Economic Impact

of

The Tree Fruit Industry

in

Washington State and the Northwest

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SUMMARY OF RESULTS

Tree Fruit Industry Economic Impact Results:

Impact Location	Estimated Total Output Impact	Total Income Impact
Washington Tree Fruit Industry		
Impact on United States	**$8.5 billion**	**$4,254,613,021**
Impact on Northwest Region (WA, OR, & ID)	**$6.5 billion**	**$3,288,632,945**
State of Washington	**$5.6 billion**	**$2,842,333,172**
Yakima Valley Region (FRD 4)	**$2.1 billion**	**$1,075,744,611**
North Central Region (FRD 3)	**$1.5 billion**	**$ 798,499,222**
Columbia Basin Region (FRD 5)	**$820 million**	**$ 409,606,035**
Other FRDs (1,2,6, & 7)	**$350 million**	**$ 178,890,063**
Oregon Tree Fruit Industry		
State of Oregon	**$630 million**	**$ 314,962,038**
Idaho Tree Fruit Industry		
State of Idaho	**$101 million**	**$ 50,448,898**

The Economic Impact of the Northwest and Washington Tree Fruit Industry

Project Evaluation

Introduction

While the concept of value from agricultural production is not new, it is frequently overlooked or misunderstood in today's industrially dominated world. The purpose of this presentation will be to highlight the impacts of the tree fruit industry in Washington State and the Northwest United States (Washington, Oregon, and Idaho).

Methodology

The basic method for this analysis is a disaggregated economic impact model developed by William Jensen and Hans Radtke for use in both the natural resource (fisheries and forest products) and the agricultural industries. The model utilizes input-output analysis (the United States Forest Service IMPLAN Model) to support its computations.

Input-output analysis is the name given to an analytical framework developed by the late Harvard Professor Wassily Leontief. For this important achievement he received the Nobel Prize in Economic Science in 1973. The term *inter-industry analysis* is also used to describe this form of economic modeling, because the primary goal of the input-output model is to analyze the interdependence of industries in an economy. Input-output models help economists understand how a particular region or economy functions based on measured relationships among the participants.

An input-output model approximates an economy (country, state, region, or county) by defining the economic relationships among economic sectors (sector meaning any homogeneous grouping of businesses, organizations, or industries such as the tree-fruit industry or the insurance industry). These economic relationships are expressed as dollar values or purchases or sales between specified economic sectors (these are called basic sectors). Depending upon the model, there can be from a few dozen to as many as several hundred sectors (the IMPLAN model uses 509 sectors).

Imports take money out of the region's economy. The basic sectors bring money into the regional economy. These exported dollars begin a multiplier process. A multiplier is characterized as a complex system of economic transactions that follow a sale of a good or service. They create a primary ripple (much like a drop of liquid when it splashes) by causing a direct impact on the purchases of effected suppliers. These same suppliers, in turn make purchases to meet these demands – another smaller ripple in the economy. This continues on for many cycles; and it is known as a multiplier effect. There are three sub-components to the multiplier effect:

*Direct Effect – the change in purchases due to the initial change in economic activity
*Indirect Effect – the change in the purchases of suppliers to these changes
*Induced Effect - the change in consumer spending changes by the changes in labor income resulting from the direct and indirect effects of the economic activity.

Each sector purchases goods and services from itself and/or from other sectors. Sectors will also sell goods and services both to themselves and to other sectors. The relationships among these many sectors are arrayed in a matrix format and an algebraic technique (matrix inversion) is used to calculate the direct and indirect impacts of change in sectors of the model. One of the resulting outputs measuring these impacts is called a "response coefficient." A response coefficient is the response of income to increases or decreases in output. Response coefficients and tree fruit industry operating detail provide the basis for the disaggregated modeling used in this evaluation.

Disaggregated impact models are effective assessment tools for evaluating the consequences of economic change. They not only evaluate the consequence of economic change they provide a detailed analysis of specific industry operations and a thorough evaluation of resulting economic impacts on the effected communities.

Note: Output or revenue (total sales) is a common reference in business statistics; and it is a favorite ploy of economic development or chamber of commerce representation. Many of these representations also overlook the diminishing effects of imports and out-of-state ownership. They reflect only gross economic activity; they do not convey economic efficiency or well-being (an example often used is the purchase of 100 shares of stock for $1,000 and the subsequent sale of that stock for $1,000 - total sales are$2,000, but *nothing exists in the form of income or benefit to the community*). A preferable measure of economic change in the community is represented by income. The results of the modeling used for this presentation will be expressed in income dollars.

A more detailed explanation of the input-output modeling process, with particular reference to the IMPLAN model, and disaggregated impact models (in this case, the Jensen-Radtke model) is provided in the three appendices to this presentation.

A Brief Overview of the Final Product

The impact modeling process first uses IMPLAN Professional, Version 2.0 (Minnesota IMPLAN Group, Inc., Stillwater, MN 55082) to generate the multipliers and income response coefficients. The IMPLAN model, in turn, requires updated location information and data for each specified geographic location (in this case 2001data sets – Minnesota IMPLAN Group, Inc.). These data sets are usually available about three years after the activity year. This is not a very significant problem because the actual change in coefficients from year-to-year is very modest. The income response coefficients determined for this impact assessment are very close to what might be expected from the 2002 data set when it becomes available next year.

The IMPLAN model discussed above generates coefficients used by the Jensen-Radtke impact assessment model. These coefficients when multiplied by tree fruit industry expenditures provide an estimate of the impact in income dollars for each dollar spent on each activity (such as labor, supplies, insurance, etc.) by business entities such as farms or packers/processors. The major question for this impact analysis is how will the tree fruit industry benefit the economies of the State of Washington and the Northwest? A further question is how significant is the impact of the Washington State tree fruit industry on the economy of the United States? This study is an attempt to answer these questions.

Modeling Information and Assumptions

Basic Assumptions

Economic impacts determined by input-output modeling are certainly not perfect: and the modeling process involves a number of underlying assumptions. In spite of these simplifying assumptions input output modeling does a good job in evaluating the economy and predicting impacts. The following are some of the simplifying assumptions used in the process:

*Industry production is a linear process. Changing output requires no economies or diseconomies of scale.
*Each industry creates one product. This assumes the total output of multi-product firms is allocated to the primary product produced by the firm or that the production of products can be separated.
*Each product is produced by a fixed and known process. All firms use the same process and there is no substitution of factor inputs (all technology is the same).
*Changes in price will affect the proportion of inputs used.
*There are no input constraints. The supply of inputs is infinite and perfectly elastic.
*There are no unused or underused local resources. Excess capacity in firms and labor is not taken into consideration.

Data Used in the Disaggregated Model

The disaggregated model has three operational data entry categories:

Commodity – This information was derived from state, industry contacts and internet sources. It represents an estimated average value per ton of each commodity category. See Exhibit 1.

Packer/Processor – This information was obtained from industry, various internet sites, and Robert Morris Associates (bank credit sources). Because the Census of Manufactures and most other sources are based upon very general category levels (all fruits and vegetables are combined), it was necessary to create average packer and processor data for the model. It should be noted that all commodities were treated as either fresh packed or processed (juice, canned, frozen, etc.). The reality is that many fresh tree fruits are sold at roadside stands or weekend markets. This is a significant distribution alternative and, if included would increase the final impact values. See Exhibit 2.

Grower/Rancher - Clark Seavert, Superintendent of the Oregon State University Mid-Columbia Agricultural Research and Extension Center, developed farm enterprise budgets that were converted to per acre costs (see Exhibit 3). The model uses 1000 acre farms as an average and farm budgets were based upon this size multiplied by the per acre cost estimates. The new 2002 USDA Census of Agriculture was used as the basis for the bearing acres in each location and these, in turn were converted to 1000 acres average farms (see Exhibit 4). The number of

farms shown in the census figures were not useful for this study because they include any farm with $1,000 or more in gross receipts and no useful operating data concerning farm budgets for agricultural sectors.

The use of *average* categories and operating data was necessitated by the limitations of detailed, available information. However, the data inputs were considered conservative as were the final impact values.

Other data entry items include IMPLAN developed coefficients, commodity production tonnage (see Exhibit 5), and the percentage distribution of consumer spending in each location.

Exhibit 1
Commodity Sales&Cost Data

	Initial Price of Commodity (per ton)	Yield	Mfr. Labor Cost	Direct Materials Cost	Overhead	Other	Sales Price of Commodity	Contribution Margin	C.M. %
Apples	398	1	50	40	70	30	700	112	16.00%
F. Bartlett Pears	344	1	74	61	61	43	690	107	15.51%
C. Bartlett Pears	344	1	166	218	21	36	925	140	15.14%
Winter Pears	308	1	74	61	61	43	650	103	15.85%
Cherries	1650	1	101	101	34	34	2275	355	15.60%
Peaches	818	1	51	41	71	30	1200	189	15.75%
Apricots	1120	1	51	41	71	30	1550	237	15.29%
Nectarines	818	1	51	41	71	30	1200	189	15.75%
Prunes/Plums	251	1	51	41	71	30	525	81	15.43%
Juice Culls	120	1	75	155	165	10	605	80	13.22%

Exhibit 2

Packer/Processor

Cost/Profit Data

	Estimated Sales	Admin Salaries	Maintenance & Repair	Utilities	Telephone	Insurance	Business & Property Taxes	Admin Supplies	Misc. Admin.	Interest Expense	Depreciation
Average Packer	20,000,000	1,200,000	40,000	40,000	30,000	80,000	40,000	25,000	50,000	20,000	240,000
Average Juice Mfr.	243,000,000	15,600,000	500,000	500,000	400,000	1,000,000	500,000	350,000	650,000	300,000	3,500,000
Average Processor	10,000,000	600,000	20,000	20,000	15,000	40,000	20,000	12,500	25,000	10,000	120,000

Exhibit 3

Budget for Average Farm (per acre x 1000)	per acre	per farm
Equipment Repair/Replace	163	163000
Fuel & Lube	163	163000
Supplies/Feed/Seed	61	61000
Fertilizer	107	107000
Spraying Services	468	468000
Misc. Production	120	120000
Labor Shares	1798	1798000
Insurance	47	47000
Utilities	40	40000
Interest Expense	71	71000
Business/Property taxes	48	48000
Depreciation	484	484000

Exhibit 4	**Total**			**Cherries**	**Cherries**			**Pears**	**Pears**	**Pears**	**Plums**	**# of Average**
Bearing Acres	**Acres**	**Apples**	**Apricots**	**Sweet**	**Tart**	**Nectarines**	**Peaches**	**All**	**Bartlett**	**Other**	**& Prunes**	**Farms**
2002 Census of Agriculture		(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres/1000)
Northwest States	258917	161768	1203	38359	2578	1319	4558	45900	16884	29016	3232	375
State of Washington	213475	152241	1066	26103	1742	1205	2931	27424	12040	15383	763	314
North Central(FRD 3)	63046	38939	334	8681	113	181	367	14364	3509	10857	67	103
Counties:												
Chelan	27253	12215	112	4823	32	27	127	9916	2295	7622	1	
Douglas	14064	10658	209	2063	80	70	145	838	319	519	1	
Okanogan	21729	16066	13	1795	1	84	95	3610	895	2716	65	
Yakima Valley(FRD 4)	82846	59366	513	10643	5	689	1606	9436	6855	2716	588	123
Counties:												
Benton	17389	12179	173	4061	3	113	211	562	415	148	87	
Kittitas	496	489	1	1	1	1	1	1	1	133	1	
Yakima	64961	46698	339	6581	1	575	1394	8873	6439	2435	500	
Columbia Basin (FRD 5)	51654	43144	3	5168	790	314	411	1820	763	671	4	60
Counties:												
Adams	2995	2766	1	118	0	1	1	107	1	1	1	
Franklin	11244	7885	1	1699	790	173	409	286	1	2	1	
Grant	37415	32493	1	3351	0	140	1	1427	761	668	2	
Other FRDs (FRD 1, 2, 6, & 7)	4619	1001	24	1595	41	7	397	1498	542	922	56	22
FRD#1	1104	872	2	24	30	1	7	128	19	203	40	
Clallum	105	93	0	2	1	0	0	8	1	1	1	
Grays Harbor	16	11	0	1	1	0	1	1	1	1	1	
Island	35	30	0	1	1	0	1	1	0	1	1	
Jefferson	22	18	0	1	1	0	0	1	1	1	1	
King	74	57	0	6	1	0	0	8	2	6	2	
Kitsap	26	18	1	1	1	0	1	3	1	2	1	
Lewis	62	41	0	4	1	0	0	12	1	11	4	
Mason	20	10	0	1	1	0	0	7	1	1	1	
Pacific	0	0	0	0	0	0	0	0	0	0	0	
Pierce	65	59	0	1	1	1	1	1	1	8	1	
San Juan	104	67	0	1	1	0	1	15	7	16	19	
Skagit	275	255	0	1	1	0	1	16	0	139	1	
Snohomish	127	57	1	1	17	0	0	50	1	6	1	
Thurston	38	32	0	1	1	0	0	4	1	1	0	
Whatcom	135	124	0	2	1	0	1	1	1	9	6	

Exhibit 4 - continued	**Total**			**Cherries**	**Cherries**			**Pears**	**Pears**	**Pears**	**Plums**	**# of Average**
Bearing Acres	**Acres**	**Apples**	**Apricots**	**Sweet**	**Tart**	**Nectarines**	**Peaches**	**All**	**Bartlett**	**Other**	**& Prunes**	**Farms**
2002 Census of Agriculture		(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	
FRD#2	2772	46	2	1120	4	1	262	1332	489	707	5	
Clark	95	29	1	5	3	0	28	26	21	6	3	
Cowlitz	19	15	0	1	0	0	1	1	1	1	1	
Klickitat	2409	1	1	1114	1	1	233	1058	360	698	0	
Skamania	247	1	0	0	0	0	0	246	107	1	0	
Wahkiakum	2	0	0	0	0	0	0	1	0	1	1	
FRD#6	289	20	13	103	3	2	106	34	26	9	8	
Ferry	5	1	1	1	0	0	1	1	1	1	0	
Lincoln	6	1	1	0	1	0	1	1	1	1	1	
Pend Oreille	2	1	0	0	0	0	0	1	0	1	0	
Spokane	175	10	10	86	1	1	47	15	13	5	5	
Stevens	101	7	1	16	1	1	57	16	11	1	2	
FRD#7	454	63	7	348	4	3	22	4	8	3	3	
Asotin	59	23	4	11	0	1	19	1	1	0	0	
Columbia	38	37	0	0	0	0	0	1	1	1	0	
Garfield	3	1	1	0	0	0	1	0	0	0	0	
Walla Walla	346	1	1	336	4	1	1	1	1	1	1	
Whitman	8	1	1	1	0	1	1	1	5	1	2	
State of Oregon	40350	6658	63	11675	831	64	813	18303	4701	13602	1943	40
Southern Oregon	6384	221	13	8	8	5	188	5922	795	5127	19	5
Counties:												
Jackson	6319	177	13	7	7	5	182	5911	788	5123	17	
Josephine	65	44	0	1	1	0	6	11	7	4	2	
Oregon Mid-Columbia	21257	1915	17	7561	3	2	43	11711	3520	8190	5	22
Counties:												
Hood River	14197	1515	0	1238	0	1	8	11433	3438	7995	2	14
Wasco	7060	400	17	6323	3	1	35	278	82	195	3	8
State of Idaho	5092	2869	74	581	5	50	814	173	143	31	526	7

Exhibit 5
Commodity Production
(in tons)

Location:	Apples	Bartlett Pears	Winter Pears	Cherries	Peaches	Apricots	Nectarines	Plums/Prunes	Juice Culls	Total Tonnage
Northwest States	2290000	216027	371000	119250	43200	5540	16500	14600	318500	3394617
State of Washington	2256500	158000	231000	87000	33000	4900	13000	5400	318500	3107300
North Central(FRD 3)	745000	44800	163600	25800	3600	1800	2000	200	0	986800
Yakima Valley(FRD 4)	791500	101000	49900	37600	20600	2100	7400	4700	318500	1333300
Columbia Basin (FRD 5)	472000	5600	6900	13900	6100	800	3400	300	0	509000
Other FRDs	148000	6600	10600	9700	2700	200	200	200	0	178200
State of Oregon	93500	58000	140000	30550	3700	0	3500	7200	0	336450
Southern Oregon	670	10672	53095	204	925	0	0	0	0	65566
Oregon Mid-Columbia	33571	45437	86370	19193	0	0	0	0	0	184571
Counties:										
Hood River	22400	44400	84210	3200	0	0	0	0	0	154210
Wasco	11200	1037	2160	16193	0	0	0	0	0	30590
State of Idaho	40000	27	0	1700	6500	640	0	2000	0	50867

Modeling Results

Background and Description of Project:

The Washington State tree fruit industry has long felt that its importance to the regional economy has been understated. In order to address the issue of relative economic significance, the Washington Tree Fruit Research Commission and the Washington Horticulture Association took the lead in defining and commissioning this study. It was further supported by the tree fruit industry of both Oregon and Idaho.

The objective of the study is to use accepted input-output methodology to determine the contribution of the tree fruit industry to the regional and national economies. It was further decided to evaluate the distribution of these benefits to various sectors of those economies.

Their very substantial dimensions dictate the need to evaluate the four major tree fruit producing regions of the State of Washington. Tree fruit reporting in Washington State is composed of four major regions – North Central (Wenatchee) Region – FRD 3, Yakima Valley Region – FRD 4, Columbia Basin Region – FRD5, and an All Other FRDs Region – FRDs 1,2,6,7. There are a total of seven fruit reporting districts (known as FRDs) in the state: FRD 3 (comprising Chelan, Douglas, and Okanogan counties), FRD 4 (comprising Kittitas and Yakima Counties), FRD 5 (comprising Adams, Franklin, and Grant counties), and FRDs 1,2,6,& 7 (comprising all other counties in the state).

Each of the arrays will display the following information for the impact location:

Direct and Indirect Purchases of Business Sectors Impacted by Activities
Total Household Income of Owners and Employees
Local Business Sectors Impacted by Household Expenditures
Total Economic Impact to the Region

Additionally, an array is provided of the distribution of local household spending as well as an estimate of household spending on goods and services from outside the region (imports). These imports from outside the region are an important consideration for economic development opportunities. The consumer spending array used in the United States array represents national averages (percentages). Those used in state and regional arrays provide a clear picture of differences which may exist. However, it should be pointed out that many of the goods and services depicted are supplemented by purchases from outside the region. These are grouped in the "other" category of the array. Purchases from outside the region (imports into the region) will vary dramatically from one location to another.

Finally, a rough estimate of the average annual employment supported by the tree fruit industry in the region is provided. This estimate is calculated by dividing an average annual income of $20,000 into the total income impact. Because of the range of wages and both full-time and part-time employment categories, it identifies only a relative magnitude rather than an accurate employment number.

Impact Results:

The following nine arrays (*Tree Fruit Industry Impact on the Northwest, Washington State Tree Fruit Industry Impact on the United States, Tree Fruit Industry Impact on the State of Washington, Tree Fruit Industry Impact on the North Central Region of Washington State, Tree Fruit Industry Impact on the Yakima Valley Region of Washington State, Tree Fruit Industry Impact on the Columbia Basin Region of Washington State, Tree Fruit Industry Impact on the region comprising of the Other Fruit Reporting Districts of Washington State, Tree Fruit Industry Impact of the State of Oregon. Tree Fruit Industry Impact on the State of Idaho*) have been prepared to address these requirements.

Washington State Tree Fruit Industry Impact on the Northwest

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 715,388,882
Total Household Income of Owners and Employees	1,486,456,105
Local Business Sectors Impacted by Household Expenditures	1,086,788,000
Total Economic Income Impact to Region	$3,288,632,945

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	11.53	$174,376,081
Retail Trade	mix	3.90	$58,982,369
Health Care	mix	15.40	$232,904,739
Eating & Drinking Places	481	4.48	$67,754,106
Food Processing	mix	3.97	$60,041,027
Wholesale Trade	mix	4.01	$60,645,974
Utilities	mix	2.13	$32,213,448
Insurance	428	1.45	$21,929,342
Personal Services	mix	2.21	$33,423,342
Communications	mix	1.63	$24,651,606
Transportation Services	mix	1.75	$26,466,448
Motor Vehicle Operation	mix	5.59	$84,541,396
Banking/Credit Services	mix	3.11	$47,034,658
State/Local Services	mix	1.09	$16,484,816
Petroleum Products	mix	0.60	$9,074,211
Education	mix	0.84	$12,703,895
Recreational Activities	mix	1.59	$24,046,658
Hotels & Lodging	479	0.69	$10,435,342
Investments	426	0.60	$9,074,211
Civic/Religious Assoc.	mix	0.84	$12,703,895
Fabrics/Apparel	mix	0.28	$4,234,632
Publications/Paper	mix	0.10	$1,512,368
Business/Labor Assoc.	mix	0.36	$5,444,526
Household Furnishings	mix	1.10	$16,636,053
Household Industry	494	0.17	$2,571,026
U.S. Postal Service	398	0.08	$1,209,895
Other	mix	2.05	$31,003,553
Non-Local Purchases	mix	28.14	$425,580,478
Total Purchases		100.00	$1,512,368,436

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 164,432
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Washington State Tree Fruit Industry Impact on the United States

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 800,715,606
Total Household Income of Owners and Employees	1,363,087,354
Local Business Sectors Impacted by Household Expenditures	2,090,750,061
Total Economic Income Impact to Region	$4,254,613,021

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	12.78	$284,798,399
Retail Trade	mix	4.14	$92,258,636
Health Care	mix	18.85	$420,066,496
Eating & Drinking Places	481	4.95	$110,309,239
Food Processing	mix	6.39	$142,399,199
Wholesale Trade	mix	4.06	$90,475,861
Utilities	mix	2.40	$53,483,267
Insurance	428	2.24	$49,917,716
Personal Services	mix	2.84	$63,288,533
Communications	mix	3.15	$70,196,788
Transportation Services	mix	2.47	$55,043,196
Motor Vehicle Operation	mix	7.38	$164,461,047
Banking/Credit Services	mix	5.08	$113,206,249
State/Local Services	mix	1.09	$24,290,317
Petroleum Products	mix	0.93	$20,724,766
Education	mix	1.74	$38,775,369
Recreational Activities	mix	2.21	$49,249,175
Hotels & Lodging	479	0.88	$19,610,531
Investments	426	1.03	$22,953,236
Civic/Religious Assoc.	mix	1.12	$24,958,858
Fabrics/Apparel	mix	0.73	$16,267,827
Publications/Paper	mix	0.66	$14,707,899
Business/Labor Assoc.	mix	0.45	$10,028,113
Household Furnishings	mix	1.51	$33,649,889
Household Industry	494	0.24	$5,348,327
U.S. Postal Service	398	0.11	$2,451,316
Other	mix	4.39	$97,829,810
Non-Local Purchases	mix	6.18	$137,719,414
Total Purchases		100.00	$2,228,469,475

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 212,731
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Washington Tree Fruit Industry Impact on State of Washington

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 611,855,842
Total Household Income of Owners and Employees	1,363,087,354
Local Business Sectors Impacted by Household Expenditures	867,389,976
Total Economic Income Impact to Region	$2,842,333,172

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	8.74	$113,436,905
Retail Trade	mix	3.85	$49,969,346
Health Care	mix	14.94	$193,907,021
Eating & Drinking Places	481	4.50	$58,405,729
Food Processing	mix	3.52	$45,686,259
Wholesale Trade	mix	3.72	$48,282,070
Utilities	mix	2.01	$26,087,892
Insurance	428	1.47	$19,079,205
Personal Services	mix	2.06	$26,736,845
Communications	mix	1.39	$18,040,881
Transportation Services	mix	1.61	$20,896,272
Motor Vehicle Operation	mix	5.35	$69,437,923
Banking/Credit Services	mix	3.10	$40,235,058
State/Local Services	mix	1.10	$14,276,956
Petroleum Products	mix	0.91	$11,810,936
Education	mix	0.96	$12,459,889
Recreational Activities	mix	1.59	$20,636,691
Hotels & Lodging	479	0.67	$8,695,964
Investments	426	0.62	$8,047,012
Civic/Religious Assoc.	mix	0.67	$8,695,964
Fabrics/Apparel	mix	0.28	$3,634,134
Publications/Paper	mix	0.08	$1,038,324
Business/Labor Assoc.	mix	0.36	$4,672,458
Household Furnishings	mix	1.05	$13,628,004
Household Industry	494	0.17	$2,206,439
U.S. Postal Service	398	0.08	$1,038,324
Other	mix	2.00	$25,958,102
Non-Local Purchases	mix	33.17	$430,515,120
Total Purchases		100.00	$1,297,905,096

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 142,117
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Tree Fruit Industry Impact on the North Central Region of Washington State

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$154,473,468
Total Household Income of Owners and Employees	444,297,553
Local Business Sectors Impacted by Household Expenditures	199,728,201
Total Economic Income Impact to Region	$798,499,222

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	8.02	$28,102,108
Retail Trade	mix	3.63	$12,719,533
Health Care	mix	14.69	$51,473,812
Eating & Drinking Places	481	4.40	$15,417,616
Food Processing	mix	2.17	$7,603,688
Wholesale Trade	mix	3.47	$12,158,892
Utilities	mix	2.02	$7,078,087
Insurance	428	0.55	$1,927,202
Personal Services	mix	1.64	$5,746,566
Communications	mix	0.72	$2,522,883
Transportation Services	mix	1.34	$4,695,365
Motor Vehicle Operation	mix	4.80	$16,819,217
Banking/Credit Services	mix	2.53	$8,865,129
State/Local Services	mix	1.06	$3,714,244
Petroleum Products	mix	0.00	$0
Education	mix	0.83	$2,908,323
Recreational Activities	mix	1.26	$4,415,044
Hotels & Lodging	479	0.61	$2,137,442
Investments	426	0.35	$1,226,401
Civic/Religious Assoc.	mix	0.35	$1,226,401
Fabrics/Apparel	mix	0.01	$35,040
Publications/Paper	mix	0.04	$140,160
Business/Labor Assoc.	mix	0.35	$1,226,401
Household Furnishings	mix	0.61	$2,137,442
Household Industry	494	0.22	$770,881
U.S. Postal Service	398	0.08	$280,320
Other	mix	1.26	$4,415,044
Non-Local Purchases	mix	43.00	$150,672,152
Total Purchases		100.00	$350,400,353

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 39,925
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Tree Fruit Industry Impact on the Yakima Valley Region of Washington State

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$240,780,684
Total Household Income of Owners and Employees	554,846,258
Local Business Sectors Impacted by Household Expenditures	280,117,669
Total Economic Income Impact to Region	$1,075,744,611

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	10.56	$49,202,305
Retail Trade	mix	3.44	$16,028,024
Health Care	mix	15.03	$70,029,417
Eating & Drinking Places	481	4.44	$20,687,333
Food Processing	mix	3.21	$14,956,382
Wholesale Trade	mix	2.43	$11,322,121
Utilities	mix	1.76	$8,200,384
Insurance	428	0.66	$3,075,144
Personal Services	mix	1.54	$7,175,336
Communications	mix	1.10	$5,125,240
Transportation Services	mix	0.77	$3,587,668
Motor Vehicle Operation	mix	4.89	$22,784,022
Banking/Credit Services	mix	2.44	$11,368,714
State/Local Services	mix	1.00	$4,659,309
Petroleum Products	mix	0.02	$93,186
Education	mix	0.86	$4,007,006
Recreational Activities	mix	1.07	$4,985,461
Hotels & Lodging	479	0.57	$2,655,806
Investments	426	0.35	$1,630,758
Civic/Religious Assoc.	mix	0.86	$4,007,006
Fabrics/Apparel	mix	0.02	$93,186
Publications/Paper	mix	0.03	$139,779
Business/Labor Assoc.	mix	0.35	$1,630,758
Household Furnishings	mix	0.75	$3,494,482
Household Industry	494	0.03	$139,779
U.S. Postal Service	398	0.06	$279,559
Other	mix	1.86	$8,666,315
Non-Local Purchases	mix	39.88	$185,813,250
Total Purchases		100.00	$465,930,919

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 53,787
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Tree Fruit Industry Impact on the Columbia Basin Region of Washington State

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 84,409,088
Total Household Income of Owners and Employees	229,717,195
Local Business Sectors Impacted by Household Expenditures	95,479,755
Total Economic Income Impact to Region	$409,606,038

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	9.44	$17,064,159
Retail Trade	mix	2.74	$4,952,945
Health Care	mix	11.85	$21,420,581
Eating & Drinking Places	481	4.42	$7,989,786
Food Processing	mix	3.26	$5,892,919
Wholesale Trade	mix	2.84	$5,133,709
Utilities	mix	1.48	$2,675,313
Insurance	428	0.24	$433,835
Personal Services	mix	1.18	$2,133,020
Communications	mix	0.46	$831,516
Transportation Services	mix	1.12	$2,024,561
Motor Vehicle Operation	mix	5.30	$9,580,513
Banking/Credit Services	mix	2.02	$3,651,441
State/Local Services	mix	0.85	$1,536,497
Petroleum Products	mix	0.00	$0
Education	mix	1.01	$1,825,720
Recreational Activities	mix	0.99	$1,789,568
Hotels & Lodging	479	0.59	$1,066,510
Investments	426	0.13	$234,994
Civic/Religious Assoc.	mix	0.29	$524,217
Fabrics/Apparel	mix	0.03	$54,229
Publications/Paper	mix	0.04	$72,306
Business/Labor Assoc.	mix	0.34	$614,599
Household Furnishings	mix	0.68	$1,229,198
Household Industry	494	0.11	$198,841
U.S. Postal Service	398	0.08	$144,612
Other	mix	1.34	$2,422,243
Non-Local Purchases	mix	47.18	$85,284,643
Total Purchases		100.00	$180,764,398

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 20,480
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Washington Tree Fruit Industry Impact on Other Fruit Reporting Districts of Washington State

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 36,676,283
Total Household Income of Owners and Employees	85,629,592
Local Business Sectors Impacted by Household Expenditures	56,584,188
Total Economic Income Impact to Region	$128,890,063

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	11.36	$9,280,918
Retail Trade	mix	3.80	$3,104,532
Health Care	mix	15.02	$12,271,073
Eating & Drinking Places	481	4.51	$3,684,590
Food Processing	mix	3.21	$2,622,513
Wholesale Trade	mix	3.71	$3,031,004
Utilities	mix	2.02	$1,650,304
Insurance	428	1.47	$1,200,964
Personal Services	mix	2.10	$1,715,663
Communications	mix	1.41	$1,151,945
Transportation Services	mix	1.62	$1,323,511
Motor Vehicle Operation	mix	5.35	$4,370,855
Banking/Credit Services	mix	3.10	$2,532,645
State/Local Services	mix	1.10	$898,680
Petroleum Products	mix	0.91	$743,454
Education	mix	0.98	$800,643
Recreational Activities	mix	1.59	$1,299,002
Hotels & Lodging	479	0.68	$555,548
Investments	426	0.62	$506,529
Civic/Religious Assoc.	mix	0.63	$514,699
Fabrics/Apparel	mix	0.32	$261,434
Publications/Paper	mix	0.08	$65,359
Business/Labor Assoc.	mix	0.36	$294,114
Household Furnishings	mix	1.06	$866,001
Household Industry	494	0.17	$138,887
U.S. Postal Service	398	0.09	$73,528
Other	mix	1.98	$1,617,625
Non-Local Purchases	mix	30.74	$25,114,033
Total Purchases		100.00	$81,698,221

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 8,945
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Oregon Tree Fruit Industry Impact on State of Oregon

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$ 70,942,252
Total Household Income of Owners and Employees	173,196,967
Local Business Sectors Impacted by Household Expenditures	70,822,819
Total Economic Income Impact to Region	$314,962,038

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	6.74	$11,530,092
Retail Trade	mix	2.28	$3,900,387
Health Care	mix	9.28	$15,875,260
Eating & Drinking Places	481	2.55	$4,362,275
Food Processing	mix	2.19	$3,746,424
Wholesale Trade	mix	2.39	$4,088,564
Utilities	mix	1.20	$2,052,835
Insurance	428	0.76	$1,300,129
Personal Services	mix	1.30	$2,223,905
Communications	mix	1.00	$1,710,696
Transportation Services	mix	0.85	$1,454,092
Motor Vehicle Operation	mix	3.29	$5,628,190
Banking/Credit Services	mix	1.79	$3,062,146
State/Local Services	mix	0.63	$1,077,739
Petroleum Products	mix	0.01	$17,107
Education	mix	0.75	$1,283,022
Recreational Activities	mix	0.81	$1,385,664
Hotels & Lodging	479	0.40	$684,278
Investments	426	0.35	$598,744
Civic/Religious Assoc.	mix	0.46	$786,920
Fabrics/Apparel	mix	0.18	$307,925
Publications/Paper	mix	0.05	$85,535
Business/Labor Assoc.	mix	0.11	$188,177
Household Furnishings	mix	0.65	$1,111,952
Household Industry	494	0.11	$188,177
U.S. Postal Service	398	0.04	$68,428
Other	mix	1.23	$2,104,156
Non-Local Purchases	mix	58.60	$100,246,792
Total Purchases		100.00	$171,069,611

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 15,748
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Idaho Tree Fruit Industry Impact on State of Idaho

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	$10,879,618
Total Household Income of Owners and Employees	25,034,994
Local Business Sectors Impacted by Household Expenditures	14,534,286
Total Economic Income Impact to Region	$50,448,898

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	11.52	$2,618,217
Retail Trade	mix	3.92	$890,921
Health Care	mix	14.37	$3,265,953
Eating & Drinking Places	481	4.44	$1,009,104
Food Processing	mix	3.33	$756,828
Wholesale Trade	mix	2.99	$679,555
Utilities	mix	1.37	$311,368
Insurance	428	0.96	$218,185
Personal Services	mix	1.86	$422,733
Communications	mix	1.49	$338,641
Transportation Services	mix	1.29	$293,186
Motor Vehicle Operation	mix	5.24	$1,190,925
Banking/Credit Services	mix	3.11	$706,828
State/Local Services	mix	1.02	$231,821
Petroleum Products	mix	0.02	$4,546
Education	mix	1.00	$227,276
Recreational Activities	mix	1.19	$270,458
Hotels & Lodging	479	0.65	$147,729
Investments	426	0.47	$106,820
Civic/Religious Assoc.	mix	0.23	$52,273
Fabrics/Apparel	mix	0.14	$31,819
Publications/Paper	mix	0.08	$18,182
Business/Labor Assoc.	mix	0.28	$63,637
Household Furnishings	mix	1.15	$261,367
Household Industry	494	0.17	$38,637
U.S. Postal Service	398	0.06	$13,637
Other	mix	1.60	$363,641
Non-Local Purchases	mix	36.05	$8,193,292
Total Purchases		100.00	$22,727,578

ESTIMATED AVERAGE ANNUAL EMPLOYMENT 2,522
(ASSUMES AVERAGE ANNUAL INCOME OF $20,000)

Final Observations

The hearty economic contribution of the tree fruit industry, particularly the tree fruit industry in the State of Washington, is seldom discussed in either the local press or in political circles. This is unfortunate because the contributions to regional income and regional business and employment are significant. The industry represents one and one-half percent of the total income of the State of Washington and one percent of the total northwest regional income. Additionally, it contributes a significant income benefit to the business sectors in each state and sub-region and to the employment base in these locations.

Exhibit 6 provides some highlights resulting from the study and its calculated impacts. The Northwest states are dominated by the tree fruit industry of the State of Washington. This includes total acreage, fruit bearing acreage, produced fruit tonnage, and the resulting farm gate values and the ex-plant fob sales values.

Apples clearly dominate the tree fruit impacts of Washington, Idaho, and the Northwest. However, pears are the dominant tree fruit for the State of Oregon. Exhibit 7 arrays total commodity values at both the farm gate and fob levels for all locations. This exhibit is graphically enhanced by the following included charts:

Chart 1 – Total Farm-Gate Values for Northwest States
Chart 2 – Farm-Gate Values for Northwest Tree Fruits
Chart 3 – Farm-Gate Values for Washington Tree Fruits
Chart 4 – Farm-Gate Values for Oregon Tree Fruits
Chart 5 – Farm gate values for Idaho Tree Fruits

Exhibit 6
Highlights of Economic Impact Study of Washington State and Northwest Tree fruit Industry

Income Impact Location	Total Tree Fruit Acres	Total Tree Fruit Bearing Acres	Total Fresh Tree Fruit Tonnage	Tree Fruit Farmgate Value	Income Derived from Tree Fruit Industry	% of Total Income Derived from Tree Fruit Industry
Northwest Region (WA, OR, ID)	300,426	258,917	3,394,617	$1,393,687,788	$3,288,632,945	1.0%
State of Washington	247,863	213,475	3,107,300	$1,249,828,400	$2,842,333,172	1.5%
Yakima Valley Region (FRD 4)	96,534	82,846	1,333,300	$491,825,900	$1,075,744,611	11.5%
North Central Region (FRD 3)	73,971	63,046	986,800	$411,527,000	$798,499,222	24.6%
Columbia Basin Region (FRD 5)	59,957	51,654	509,000	$223,584,900	$409,606,035	14.5%
Other FRD's (1,2,6,7)	16,865	4,619	178,200	$83,090,600	$178,890,063	0.1%
State of Oregon	46,419	40,350	336,450	$158,389,300	$314,962,038	0.3%
State of Idaho	6,144	5,092	50,867	$25,270,088	$50,448,898	0.2%

Exhibit 7

Commodity Value

(farmgate & fob sales)

Location:	Apples farmgate	Apples fob sales	Bartlett Pears (fresh) farmgate	Bartlett Pears (processed/packed) fob sales	Winter Pears farmgate	Winter Pears fob sales	Cherries farmgate	Cherries fob sales	Peaches farmgate	Peaches fob sales
Northwest States	911,420,000	1,603,000,000	74,313,288	162,020,250	114,268,000	241,150,000	196,762,500	271,293,750	35,337,600	51,840,000
State of Washington	898,087,000	1,579,550,000	54,352,000	118,500,000	71,148,000	150,150,000	143,550,000	197,925,000	26,994,000	39,600,000
North Central(FRD 3)	296,510,000	521,500,000	15,411,200	33,600,000	50,388,800	106,340,000	42,570,000	58,695,000	2,944,800	4,320,000
Yakima Valley(FRD 4)	315,017,000	554,050,000	34,744,000	75,750,000	15,369,200	32,435,000	62,040,000	85,540,000	16,850,800	24,720,000
Columbia Basin (FRD 5)	187,856,000	330,400,000	1,926,400	4,200,000	2,125,200	4,485,000	22,935,000	31,622,500	4,989,800	7,320,000
Other FRDs	58,904,000	103,600,000	2,270,400	4,950,000	3,264,800	6,890,000	16,005,000	22,067,500	2,208,600	3,240,000
State of Oregon	37,213,000	65,450,000	19,952,000	43,500,000	43,120,000	91,000,000	50,407,500	69,501,250	3,026,600	4,440,000
Southern Oregon	266,660	469,000	3,671,168	8,004,000	16,353,260	34,511,750	336,600	464,100	756,650	1,110,000
Oregon Mid-Columbia	13,361,258	23,499,700	15,630,328	34,077,750	26,601,960	56,140,500	31,668,450	43,664,075	0	0
State of Idaho	15,920,000	28,000,000	9,288	20,250	0	0	2,805,000	3,867,500	5,317,000	7,800,000

Exhibit 7 - continued

Commodity Value

(farmgate & fob sales)

Location:	Apricots farmgate	Apricots fob sales	Nectarines farmgate	Nectarines fob sales	Plums/Prunes farmgate	Plums/Prunes fob sales	Juice Culls farmgate	Juice Culls fob sales	Total farmgate	Total fob sales
Northwest States	6,204,800	8,587,000	13,497,000	19,800,000	3,664,600	7,665,000	38,220,000	192,692,500	1,393,687,788	2,558,048,500
State of Washington	5,488,000	7,595,000	10,634,000	15,600,000	1,355,400	2,835,000	38,220,000	192,692,500	1,249,828,400	2,304,447,500
North Central(FRD 3)	2,016,000	2,790,000	1,636,000	2,400,000	50,200	105,000	0	0	411,527,000	729,750,000
Yakima Valley(FRD 4)	2,352,000	3,255,000	6,053,200	8,880,000	1,179,700	2,467,500	38,220,000	192,692,500	491,825,900	979,790,000
Columbia Basin (FRD 5)	896,000	1,240,000	2,781,200	4,080,000	75,300	157,500	0	0	223,584,900	383,505,000
Other FRDs	224,000	310,000	163,600	240,000	50,200	105,000	0	0	83,090,600	141,402,500
State of Oregon	0	0	2,863,000	4,200,000	1,807,200	3,780,000	0	0	158,389,300	281,871,250
Southern Oregon	0	0	0	0	0	0	0	0	21,384,338	44,558,850
Oregon Mid-Columbia	0	0	0	0	0	0	0	0	87,261,996	157,382,025
State of Idaho	716,800	992,000	0	0	502,000	1,050,000	0	0	25,270,088	41,729,750

Chart 1 - Total Farmgate Values - Northwest States

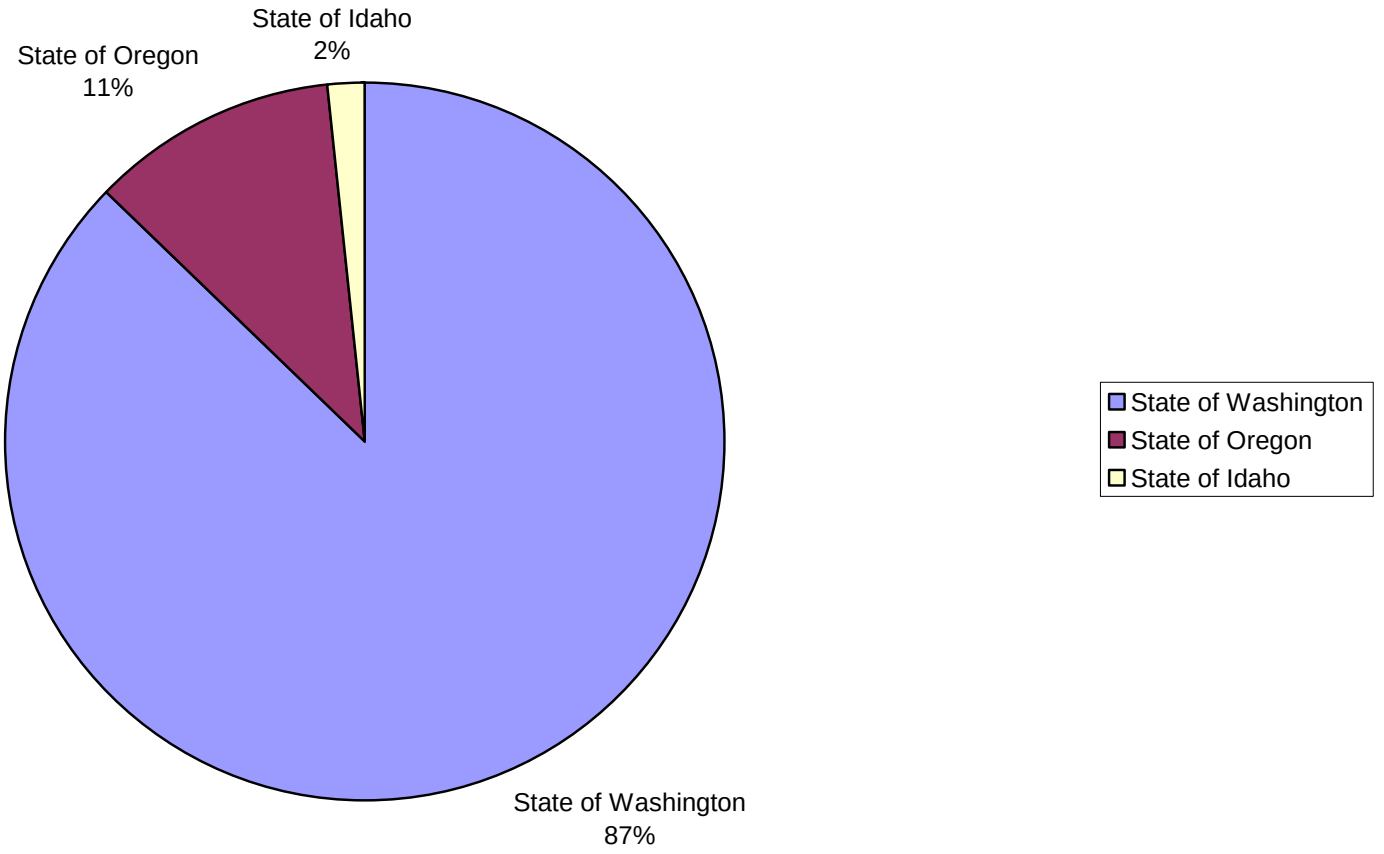


Chart 2 - Farmgate Values Northwest Tree Fruits

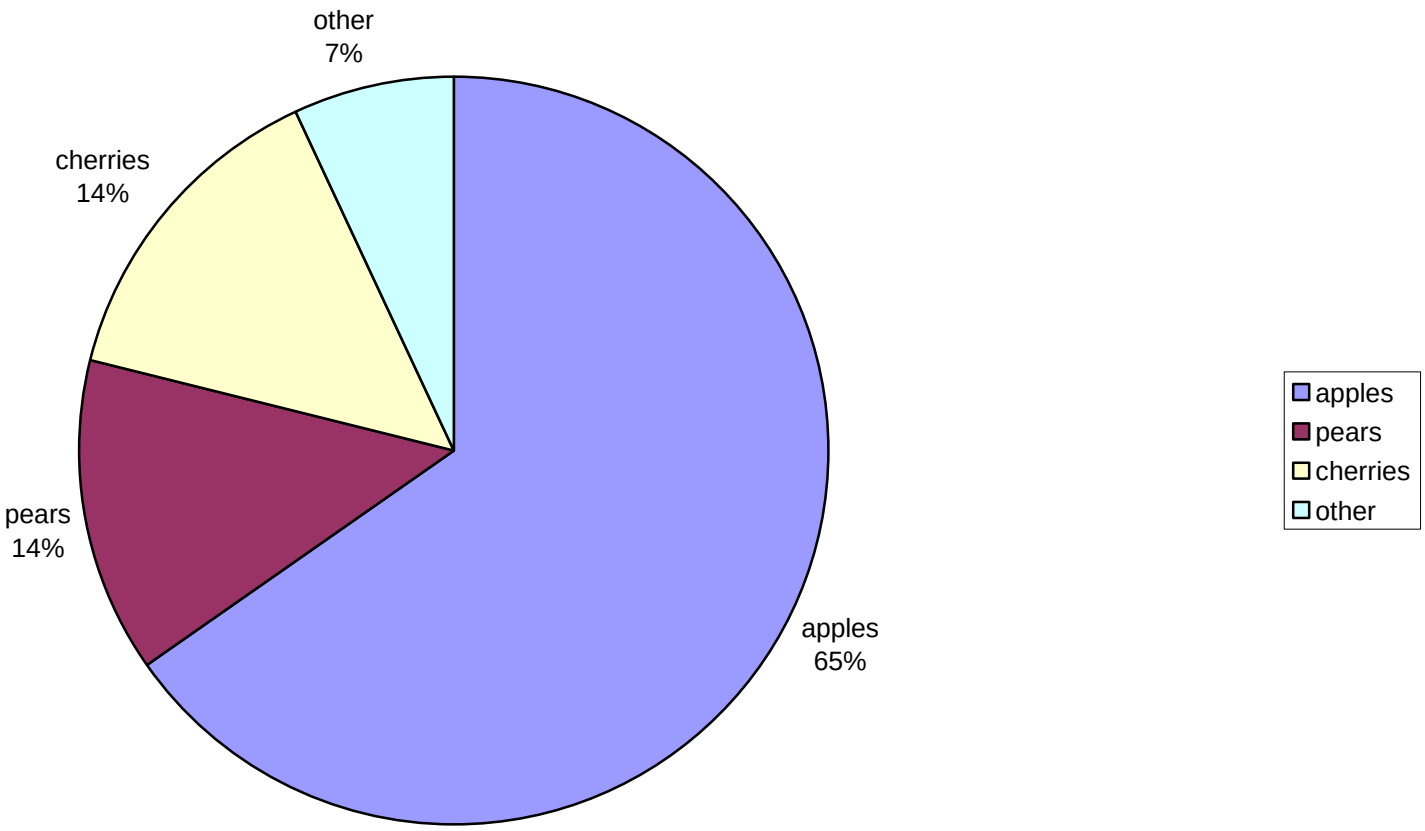


Chart 3 - Farmgate Values Washington Tree Fruits

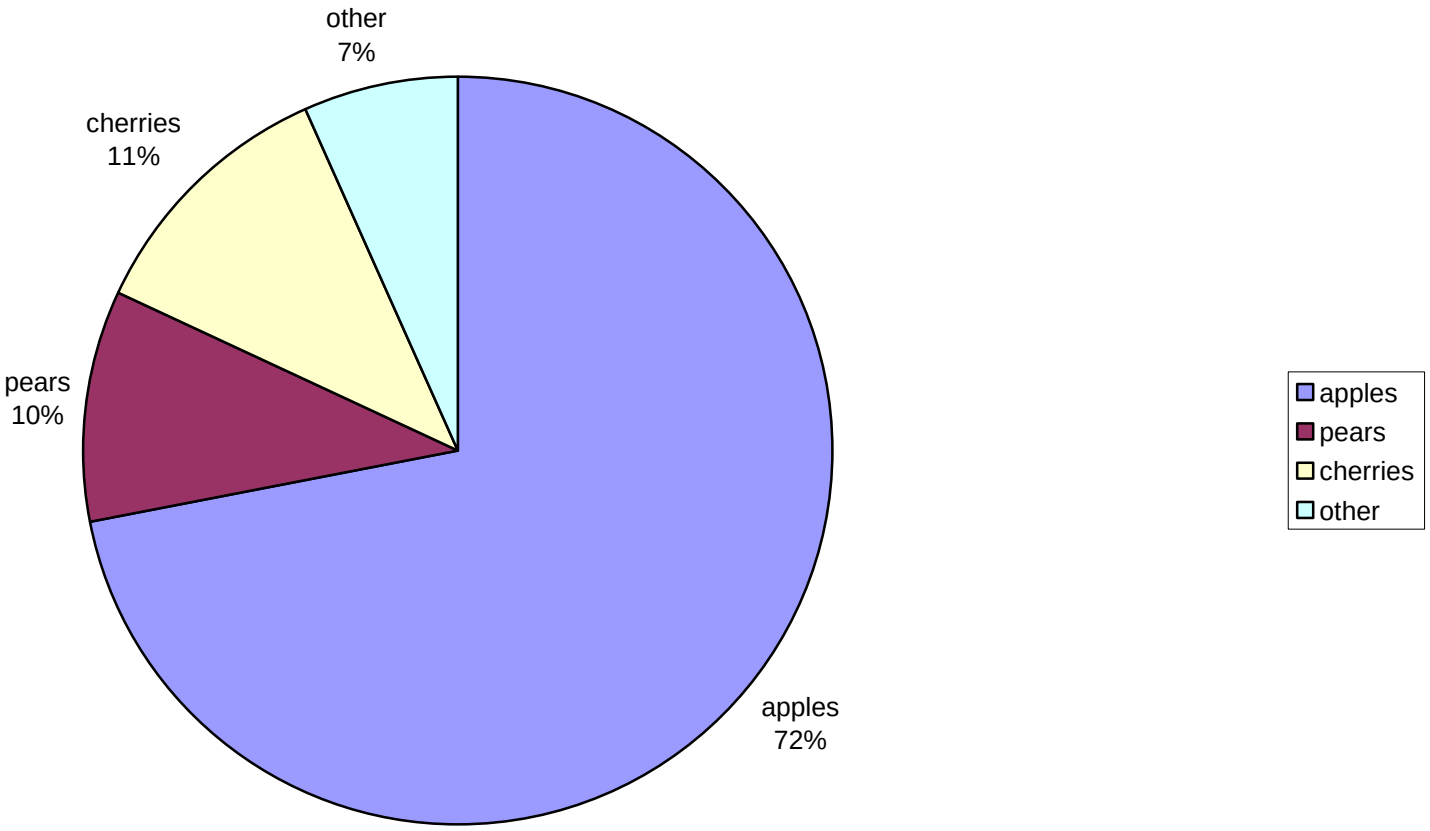


Chart 4 - Farmgate Values Oregon Tree Fruits

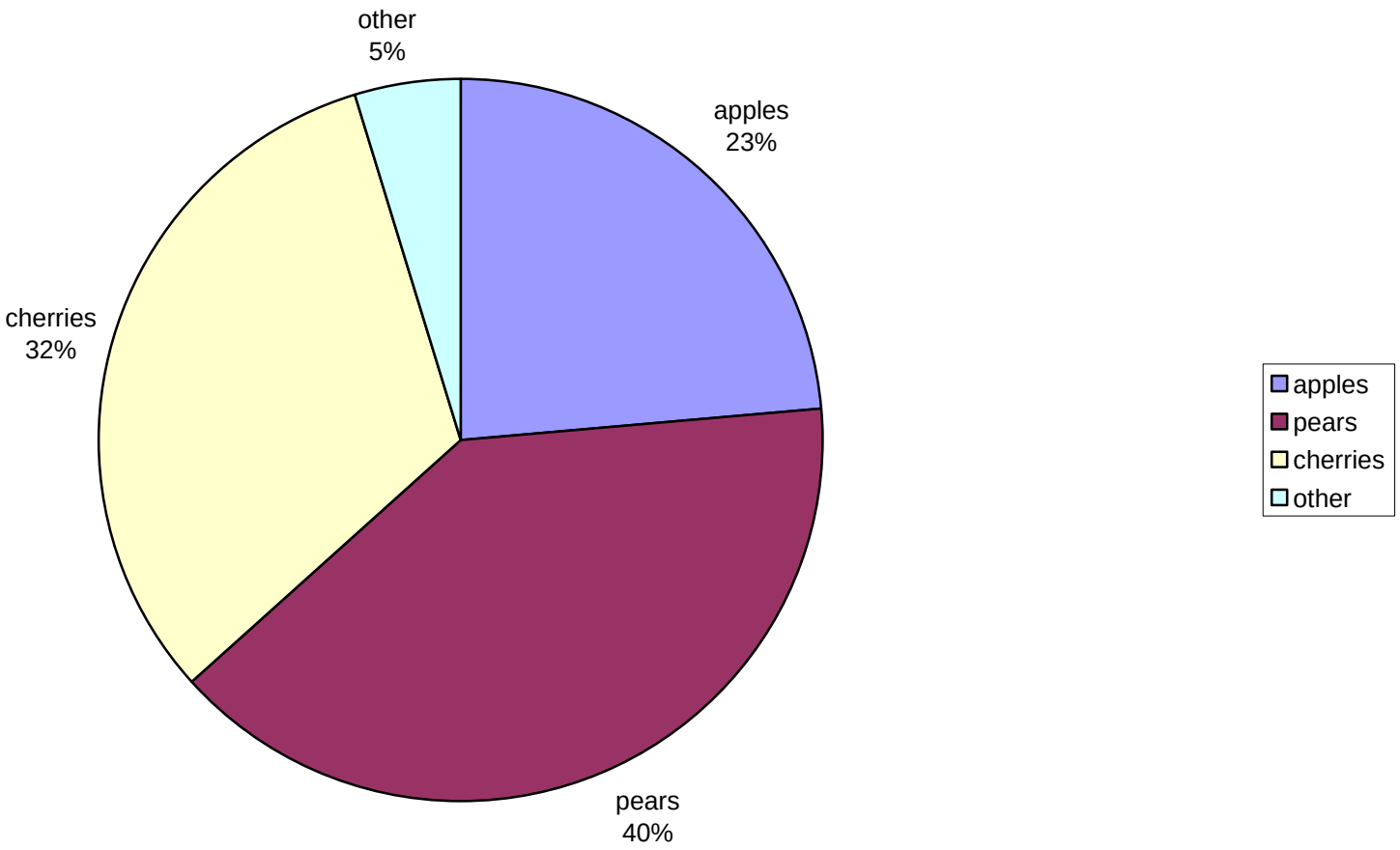
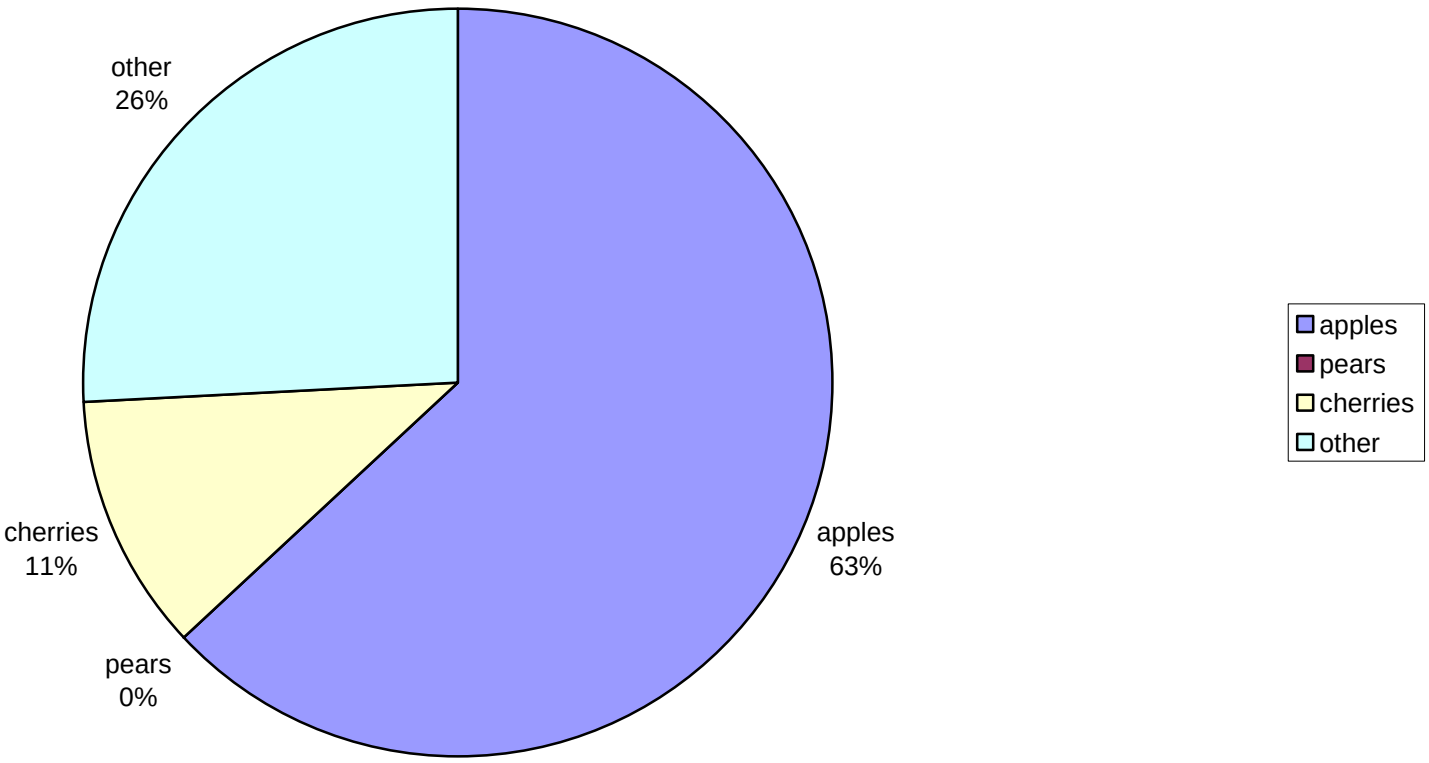


Chart 5 - Farmgate Values Idaho Tree Fruits



Appendix A

Economic Impact Analysis Using Input-Output Modeling

ECONOMIC IMPACT ANALYSIS USING INPUT-OUTPUT MODELING

I PURPOSE OF ECONOMIC IMPACT ANALYSIS

People who are interested in economic stability or economic development in communities often want to be able to estimate the impact of changes, or proposed changes, in these economies. Economic input/output models are useful to explain the inter-relationships between industries, and are often used to estimate the impact of resource changes, or to calculate the contributions of an industry to local economies.

In the Western states, Professor Philip Bourque of the University of Washington prepared a series of I/O studies that provided a rich source of information about the economy of Washington State. First, they showed a cross-sectional view of purchases and sales of goods and services among industries, thereby describing the prevailing industrial linkages or interdependencies among producers. Secondly, they supplied an estimate of the gross state product originating within each sector of the economy, and the disposition of final products of each industry among various end uses. These uses include exports to the rest of the nation and to foreign markets. Combined with measures of imports, estimates of the external trade balances of the region became available. Thirdly, the input/output accounts provided the basis for estimating the multiplier, or “ripple” effects, of changes in exports or other autonomous expenditures for the output of any given Washington industry upon other industries in the state. These various applications combined to contribute a better understanding of the economic structure of Washington State, improved assessments of economic impacts, better forecasting, and therefore progress in economic planning.

The data in these models are obtained directly from people in each of the economic sectors and are included in general economic information developed by various government agencies.

It takes time to ask people about their sales, purchases, to whom they sold, and from whom they purchased. I/O models can also be constructed using published data to estimate the level of local economic activity. One such widely accepted model is IMPLAN ("IMpact analysis for PLANning”), developed by the US Forest Service. This model was developed in response to the US Forest Service need to evaluate natural resource changes (in timber, grazing, recreation, etc.) on locally dependent communities.

The IMPLAN system can be used to construct county, or combined county-wide models for all US states. A comparison of economic impacts of changes in natural resource use between survey-based models and the IMPLAN models showed that both models may differ somewhat in final impacts, but IMPLAN provides a uniform method for estimating local income impacts for counties anywhere in the United States.

II REGIONAL ECONOMIC ANALYSIS AND “IMPLAN”

There are two components to the IMPLAN system: the database and the software (these are described in more detail in additional enclosures). The databases provide all the information needed to create regional IMPLAN models. The software performs the calculations and provides an interface to describe an economy, create alternative scenarios, and introduce resource changes. IMPLAN was originally developed by the USDA Forest Service, in cooperation with the Federal Emergency Management Agency and the USDI Bureau of Land Management, to assist the Forest Service in land and resource management planning. The system has now been privatized and is available to anyone. The IMPLAN accounts closely follow the accounting conventions used in the “Input-Output Study of the US Economy” by the Bureau of Economic Analysis (1980) and the rectangular format by the United Nations.

IMPLAN software is designed to serve three functions:

- data retrieval
- data reduction and model development
- impact analysis

Comprehensive and detailed data coverage of the entire US by county, and the ability to incorporate user-supplied data at each stage of the model building process, provides a high degree of flexibility both in terms of geographic coverage and model formulation. The IMPLAN database consists of two major parts:

- a national level technology matrix
- estimates of sectoral activity for final demand, final payments, industry output and employment for each county in the US.

The IMPLAN system is being used as a tool to describe local economies and industrial sectors in a state economy.

III STRUCTURE OF JENSEN-RADTKE IMPACT MODEL

The Jensen-Radtke model was first developed in 1982 as a technique to evaluate the impact of El Nino on the coastal fishing communities of the western United States. It was later used to evaluate tree fruit impacts in the Hood River Valley region of Oregon. It is a straight-forward spreadsheet based model which utilizes both IMPLAN multipliers and basic industry operating data.

The Jensen-Radtke model uses accounting models that evaluate and classify data by operating significance and by cost classification. These operating accounting models are created for a range of suppliers and processors. The data is transformed into cash flows and is then used to evaluate financial impacts upon farms, packer/processors, and dependent communities. The model can be used to measure the income and employment contribution of the relevant sector or to estimate the changes in management decisions and resource changes upon the principal participants and their communities.

The IMPLAN database consists of 21 economic and demographic variables at a 509 industrial level for all 3,000 counties in the Unites States. The variables include employment, value-added, government purchases, and household purchases by county. The data is built from the county level up, and the national level down. The primary source is employment and payroll data at the county level, adjusted for non-disclosure. The data is then “re-sectored” to match the IMPLAN sectoring scheme. Data from the National Income and Product Accounts is then added to form the national IMPLAN database. The national data is then allocated to states and counties by various means. Finally, the databases are written to formats that can be used by the IMPLAN software.

Industries in the West that mirror the national industries are well represented by the IMPLAN models. However, many resource=based industries (fishing agriculture, tourism) are not very well defined by national industries. This is especially true for industries that may not be “covered” by unemployment insurance. The analysts is then faced with three basic choices:

- Accept the industry as defined in the IMPLAN model, and use the coefficients and multipliers of the model to estimate impacts of use.
- Change purchases and sales of the sector of interest. This involves gathering specific information on the sector of interest and then introducing changes into the matrix, often a quite difficult task.
- Define the purchases (costs) of the industry being analyzed and introduce these as a change in final demand. The terminology is to do an “impact run”, and is especially useful when many different geographic areas are

being analyzed with the same basic changes of resource use (and therefore final demand).

The procedure was best outlined by Jay Sullivan in a U.S. Forest Service handbook:

> "Once the direct impact of an output is established, the sector(s) in which these impacts occur must be determined. In order that all sectoral linkages are accounted for, the direct impacts should be assigned to the sector that represents the point of final consumption for that output. The point of final consumption is the sector from which ultimate consumers purchase a product, or the sector beyond which the output is exported from a region. For example, the point of final consumption for an output of timber might be the New Construction sector, because the timber is used in the construction of a house that an ultimate consumer (home buyer) may purchase. If the timber is exported (out of the area) following processing at the sawmill, however, the point of final consumption is the Sawmills and Planing Mills sector. By identifying the final consumption point, the transactions of all industries involved in processing are considered."
>
> "In some cases, the ultimate consumer may purchase goods from a wholesaler or retailer. When this situation occurs, the market effect of a forest output is not allocated in full to the wholesale trade or retail trade sector. Instead, only the trade margin (mark-up) associated with each of these intermediate distributors is used to represent final demand in that sector. These margins are a measure of the distribution services offered by the wholesalers and retailers, and are obtained by subtracting the distributor's cost of goods from their sales revenues. The residual value of the good is allocated to the producing sector(s).

Sullivan goes on to explain how expenditures for activities such as recreation, which are not defined by sectors in the IMPLAN, may be allocated to sectors.

> "The literature contains various ways of categorizing recreation user expenditures. Generally, user expenditures are recorded for lodging, food purchased for off-premise consumption (groceries), purchased meals and beverages (restaurants), gas and oil, and other goods...The user expenditure may be allocated to industrial sectors according to the *Detailed Input-Output Commodity Composition of Personal Consumption Expenditures, 1972* (BEA, unpublished).
>
> "Occasionally, an....expenditure may be encumbered for which there is no comparable personal consumption category. The expenditure must then be allocated to the appropriate sector(s) according to the planner. The transportation and trade portions of that expenditure may be determined by using the margins presented for a similar personal consumption category."

Various discussions of the above procedure are covered in IMPLAN manuals under "Impact Considerations". The above discussion is included to allow the reader to better understand the challenges initially faced when IMPLAN was developed, and to understand the development of the Jensen-Radtke model. Basically, Jensen and Radtke were facing the same problem in 1982 that caused Sullivan and colleagues to disaggregate the standardized I/O models in order to estimate impacts of resource changes in sectors not very well defined in those models. The solution was to establish expenditure flows for sectors being analyzed, and then to introduce these expenditure flows as an "impact". The resulting impacts, if done by a described unit, could be multiplied by any sum of units to get an estimated total impact.

The disaggregated expenditure items relate to budgets that reflect purchase patterns of fishing boats.

These disaggregated expenditure impacts are used to estimate the impacts per defined unit for the supplying sector, and the processing sector (margined). The total

impacts that result from the Jensen-Radtke model include both supplier and processing components.

The structure of Jensen-Radtke model uses the IMPLAN model as a general description of a certain geographic area, and then includes additional detail relevant industry to estimate economic impacts of resource use in this industry.

IV INFORMATION NEEDED FOR THE JENSEN-RADTKE MODEL

The Jensen-Radtke model is a menu driven, improved “spreadsheet” that allows changes to be made in many of the key factors that effect the estimated amount of income that is generated in a location resulting from resource use. In most communities, primary processing of resources is required to prepare a product to be transported to markets. Distribution and retailing are not included, since the final consumption of a product (or substitutes) would take place in an area independent of the availability of the resources. The information needed to estimate the contribution of resources is taken from estimated supplies, prices, costs, yields, and distribution of expenditures. This section discusses the availability of such information.

A Supplier Costs and Processing Costs

In addition to the variable processing costs, firms need a certain support base (buildings, sales etc.) These costs have been derived from discussions with packer/processors and review of some available literature. Fixed processing costs have been estimated for small, medium, and large processors. Specialty plant costs have also been developed.

The amount of product each processor receives is dependent on the total number of processors estimated to be in the area in each size class, and the total number of units supplied in that area.

B Distribution of Resources

There are two decisions that an analyst has to make concerning distribution of revenue flows. One is the location of expenditures. This category was first added for rural areas in Alaska when it became clear that the IMPLAN model could not correct for all the purchases that were made *out of the area*. This estimate of purchases will override the supply/demand pooling of the IMPLAN model. This category (other than 100 percent for local) is used when there is a clear indication of outside sales.

The other estimate of distribution is among suppliers and manufacturers. This becomes an art, and depends on the best information available from published reports and data as well as from knowledgeable local participants and authorities. The Jensen-Radtke model includes the best estimates available for these categories. It is the responsibility of the analyst to review these and to relate these categories to the inventory of suppliers and manufacturers in the area.

C Location Inventory

Data systems such as USDA and state information sources can be used as an indication of how many participants are available and the volume of resources produced in the community. In addition, it is important to obtain supplementary information from knowledgeable local participants. The challenge is to then take this information and fit it to the model.

IV RESULTS FROM JENSEN-RADTKE MODEL

The results from the Jensen-Radtke model include a printout of total quantity by major commodities, the marginal contribution on a per unit basis, and an estimate of

total economic impacts of the resources that have been supplied and processed in the area. Also included is an estimate of the total number of resulting jobs.

The local sectors impacted by household expenditures are also estimated.

These disaggregated impacts allow the analyst to estimate a variety of the local businesses that may be impacted by resource production and price changes.

The model provides estimates that are in fixed proportions. Therefore, per unit estimates (given the same price and other factors) may be made for any quantity of crops harvested in that area.

The results of the model are a best guess of the flow of revenues, the expenditure patterns, and the definition of the rest of the economy.

Results should be viewed in a general sense to estimate the contribution of the industry in an area. If these models are to be used for management decisions on allocation or other criteria, all of the factors in the model should be reviewed.

Appendix B

Overview of Input-Output Analysis

OVERVIEW OF INPUT-OUTPUT ANALYSIS

This overview does **not** cover the theoretical aspects of Input-Output theory, techniques, planning, or analysis using Micro IMPLAN.

Micro IMPLAN ("IMpact analysis for PLANning") is a microcomputer program that constructs regional input-output (I-O) accounts and models. A model can be constructed for any region in the United States using companion data that are available by state and county, with the county being the smallest unit of measure. Micro IMPLAN (MI) does not, however, limit you to these data but allows the user to substitute primary data, a feature that greatly increases the program's flexibility. MI also allows you to create aggregate models that consist of industries grouped together for a specific purpose. At each stage of the model building process, reports can be generated which contain information about a region's market structure and industry interrelationships. Once you have constructed a regional I/O model, you can perform impact analysis with that model. New industries can be introduced, industries can be downsized or removed to see the impact on regional employment and income, and reports can be generated to show the consequences of various other economic changes. With Micro IMPLAN's impact analysis capabilities, you can create multiple scenarios for each model to simulate many possibilities. Finally, Micro IMPLAN includes its own file management utilities so that you can manipulate the many types of files that are created by MI, plus manage the input data files and data file directories.

The IMPLAN system has been in use since 1979 and has evolved from a mainframe, non-interactive application that ran in "batch" mode to a menu-driven microcomputer program that is completely interactive. The first release of Micro IMPLAN was in 1989.

A. Input-output analysis is a means of examining relationships within an economy both between businesses and between businesses and final consumers. It captures all monetary market transactions for consumption in a given time period. The resulting mathematical formulae allow one to examine the effects of a change in one or several economic activities on an entire economy (impact analysis). Wassily Leontief 1986

1. Primary input-output study is based on data collected directly from the source, i.e. industries. This is not very common because primary data collection is costly.

2. Secondary input-output studies rely on data collected form other sources to construct economic flows. Inter-industry transactions are taken from primary data discovered in other studies. IMPLAN is a secondary input-output modeling tool.

B. There are two phases of input-output analysis: descriptive modeling and prescriptive modeling

1. A descriptive model includes information about local economic interactions known as **Regional Economic Accounts**

a) Regional economic accounts describe the local economy in terms of the flow of dollars from purchasers to producers with the region

b) Trade flows are also included in the descriptive model describing the flow of goods and services between a region and the outside world. (regional imports and exports) Initial IMPLAN data sets include all imported goods and services, but when regional accounts are created this data is removed allowing the analysis of only those flows within the region being examined.

c) Social Accounting Matrices (SAM's) allow the inclusion of non-industrial transactions like the payment of taxes by businesses and households. SAM'
2. Regional economic accounts are then used to construct local level **multipliers**. These multipliers describe economic responses to changes in demand or production. The creation of these multipliers constitutes the prescriptive model.

a) Purchases for final use (final demand) drive input-output models. Industries producing goods for consumption purchase goods and services from other producers. These other producers also purchase goods and services for use in their production processes. Indirect purchases **(indirect effects)** continue until **leakages** (imports, wages, profits, etc.) stop the cycle.

b) Indirect effects and **induced effects** (effects of increased household spending) are mathematically derived as sets of multipliers. Derivation of these multipliers is called the

Leontief inverse. These multipliers reveal the change of output for each industry caused by a one-dollar change in final demand for any given industry.

C. T -Accounts. The analysis framework within I0 analysis is similar to a financial accounting framework. T -Accounts can be used to represent the accounting system used within I0. T-Accounts include receipts (income) and expenditures (expenses).

1. Institutions = consumers; households, schools, government agency, investment, or export

2. Profits balance expenditures with receipts, and like any accounting, receipts must balance with expenditures. This is a fundamental of I0 modeling. In a balanced set of accounts, all receipts must equal all expenditures.

D. Industry vs. Commodity

1. Industries consist of businesses producing goods and services. Commodities are the goods and services.

a) Confusion: industries derive their name from primary commodity they produce.

b) Industries also produce secondary commodities, or by- products.

2. IO data is collected on a commodity by industry basis because a commodity basis asks industries what they buy, not who they buy it from, which is an easier question to answer. This format follows the guidelines suggested by the U.S. Bureau of Economic Analysis as well as the United Nations.

E. I0 Accounting replaces the T-Accounts with several tables showing income and expenditures as the flow of goods and services in dollars:

1. Use table details the dollar value of goods and services purchased by each industry. Each column is a separate industry, the rows are the commodities and dollars are the units.

2. Value added table details payments made by each industry to workers, taxes, interest, profits, and other income; one column industry.

3. The make table gives the value of each commodity or service produced by each industry. Each industry can produce more than one category of goods and services. In this table a row is an industry and a column is a commodity and the units are dollars.

4. The final demand table consists of purchased goods and services for final consumption. Each row is a commodity, the columns are the final demand sectors and the units are dollars. 5. (6) SAM’s use an additional 3 tables

a) The absorption table is a coefficient form of the use table derived by dividing each element of the use table by the respective industry's total dollar output, showing the proportion of each commodity it uses. Each column is an industry's production function showing the proportion of commodities used to produce one dollars output.

b) The byproducts table is a coefficient form of the make table derived by dividing each element by the make table row totals, showing the percentage of an industry's total output each commodity (or byproduct) represents.

c) The market shares table is another coefficient from of the make table derived by dividing each make element by the make column (commodity) total, showing the percentage of the total production of a commodity is produced by each industry.

F. Trade Flows describe the movement of goods and services between a region and the outside world (regional imports and exports). IMPLAN will allow the use of three different assumptions to characterize the nature of these flows.

1. **Regional Purchase Coefficients (RPC's)** represent the proportions of local demand purchased from local producers. For example, an RPC of 0.25 for a given commodity means that for each $1 of local need for that commodity, 25% will be purchased from local producers. IMPLAN generates RPC's automatically with a set of econometrically based set of equations. By default all industries/institutions are treated equally with each taking an equal proportion of its needs from local sources based on that

RPC. You can use these generated RPC's, assign your own RPC's equally or assign specific RPC values to specific users of a given commodity.

2. **Supply/Demand Pooling** assumes that local demand will buy as much locally as possible and all local need, which can possibly be met by local producers, will be. Since this strategy minimizes imports, it will maximize local economic activity. The percent of local usage is based on physical capacity for the region. The total commodity supply is divided by the demand. If the ratio is .8 then 80% of local needs will be met by local demand. If supply is greater than demand, the remainder is exported.

3. **Location Quotients (LQ's)** are based on commodity output. The Location quotient equation is a fixed equation. It is based on comparing the rations of local production to national production ratios and is constrained to be less than or equal to one:

a) $LQ_j = (Region_i/Region_{sum})/(US_j/US_{sum})$ where:

b) $Region_j$ = the region's production of commodity I.

c) $Region_{sum}$ = the region's total production of all commodities.

d) US_i= the U.S.'s production of commodity I.

e) US_{sum} = the U.S.'s total production of all commodities

G. I0 models are driven by final consumption. Industries respond to meet demands directly or indirectly. Each industry that produces goods and services generates demands for other goods and services and so on, round by round. The iterations are described as multipliers.

1. There are three different types, Type I, II, and III, of multipliers used in predictive modeling. Starting with the transactions table, we derive a coefficient matrix by dividing each industry column element by the column total. This coefficient matrix is called the A Matrix.

2. The columns in **A** are the **production functions** which shows the where an industry spends and in what proportions to generate each dollar of output.

3. Through algebraic manipulation of A the multipliers are derived. The resulting equation is the **predictive model:**

a) $\mathbf{X = (I-A)^{-1}*Y}$ where:

b) **X** = total industry output

c) **I** = the identity matrix

d) **A** = A Matrix

e) **Y** = Final demand

4. This can also be interpreted as $\Delta X = (I-A)^{-1} * \Delta Y$, or the change in total industry output = $(I-A)^{-1}$*the change in final demand. $(I-A)^{-1}$ is the matrix of multipliers and is also known as the **Leontief Inverse.**

5. These multipliers break down economic effects down to three components

a) **Direct effects** are the changes in the industries to whom a final demand change was made.

b) **Indirect effects** are the changes in inter-industry purchases as they respond to the new demands of the directly affected industries.

c) **Induced effects** reflect changes in spending from households as income/population increases or decreases due to changes in production.

6. **Type I multipliers** measure the direct and indirect effects of a change in economic activity. It captures the inter-industry effects only.

7. **Type II multipliers** capture direct and indirect effects. In addition to the inter-industry effects, the Type II also takes into account the income and expenditures of households. The household income and the household expenditures are treated as industries. This internalizes the household sector, including the induced, or household spending, effects

8. **Type III multipliers** use an employment-based calculation of induced affects. It assumes full employment and, therefore, each job adds or subtracts population with the associated average expenditures per person.

H. IO modeling is based on several key assumptions:

1. **Constant returns to scale.** All production functions are linear

2. **No supply constraints.** All industries have unlimited access to raw materials.

3 **Fixed commodity input structure.** This implies that input price changes will not cause industries to substitute other inputs. Instead industries will change output in response to input price changes.

4. **Homogenous sector output.** The proportions of all the products produced by an industry remain the same regardless of total output. An industry will not increase the output of one product without proportionally increasing the output of all of the other products it produces.

5. **Industry technology assumption.** It assumes that all products made by the industry are created with the same technology. In other words, an industry has one primary product and all other products are by-products of that production process.

Appendix C

IMPLAN Database – An Overview

IMPLAN DATABASE – AN OVERVIEW

Background

The current(1998)IMPLAN database was constructed by the Minnesota IMPLAN Group, Inc. Prior to that it was the responsibility of the University of Minnesota,

The IMPLAN database consists of 21 economic and demographic variables at a 509 industrial sector level for all 3,000 counties 50 states in the United States. The variables include employment, value-added, government purchases, and household purchases by county and by state. As might be expected, many of the components must be estimated through the use at data from 30 to 440 different sources. All of the data is from state and Federal government sources.

The data is built from the county level up, and the national level down. First, employment and payroll data at the county level is adjusted for non-disclosure. Next, data is re-sectored to match the IMPLAN sectoring scheme. Then, data is taken from the *National Income and Product Accounts* to form the national IMPLAN database. When that task has been completed, the national data is then allocated to counties and states by various means. Finally, the databases are written to formats that can be used by the IMPLAN software.

Database Overview

The components of the IMPLAN database are part of the social accounts of the regions. Social accounts show the flows of commodities to industry from producers and institutional consumers. Also shown is the consumption of factors of production (workers, owners of capital, and imports from outside the region).

The IMPLAN database and software provides the information and capability to estimate a complete set of social accounts for a local area. This set of social accounts *is* then converted to the industry-by-industry formulation of input/output accounts and ultimately the predictive Leontief multipliers and response coefficients.

Data Summary

There are three different levels of data: National, state, and county. Data availability differs with the level. The
National level is the highest, and the data for each IMPLAN component is available. State level data is the next highest level. Some, though not all, data is available at the state level. The lowest level is the county data. Employment, employee compensation, proprietary income, population, and federal purchases data are available at the county level. Other county data is estimated.

There are five main components of the IMPLAN database. They are:

1. Employment
2. Value Added
3. Output
4. Final Demands
5. Structural Matrices

Employment is total wage and salary and self employed Jobs in a region. In the 1985 database, employment was measured as full- time equivalent jobs. This meant that total employment in a region would generally be below most published estimates since these are generally full-time and part-time. In the 1998 *and later* databases, employment includes both full-time and part-time workers. Employment in these later databases is measured in total jobs. This change was made to avoid the problems of applying national full time equivalent (FTE) ratios to data that varies

substantially from region to region. The change also ensures that IMPLAN employment estimates are closer to published estimates.

Value Added There arc four sub-components for Value Added. They are:

1. Employee Compensation
2. Proprietary Income
3. Other Property Type Income
4. Indirect Business Taxes

Employee compensation is wage and salary payments as well as benefits including health and life insurance, retirement payments, and any other non-cash compensation. This provides a measure of income to workers who are paid by employers.

Proprietary income consists of payments received by self- employed individuals as income. This would be recorded on Federal Tax Form 1040C. This includes income received by private business owners, doctors, lawyers, and so forth. Any income a person receives for payment of self-employed work is counted here.

Other property type income consists of payments from rents, royalties, and dividends. This includes payments to individuals in the form of rents received on property, royalties from contracts, and dividends paid by corporations. This also includes corporate profits earned by corporations.

Indirect business taxes consist primarily of excise and sales taxes paid by individuals to businesses (sales and excise taxes) . These taxes occur during the normal operation of these businesses but do not include taxes on profit or income.

Output is estimated from available data. This includes both total industry and commodity output.

Final Demands are goods and services purchased for their ultimate use by an end user. For a region this would include
exports as that is the final use for that product. In an input-output framework, final demands are allocated to producing industries with margins allocated to the service sectors (transportation, wholesale and retail trade, insurance) associated with providing that good to the final user. Thus final demands are in producer prices. All final demands in the original data are on a commodity basis. The dist1nct1on between industries and commodities is as follows from the 1972 I-0 Definitions and Conventions Manual:

> *An input-output industry is a grouping of establishments, as classified by SIC.
>
> *An input-output commodity consists of the characteristic products of the corresponding 1-0 industry wherever made.

There are several industries that have no commodities. This a result of the departures from the strict SIC classification of industries. Also some commodities have no associated industry. An example of this is non-comparab1e imports. There are 12 sub-components for final demands. They are:

1. Personal Consumption Expenditures (PCE) -three levels
2- Federal Government Military Purchases
3. Federal Government Non-Military Purchases
4. State and local Government Non-Education Purchases
5. State and Local Government Education Purchases
6. Commodity Credit Corporation
7. Inventory Purchases
8. Capital Formation
9. Foreign Exports
10. State & Local Government Sales
11. Federal Government Sales

12. Inventory Sales

Personal consumption expenditures (PCE) consist of payments by individuals/households to industries for goods and services used for personal consumption. Individuals tend to buy little directly from industries other than retail trade. However, in an input-output table, purchases made by individuals for final consumption arc shown as payments made directly to the industry producing the good (as a result, any data used in the database development that is in purchaser prices needs to be allocated to the producing industries - these allocators are called *margins).* PCE is the largest component of final demand.

Federal Government purchases are divided between military and non-military uses. Federal military purchases are those made to support the national defense. Goods range from food for troops to missile launchers. Non-military purchases arc made to supply all other government functions. Payments to other governmental units are transfers and are not included in Federal Government purchases.

State and local government purchases are divided between public education and non-education. Public education purchases are for elementary, high school, and higher education. Non-education purchases are for all other government activities. These include state government operations and operations including police protection and sanitation. Private sector education purchasers are not included here (private education purchases show up as intermediate purchases for TMPLAN sectors 49S and 496).

Commodity Credit purchases are made by Commodity Credit to producers of agricultural commodities as part of national agricultural support programs. These commodities are stored until sold on the open market.

Inventory purchases are made when industries do not sell all output created in one year. This is generally the case. Each year a portion of inventory goes to inventory. Inventory purchases and sales generally involve goods producing industries (e.g. agriculture, mining, and manufacturing).

Capital formation IS expenditures made to obtain capital equipment. The dollar values in the IMPLAN database are the expenditures made to an industrial sector producing the capital equipment. The values arc not expenditures by the industrial sector.

Foreign Exports are demands made to industries for goods that are exported beyond national borders. These represent goods and services demanded by foreign parties. Domestic exports are calculated during the IMPLAN model creation and are not part of the database..

State *and local government sales* were obtained from the l998 Annual Survey of Data for State and Local Government. Purchases and Sales: Finance Data Series (as were purchases above).

Federal Government sales were estimated using National Income and Product Accounts (NIPA) control totals and the 1982 I/O distribution. The exception to this is Federal timber sales which was determined from Forest Service data.

Inventory Sales occur when industries sell more than they produce and deplete inventory.

Structural Matrices make up the last main component of the (IMPLAN database. As a starting point to forming the 1998 and subsequent national **transactions matrices**, the National Bureau of Economic Analysis 1982 Benchmark Input-Output model (this is also referred to as the" technical coefficient matrix or direct requirements matrix) was price adjusted to these matrices. It was then re-sectored into the IMPLAN sectoring format. The rows and columns of the transactions matrix were summed to

obtain the Intermediate Industry and Commodity Output. The national data was collected to form the new Final Demands and Value-Added. Next, Total Industry and Commodity Output were estimated. The difference between the Total Industry Output and Total Value-Added is the new Intermediate Industry Output. The difference between Total Commodity Output and Total Final Demands is the new Intermediate Commodity Output. Adjustments were made to Final Demands and Value-Added to ensure that the new Intermediate Outputs were consistent with the 1982 1/0 model. The new Intermediate Output row and column was the basis for the Ratio Allocation System the RAS is a system used to re-balance matrices) of the 1982 Transactions Matrix to form the 1998 and Subsequent Transactions Matrices.

Finally, the data and matrices are written to a format that the IMPLAN software can use.

Industrial Sectoring Schemes

Sectoring Schemes arc ways to classify data. In general, an industrial classification scheme allows data to be classified according to the type of products or service produced.

All data used in IMPLAN has its origins in a report or survey of a single establishment. An establishment may be a single business, or it may be one location of a multi-location firm. Each establishment is counted separately on the unemployment or Social Security rolls. The establishment either submits an unemployment report or responds to a census or a survey and is counted by the data collection agency. That agency assigns the establishment a code depending on the primary type of product produced by that establishment.

Standard Industrial Classification Codes:

The most common scheme was the government's 4-diqit Standard Industrial Classification (SIC} scheme as described in the 1987 Standard Industrial Classification manual published by the Office of Management and Budget. The scheme has 4 levels of detail using numbers to refer to the level of detai1 with 1-digit detail as the most aggregated (and 4-digit detail the least aggregated. There are 5 and 7 digit commodity codes (they are not, however, useful for this modeling purpose).

Starting with the 2001 IMPLAN data, there is a new sectoring scheme. It is NAICS North American Industry Classification System) based and has 509 sectors (as opposed to the previous 528 sectors). It very closely follows the BEA Benchmark Study for the United States sectoring. Beginning in 1997, the Standard Industrial Classification (SIC) was replaced by the North American Industry Classification System. This six-digit code is a major revision that not only provides for newer industries, but also reorganizes the categories on a production and process-oriented basis. This new, uniform, industry-wide classification system has been designed as the index for statistical reporting of all activities of the United States, Canada, and Mexico.

Regional Economic Information Sectoring:

The other major data set used in the IMPLAN database is from the Regional Economic Information System {REIS} Their sectoring scheme is a modified 2-digit SIC code system. The modifications are found in the agricultural and government sectors.

Bureau of Labor Statistics 224 Sectoring:

Data from the Bureau of Labor Statistics (BLS} was used for deflators and some output estimates.