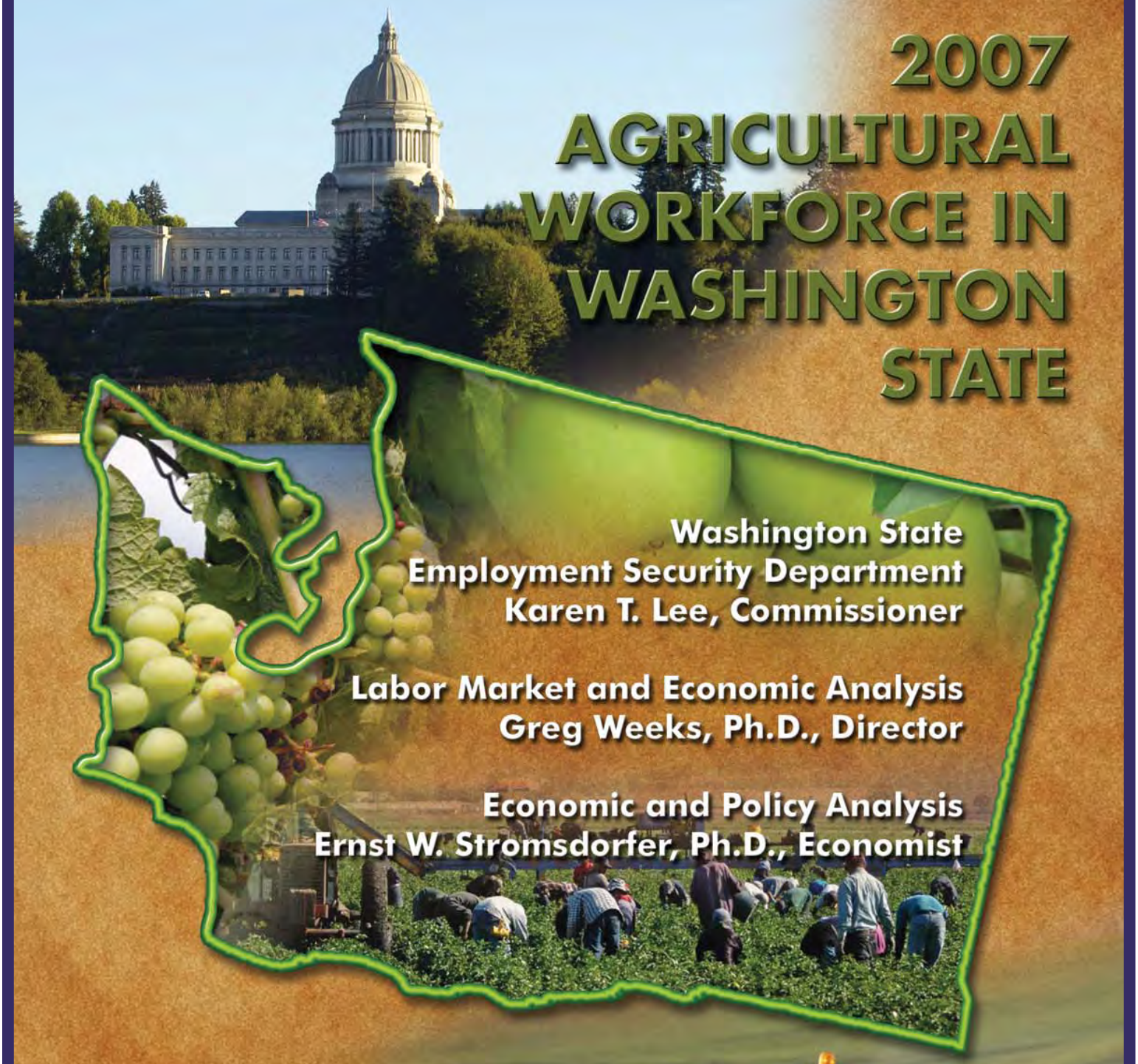
2007 AGRICULTURAL WORKFORCE IN WASHINGTON STATE



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Ernst W. Stromsdorfer, Ph.D., Economist

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Foreword

The Employment Security Department (ESD) collects data on agricultural employment, wage rates, and earnings to assist Washington's agricultural industry in the recruitment of farm workers and in industry management. Over the seasons, it is important to estimate the number of workers needed across the agricultural regions of the state. Reliable estimates of the wage rates paid to these workers for different jobs are crucial. Also, it is important to understand how the industry evolves and responds to economic and weather challenges yearly and over time.

A major source of agricultural farm labor data is the Employment Security Department's Unemployment Insurance (UI) tax records. Since 1990, the data compiled from the UI tax records include virtually all hired agricultural employment and wages paid. These highly reliable data are essential to measure the impact of agriculture on the state and local agricultural regions. Complementing this data source is the Quarterly Census of Employment and Wages (QCEW).

However, the UI tax records and the QCEW do not include information on employment in specific activities such as apple tree pruning as well as the corresponding wage rates for these activities. To obtain these data, the ESD conducts a monthly survey – the Agricultural Labor Employment and Wage Trends survey – in which approximately 600 growers participate. This survey estimates the number of seasonal employees working in specific jobs each month, such as cherry pruning in southeastern Washington, as well as their corresponding wage rates.

The next primary source for the data contained in this report is the yearly Washington Annual Agriculture Bulletin and supporting data from the national website of the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) – a very comprehensive information source.

The final primary source of data is from the various growers' associations, such as the Northwest Cherry Growers and the U.S. Apple Association.

It is important to note that final, official, or even preliminary data are not always available for the 2007 calendar or fiscal year. In such a case, typically data for 2005 or 2006 are the latest figures available. This is the case in particular for the Washington Annual Agriculture Bulletin, compiled and published by the Washington Field Office of the USDA National Agricultural Statistics Service. Production data for 2007 will not be available until August 2008.

Taken as a whole, these data can assist agricultural employers in assessing their labor requirements. These data can also assist economists and policy makers in estimating the impact of seasonal farm work and agricultural labor in general, on Washington's economy. Finally, for state and local officials and social service agencies, these data can provide a basis for estimating the impact of the farm worker population on their existing and proposed programs and facilities.

The State of the Agricultural Economy in Washington

Introduction

This chapter reviews the economic performance of the agricultural sector in Washington state and sets forth the sector's role in the overall economy of the state. The production data in this chapter are for 2006, and thus lag by one year the employment and wage rate data in this report. Even so, the 2006 production data still help to establish the context in which to analyze the agricultural workforce during the 2007 agricultural production cycle.[1]

The Total Value of Production for 2006

For calendar year 2006, the total value of agricultural production in current dollars was $6,669,845,000. This represents 2.3 percent[2] of state gross domestic product (GDP) for 2006 which was estimated to be $293,531,000,000.[3, 4]

Viewing *Figure 1* and using 2006 as the base of comparison, since 1997 total state agricultural output increased by 24.7 percent in constant dollar terms. Over the same period, the total value of production plus government payments increased 25.0 percent.[5] Finally, note that for the nation, the constant dollar growth rate for the United States GDP was estimated at 2.4 percent over the period of 2000 quarter 1 to 2007 quarter 2 – very similar to Washington's agricultural sector annualized growth rate of 2.5 percent over the comparable period.[6]

Even more telling, between 2005 and 2006, with 2006 as the base year, the constant dollar value of agricultural production increased by 7.3 percent. This compares to a constant dollar increase of 6.2 percent between 2004 and 2005. Between 2005 and 2006, the constant dollar rate of growth for the state overall was 5.6 percent. In 2006, national economic growth for the entire economy was 2.9 percent.[7] Thus, the growth rate in Washington state agricultural production is 2.5 times that of the growth rate in national GDP for the period in question.[8]

Figure 1
Total Value of Agricultural Production and Government Payments in $1,000s of Current and Constant Dollars, 2000 = 100
Washington State, 1997 to 2006
Source: Appendices 1 and 3

	Total Value of Production		Total Value of Production Plus Government Payments	
Year	Current Dollars	Constant Dollars	Current Dollars	Constant Dollars
1997	5,540,292	5,349,151	5,687,555	5,491,334
1998	5,242,793	4,609,987	5,503,317	4,839,066
1999	5,362,137	4,437,168	5,632,731	4,661,084
2000	5,341,809	4,420,346	5,694,602	4,712,283
2001	5,573,177	4,900,494	5,872,198	5,163,423
2002	5,585,653	4,718,759	5,801,565	4,901,162
2003	5,758,735	5,311,857	6,024,133	5,556,660
2004	5,661,906	5,856,675	5,858,880	6,060,425
2005	6,218,619	6,218,619	6,458,528	6,458,528
2006	6,669,845	6,669,845	6,866,311	6,866,311

Figure 2 shows the time pattern of growth in current dollars. Note that there have been dips in the total value of agricultural production as well as increases over time. *Figure 3*, a more meaningful comparison over time since the value of production is measured in 2006 constant dollars, shows

a similar pattern, including years when the value of output fell in constant dollar terms. Note the inverse relationship between net value added and net farm income, on the one hand, and total hired and contract labor, on the other.

Figure 2
Final Agricultural Sector Output, Net Value Added, Total Hired and Contract Labor, Net Farm Income
Washington State, 1997 to 2006, Current Dollars
Source: Appendix 2

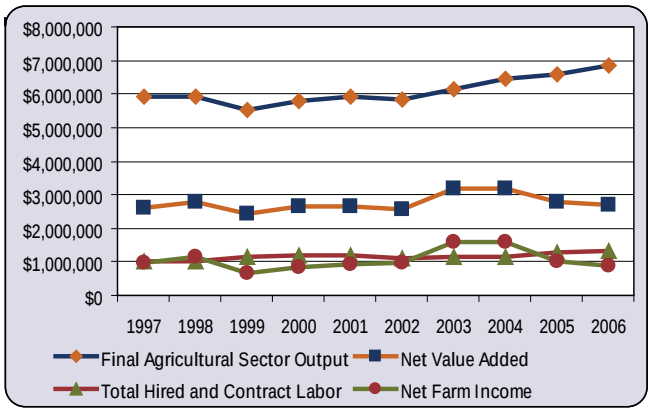
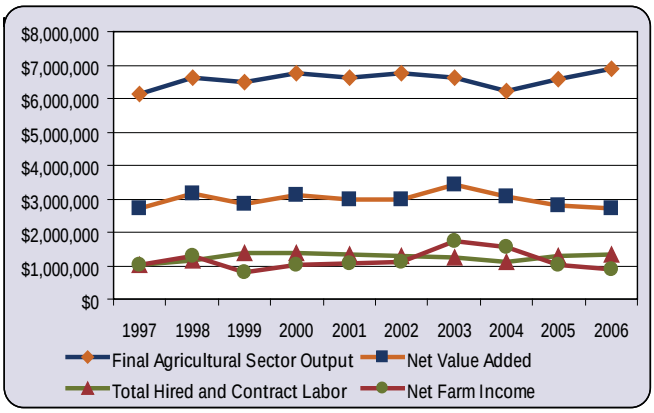


Figure 3
Final Agricultural Sector Output, Net Value Added, Total Hired and Contract Labor, Net Farm Income
Washington State, 1997 to 2006, Constant Dollars, 2000 = 100
Source: Appendix 2



The Changing Composition of Agricultural Production

Figure 4 shows the changing composition of agricultural production. The relevance of these changes is that they differentially affect the demand for nonseasonal and seasonal agricultural labor. Note that the proportion of total value in production due to field crops has dropped by 1.1 percent between the average of 1997 to 1999 and the average of 2004 to 2006.[9] When contrasting 2003 to 2005 with 1996 to 1998, the drop was 4.5 percent. Total value in production from fruits and nuts increased by 4.7 percent over the average of the period 2004 to 2006 compared to the average of the period 1997 to 1999. Thus, while the share in field crop production was dropping, the share in fruits and nuts, which uses a relatively large share of the annual seasonal agricultural labor force, was rising. For the 2004 to 2006 versus 1997 to 1999 average comparison, the value share of total crops rose 3.3 percent while that of livestock and related products dropped by 1.3 percent.

Figure 4
Percent Change in Composition of Total Value of Agricultural Production, Current Dollars
Washington State, 2004 to 2006 Compared to 1997 to 1999
Source: Appendix 1

Year	Field Crops	Fruits and Nuts	Commercial Vegetables	Berry Crops	Total Crops	Specialty Products	Livestock and Products
2004 to 2006 Average Percent							
	30.7	26.6	6.0	1.2	64.3	8.8	26.9
1997 to 1999 Average Percent							
	31.8	21.9	6.3	1.0	61.0	10.9	28.2
Difference: 2004 to 2006 minus 1997 to1999							
	-1.1	4.7	-0.3	0.2	3.3	-2.1	-1.3

The Contribution of Labor to the Total Value of Agricultural Production

Figure 5 shows the relationship between final agricultural sector output, net value added, total hired and contract labor[10], and net farm income. Note that the share of net value added as a percent of the total value of final agricultural sector output has been trending down. This means that more intermediate inputs from outside of the Washington state agricultural sector are being purchased to produce the value of the final output. Examples are energy costs and fertilizers, whose prices have been rising recently. However, it is possible that recent increases in agricultural prices, holding input costs constant, will reverse that trend for 2007 and 2008.[11]

Figure 5
Relationship Between Final Agricultural Sector Output, Net Value Added, Total Hired and Contract Labor, and Net Farm Income, Constant Dollars 2006 = 100
Washington State, 1997, 2005, and 2006
Source: Appendix 2

	1997	2005	2006
Net Value Added as a Percent of Final Agricultural Sector Output	44.3	42.3	39.1
Total Hired and Contract Labor as a Percent of Net Value Added	38.2	46.0	49.4
Net Farm Income as a Percent of Net Value Added	37.6	36.8	33.4

Next, total hired and contract labor as a percent of net value added has been increasing over time. In 1997 its share of net value added was 38.2 percent which, by 2006, rose to 49.4 percent. This represents an average annual increase of 1.1 percent over the ten-year period, expressed in 2006 prices. This does not mean that average hourly wage rates have risen by 1.1 percent. It means that the quantity of labor hired times the average hourly wage rate has risen by 1.1 percent.

Finally, with net value added as a share of total agricultural sector output falling, while total hired and contract labor as a share of net value added was rising, we see that the share of net farm income has been falling – from 37.6 percent of total agricultural sector output in 1997 to 33.4 percent in 2006. However, as discussed below, the absolute quantity and relative share of net farm income will likely be shown to have risen when the 2007 data become available. And, this share is projected to continue to rise in 2008.

What explains the relationship among these trends? According to the Economic Research Service of the U.S. Department of Agriculture:

> "Net value added and net farm income have followed the value of commodity production over both the long term and in year-to-year fluctuations. Because farmers typically do not vary their production mix dramatically from year to year, production costs tend to be comparatively stable. Thus, the direction and magnitude of annual changes in the value of livestock production arise primarily from market prices for livestock and products. Variability in the value of crop production is determined by both market prices and production levels. The volatility in crop production primarily derives from unpredictable variability in yields due to weather, plant disease, and pests."[12]

Prospects for the Future

Normally, this report does not look to the future, but reports on the known past. However, 2007 estimates of the dollar value of agricultural production, which are not reported in this year's report due to lags in data availability, are known to be a record year for agriculture in the United States. As *Figure 6* shows, the All Farm Products Index is estimated to rise sharply between 2006 and February 2008. All crops, food grains, feed grains and hay, oil bearing crops, dairy products, and poultry and eggs are all projected to increase in price sharply. On the down side, particularly for Washington, potatoes and dry beans, fruits and nuts, and meat animals are estimated to maintain relatively stable prices. The price index for commercial vegetables is estimated to fall sharply.

Figure 6
Indices of Agricultural Prices
United States, 2006, 2007, and 2008, 1990 to 1992 = 100
Source: [1]USDA, NASS, Agricultural Prices 2006 Summary, July 2007
[2]USDA, NASS Agricultural Statistics Board, Agricultural Prices, February 2008

Type of Commodity	2006 Index Annual[1]	February 2007 Index[2]	February 2008 Index
All Farm Products Index	116	128	145
All Crops	119	138	159
Food Grains	134	154	298
Feed Grains and Hay	109	150	184
Oil Bearing Crops	100	124	197
Potatoes and Dry Beans	127	128	127
Fruits and Nuts	156	159	155
Commercial Vegetables	136	165	112
Meat Animals	116	114	114
Dairy Products	99	114	148
Poultry and Eggs	117	139	163

These prices of farm commodities, and therefore farm income, are primarily being driven by:

- low rainfall in other countries – a transitory factor as international weather patterns change, though Australia has seen drought conditions for the better part of a decade;
- rising international consumption due to increasing economic growth in developing nations – a permanent factor;
- restrictions of exports of key agricultural products by certain food exporting nations;
- a weak U.S. dollar, which makes our agricultural exports cheaper to importing nations and agricultural imports from abroad more expensive – a factor that varies over time, and;
- increasing demand for agricultural inputs to bio-fuels production – a factor that depends on the vagaries of public policy, since on net bio-fuels production in the United States is currently subsidized.

Summary and Conclusions

- The total value of agricultural production for Washington increased in constant dollar terms by 6.2 percent between 2004 and 2005 and by 7.3 percent between 2005 and 2006.

- Rising demand for agricultural products produced by Washington should result in even greater increases for the 2006 to 2007 period and the 2007 to 2008 period.

- Nationally, farm household income fell by 4.8 percent for the 2005 to 2006 period; the drop for Washington was 8.7 percent. However, nationally, farm household income is expected to rise by 8.4 percent for the 2006 to 2007 period.

- Because Washington state is a major producer of wheat, Washington's agricultural sector should benefit accordingly in 2007. And, as noted, these increases are expected to carry on into 2008.[13]

- However, the estimated relatively stable prices for potatoes and dry beans, fruits and nuts, and meat animals, combined with the drop in prices of commercial vegetables, imply that the benefits of increased net farm income will vary among the producing sub-sectors of the state's agricultural economy.

Endnotes

[1] The production data provided by the National Agricultural Statistics Service (NASS), United States Department of Agriculture (USDA) for Washington lags by one year. Thus, we are reporting on the agricultural economy's performance during 2006. See *Appendices 1 and 2* for the relevant 2006 data and their sources. Full production data for 2007 will not be available until August 2008. These production data can then be accessed by emailing Roger Strickland at NASS/USDA in Washington, D.C.: **rogers@ers.usda.gov.**

[2] Throughout this study, percentages are rounded to the nearest tenth of one percent.

[3] U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, "News Release: Gross Domestic Product (GDP) by State, 2006," June 6, 2007.

[4] Multiplier effects further enhance the economic impact of the agricultural sector on the state economy. See *2005 Agricultural Workforce in Washington State, Chapter 1*. An updated input/output table for Washington state is currently being estimated by the state Office of Financial Management.

[5] Note, however, that government payments do not represent true value added. Such subsidies are transfer payments and are not a contribution to any measure of economic output. Taxes from "Consumer Peter" have been levied to pay subsidies to "Farmer Paul."

[6] See *2007 Washington State Labor Market and Economic Report*, page 4.

[7] See the source in endnote 3 above.

[8] Note that "agriculture is more dependent on improvements in technology as a source of growth than the rest of the U.S. economy." The average annual growth rate in agricultural labor productivity across the nation is estimated at 4.9 percent for the period 1948 to 2004 and 3.7 percent for the period 1981 to 2004. Washington state is ranked fourth in total factor productiv-

ity in agriculture for 1999, rising from 27th rank in 1960. The average annual growth rate in agricultural productivity over the period 1960 to 1999 is 2.4 percent, compared to an average annual rate for the nation in agriculture of 1.9 percent. *Most of this growth is due to the increase in technology, since labor and land inputs were decreasing over this time period. This contrasts sharply with growth in the nonagricultural sector, where the lion's share of growth increase is due to the increase in factors of production rather than technology per se.* See USDA, Economic Research Service (ERS), "Agricultural Research and Productivity: Questions and Answers," **http://www.ers.usda.gov/briefing/agresearch/questions/** and **http://www.ers.usda.gov/Data/AgProductivity/table13.xls**. See also, Fuglie, et al., "Productivity in U.S. Agriculture," September 2007.

[9] We are using a three-year average to help adjust for annual differences in growing and production conditions that are due to transitory conditions. Due to the rising demand for field crops vis-à-vis other agricultural production, we expect the total value share of field crops to rise in 2007 and 2008 compared to earlier years.

[10] *Total hired labor* is labor that is hired directly by the agricultural producer. *Contract labor* is labor supplied by a labor contractor whose services are purchased by the agricultural producer.

[11] USDA, ERS, "Farm Income and Costs: 2008 Farm Sector Income Forecast," updated February 12, 2008.

[12] "Farm Income and Costs: 2008 Farm Sector Income Forecast," updated February 12, 2008.

[13] USDA, ERS, "Farm Income and Costs: 2006 Farm Sector Income Estimates" and "Farm Income and Costs: 2008 Farm Sector Income Forecast" at these respective web sites: **http://www.ers.usda.gov/Briefing/FarmIncome/2006incomeaccounts.htm** and **http://ers.usda.gov/Briefing/FarmIncome/nationalestimates.htm**.

Employment, Hours Worked, and Average Annual Earnings

Introduction – How Adequate is the Supply of the Agricultural Labor Force?

In this chapter, and the two that immediately follow, we focus on two objectives. The first objective is to show Washington state's basic structure of agricultural employers, agricultural workers employed, and the hours they work. In *Chapter 3* we discuss the level and change in average hourly wage rates and average annual earnings. In *Chapter 4* we discuss unemployment, job vacancies, and the impact of the agricultural labor force on the unemployment insurance system.

Given these basic statistics that reveal the economic structure of the state's agricultural economy, the second objective is to shed light on the perennial concern of growers concerning the threat of an actual or potential shortage of labor. The concern here is not over spot shortages in various locales across the state in response to weather-induced growing and harvest patterns.[1] The concern is whether a structural, long-term shortage is developing in the available agricultural labor force that will drive up real wage rates at the same time as the quantity of labor supplied decreases. That is, we are concerned about the situation where increasing real wage rates do not increase the quantity of labor supplied to growers and producers.

The Conceptual and Empirical Problem

As is well known, the U.S. Congress is also concerned with these issues; in particular, as these issues are affected by the presence of a large proportion of this labor force that is undocumented, both in the state and nation. Legislative initiatives on immigration reform are on hold for the time being. However, there are continuing media reports of steps to tighten border controls and to seek out undocumented workers. As of January 2008, the policy dilemma for growers and workers is summed up by Linda Levine, a specialist in labor economics for the U.S. Congressional Research Service, as follows:

> "A little more than one-half of the SAS (seasonal agricultural services) workforce is not authorized to hold U.S. jobs. Crop growers contend that their sizable presence implies a shortage of native-born farm workers. Grower advocates argue that farmers would rather not employ unauthorized workers because doing so puts them at risk of incurring penalties. Farm worker advocates counter that crop growers prefer unauthorized workers because they are in a weak bargaining position. If the supply of unauthorized workers were curtailed, it is claimed, farmers could adjust to a smaller workforce by introducing labor-efficient technologies[2] and management practices, and by raising wages,[3] which, in turn, would entice more U.S. workers to accept farm jobs. Growers respond that further mechanization would be difficult for some crops, and that much higher wages would make the U.S. industry uncompetitive in world markets without expanding the legal farm work force. *These remain untested argu-*

ments because perishable crop growers have rarely, if ever, operated without unauthorized foreign-born workers.[4]

Key Questions

The prior discussion sets up several key questions:

- What has happened to the total size of the agricultural workforce over time, both nationally and for Washington state?
- What is the recent trend in average hours worked per week in the agricultural labor force, both nationally and for Washington state?
- What has been the trend in average hourly constant dollar wage rates for agricultural workers nationally and for the Pacific Region and Washington state?

This chapter addresses the first two questions.

Farm Labor at the National Level

Figure 7 displays hired farm employment in the United States over the period 1997 to 2006, the most recent available data of this type.

Figure 7
Hired Farm Employment
United States, 1997 to 2006, in 1,000s
Source: [1]U.S. Congress, Congressional Research Service, Linda Levine, "Farm Labor Shortages and Immigration Policy," Table 1, Updated January 17, 2008

		USDA Economic Research Service[2]		USDA National Agricultural Statistics Service[3]		
Year	Total Nonfarm Wage and Salary Employment[1]	Hired Farm Workers[4]	Hired Crop Workers[5]	Hired Farm Workers[6]	Agricultural Service Workers[7]	Total
1997	116,983	889	432	876	240	1,116
1998	119,019	875	458	880	246	1,126
1999	121,323	840	440	929	233	1,162
2000	125,114	878	468	890	243	1,133
2001	125,407	745	392	881	244	1,125
2002	125,156	793	370	886	225	1,111
2003	126,015	777	372	836	236	1,072
2004	127,463	712	368	825	277	1,102
2005	129,931	730	393	780	282	1,062
2006	132,449	748	351	752	255	1,007

Notes: [1] Estimated from the Current Population Survey (CPS), U.S. Department of Labor, Bureau of Labor Statistics, persons aged 16 and older.
[2] Estimated from the CPS, U.S. Department of Labor, Bureau of Labor Statistics, persons aged 15 and older.
[3] USDA, NASS, Farm Labor Survey, a quarterly survey of persons on farmers' payrolls during the survey week.
[4] Estimated from the CPS, based on the activity in which a worker spent the most hours during the survey week.
[5] Data are for crop workers, and are limited to farm workers whom growers employ directly, i.e., the workers are not hired through labor contractors.
[6] Persons paid directly by farmers, including field workers, livestock workers, supervisory workers, and other workers on farmers' payrolls.
[7] Persons supplied to farmers to perform various labor services, but who are paid by agricultural service firms, including labor contractors.

Two statistical series are presented in *Figure 7*.[5] In the second and third columns, the Economic Research Service (ERS) of the United States Department of Agriculture (USDA) estimates that there was an annual average of 1,099,000 hired farm and hired crop workers in 2006, while the National Agricultural Statistics Service (NASS) estimates in the fourth and fifth columns sum to an annual average of 1,007,000 hired farm and agricultural service workers. Both estimates are close to each other in terms of the group of agricultural workers defined as "hired farm workers." These will include most seasonal agricultural workers, though not all. Particularly in California, a larger proportion of seasonal agricultural workers is provided by labor contractors who are not enumerated in the "hired farm workers" definition.

The key observation, however, is that both series agree on one thing: the agricultural labor force has been declining in size over time. Taking three-year averages to adjust for annual changes in demand due to such things as weather, we see that the ERS estimated an average drop in the hired farm and hired crop workers of 138,000 workers between the average annual employment in 1997 to 1999 and the average annual employment in 2004 to 2006. For the same comparison, the NASS estimates for hired farm and agricultural service workers are a reduction of only 109,000 workers overall. Thus, we judge that nationwide, this component of the agricultural labor force has dropped somewhat more than 100,000 workers. The percentage drop ranges from a high of 15.9 percent (ERS estimate) to a low of 12.2 percent (NASS estimate).

Regional Comparisons

Figure 8 displays a consistent set of estimates taken by NASS in its *Farm Labor Survey* for the years 2005 to 2007.[6] Since these are historical data – representing what has happened in the past – the employment figures represent equilibrium estimates. That is, the data represent the quantity of workers demanded by agricultural growers at current wage rates as well as the quantity of workers supplied – workers willing to work at those wage rates[7].

First, look at the statistical estimates for the third quarter of each year – the peak quarter of seasonal employment. For the Pacific Region, which is dominated by Washington state, peak employment dropped from 109,000 workers in 2005, to 92,000 in both 2006 and 2007. The comparable statistics for California are 206,000, 191,000, and 188,000, respectively. For the United States, the comparable statistics are 936,000, 876,000 and 843,000, respectively. Thus, we see a consistent decline over the past three years in the amount of labor demanded by these three geographic sectors during the peak employment month.[8] *The quantity demanded and supplied of agricultural labor during the three most recent peak seasons is declining.*

Figure 8
Farm Labor Workers Employed
Pacific Region, California, and United States, 2005 to 2007
Source: National Agricultural Statistics Service, U.S. Department of Agriculture, *AGRI-FACTS*, Posted Online November 26, 2007

Number of Workers[1]

Year	Pacific Region Washington and Oregon	California	United States Except Alaska
2005			
January	38,000	143,000	589,000
April	64,000	182,000	753,000
July	109,000	206,000	936,000
October	76,000	183,000	842,000
Average Last Three Quarters	83,000	190,000	844,000
2006			
January	52,000	125,000	614,000
April	65,000	137,000	720,000
July	92,000	191,000	876,000
October	85,000	186,000	800,000
Average Last Three Quarters	81,000	171,000	799,000
2007			
January	n.a.	n.a.	n.a.
April	63,000	176,000	736,000
July	92,000	188,000	843,000
October	75,000	177,000	806,000
Average Last Three Quarters	77,000	183,000	795,000

Notes: n.a. = No January 2007 Survey was conducted.
[1] All hired farmworkers and wage rates include supervisor/manager and other workers which are not published separately. This survey has two components: 1) A target population of all farms with a value of sales of $1,000 or more per year (1,700 sample points); and, for agricultural services, all operations that provide agricultural services to farmers (600 sample points).

Second, view the average annual workers employed for the last three quarters of each year. For the Pacific Region, the average drops from 83,000 in 2005 to 81,000 in 2006 and 77,000 in 2007. We see the same secular decline for the United States data: 844,000 in 2005; 799,000 in 2006; and, 795,000 in 2007. For California, the average drops from 190,000 in 2005 to 171,000 in 2006 before rising again to 183,000 in 2007. This amounts to a net 7,000 drop in employment between 2005 and 2007 for California.

We again conclude that overall, the employment of agricultural labor, at current wage rates, is generally declining.

The data in *Figure 9* bolster the above observation. Note that for the three different USDA mountain regions, the quantity of labor employed at current wage rates declined sharply between July 2006 and July 2007.

Figure 9
Number of Hired Farm Workers by Geographic Area, United States and Multiple Regions, July 2005 to July 2007
Source: U.S. Congress, Congressional Research Service, Linda Levine, "Farm Labor Shortages and Immigration Policy," Table 3, p. CRS-10, Updated January 17, 2008

Number of Hired Farm Workers Excluding Agricultural Service Workers[1]

Area	In 1,000's July 05	July 06	July 07	Percent Change July 05 to July 06	July 06 to July 07
United States except Alaska	936	876	847	-6.4	-3.3
Pacific: Oregon and Washington	109	92	92	-15.6	0.0
California	206	191	192	-7.3	0.5
Mountain I: Idaho, Montana, Wyoming	29	30	22	3.4	-26.7
Mountain II: Colorado, Nevada, Utah	26	25	18	-3.8	-28.0
Mountain III: Arizona, New Mexico	24	25	22	4.2	-12.0

Notes: [1] See *Figure 7* definitions of hired farm worker and agricultural service worker.

Employment in Washington State

Total Agricultural Employment

Appendix 4 displays the total agricultural employment – seasonal plus nonseasonal – by county, for calendar year 2007. *Figure 10* displays the linear plot of seasonal and nonseasonal agricultural employment over 2007. The data for total employment represent workers in jobs and are not adjusted for multiple job holders in agriculture. Thus, there are more jobs filled than workers filling those jobs, implying that some jobs are part time during the week, or some workers are moonlighting with multiple jobs, or both. However, the picture of total agricultural employment is accurate in the sense that growers in any given month had to fill a given number of jobs with agricultural workers. In other words, the mix of part-time and full-time jobs fits in with the production needs of the growers at each point in time.

An estimated average of 94,807 jobs per month was filled by agricultural workers over 2007. This contrasts with an average of 93,580 jobs per month during 2006. In 2007, employment peaked in July at 135,490 workers in jobs; the second hiring peak occurred in September at 118,510 workers employed. The peak months were the same in 2006, at 139,160 workers employed in July and 118,550 workers employed in September. But, the June experience differed between the two years. In June 2006 there were 123,820 jobs filled as the cherry harvest was delayed somewhat. With 2007 being a more normal year in terms of weather, June employment was 128,910 workers – somewhat more than 5,000 additional workers.

Figure 10
Total, Nonseasonal, and Seasonal Agricultural Employment
Washington State, 2007 by Month
Source: Appendices 4 and 5

Agricultural Employment

	January	February	March	April	May	June	July	August	September	October	November	December
Total[1]	65,340	73,430	80,380	85,010	89,340	128,910	135,490	112,830	118,510	112,420	71,830	64,190
Nonseasonal[2]	53,408	58,125	60,484	60,389	66,313	75,029	72,012	70,502	64,398	64,435	57,901	52,567
Seasonal[3]	11,931	15,305	19,896	24,621	23,027	53,881	63,479	42,328	54,112	47,985	13,929	11,623

Notes: [1] Total agricultural employment includes ES-QCEW UI-covered employment plus noncovered employment, not adjusted for multiple job holders.
[2] Nonseasonal includes multiple job holders.
[3] Seasonal is a count, provided by employers, of jobs filled during the survey week and month.

Current Use of H-2A Workers

In view of the fears of a federal crackdown on the employment of undocumented workers (see, as one example, "Employers fear new crackdown," *Capital Press*, Vol. 80, No. 32, August 10, 2007), agricultural producers, both in Washington and nationwide, have been increasing their contracting of H-2A workers. In 2004, before the concern over undocumented workers gained its current prominence, nationwide, 6,691 agricultural producers were certified to hire 44,619 workers. In 2007, 7,491 employers were certified to hire 76,818 certified workers. For Washington state, in 2006, 814 workers were certified and 515 were known to be hired. In 2007, this number rose to 1,657 certified with 1,140 known to be hired.

The administrative cost, higher real earnings that must be paid – including housing and transportation to and from the United States, and a guarantee for a minimum employment of three-fourths of the hours offered for the contract period – imply that it is the larger, more diversified growers who can avail themselves of this source of labor. Smaller, less diversified growers will be at a disadvantage in terms of the cost of the program.

Washington State Employment by Workforce Development Areas

Figure 11
Percentage of Average Annual Agricultural Employment (Seasonal Plus Nonseasonal) by County
Washington State, 2007
Source: LMEA/ESD, Appendix 4

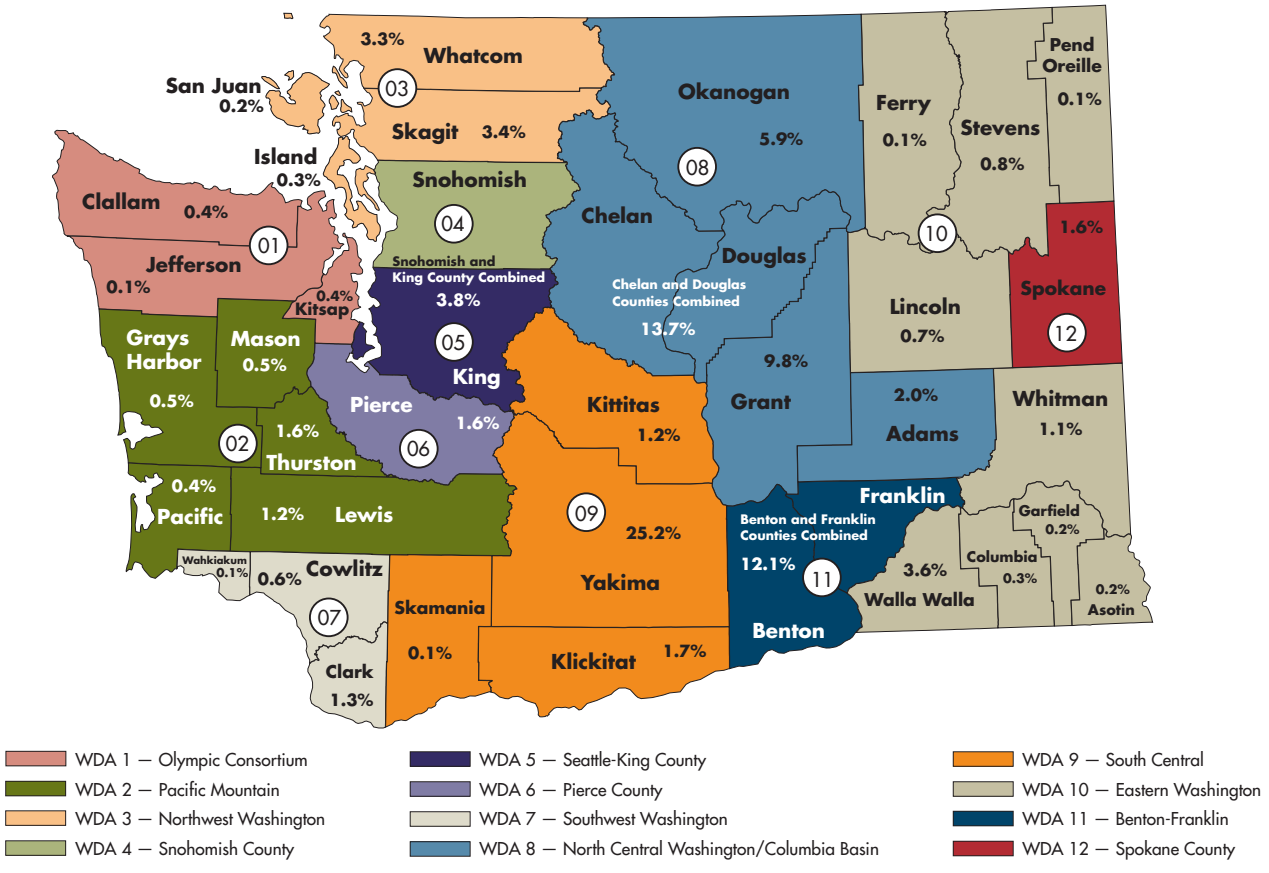


Figure 11 displays the geographic distribution of total agricultural employment by county. This pattern, on the whole, is very stable year by year. Slight year-to-year variations in the proportions occur due to weather patterns. For example, total agricultural employment in Yakima County was 24.9 percent in 2006 and it was 25.2 percent in 2007.

Seasonal Agricultural Employment

Figure 11 also displays the regional pattern of percentage of seasonal agricultural employment by county over 2007. Monthly average seasonal employment statewide was 31,842 workers in 2007. This contrasts with 32,014 workers in 2006. *Note that these totals represent essentially the same size of seasonal workforce between the two years.*

In summary, while other measures suggest a general tightening of the state labor market and even the state agricultural labor market (see *Chapters 3 and 4*), it remains a fact that the necessary labor force was forthcoming during 2007 and that there was no generalized shortage of labor in 2007 relative to 2006.

Seasonal Agricultural Employment by Crop

Figure 12 displays seasonal agricultural employment by agricultural area and by crop. The basic observation one should draw from this figure is the fact that the structure or pattern of employment changed very little for the most dominant agricultural areas between 2006 and 2007. Likewise, employment – the number of workers willing to work at the average hourly wage rate employers offered – actually decreased somewhat in the three dominant tree fruits that drive the seasonal surge in the demand for seasonal workers. Employment in apples dropped by 5.0 percent; employment in cherries dropped by 0.9 percent; and, employment in pears dropped by 6.5 percent. Employment in other tree fruit rose dramatically, but 2007 employment in this crop group comprised only 6.4 percent of total seasonal employment in tree fruit. The other crop group that had a sharp increase in employment was other seasonal crops. All in all, the picture appears that there was no dramatic change in critical seasonal employment sectors in 2007 compared to 2006.

Figure 12
Seasonal Agricultural Employment by Region and Crop
Washington State, 2006 Compared to 2007
Source: LMEA/ESD, Agricultural Labor Employment and Wage Trend Survey

	2006 Annual Average Employment	2007 Annual Average Employment	2006 to 2007 Change	2006 to 2007 Percent Change
State Totals	32,014	31,842	-172	-0.5%
Area Totals				
Western Area 1	4,071	3,730	-341	-8.4%
South Central Area 2	9,314	9,437	123	1.3%
North Central Area 3	8,510	8,435	-75	-0.9%
Columbia Basin Area 4	4,606	4,735	129	2.8%
South Eastern Area 5	5,118	5,150	32	0.6%
Eastern Area 6	395	355	-40	-10.1%
Crop Totals				
Apples	15,478	14,697	-781	-5.0%
Cherries	5,092	5,044	-48	-0.9%
Pears	1,091	1,020	-71	-6.5%
Other Tree Fruit	699	1,422	723	103.5%
Grapes	1,183	1,342	159	13.5%
Blueberries	344	381	37	10.8%
Raspberries	1,018	790	-228	-22.4%
Strawberries	233	218	-15	-6.4%
Bulbs*	305	*	*	*
Hops	448	336	-112	-25.0%
Nurseries*	1,310	965	-345	-26.3%
Wheat/Grain	170	190	20	11.9%
Asparagus	1,029	901	-128	-12.4%
Cucumbers	56	54	-2	-4.3%
Onions	512	473	-39	-7.7%
Potatoes	1,186	1,268	82	6.9%
Misc Vegetables	789	963	174	22.0%
Other Seasonal Crops	1,073	1,779	706	65.8%

Note: * The 2007 conversion from SIC to NAICS industry codes placed bulb growers into the nursery sector.

Total Agricultural Employment by Agricultural Region

Figure 13 displays total agricultural employment by agricultural region. Again, we are interested in the comparison of the seasonal pattern in total agricultural employment between 2006 and 2007. An inspection of this figure indicates that there has been no dramatic year-to-year change in the pattern of total agricultural employment either by agricultural region or by key agricultural county. Employment rose by 0.4 of a percent in the Columbia Basin on a base of 11,220 workers. Employment dropped by 0.8 of a percent in the North Central Region on a base of 19,710 workers. For the South Central Region, there was an increase of 0.4 percent on a base of 25,510 workers. For the South Eastern Region, there was an increase of 0.6 percent on a base of 14,870 workers. For all intents and purposes, the employment pattern was essentially unchanged in the Eastern Region.

Figure 13
Total Employment and Agricultural Employment
Washington State and Selected Areas, 2007 Compared to 2006
Source: LMEA/ESD, U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics

	2007 Employment				2006 Employment	
	Total Statewide	Total Agricultural	Percent of Total County	Percent of Total State Agricultural	Percent of Total County	Percent of Total State Agricultural
Washington	3,253,480	94,810	– –	– –	– –	– –
Western	2,566,580	18,740	78.9%	19.8%	80.5%	20.4%
Eastern	686,890	76,070	21.1%	80.2%	21.6%	79.5%
Agricultural Area						
Columbia Basin	45,590	11,220	24.6%	11.8%	24.7%	11.4%
Adams	7,530	1,890	25.1%	2.0%	26.5%	2.1%
Grant	38,060	9,330	24.5%	9.8%	24.3%	9.2%
North Central	97,100	19,710	20.3%	20.8%	21.2%	21.5%
Chelan and Douglas	58,480	12,970	22.2%	13.7%	22.9%	14.0%
Kittitas	19,350	1,140	5.9%	1.2%	5.8%	1.1%
Okanogan	19,270	5,600	29.1%	5.9%	30.8%	6.3%
South Central	121,250	25,510	21.0%	26.9%	20.8%	26.5%
Klickitat	9,070	1,610	17.8%	1.7%	17.6%	1.6%
Yakima	112,180	23,900	21.3%	25.2%	21.1%	24.9%
South Eastern	139,760	14,870	10.6%	15.7%	10.5%	15.1%
Benton and Franklin	112,040	11,470	10.2%	12.1%	9.9%	11.4%
Walla Walla	27,720	3,400	12.3%	3.6%	12.6%	3.7%
Eastern	283,190	4,760	1.7%	5.0%	1.7%	5.1%
Asotin	9,820	160	1.6%	0.2%	14.6%	0.7%
Lincoln	4,450	650	14.6%	0.7%	0.7%	1.6%
Spokane	222,180	1,490	0.7%	1.6%	5.2%	1.1%
Whitman	19,520	1,010	5.2%	1.1%	1.8%	0.2%
Other Eastern Areas	27,220	1,450	5.3%	1.5%	5.4%	1.5%

Notes: The data in this exhibit are computed from data available from the U.S. Department of Labor, Bureau of Labor Statistics Local Area Unemployment Statistics.
Total Agricultural Employment includes ES-QCEW UI covered employment plus noncovered employment, not adjusted for multiple jobholders.

Washington Agricultural Employment by Major NAICS[9] Sectors

Figure 14 provides detail on the number of workers employed by various sub-sectors of production agriculture and of value added agriculture manufacturing. These data are from the *Quarterly Census of Employment and Wages (QCEW)*. The reported data lag by one year.

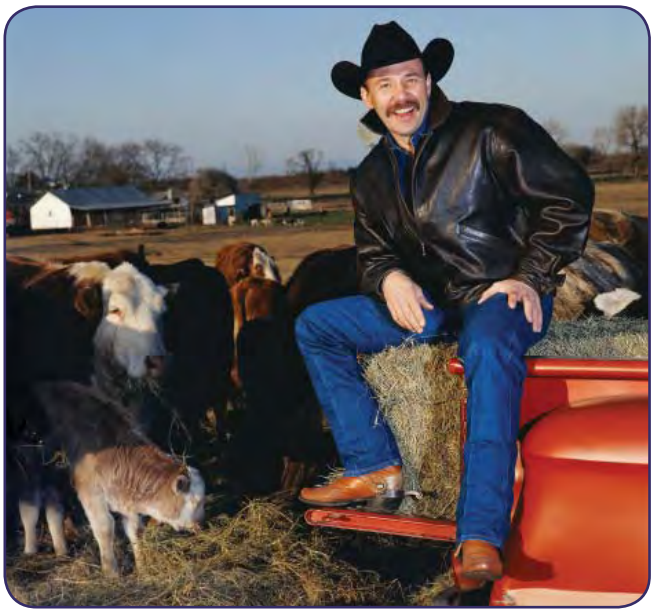
Figure 14
Total Employers, Total Jobs, Annual Total and Average Earnings by Industry
Washington State, 2006, Compared to 2004 and 2005 in Current Dollars
Source: LMEA/ESD, Quarterly Census of Employment and Wages, Compared to 2004 and 2005 in Current Dollars

Industry	2006 Average Number of Firms	2006 Annual Total Earnings (Industry Sector Wage Bill)	2006 Monthly Average Jobs	2006 Annual Average Earnings Per Job	2005 Average Annual Earnings Per Job	Percent Change in Average Annual Earnings Compared to 2005	Percent Change in Average Annual Earnings Compared to 2004
Production Agriculture	6,532	1,347,565,116	69,954	19,264	17,971	7.2%	3.1%
Poultry and Egg Production	55	16,300,132	622	26,206	25,231	3.9%	0.3%
Animal Aquaculture	*	*	*	*	*	*	*
Cattle Ranching and Farming	724	121,151,855	4,657	26,015	24,209	7.5%	3.2%
Other Crop Farming	695	127,561,083	5,735	22,243	20,958	6.1%	1.7%
Support Activities for Crop Production	278	277,131,352	12,305	22,522	20,353	10.7%	0.5%
Greenhouse, Nursery, and Floriculture	373	101,398,226	4,794	21,151	20,323	4.1%	0.7%
Other Animal Production	132	7,406,109	355	20,862	20,475	1.9%	3.8%
Vegetable and Melon Farming	379	96,100,805	4,178	23,002	20,842	10.4%	6.3%
Support Activities for Animal Production	191	12,116,572	599	20,228	19,860	1.9%	2.0%
Oilseed and Grain Farming	1,126	33,411,756	1,763	18,952	18,515	2.4%	1.0%
Hog and Pig Farming	*	*	*	*	*	*	*
Fruit and Tree Nut Farming	2,493	523,442,930	33,916	15,434	14,835	4.0%	3.9%
Other Industries*	68	17,899,607	706	25,354	24,945	1.6%	na
Value Added Agriculture Manufacturing	1,109	1,367,444,132	35,291	38,748	36,691	5.6%	4.7%
Seafood Product Preparation and Packaging	110	356,762,652	6,592	54,121	51,538	5.0%	7.5%
Dairy Product Manufacturing	*	*	*	*	*	*	*
Grain and Oilseed Milling	*	*	*	*	*	*	*
Beverage Manufacturing	250	150,121,526	3,714	40,420	40,685	-0.7%	2.8%
Animal Food Manufacturing	53	26,979,736	700	38,542	37,570	2.6%	3.1%
Other Food Manufacturing	142	99,566,256	2,877	34,608	36,073	-4.1%	7.6%
Fruit and Vegetable Preserving and Specialty	103	360,859,594	10,186	35,427	33,851	4.7%	2.8%
Bakeries and Tortilla Manufacturing	*	*	*	*	*	*	*
Animal Slaughtering and Processing	74	130,244,610	3,890	33,482	28,630	16.9%	10.0%
Sugar and Confectionery Product Manufacturing	*	*	*	*	*	*	*
Other Industries*	377	242,909,758	7,332	33,130	32,126	3.1%	*

Notes: *Not published due to confidentiality. Totals are folded into "Other Industries.

Production Agriculture

The production agriculture sector is very dynamic. Its structure changes from year to year. There were 4.9 percent fewer establishment[10] employers in production agriculture in 2006 compared to 2005; 6,532 employers versus 6,852 employers, respectively. Producers in tree and nut farming represented 42.2 percent of total employers in 2005 and 38.2 percent in 2006 – down by four percentage points in one year. Four hundred fruit and tree nut farming establishments disappeared in 2006 relative to 2005. Producers in oilseed and grain farming increased by 1.5 percent between the two years while vegetable and melon farming increased by 3.0 percent and cattle ranching and farming increased by 3.9 percent. On the other hand, producers in other crop farming dropped by 3.4 percent and support activities for crop production dropped by 11.9 percent between the two years.



The average monthly employment measured by this QCEW data source[11] also declined between the two years by 6.2 percent – 69,954 versus 74,278, respectively. Note also that the annual total wage bill (annual total earnings in dollars) has increased slightly between 2005 and 2006, being estimated at $1.348 billion in 2006 and $1.335 billion in 2005. Thus, while the number of workers has been falling, labor earnings have been increasing.

As a final indicator of the dynamic nature of this industry sector, note the differential changes in average annual earnings between 2005 and 2006, and 2004 and 2005. First, there is relative stability in fruit and tree nut farming. Average annual earnings have increased 4.0 percent between 2005 and 2006 and 3.9 percent between 2004 and 2005. However, average annual earnings are beginning to show the effect of increased demand for certain agricultural products and related services in 2006 relative to earlier years. Even while the number of jobs has been declining, average annual earnings for other crop farming rose by 6.1 percent in 2006 compared to 2005. The increase is 10.7 percent for support activities for crop production. It is a startling 21.8 percent for oilseed and grain farming. In nine of the 12 production agriculture sub-sectors, average annual earnings rose in 2006 compared to 2005!

Summarizing the picture for 2006:

- the number of establishments dropped;
- annual total earnings increased; and
- the number of workers dropped.

The overall picture thus suggests some combination of an increase in productivity and an increase in demand for the sector as a whole. In any case, *the production agriculture sector is highly dynamic – subject to dramatic changes – year by year.*

Value Added Agriculture Manufacturing

The number of establishments in value added agriculture manufacturing increased 15.0 percent between 2005 and 2006. The estimated increase of annual total earnings for the sector only increased about $10 million between the two years, from $1,357.5 million to $1,367.4 million in the respective years. As might be expected, this sector also exhibits considerable dynamic change from year

to year in certain sub-sectors. Beverage manufacturers increased their establishments by 30.2 percent between the two years. Fruit and vegetable preserving and specialty establishments increased by 32.1 percent. However, average monthly jobs decreased from 36,997 in 2005 to 35,291 in 2006 – a drop of 4.8 percent (for 2005, see *2006 Agricultural Workforce in Washington State, Chapter 2*, Exhibit 2.2, p. 16).

View the same phenomenon from the standpoint of average annual earnings. Dairy and product manufacturing establishments increased slightly in average annual earnings in 2006. Animal slaughtering and processing saw a higher rise in average annual earnings. Unlike production agriculture, five of the ten sub-sectors in value added agriculture manufacturing experienced a lower rate of increase in average annual earnings. *Yet, again, the overall picture is one of considerable dynamic change from year to year.*

Average Weekly Hours Worked – Regional Contrasts

Figure 15 reports the statistical estimates of average weekly hours worked based on the *Farm Labor Survey* previously discussed. The reduction in workers employed can be due either to an actual reduction in the demand for labor holding labor supply constant, or a drop in the supply of labor, holding labor demand constant. Thus, we look to the average weekly hours worked to see if the workers actually hired have been working longer hours to make up for the fact that there are fewer workers being employed at current wage rates. *An increase in average weekly hours worked is evidence suggestive of a decrease in the supply of workers at current wage rates.*

Figure 15
Weekly Average Hours Worked by Farm Labor Workers[1]
Pacific Region, California, and United States, 2005 to 2007
Source: National Agricultural Statistics Service, U.S. Department of Agriculture, *AGRI-FACTS*, Posted Online November 26, 2007

Weekly Average Hours Worked

Year	Pacific Region Washington and Oregon	California	United States Except Alaska
2005			
January	35.9	40.1	37.0
April	40.2	45.0	39.9
July	39.3	45.3	40.6
October	43.1	44.4	42.0
2006			
January	35.8	41.6	38.2
April	37.5	43.0	40.8
July	41.3	46.4	41.0
October	41.9	44.6	41.6
2007			
January	n.a.	n.a.	n.a.
April	38.5	45.5	40.7
July	39.7	47.9	41.6
October	40.7	45.7	42.1

Notes: n.a. = The January 2007 Farm Labor Survey was not conducted.
[1] All hired farmworkers and wage rates include supervisor/manager and other workers which are not published separately.

The quarter-by-quarter comparisons within each region sampled do not reveal any strikingly consistent patterns in average weekly hours worked. Therefore, we have averaged the last three quarters of each year to observe if an annual pattern exists. Now, we note that the annual average of weekly hours worked in the Pacific Region – again, dominated by Washington – have declined from 40.9 hours per week in 2005, to 39.6 hours worked per week in 2007. At a decrease of 1.3 average weekly hours, times an

average annual employment of 77,000 workers, this yields a decrease in total hours of 100,100 worker hours, or a reduction of 2,502 full-time equivalent (FTE) worker weeks. *Though the number of workers employed declined between 2005 and 2007, the average weekly hours employed also declined, suggesting no overall shortage of labor at current wage rates in the Pacific Region.*

However, in California and nationwide, between 2005 and 2007, average weekly hours worked have consistently increased. The 2005 to 2007 change in California was an annual average weekly hour increase of 1.5 hours. Compared to 2005, at an average of 180,000 workers employed in 2007, this represents an increase of 270,000 hours, or 6,750 FTE worker weeks. For the United States in 2007, the FTE worker week increase is estimated at 13,913 worker weeks (795,000 average annual workers x 0.7 hours increase = 556,500 hours increase / 40 = 13,913 worker weeks). The FTE increase in California is 48.5 percent of the national FTE increase.

Summary and Conclusions

- Nationwide, the average annual size of the agricultural labor force has been decreasing between 1997 and 2006. The estimated decrease ranges from 78 thousand to 210 thousand workers, depending on one's data source.
- Regionally, while the total agricultural labor force has been stable over the past two years in Washington, it has decreased in California.
- Seasonal agricultural employment in Washington state has also, effectively, been stable between 2006 and 2007, both in terms of total numbers of workers employed and in terms of the seasonal pattern with respect to crops, counties, and agricultural areas.
- Though the number of workers employed in the Pacific Region declined somewhat between 2006 and 2007, the average weekly hours worked also declined, suggesting no structural shortage of agricultural labor in the combined labor markets of Washington and Oregon.
- The production agriculture sector is highly dynamic: The number of establishments has dropped, annual total earnings have increased, and the number of workers has dropped. The overall picture thus suggests some combination of an increase in productivity and an increase in demand for the sector as a whole.

Endnotes

[1] To some extent, spot shortages can be alleviated by increased advertising in the media and the work place, increased use of the WorkSource centers, and by increasing the local wage rate, which, by word of mouth through the informal labor market, will draw workers to a locale or grower suffering the spot shortage, given that the grower or locale is offering a wage increase over that currently being received by available workers. This phenomenon apparently occurred during the 2006 growing and harvesting season for sweet cherries in the state. See *2006 Agricultural Workforce in Washington State, Chapters 2 and 3*.

[2] Referring back to *Chapter 1, endnote 8*, note that the agricultural sector rate of technological improvement already exceeds that in the nonagricultural sector of the U.S. economy.

[3] Referring back to *Chapter 1*, note the inverse relationship between the total wage bill paid to directly hired labor and labor hired through labor contractors versus net farm income. In the short run, other things held constant, including technology, a rise in the wage bill is going to result in a drop in net farm income.

[4] U.S. Congress, Congressional Research Service, Domestic Social Policy Division, Linda Levine, "Farm Labor Shortages and Immigration Policy," *CRS Report for Congress*, updated January 17, 2008.

[5] Note, first, that there are different ways to define the farm labor force. These differences are a function of the statistical data available, such as the U.S. Bureau of Labor Statistics, *Current Population Survey, Household Survey of the Labor Force*, from which we gain our national employment and unemployment data on a monthly basis. Or, they are data generated from specialized surveys, such as the NASS *Farm Labor Survey*. In some cases it is employers who are the universe sample and in other cases, as with the *Farm Labor Survey*, it is the workers who are the universe sample. These differences result in somewhat different statistical estimates.

[6] See the notes to *Figure 8* for a discussion of this sample survey design.

[7] These historical statistical estimates represent the final equilibrium – the balance between labor demanded and labor supplied in the labor market. So, at the equilibrium wage rate that balances supply and demand, the quantity of workers demanded equals the quantity of workers supplied. In the remainder of the chapter we will refer to this quantity simply as the number of workers *employed*.

[8] The statistics for the Pacific Region are consistent with ESD, LMEA data that show the number of agricultural workers employed in Washington state to have held steady between 2006 and 2007.

[9] NAICS = North American Industry Classification System. The web address at **http://www.census.gov/epcd/www/naics.html** fully describes this industrial classification system which incorporates industrial classifications in the United States, Canada, and Mexico.

[10] A firm is generally thought of as a legal entity. Any given firm can have one or more establishments in a region producing goods and services. A good example of this phenomenon is Starbucks.

[11] A description of the *Quarterly Census of Employment and Wages (ES-202) Program* can be found at the following web address: **http://www.bls.gov/cew/cewover.htm**

Chapter 3

Average Hourly Wage Rates and the Question of a Structural Shortage of Agricultural Labor

Introduction

This chapter has two objectives. The first is to report on the level and change in the level of agricultural wage rates nationally, regionally, and in Washington state. The second is to address and clarify the issue as to whether a structural shortage of seasonal and non-seasonal agricultural labor has begun to occur in Washington state, particularly in light of the current concern over the employment of undocumented workers in the United States. Corollary to this second concern, we clarify the interdependence between the overall supply of agricultural labor at any given time and spot shortages of labor that may occur at that same point in time.

Average Hourly Wage Rates at the National Level[1]

Figure 16 shows the current dollar level of average hourly wage rates for field workers nationwide and for production and nonsupervisory workers in the private nonfarm sector. The latest data are for 2006.

Figure 16
Average Hourly Earnings of Field Workers and Other Workers in the Private Sector
United States, 1997 to 2006, Current Dollars
Source: U.S. Congress, Congressional Research Service, Domestic Social Policy Division, Linda Levine, Farm Labor Shortages and Immigration Policy, Updated January 17, 2008, Table 6. The data in column (b) are from the Farm Labor Survey. The data in column (c) are from the U.S. Bureau of Labor Statistics employer survey data.

Year	Average Hourly Wage Rate of Field Workers	Average Hourly Wage Rates of Production for Private Nonfarm Sector	Ratio of Average Hourly Field Worker Wage Rates to Those of Private Nonfarm Sector
(a)	(b)	(c)	(d)
1997	6.66	12.51	0.53
1998	6.97	13.01	0.54
1999	7.19	13.49	0.53
2000	7.50	14.02	0.53
2001	7.78	14.54	0.54
2002	8.12	14.97	0.54
2003	8.31	15.37	0.54
2004	8.45	15.69	0.54
2005	8.70	16.13	0.54
2006	9.06	16.76	0.54
1997 to 2006 Percent Change			
	36.0	34.0	

Note: Field workers are a subset of hired farm workers who engage in planting, tending, and harvesting crops. The above data relate to all field workers regardless of method of payment, i.e., piece rate, hourly rate, or any combination of the two. Workers paid directly by agricultural service workers are excluded.

Since 1997, average hourly wage rates of field workers have increased 36.0 percent, from $6.66 per hour to $9.06 per hour. Over the same period, average hourly wage rates of production and nonsupervisory workers have increased 34.0 percent, from $12.51 per hour to $16.76 per hour. Thus, in current dollar terms, unadjusted for inflation, the average hourly wage rates of field workers have increased more than hourly wage rates in the private nonfarm sector. Note, however, in column (d) of *Figure 16* that the ratio of average hourly wage rates of field workers to those of production and

nonsupervisory workers has remained at 0.54 for the past six years – 2001 to 2006. This suggests that there has been no *differential shift* in either the demand for or the supply of field worker labor relative to production and nonsupervisory labor in the private nonfarm sector. Remember that the overall national economy will primarily determine wage rates in the agricultural sector, other things equal, since there is relatively free movement of labor between the lower wage agricultural sector and the higher wage nonagricultural sectors, both nationwide and statewide (given that the workers are presently in the United States).[2]

Average Hourly Wage Rates Compared at the Regional Level

Figure 17 compares average hourly wage rates of field workers by region over the period July 2005 to July 2007. At the national level, between July 2005 and July 2006, current dollar wage rates rose 3.7 percent, but the CPI-W rose 4.3 percent during that period, so on net, constant dollar wage rates fell by 0.6 of a percent (3.7 - 4.3 = -0.6). However, between July 2006 and July 2007, current dollar wage rates increased by 4.3 percent while the CPI-W only increased by 2.3 percent, so constant dollar wage rates rose by 2.0 percent. Nationwide, producers were bidding up constant dollar (or real) wage rates, either due to an increase in labor demand, a shift back in labor supply, or some combination of the two.

Figure 17
Average Hourly Wage Rates of Hired Field Workers by Region, Current Dollars
United States, July 2005 to July 2007
Source: U.S. Congress, Congressional Research Service, Domestic Social Policy Division, Linda Levine, Farm Labor Shortages and Immigration Policy, Updated January 17, 2008, Table 7. The data source is the USDA, NASS, Farm Labor Survey.

			Percent Change	
July 05	July 06	July 07	July 05 to July 06	July 06 to July 07
United States Excluding Alaska				
8.61	8.93	9.31	3.7	4.3
Pacific - Washington and Oregon				
8.60	9.50	9.64	10.5	1.5
California				
8.76	8.92	9.80	1.8	9.9
Mountain I - Idaho, Montana, Wyoming				
8.39	8.41	8.36	0.2	-0.6
Mountain II - Colorado, Nevada, Utah				
8.62	8.33	9.25	-3.4	11.0
Mountain III - Arizona, New Mexico				
7.90	7.55	8.34	-4.4	10.5

Note: A hired field worker is anyone, other than an agricultural service worker, who was paid for at least one hour of work on a farm spent planting, tending, and harvesting crops, including the operation of farm machinery on crop farms. The data reflect all ways that farm workers are paid, e.g., hourly, piece work, or any combination of the two. The average hourly wage rate is calculated based on total earnings paid and hours worked during the survey week.

The contrast between California and the Pacific Northwest is interesting, since labor tends to flow up to the Pacific Northwest from California as the planting, growing, and harvesting season moves north. Average hourly wage rates were higher in California than in the Pacific Northwest in July 2005; the situation reversed in July 2006; and, again, average hourly wage rates were

higher in California than in the Pacific Northwest in July 2007. Average hourly wage rates rose by 10.5 percent in the Pacific Northwest between July 2005 and July 2006, to drop back to a 1.5 percent increase between July 2006 and July 2007. Almost the exact reverse pattern occurred for California! Based on data from the *2006 Agricultural Workforce in Washington State*, we attribute at least some of the 2005 to 2006 increase in the Pacific Region, which is dominated by Washington, to changing weather patterns affecting the harvesting of sweet cherries. Seasonal weather patterns in 2007 returned to a more historical pattern in 2007 based on National Agricultural Statistics Service (NASS) analyses.[3] We have no clear explanation for the wage increase pattern in California, though NASS attributes at least part of the increase to a reduction in the supply of undocumented workers due to increased border patrolling and inspection of firms to uncover the employment of such workers. *In any case, the 2007 wage increase in California did not translate itself into a comparable wage increase in the Pacific Region.*

To further complicate the picture, note the year-by-year pattern of changes in the three mountain regions that are contiguous to California and the Pacific Northwest Region. Region II had an *absolute* shift in wage rates of 14.4 percent (|-3.4%| + |11.0 %| = |14.4 %|). The absolute shift is 14.9 percent in Mountain Region III, which includes Arizona. Clearly, something changed in these two mountain regions over the past three years. Yet, these sharp increases in average hourly wage rates did not spill over into the Pacific Northwest agricultural labor market. Of course, one possibility is that agricultural workers were leaving these regions in favor of other agricultural regions, including the Pacific Northwest. But, we have no data on this possibility.

Comparisons by Type of Agricultural Worker and Region

Appendix 6 displays average hourly wage rates by type of agricultural labor and by region for the period 2005 through 2007. The wage rates reported are in current, not constant dollars, so they reflect inflationary pressures as well as underlying labor demand and supply factors not associated with inflation.

Field Workers Only

In 2006, average hourly wage rates for *field workers only* were higher in every quarter for the Pacific Region, compared to California and the United States. For 2007, average hourly wage rates were also higher in the Pacific Region in the 3rd and 4th quarters, compared to California and the United States.

Livestock Workers Only

For both 2006 and 2007, and for the 3rd and 4th quarters, average hourly wage rates were higher for *livestock workers only* in the Pacific Region compared to California and the United States.

All Agricultural Workers

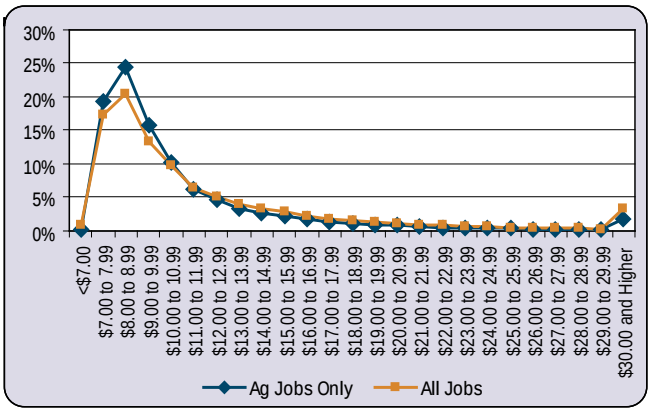
For both 2006 and 2007, and for the 3rd and 4th quarters, average hourly wage rates were higher for *all agricultural workers* in the Pacific Region compared to California and the United States.

In summary, the Pacific Region currently appears to be a high wage agricultural sector in comparison to California and the United States overall.

The Wage Distribution and the Median Wage

Figure 18 and the data that underlie it in *Appendix 7* display the wage distribution for agriculture only workers, all agriculture jobs, and for workers who held both agricultural and nonagricultural jobs during 2006, the year for which we have complete data. This set of wage distributions provides much more information to growers than simply reporting average or median wage rates.

Figure 18
Distribution of Average Hourly Wage Rates in Agriculture, Agricultural Workers Only and Workers with Agricultural and Nonagricultural Jobs, Current Dollars Washington State, 2006
Source: LMEA/ESD, Vancouver Office, UI Wage File
See Appendix 7



Note first that the distributions are highly skewed to the right. A large number of persons earn relatively low average hourly wage rates while a scattering of people earn much higher average hourly wage rates. Thus, the median wage rate rather than the average wage rate is a better measure of the central tendency of the wage distribution.[4] Seasonal workers are concentrated in the humped, lower left end of the distribution.

Workers in Agriculture Only

For workers who worked only in agriculture during 2006, the median wage lies in the range of $9.00 to $9.99 per hour. We find that 12.8 percent of the workers who held only agricultural jobs fell at or near the Washington state minimum wage of $7.63 per hour for 2006. More significant, especially for the issue of immigration reform and the H-2A program as it stands, 55.8 percent of the workers employed only in agricultural jobs fall below the Adverse Economic Wage Rate (AEWR) of $9.77 per hour for 2006. To the extent that these are seasonal workers who, under current production methods, will have to be supplied from foreign sources, the cost implications to growers are significant.

All Agricultural Jobs

The picture is similar for *all* agricultural jobs. Here the median hourly wage rate again fell in the range of $9.00 to $9.99 per hour. Now, 56.8 percent of the workers fell below the AEWR – still a very high figure in light of the H-2A program wage rate requirements. Thirteen point six percent of all agricultural jobs received an average hourly wage rate at or near the state minimum wage.

The Potential Impact of the AEWR

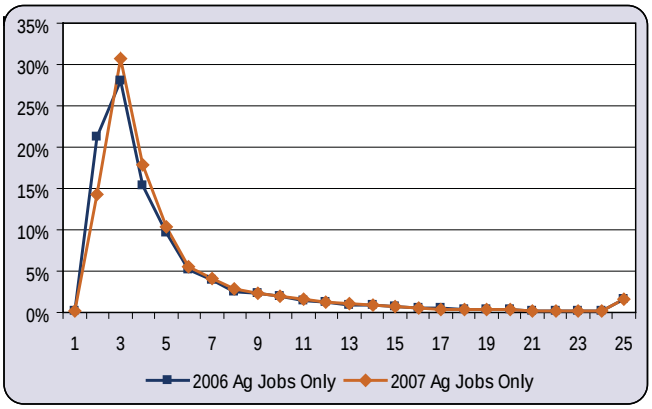
The AEWR currently increases the effective hourly wage rate to about $12.00 per hour, once housing, two-way travel, and other factors that must be met in the H-2A contract are considered. In 2006, for workers with only agricultural jobs, fully 75.6 percent earned average hourly wage rates that fell below the $12.00 to $12.99 wage range. For all agricultural jobs, the figure was 76.3 percent.

Average Hourly Wage Rate Changes – 2nd Quarter 2006 Versus 2nd Quarter 2007

Figures 19 and 20 display the change in the distribution of average hourly wage rates between 2006 and 2007 for the 2nd quarter, the latest period for

which we have comparable data. In both figures, the distributions shift to the right, that is, there is an increase in average hourly wage rates in constant terms (2007 = 100). Furthermore, the lion's share of the shift occurs in the low left end of the wage distribution. This shift to the right indicates that average hourly wage rates rose in the 2nd quarter 2007 compared to the 2nd quarter 2006.

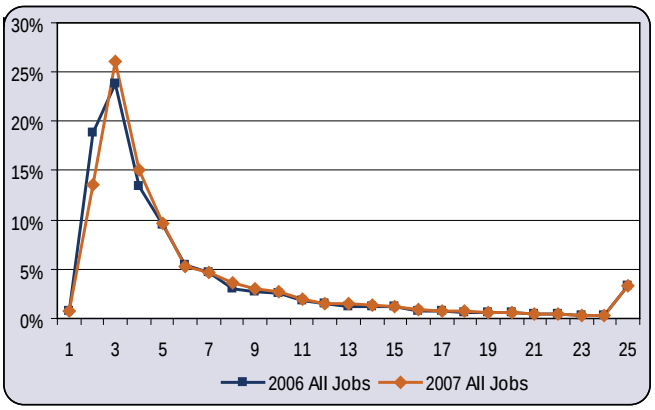
Figure 19
Wage Distribution Comparison
Workers in Agricultural Jobs Only
Washington State, 2006 and 2007, Second Quarter
Source: LMEA/ESD, Vancouver Office, UI Wage File
See Appendix 12



Workers Employed Only in Agricultural Jobs

Figure 19 shows the data for *workers who were employed only in agriculture*. This category captures a high proportion of individuals who are seasonal workers, migrant workers, or both. In 2006, 21.2 percent of these workers earned in the range of $7.00 to $7.99. This percentage fell to 14.3 percent in 2007, a decrease of 6.9 percentage points in this wage range between the two years. Those workers earning in the $8.00 to $8.99 range rose 2.7 percentage points from 28.0 percent in 2006 to 30.7 percent in 2007. Those earning in the range $9.00 to $9.99 rose 2.4 percentage points from 15.4 percent in 2006 to 17.8 percent in 2007. Much smaller percentage increases occurred in the wage distribution up to the range $14.00 to $14.99. Note that wage changes in the low end of the distribution can be expected to have an impact on raising wages in the higher end of the distribution. This is because workers are conscious of the wage structure near them and make invidious comparisons both above and below the wage rate they are earning.

Figure 20
Wage Distribution Comparison
All Workers in Agricultural Jobs
Washington State, 2006 and 2007, Second Quarter
Source: LMEA/ESD, Vancouver Office, UI Wage File
See Appendix 12



All Workers in Agricultural Jobs

Figure 20 shows the wage distribution for workers in *all agricultural jobs for which there were reported earnings*. Again, the entire distribution shifts to the right as wage rates increase. However, the major changes do not extend beyond the $9.00 to $9.99 interval. During 2006, 18.8 percent of all jobs fell in the range of $7.00 to $7.99. This drops by 5.3 percentage points in 2007, to 13.5 percent. Workers in the range of $8.00 to $8.99 rose by 2.3 percent between 2006 and 2007, from 23.8 percent to 26.1 percent. Workers in the wage range $9.00 to $9.99 rose by 1.5 percent between 2006 and 2007, from 13.5 percent to 15.0 percent. There was no change in the distribution for the $10.00 to $10.99 range. Small percentage point changes then occur in various ranges all the way up to $18.00 to $18.99.

The State Minimum Wage and the Constant Dollar Wage

Finally, in 2006, 19.5 percent of all jobs were at or near the state minimum wage. This fell to 18.0 percent for 2007. *Constant dollar wage rates are moving up faster than the constant dollar state minimum wage rate.*

Using a different data set,[5] *Figures 21, 22, and 23* display the constant dollar time trend in average hourly wage rates for apples, cherries, and pears relative to the state minimum wage rate. Constant dollar average hourly wage rates are rising faster for these three dominant tree fruit groups than is the state hourly minimum wage rate. In constant dollars (2000 = 100), the average hourly wage rate for apples stood at $10.15 per hour, cherries at $14.02, and pears at $11.32. Of course, current dollar wage rates were even higher (*Appendix 8*).

Figure 21
Average Hourly Wage Rates, Apples
Compared to the State Minimum Wage,
Constant Dollars, 2000 = 100
Washington State, 2007, Fourth Quarter Data
Source: ESD, UI Wage Records

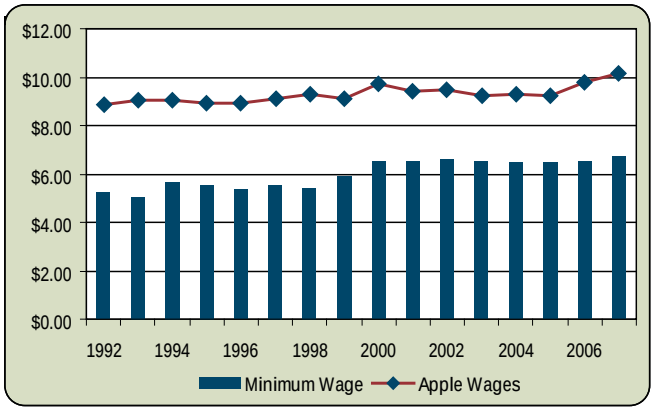


Figure 22
Average Hourly Wage Rates, Cherries
Compared to the State Minimum Wage,
Constant Dollars, 2000 = 100
Washington State, 2007, Third Quarter Data
Source: ESD, UI Wage Records

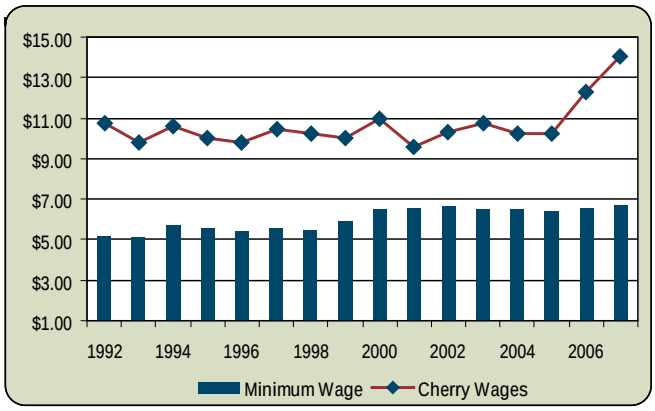
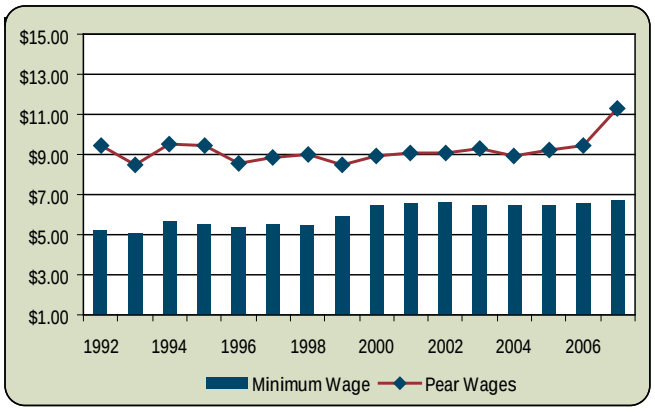


Figure 23
Average Hourly Wage Rates, Pears
Compared to the State Minimum Wage,
Constant Dollars, 2000 = 100
Washington State, 2007, Third Quarter Data
Source: ESD, UI Wage Records



Further Evidence of an Increase in Constant Dollar Agricultural Wage Rates

Constant Dollar Average Hourly Wage Rates for Tree Fruit

Due to inflation, growers commonly experience the necessity to increase current dollar wage rates in order to attract and keep workers. However, it is the increase in constant dollar wage rates that is a major concern to producers of all economic sectors. *Figures 24, 25, and 26* show the historical trend in current dollar and constant dollar average hourly wage rates for cherries, apples, and pears, each measured during the peak demand period for the respective crop. Constant dollar average hourly wage rates are rising very slowly in the peak demand season for pears. For cherries, there was a sharp increase in the percentage change in constant dollar average hourly wage rates in 2006, followed by a small, but positive increase into 2007. The constant dollar average hourly wage rate in apples rose sharply in 2006 as a reaction to the rise in cherry wage rates that accompanied the extended cherry picking season that year. But constant dollar wage rates have risen only slightly during the peak demand season in 2007. The overall picture, though, is of some increase in the constant dollar average hourly wage rate.

Figure 24
Percent Change in Average Hourly Wage Rates, Cherries, Current and Constant Dollars, 2000 = 100
Washington State, 1992 to 2007, Third Quarter Data
Source: ESD, UI Wage Records

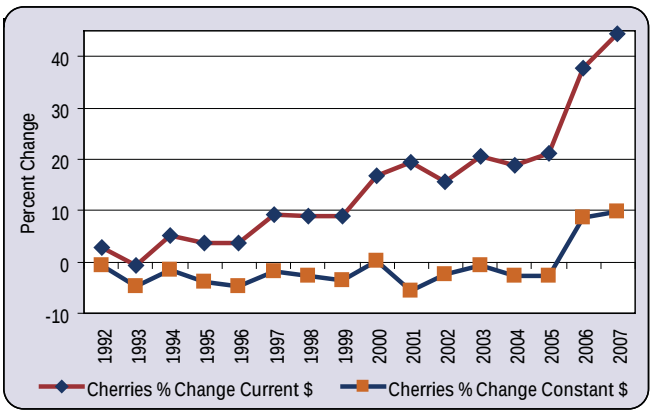


Figure 25
Percent Change in Average Hourly Wage Rates, Apples, Current and Constant Dollars, 2000 = 100
Washington State, 1992 to 2007, Fourth Quarter Data
Source: ESD, UI Wage Records

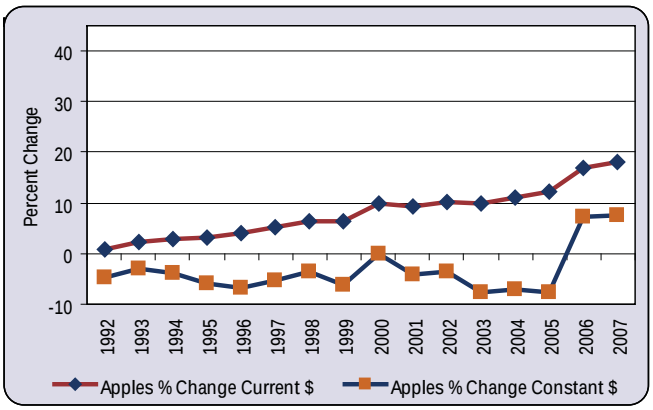
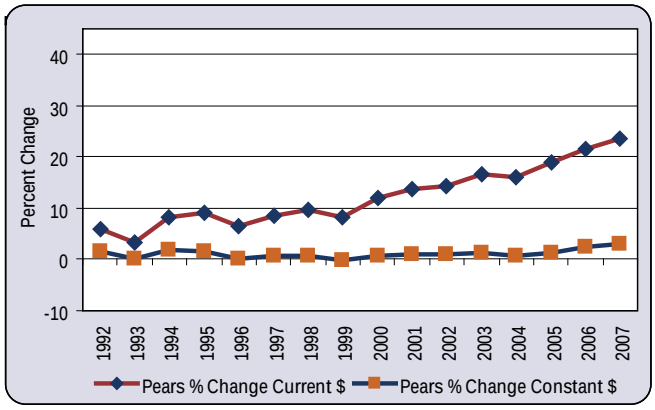


Figure 26
Percent Change in Average Hourly Wage Rates, Pears, Current and Constant Dollars, 2000 = 100
Washington State, 1992 to 2007, Third Quarter Data
Source: ESD, UI Wage Records



A Statistical Test

Figure 27 shows average hourly wage rates in agriculture for the state as a whole based on LMEA monthly agricultural labor survey data. These data do not include piece rate information. However, geographic labor mobility is high in agriculture, and information sharing among workers, given inexpensive cell phone communication, is also high, forcing growers to maintain a competitive

wage structure. So, it is reasonable to use changes in hourly wage rates as an indicator of changes in agricultural wages overall.

To summarize the data in *Figure 27*, both the mean and median wage rates are reaching the same level as they were in 2003, after falling in 2004 and 2005, then rising again.

Figure 28 shows the statistical test of the year-to-year changes in current dollar average hourly wage rates in seasonal agricultural labor for Washington state. Except for the comparison between 2003 and 2004, each year current dollar average hourly wage rates have risen and are statistically significantly different from the previous year.

Figure 27
Mean and Median of Seasonal Hourly Agricultural Wage Rates, Constant Dollars, 2000 = 100
Washington State, 2003 to 2007
Source: LMEA/ESD, Agricultural Labor Employment and Wage Trends Survey

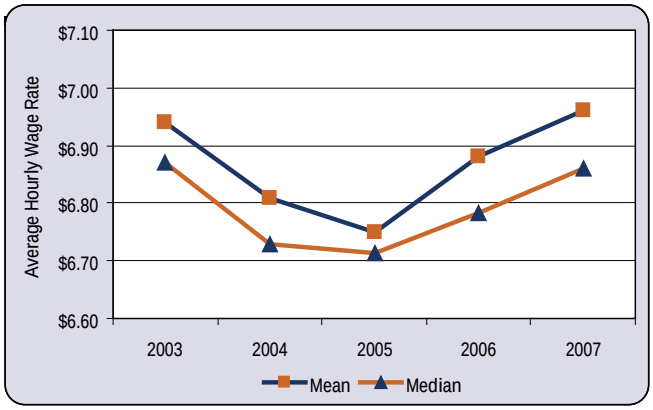


Figure 28
Paired Year-by-Year Comparisons of Average Hourly Wage Rate Increases for Seasonal Agricultural Labor, Current Dollars
Washington State, 2003 to 2007
Source: LMEA/ESD, Agricultural Labor Employment and Wage Trends Survey

Year-by-Year Comparison

	2003	2004	2005	2006	2007
2003	7.47	Not Statistically Significantly Different	Statistically Significantly Different	Statistically Significantly Different	Statistically Significantly Different
2004	--	7.51	Statistically Significantly Different	Statistically Significantly Different	Statistically Significantly Different
2005	--	--	7.67	Statistically Significantly Different	Statistically Significantly Different
2006	--	--	--	8.00	Statistically Significantly Different
2007	--	--	--	--	8.38

Figure 29
Paired Year-by-Year Comparisons of Average Hourly Wage Rate Increases for Seasonal Agricultural Labor, Constant Dollars, 2000 = 100
Washington State, 2003 to 2007
Source: LMEA/ESD, Agricultural Labor Employment and Wage Trends Survey

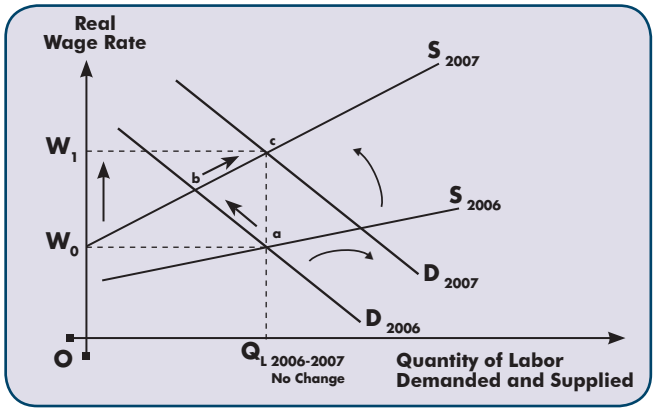
Year-by-Year Comparison

	2003	2004	2005	2006	2007
2003	6.94	Statistically Significant Difference at Probability 0.036	Statistically Significant Difference at Probability 0.001	Not Statistically Significantly Different	Not Statistically Significantly Different
2004	--	6.81	Not Statistically Significantly Different	Not Statistically Significantly Different	Statistically Significant Difference at Probability 0.034
2005	--	--	6.75	Statistically Significant Difference at Probability 0.051	Statistically Significant Difference at Probability 0.003
2006	--	--	--	6.88	Statistically Significant Difference at Probability 0.106
2007	--	--	--	--	6.96

However, *Figure 29* displays the statistical test for the same years in constant dollar terms and thus allows us to make more accurate predictions of changes in average hourly wage rates over time. Here the picture is somewhat different. Most important for the present discussion, constant dollar average hourly wage rates rose from $6.88 in 2006 to $6.96 in 2007. This increase is statistically significant at a probability of 0.106. That is, the chances are only one out of 9.4 that the true difference between the two years is actually zero. These are not high odds, but the sample sizes being tested are small, and so the acceptance of statistical significance in this case is not unwarranted. Note also, that there is no statistically significant difference in constant dollar average hourly wage rates between 2003 and 2007.

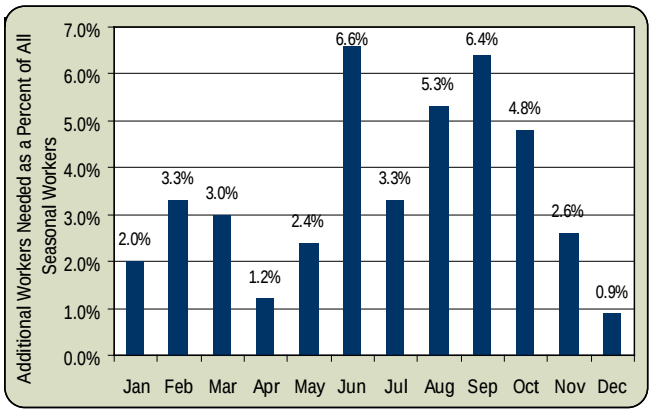
Discussion of the Test

We see in *Chapter 2* that overall, total and seasonal agricultural employment was effectively the same between 2006 and 2007, the total annual average being 93,600 jobs in 2006 and 94,800 jobs in 2007. Seasonal employment was similar, too, being 32,000 in 2006 and 31,800 in 2007. The patterns of employment across major crops and growing areas also were not dramatically different, especially for the most important tree fruit crops. Other measures of unemployment decreased; job vacancies in agriculture increased; continued claims in unemployment insurance continued to fall annually; and, there was increased demand for H-2A workers. These phenomena suggest that the agricultural labor market in Washington has been tightening over the past couple of years. For all these phenomena to be happening simultaneously, it is most likely the case that the overall supply of agricultural labor has been falling over time. In response, agricultural producers have maintained required employment levels by increasing the constant dollar average hourly wage rate. The following diagram displays this process graphically.



Discussion: The point of departure is the 2006 growing and harvest season. At this time, the average hourly wage rate being paid is W_0. As estimated by LMEA, this sum is $6.88 in constant dollars, 2000=100 (*see Figure 29*). The quantity of labor demanded and supplied in 2006 is equal to the quantity Q_L. The actual estimate is an average annual employment of 93,580 workers of whom 32,014 were seasonal workers. Next, for a number of reasons, the labor supply decreased in 2007, shifting from the curve labeled S_{2006} back and up to the curve labeled S_{2007}. Responding to this decrease in supply, growers raised the constant dollar wage rate to W_1 in 2007, or $6.96 in 2000 constant dollars. Workers responded by offering more labor along their S_{2007} supply curve from b to c. Thus, in 2007 Q_L is almost the same as in 2006: 94,810 total employment and 31,842 seasonal employment.

Figure 30
Percent of Reported Labor Shortage by Month
Washington State, 2007
Source: LMEA/ESD, Agricultural Labor Employment and Wage Trends Survey



Note: These values represent the percent of additional workers reported as needed by reporting employers, weighted by the size of that employer's seasonal employment.

Grower Experience with Reported Labor Shortages, 2007

Figure 30 reports on the percentage of agricultural producers who reported a labor shortage in any given month during 2007, weighted by the size of that employer's labor force, so that the data represent the estimated percentage shortage of workers, rather than a percent of employers who report a shortage. As can be expected, the data show a distinct seasonal pattern, peaking in June at a worker shortage of 6.6 percent when sweet cherries come on line, dropping in July and then rising to a peak of 6.4 percent in September when the apple harvesting season reaches its peak demand for labor. Note that we do not know if these shortages persisted *after* the producers offered increased wage rates, or if they are shortages reported at the current level of wage rates. A shortage that persists even after constant dollar wage rates have increased is more critical to the agricultural sector than a shortage that exists at a constant dollar wage rate offer that is insufficient to draw forth additional labor into the agricultural labor market.

Since constant dollar wage rates did increase by 1.2 percent, we can assume that at least some of these shortages persisted after wage rate offers increased.

A Structural Shortage Versus Spot Shortages

Growers become understandably frustrated when economists draw fine distinctions between a generalized shortage of labor due to major changes in national policy toward immigrant labor and spot shortages that occur due to seasonal weather fluctuations vis-à-vis specific crops and locales. In recognition of their concern, it is correct to point out that any given spot shortage can be exacerbated by a general reduction in the supply of agricultural labor, other things held constant. And, in fact, it appears that the general level of agricultural labor supply has been decreasing over time both nationally and in Washington state.

Thus, it is possible for spot shortages to increase in frequency, size, and location as the annual average size of the agricultural labor force decreases. Improved information to allocate scarce labor, as well as wage increases where spot shortages occur, can ease spot shortages, but there is the possibility that at some point increasing wage rates can result in pirating labor from producers who are less able to raise wage rates. Labor pirating on the West Coast was a widespread problem in agriculture during World War II and required national legislation to keep it under control.[6]

We do not know at this time whether the Washington agricultural economy has reached the point at which spot shortages are being worsened by the general drop in agricultural labor supply. The opinions of agricultural producers in the shaded box, "Media-Reported Reasons for Spot Shortages," suggests that there is still some room to increase employment by improving the wage offer or by improving the quantity, quality, and timeliness of labor market information.[7] Apart from the concern over a reduced supply of seasonal and migrant workers per se, producers have made three broad classes of observations on the shortage problem:

1. Failure to provide certain amenities, such as housing, failure to provide or properly establish a bonus incentive for workers to stay until the harvest is completed, and providing differential wage rates for different agricultural functions are all identified by growers as reasons why a grower's labor force may not appear or may melt away.

2. A different problem lies in the fact that weather patterns create agricultural winners and losers. In a piece work payment situation, the growers who have a thin crop implicitly offer lower earnings (defined as the actual hourly wage rate times hours worked) than do those growers with a more abundant crop. Growers who are not diversified either in terms of different varieties of the same crop, or in terms of different crops also face this possibility. An offer of higher wages will likely cure the problem but may place the grower in a deficit financial position. In such a situation, the grower may have to leave some or all of a given crop unharvested.

3. Finally, bad luck in the form of localized adverse weather can place a particular grower's planting, tending, and harvest process out of synchronization with the rest of the growers in a region, again resulting in the grower's labor force melting away or otherwise being inadequate.

Technological Responses to the Long-Term Decline in Labor Supply and Seasonal Spot Shortages[8]

Labor has long been recognized as the most difficult production input to manage and provide for. This situation is clearly exacerbated by the conditions of uncertainty under which agricultural production takes place. An important response to this general problem of uncertainty in the supply of and cost of labor is to replace labor with technology. Note first that agriculture has always been characterized to improve output and profits primarily by improving technology, and not by adding additional inputs in the form of land and labor. Indeed, in recent years, Washington state growers have been national leaders in improving agricultural productivity (see *2005 Agricultural Workforce in Washington State, Chapter 5*, pgs. 86 to 88.)

Media-Reported Reasons for Spot Shortages

Interdependence of Overall Labor Supply and Spot Shortages in Labor Supply:

"There wasn't a shortage per se but a spot shortage," Wines said, "caused by increased demand due to larger crops."

"Just because the numbers (average annual seasonal labor employed) are up doesn't mean there wasn't a shortage," said Kirk Mayer, manager of the Washington Growers Clearing House Association in Wenatchee. *The Wenatchee World*, 04/23/2007. Definition in parentheses added.

Shortage Due to Insufficient or Untimely Job Vacancy Information:

- **Insufficient information/outreach concerning the employment needs of a given grower.** "Pickers plentiful for littler harvest," Tri-City Herald, 10/02/07.

Shortage Due to Real Wage Rates Being too Low:

- **Failure to provide certain amenities.** "Taking care of the workers is the only way to ensure enough help to get through the harvest," growers said. "Pickers plentiful for littler harvest," *Tri-City Herald*, 10/02/07. "People that have housing are the ones that will be able to capture the available workforce," said Gary Hudson, Zirkle's Selah-based spokesman," *Tri-City Herald*, online, 03/17/07.

- **No bonus incentive for staying until the end of harvest.** "Pickers plentiful for littler harvest," *Tri-City Herald*, 10/02/07.

- **Differential wage rates for harvesting different crops or performing different functions.** "Workers who had been harvesting asparagus spears recently moved on to the cherry crop, leaving some asparagus growers to plow up their remaining harvest." Worker shortage takes toll on crops, *The Seattle Times*, online 06/26/07. "Almost all growers need people to thin apples since workers prefer picking cherries, where they can make more money," he (Kirk Mayer) said. *The Wenatchee World*, 06/27/07. "Gonzalez said about half the workers at the Monitor camp have jobs and the

rest are looking for jobs. They don't want to work at thinning (paid at an hourly rate). They want the big bucks – cherry time," he said. *The Wenatchee World*, 06/19/07.

Shortage Due to Expected Earnings Being too Low/Employment Being too Unstable:

- Having only a single variety or type of a given crop. Relative lack of a diverse agricultural sector in a given locale that offers longer term employment possibilities due to the diversified growing, tending, and harvest processes. "We could have used a few more pickers, but we weren't as desperate as some of the farms because we have so many varieties that we can keep the pickers busy," Raap said. "Pickers plentiful for littler harvest," *Tri-City Herald*, 10/02/07.

- A light or thin crop. "Gale Vradenburg… said labor is tight, but not critical. He said there are spot shortages because crops are light." "Pickers are paid by how much they pick and they know they can make more money in orchards with heavy crops than in those with lighter crops," he said. *The Wenatchee World*, 06/27/07.

Shortage Due to Local Variations in Weather Patterns:

- Short-term weather patterns. "So you get started on the next variety a few days late and then you lose a few days to rain and, all of a sudden, you are behind and don't have extra people to fill that void," Schell said. *The Wenatchee World*, 10/08/07.

It turns out now that the fiber optics, and computerization, linked with robotics of various types, have begun to make major inroads into significantly improving productivity in several functional areas by substituting capital for labor. Several important functional areas are:

- Pruning
- Thinning
- Picking
- Sorting and Packing

Technologies to substitute capital for labor in these functional areas are either in place now, or in prototype development stage.

Automated Sorting and Packing

Automated sorting and packing of the very tender Rainier Cherry has been considered by a major agricultural firm – Holtzinger Fruit Company. However, the technology has not yet been adopted.[9] The technology weds optical scanning, computerization, and robotics to view each cherry and sort that cherry by size and color. The labor on a typical packing line is expected to be reduced by about one half. In the case of Rainier cherries, once adopted, approximately 30 workers would be made redundant on each sorting line. Needless to say, this technology can be generalized to other tree fruit. This innovation is significant, since the industry each year has difficulty finding enough workers, as *Figure 30* displays, to handle any particular short term harvest – in the case of cherries, typically a little over a month duration. The problem of finding and keeping the necessary workforce is exacerbated since work on sorting and packing lines generally pays less than piece work harvesting high value crops like sweet cherries, yet the several operations occur simultaneously.

In sum, with sophisticated mechanization, the size of the surge in the seasonal labor force is reduced and the existing labor force, now smaller in size, can be given more steady work over the entire growing and

harvesting season. Two kinds of uncertainty are reduced: First, uncertainty over having enough labor at all during the surge; and second, uncertainty over the cost of the wage bill to bring in the harvest and ship it quickly and in top condition. Both the production process and the labor force become transformed.

Pruning, Thinning, and Picking

Pruning, thinning, and picking are all labor intensive activities that have high, but short-term, employment surges. Various methods are being experimented with to perform the thinning function, including mechanical devices and chemicals. Mechanical thinners are being refined so that they can more selectively thin tree fruit blossoms without causing excessive leaf and branch damage.[10]

A firm called *Vision Robotics*, along with university, industry, and government support, is developing a machine, now in prototype status, that detects the apples in trees and maps their position so that they can be picked. The technology, when perfected, can be generalized to other tree fruit. Indeed, the technology can be extended to count fruit and estimate harvest size and quality, thin fruit, and prune. The harvesting function is being concentrated on at this time, with the most difficult function being the development of a robotic hand that will pick fruit without damaging it. It is estimated that a robotic harvester will cost about $500,000 and has a payback period of just three years. This implies a profit on the investment of 33 percent – very high!

A robotic pruner is also being developed for grapes and may be in the field ready for demonstration by 2009. As with apples, imaging, artificial intelligence, and robotics are wedded to control and direct the pruning process.[11]

In short, it is clear that this technology will soon come on line and will then be generalized to a variety of tree crops and functions for each tree crop.[12] When this occurs, as with the production of tomatoes for processing[13], the demand for seasonal labor will drop off sharply.

Summary and Conclusions

The sum of the evidence suggests that in 2007 there was initially an anticipated general shortage of agricultural labor to which the growers responded by raising real wage rates. The increase in real wage rates brought forth additional supplies of agricultural labor from other sectors of the economy so that the total and the seasonal average annual labor force was essentially the same in 2007 as it was in 2006. The reasoning for this conclusion is in the discussion below.

1. Unlike 2006, the weather patterns in 2007 were similar to historical norms except for cold wet springs and dry summers that had an important impact on hay making, pasture development, and range pasturing (see USDA, NASS, *AGRI-FACTS*). These three activities do not require massive seasonal influxes of labor compared to fruits and vegetables.

2. Next, the field crops and fruits experienced a relatively normal cropping season, with the 2007 seasonal demand for harvest labor following more usual patterns, compared to 2006. Thus, overall agricultural labor demand in 2007 likely did not shift out for any given crop due to seasonal weather patterns as it did in 2006 for sweet cherries. This phenomenon allows one to assume the overall demand for labor was relatively constant initially. Given a relatively constant demand curve for agricultural labor, this allows one to infer whether there has been a change in the supply of labor, based on observing an increase in the real wage rate paid to agricultural labor.

3. Then, the evidence in *Chapter 2* suggests that the overall agricultural labor force has been secularly declining across the nation. County unemployment rates have also been falling in Washington, suggesting that overall the state labor market is tightening. Advertised job vacancies in agriculture have been increasing. Unemployment insurance (UI) continuing claims in agriculture have been falling. Certification of H-2A labor increased sharply in 2007 compared to 2006.

4. Yet, for 2007, the average annual size of the total labor force employed in Washington agriculture as well as the average annual seasonal labor force employed in Washington, are similar to 2006.

5. However, average hourly wage rate data suggests that there was a statistically significant increase in hourly real wage rates during 2007 compared to 2006.

6. Then, for real wage rates to have risen, there has to have been an initial overall reduction in labor supply which was compensated for by growers raising real wage rates and thereby drawing more people into the agricultural labor force.

7. The people drawn in, if the secular decline in agriculture UI constant claims data is any indicator, are largely persons legally eligible to work in the state. Also, H-2A workers doubled from 814 in 2006 to about 1,657 in 2007 – another indicator of a response to an anticipated shortage of undocumented seasonal workers.

8. Finally, the factor that enabled growers to offer higher real wage rates is the apparent increase in demand for agricultural products during 2007, partly driven by a rise in export prices in 2007 compared to 2006 and by the general rise in commodity prices. (*See Chapter 5*. It is estimated that about one-third of Washington's total annual agricultural production enters into international trade.)

Endnotes

[1] Strictly speaking, all of the wage rate measures in this chapter are measures of earnings. Thus, average hourly earnings include such components as overtime pay, sick leave pay, etc. The measures are variously annual total earnings, or total earnings based on some other time metric, divided by hours worked for the given time metric, such as the year, the calendar quarter, the month, or the week.

[2] There were, as of estimates reported in 2006, an estimated 7.2 million unauthorized workers in the United States out of a total of 11.1 million unauthorized individuals, the majority of whom are of Mexican origin. These unauthorized workers make up nearly 5.0 percent of the U.S. labor force. Short-term unauthorized workers (who arrived between 2000 and 2005) comprise just under 2.0 percent of the U.S. labor force and 40.0 percent are concentrated in just two industry sectors – construction and services. An estimated 120,000 short-term unauthorized workers work in farming, fishing, and forestry occupations. One can see that most of the unauthorized workers have committed themselves to the nonagricultural sector. As workers migrate from the agricultural to the nonagricultural sectors, which they have been doing over time, this will drive up wage rates in the agricultural sector, other things

equal. See: "The Labor Force Status of Short-Term Unauthorized Workers," Pew Hispanic Center, *Fact Sheet*, April 13, 2006.

[3] United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), *AGRI-FACTS*, Various issues, posted online beginning January 15, 2007 and ending December 12, 2007. See also the analysis in *Chapter 2*.

[4] The median identifies the point in the distribution where 50 percent of the observations lie below that point and 50 percent of the observations lie above that point.

[5] These data are derived from the Monthly *Seasonal Farm Labor Survey* conducted by the Labor Market and Economic Analysis branch of the Employment Security Department. The methodology used to collect these data is reported in each monthly report. The monthly reports are online and can be accessed at: **www.workforceexplorer.com.**

[6] Ham, William T., "Wage Stabilization in Agriculture," *Journal of Farm Economics*, Vol. 27, No. 1. Feb. 1945.

[7] These reasons were gleaned out of a reading of a year's clippings of articles from printed media across Washington state dealing with the agricultural sector in Washington. The reasons stated here are observations made by agricultural producers.

[8] In this discussion we do not mean to imply that the only relevant technological change is confined to capital/labor substitution. In fact, for example, every aspect of the production of, say, apples, represents the accumulation of technological advance. See, for example: "The Optimal Orchard," and "Driving Tree Performance," in *Good Fruit Grower*, Vol. 58, No. 2, January 15, 2007.

[9] "Holtzinger Fruit Co. invests in a new technology packing line that handles Rainiers with kid gloves," *Yakima Herald Republic*, June 25, 2007.

[10] Warner, Geraldine, "Mechanical blossom thinning tested on peach," *Good Fruit Grower*, Vol. 58, No. 12, July 2007.

[11] Hansen, Melissa, "Robotic pruner for grapes," *Good Fruit Grower*, Vol. 58, No. 17, December 2007.

[12] "Robots are getting closer," *Good Fruit Grower*, Vol. 58, No. 17, December 2007.

[13] Martin, Philip, "Farm labor Shortages: How Real, What Response?" Philips reports that: "In 1960 over 80 percent of the 45,000 peak-harvest workers, employed to pick the state's (California) 2.2 million ton processing tomato crop into 50 to 60 pound lugs, were Mexican Braceros. A decade later all the state's processing tomatoes were harvested mechanically." *Giannini Foundation of Agricultural Economics, University of California,* p. 10, November 2007.

Employment, Unemployment, Job Vacancies, and the Insured Unemployed

Introduction

This chapter focuses on the statewide structure of employment and unemployment to shed light on the continuing question of the adequacy of seasonal and migrant agricultural labor supply for Washington state during 2007. It presents employment, unemployment, and job vacancy data for the agricultural sector and for those counties and major statistical areas[1] that have a high percentage of the state's agricultural production.

Overall Situation of Employment Growth

The Washington state agricultural sector operates in the context of the overall national economy. Events in the national economy, such as the tightening of immigration controls, the changing foreign exchange rate, and rising energy prices, have a significant impact on employment, hours worked, hourly wage rates, and total earnings of agricultural workers across the state and the nation.[2] Thus, a discussion of the broad changes in the national economy and labor force sets the stage for a discussion of the Washington state economy and the agricultural sector within the state's economy.

Employment

The United States' labor force[3] grew by 1.1 percent from the end of 2006 through the end of 2007, increasing from 151,248,000 workers to 153,124,000 workers. Over the same time period, the Washington state labor force grew 2.3 percent, from 3,326,500 workers to 3,403,200 workers. This increase was greater than the 2.0 percent increase for 2006 and more than double that of the nation as a whole for 2007.

For 2005, the U.S. agricultural labor force was estimated to be 1,212,000 workers, rising to 1,287,000 in 2006 and then falling to 1,220,000 in 2007. This represents a 6.2 percent increase between 2005 and 2006 and a 5.2 percent decrease from 2006 to 2007. Between 2005 and 2006, the Washington state agricultural labor force was essentially unchanged, being estimated at 93,600 workers in 2006 (rounding to the nearest 100 workers). During 2007, the seasonally unadjusted agricultural labor force in Washington state, averaged over 12 calendar months, was estimated to be 94,800 workers. This represents a 1.3 percent increase over 2006 – an interesting fact in light of the recent concern over the employment of undocumented workers in the United States.

Unemployment

The estimate of the number and percent of individuals in the labor force who are unemployed is a measure of the number of workers who are out of work, looking for work, and therefore available for hire by producers. Thus, the level and percent of unemployment in the total labor force is one indicator of the tightness of the labor market – how hard it is for employers to hire additional qualified workers at current wage rates.[4]

At the national level, the seasonally adjusted unemployment rate for 2005, 2006, and 2007 was estimated at 5.1 percent, 4.6 percent, and

4.6 percent, respectively. It rose to 5.1 percent in March 2008. Statewide, for the same three years, the unemployment rate is estimated to be 5.5 percent, 5.0 percent, and 4.7 percent. In February 2008 the seasonally adjusted unemployment rate is estimated to be 4.5 percent. Thus, the state unemployment rate has fallen over the most recent three-year period while the national rate leveled off and now has begun to rise.

National Estimates of Unemployed Hired Farm Workers

Figure 31 presents national estimates of the unemployment rate and unemployment level of hired farm workers.[5] The important fact to note from this figure is that as of 2004, the rate of unemployment and the number of unemployed hired farm workers began to drop, falling from 12.9 percent and 100,000 estimated unemployed hired farm workers in 2003 to just 9.4 percent and 78,000 unemployed workers in 2006. This suggests that, nationwide, the agricultural labor market began to tighten up starting around 2004 and into 2005, when political concern over undocumented workers began to gain the attention of the nation.

Figure 31
The Unemployment Rate and Level of Hired Farm Workers Unites States, 1997 to 2006
Source: U.S. Congress, Congressional Research Service, Linda Levine, "Farm Labor Shortages and Immigration Policy," Table 4, p. CRS-12

Year	Hired Farm Workers Unemployment Rate	Hired Farm Workers Unemployment Level	Unemployment Rate for All Occupations
1997	10.6	106,000	4.9
1998	11.8	117,000	4.5
1999	10.6	100,000	4.2
2000	10.6	104,000	4.0
2001	12.1	103,000	4.7
2002	11.4	102,000	5.8
2003	12.9	100,000	6.0
2004	11.4	92,000	5.5
2005	9.0	72,000	5.1
2006	9.4	78,000	4.6

Agricultural County, MSA, and MD Unemployment Rates, 2007 Versus 2006

Figure 32 shows the estimated monthly unemployment rates in key agricultural counties and selected metropolitan statistical areas (MSA) and metropolitan divisions (MD) during peak growing and harvesting months. The data in this table are *estimated values*, not *sample statistics*.[6] Therefore, we take as strong evidence of change a difference in the unemployment rate between different months and years of at least 0.5 of one percent. Also, we are interested mainly in the *direction of change* rather than the absolute value of any given estimate. Finally, we contrast the key growing counties with the official statistical areas since these areas represent large regional labor markets and will draw labor from rural areas.

When one contrasts the changes in unemployment rates for 2005 versus 2006[7] with those of 2006 versus 2007, there is a definite change between the two periods. The difference in unemployment rates between 2006 and 2007 has increased across the board, with the unemployment rates dropping sharply in 2007 relative to 2006. In May, June, July, August, and September, the unemployment rate has dropped by 0.5 percent or better in all but one or two of the agricultural counties measured. For the major statistical areas, the labor market tightened up in May, June, and August for all but one or two of the major statistical areas.

Figure 32
Comparison of Selected Unemployment Rates by Season
Selected Counties, MSAs, and MDs, 2006 and 2007
Source: LMEA/ESD, Resident Civilian Labor Force and Employment, Benchmark: 1st Quarter 2007
http://www.workforceexplorer.com/admin/uploadedPublications/1886_laus_historical.xls

Unemployment Rate

County, MD or MSA	May 2006	May 2007	June 2006	June 2007	July 2006	July 2007	August 2006	August 2007	September 2006	September 2007	October 2006	October 2007
Key Agricultural Counties												
Benton	5.4	4.3	5.6	4.5	5.5	5.1	5.5	4.5	4.8	4.2	4.6	4.0
Franklin	5.9	4.9	6.0	5.0	6.6	5.9	5.9	5.0	5.3	4.5	5.1	4.4
Grant	6.7	5.0	5.5	4.6	5.4	4.8	5.3	4.4	4.4	3.9	4.2	3.9
Okanogan	6.2	6.0	5.9	5.3	5.0	4.5	6.1	5.1	4.7	4.1	4.4	4.0
Skagit	5.1	4.5	5.4	4.6	5.1	4.7	5.1	4.4	4.6	4.1	4.2	4.1
Walla Walla	5.4	4.4	5.4	4.5	5.2	4.7	5.1	4.3	4.5	4.1	4.0	3.7
MD/MSAs												
Bellingham MSA[2]*	4.5	3.9	4.9	4.2	4.7	4.4	4.6	4.0	4.2	3.9	3.8	3.7
Bremerton MSA[2]	4.7	4.2	5.2	4.5	5.1	4.6	5.0	4.3	4.6	4.2	4.2	4.0
Olympia MSA[2]	4.5	4.1	4.9	4.4	4.9	4.5	4.8	4.3	4.4	4.2	4.0	4.0
Seattle MD[1]	4.4	3.7	4.4	3.8	4.1	3.5	4.0	3.4	4.4	3.8	4.1	3.7
Spokane MSA[2]	4.8	4.1	5.1	4.5	5.1	4.9	5.0	4.6	4.4	4.3	4.1	4.1
Tacoma MSA[2]	5.1	4.4	5.5	4.8	5.4	5.0	5.3	4.7	4.8	4.5	4.5	4.3
Wenatchee MSA[2]*	5.3	4.9	4.4	3.9	3.7	3.7	5.5	4.4	3.8	3.5	3.5	3.6
Yakima MSA[2]*	6.7	5.8	6.0	5.2	5.7	5.5	6.8	5.7	4.9	4.4	4.6	4.2

Notes: [1] MD = Metropolitian Division
[2] MSA = Metropolitan Statistical Area
* Bellingham, Wenatchee, and Yakima MSAs are significant agricultural labor markets.

Remember that the major statistical areas are large, with a wider variety of jobs, and will tend to draw labor from the rural areas of the state and the rural areas immediately surrounding them, in particular.

In short, the 2006 to 2007 labor market period has tightened almost uniformly for both the state's agricultural counties and the major statistical areas compared to the 2005 to 2006 period. Overall, the available supply of workers out of work and looking for work stays tight from May to August, easing off only in October for the agricultural counties and in September for the major statistical areas.

Estimates of Unemployed Workers Available for Work

Figure 33 compares the absolute number of workers unemployed during the month of January for 2006 and 2007 against the number of unemployed in the peak month of economic activity for the counties, MSAs, and MDs. With respect to both the key agricultural counties and the three types of statistical areas, note that for January 2006 and 2007, the total number of unemployed is very similar. For the counties, it is 18,870 versus 18,910 unemployed workers, respectively. For the major statistical areas, it is 141,270 in 2006 versus 142,340 in 2007.

Figure 33
Total Unemployed Workers Available for Work, January versus Peak Employment Month
Selected Counties, MSAs, and MDs, 2006 and 2007
Source: LMEA/ESD, Resident Civilian Labor Force and Employment, Benchmark: 1st Quarter 2007
http://www.workforceexplorer.com/admin/uploadedPublications/1886_laus_historical.xls

	January	2006 Peak Employment Month	Difference	January	2007 Peak Employment Month	Difference
Key Agricultural Counties						
Benton	5,630	3,940	-1,690	5,320	3,570	-1,750
Franklin	2,700	1,470	-1,230	2,990	1,410	-1,580
Grant	3,470	1,750	-1,720	3,570	1,710	-1,860
Okanogan	1,720	1,030	-690	1,800	930	-870
Skagit	3,360	2,380	-980	3,360	2,400	-960
Walla Walla	1,990	1,180	-810	1,870	1,120	-650
Total	18,870	11,750	-7,120	18,910	11,240	-7,670
MD/MSAs						
Bellingham MSA[2]*	4,970	3,960	-1,010	5,340	3,960	-1,380
Bremerton MSA[2]	5,820	5,080	-740	6,140	5,000	-1,140
Olympia MSA[2]	6,020	4,970	-1,050	6,400	5,160	-1,240
Seattle MD[1]	60,100	55,260	-4,840	59,020	48,270	-10,750
Spokane MSA[2]	13,210	9,360	-3,850	13,750	9,430	-4,320
Tacoma MSA[2]	20,100	16,770	-3,330	20,690	16,820	-3,870
Wenatchee MSA[2]*	3,760	2,190	-1,570	3,980	2,290	-1,690
Yakima MSA[2]*	10,620	5,750	-4,870	10,300	5,320	-4,980
Total	141,270	118,410	-22,860	142,340	109,180	-33,160

Notes: [1] MD = Metropolitian Division
[2] MSA = Metropolitan Statistical Area
* Bellingham, Wenatchee, and Yakima MSAs are significant agricultural labor markets.

However, when we compare the numbers of unemployed during the month of peak activity for the labor market area in question, we see that for the agricultural counties, total unemployment dropped 7,120 workers in 2006 but the drop increased to 7,670 workers in 2007 – a decrease in the unemployed between the two years of 550 workers. For the major statistical areas, the count of unemployed workers declined by 22,860 for the peak activity months of 2006 but the decline was 33,160 workers for the peak month in 2007 – a difference between the two years of 10,300 workers. Again, the evidence suggests that the labor markets in the agricultural counties and major statistical areas became tighter in 2007 compared to 2006. Note again, as the labor market tightens, employers will have to increase the wage rate offer, other things equal, to keep their existing labor force and to gain additional qualified workers.

Labor Market Flexibility – Total Employment Levels and Seasonal Changes

Figure 34 compares the total number of employed workers in 2007 for the key agricultural counties with selected major statistical reporting areas. The labor markets of the key agricultural counties are relatively small and do not exceed 100,000 workers. Likewise, except for the major statistical reporting areas that have large agricultural sectors – Bellingham, Wenatchee, and Yakima – the key statistical reporting areas have large labor markets exceeding 100,000 workers, with a seasonal employment pattern that is quite different from that of the key agricultural counties.

Figure 34
Total Employment, January to Peak Employment Seasonal Surge
Selected Counties, MSAs, and MDs, 2007
Source: LMEA/ESD, Resident Civilian Labor Force and Employment, Benchmark: 1st Quarter 2007

	January Employment	Peak Employment Month	Peak Employment	Employment Gain	Percent Difference
Key Agricultural Counties					
Benton	77,210	6	88,320	11,110	14.4
Franklin	27,420	6	31,360	3,940	14.4
Grant	33,760	10	42,360	8,600	25.5
Okanogan	16,440	7	25,280	8,840	53.8
Skagit	53,510	7	56,000	2,490	4.7
Walla Walla	26,530	10	28,930	2,400	9.0
Total	234,870		272,250	37,380	15.9
MD/MSAs					
Bellingham MSA[2]*	99,560	11	104,790	5,230	5.3
Bremerton MSA[2]	116,560	11	120,100	3,540	3.0
Olympia MSA[2]	120,690	11	125,540	4,850	4.0
Seattle MD[1]	1,356,550	12	1,404,280	47,730	3.5
Spokane MSA[2]	219,540	11	228,690	9,150	4.2
Tacoma MSA[2]	364,000	11	381,220	17,220	4.7
Wenatchee MSA[2]*	52,310	7	71,660	19,350	37.0
Yakima MSA[2]*	104,240	9	120,770	16,530	15.9
Total	2,433,450		2,557,050	123,600	5.1

Notes: [1] MD = Metropolitian Division
[2] MSA = Metropolitan Statistical Area
* Bellingham, Wenatchee, and Yakima MSAs are significant agricultural labor markets.

Viewing the counties, note that the employed labor force is quite flexible over the season. The small market of Okanogan County expands by 53.8 percent from the base month of January 2007 to the peak month of July. The average peak month expansion of the key agricultural counties is 15.9 percent over the season. In contrast, the average peak month expansion is only 5.1 percent for the key statistical labor market areas. The two heavily agricultural MSAs, however, Wenatchee and Yakima, expand by 37.0 and 15.9 percent, respectively. Overall, the agricultural counties *expanded* their peak season employment in 2007 compared to 2006, with Benton and Franklin counties increasing their peak employment from 9.5 percent in 2006 to 14.4 percent in 2007. On the other hand, the Yakima MSA decreased its peak employment from an increase of 25.4 percent in 2006 to just 15.9 percent in 2007.[8] With respect to the major agricultural growing areas, these expansions are clearly related to the seasonal, year-to-year, growing and harvesting patterns. The point is that the agricultural labor market, thus far, appears to readily respond to these variations in seasonal patterns.

Job Vacancies Over Time

Job vacancies are another indicator of how loose (easy to hire workers at existing wage rates) or tight (hard to hire workers at existing wage rates) the agricultural labor market has become. The data in *Figure 35* present the vacancies that exist in the production agricultural sector at existing wage rates.

Figure 35
Job Vacancy Data for the Production Agriculture Industry (NAICS 11)
Washington State, October 2005, 2006, and 2007
Source: LMEA/ESD, Job Vacancy Survey

Workforce Development Area	2005 Vacancies	2005 Percent Full Time	2005 Percent Permanent	2005 Percent New	2006 Vacancies	2006 Percent Full Time	2006 Percent Permanent	2006 Percent New	2007 Vacancies	2007 Percent Full Time	2007 Percent Permanent	2007 Percent New
1	5	100%	100%	0%	43	100%	100%	41%	4	100%	100%	0%
2	20	83%	83%	0%	53	100%	100%	16%				
3	13	100%	100%	0%	29	100%	100%	34%	19	100%	100%	100%
4	6	0%	100%	0%	88	100%	100%	21%	37	100%	100%	100%
5	84	100%	0%	0%	1,017	99%	96%	30%	149	97%	71%	71%
6					66	100%	100%	0%	4	100%	100%	100%
7					62	100%	100%	35%	21	100%	100%	100%
8	86	100%	44%	0%	7	100%	100%	0%	627	14%	13%	13%
9	61	0%	0%	0%	24	100%	100%	47%	245	61%	20%	20%
10	462	35%	68%	0%	35	100%	88%	17%	520	2%	2%	2%
11	28	100%	100%	0%	11	100%	100%	0%	22	83%	83%	83%
12	5	100%	100%	0%	89	100%	100%	9%				
Grand Total												
October	770	52%	55%	0%	1,524	99%	97%	26%	1,648	30%	21%	21%
April[1]	1,525	89%	27%	19%	1,700	79%	8%	53%	2,745	30%	9%	52%

Notes: [1] These data are taken from 2006 Agricultural Workforce in Washington State, Exhibit 4.4, page 44.
Percentages may not equal 100 due to rounding.

Figure 35 shows the detail on job vacancies for October and a summary of the data for April 2005 through 2007.[9] Note that for all three years, vacancies are higher in April than in October. For 2005, April vacancies were 2.0 times higher than in October. This ratio declines to 1.1 in 2006 and rises again to 1.7 in 2007. More vacancies were reported in absolute and percentage terms in 2007 than in 2006.

Just as important, by both seasonal month and year, vacancies are rising over time – that is, agricultural producers are increasing the number of job offers relative to previous years. April vacancies were 2,745 in 2007 but only 1,525 in 2005 – an 80 percent increase. October vacancies in 2005 were 770, but this vacancy level increased to 1,648 in 2007 – an increase by a factor of 2.1. In short, job offers are increasing over time at current agricultural wage rates. This indicates that agricultural producers were bidding for more workers in the available labor pool.

H-2A Certifications: United States Compared to Washington State

Threats of shutting down the border between Mexico and the United States along with threats of increased prosecution of employers who knowingly hire undocumented workers have increased the number of agricultural employers seeking H-2A workers both nationwide and in Washington state. As *Figure 36* shows, since 2004, when pressure to halt the flow of undocumented workers into America began, the number of Department of Labor H-2A certified employers has increased from 6,691 to 7,491 – 12 percent. In addition, the number of certified foreign workers has increased from 44,619 to 76,818 – 72 percent. As noted above, the agricultural labor force was estimated to be 1,220,000 in 2007. A large proportion of these are undocumented workers. The 2007 National Agricultural Worker Survey estimates the proportion at 52.0 percent over the period 2005 to 2007.[10] The challenge facing the H-2A Program is considerable, therefore, if this program, or one similar to it, is to supply the necessary legal workers to replace undocumented workers.

Figure 36
H-2A Certifications
United States, Fiscal Years 2004 to 2007
Source: United States Department of Labor, H-2A Certification
http://www.foreignlaborcert.doleta.gov/h-2a.cfm

Year	Employers	Workers
2004	6,691	44,619
2005	6,602	48,366
2006	6,550	59,112
2007	7,491	76,818

In Washington state, for 2007, growers requested 1,804 workers and had 1,525 of these certified. An additional 987 WorkSource referrals were provided to agricultural growers. One should contrast this number with the average annual size of the agricultural labor force – an average of approximately 94,000 workers a year in recent history – and with the annual seasonal surge which in July 2007 amounted to 70,150 additional workers compared to the workforce employed in January 2007.[11]

Unemployment Compensation: Agriculture Compared to Nonagriculture

A final approach to view the issue of the changing demand for labor and the labor market's ability to respond to potential labor shortages is to compare the unduplicated claims for unemployment compensation benefits in production agriculture with those claims in the nonagricultural sector of the Washington economy. *Figures 37 and 38* display the historical picture of the change in continuing claimants for the agricultural and nonagricultural labor markets in the state.

Figure 37
Unduplicated Continued Claimants for Unemployment Insurance, Agriculture Sectors
Washington State, 2004 to 2007
Source: LMEA/ESD, Continued Claim File; Appendix 9

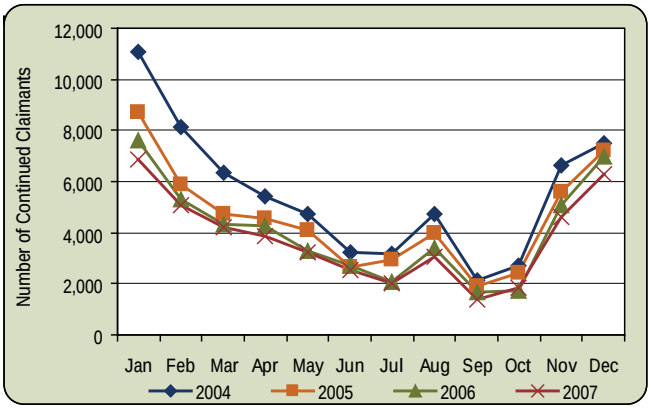
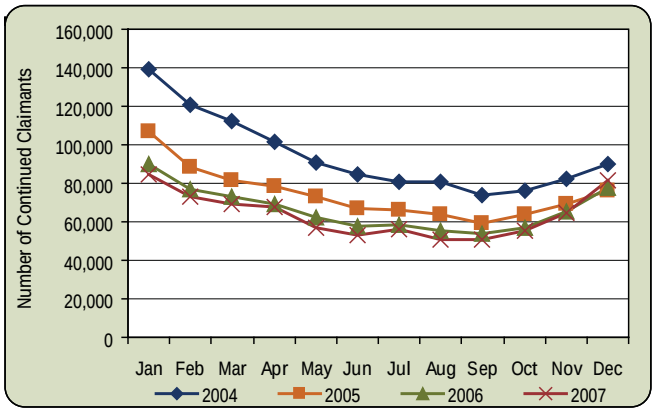


Figure 38
Unduplicated Continued Claimants for Unemployment Insurance, Nonagriculture Sectors
Washington State, 2004 to 2007
Source: LMEA/ESD, Continued Claim File; Appendix 9



As noted before, recent concerns over a general shortage of seasonal and migrant labor became an increasing concern of agricultural producers beginning in 2005, based on a review of media articles during that year. However, the statewide labor market and the agricultural labor market began tightening between 2003 and 2004. (At this time, the state unemployment rate has continued to drop into February 2008.)

As of 2003, there were 129,973[12] unduplicated continuing claimants for unemployment insurance benefits in the nonagricultural sector and 6,849 such claimants in the agricultural sector. As shown in *Appendix 9*, by 2004, this number had dropped to 99,787 for the nonagricultural labor market and 5,488 for the agricultural labor market – a single year change of 23.2 percent and 19.9 percent, respectively.

By 2007, the nonagricultural continuing claimants had dropped to 63,629 and the agricultural labor market continuing claimants had dropped to 3,749. Compared to 2003, these changes represent, respectively, a 51.0 percent drop and a 45.3 percent drop in continuing claimants. For 2007 compared to 2003, there were an estimated 3,100 fewer individuals who could have worked full time in the agricultural producing sector. Looking at it another way, the agricultural economy has, in effect, absorbed an additional 3,100 continuing claimants and the nonagricultural labor market sector has absorbed an additional 30,186 continuing claimants.[13] Clearly, the statewide and the agricultural labor markets have been steadily tightening up over the past four years.

Seasonal Continued Claimants Compared to Seasonal Employment

A final indicator of both the flexibility of the agricultural labor market and the increasing tightness of this labor market can be shown by comparing the seasonal continuing claimants to the seasonal component of agricultural employment during the 2005 to 2007 period (*Figure 39*).

Notice first, that except for June and October of 2006, monthly continued claimants drop consistently from 2005 to 2007, just as shown in *Figure 37*. Second, for all 12 months, note that the share of continued claimants compared to the seasonal component of the agricultural labor force in 2007 was consistently lower than the same share for 2005.

Figure 39
Seasonal Pattern of Unduplicated Continued Claimants Compared to Seasonal Component of Employment in Agriculture
Washington State, 2005, 2006, and 2007
Source: Continued Claimants - UI Unduplicated Continued Claimant Data, LMEA/ESD, Data Warehouse
Seasonal Employment - LMEA/ESD, Agricultural Labor Employment and Wage Trends Survey

	2005			2006			2007		
Month	Continued Claimants	Seasonal Employment	Continued Claimants as a Percent of Seasonal Employment	Continued Claimants	Seasonal Employment	Continued Claimants as a Percent of Seasonal Employment	Continued Claimants	Seasonal Employment	Continued Claimants as a Percent of Seasonal Employment
January	8,702	9,460	87.1	7,619	12,771	59.7	6,881	11,934	57.7
February	5,865	14,672	40	5,285	15,756	33.5	5,096	15,305	33.3
March	4,703	17,687	26.6	4,339	19,027	22.8	4,184	19,906	21.0
April	4,574	20,994	21.8	4,253	22,454	18.9	3,849	24,614	15.6
May	4,108	22,782	18	3,292	24,516	13.4	3,226	23,050	14.0
June	2,627	58,132	4.5	2,697	51,906	5.2	2,515	53,901	4.7
July	2,938	52,628	5.6	2,086	67,482	3.1	2,018	63,453	3.2
August	3,991	39,133	10.2	3,421	42,014	8.1	3,082	41,873	7.4
September	1,891	50,063	3.8	1,651	49,629	3.3	1,396	54,094	2.6
October	2,395	46,806	5.1	1,757	49,119	3.6	1,829	47,990	3.8
November	5,575	14,900	37.4	5,095	16,533	30.8	4,613	13,277	34.7
December	7,206	10,845	66.4	6,982	12,970	53.8	6,294	11,354	55.4
Monthly Average	4,548	29,842	15.2	4,040	32,015	12.6	3,464	31,729	10.9

Notes: Unduplicated continued claimaints are individuals who have filed at least one UI claim. They are an unduplicated count of persons legally eligible to register for waiting period credit or requesting benefit payment for one or more weeks of unemployment. This is the single most comprehensive measure of individuals in the UI system at any point in time.

For example, in January 2005, continued claimants represented 87.1 percent of the seasonal component of agricultural employment; this dropped to 57.7 percent in 2007. For six of the 12 months shown, the drop in percentage share was consistent from 2005 to 2006 and then 2007. In short, the ability of the pool of continuing claimants to meet the needs of the seasonal surge in agricultural employment has decreased over the past three calendar years.

Finally, *Appendix 10* displays continued claimants as a function of agricultural sub-sectors. Over the three-year period continued claimants have risen only in the sub-sector of crop preparation. And, they rose for vegetables and melons between 2006 and 2007. In all other areas, such claims have declined; for example, in deciduous tree fruits, such claims dropped 12.3 percent between 2005 and 2006, and a further 16.9 percent between 2006 and 2007.

Summary and Conclusions

- The labor force in Washington state grew at a faster rate in 2007 than did the United States' labor force.

- The unemployment rate in the state has continued to decline over the three-year period 2005 through 2007, whereas it has leveled off and has begun to increase for the national economy.

- The state agricultural and nonagricultural labor markets both are tightening in 2007 compared to earlier years. This means that agricultural and nonagricultural employers would have to offer higher wage rates, other things equal, to gain their desired labor force, both in terms of quantity and quality of workers.

- The overall tightening of the state labor force and the agricultural labor force in particular is further evidenced by:

    - declining unemployment rates in key agricultural and nonagricultural areas of the state;

    - increasing job vacancy rates; and,

    - decreasing continued claimants for unemployment insurance benefits.

Endnotes

[1] The major statistical areas are defined as: *metropolitan statistical areas* (MSAs), and *metropolitan divisions* (MDs).

[2] For a comprehensive discussion of the economic factors affecting the Washington state economy and labor force overall, see the *2007 Washington State Labor Market and Economic Report*, December 2007.

[3] The labor force includes those persons who are either working, according to the definitions in the U.S. Bureau of Labor Statistics *Household Survey of the Labor Force*, or who are out of work and actively seeking work.

[4] The labor force is quite elastic. For example, when the unemployment rate drops and the labor market tightens up, some individuals can move directly from being out of the labor force directly into employment, thus increasing the labor force directly, with no transition first to unemployment. An example would be a Wenatchee full-time housewife or full-time high school student – both of whom are defined as being out of the labor force – who decide to begin picking apples, and do so by applying at a nearby orchard with a help wanted sign and begin working immediately.

[5] U.S. Congress, Congressional Reference Service, Linda Levine, "Farm Labor Shortages and Immigration Policy," Table 4, p. CRS-12.

[6] Sample statistics are more reliable measures of economic activity.

[7] *2006 Agricultural Workforce in Washington State*, Exhibit 4.1, p. 41.

[8] *2006 Agricultural Workforce in Washington State*, Exhibit 4.3, p. 43. Note the typographical error in the exhibit for the Seattle-Bellevue-Everett MD. The "difference" should be 25,600 and the "Percent Change" should be 1.9.

[9] For the detail on April 2007, see the *2006 Agricultural Workforce in Washington State*, Exhibit 4.3, p. 43.

[10] See Carroll Daniel and Russel Saltz, NAWS Findings: 1989 to 2007, presented at "Immigration Reform: Implications for Farmers, Farm Workers, and Communities, "Washington, D.C., May 8, 2008. **http://migration.ucdavis.edu/cf/**

[11] See *Appendix 4*. The 70,150 estimate is based on subtracting January 2007 employment from the July 2007 peak agricultural employment: 135,490 - 65,340 = 70,150.

[12] See the *2006 Agricultural Workforce in Washington State*, Appendix Exhibit 4.1, p. 96.

[13] This is not quite correct, since claimants in agriculture could have found jobs in nonagricultural industries and vice versa. But, as an average picture, the statement suffices.

The Role of International Trade[1] with Respect to Washington State Agriculture

Introduction

> "The ability of a regional economy, like Washington, to sell goods and services in markets beyond its borders is a key determinant of its economic growth and welfare."[2]

Ten years have passed since this observation was written. Its significance, both for Washington and the nation, is greater than ever. International trade in agricultural products has expanded worldwide. Since fiscal year (FY) 2003, U.S. agricultural *exports* have risen from $56.0 billion in current dollars to a forecast of $101 billion in FY 2008 – an increase of 80.4 percent. Agricultural *imports* to the United States over the same time period have expanded from $45.7 billion in current dollars to a forecast of $76.5 billion – an increase of 67.4 percent.[3] Over the period FY 2002 to FY 2006, state exports grew by 27.5 percent in current dollars.[4] Since national prices to farm producers increased by only 15.5 percent over that period, constant dollar exports over the five-year period increased by 12.0 percent – 2.4 percent a year on average.

This chapter discusses international trade in production agriculture and processed agricultural products for the United States and for Washington state. It describes the importance of international trade to the Washington economy in terms of generating both agricultural and nonagricultural employment and earnings both in the agricultural sector and in the overall state economy.[5]

The National Context of International Trade in Agriculture

Three important international agricultural market phenomena have occurred in the past several years that directly affect Washington state agricultural exports. These are:

- a downward change in U.S. export prices due to the falling value of the dollar with key trading partners, international demand held constant;
- an increase in international demand for agricultural products; and,
- a reduction in the international supply of certain key agricultural products.

Falling Value of the Dollar

First, the value of the U.S. dollar in international trade has been falling with respect to the currency of many key U.S. trading partners. Even with no shift in demand (that is, an increase in demand) for U.S. agricultural products, foreign consumers are able to buy larger quantities of U.S. agricultural products, given their income. When the value of the dollar falls against, say, the Japanese yen, it takes fewer Japanese yen to buy one U.S. dollar. Since U.S. agricultural exports are priced in terms of U.S. dollars, agricultural products from America become cheaper for the Japanese, all other things being equal.

Increase in Demand

Second, world demand for U.S. agricultural products has increased sharply in the past several years. *The physical volume of exports is increasing even as the price of those exports is increasing.* In other words, world demand has shifted out – international consumers are buying more U.S. agricultural products at every price. There

are two major contributing reasons for this increase in demand. First, the increased demand for coarse grains to feed the bio-fuel market has reduced supplies of these grains for other uses and has caused an increase in the price of their near substitutes, for example, corn (cornflakes) versus wheat (Wheaties). Second, incomes in developing nations, such as China and India, are rising, resulting in an increase in demand for food. Consumers in these countries have a much higher income elasticity of demand for food – the extra food they buy out of each extra dollar they earn – than in the developed economies. In addition, as their incomes are rising, their diets are shifting away from grains toward the consumption of more meat. This shift creates a new competing demand for feed grains such as corn and wheat, competing with the direct consumption of these grains as human food.

Decrease in Supply

Third, world supply of key agricultural products such as rice and wheat has fallen. First, there have been adverse weather conditions – mainly drought – in several major[6] food producing nations, most notably Australia. Second, some countries, such as Argentina and China which are normally food exporters, have curtailed the export of key agricultural products for fear of having insufficient food for their citizens.

Export Versus Import Prices: Agricultural Products[7]

Figure 40 shows the indices of export and import prices, in current prices unadjusted for inflation, for selected U.S. products over the period 1997 through 2007. Since 2000, export prices of all U.S. agricultural commodities have risen 50.9 percentage points. Prices of foods, feeds, and beverages have risen 52.3 percentage points. During this same period, the import prices of foods, feeds, and beverages have risen only 28.9 percentage points.

Figure 40
Indices of Export and Import Prices, Selected Products
United States, 1997 to 2007[1]
Source: U.S. Department of Labor, Bureau of Labor Statistics and Haver Analytics

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Export Prices (2000 = 100)											
Agricultural Commodities	120.6	108.8	101.1	100.0	101.2	103.2	112.3	123.4	121.0	125.8	150.9
Foods, Feeds, and Beverages	118.6	107.1	101.9	100.0	101.0	104.1	112.8	124.6	122.1	127.2	152.3
Import Prices (2000 = 100)											
All Commodities	99.1	93.1	93.9	100.0	96.5	94.1	96.9	102.3	110.0	115.3	120.2
Foods, Feeds, and Beverages	108.4	104.9	102.0	100.0	96.1	97.3	101.8	107.6	114.6	119.2	128.9
Petroleum and Petroleum Products	66.0	44.8	60.1	100.0	82.8	85.3	103.2	134.6	185.1	223.3	249.1
Imports, Excluding Fuels (2001 = 100)	n.a.	n.a.	n.a.	n.a.	100.0	99.9	100.4	102.9	104.9	106.9	109.6

Notes: [1] These indices are not seasonally adjusted.

The export/import price changes between 2006 and 2007 have been even more dramatic. The index of prices for exported U.S. agricultural products rose from 125.8 to 150.9 – an increase of 25.1 percentage points in just two years. For foods, feeds, and beverages, over the same period, export prices rose 30.2 percentage points. In contrast, import prices for foods, feeds, and beverages rose only from an index level of 119.2 to a level of 128.9 – only 9.7 percentage points in two years. Thus, for these export products, the change (increase) in U.S. export prices is 2.1 times greater than the change (increase) in prices of agricultural imports into the United States over this two-year period (30.1 / 14.3 = 2.1).

Exports and Imports of Agricultural Products – Total U.S.

Figure 41 shows the fiscal year pattern of U.S. agricultural exports and imports since 1997. The recent surge in the *value* of U.S. agricultural exports is remarkable. Between 1997 and 2003, annual exports in billions of current dollars were relatively stable while imports gradually increased. Then, exports jumped up by $6.4 billion between FY 2003 and FY 2004. Exports then stabilized between 2004 and 2005 at about $62.4 billion. Between FY 2005 and FY 2006, the value of exports increased by 9.8 percent [(68.6 / 62.5 = 1.098) = 9.8% increase]. The value of exports continued to rise by an increase of 19.4 percent between FY 2006 and 2007; and, by an estimated 23.3 percent between FY 2007 and 2008! Over the same time period, the value of increases in annual agricultural imports to the United States has remained in the range of nine to 11 percent since 2002. In FY 2005, the balance of trade between exports and imports (i.e., total dollar exports minus total dollar imports) was only $4.8 billion, having fallen from $21.6 billion as of 1997. For FY 2008, the balance of trade is projected to be $24.5 billion. Much of this increase has been due to an increase in unit value – higher prices – for the U.S. exports. These record high prices have thus far "not yet had any dampening effect on (foreign) importers (of U.S. agricultural products)."[8] A smaller, but positive, share of the increase has been due to an increase in the physical quantity of U.S. exports.

Appendix 16 displays the current dollar value (unadjusted for inflation) of U.S. exports in detail. Given our discussion of shift in demand and changes in the value of the U.S. dollar, of consid-

Figure 41
U.S. Agricultural Trade, Current Dollars in Billions
Fiscal Years 1997 to 2008 (est.)
Source: USDA, ERS and FAS, "Outlook for U.S. Agricultural Trade," AES-57, February 21, 2008 and "Value of U.S. Agricultural Trade by Fiscal Year

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 est.
Exports	57.3	53.7	49.1	50.7	52.7	53.3	56.0	62.4	62.5	68.6	81.9	101.0
Imports	35.7	36.8	37.3	38.9	39.0	41.0	45.7	52.7	57.7	64.0	70.0	76.5
Balance	21.6	16.9	11.8	11.8	13.7	12.5	10.3	9.7	4.8	4.6	11.9	24.5

Notes: http://www.ers.usda.gov/Data/FATUS/DATA/XMS1935fy.xls

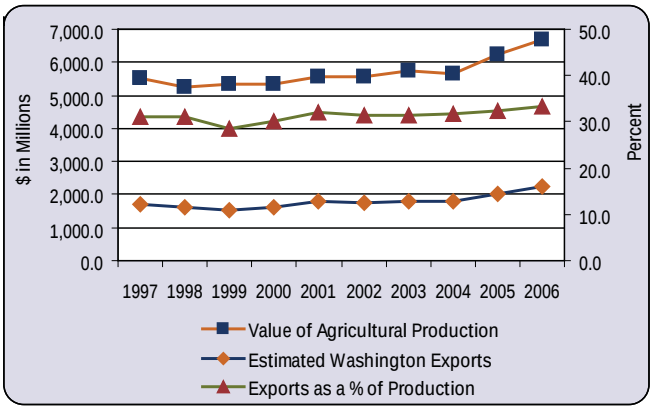
erable interest are the changes in export quantities between 2005 and 2006. Between those years, total exports increased 9.9 percent. The largest dollar volume increases occurred in feed grains and products, fruits and preparations, live animals and poultry, and other. The largest proportional increases occurred for feed grains and products (24.7 percent), live animals and poultry (18.7 percent), hides and skins (13.1 percent), feeds and fodders (12.9 percent), fruits and preparations (11.8 percent), and other (11.1 percent).

Washington State Agricultural Exports, 1997 to 2006

As of FY 2005, Washington state ranked 8th in international exports of *state-produced agricultural products*, exporting $2,035 million. For that year, this compares to California, ranked first, exporting $10,168 million, and Idaho and Oregon, ranked 23rd and 25th, respectively, at $856 million and $816 million. And, between 2005 and 2006, the value of total state-produced agricultural exports increased by 10.3 percent.

Figure 42 shows the current dollar trend of Washington state-produced exports. *Appendix 15* describes the methodology used to derive these estimated exports.[9] Exports as a share of the value of state production ranged from a low of 28.4 percent of state production in 1999 to a high of 33.4 percent of state production in 2006. Note that exports as a share of the value of total production have risen from 31.3 percent in 2002 and 2003 to 33.4 percent in 2006.

Figure 42
Ratio of State-Produced Agricultural Exports to Value of State Agricultural Production
Washington State, 1997 to 2006, Current Dollars
Source: Appendices 1 and 17



Appendix 17 displays the current dollar value of Washington state-produced agricultural exports over the period 1997 to 2006.

Of interest are the changes occurring between 2005 and 2006. Over that period, the largest absolute changes in the value of exports were in fruits and preparations (up $95.0 million), other (up $45.8 million), live animals and poultry (up $27.1 million), vegetables and preparations (up $21.1 million), hides and skins (up $13.2 million), and feeds and fodders (up $10.9 million). The largest proportional shifts in exports were for live animals and poultry (up 69.5 percent)[10], feeds and fodders (up 42.1 percent), hides and skins (up 30.0 percent), fats, oils, and greases (up 22.3 percent), other (up 13.3 percent), and fruits and preparations (up 12.9 percent).

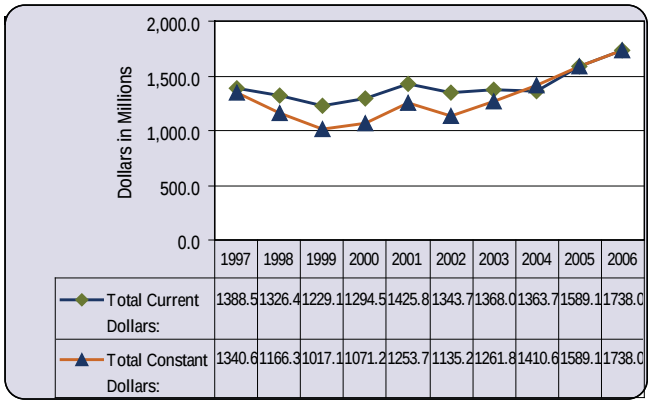
Figures 43 through 47 show both the current and constant dollar trend in the value of state-produced agricultural products by broad groupings. With the exception of live animals and poultry (*Figure 46*) and dairy products (*Figure 47*), the constant dollar value of Washington-produced agricultural exports has been trending up.

Note that we are reporting constant dollar values, so that the prices of Washington-produced *exports* have been rising faster than the general index of prices received by agricultural producers nationwide.

Wheat and Products, Feed Grains and Products, and Feeds and Fodders

Between 2003 and 2004, the constant dollar value of this export group rose 11.8 percent; between 2004 and 2005, the value rose 12.7 percent; and, between 2005 and 2006, 9.4 percent (*Figure 43*).

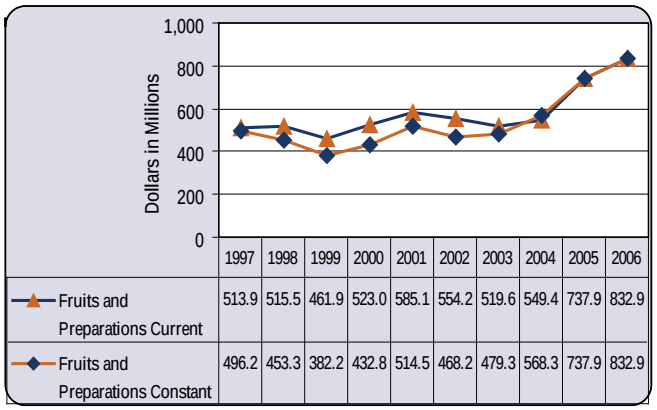
Figure 43
Export Value of Wheat and Products, Feed Grains and Products, and Feeds and Fodders, Current and Constant Dollars, 2006 = 100, Washington State Production, 1997 to 2006
Source: Appendix 17



Fruits and Preparations

Fruits and preparations are a strong suit of Washington agricultural production. Between 2003 and 2004, the constant dollar export value rose 18.6 percent; between 2004 and 2005, the value rose 29.8 percent; and, between 2005 and 2006, the export value rose 12.9 percent. Export value of fruits and preparations rose in constant dollar terms a total of 61.3 percent over the most recent four year period! (*Figure 44*).

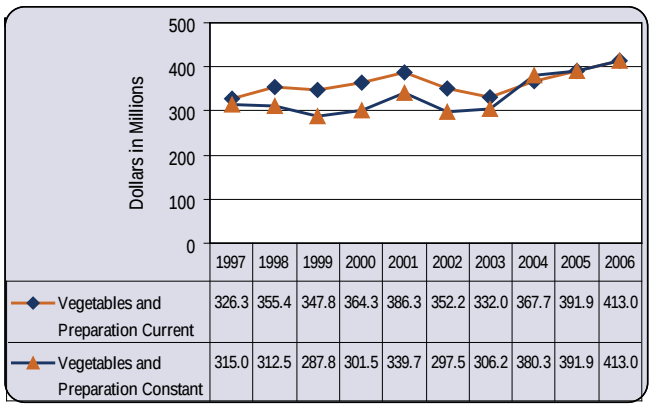
Figure 44
Export Value of Fruits and Preparations, Current and Constant Dollars, 2006 = 100, Washington State Production, 1997 to 2006
Source: Appendix 17



Vegetables and Preparations

As shown in *Figure 45*, after a sharp constant dollar export value increase of 24.2 percent between 2003 and 2004, the increase in export value dropped to 3.1 percent between 2004 and 2005 and 5.4 percent between 2005 and 2006.

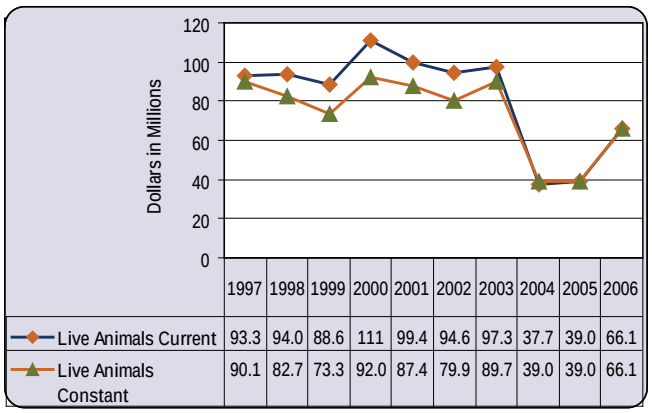
Figure 45
Export Value of Vegetables and Preparations, Current and Constant Dollars, 2006 = 100, Washington State Production, 1997 to 2006
Source: Appendix 17



Live Animals and Poultry

This export history shows the dramatic effect of international embargoes placed on Washington-produced beef cattle due to the discovery of "Mad Cow" disease in the state[11]. Between 2003, when the first infected cow was detected in Mabton, Washington, and 2004, the value of exports dropped 56.5 percent. Export value remained unchanged in constant dollar terms between 2004 and 2005. Export value then recovered between 2005 and 2006, with a 69.5 percent increase in the value of exports (*Figure 46*).

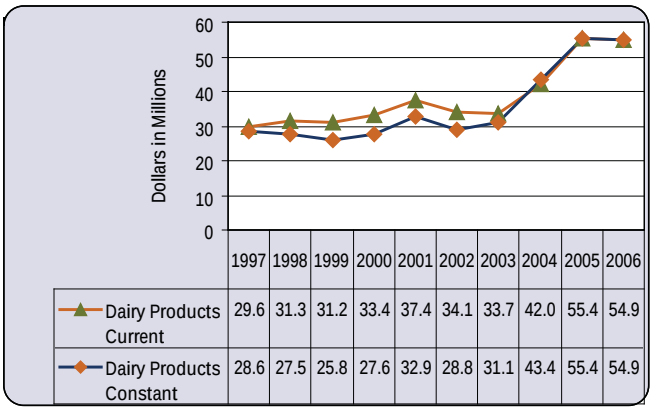
Figure 46
Export Value of Live Animals and Poultry, Current and Constant Dollars, 2006 = 100,
Washington State Production, 1997 to 2006
Source: Appendix 17



Dairy Products

As shown in *Figure 47*, the constant dollar export value of Washington-produced dairy products rose sharply by 39.5 percent between 2003 and 2004. This sharp increase was repeated with a 27.6 percent increase between 2004 and 2005. Then, between 2005 and 2006, there was essentially no change, with a small drop of 0.009 percent.

Figure 47
Export Value of Dairy Products, Feed Grains and Products, and Feeds and Fodders, Current and Constant Dollars, 2006 = 100,
Washington State Production, 1997 to 2006
Source: Appendix 17



The Role of Foreign Exchange Rates in International Trade[12]

A foreign exchange rate is simply the price of one foreign currency in terms of another. In order for an importer in the United States, such as Costco, to buy agricultural products such as Canadian hothouse tomatoes, the U.S. importer must first use American dollars to buy Canadian dollars. This is because all Canadian agricultural products are priced and sold in terms of Canadian dollars. As of 2007, the American importer would be able to buy $1.074 Canadian dollars for each $1.00 U.S. dollar (*Appendix 18*). However, in 2002, that same importer would have been able to buy $1.569 Canadian dollars for one U.S. dollar. From the standpoint of the U.S. importer, Canadian goods were 46.1 percent cheaper to the U.S. importer, and thus, the U.S. consumer, in 2002 compared to 2007. Other things equal, the U.S. consumer will now consume fewer Canadian hot house tomatoes in 2007 relative to 2002.

However, there are two aspects to each foreign exchange rate. The recent "cheapening" or "fall in value" of the U.S. dollar relative to the Canadian dollar is bad for U.S. consumers of Canadian agricultural products but good for Canadian consumers of U.S. agricultural products. And, the U.S. importer of Canadian agricultural products is adversely affected while the U.S. exporter of U.S. agricultural products to Canada is benefited. As one can see, changes in the foreign exchange rate of one currency in terms of another create both winners and losers in each pair of countries that engage in international trade.

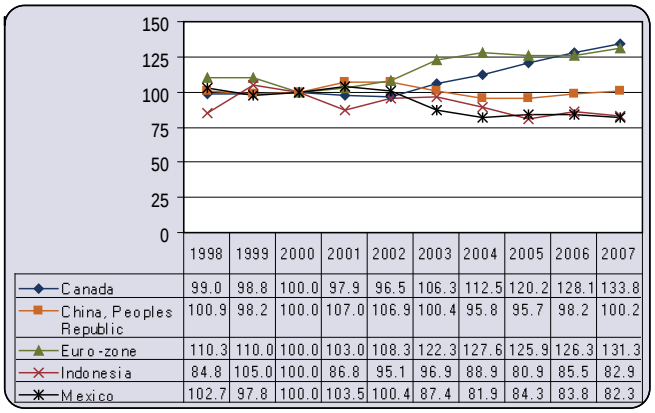
Recent Trends in Exchange Rates Among the Top Ten (as of 2007) Agricultural Trading Partners of the U.S.

Figures 48, 49, and 50 display the trend in foreign exchange rates between the United States and its top ten agricultural trade partners as of 2007 in terms of current prices. Within the top ten, Canada, the Peoples Republic of China, the Euro-zone 27 nations, Indonesia, and Mexico are top ten *exporters* of agricultural products to America and also top ten *importers* of U.S. agricultural products. In contrast, *among the top ten partners*, Taiwan, Japan, Russia, South Korea, and Turkey are only *importers* of U.S. agricultural products. And, among the top ten, the following countries export only to the United States: Australia, Brazil, Chile, Columbia, and New Zealand[13] (*Appendix 19*).

Top Ten Partners in both Exports and Imports

Figure 48 displays the trend in exchange rates for those top ten international trade partners that both import from the United States and export to the United States. The situation with Canada is the most striking. After an initial five-year period when the U.S. dollar bought more Canadian dollars, the situation reversed in 2003. By 2007, relative to the base year 2000, the value of the Canadian dollar had increased 33.8 percent. Thus, U.S. imports to Canada were 33.8 percent cheaper to Canadian consumers of, say, Washington apples, while U.S. consumers were now paying 33.8 percent more for, say, Canadian hothouse vegetables such as tomatoes, bell peppers, and cucumbers. The value of the U.S. dollar has also fallen sharply against the value of the Euro. Imports from the Euro-zone now cost U.S. consumers 31.3 percent more. This is bad news for the U.S. consumers of French wines but relatively good news for the Washington state producers of premium wines[14] as well as Euro consumers of these Washington wines. Consumers and importers in Mexico and Indonesia find U.S. agricultural produce less expensive, while U.S. consumers of imports from Mexico and Indonesia find them more expensive. With respect to China, the value of the U.S. dollar in terms of the yuan has been relatively stable over time due to the fact that until 1995, China has pegged the value of the yuan to the U.S. dollar.[15]

Figure 48
Exchange Rate Index for Top Ten Nations (2007) Exporting Agricultural Products to and Importing Agricultural Products from the United States
Select Nations, 1998 to 2007
Source: Appendix 19

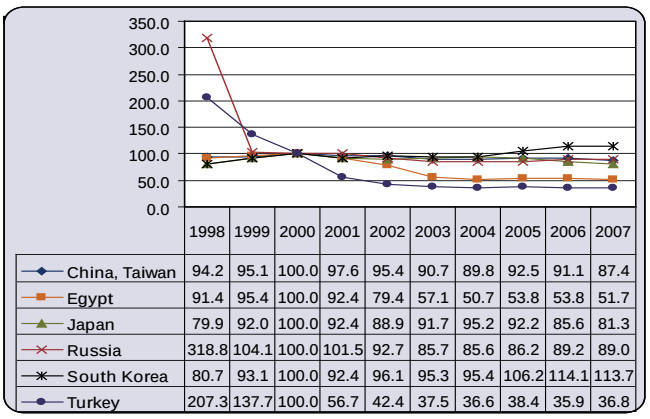


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Canada	99.0	98.8	100.0	97.9	96.5	106.3	112.5	120.2	128.1	133.8
China, Peoples Republic	100.9	98.2	100.0	107.0	106.9	100.4	95.8	95.7	98.2	100.2
Euro-zone	110.3	110.0	100.0	103.0	108.3	122.3	127.6	125.9	126.3	131.3
Indonesia	84.8	105.0	100.0	86.8	95.1	96.9	88.9	80.9	85.5	82.9
Mexico	102.7	97.8	100.0	103.5	100.4	87.4	81.9	84.3	83.8	82.3

Top Ten Partners Export Destinations Only

Figure 49 shows the trend in paired exchange rates for the five U.S. trading partners that are only in the top ten export destinations of U.S. agricultural goods. Except for South Korea, where the value of the Korean won has risen 13.7 percent against the U.S. dollar, thus inhibiting exports to South Korea, the values of the currencies of Taiwan, Japan, Russia, and Turkey have fallen against the U.S. dollar, tending to increase our agricultural exports to these nations.

Figure 49
Exchange Rate Index for Top Ten Nations (2007) That Only Import Agricultural Products from the United States
Select Nations, 1998 to 2007
Source: Appendix 19

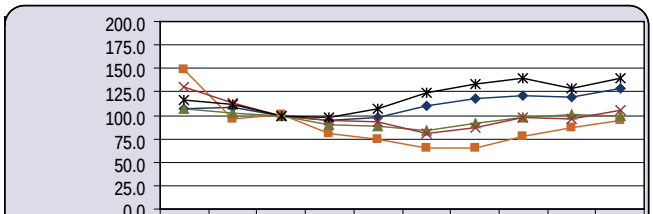


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
China, Taiwan	94.2	95.1	100.0	97.6	95.4	90.7	89.8	92.5	91.1	87.4
Egypt	91.4	95.4	100.0	92.4	79.4	57.1	50.7	53.8	53.8	51.7
Japan	79.9	92.0	100.0	92.4	88.9	91.7	95.2	92.2	85.6	81.3
Russia	318.8	104.1	100.0	101.5	92.7	85.7	85.6	86.2	89.2	89.0
South Korea	80.7	93.1	100.0	92.4	96.1	95.3	95.4	106.2	114.1	113.7
Turkey	207.3	137.7	100.0	56.7	42.4	37.5	36.6	38.4	35.9	36.8

Top Ten Partners Import Sources Only

The value of the U.S. dollar has fallen over time against the Australian dollar (-28.3 percent), the New Zealand dollar (-39.6 percent), and the Columbian peso (-6.0 percent) (*Figure 50*). The value of the U.S. dollar has risen against the Chilean peso and the Brazilian real. Imports of coffee from Brazil have become less expensive to U.S. consumers while imports of coffee from Columbia have become more expensive. The absolute value of the price shift between Brazilian and Columbian coffee as perceived by U.S. consumers is 12.1 percent (|6.0| + |-6.1| = |12.1|). Australian wines, a large U.S. import commodity from Australia, and lamb chops and lamb roasts from New Zealand, are now considerably more expensive to U.S. consumers. Again, wine producers in Washington state benefit, other things equal.

Figure 50
Exchange Rate Index for Top Ten Nations (2007) That Only Export Agricultural Products to the United States
Select Nations, 1998 to 2007
Source: Appendix 19



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia	107.6	107.9	100.0	93.8	97.6	109.4	118.1	121.2	119.6	128.3
Brazil	148.7	96.9	100.0	81.2	74.1	64.6	65.0	77.8	86.6	93.9
Chile	107.4	101.9	100.0	90.1	88.2	84.5	91.9	97.5	101.3	98.7
Columbia	129.7	112.5	100.0	94.5	92.6	80.4	87.0	97.9	95.9	106.0
New Zeland	116.2	111.8	100.0	98.0	106.8	123.3	133.0	139.6	128.9	139.6

International Trade Multipliers[16]

International trade multipliers, calculated from *national* input/output tables, help quantify the full impact of state-produced agricultural products on other economic sectors, industries, and households.[17] The multipliers are calculated from the standpoint of the agricultural producer and from the standpoint of the agricultural exporter. *These are separate and distinct multiplier estimates and cannot be added to or subtracted from each other.*

Figure 51 shows the estimated agricultural multipliers for commodities entering into international trade at the national level. The products/agricultural multipliers in *Figure 51* are arranged consistent with the top eight Washington state-produced agricultural products and commodities in descending importance.

Figure 51
Agricultural Trade Multipliers, by Product, Open Model [1]
United States, Calendar Year 2006
Source: USDA, ERS, "Agricultural Trade Multipliers: ERS Estimates," Data Sets, Updated October 11, 2007. Multipliers for additional agricultural products are displayed in this source.

Commodity[2]	Producer Employment Multiplier [3] (Jobs / $ Billion Export Value)	Port Employment Multiplier [4] (Jobs / $ Billion Export Value)	Producer Output Multiplier ($Total Economic Output With Respect to $ Export Value)	Port Output Multiplier ($Total Economic Output with Respect to $ Export Value)
Fruits	18,907	10,358	2.79	1.91
Fluid Milk	6,054	13,203	3.96	3.33
Creamery Butter	3,969	11,215	4.08	3.17
Cheese	4,146	13,135	4.27	3.49
Dry Condensed and Evaporated Dairy Products	3,312	9,529	3.40	2.72
Ice Cream and Frozen Dessert	6,751	9,324	3.26	2.68
Wheat	18,315	12,264	2.65	2.32
Cattle	28,856	18,299	3.86	3.27
Animal (except Poultry) Slaughtering	6,926	15,635	4.38	3.58
Meat Processed from Carcasses	9,696	13,733	4.06	3.41
Vegetables and Melons	11,466	9,349	2.21	1.90
Greenhouse and Nursery Products	15,716	12,014	1.67	1.71
Forest Nursery, Forest and Timber Tract Products	11,429	16,143	2.30	2.35
Fish	17,186	9,955	2.28	2.27
Poultry and Eggs	25,020	16,310	3.17	3.05

Notes: [1] The open model multipliers reflect the value of the exported commodity or product to the originating sector (these are known as "direct effects") plus the value of the activity in sectors supporting the originating sector (known as "indirect effects). The 15 sub-commodities in this figure reflect the descending order by economic value of the top eight agricultural commodities produced in 2006 for Washington state.

[2] The commodities in this figure roughly correspond to the production subsectors in Figure 14, Chapter 2.

[3] The producer level multiplier includes the activity embodied in the commodity as it leaves the farm gate or manufacturer's door.

[4] The port level multiplier includes shipping, handling, and storage charges in addition to the farm or manufacturing sector's value. Each of these multipliers is a separate and distinct measure. They cannot be added to or subtracted from each other. See the glossary for a more detailed definition of these multipliers.

The largest multipliers are concentrated in the fluid milk and associated commodities as well as in cattle and associated commodities. Greenhouse and nursery products have the lowest multipliers. Fruits and vegetables and melons have multipliers of intermediate value. For example, from the standpoint of the fruit producer, an additional dollar of fruit exported results in the creation of 1.79 additional (full-time equivalent) jobs throughout the national economy. From the standpoint of the fruit exporter, the same dollar of exported fruits generates an additional 0.9 of a full-time equivalent job throughout the national economy. One billion dollars of fruit exports generates 18,907 full-time equivalent jobs from the standpoint of the fruit producer, or 18.9 jobs per million dollars of export. Put another way, $52,900 dollars of fruit export generates one full-time equivalent job ($1,000,000 / 18.9 = $52,900).

The North American Free Trade Agreement (NAFTA) at 13[18]

NAFTA became operational in 1994. As of 2008, "the last of NAFTA's transitional restrictions governing U.S-Mexico and Canada-Mexico agricultural trade will be removed." A key effect of NAFTA has been to increase the integration of North America's agricultural markets into one single market. The next major effect has been to dramatically increase the amount of two-way trade in agricultural products. As *Figure 52* shows, two-way trade with Canada increased from $8,987 million over the 1991 to 1993 period ($4,941 billion of exports plus $4,046 billion of imports) to $21,226 million in the 2003 to 2005 period – an increase by a factor of 2.36. The proportional effect on two-way trade with Mexico was 2.64 times, increasing from $6,018 million over the 1991 to 1993 period to $15,891 million over the 2003 to 2005 period. Over these two time periods, the U.S. balance of trade with Mexico is positive at $1,297 million ($8,595 million exports minus $7,298 million imports) while it is negative with respect to Canada at $1,446 million.

Figure 52
Selected Agricultural Exports to and Imports from Canada and Mexico, in Current U.S. Dollars in Millions
1991 to 1993 versus 2003 to 2005
Source: UDSA, ERS, Steven Zahniser, NAFTA at 13: Implementation Nears Completion, WRS-07-01, March 2007 Appendices 1, 2, 3, and 4

Nation and Commodity	Exports to 1991 - 1993	Exports to 2003 - 2005	Imports from 1991 - 1993	Imports from 2003 - 2005
Canada				
Total	4,941	9,890	4,046	11,336
Animals and Animal Products	909	1,427	1,784	3,651
Grains and Feeds	779	1894	762	2,236[2]
Fruits and Preparations except Juice	708	1,107	68	268
Fruit Juices	156	313	--	--
Wine	41	114	--	--
Vegetables and Preparations	1,067	2,042	281	1,834
Oilseeds and Products	322	899	333	899
Essential Oils	46	264	--	--
Nursery and Greenhouse Products[1]	109	156	85	303
Beverages except Fruit Juices	111	186	195	353
Mexico				
Total	3,476	8,593	2,542	7,298
Animals and Animal Products	1,186	2,484	408	654
Grains and Feeds	896	2,356	51	295
Fruits and Preparations except Juice	81	248	322	1,131
Vegetables and Preparations	150	732	923	2,691
Oilseeds and Products	633	1,502	38	53
Essential Oils	21	64	--	--
Beverages except Fruit Juices	51	79	170	1,445

Notes: [1] Imports from Canada are termed Nursery stock, bulbs, etc.

[2] The overwhelming majority of these imports are process agricultural products such as sweet biscuits (cookies) waffles, and wafers, not frozen or mixes and doughs.

Two-way trade has continued to grow across an increasing range of agricultural products, and increased investments are occurring in the region's food processing industries, while "supply chains and productive activities across international borders are undergoing further restructuring."[19] The increase in two-way trade indicates that the three countries are all producing and trading more and increasing their regional specialization. This increasing specialization unambiguously benefits consumers but does create winners and losers among agricultural producers in the trading nations. With respect to Washington state, the most notable losers in recent years have been the fresh and processed asparagus growers, though NAFTA has not been the fundamental cause of this decline.[20] Finally, it is important to note that much of this increase in two-way trade was already underway before NAFTA, especially with respect to Canada. According to an analysis of the Congressional Budget Office over the period 1994 to 2001, most of the increase in two-way trade with Mexico – over 80 percent – is estimated to be due to factors other than NAFTA.[21] Even so, a 20 percent effect for any economic policy is of significant importance.

Selected Detail: U.S. and Mexico

Exports

The value of U.S. exports to Mexico has increased over the two periods as follows: total exports up 147 percent; animals and animal products, up 109 percent; grains and feeds, up 163 percent; fruits and preparations except juice, up 207 percent. Within the latter category, apples are up 123 percent. Vegetables and preparations are up 388 percent; oil seeds and products are up 137 percent; essential oils, such as mint, are up 204 percent; and beverages except fruit juices are up 55 percent.

Imports

The value of imports from Mexico is up 187 percent. Imports of animals and animal products are up 60 percent, while grains and feeds, mostly in the form of processed foods, are up 478 percent. Fruits and preparations except fruit juice are up 251 percent. The majority of these imports are: fresh grapes; fresh and dried limes; fresh, dried, and processed avocados; and fresh mangoes, watermelons, strawberries, and papayas. Vegetables and preparations are up 191 percent, the lion's share of which are fresh tomatoes, peppers, cucumbers, squash, onions, and asparagus plus frozen broccoli. Beverages except fruit juices are up 750 percent, the lion's share of which is beer, Mexico's single largest export to the U.S.

Selected Detail: U.S. and Canada

Exports

The value of U.S. exports to Canada has increased 100 percent over the time period indicated above. Animal and animal products have increased 57 percent, with beef and veal exports dropping 43 percent and cattle and calves dropping 68 percent, while pork exports rose by 835 percent! Fresh and frozen poultry, eggs, and prepared or preserved poultry meats also had large increases. Essentially, a new market opened up for retail preparations for infant use, with exports increasing from four million dollars to $61 million. Grains and feeds were up 143 percent, and, with the exception of corn, these gains were almost entirely in processed agricultural commodities like dog food or cat food and pastry, cake, bread, and pudding. Fruits and preparations except fruit juice were up 56 percent, with about half of this increase in the form of fresh grapes, strawber-

ries, apples (up 59 percent), peaches, and watermelons. Wine exports are up by 336.6 percent, from $41 million to $179 million. Vegetables and preparations are up 91 percent, with about half of this increase due to fresh vegetables. Oil seeds and products are up 180 percent and essential oils, such as mint, are up 475 percent.

Imports

The value of imports from Canada is up 180 percent. Animals and animal products are up 105 percent. Grains and feeds, mostly in the form of processed agricultural products such as bread, pastry, cakes, biscuits (cookies), and puddings, are up 193 percent. Fruits and preparations are up 294 percent, over one-fourth of which are blueberries. Vegetables and preparations are up 553 percent of which fresh and frozen potatoes, fresh tomatoes, peppers, and cucumbers and fresh or chilled mushrooms comprised more than half. Maple syrup, including blends with sugar is up 211 percent.

Summary and Conclusions

- Washington state agriculture is highly dependent on international trade. About one-third of the value of state produced agricultural products enters into international trade.
- The dollar value of U.S. and Washington-produced agricultural commodities has increased sharply in the last year or so and promises to continue to increase in 2008. This will raise net farm incomes, other things equal.
- These increased export values have been due to three major events:
    - The value of the dollar with respect to the currencies of U.S. trading nations has in general been falling. This has cheapened the cost of U.S. and Washington state exports to its major trading partners.
    - World demand for agricultural products has been on the rise due to a variety of reasons, among which are: restricted exports from other food exporting nations, an increase in incomes of developing nations, the increase in demand for bio-fuel products, and adverse weather in key agricultural exporting nations.
    - World supply of some key products has been falling.
- Agricultural export multipliers indicate that production agriculture that enters into international trade has significant indirect effects on employment and earnings in the economy as a whole.
- Two-way trade between the U.S. and Canada and the U.S. and Mexico has expanded dramatically between 1991 to 1993 and 2001 to 2003.
- NAFTA has fostered the integration of the agricultural producing sectors in the U.S., Canada, and Mexico. However, perhaps 80 percent of the measured increase in two-way trade with Mexico is due to factors other than NAFTA per se.

Endnotes

[1] See *Appendix 15* for a discussion on the method used to estimate exports of state-produced agricultural products. Note that this chapter deals with the export of Washington-produced agricultural products only. Recent media reports concerning Washington's agricultural "exports" reflect more accurately the activity of the state's role as an exporter of U.S. agricultural goods and services, rather than Washington-produced agricultural exports. See: Washington State Department of Agriculture, "Washington's agriculture exports soar 38 percent in 2007," *News Release*, February 26, 2008.

[2] Conway, Richard S., *Foreign Exports and the Washington State Economy*, Dick Conway and Associates, Seattle, Washington, February 1997, Executive Summary. This study provides a comprehensive listing of key facts about the state's dependence on international trade as of 1997.

[3] USDA, Economic Research Service, "Outlook for U.S. Agricultural Trade," AES-57, February 21, 2008.

[4] USDA, Economic Research Service, Nora Brooks, "U.S. Agricultural Trade Update – State Exports," FAU-123, June 29, 2007. Nora Brooks is currently responsible for updating and reporting these statistics and can be contacted for further assistance at: **NHBROOKS@ers.usda.gov.**

[5] International trade, like any trade between two producing individuals, firms, or nations, occurs because of specialization of production based on differences in each trading partner's comparative advantage. For a discussion of comparative advantage, see *Chapter 1* of the *2005 Agricultural Workforce in Washington State*.

[6] The income elasticity of demand for food in developing nations is much higher than in developed nations such as the United States. For the United States consumer, a ten dollar increase in income results in an additional expenditure of $1.40 for food. For the consumer in India, a ten dollar increase in income currently is estimated to result in an additional expenditure of $7.00 for food. See *2005 Agricultural Workforce in Washington State*, page 5.

[7] For detail on agricultural prices see: UDSA, NASS, *Agricultural Prices*, February 29, 2008.

[8] See again, "Outlook for U.S. Agricultural Trade," AES-57, February 21, 2008, page 2ff. See also, USDA, ERS, "Converging Patterns in Global Food Consumption and Food Delivery Systems," *Amber Waves*, February 2008.

[9] To gain a sense of the reliability of the imputation methods used to derive state specific estimates of state-produced agricultural exports, note the following correspondence via email from Dan P. Kelly, Assistant Manager, Washington Growers Clearing House, dated 2/29/2008: "Export shipments (of apples in 2006 to 2007) were 29 percent of total shipments, compared with 29 percent in 2005 and 28 percent in 2004. Washington export shipments totaled 29.3 million boxes compared to 29.0 million boxes a year ago and 28.9 million in 2004. Estimated fresh export value was $519 million, compared with $424 million in 2005, and $344 million in 2004. Fresh export f.o.b. average for the season was $17.70. Apples are exported to over 65 countries."

[10] This large percentage change reflects recovery from the drop in beef exports due to the occurrence of bovine spongiform encephalopathy in Washington state. As of April 2006, Japan imported just 1,176,000 pounds of U.S. beef and veal. This rose to 9,458,000 pounds by April 2007

and 12,527,000 as of February 2008. Clearly, BSE had a major impact! USDA, ERS, *Data Sets*, "Meat and Livestock Monthly U.S. Trade," updated April 10, 2008. **http://www.ers.usda.gov/Data/MeatTrade/LivestockMeatMonthly.htm**

[11] Bovine Spongiform Encephalopathy. See: *Capital Press*, "Study: BSE reports hurt sales only slightly," September 14, 2007.

[12] There is no single foreign exchange rate for the U.S. dollar. Exchange rates are based on pairs of nations that engage in international trade. Thus, there is one exchange rate for Japanese yen and U.S. dollars and another exchange rate for Mexican pesos and U.S. dollars. See *Appendix 19*.

[13] When we speak of "importing only" or "exporting only," we are referring to the top ten in each category. For example, this does not mean that a top ten "exporting only" nation does not import agricultural products from the U.S.; only that it is not among the top ten importers. See *Appendix 21*.

[14] These are wines selling for more than $7.00 per 750 ml. bottle. For a detailed discussion of the Washington state wine industry see *2006 Agricultural Workforce in Washington State*.

[15] To "peg" a nation's currency at a given exchange rate vis-à-vis some other foreign currency, a nation offers to buy the currency of that nation at a given rate of its own domestic currency. Until 2006, the yuan was pegged at 8.28 yuan to the U.S. dollar. See *Greg Mankiw's Blog*, March 31, 2006. **http://gregmankiw.blogspot.com/2006/03/chinese-exchange-rate.html.**

[16] International trade multipliers should be used with caution. This writer suggests that the reader and policy maker treat the product-by-product estimates primarily as orders of magnitude rather than precise measures of economic impact of agricultural exports. The USDA Economic Research Service annually estimates agricultural trade multipliers for the most recent calendar year available; in this report, 2006. These multipliers are derived from the 1997 Benchmark Input/Output tables estimated by the U.S Department of Commerce, Bureau of Economic Analysis. They include 69 agriculturally based commodities or combinations of agriculture, food processing, tobacco and fiber and textile products and are adjusted annually to account for price changes and labor productivity changes. See: USDA, ERS, "Agricultural Trade Multipliers: Assumptions," Data Sets, updated October 11, 2007.

[17] For a detailed discussion of agricultural multipliers, see *Chapter 1* of the *2005 Agricultural Workforce in Washington State*.

[18] This discussion is based primarily on two studies: USDA, ERS, Steven Zhaniser, NAFTA AT 13: *Implementation Nears Completion*, WRS-07-01, March 2007 and U.S. Congress, Congressional Budget Office, "The Effects of NAFTA on U.S.-Mexican Trade and GDP," a CBO Paper, May 2003. These two reports are wide-ranging and very comprehensive. The interested reader is directed to them for a comprehensive review of NAFTA and trade in general.

[19] See USDA, ERS, Steven Zhaniser, NAFTA AT 13: *Implementation Nears Completion*, WRS-07-01, March 2007.

[20] See *Chapter 1, 2005 Agricultural Workforce in Washington State*.

[21] See U.S. Congress, Congressional Budget Office, "The Effects of NAFTA on U.S.-Mexican Trade and GDP," a CBO Paper, May 2003, *Chapter 3, Table 1*. The results are for the time period 1994 through 2001.

Bibliography

1. *Capital Press*, "Study: BSE reports hurt sales only slightly," September 14, 2007.

2. Chase, Robert A. and Glenn Pascall, *Washington State Foreign Imports*. Chase Economics, Tacoma, WA, July 1999.

3. Conway, Robert S., Jr., *Foreign Exports and the Washington State Economy*, Dick Conway and Associates, Seattle, WA, February 1997.

4. Devadoss, Stephen and Prasanna Sreedharan, "Effect of Trade Barriers on U.S. Apple Exports on Washington Apple Exports," IMPACT, Washington State University, Abstract dated July 1, 2003.

5. *The Economist*, "Country Briefings United States," March 7, 2008. **http://www.economist.com/countries/usa/profile.cfm?folder=Profile-Economic%20Data**

6. Fuglie, K. O., J. M. MacDonald, and E. Ball. "Productivity Growth in U.S. Agriculture", Economic Brief Number 9, Economic Research Service, U.S. Department of Agriculture, September 2007. **http://www.ers.usda.gov/publications/EB9/eb9.pdf**

7. *Greg Mankiw's Blog*, March 31, 2006. **http://gregmankiw.blogspot.com/2006/03/chinese-exchange-rate.html**

8. Ham, William T., "Wage Stabilization in Agriculture," *Journal of Farm Economics*, Vol. 27, No. 1, February 1945.

9. Hansen, Melissa, "Robotic pruner for grapes," *Good Fruit Grower*, Vol. 58, No. 17, December 2007.

10. Hansen, Melissa, "The Optimal Orchard," *Good Fruit Grower*, Vol. 58, No. 2, January 15, 2007.

11. Holland, David W. and Abdul Razack, "Assessing the Economic Impact of an Agricultural Export Shock on the Washington Economy: A Tale of Two Models," WP 2006-11, IMPACT, Washington State University, Pullman, WA, September 25, 2006.

12. Martin, Philip, "Farm labor Shortages: How Real, What Response?" Giannini Foundation of Agricultural Economics, University of California, November 2007.

13. Northwest Cherry Growers, Washington State Fruit Commission, *2007 NWCG Annual Report*, 2007.

14. The Pew Hispanic Center, "The Labor Force Status of Short-Term Unauthorized Workers," Fact Sheet, April 13, 2006.

15. Schreiber, Alan, "The State of the Washington and U.S. Asparagus Industry," Washington Asparagus Commission, Eltopia, WA, 2005.

16. Schmitz, John, "Oregon grower employs harvest aids," *Good Fruit Grower*, Vol. 58, No. 17, December 2007.

Bibliography

17. U.S. Congress, Congressional Budget Office, "Policies That Distort World Agricultural Trade: Prevalence and Magnitude," A CBO Paper, August 2005.

18. U.S. Congress, Congressional Budget Office, "The Effects of Liberalizing World Agricultural Trade: A Survey," A CBO Paper, December 2005.

19. U.S. Congress, Congressional Budget Office, "The Effects of NAFTA on U.S.-Mexican Trade and GDP," A CBO paper, May 2003.

20. U.S. Department of Agriculture, Economic Research Service, "Farm Income and Costs: 2006 Farm Sector Income Estimates," updated October 5, 2007. **http://www.ers.usda.gov/Briefing/FarmIncome/2006incomeaccounts.htm**

21. U.S. Department of Agriculture, Economic Research Service, "Agricultural Trade Multipliers: Assumptions," Data Sets, updated October 11, 2007. **http://www.ers.usda.gov/data/trademultiplier/assumptions.aspx**

22. U.S. Department of Agriculture, Economic Research Service, "Converging Patterns in Global Food Consumption and Food Delivery Systems," Amber Waves, February 2008. **http://www.ers.usda.gov/AmberWaves/February08/Features/CovergingPatterns.htm**

23. U.S. Department of Agriculture, Economic Research Service, "Farm Income and Costs: 2008 Farm Sector Income Forecast," updated February 12, 2008. **http://www.ers.usda.gov/Briefing/FarmIncome/nationalestimates.htm**

24. U.S. Department of Agriculture, Economic Research Service, Steven Zahniser, *NAFTA at 13: Implementation Nears Completion*, WRS-07-01, March 2007.

25. U.S. Department of Agriculture, Economic Research Service, "U.S. Agricultural Trade Boosts Overall Economy," Outlook Report No. (FAU-124), April 2008. **http://www.ers.usda.gov/Publications/FAU/2008/04Apr/FAU124/**

26. U.S. Department of Agriculture, Economic Research Service, World Agricultural Outlook Board, *World Agricultural Supply and Demand Estimates*, WASDE-457, April 9, 2008.

27. U.S. Department of Agriculture, Economic Research Service, Top 15 U.S. Agricultural Export Destinations, by calendar year, value $U.S. **http://ers.usda.gov/Data/FATUS/DATA/Xcytop15.xls**

28. U.S. Department of Agriculture, Economic Research Service, Top 15 U.S. Import Sources, by calendar year, value $U.S. **http://ers.usda.gov/Data/FATUS/DATA/Mcytop15.xls**

29. U.S. Department of Agriculture, Economic Research Service, Data Sets, "Meat and Livestock Monthly U.S. Trade," updated April 10, 2008. **http://www.ers.usda.gov/data/MeatTrade/LivestockMeatMonthly.htm**

Bibliography

30. U.S. Department of Agriculture, Foreign Agricultural Service, Trade Agreements, **http://www.fas.usda.gov/itp/agreements.asp**

31. U.S. Department of Agriculture, Foreign Agricultural Service, "What is U.S. Agricultural Trade Policy?" **http://www.fas.usda.gov/itp/policy/whatis.asp**

32. U.S. Department of Agriculture, Foreign Agricultural Service, "Outlook for U.S. Agricultural Trade," AES-57, February 21, 2008.

33. U.S. Department of Agriculture, National Agricultural Statistics Service, *2007 Washington Annual Statistical Bulletin*, USDA/National Agricultural Statistics Service, Washington Field Office, Olympia, WA.

34. U.S. Department of Agriculture, National Agricultural Statistics Service, *Agricultural Prices 2006 Summary*, July 2007.

35. U.S. Department of Agriculture, National Agricultural Statistics Service, Agricultural Statistics Board, *Agricultural Prices*, February 29, 2008. **http://usda.mannlib.cornell.edu/usda/nass/AgriPric//2000s/2008/AgriPric-02-29-2008.pdf**

36. U.S. Department of Agriculture, National Agricultural Statistics Service, *Guide to the Sample Survey and Census Programs of NASS*, February 2005. **http://www.usda.gov/nass/nassinfo/surveyprograms/index.htm**

37. U.S. Department of Agriculture, National Agricultural Statistics Service, *AGRI-FACTS*, Various issues, Posted online beginning January 15, 2007 and ending December 12, 2007.

38. U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, "News Release: Gross Domestic Product (GDP) by State, 2006," June 7, 2007. **http://www.bea.gov/newsreleases/regional/gdp_state/gsp_newsrelease.htm**

39. U.S., General Accounting Office, *Agricultural Trade: Significance of High-Value Products as Agricultural Exports*, Report to Congressional Requesters, GAO/GGD-93-120, August 1993.

40. U.S. Library of Congress, Congressional Research Service, Domestic Social Policy Division, Levine, Linda, *Immigration: The Effects on Native-Born Workers*, CRS Report for Congress, Order Code 95-408, updated March 28, 2006.

41. U.S. Library of Congress, Congressional Research Service, Domestic Social Policy Division, Levine, Linda, *Farm labor Shortages and Immigration Policy*, Order Code RL30395, updated January 17, 2008.

42. Wahl, Thomas I., "U.S.-China Agricultural Trade: How Competitive Are We?" Testimony before the U.S. China Economic and Security Review Commission, January 13, 2005. **http://www.uscc.gov/hearings/2005hearings/written_testimonies/05_01_04wrts/wahl_thomas_wrts.pdf**

Bibliography

43. Warner, Geraldine, "Mechanical blossom thinning tested on peach," *Good Fruit Grower*, Vol. 58, No. 12, July 2007.

44. Warner, Geraldine, "FAST forward: Robots will help the apple industry remain competitive," *Good Fruit Grower*, Vol. 58, No.17, December 2007.

45. Warner, Geraldine, "Driving tree performance," *Good Fruit Grower*, Vol. 58, No. 2, January 15, 2007. Washington, State of, Department of Agriculture, "Washington's agriculture exports soar 38 percent in 2007," *News Release*, February 26, 2008.

46. Washington, State of, Department of Agriculture, Employment Security Department, Labor Market and Economic Analysis branch, *2006 Agricultural Workforce in Washington State*, July 2007 **http://www.workforceexplorer.com/admin/uploadedPublications/8408_PU_Ag_Report_2006.pdf**

47. Washington, State of, Department of Agriculture, Employment Security Department, Labor Market and Economic Analysis branch, *2005 Agricultural Workforce in Washington State*, July 2006. **http://www.wa.gov/esd/farmworkers/7024_MasterAgRprt4Web.pdf**

48. Washington, State of, Department of Agriculture, Employment Security Department, Labor Market and Economic Analysis branch, *2007 Washington State Labor Market and Economic Report*, December 2007. **http://www.workforceexplorer.com/admin/uploadedPublications/8670_2007_Annual_ReportWex.pdf**

49. Washington, State of, Office of the Governor, *Governor Gregoire's Global Competitiveness Council. Rising to the Challenge of Global Competition, Olympia*, WA, and March 2006.

Appendix 1

Value of Agriculture Production and Government Payments, Washington State, 1997 to 2006, in $1,000s, Current Dollars

YEAR	FIELD CROPS	FRUITS AND NUTS	COMMERCIAL VEGETABLES	BERRY CROPS	TOTAL CROPS	SPECIALTY PRODUCTS[1]	LIVESTOCK AND PRODUCTS	TOTAL VALUE OF PRODUCTION	GOVERNMENT PAYMENTS	TOTAL VALUE[2]
1997	1,869,686	1,235,820	357,558	50,183	3,513,247	577,012	1,450,033	5,540,292	147,263	5,687,555
1998	1,648,070	1,070,299	357,016	40,405	3,115,790	584,544	1,542,459	5,242,793	260,524	5,503,317
1999	1,617,658	1,233,033	299,306	66,252	3,216,249	592,518	1,553,370	5,362,137	270,594	5,632,731
2000	1,697,526	1,164,734	325,760	46,739	3,234,759	587,994	1,519,056	5,341,809	352,793	5,694,602
2001	1,750,181	1,315,186	306,775	61,534	3,433,676	535,386	1,604,115	5,573,177	299,021	5,872,198
2002	1,798,986	1,450,719	361,775	62,378	3,673,858	515,334	1,396,461	5,585,653	215,912	5,801,565
2003	1,736,997	1,647,682	354,976	66,161	3,805,816	503,751	1,449,168	5,758,735	265,398	6,024,133
2004	1,814,623	1,256,584	294,995	77,614	3,443,816	539,951	1,678,139	5,661,906	196,974	5,858,880
2005	1,787,459	1,677,690	384,105	76,037	3,925,291	543,970	1,749,538	6,218,619	239,909	6,458,528
2006	2,066,919	1,993,810	437,218	67,595	4,565,542	540,216	1,564,087	6,669,845	196,466	6,866,311

Notes: [1] Includes forest products, Christmas trees, floriculture, nursery and other horticultural products, and agaricus and other (shitake, oyster, etc.) mushrooms.
[2] Includes government payments.

Source: *2007 Washington Annual Agriculture Bulletin*, **Page 3**
http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/annual2007.pdf

Appendix 2

Value Added to the U.S. Economy by the Agriculture Sector via the Production of Goods and Services, Washington State, Current Dollars, 1997 to 2006[1]

ITEM	1997 1,000s DOLLARS	1998 1,000s DOLLARS	1999 1,000s DOLLARS	2000 1,000s DOLLARS	2001 1,000s DOLLARS	2002 1,000s DOLLARS	2003 1,000s DOLLARS	2004 1,000s DOLLARS	2005 1,000s DOLLARS	2006 1,000s DOLLARS
Cash Receipts:										
Crops (Final crop output)	3,600,289	3,494,962	3,150,073	3,372,844	3,461,654	3,695,061	3,984,276	4,033,173	4,083,812	4,524,433
Livestock (Final animal output)	1,641,016	1,713,025	1,674,623	1,712,827	1,755,285	1,552,649	1,527,014	1,735,656	1,829,463	1,614,540
Machine hire and custom work	111,047	72,218	70,702	85,196	59,205	57,605	88,552	47,249	30,360	66,988
Forest products sold	255,000	247,000	235,000	225,000	171,000	140,000	120,000	140,000	150,000	140,000
Other farm income	114,208	170,019	203,205	128,270	210,224	131,077	148,873	176,873	195,886	206,296
Gross imputed rental value of farm dwellings	203,418	206,008	212,394	252,501	254,640	269,218	281,676	306,516	307,797	320,375
Final agricultural sector output	**5,924,978**	**5,903,232**	**5,545,996**	**5,776,638**	**5,912,008**	**5,845,610**	**6,150,391**	**6,439,467**	**6,597,318**	**6,872,632**
Less: Intermediate consumption outlays:										
Farm origin	834,334	819,549	799,518	894,498	814,580	834,937	769,987	698,852	824,590	866,930
Manufactured inputs	743,217	689,090	694,193	699,831	759,829	685,737	641,710	787,766	911,298	995,113
Other intermediate expenses:										
Repair and maintenance of capital items	318,271	284,238	313,481	314,645	271,389	264,894	225,655	279,137	235,862	348,781
Machine hire and custom work	119,126	154,697	141,732	106,706	102,441	177,527	98,607	85,189	92,679	86,523
Marketing, storage, and transportation expense	327,152	301,341	318,793	383,071	423,538	372,686	395,536	410,865	649,016	664,552
Contract labor	44,471	36,425	39,429	38,603	54,892	47,585	40,285	34,207	23,828	27,054
Miscellaneous expenses	478,237	493,080	498,712	463,476	549,968	549,776	498,113	534,191	635,937	640,076
Total Intermediate Consumption Outlays	**2,864,808**	**2,778,420**	**2,805,858**	**2,900,830**	**2,976,637**	**2,933,142**	**2,669,893**	**2,830,207**	**3,373,210**	**3,649,029**
Government transactions:										
+ Direct government payments	147,263	260,524	270,594	352,793	299,021	215,912	265,398	196,974	239,909	196,466
- Motor vehicle registration and license fees	19,321	19,168	19,955	17,438	19,416	13,105	10,315	11,001	7,904	12,504
- Property taxes	161,673	153,629	165,091	164,220	165,226	142,699	160,000	170,000	190,000	230,000
Gross value added	**3,026,439**	**3,212,539**	**2,825,686**	**3,046,943**	**3,049,750**	**2,972,576**	**3,575,581**	**3,625,233**	**3,266,113**	**3,177,565**
Less: Capital consumption	401,758	407,689	401,698	397,149	402,146	406,219	414,293	445,022	472,915	487,962
Net value added	**2,624,681**	**2,804,859**	**2,423,988**	**2,649,794**	**2,647,604**	**2,566,357**	**3,161,288**	**3,180,211**	**2,793,198**	**2,689,603**
Less: Factor payments:										
Employee compensation (total hired labor)	957,954	986,162	1,126,503	1,141,855	1,134,115	1,073,301	1,119,716	1,095,793	1,261,546	1,300,775
Net rent received by nonoperating landlords	409,930	392,542	348,288	363,568	314,329	297,477	224,307	274,171	257,171	209,814
Real estate and non-real estate interest	268,812	271,608	278,201	287,047	259,860	244,902	219,855	216,840	247,851	281,288
Net farm income	**987,985**	**1,154,538**	**670,996**	**857,324**	**939,300**	**950,677**	**1,597,410**	**1,593,407**	**1,026,630**	**897,726**

Note: [1] Value of agricultural sector production is the gross value of the commodities and services produced within a year. Net value added is the sector's contribution to the national economy and is the sum of the income from production earned by all factors of production, regardless of ownership. Net farm income is the farm operator's share of income from the sector's production activities. The concept presented is consistent with that employed by the Organization for Economic Cooperation and Development.

Source: USDA - Economic Research Service Revised - August 31, 2007. *2007 Washington Annual Agriculture Bulletin*, Page 20
http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/annual2007.pdf
http://www.ers.usda.gov/Briefing/FarmIncome/nationalestimates.htm

Appendix 3

Agricultural Prices Received by Farmers, All Farm Products, Washington State, Selected Base Years

YEAR	INDEX 1990 - 1992 = 100	INDEX 2006 = 100	INDEX 2007 = 100
1997	112.0	96.6	81.8
1998	102.0	87.9	74.5
1999	96.0	82.8	70.1
2000	96.0	82.8	70.1
2001	102.0	87.9	74.5
2002	98.0	84.5	71.5
2003	107.0	92.2	78.1
2004	120.0	103.4	87.6
2005	116.0	100.0	84.7
2006	116.0	100.0	84.7
2007	137.0	118.1	100.0

Source: LMEA/ESD, Haver Analytics, Inc.

Appendix 4

Total Agricultural Employment in Washington State, Statewide by MSA/MD, and by County, 2007 (Benchmark: March 2007)

AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Washington	65,340	73,430	80,380	85,010	89,340	128,910	135,490	112,830	118,510	112,420	71,830	64,190	94,810
Bellingham MSA	2,520	2,750	2,870	3,030	3,200	3,710	5,300	3,910	3,070	2,780	2,510	2,430	3,170
Bremerton MSA	310	350	370	390	420	440	430	400	370	370	390	340	380
Olympia MSA	1,300	1,350	1,390	1,470	1,640	1,700	1,710	1,640	1,540	1,400	1,310	1,330	1,480
Richland-Kennewick-Pasco MSA	7,150	8,050	8,920	10,520	12,130	20,820	13,020	13,680	14,930	12,950	8,640	6,810	11,470
Seattle-Bellevue-Everett MD	2,790	3,110	3,430	3,680	3,950	4,150	4,380	3,980	3,730	3,790	3,060	2,910	3,580
Spokane MSA	1,110	1,280	1,490	1,630	1,750	1,780	1,830	1,720	1,550	1,410	1,230	1,150	1,490
Tacoma MD	1,280	1,410	1,770	1,570	1,660	1,730	1,880	1,620	1,510	1,410	1,230	1,270	1,530
Chelan-Douglas	8,430	9,720	10,180	9,950	9,790	18,550	25,180	15,470	16,820	15,140	8,600	7,820	12,970
Yakima MSA	16,590	18,670	19,990	20,570	21,960	32,640	32,680	28,220	31,700	30,430	17,090	16,210	23,900
Adams	1,080	1,210	1,490	1,810	1,780	2,270	2,350	2,120	2,340	2,950	1,730	1,510	1,890
Asotin	130	150	160	190	200	190	190	180	150	150	140	120	160
Clark	870	960	1,090	1,100	1,270	1,620	1,620	1,410	1,300	1,080	1,010	1,090	1,200
Clallam	270	290	310	350	380	430	460	410	360	310	290	280	340
Columbia	230	240	260	270	290	350	350	360	360	270	220	210	280
Cowlitz	370	390	420	590	570	860	930	790	540	440	410	400	560
Ferry	100	110	120	130	140	150	150	140	130	110	100	100	120
Garfield	130	150	160	160	180	190	210	220	170	160	140	130	170
Grant	6,060	7,050	7,760	8,370	8,640	12,210	12,060	11,400	12,590	12,830	7,540	5,490	9,330
Grays Harbor	440	510	550	530	580	610	600	560	520	500	430	410	520
Island	280	300	320	320	330	370	350	330	310	300	280	290	310
Jefferson	110	120	130	140	150	170	180	160	150	130	120	110	140
Kittitas	850	930	1,020	1,590	1,160	1,270	1,400	1,380	1,270	1,450	720	610	1,140
Klickitat	1,080	1,440	1,470	1,550	1,580	2,300	1,860	2,020	1,910	1,730	1,230	1,150	1,610
Lewis	910	1,010	1,110	1,170	1,250	1,300	1,400	1,330	1,220	1,090	1,070	960	1,150
Lincoln	540	590	640	620	670	720	750	870	710	610	540	530	650
Mason	450	470	490	500	510	530	560	540	500	520	530	500	510
Okanogan	3,180	3,530	4,050	4,210	4,240	6,750	11,370	6,840	8,110	8,030	3,580	3,280	5,600
Pacific	310	330	350	380	410	430	440	400	380	350	310	300	370
Pend Oreille	100	110	130	130	140	150	160	140	130	120	100	100	130
San Juan	120	130	150	150	160	180	180	170	150	130	120	120	150
Skagit	2,380	2,560	2,990	3,030	3,130	3,570	4,160	4,200	4,120	3,460	2,500	2,350	3,200
Skamania	70	80	100	90	100	100	110	100	110	110	110	70	90
Stevens	560	640	740	810	870	910	920	850	790	690	610	570	750
Wahkiakum	50	50	60	60	70	70	70	70	60	50	50	50	60
Walla Walla	2,420	2,500	2,930	3,000	3,010	4,640	5,080	3,890	3,820	4,210	3,000	2,320	3,400
Whitman	830	900	990	980	1,050	1,110	1,210	1,320	1,100	960	880	840	1,010

Note: MSA = Metropolitan Statistical Area; MD = Metropolitan Division
Total Agricultural Employment includes ES-QCEW UI covered employment plus noncovered employment, not adjusted for multiple jobholders.

Source: ESD/LMEA

Appendix 5

Employment of Covered Seasonal Workers by Crop in Washington State, Statewide, and by Agricultural Reporting Areas, 2007

WASHINGTON STATE													
ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
State Totals	**11,931**	**15,305**	**19,896**	**24,621**	**23,027**	**53,881**	**63,479**	**42,328**	**54,112**	**47,985**	**13,929**	**11,623**	**31,843**
Apples, Total	6,444	7,511	7,054	8,865	9,497	17,858	16,840	16,744	35,045	37,327	6,673	6,506	14,697
Apple Pruning	5,118	6,380	5,278	2,139	1,591	887	395	1,861	744	239	2,432	5,556	2,718
Apple Thinning	6	10	109	3,337	2,033	15,048	12,664	3,023	-	-	6	264	3,042
Apple Harvester	-	-	-	-	-	-	958	8,535	31,795	35,779	2,479	-	6,629
Apple Sort, Grade, Pack	591	402	164	21	265	196	-	353	1,671	414	228	427	394
Other Apple Activities	729	719	1,503	3,368	5,608	1,727	2,823	2,972	835	895	1,528	259	1,914
Cherries, Total	823	1,996	1,237	1,233	1,017	21,977	27,541	2,781	298	65	632	932	5,044
Cherry Pruning	812	1,895	864	41	446	330	159	635	235	-	541	927	574
Cherry Harvester	-	-	-	-	30	15,422	18,778	1,668	-	-	-	-	2,992
Other Cherry Activities	11	101	373	1,192	541	6,225	8,604	478	63	65	91	5	1,479
Pears, Total	571	700	938	693	34	420	446	2,729	3,952	612	867	274	1,020
Pear Pruning	360	662	886	516	-	-	93	-	42	-	265	236	255
Pear Thinning	-	-	-	-	-	362	181	-	-	-	-	-	45
Pear Harvester	-	-	-	-	-	-	-	2,089	2,774	-	-	-	405
Other Pear Activities	211	38	52	177	34	58	172	640	1,136	612	602	38	314
Other Tree Fruit Workers	27	403	965	1,784	193	569	3,523	6,432	2,959	-	7	204	1,422
Grape Workers	693	1,065	3,439	664	861	2,323	1,627	1,237	1,036	1,524	1,325	313	1,342
Blueberry Workers	131	225	115	148	-	-	366	1,437	947	541	242	420	381
Raspberry Workers	550	339	516	531	678	798	3,929	687	227	403	579	245	790
Strawberry Workers	-	-	29	201	128	1,644	557	36	7	16	-	-	218
Bulb Workers*	*	*	*	*	*	*	*	*	*	*	*	*	*
Hop Workers	44	57	397	780	607	288	273	130	1,131	207	118	-	336
Nursery Workers	480	625	1,772	1,567	1,352	1,019	1,019	1,189	563	423	742	833	965
Wheat/Grain Workers	99	70	139	87	166	146	439	630	190	160	112	45	190
Asparagus Workers	-	18	86	3,961	4,229	1,846	360	110	53	152	-	-	901
Cucumber Workers	-	-	-	-	-	48	163	242	150	40	-	-	54
Onion Workers	488	484	600	287	33	541	454	1,218	653	291	424	199	473
Potato Workers	775	757	993	983	497	596	930	2,002	2,481	3,164	1,011	1,025	1,268
Misc. Vegetable Workers	171	227	410	628	1,301	1,068	1,881	2,260	1,807	1,504	216	80	963
Other Seasonal Workers	635	828	1,206	2,209	2,434	2,740	3,131	2,464	2,613	1,556	981	547	1,779

* The 2007 conversion from SIC to NAICS industry codes placed bulb growers into the nursery sector.

WESTERN AREA 1													
ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Total	**1,913**	**1,997**	**3,276**	**3,129**	**3,305**	**4,727**	**7,507**	**6,006**	**4,711**	**3,708**	**2,162**	**2,323**	**3,730**
Blueberry Workers	131	225	115	148	-	-	366	1,437	947	541	242	420	381
Raspberry Workers	550	339	516	531	678	798	3,929	687	227	403	579	245	790
Strawberry Workers	-	-	-	19	128	1,644	557	36	7	16	-	-	201
Bulb Workers*	*	*	*	*	*	*	*	*	*	*	*	*	*
Cucumber Workers	-	-	-	-	-	48	163	242	150	40	-	-	54
Potato Workers	581	528	596	498	365	329	185	863	1,232	1,397	904	910	699
Misc. Vegetable Workers	97	82	229	367	411	440	745	1,192	1,143	695	156	75	469
Nursery Workers	415	588	1,579	1,335	1,140	946	787	700	410	180	109	649	737
Rhubarb Workers	18	82	72	46	226	83	67	35	-	-	-	5	53
Other Seasonal Workers	69	153	169	185	357	423	604	767	595	436	172	19	329

* The 2007 conversion from SIC to NAICS industry codes placed bulb growers into the nursery sector.

Appendix 5 (*Continued*)

Employment of Covered Seasonal Workers by Crop in Washington State, Statewide, and by Agricultural Reporting Areas, 2007

SOUTH CENTRAL AREA 2													
ACTIVITY	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**AVG**
Total	**3,282**	**4,501**	**5,724**	**7,638**	**7,608**	**19,202**	**18,012**	**11,537**	**16,015**	**12,903**	**4,123**	**2,697**	**9,437**
Apples, Total	2,096	1,744	2,016	1,131	2,513	3,384	3,820	2,201	8,725	10,731	2,055	1,402	3,485
Apple Pruning	1,494	1,557	1,698	698	998	378	-	496	49	40	280	1,394	757
Apple Thinning	-	-	-	-	-	2,201	2,494	364	-	-	-	-	422
Apple Harvester	-	-	-	-	-	-	958	596	7,834	10,199	1,775	-	1,780
Apple Sort, Grade, Pack	196	-	-	-	248	168	-	340	742	-	-	-	141
Other Apple Activities	406	187	318	433	1,267	637	368	405	100	492	-	8	385
Cherries, Total	183	860	169	956	596	11,482	8,731	254	260	-	487	490	2,039
Cherry Pruning	178	860	161	7	430	59	122	231	235	-	487	490	272
Cherry Harvester	-	-	-	-	-	7,064	3,989	-	-	-	-	-	921
Other Cherry Activity	5	-	8	949	166	4,359	4,620	23	25	-	-	-	846
Pears, Total	360	437	570	633	23	346	111	1,925	2,248	22	368	236	607
Pear Pruning	360	437	562	501	-	-	-	-	-	-	265	236	197
Pear Thinning	-	-	-	-	-	346	111	-	-	-	-	-	38
Pear Harvester	-	-	-	-	-	-	-	1,752	2,223	-	-	-	331
Other Pear Activities	-	-	8	132	23	-	-	173	25	22	103	-	41
Other Tree Fruit, Total	-	286	855	1,642	103	375	2,508	4,584	1,594	-	7	-	996
Other Tree Fruit Pruner	-	286	839	-	-	-	-	97	-	-	-	-	102
Other Tree Fruit Harvester	-	-	-	-	-	-	2,104	4,487	1,458	-	-	-	671
Other Tree Fruit Activities	-	-	16	1,642	103	375	404	-	136	-	7	-	224
Grapes, Total	422	610	1,183	127	163	815	657	468	401	728	480	201	521
Grape Pruning	367	504	796	7	22	12	23	-	-	-	187	201	177
Grape Harvester	-	-	-	-	-	-	-	-	361	354	253	-	81
Other Grape Activity	55	106	387	120	141	803	634	468	40	374	40	-	264
Asparagus Workers	-	18	86	1,260	2,375	874	360	103	53	152	-	-	440
Hops, Total	44	57	278	503	371	288	273	130	854	144	67	-	251
Hop Twining and Training	-	-	162	125	207	93	65	26	-	-	67	-	62
Hop Harvester	-		-	-	-	-	-	-	701	130	-	-	76
Other Hop Activity	44	57	116	378	164	195	208	104	153	14	-	-	119
Onion Workers	-	18	164	19	18	205	42	290	234	50	-	-	87
Potato Workers	-	-	-	-	-	-	7	162	71	-	-	-	20
Misc. Vegetable Workers	54	53	24	155	256	397	613	423	544	499	60	-	257
Other Seasonal Workers	123	418	379	1,212	1,190	1,036	890	997	1,031	577	599	368	735

NORTH CENTRAL AREA 3													
ACTIVITY	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**AVG**
Total	**2,541**	**3,823**	**3,688**	**5,207**	**3,485**	**12,761**	**22,708**	**11,927**	**16,208**	**13,690**	**2,805**	**2,380**	**8,435**
Apples, Total	2,168	3,212	2,737	4,946	3,318	5,917	5,726	8,894	14,626	13,009	2,281	2,236	5,756
Apple Pruning	1,507	2,409	1,834	646	-	82	93	453	42	-	1,197	1,636	825
Apple Thinning	-	-	-	3,320	378	5,208	3,974	949	-	-	-	-	1,152
Apple Harvester	-	-	-	-	-	-	-	5,692	13,302	12,326	-	-	2,610
Apple Sort, Grade, Pack	395	402	164	21	17	28	-	13	929	414	228	427	253
Other Apple Activities	266	401	739	959	2,923	599	1,659	1,787	353	269	856	173	915
Cherries, Total	244	375	599	192	110	6,608	16,714	2,473	-	56	25	144	2,295
Cherry Pruning	244	375	423	34	-	271	-	364	-	-	25	144	157
Cherry Harvester	-	-	-	-	-	4,610	12,843	1,668	-	-	-	-	1,593
Other Cherry Activity	-	-	176	158	110	1,727	3,871	441	-	56	-	-	545
Pears, Total	120	225	338	40	7	24	163	337	1,483	590	499	-	319
Pear Pruning	-	225	324	15	-	-	93	-	42	-	-	-	58
Pear Thinning	-	-	-	-	-	16	70	-	-	-	-	-	7
Pear Harvester	-	-	-	-	-	-	-	337	551	-	-	-	74
Other Pear Activities	120	-	14	25	7	8	-	-	890	590	499	-	179
Other Tree Fruit Workers	-	-	14	-	15	-	-	105	21	-	-	-	13
Other Seasonal Workers	9	11	-	29	35	212	105	118	78	35	-	-	53

Appendix 5 (*Continued*)

Employment of Covered Seasonal Workers by Crop in Washington State, Statewide, and by Agricultural Reporting Areas, 2007

COLUMBIA BASIN AREA 4

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Total	**2,003**	**2,314**	**2,755**	**3,339**	**3,312**	**6,595**	**7,299**	**6,229**	**9,084**	**9,163**	**2,833**	**1,897**	**4,735**
Apples, Total	1,190	1,493	1,463	1,906	2,313	3,828	3,854	3,937	6,742	6,963	1,677	1,255	3,052
Apple Pruning	1,166	1,448	1,109	647	546	219	218	640	646	-	567	946	679
Apple Thinning	6	10	109	-	707	3,292	2,974	1,371	-	-	-	264	728
Apple Harvester	-	-	-	-	-	-	-	1,461	5,856	6,875	615	-	1,234
Other Apple Activities	18	35	245	1,259	1,060	317	662	465	240	88	495	45	411
Cherries, Total	116	224	380	56	204	1,883	1,675	-	30	9	91	113	398
Cherry Pruning	113	204	231	-	-	-	-	-	-	-	-	113	55
Cherry Harvester	-	-	-	-	-	1,810	1,617	-	-	-	-	-	286
Other Cherry Activity	3	20	149	56	204	73	58	-	30	9	91	-	58
Pear Workers	91	38	30	20	4	50	172	467	221	-	-	38	94
Mint Workers	-	-	14	-	4	29	48	40	30	-	-	-	14
Other Tree Fruit Workers	12	23	90	12	-	104	152	80	225	-	-	26	60
Asparagus Workers	-	-	-	194	140	172	-	-	-	-	-	-	42
Onion Workers	265	219	240	197	15	-	-	-	419	241	424	199	185
Potatoes, Total	194	206	285	385	93	171	564	789	1,048	1,666	94	115	468
Potato Harvester	-	-	-	5	-	-	-	-	17	71	-	-	8
Potato Sort, Grade, Pack	123	128	183	37	-	89	401	599	624	761	3	88	253
Other Potato Activities	71	78	102	343	93	82	163	190	407	834	91	27	207
Misc. Vegetable Workers	2	3	5	9	194	41	249	379	-	-	-	-	74
Wheat/Grain Workers	-	-	-	9	-	8	3	85	6	22	15	-	13
Nursery Workers	-	-	25	-	-	-	-	323	-	127	502	147	94
Other Seasonal Workers	133	108	223	551	345	309	582	129	363	135	30	4	243

SOUTH EASTERN AREA 5

ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Total	**2,038**	**2,498**	**4,109**	**4,908**	**4,832**	**10,235**	**7,358**	**5,893**	**7,683**	**8,171**	**1,827**	**2,248**	**5,150**
Apples, Total	990	1,062	838	882	1,353	4,729	3,440	1,712	4,952	6,624	660	1,613	2,405
Apple Pruning	951	966	637	148	47	208	84	272	7	199	388	1,580	457
Apple Thinning	-	-	-	17	948	4,347	3,222	339	-	-	6	-	740
Apple Harvester	-	-	-	-	-	-	-	786	4,803	6,379	89	-	1,005
Other Apple Activities	39	96	201	717	358	174	134	315	142	46	177	33	203
Cherries, Total	280	537	89	29	107	2,004	421	54	8	-	29	185	312
Cherry Pruning	277	456	49	-	16	-	37	40	-	-	29	180	90
Cherry Harvester	-	-	-	-	30	1,938	329	-	-	-	-	-	191
Other Cherry Activity	3	81	40	29	61	66	55	14	8	-	-	5	30
Other Tree Fruit Workers	15	94	6	130	75	90	863	1,663	1,119	-	-	178	353
Grape Workers	271	455	2,256	537	698	1,508	970	769	635	796	845	112	821
Asparagus Workers	-	-	-	2,507	1,714	800	-	7	-	-	-	-	419
Hop Workers	-	-	119	277	236	-	-	-	277	63	51	-	85
Onion Workers	223	247	196	71	-	336	412	928	-	-	-	-	201
Potatoes, Total	-	23	112	100	39	96	174	188	130	101	13	-	81
Potato Harvester	-	-	-	-	-	-	70	23	31	18	-	-	12
Potato Sort, Grade, Pack	-	-	-		-	-	35	26	11	55	-	-	12
Other Potato Activities	-	23	112	100	39	96	69	139	88	28	13	-	59
Misc. Vegetable Workers	-	7	80	51	214	107	207	231	120	310	-	-	111
Wheat/Grain Workers	9	4	-	23	9	17	84	51	4	18	11	15	21
Nursery Workers	-	-	-	-	-	-	-	-	-	-	41	-	3
Strawberry Workers	-	-	29	182	-	-	-	-	-	-	-	-	18
Other Seasonal Workers	250	69	384	119	387	548	787	290	438	259	177	145	321

Appendix 5 (*Continued*)

Employment of Covered Seasonal Workers by Crop in Washington State, Statewide, and by Agricultural Reporting Areas, 2007

	EASTERN AREA 6												
ACTIVITY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
Total	**154**	**172**	**344**	**400**	**485**	**361**	**595**	**736**	**411**	**350**	**179**	**78**	**355**
Wheat/Grain, Total	90	66	137	55	155	121	352	494	180	120	86	30	157
Wheat/Grain Harvester	-	-	-	-	-	-	-	59	20	-	-	-	7
Wheat/Grain Eqpmt Operator	-	13	28	22	18	33	311	396	100	105	69	-	91
Other Wheat/Grain Activity	90	53	109	33	137	88	41	39	60	15	17	30	59
Nursery Workers	13	37	168	232	212	57	128	119	153	116	90	37	114
Other Seasonal Workers	51	69	39	113	118	183	115	123	78	114	3	11	85

Source: LMEA/ESD

Appendix 6

Average Hourly Wage Rates
Pacific Region, California, and the U.S., Current Dollars, 2005 to 2007[1]

	FIELD WORKERS ONLY			LIVESTOCK WORKERS ONLY			FIELD AND LIVESTOCK			ALL AGRICULTURAL WORKERS		
MONTH/YEAR	PACIFIC	CALIFORNIA	U.S.	PACIFIC	CALIFORNIA	U.S.	PACIFIC	CALIFORNIA	U.S.	PACIFIC	CALIFORNIA	U.S.
2005												
January	9.32	8.56	8.71	9.90	9.93	9.20	9.39	8.86	8.90	10.33	9.82	9.78
April	8.87	8.62	8.56	10.78	9.60	9.14	9.23	8.76	8.72	9.95	9.48	9.35
July	8.60	8.76	8.61	10.67	10.66	9.26	8.80	9.00	8.78	9.21	9.68	9.38
October	8.96	9.21	8.90	9.58	10.45	9.15	9.00	9.37	8.96	9.62	10.13	9.61
2006												
January	9.36	8.99	9.11	10.47	10.50	9.26	9.48	9.20	9.17	10.25	10.30	9.78
April	9.24	8.93	8.95	10.13	10.80	9.31	9.45	9.21	9.06	10.10	10.18	9.78
July	9.50	8.92	8.93	11.06	10.24	9.49	9.59	9.09	9.07	10.15	9.89	9.72
October	10.25	9.14	9.26	11.00	10.41	9.42	10.31	9.32	9.30	10.85	10.11	9.96
2007												
January	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
April	9.39	9.62	9.35	9.70	10.90	9.59	9.45	9.82	9.42	10.24	10.71	10.20
July	9.64	9.60	9.24	10.65	10.60	9.73	9.71	9.72	9.37	10.41	10.32	9.99
October	10.48	9.70	9.62	11.07	10.80	9.98	10.55	9.86	9.72	11.30	10.56	10.33

Notes: n.a = The January 2007 Farm Labor Survey was not conducted.
The Pacific Region is Washington (dominating) and Oregon state.
The United States data do not include Alaska.
[1] All hired farm workers and wage rates include supervisor/manager and other workers which are not published separately.

Source: National Agricultural Statistics Services, U.S. Department of Agriculture, AGRI-FACTS, posted online November 26, 2007
http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/2007/ab10.pdf

Appendix 7

Comparison of Agriculture Only and Agriculture Plus Nonagriculture, Average Hourly Wage Rates, by Attachment to Agriculture, Current Dollars, Washington State, 2006

							WORKERS WITH AGRICULTURE AND NONAGRICULTURE JOBS								
	ALL AGRICULTURE JOBS			AGRICULTURE ONLY WORKERS			AGRICULTURE JOBS			NONAGRICULTURE JOBS			ALL JOBS		
WAGE RATE	HOURS WORKED	FULL TIME EQUIVALENT[1]	PERCENT	HOURS WORKED	FULL TIME EQUIVALENT	PERCENT	HOURS WORKED	FULL TIME EQUIVALENT	PERCENT	HOURS WORKED	FULL TIME EQUIVALENT	PERCENT	HOURS WORKED	FULL TIME EQUIVALENT	PERCENT
Workers at or near Minimum Wage of $7.63															
	17,619,978	8,471	13.6%	12,734,558	6,122	12.8%	4,885,420	2,349	16.5%						
Workers Below "Adverse Effect" Wage Rate of $9.77															
	73,381,090	35,279	56.8%	55,501,251	26,683	55.8%	17,879,839	8,596	60.5%						
<$7.00	398,970	192	0.3%	296,440	143	0.3%	102,530	49	0.3%	449,420	216	1.1%	551,950	265	0.8%
$7.00 to $7.99	24,935,855	11,988	19.3%	18,139,895	8,721	18.2%	6,795,960	3,267	23.0%	5,365,492	2,580	13.2%	12,161,452	5,847	17.3%
$8.00 to $8.99	31,422,312	15,107	24.3%	24,076,015	11,575	24.2%	7,346,297	3,532	24.9%	6,939,189	3,336	17.1%	14,285,486	6,868	20.4%
$9.00 to $9.99	20,499,365	9,855	15.9%	16,030,656	7,707	16.1%	4,468,709	2,148	15.1%	4,919,055	2,365	12.1%	9,387,764	4,513	13.4%
$10.00 to $10.99	13,299,599	6,394	10.3%	10,422,291	5,011	10.5%	2,877,308	1,383	9.7%	3,918,199	1,884	9.7%	6,795,507	3,267	9.7%
$11.00 to $11.99	7,954,394	3,824	6.2%	6,231,823	2,996	6.3%	1,722,571	828	5.8%	2,744,933	1,320	6.8%	4,467,504	2,148	6.4%
$12.00 to $12.99	6,120,692	2,943	4.7%	4,763,340	2,290	4.8%	1,357,352	653	4.6%	2,289,653	1,101	5.6%	3,647,005	1,753	5.2%
$13.00 to $13.99	4,411,295	2,121	3.4%	3,474,577	1,670	3.5%	936,718	450	3.2%	1,823,083	876	4.5%	2,759,801	1,327	3.9%
$14.00 to $14.99	3,551,775	1,708	2.8%	2,754,188	1,324	2.8%	797,587	383	2.7%	1,586,107	763	3.9%	2,383,694	1,146	3.4%
$15.00 to $15.99	2,997,139	1,441	2.3%	2,338,183	1,124	2.3%	658,956	317	2.2%	1,381,353	664	3.4%	2,040,309	981	2.9%
$16.00 to $16.99	2,182,469	1,049	1.7%	1,728,614	831	1.7%	453,855	218	1.5%	1,175,170	565	2.9%	1,629,025	783	2.3%
$17.00 to $17.99	1,684,041	810	1.3%	1,346,711	647	1.4%	337,330	162	1.1%	961,703	462	2.4%	1,299,033	625	1.9%
$18.00 to $18.99	1,417,957	682	1.1%	1,138,690	547	1.1%	279,267	134	0.9%	797,667	383	2.0%	1,076,934	518	1.5%
$19.00 to $19.99	1,012,642	487	0.8%	818,060	393	0.8%	194,582	94	0.7%	754,663	363	1.9%	949,245	456	1.4%
$20.00 to $20.99	1,014,876	488	0.8%	831,067	400	0.8%	183,809	88	0.6%	633,711	305	1.6%	817,520	393	1.2%
$21.00 to $21.99	734,576	353	0.6%	595,112	286	0.6%	139,464	67	0.5%	491,209	236	1.2%	630,673	303	0.9%
$22.00 to $22.99	578,763	278	0.4%	454,633	219	0.5%	124,130	60	0.4%	431,684	208	1.1%	555,814	267	0.8%
$23.00 to $23.99	580,346	279	0.4%	475,040	228	0.5%	105,306	51	0.4%	355,521	171	0.9%	460,827	222	0.7%
$24.00 to $24.99	469,953	226	0.4%	394,931	190	0.4%	75,022	36	0.3%	350,963	169	0.9%	425,985	205	0.6%
$25.00 to $25.99	475,947	229	0.4%	394,719	190	0.4%	81,228	39	0.3%	304,719	146	0.8%	385,947	186	0.6%
$26.00 to $26.99	309,211	149	0.2%	257,802	124	0.3%	51,409	25	0.2%	271,017	130	0.7%	322,426	155	0.5%
$27.00 to $27.99	262,692	126	0.2%	223,011	107	0.2%	39,681	19	0.1%	210,104	101	0.5%	249,785	120	0.4%
$28.00 to $28.99	265,504	128	0.2%	222,218	107	0.2%	43,286	21	0.1%	212,363	102	0.5%	255,649	123	0.4%
$29.00 to $29.99	200,133	96	0.2%	160,713	77	0.2%	39,420	19	0.1%	166,154	80	0.4%	205,574	99	0.3%
$30.00 and Higher	2,324,244	1,117	1.8%	1,978,697	951	2.0%	345,547	166	1.2%	2,028,562	975	5.0%	2,374,109	1,141	3.4%
Total	**129,104,750**	**62,070**	**100.0%**	**99,547,426**	**47,859**	**100.0%**	**29,557,324**	**14,210**	**100.0%**	**40,561,694**	**19,501**	**100.0%**	**70,119,018**	**33,711**	**100.0%**

Notes: [1] One Full Time Equivalent job equals 2,080 hours worked per year or 520 hours worked per quarter.

Source: LMEA/ESD, Vancouver Office, UI Wage File Database

Appendix 8

Average Hourly Wage Rates, Apples, Cherries, and Pears, 2000 = 100, CPI-W, Washington State, 1992 to 2007

YEAR	APPLES CURRENT DOLLARS	APPLES CONSTANT DOLLARS	CHERRIES CURRENT DOLLARS	CHERRIES CONSTANT DOLLARS	PEARS CURRENT DOLLARS	PEARS CONSTANT DOLLARS
1992	10.85	8.85	13.18	10.74	11.56	9.42
1993	10.79	9.05	11.64	9.77	10.14	8.51
1994	10.50	9.04	12.30	10.59	11.09	9.55
1995	10.08	8.92	11.33	10.03	10.68	9.45
1996	9.78	8.91	10.71	9.76	9.40	8.56
1997	9.76	9.10	11.24	10.48	9.52	8.87
1998	9.82	9.30	10.82	10.25	9.50	9.00
1999	9.43	9.12	10.39	10.05	8.76	8.47
2000	9.73	9.73	10.97	10.97	8.96	8.96
2001	9.70	9.44	9.85	9.58	9.37	9.11
2002	9.92	9.50	10.79	10.34	9.47	9.07
2003	9.95	9.24	11.58	10.75	9.99	9.28
2004	10.27	9.30	11.33	10.26	9.83	8.90
2005	10.54	9.26	11.68	10.26	10.49	9.22
2006	11.42	9.79	14.32	12.27	11.02	9.44
2007	12.22	10.15	16.88	14.02	13.63	11.32

Source: LMEA/ESD, UI Wage File Database

Appendix 9

Unduplicated Continued Claimants for Unemployment Compensation, Agriculture and All Nonagriculture Industries, Washington State, 2004 to 2007

	2004			2005			2006			2007		
MONTH	AGRI	ALL NONAG INDUSTRY	PERCENT AGRI NONAG INDUSTRY	AGRI	ALL NONAG INDUSTRY	PERCENT AGRI NONAG INDUSTRY	AGRI	ALL NONAG INDUSTRY	PERCENT AGRI NONAG INDUSTRY	AGRI	ALL NONAG INDUSTRY	PERCENT AGRI NONAG INDUSTRY
January	11,055	150,001	7.37	8,750	116,057	7.54	7,619	94,025	8.10	6,881	84,234	8.17
February	8,270	130,389	6.34	5,847	93,845	6.23	5,285	78,733	6.71	5,096	72,720	7.01
March	6,346	118,411	5.36	4,689	86,016	5.45	4,339	74,404	5.83	4,184	69,477	6.02
April	5,384	106,538	5.05	4,565	82,488	5.53	4,253	70,872	6.00	3,849	67,412	5.71
May	4,707	95,399	4.93	4,103	77,284	5.31	3,292	62,918	5.23	3,226	56,677	5.69
June	3,204	87,733	3.65	2,623	69,583	3.77	2,697	58,138	4.64	2,515	53,176	4.73
July	3,188	85,534	3.82	2,942	69,106	4.26	2,086	58,432	3.57	2,018	56,494	3.57
August	4,733	85,532	5.53	3,980	67,318	5.91	3,421	56,284	6.08	3,082	51,107	6.03
September	2,137	75,433	2.83	1,879	60,878	3.09	1,651	52,967	3.12	1,396	51,102	2.73
October	2,725	78,500	3.47	2,396	66,074	3.63	1,757	56,354	3.12	1,829	55,706	3.28
November	6,605	88,701	7.45	5,593	74,396	7.52	5,098	67,681	7.53	4,613	64,275	7.18
December	7,504	97,272	7.71	7,227	82,953	8.71	6,982	82,192	8.49	6,294	81,163	7.75
Average	5,488	99,787	5.50	4,550	78,833	5.77	4,040	67,750	5.96	3,749	63,629	5.89

Source: LMEA/ESD, Data Warehouse

Appendix 10

Detailed Agricultural Industries: Most Continued Claimants (Unduplicated Workers) Washington State, 2005 to 2007

NAICS	2005	2006	2007	PERCENT CHANGE 2005 - 2006	PERCENT CHANGE 2006 - 2007
Deciduous Tree Fruits	5,935	5,208	4,329	-12.25	-16.88
Crop Preparation	2,748	2,867	2,999	4.33	4.6
Field Crops	1,146	1,053	979	-8.12	-7.03
General Farms	645	476	300	-26.21	-26.98
Ornamental Floriculture	683	589	488	-13.77	-17.15
Grapes	681	588	532	-13.66	-9.53
Vegetables and Melon	491	486	558	-1.02	14.81
Irish Potatoes	555	483	447	-12.98	-7.46
Wheat	259	236	208	-8.89	-11.87
Berry Farms	226	184	154	-18.59	-16.31
Dairy Farms	146	130	95	-10.96	-26.93
Farm Labor	112	86	71	-23.22	-17.45

Source: LMEA/ESD, Data Warehouse

Appendix 11

Demographic Characteristics of Continued Claimants in Agriculture, Washington State, 2005 to 2007

	2005		2006		2007	
Total Continued Claims	**17,444**	**100%**	**15,927**	**100%**	**14,639**	**100%**
Female	6,123	35.1%	5,878	36.9%	5,558	38.0%
Male	11,321	64.9%	10,049	63.1%	9,081	62.0%
White	5,268	30.2%	4,847	30.4%	4,527	30.9%
Black	123	0.7%	122	0.8%	118	0.8%
Hispanic	11,541	66.2%	10,525	66.1%	9,620	65.7%
Native American	156	0.9%	147	0.9%	112	0.8%
Asian	150	0.9%	123	0.8%	106	0.7%
Other	206	1.2%	168	1.1%	156	1.1%
Under Age 25	1,205	7.2%	1,379	8.7%	1,260	8.6%
Age 25-34	3,588	21.5%	3,170	19.9%	2,829	19.3%
Age 35-44	5,346	32.0%	4,879	30.6%	4,337	29.6%
Age 45-54	4,541	27.2%	4,138	26.0%	3,919	26.8%
Age 55+	2,005	12.0%	2,366	14.9%	2,294	15.7%
Less than Grade 12 Education	10,990	63.0%	9,941	62.4%	9,128	62.4%
High School Graduate or GED	4,297	24.6%	4,070	25.6%	3,830	26.2%
More than High School	2,157	12.4%	1,921	12.1%	1,681	11.5%

NOTE: These data represent continued claims, not unduplicated continued claimants. Thus, a person submitting two claims in a year would be counted twice.

Source: LMEA/ESD, Data Warehouse

Appendix 12

Distribution of Hourly Wage Rates, Agricultural Workers Only and All Agricultural Jobs, Washington State, 2nd Quarter 2006 and 2007[1]

	2006		2007	
	AGRICULTURAL ONLY WORKERS PERCENT	ALL AGRICULTURAL JOBS PERCENT	AGRICULTURAL ONLY WORKERS PERCENT	ALL AGRICULTURAL JOBS PERCENT
Workers at or Near Minimum Wage of $7.63	**19.5%**		**18.0%**	
<$7.00	0.2%	0.8%	0.2%	0.7%
$7.00 to $7.99	21.2%	18.8%	14.3%	13.5%
$8.00 to $8.99	28.0%	23.8%	30.7%	26.1%
$9.00 to $9.99	15.4%	13.5%	17.8%	15.0%
$10.00 to $10.99	9.7%	9.6%	10.3%	9.6%
$11.00 to $11.99	5.2%	5.4%	5.6%	5.2%
$12.00 to $12.99	4.0%	4.7%	4.2%	4.7%
$13.00 to $13.99	2.6%	3.1%	2.9%	3.6%
$14.00 to $14.99	2.2%	2.7%	2.3%	3.0%
$15.00 to $15.99	2.0%	2.6%	2.0%	2.7%
$16.00 to $16.99	1.4%	1.8%	1.5%	2.0%
$17.00 to $17.99	1.2%	1.6%	1.2%	1.5%
$18.00 to $18.99	0.9%	1.2%	1.1%	1.6%
$19.00 to $19.99	0.8%	1.3%	0.8%	1.3%
$20.00 to $20.99	0.7%	1.2%	0.7%	1.2%
$21.00 to $21.99	0.4%	0.8%	0.5%	0.9%
$22.00 to $22.99	0.5%	0.8%	0.4%	0.7%
$23.00 to $23.99	0.4%	0.6%	0.4%	0.7%
$24.00 to $24.99	0.3%	0.5%	0.4%	0.6%
$25.00 to $25.99	0.4%	0.6%	0.3%	0.5%
$26.00 to $26.99	0.2%	0.4%	0.3%	0.5%
$27.00 to $27.99	0.2%	0.4%	0.2%	0.4%
$28.00 to $28.99	0.2%	0.3%	0.2%	0.3%
$29.00 to $29.99	0.2%	0.3%	0.1%	0.3%
$30.00 and Higher	1.6%	3.3%	1.6%	3.3%

Notes: The data represent workers in Full Time Equivalent Jobs. One FTE = 2,080 hours worked per year or 520 hours worked per quarter.

Source: LMEA/ESD, Vancouver Office, UI Wage File Database

Appendix 13

Percentage Wage Rate Changes – Pears, Cherries, and Apples, Current and Constant Dollars, Year 2000 = 100 CPI-W, Washington State, 1992 to 2007

YEAR	PEARS PERCENT CHANGE CURRENT	PEARS PERCENT CHANGE CONSTANT	CHERRIES PERCENT CHANGE CURRENT	CHERRIES PERCENT CHANGE CONSTANT	APPLES PERCENT CHANGE CURRENT	APPLES PERCENT CHANGE CONSTANT
1992	5.83	1.54	2.81	-0.83	0.83	-4.83
1993	3.29	0.04	-0.63	-4.83	2.33	-2.98
1994	8.38	1.74	5.12	-1.43	2.96	-3.75
1995	9.03	1.57	3.63	-3.75	3.25	-5.76
1996	6.40	0.13	3.69	-4.89	3.92	-6.76
1997	8.61	0.64	9.19	-1.88	5.25	-5.20
1998	9.79	0.84	8.81	-2.83	6.42	-3.50
1999	8.23	-0.03	8.87	-3.67	6.29	-6.08
2000	11.86	0.78	16.69	0.14	9.75	-0.07
2001	13.79	1.03	19.38	-5.63	9.37	-4.10
2002	14.26	0.96	15.63	-2.45	10.17	-3.66
2003	16.70	1.29	20.50	-0.76	9.83	-7.80
2004	15.95	0.69	18.94	-2.80	11.13	-7.12
2005	19.06	1.20	21.13	-2.79	12.17	-7.72
2006	21.55	2.50	37.61	8.64	16.78	7.33
2007	23.68	3.00	44.34	9.87	17.96	7.60

Source: LMEA/ESD, UI Wage File Database

Appendix 14

Comparison of Average Hourly Wage Rates with the State Minimum Wage, Tree Fruit, Constant Dollars, Washington State, 1992 to 2007, Year 2000 = 100, CPI-W

YEAR	WASHINGTON STATE MINIMUM WAGE PERCENT	HARVEST 3RD QUARTER PEAR WAGES PERCENT	HARVEST 3RD QUARTER CHERRIES WAGES PERCENT	HARVEST 4TH QUARTER APPLES WAGES PERCENT
1992	5.21	9.42	10.74	8.85
1993	5.07	8.51	9.77	9.05
1994	5.69	9.55	10.59	9.04
1995	5.54	9.45	10.03	8.92
1996	5.38	8.56	9.76	8.91
1997	5.53	8.87	10.48	9.10
1998	5.44	9.00	10.25	9.30
1999	5.89	8.47	10.05	9.12
2000	6.50	8.96	10.97	9.73
2001	6.54	9.11	9.58	9.44
2002	6.61	9.07	10.34	9.50
2003	6.51	9.28	10.75	9.24
2004	6.49	8.90	10.26	9.30
2005	6.46	9.22	10.26	9.26
2006	6.54	9.44	12.27	9.79
2007	6.70	11.32	14.02	10.15

Source: LMEA/ESD, UI Wage File Database

Appendix 15

Methodology Used in the Estimation of U.S. Exports of Agricultural Products, by State[1]

"Data on the value of U.S. agricultural exports by State of production are not part of the U.S. export information collected by the U.S. Department of Homeland Security's Customs and Border Protection. Consequently, the Economic Research Service (ERS) estimates State agricultural exports using the Customs District-level export data compiled by the U.S. Census Bureau and the State-level agricultural production data supplied by USDA's National Agricultural Statistics Service (NASS). Using these approximations, a State that is the largest producer of an agricultural commodity will also account for the largest share of U.S. exports of that commodity. Countries of destination for each State's exports cannot be determined.

U.S. commodity exports often are produced in inland States. From the farm, a commodity is sold to a local elevator, which in turn may sell it to a larger elevator located at a major transportation hub, which then moves the commodity to a port. As the commodity passes through several States before being exported, the State-of-origin is often lost or the product commingled with a similar product from other States. Frequently, the State from which the commodity began its export journey, not necessarily the State in which the commodity was produced, is reported by the exporter. To more accurately reflect the situation for inland agricultural-producing States, ERS calculates U.S. State agricultural exports based on a State's share of (nationwide) production of the exported commodity. (Word in parentheses added.)

The underlying crop and livestock production and slaughter estimates by State are publicly available from NASS Data and Statistics. The State's share of production of the commodity is simply applied to the U.S. export figure for the commodity to derive export value.

NASS does not provide production statistics for processed agricultural products such as pasta. For these products, supplemental data from the 2002 Census of Agriculture and the U.S. Department of Commerce's 2002 Economic Census, Subject Series, Manufacturing Product Summary have been used to refine State export estimates.

Estimates of U.S. State exports are also made by other organizations – U.S. Census Bureau, International Trade Administration, etc. Their estimates are based primarily on the Customs data reported at the port and are compiled by the Census Bureau. These estimates are based on origin of movement, not production location. Consequently, compared with ERS's estimates, those estimates for agricultural commodities tend to inflate the relative exports of port States and undercount those of inland States, where farm commodities often originate. For a complete discussion of the origin of movement series see State Export Data Series." **http://www.ers.usda.gov/publications/FAU/2007/06Jun/FAU123/fau123.pdf**

Notes: [1] This discussion is taken verbatim from: USDA, Economic Research Service, Nora Brooks, "U.S. Agricultural Trade Update – State Exports," FAU-123, June 29, 2007.

Appendix 16

Estimated Agricultural Exports, Current Dollars, in Millions, United States, 1997 to 2006

EXPORT	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Wheat and Products	5271.6	4909.3	4847.7	4586.0	4508.8	4793.6	5312.2	6631.9	5886.3	6187.4
Feed Grain and Products	8625.0	6524.8	6983.5	6605.7	6533.7	6795.6	6684.3	8290.9	6968.4	8689.7
Fruits and Preparations[1]	3430.6	3215.7	3287.8	3382.1	3515.3	3451.6	3555.7	3841.9	4099.5	4585.2
Vegetables and Preparations	2936.2	3121.7	3112.3	3184.1	3221.3	3120.5	3097.8	3291.3	3631.9	3905.1
Live Animals and Poultry	5210.8	5322.4	5267.1	6406.6	6293.2	6098.5	6279.7	4417.5	4922.6	5841.9
Hides and Skins	1694.8	1358.6	1112.7	1428.4	1932.9	1777.3	1785.4	1763.3	1748.1	1977.5
Poultry and Poultry Products	2867.3	2711.4	2063.7	2235.4	2518.6	2280.1	2103.7	2519.2	3028.7	2986.1
Fats, Oils, and Greases	526.1	632.7	544.2	421.5	320.0	428.0	539.4	574.1	479.4	478.0
Dairy Products	870.2	923.1	916.1	998.5	1120.9	1031.4	1030.2	1325.0	1744.5	1819.6
Feeds and Fodders	1788.1	1699.7	1656.3	1859.8	2143.7	1950.5	1998.6	2032.2	2210.6	2494.8
Seeds	817.6	794.7	795.5	771.8	727.1	833.3	802.9	865.4	916.3	876.8
Other	6653.0	6292.2	6475.0	6586.9	7361.8	7587.4	7780.4	8520.9	8963.4	9955.3
Annual Total[2]	57305.3	53661.7	49118.3	50761.8	52716.9	53319.3	56014.0	62408.8	62516.2	68720.6

Notes: [1] Apples, apple juice, and apple products as well as other miscellaneous fruits assumed to equal the previous year; current year production data are not released until July or later.
[2] The annual total includes all agricultural products exported, not just those represented in this appendix.

Source: USDA, ERS, *State Export Data*, "State Exports by Commodity, Since 1997
http://www.ers.usda.gov/Data/StateExports/sxcomm.xls

Appendix 17

Estimated Agricultural Exports, Current Dollars, in Millions, Washington State, 1997 to 2006

EXPORT	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Wheat and Products	360.5	277.3	253.8	211.2	269.7	266.5	349.8	325.8	320.3	314.2
Feed Grain and Products	37.0	29.2	23.4	25.4	21.2	18.1	13.9	19.8	18.7	20.1
Fruits and Preparations[1]	513.9	515.5	461.9	523.0	585.1	554.2	519.6	549.4	737.9	832.9
Vegetables and Preparations	326.3	355.4	347.8	364.3	386.3	352.2	332.0	367.7	391.9	413.0
Live Animals and Poultry	93.3	94.0	88.6	111.2	99.4	94.6	97.3	37.7	39.0	66.1
Hides and Skins	45.0	36.6	28.7	37.3	49.9	43.2	40.5	35.8	44.0	57.2
Poultry and Poultry Products	16.5	5.8	4.5	3.9	4.2	3.9	3.9	4.0	4.9	5.0
Fats, Oils, and Greases	12.7	15.8	12.4	9.3	7.1	9.3	11.1	9.6	10.3	12.6
Dairy Products	29.6	31.3	31.2	33.4	37.4	34.1	33.7	42.0	55.4	54.9
Feeds and Fodders	27.9	23.7	22.4	26.0	26.7	24.0	21.7	21.3	25.9	36.8
Seeds	19.6	17.9	18.6	17.4	15.6	18.7	21.2	24.8	25.1	23.5
Other	236.0	229.7	231.7	248.6	282.5	327.7	356.8	365.0	345.3	391.1
Annual Total	1718.2	1632.3	1524.4	1611.0	1785.0	1746.5	1801.5	1802.9	2018.7	2227.2

Note: [1] Apples, apple juice, and apple products as well as other miscellaneous fruits assumed to equal the previous year; current year production data are not released until July or later.

Source: USDA, ERS, *State Export Data*, "State Exports by Commodity, Since 1997
http://www.ers.usda.gov/Data/StateExports/sxcomm.xls

Appendix 18

Foreign Exchange Rates for United States International 2007 Top Ten Export/Import Partners, Local Currency per $U.S., Current Dollars, United States, 1998 to 2007

TOP TEN EXPORT (X) OR IMPORT (M) TRADING PARTNERS AND CURRENT UNIT	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia - M only Australian $	1.592	1.550	1.725	1.933	1.841	1.542	1.360	1.309	1.328	1.195
Brazil - M only Reals	1.161	1.815	1.830	2.358	2.921	3.077	2.925	2.434	2.175	1.947
Canada - X and M Canadian $	1.483	1.486	1.485	1.549	1.569	1.401	1.301	1.212	1.134	1.074
Chile - M only Pesos	460.288	508.777	539.588	634.938	688.936	691.433	609.369	560.090	530.287	522.669
China - Mainland - X and M Yuan	8.279	8.278	8.278	8.277	8.277	8.277	8.277	8.195	7.973	7.607
China - Taiwan - X only Taiwan $	33.537	32.318	31.269	33.825	34.544	34.405	32.907	32.147	32.506	32.851
Columbia - M only Pesos	1426.039	1756.230	2087.905	2299.635	2504.239	2877.653	2628.613	2320.835	2361.139	2078.148
Egypt - X only Dinar	3.388	3.395	3.472	3.973	4.500	5.851	6.196	5.779	5.733	5.642
European Union - 12 Nations - X and M Euro	0.899	0.938	1.086	1.118	1.062	0.886	0.805	0.804	0.797	0.731
Indonesia - X and M Rupiah	10013.600	7855.200	8421.800	10260.900	9311.200	8577.100	8938.850	9704.742	9159.317	9141.933
Japan - X only Yen	130.905	113.908	107.766	121.530	125.389	115.935	108.193	110.218	116.300	117.762
Mexico - X and M Pesos	9.136	9.561	9.456	9.343	9.657	10.788	11.286	10.898	10.899	10.929
New Zealand - M only NZ $	1.868	1.890	2.201	2.379	2.162	1.722	1.509	1.420	1.542	1.361
Russia - X only Rubles	9.705	24.620	28.129	29.169	31.348	30.692	28.814	28.284	27.191	25.582
South Korea - X only Won	1401.437	1188.817	1130.958	1290.994	1251.088	1191.614	1145.319	1024.117	954.791	928.934
Turkey - X only Liras	n.a.	n.a.	1.000	1.000	2.000	2.000	1.000	1.000	1.428	1.355

Notes: If the value in a given year increases relative to the previous year, the U.S. dollar buys more of the foreign currency. Imports from that nation to the United States then become cheaper and exports to the country from the United States become more expensive to the receiving nation. The reverse occurs if the value in the figure decreases between any two years. Example: Australia is a top ten agricutural importer to the United States. In 2004, the U.S. dollar bought 1.360 Australian dollars. In 2007, the U.S. dollar bought only 1.195 Australian dollars. Imports of Australian wine to the United States became more expensive. The price of Australian wine increased by 13.8 percent between the two years, other things equal.

Source: For years 1998 through 2005 - USDA, ERS, Nominal annual average exchange rates (local currency per $U.S.), updated January 18, 2008.
http://www.ers.usda.gov/Data/ExchangeRates/Data/NominalAnnualCountryExchangeRates.xls

Appendix 19

Foreign Nominal (Current Value) Exchange Rate Indices for United States Top Ten Agricultural Export/Import Partners During 2007, 1998 to 2007

2005 TOP TEN EXPORT TRADING PARTNERS EXPORTS(X) OR IMPORT (M)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia X	107.6	107.9	100.0	93.8	97.6	109.4	118.1	121.2	119.6	128.3
Brazil X	148.7	96.9	100.0	81.2	74.1	64.6	65.0	77.8	86.6	93.9
Canada X and M	99.0	98.8	100.0	97.9	96.5	106.3	112.5	120.2	128.1	133.8
Chile X	107.4	101.9	100.0	90.1	88.2	84.5	91.9	97.5	101.3	98.7
China, Peoples Republic X and M	100.9	98.2	100.0	107.0	106.9	100.4	95.8	95.7	98.2	100.2
China, Taiwan M	94.2	95.1	100.0	97.6	95.4	90.7	89.8	92.5	91.1	87.4
Columbia X	129.7	112.5	100.0	94.5	92.6	80.4	87.0	97.9	95.9	106.0
Egypt M	91.4	95.4	100.0	92.4	79.4	57.1	50.7	53.8	53.8	51.7
Euro-zone X and M	110.3	110.0	100.0	103.0	108.3	122.3	127.6	125.9	126.3	131.3
Indonesia X and M	84.8	105.0	100.0	86.8	95.1	96.9	88.9	80.9	85.5	82.9
Japan M	79.9	92.0	100.0	92.4	88.9	91.7	95.2	92.2	85.6	81.3
Mexico X and M	102.7	97.8	100.0	103.5	100.4	87.4	81.9	84.3	83.8	82.3
New Zealand X	116.2	111.8	100.0	98.0	106.8	123.3	133.0	139.6	128.9	139.6
Russia M	318.8	104.1	100.0	101.5	92.7	85.7	85.6	86.2	89.2	89.0
South Korea M	80.7	93.1	100.0	92.4	96.1	95.3	95.4	106.2	114.1	113.7
Turkey M	207.3	137.7	100.0	56.7	42.4	37.5	36.6	38.4	35.9	36.8

Notes: If the value of the nominal index rises from one year to the next, the value of the U.S. dollar is falling relative to the currency it is being exchanged for. If the index falls from one year to the next, the value of the U.S. dollar is rising. Example: For Canada, since 2000, the value of the U.S. dollar relative to the Canadian dollar has fallen 33.8 percent. Thus, Canadian agricultural goods have become relatively more expensive for American consumers. Agricultural imports from Canada to the United States will tend to decrease. Conversely, agricultural exports from the United States to Canada will tend to increase.

Source: Haver Analytics and J.P. Morgan Effective Exchange Rate Indexes, 2000 = 100, Nominal (Current) Dollars.

Glossary

Note: We direct the reader to the 2005 and 2006 studies of the Agricultural Workforce in Washington State for more extensive glossaries of economic and other technical terms. These two studies can be easily accessed at **www.workforceexplorer.com**, which gives one the website for the Labor Market and Economic Analysis branch of the Employment Security Department.

Absolute Advantage – The economic situation in which a person or firm requires fewer resources, e.g. labor hours, to produce a given amount of goods or services. American agricultural workers, on the whole, have an absolute advantage in agriculture compared to China because the American farm worker produces over $70,000 worth of output per year while the farm worker in China produces about $3,000 worth of output per year.

Comparative Advantage – The economic situation in which an economic actor – a person, or firm, or a trading nation – has a lower opportunity cost in producing a good or service compared to the opportunity cost of the good or service produced by one's trading partner. Consider the following simple example that assumes labor is the only factor of production used to produce either of two goods:

Trading Partner	Output in Pounds Achieved by One Hour of Labor	
	Apples	Avocados
Farmer A	15	10
Farmer B	4	2

Farmer A has an absolute advantage in producing both apples and avocados, since Farmer A is absolutely more productive than Farmer B in producing both apples and avocados for a given hour of labor. However, it costs Farmer A 1.5 pounds of apples to produce a pound of Avocados (15/10 = 1.5). This is the opportunity cost – the quantity of avocados one has to give up in order to increase the production of apples by one pound. Yet the cost to Farmer A of producing one pound of apples is only 2/3 of a pound of avocados (10/15 = .667). In contrast, it costs Farmer B 2.0 pounds of apples to produce a pound of avocados (4/2 = 2.0). Yet it costs Farmer B only one half (2/4 = .5) a pound of avocados to produce a pound of apples. Farmer B produces avocados *relatively* cheaper in real terms than does Farmer A. Farmer A produces apples *relatively* cheaper than Farmer B. Farmer A will tend to specialize in apples and trade them for avocados produced by Farmer B. Farmer B will specialize in avocado production and trade avocados for apples. The result will be an overall increase in the total production of both apples and avocados. Each party to the trade can consume more of both apples and avocados.

Continued Claimants – Individuals who are eligible for Unemployment Insurance benefits and who are in a waiting period for Unemployment Insurance credit or who are requesting payments of Unemployment Insurance benefits for one or more weeks of unemployment.

Direct Effects (of an input/output model) – Direct effects are a measure of the impacts of economic activity occurring within the exporting sector, such as the value of the amount of labor employed in direct production on a farm or in a food processing plant.

Derived Demand for Labor – This concept recognizes the fact that the demand for labor is a direct function of the demand for a particular product or service produced by that labor.

Foreign Exchange Rate – This is the price of one international currency in terms of another. This is also termed the Exchange Rate.

Indirect Effects – Indirect effects are a measure of the impacts of supporting economic activity from other sectors generated by the exporting activity, such as the transportation services needed to bring an agricultural product from the farm gate to a food processor.

Input/Output Analysis – Analysis that uses the information contained in benchmark year accounting tables to provide a snapshot of the interrelationships between the sectors of an economy. I/O analysis can be used to quantify the entire impact of a given economic activity (e.g., exporting) on a given area (e.g., the United States or Washington state).

Migrant Agricultural Worker – A person employed in agricultural work of a seasonal or other temporary nature who is required to be absent overnight from his or her permanent place of residence. Exceptions are immediate family members of an agricultural employer or a farm labor contractor, and temporary foreign workers. Temporary foreign workers are nonimmigrant aliens authorized to work in agricultural employment or a specified time period, normally less than a year.

Multiplier – An output multiplier is a summation of the effects of $1 of demand for a particular commodity from a particular industry. Thus, a producer output multiplier for wheat of 2.65 implies that each one dollar of wheat produced generates an additional $1.65 of economic activity.

Open Input/Output Model – An open model measures the *direct* and *indirect* effects of an economic activity, such as exports, or the production of wheat; that is, the impacts of sales and purchases between all goods and service sectors of the economy; sales to final demand (consumption, investment, government, and net exports); and purchases of land, labor, and capital services. ***Open model multipliers are best suited to describe what has already happened in an economy or the interrelatedness of sectors in a base period.***

Port-Value Multiplier – Port-value multipliers include the farm or manufacturing sector's value, in addition to the shipping, handling, and storage charges associated with moving the product from the producer or manufacturer to the port. The portions of the multiplier that apply to the producer (farm, food processing, or other manufacturing sector) value are calculated separately. To this, the jobs or value related to wholesale and retail trade is added, as well as the value or jobs associated with shipping the commodity from the farm or producing sector to the port. These elements combined constitute one multiplier.

Producer-Value Multiplier – A producer-value multiplier includes just the activity embodied in the commodity as it leaves the farm gate or manufacturer's door. It would be proper to apply this type of multiplier at the finished product stage of production but before shipping and handling charges have been added at the port to the value of an export.

Seasonal Agricultural Worker – A person employed in work of a seasonal or other temporary nature who is not required to be absent overnight from his or her permanent place of residence. The same exceptions listed above for Migrant Agricultural Worker apply here.

Seasonal Hired Worker – Any worker employed less than 150 calendar days during a calendar year.

Shortage of Labor – This is the difference between the quantity of labor supplied and the quantity of labor demanded when the hourly wage rate (or its piece-rate equivalent) lies below the equilibrium wage rate – the wage rate that exactly balances quantity supplied and demanded. The shortage concept can also be thought of as excess demand at the price or wage currently being offered. For this kind of shortage to exist, the wage rate being offered is below what workers are willing to accept.

Value Added – In general, the difference between the price at which some quantity of output can be sold, such as a metric ton of apples, and the cost of all intermediate inputs used to produce that output. Gasoline and fertilizer would be intermediate inputs, but the labor of the agricultural producer and any labor hired by him or her, would be a contribution to value added.

Worker/Month – One worker employed in an occupation or activity for one month during a calendar year. Summing these for a calendar month yields the total number of workers employed in an activity in a given month. Also termed **Average Monthly Workers**.

Worker/Year – The sum of all worker/months over a calendar year divided by 365. Also termed **Average Worker Year**.