietary input-output modeling system developed and maintained by Minnesota IMPLAN Group, Inc. (MIG). IMPLAN consists of two components: IMPLAN professional software and IMPLAN database(s). Combining the two components allows development of input-output models that can estimate the economic impact of a change to the regional economy such as new firms moving into an area, loss of production in an industry, or new investments in an economic activity. IMPLAN estimates the impact of economic changes in states,77 counties, or communities using a database of the study area to create the model. MIG has been developing databases and distributing IMPLAN software to public and private organizations since 1988. There are over 1,300 active users of MIG software and databases in the United States and abroad.

IMPLAN Inputs

IMPLAN database files are used to create the model. Database files contain information for 528 different industries (generally with a 3, 4 or 5 digit North American Industry Classification System (NAICS) code breakdown) and 21 different economic variables. Database files are available for an individual state, county, or custom zip code level. The most current year for which data are presently available is 2001.

IMPLAN databases include the following components:

- Employment
- Industry Output
- Value Added Employee Compensation
- Proprietary Income
- Other Property Type Income
- Indirect Business Taxes
- Institutional Demands
- Personal Consumption Expenditures
- Federal Government Military Purchases
- Federal Government Non-Military Purchases
- State and Local Government Non-Education Purchases
- State and Local Government Education Purchases
- Commodity Credit Corporation
- Inventory Purchases
- Capital Formation
- Foreign Exports
- State and Local Government Sales
- Federal Government Sales
- Inventory Sales

Data in IMPLAN primarily comes from government data sources including:

- US Bureau of Economic Analysis Benchmark I/O Accounts
- US Bureau of Economic Analysis Output Estimates
- US Bureau of Economic Analysis REIS Program
- US Bureau of Labor Statistics ES202 Program
- US Bureau of Labor Statistics Consumer Expenditure Survey
- US Census Bureau County Business Patterns
- US Census Bureau Centennial Census and Population Surveys
- US Census Bureau Economic Censuses and Surveys
- US Department of Agriculture
- US Geological Survey

Data that can be edited in the IMPLAN database include value added, employment, final demands, byproducts, and regional purchase coefficients.

The study area is the geographical area considered in the analysis. The database is the most accurate for a study area with a stable economy because the most recent available data are always a few years old. For a study area with an economy that is changing rapidly, the database creates some challenges. For example, if a new company located in the study area last year, it would not show up in the IMPLAN data set. If this company were a significant source of economic activity, the results using the IMPLAN data would not be completely accurate. For this reason, data within IMPLAN must be checked for its reliability and accuracy, utilizing expertise and information from various sources. The modeling approach used by IMPLAN requires the analyst to adjust for recent changes in the relationship between industries if they are significant to the analysis.

Aggregation of Industries

There are 528 different sectors in IMPLAN. It is possible to generate reports and multipliers for all 528 different sectors. However, using each detailed sector creates information overload because it is difficult to sort through all the data to identify trends and relationships. For the analysis of the Long-term MP Contract alternatives, the 528 sectors were aggregated into 28 industry groups. Various information and multipliers were then estimated for these 28 aggregated sectors.

IMPLAN Models

IMPLAN uses two types of models – a descriptive model and a predictive model. The descriptive model uses public data to develop a description of the economy. It describes the transfers of money between businesses, and between businesses and final consumers. The relationships captured in the descriptive model can then be used in the predictive model.

The predictive model uses the data from the descriptive model to create multipliers. These multipliers are used to predict the total economic activity based on a change in economic activity. Because the predictive model is forecasting what will happen based on the descriptive model, it is assumed that existing relationships will continue in the future.

Descriptive Model

The primary components of the descriptive model are the factors of production for economic activities. Four basic factors of production contribute to the value of goods and services: labor, management (entrepreneurship), land (natural resources), and capital (investment or physical capital goods). Payments are made to each of these production factors to produce goods and services. In IMPLAN, payments to factors of production are categorized as follows:

- **Labor.** Consists of two components - *Employee Compensation* (wages and salaries) and *Proprietor Income* (profit, returns to management, or entrepreneurship). Payments to labor and entrepreneurship are combined in this category, but can be separated if desired.

- **Other Property Type Income.** Consists of payments for rents, royalties, and dividends. Payments to individuals in the form of rents received on property, royalties from contracts, and dividends paid by corporations are included, as well as profits earned by corporations.

- **Indirect Business Taxes.** Consists of excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses, but not taxes on profit.

- **Value Added.** Consists of total payments made to *Labor Income*, *Other Property Income*, and *Indirect Business Taxes*.

Predictive Model

Multipliers are developed in the IMPLAN predictive model to estimate the impact of changes in economic activity in the study area. The underlying concept of multipliers is that when money is spent in an economic system, people or businesses receiving the money spend at least a part of it again. However, only part of the money is spent in the study area. The money that is not spent within the study area is called leakage. For example, assume that $1,000 is initially spent and there is an 80% leakage. The first person spends $1,000, and then the person receiving this money spends $200 in the study area ($1,000 less a leakage of $800). The person receiving the $200 then spends $40; the person receiving the $40 spends $8; the person receiving the $8 spends $1.60; the person receiving the $1.60 then spends $0.32, etc. The result is a total of $1,250 being spent as a result of spending the initial $1,000. This $1,250 includes the original $1,000 and an additional $250 of spending in the study area. As percentages, a total of 125% ($1,250/$1000) is spent or 100% of the original amount plus an additional 25%. Different levels of leakage result in different multiplier values for the study area. Table B1 compares leakages of 80% and 50%. The multiplier for a leakage of 80% is 125 % while the multiplier for a leakage of 50% is 200%; thus, the larger the leakage, the smaller the multiplier.

Table B-1. Examples of Multipliers with 80% Leakage and 50% Leakage.

Percent Leakage	Dollar Amount		Percentages	
	80%	50%	80%	50%
Direct	$1,000.00	$1,000.00	100.0%	100.0%
Step 1	$ 200.00	$ 500.00	20.0%	50.0%
Step 2	$ 40.00	$ 250.00	4.0%	25.0%
Step 3	$ 8.00	$ 125.00	0.8%	12.5%
Step 4	$ 1.60	$ 62.50	0.2%	6.3%
Step 5	$ 0.32	$ 31.25	0.0%	3.1%
Step 6	$ 0.06	$ 15.63	0.0%	1.6%
Step 7	$ 0.01	$ 7.81	0.0%	0.8%
Step 8	$ 0.00	$ 3.91	0.0%	0.4%
Step 9		$ 1.95		0.2%
Step 10		$ 0.98		0.1%
Step 11		$ 0.49		0.0%
Step 12		$ 0.24		0.0%
Step 13		$ 0.12		0.0%
Step 14		$ 0.06		0.0%
Step 15		$ 0.03		
Step 16		$ 0.02		
Step 17		$ 0.01		
Step 18		$ 0.00		
Total	$1,250.00	$2,000.00	125%	200%

The size of the study area typically impacts leakage and, hence, the multiplier. The multiplier is usually larger for the United States (US) than for an individual state such as New Mexico. Likewise, the multiplier for New Mexico is usually higher than for a county within New Mexico. Basically, a larger geographic area is usually more self-sufficient than a smaller area.

The impact of an industry in a study area is determined by the regional purchase coefficients (RPCs), which represent the proportion of business activity undertaken within the study area minus leakage. For example, if the study area is largely self-contained such that a high proportion of business activity is found within that area and not many imports are needed, then the RPCs could be quite high or close to 1.0. More isolated areas with limited economic activity would be expected to have small RPCs due to the absence of a broad economic base. RPCs differ between regions and between the types of industries. Larger RPCs will result in larger multipliers for economic impacts in the study area.

Multiplier Components

Three different components comprise an IMPLAN multiplier. The first component is the direct effect, which is the original money spent to purchase a product. The indirect effect results from businesses purchasing goods and services from other businesses in order to make a final product. The induced effect reflects additional purchases made by households resulting from the direct expenditure. Induced effects are based on the economic concept of a marginal propensity to consume, the added buying that a household will make due to an increase in income.

These effects can also be seen as linkages. Backward linkages (indirect effects) are from suppliers of the industry, which may include labor, electricity, and parts. Forward linkages (induced effects) are between the industry producing the good and consumers of that good or service. Forward linkages also include industries that add value to the product, households, and exports of the product outside the system. A graphic of these linkages is provided in Figure B-1.

Application of Multipliers

For an illustration of the use of multipliers to evaluate impacts from a new event or a change in the economy, assume that the regional economy is only comprised of three industry sectors, with no households or institutions. In order to estimate the impact of a change, one must know (a) the industry in which the change occurs (b), the size of the change, and (c) the multipliers pertaining to the industry. Table B-2 provides a list of hypothetical industry-to-industry multipliers for this simple economy. The bottom row of Table B2 contains the multipliers. In this example, the total multiplier would be 1.466 for a change in the agricultural sector.

Suppose there is a $5 increase in the agriculture industry's output. The total impact is $7.33 ($5 x 1.466). This means that a change in the agriculture industry of $5 will result in a total impact of $7.33 in economic activity. In Table B-2, only one multiplier is shown for each industry. In IMPLAN, there are eight different types of multipliers that are associated with the results. The different types of multipliers are based on the different factors of production discussed above. The types of multipliers chosen for use correspond to the type of information needed in the analysis. The different types of multipliers are listed and described below.

- Total Output. Dollars of output (sales), i.e., the value of goods or services produced assuming they are sold. The total value of output (or total value of sales) equals value added plus the value or purchase price of imported goods and services.
- Employment. Number of full-time and part-time job equivalents created (or lost) for each change in economic activity.

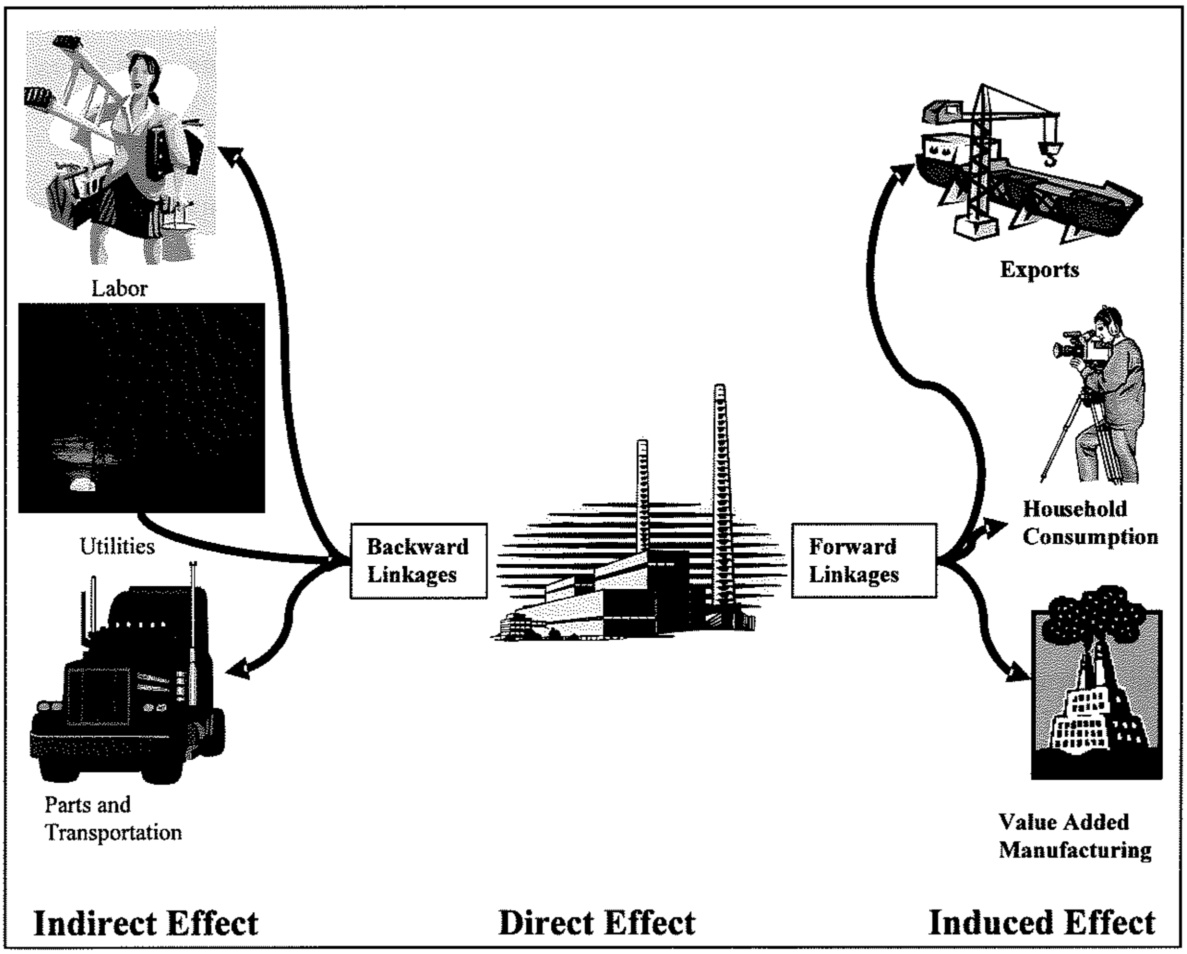

Figure B-1. Illustration of Linkages and Effects (adapted from IMPLAN manual).

- Labor Income. Consists of two components: employee compensation (wages and salaries) and proprietor income (profits or returns to entrepreneurship). Labor income multipliers represent a broad measure of impact, but employee compensation and proprietor income allow more specific analyses.
- Employee Compensation. Wages and salaries of employees, which are usually the largest portion of labor income.
- Proprietor Income. Profit and returns to management, which may be a significant part of labor income for certain industry types.
- Other Property Income. Payments for land and physical capital in the form of rents, royalties and dividends.
- Indirect Business Taxes. Excise taxes, property taxes, fees, licenses, and sales taxes paid by businesses and households. Indirect business taxes do not include taxes on profit or income. Income tax impacts can be estimated elsewhere in IMPLAN.
- Value Added. Total of payments made to Labor Income, Other Property Income, and Indirect Business Taxes. This category relates to the dollar value that is added to a good or service due to local contributions of labor, management, land, and capital.

Table B-2. Industry-to-Industry Multipliers for a Simplified Economy.

	Industries		
Industry	**Agriculture**	**Manufacturing**	**Services**
Agriculture	1.076	0.08	0.038
Manufacturing	0.186	1.286	0.063
Services	0.204	0.211	1.278
Multiplier	1.466	1.577	1.379

Model Outputs

As described above, IMPLAN provides three estimates of effects or impacts for each sector of the economy: direct, indirect, and induced impacts. Direct impacts are typically the largest and induced impacts are typically the smallest. Direct impacts are generally assumed to occur only in the sectors affected by the change in economic activity. Indirect impacts (due to changes in support industries) and induced impacts (due to changes in income) are distributed over the sectors related to the directly affected economic activities.

Two of the primary outputs of IMPLAN are total output and value added. Total output represents the total value (sales) of a good or service, including goods or service imported to produce the output as well as the value added by the economic activity in the study area. Value added reflects the dollar value that is added to a good or service due to local contributions of labor, management, land, and capital: employee compensation, proprietor income, other property income, and indirect business taxes. Value added is the difference between the out-of-area purchase price (or cost) and the value of final sales. Value added is the most inclusive and important impact category because it reflects the entire value of local inputs added in the production process, including indirect business taxes.

Table B3 is an example of an IMPLAN report on total output, value added and employment for aggregated industries in a sample county. Agriculture in the sample county (row 1 of the data) generated $152.5 million of gross annual industry output. The agricultural sector employed 2,058 people with total payroll of $13.3 million. Agricultural resource owners (e.g., landowners) generated $12.0 million in income. Land and buildings used in agriculture provided $10.2 million in other property income. Agriculture also generated $3.2 million in indirect business taxes (primarily property tax). In total, agriculture was responsible for adding $38.7 million to the county's economy.

For all sectors combined, the total value of output for this county was $2.9 billion. Full-time and part-time jobs totaled nearly 25,000. Employee compensation was the largest single component of value added to the county, as is the case in most regional economies. Employees earned almost $778.2 million, with resource owners (i.e., proprietors) *earning another $68.7 million. Other property income (e.g., payments for* natural resources and physical capital) was $296.2 million, with $74.1 million generated as indirect taxes. Of the $2.9 billion in sales, 42% ($1.2 billion) was value added in the study area.

Table B-3. Total Output, Employment, Value Added, and Value Added Components, for a Sample County, 2001.

Industry	Total Output ($M)	Employment (Jobs)	Employee Compensation ($M)	Proprietor Income ($M)	Other Property Income ($M)	Indirect Business Tax ($M)	Value Added ($M)
Agriculture	**152.5**	**2,058.0**	**13.3**	**12.0**	**10.2**	**3.2**	**38.7**
Mining	2.0	22.0	0.7	0.0	0.4	0.1	1.3
Construction	181.4	1,614.0	41.4	12.5	6.0	1.1	61.0
Manufacturing	453.5	2,508.0	103.8	2.9	32.0	4.6	143.3
TCPU*	1,382.0	6,131.0	359.4	12.7	94.8	11.9	478.7
Trade	246.4	5,602.0	95.6	11.5	31.2	30.8	169.2
FIRE**	230.8	1,346.0	19.6	7.8	110.8	20.6	158.8
Services	129.1	2,786.0	56.4	9.3	8.9	1.8	76.5
Government	109.1	2,925.0	87.9	0.0	1.9	0.0	89.9
Totals	2,886.8	**24,993.0**	**778.2**	**68.7**	**296.2**	**74.1**	**1,217.3**

*TCPU: Transportation, Communications, and Public Utilities
** FIRE: Finance, Insurance, and Real Estate

Appendix C
Aggregated Sectors Used in Analyses

For the analysis of the curtailment scenarios, the 528 sectors were aggregated into 28 industry groups. Various data were then estimated for these 28 aggregated sectors. Table C-1 lists the 28 industry aggregations for this analysis and gives a brief description of each industrial sector.

Table C-1. Basic Industry Aggregation Descriptions

Industry Sector	Aggregation Description
Other Crops	Oilseed, Grain, Tobacco, and Cotton Production
Nursery, Fruits, and Vegetables	Nursery, Vegetable, Melon, Fruit, and Greenhouse Production
Sugar Beets	Sugarcane and Sugarbeet Production
Hay and Silage	All Other Crop Production, (e.g., hay, silage, forages)
Cattle	Beef and Dairy Cattle Production
Poultry and Eggs	Poultry and Egg Production
Other Livestock	All Other Animal Production (e.g., aquaculture, horses, sheep)
Logging, Hunting, and Trapping	Logging, Forest Nurseries, Sawmills, Fishing, and Hunting
Ag Support Industries	General Support Industries (e.g., chemicals, etc.)
Mining	Copper, Other Metals, Sand, and Gravel Production
Private Power Supply	Power Generation and Supply
Construction	Residential, Farming, Commercial Building
Other Manufacturing	All Other Manufacturing Businesses
Other Food Manufacturing	All Other Food Manufacturing Businesses
Sugar Manufacturing	Sugar Manufacturing
Dairy Manufacturing	Manufacturing of Dairy-derived Foods
Meat Processing	Manufacturing of Carcasses and Animal Slaughtering
Seafood Processing/Packaging	Seafood Product Preparation and Packaging
Wholesale Trade	Wholesale Trade
Transportation	Air, Rail, Truck, etc. Transportation Businesses
Retail	Retail Trade
FIRE	Finance, Insurance, and Real Estate
Services	All Support Services (e.g., accounting, legal)
Households	Activities of Private Households
Federal Government	Federal Military and Nonmilitary Expenditures
State and Local Government	State and Local Government Activities
State and Local Utilities	State and Local Electric Utilities
Owner-Occupied Dwellings	Activities of Owner Occupied Households

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