

Agricultural Workforce in Washington State 1999



Labor Market and
Economic Analysis Branch
Greg Weeks, *Director*

Prepared jointly by
Economic and Policy Analysis Unit and
Agricultural Labor Market Information Unit

JOB SERVICE  **Washington State
Employment Security**
Carver Gayton, *Commissioner*

Agricultural Workforce in Washington State 1999

Published June 2000

Labor Market and
Economic Analysis Branch
Greg Weeks, *Director*

Prepared jointly by
Economic and Policy Analysis Unit and
Agricultural Labor Market Information Unit

Washington State
Employment Security
Carver Gayton, *Commissioner*

- *To order printed publications call (360) 438-4800*
- *This report and other agricultural and labor market information are available on our homepage at www.wa.gov/esd/lmea*
- *Labor Market Information can also be accessed through a comprehensive database at www.wilma.org*
- *Or call our Labor Market Information Center at 1-800-215-1617*

The authors wish to acknowledge the computer programming assistance of Jim Ketter, and the Layout and Desktop Publishing of Bonnie Dalebout.

CONTENTS

Tables	iii
Figures	iv
Foreword	v
Washington Agriculture Down But Still Strong	1
Agricultural Employment	5
Hours and Earnings	13
Hispanic Farm Workers	20
Migrant Farm Workers	22
Outlook and New Developments	27
Agriculture in Aggregate	39
Appendices	
I Agricultural Reporting Areas Defined	40
II Employment of Seasonal Workers by Activity in Washington, Statewide and by Agricultural Reporting Areas, 1999	41
III Total Agricultural Employment in Washington State, Statewide and by Area, 1999 (Benchmark: March 1999)	45
Glossary	46

TABLES

Table 1	Value of Top Ten Agricultural Commodities that Employ Large Numbers of Seasonal Farm Workers, Washington State, 1995, 1996, 1997, and 1998.....	3	Table 10	Employment and Earnings of Agricultural Workers in Nonagricultural Industries, Washington State, 1999	17
Table 2	Agricultural Exports by Commodity Group, Washington State, 1994-1998	3	Table 11	Labor Turnover in Agricultural Employment, Washington State, 1998-1999	17
Table 3	Total Employment, Agricultural Employment and Percent Agricultural Employment, Washington State and Selected Areas, 1999	8	Table 12	Employment and Earnings of Former Agricultural Workers by Nonfarm Industry, Washington State, 1999	18
Table 4	Hired Agricultural Workers, Washington State, 1990, 1995, and 1998 Annual Averages	9	Table 13	Claims for Regular Entitlement Unemployment Insurance, Selected Industries and Months, Washington State, 1999 and January 2000	19
Table 5	Average Annual Earnings of Workers in Covered Employment and Agricultural Employment, Washington State, 1998	14	Table 14	Crop and Livestock Claimants for Regular Entitlement Unemployment Insurance by Sex and Ethnicity, Washington State, January 2000	20
Table 6	Average Annual Hours and Earnings of Agricultural Workers, Washington State, 1995-1999	14	Table 15	Years of School Completed by Regular Entitlement Unemployment Compensation Claimants by Ethnicity, Washington State, January 2000	21
Table 7	Hours and Earnings of Agricultural Workers, Washington State, 1998	15	Table 16	Migrant Visits to Federally Funded Health Clinics, Washington State, CY 1998	22
Table 8	Average Annual and Average Hourly Earnings of Individuals in Major Agricultural Industries, Washington State, 1999	16	Table 17	Migrant Student Count, Washington State, Academic Year 1998-1999	23
Table 9	Average Annual Hours and Earnings of Workers Employed in Both Agricultural and Non-agricultural Jobs, Washington State, 1999	16	Table 18	Selected U.S. Farm Worker Characteristics, 1998	24

FIGURES

List of Figures

Figure 1	
Map of Agricultural Reporting Areas	2
Figure 2	
Washington State Apple Exports, 1996-1997, 1997-1998, and 1998-1999 Crop Years	3
Figure 3	
Total Agricultural Employment, Washington State, 1990, 1994-1999	5
Figure 4	
County Percentage of Total Agricultural Employment, Washington State, 1999	7
Figure 5	
Estimated Periods of Seasonal Agricultural Work in Washington State	10

FOREWORD

The Employment Security Department collects employment and wage data on agricultural employment to assist in the recruitment of farm workers. A shortage of farm workers at harvest time can result in the loss of millions of dollars to farmers and the state economy. Conversely, a surplus of workers can be expensive to the public if workers and their families are stranded far from home without jobs or funds to support themselves. Clearly, it is important to be able to estimate how many workers will be needed for crop activity.

A major source of agricultural farm labor data is the department's Unemployment Insurance (UI) tax records. Since 1990, most agricultural employment has been covered by the Employment Security Act. Under this act, employers are required to report employment and wages quarterly for UI tax purposes. Although data compiled from the tax records include virtually all hired agricultural employment and wages and are essential to measure the impact of agriculture on the state and in local areas, it does not include information on employment in specific activities such as apple harvesting and corresponding wage rates. Such detailed information is essential to plan recruitment, or public

and private programs to deal with the influx of thousands of temporary farm workers and their families. To obtain this information, the department conducts a monthly survey—the *In-Season Farm Labor Survey*—in which approximately 600 growers voluntarily participate. This monthly survey provides estimates of the number of seasonal employees working in specific jobs such as asparagus cutting in south central Washington (Klickitat and Yakima counties) and corresponding wage rates. Seasonal agricultural employees are individuals who are employed on any one farm for less than 150 days.

Data contained in this report from these and other sources available to the department are intended to assist agricultural employers and employer associations in assessing their labor requirements. They are also intended to assist economists in estimating the impact of seasonal farm work on Washington's economy. Finally, for state and local officials and social service agencies, these data are intended to provide a basis for estimating the impact of the farm worker population on their existing and proposed programs and facilities and will help them plan accordingly.

WASHINGTON AGRICULTURE DOWN BUT STILL STRONG

The overall outlook for the agricultural industry in Washington remains encouraging despite setbacks in recent years. While serious problems continue for some producers, preliminary 1999 commodity data show higher production values than in 1998. In typical years, the value of Washington's agricultural production declines in some commodities because of unfavorable market or weather conditions. Because of the broad diversity in the state's commodities, though, the losses are usually offset by increases in other agricultural industries.

The total value of agricultural production in Washington rose each year from 1987-95, increasing from \$3.0 to \$5.9 billion over the eight-year period. Like other major industries in Washington, agriculture experiences downturns as well as expansions, and the strong expansion in the state's agricultural industry was interrupted in 1996 when domestic and foreign production both increased while demand declined in foreign markets. From 1995-98, the total value of agricultural production in the state fell to \$5.2 billion for a loss of about 11 percent. The downturn in the value of agricultural commodities sold was not unique to Washington. Nationally, the total value of crops produced fell 14.2 percent from 1996-98.

The decline in Washington largely resulted from losses in two leading crops, wheat and apples. The value of production in the state's wheat crop fell \$341 million or 46 percent from 1995-98 while apple producers saw their total returns fall \$337 million, off 33 percent. In 1995, a drought in the Midwest wheat belt and in other major wheat producing countries resulted in exceptionally low supplies, boosting wheat prices significantly. Wheat production expanded in this state as well as nationally and worldwide after 1995 because of high prices in the mid-1990s as well as more favorable growing conditions. With production exceeding demand, global competition among wheat growing nations increased because of high carry-over supplies, which is expected to keep prices relatively low over the next several years. Washington wheat growers, who mainly grow soft white wheat, are highly dependent on exports with 90 percent of their crop sold abroad. Egypt, Japan, and Pakistan are their largest customers. Pakistan had been the Northwest's largest customer for wheat, but Australia undercut the U.S. price to help dispose of its near-record crop. Pakistan ordered 18.4 million bushels of Australian wheat in November 1999. This was a major loss for Washington growers. Compounding the problems of wheat producers, Egypt's 1999 Northwest wheat orders were only 80 percent of their 1998 or-

ders while Japan remained mired in recession but bought about as much Northwest wheat as it had in 1998.

Agricultural Exports Down

The decline in the value of wheat and other agricultural commodities shipped abroad lowered the total value of the state's exports substantially between 1996 and 1998. Washington is a leading export state and ranks 8th nationally in the export of raw and processed agricultural products. From 1996-98, however, the total value of those exports fell from \$2.2 billion to \$1.8 billion for a loss of 18 percent. The value of wheat exports alone declined approximately \$235 million for a loss of 46 percent. Raw and processed fruit exports also recorded a substantial loss, dropping nearly \$43 million or 8 percent.

Most of the value loss in the fruit category was in fresh apple exports. Apple growers are highly dependent on foreign exports, especially to Asia and Mexico. Markets in both areas turned sharply downward. Asia had been a rapidly expanding market with a growing population, urbanization, and increasing incomes. Poor banking practices and economic policies in those countries, however, led to the failure of several financial institutions and other large firms. This resulted in a sharp increase in the value of the U.S. dollar against the currencies of those Asian nations. The higher valued dollar made the cost of U.S. exports, including apples and wheat, much more expensive. As a result, U.S. exports declined. Apple exports to Mexico fell in the 1997-98 marketing year because of a trade dispute. Mexico imposed a stiff penalty tariff on U.S. apples in September 1997 after claiming that exporters were selling apples for less in Mexico than in the U.S. In March 1998, they dropped the penalty tariff in exchange for a floor price to ensure that American apple imports did not undercut Mexican apple production.

For the 1998-99 crop year, apple exports increased substantially with recovery underway in important Asian markets, the lifting of the penalty tariff by Mexico and lower apple prices because of a large crop in 1998. On a metric ton basis, Washington fresh apple exports jumped from 419,070 to 577,844. Exports to Mexico alone rose from 45,865 to 84,180 metric tons. Taiwan was the largest export market for Washington apples in both the 1997-98 and 1998-99 crop year and apple exports to that nation jumped from 70,855 to 88,023 metric tons. Despite the increased volume in the 1998-99 crop year, exports to some Asian nations remained well below those in the 1996-97 period, as economic recov-

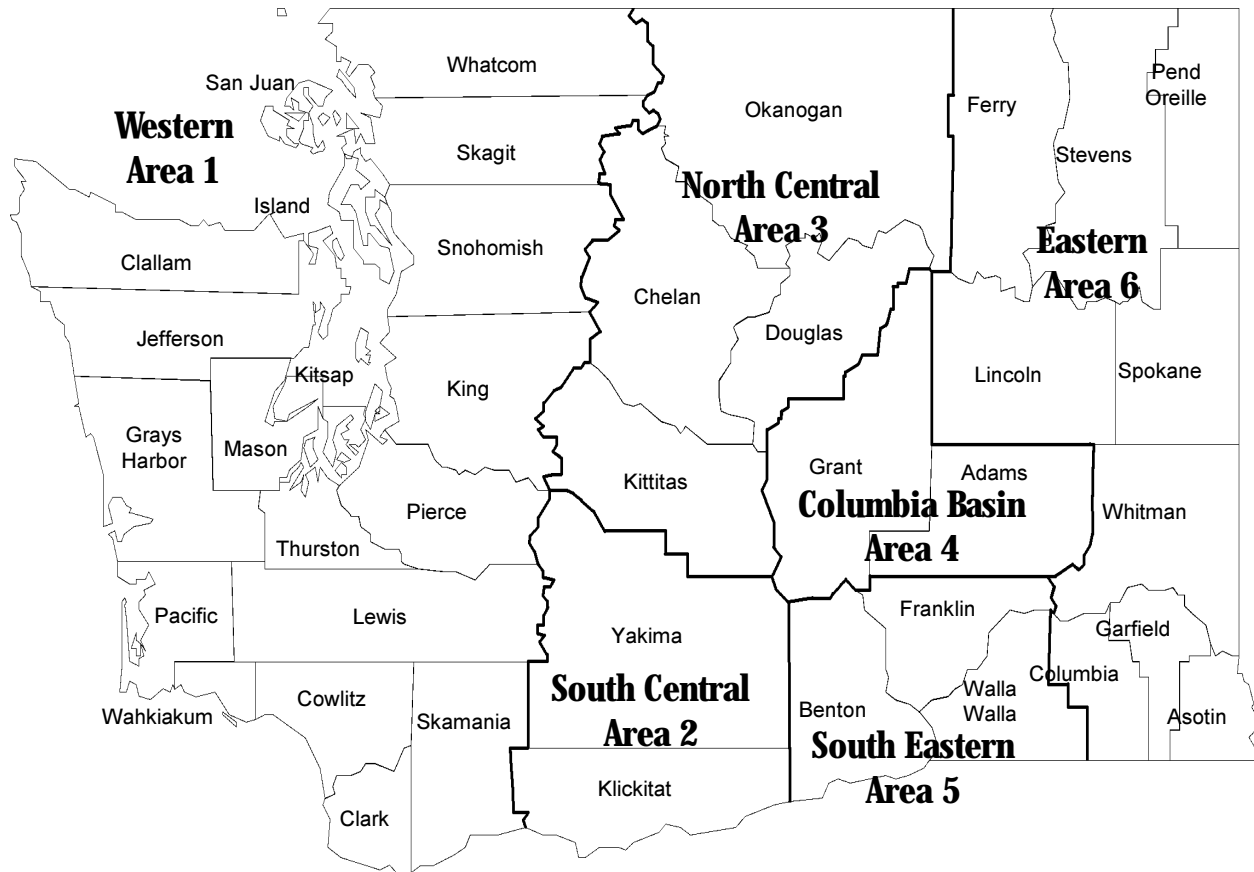
ery in those nations was far from complete. Sales to Thailand totaled 12,389 metric tons in 1998-99, up from 10,880 in the previous year but down from 31,193 in the 1996-97 crop year. In Indonesia the changes were even sharper; 1996-97, 78,487 metric tons; 1997-98, 12,034 metric tons; and 1998-99, 25,443 metric tons.

Potato Product Exports Expand

In contrast to the overall decline in the value of agricultural exports from 1995-98, vegetable and vegetable products sold abroad continued to gain in value. Over the

same period the value of these exports rose to \$35.3 million or 8.4 percent. The bulk of vegetable and vegetable products exported from Washington are frozen potato products: fries, curly fries, hash browns, etc. Approximately 90 percent of the state's potatoes are processed and about 65 percent of the frozen fries are exported. Washington accounts for about one-third of U.S. potato exports. Idaho is the nation's largest potato producer, but it accounts for only 28 percent of the French fry market. Washington growers raise potatoes on 170,000 irrigated acres in eastern Washington. One trade source expects the acreage to in-

*Figure 1
Map of Agricultural Reporting Areas*



Counties Within Agricultural Reporting Areas

- Area 1 = Clallam, Clark, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, San Juan, Skagit, Skamania, Snohomish, Thurston, Wahkiakum, Whatcom
- Area 2 = Klickitat, Yakima
- Area 3 = Chelan, Douglas, Kittitas, Okanogan
- Area 4 = Adams, Grant
- Area 5 = Benton, Franklin, Walla Walla
- Area 6 = Asotin, Columbia, Ferry, Garfield, Lincoln, Pend Oreille, Spokane, Stevens, Whitman

Table 1

Value of Top Ten Agricultural Commodities that Employ Large Numbers of Seasonal Farm Workers Washington State, 1995, 1996, 1997, and 1998

	Value of Production (in thousands)			
	1995	1996	1997	1998
Apples *	\$1,021,750	\$912,700	\$821,400	\$684,500
Milk	687,934	792,277	732,423	847,641
Wheat	742,500	755,680	560,608	401,933
Cattle and Calves	450,009	407,123	468,580	447,415
Potatoes *	553,823	451,203	431,984	447,480
Hay	328,878	371,347	361,824	326,856
Farm Forest Products	338,000	315,000	300,000	305,000
Nursery Products *	245,000	245,000	250,000	260,000
Sweet Cherries *	106,519	118,940	132,694	127,725
Grapes *	73,676	57,744	124,410	107,004
Pears *	118,166	125,768	123,670	103,794
Hops *	99,290	93,953	89,306	71,666
Asparagus *	58,659	63,312	64,204	61,292

*Major employers of seasonal farm workers.

Source: U.S. Department of Agriculture and Washington State Department of Agriculture

Table 2

Agricultural Exports by Commodity Group Washington State, 1994-1998

	1994	1995	1996	1997	1998
Commodity Group	<i>(in millions of dollars)</i>				
Total	1,679.1	1,816.6	2,209.6	2,014.8	1,816.8
Wheat & Products	383.5	430.1	509.2	383.2	274.6
Feed Grains & Prods.	25.0	25.5	323.4	190.1	174.9
Fruit & Preparations	503.8	513.6	512.2	537.1	469.3
Vegs. & Preps.	387.9	421.6	426.1	419.7	456.9
Live Animals/Poultry	80.3	99.2	104.3	101.4	94.3
Hides and Skins	36.1	45.4	43.3	46.7	34.3
Poultry & Products	3.3	3.6	4.8	4.6	4.6
Fats, Oils & Greases	11.1	19.0	15.4	13.0	15.6
Dairy Products	32.0	32.7	25.5	31.7	33.7
Feeds & Fodder	20.9	24.1	28.5	33.7	32.3
Seeds	10.2	10.7	12.8	23.9	19.6
Other *	185.0	191.3	204.3	229.6	206.6

Detail may not add to total because of rounding.

*Mainly confectionary, nursery and greenhouse, essential oils, beverages, excluding juice and other miscellaneous animal and vegetable products.

Source: Economic Research Service, USDA

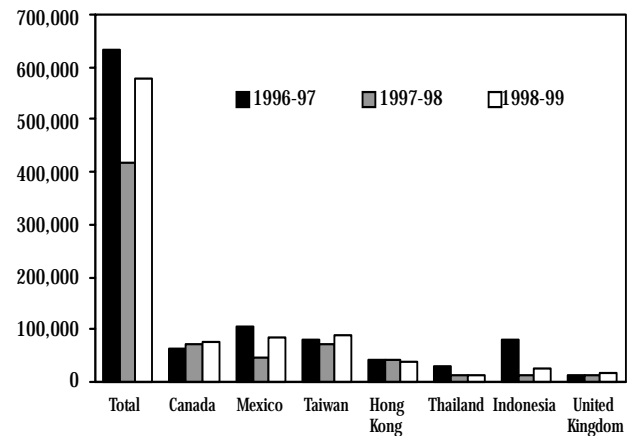
crease to 200,000 in a few years because of the expanding export market. Demand for potato and processing plant workers, of course, would also increase. Potato growers employed nearly 2,000 workers in 1999.

Encouraging Export Developments

A number of positive factors will improve demand for the state's agricultural products over the next several years.

Figure 2

Apple Exports (in Metric Tons) Washington State, 1996-97, 1997-98, and 1998-99 Crop Years



Source: IMPACT Center, Washington State University

First, economic conditions are improving for our major trading partners. According to the U.S. Department of Agriculture, Southeast Asian economies are expected to grow 6 percent in 2000 compared to the 6 percent contraction in 1998. Latin American countries are expected to add 2.7 percent after being in a recession in 1999. Overall global economic growth is forecast to increase 3 percent to post its highest rate of expansion since 1997. If China is granted permanent normal trade relations by Congress and becomes a member of the World Trade Organization (WTO), it would also bolster the agricultural trade prospects of Washington.

Wheat prices are expected to show a modest increase because of lower production, but the gain will be limited because of large carryover supplies. In 1999, U.S. producers planted the lowest wheat acreage since 1972 and are expected to plant even less in 2000. Washington wheat growers planted 1.85 million acres of winter wheat for 2000, 16 percent less than for 1998 and 3 percent less than for 1999. Developments for apple growers are more favorable. A 15 percent smaller crop in 1999 because of cold spring weather, the removal of some Red Delicious orchards resulting from low prices and the tendency for biennial bearing of apple trees, smaller crops following large crops, boosted the price of the 1999 crop substantially. Preliminary data show the price per ton increasing from \$230 in 1998 to \$368 in 1999, the highest since 1995. Also, despite the drop in volume, the total value of production jumped 34 percent to over \$936 million. Unless there are unusual weather conditions in the spring of 2000, production will increase substantially from 1999 because of the tendency for large apple crops to follow small crops. Since Washington produces about half of the nation's commercial apples, its production has a major impact on prices. With a larger crop there would be a ten-

dency for prices to be lower, but this should be tempered for the 2000 crop because of recovery in the export market and better prices for juice apples. Washington growers had been hurt by a 180 percent increase in the import of Chinese apple juice concentrate, which was being sold below the cost of production. In November 1999, the federal government imposed a 55 percent duty on Chinese apple juice concentrate retroactive to August 17. Anticipation of the decision forced Chinese juice out of the U.S. market and the price growers received for juice apples increased 10 times over the year-earlier price to \$100 per ton, which the industry considers its breakeven point. In 1998, Washington growers left some apples on the trees because prices did not cover the cost of picking apples for processing.

Trade With China May Increase

Despite the difficulty with China over apple juice concentrate, prospects in the future for increasing exports to China are encouraging. If trade relations with China are normalized, and that country becomes a member of the WTO, U.S. agriculture would have access to a nation with more than 1 billion people and an economy that is projected to grow 7 percent annually. No other economy in the world is expected to grow that fast. Membership in the WTO brings more favorable access to other member countries, but it also requires members to abide by its rules. According to the U.S. Department of Agriculture, China's accession to the WTO would strengthen the global trading system, slash barriers to U.S. agriculture, give U.S. farmers and agribusiness stronger protection against unfair trade practices and import surges, and create a more level and consistent playing field.

Washington ranks 8th in the nation in agricultural exports and would be a major beneficiary of expanded trade with China. Under its WTO accession agreement, China would reduce tariffs by up to 75 percent for fresh and processed deciduous fruit. Tariffs on apples, pears, cherries, and jams and jellies would fall from 30 percent to 10 percent; tariffs on plums would fall from 40 to 10 percent; and the tariff on wine would fall from 65 to 20 percent.

China's tariff on vegetables would fall up to 60 percent, depending on the product by 2004, while it would commit to a nominal 1 percent tariff on wheat and other grains imported within a tariff rate quota (TRQ). The TRQ on wheat would be initially set at 7.3 million metric tons and grow to 9.6 million by 2004. As a result of the 1999 U.S.-China bilateral agreement, China also agreed to import wheat and other grains from the Pacific Northwest. China had banned soft white wheat from the Northwest for 27 years, claiming the

grain was diseased, but lifted the ban in April 1999. Washington is a major wheat exporter with overseas sales of \$275 million in 1998.

Worker Demand Grows

The overall need for agricultural workers has continued to increase in Washington, even between 1995 and 1998, although it declined in 1999 because of smaller apple and cherry crops. The increasing trend in farm labor requirements in the state largely result from the shift to labor-intensive crops such as tree fruits. Tree fruits, mainly apples, account for approximately 47 percent of the state farm employment, and while the size of the crop will influence the number of harvest workers employed, prices generally have little impact. The collapse of the market for juice apples in 1998, which resulted in growers leaving some apples on their trees, was an exception. Even in that year, however, the average number of fruit tree workers increased 2,300 despite lower apple prices because of the large size of the crop. The apple crop is expected to increase between 1999 and 2000 and with it the need for workers. Wheat growers, however, are expected to employ fewer workers, but wheat is not a labor-intensive crop like tree fruits so the loss will be relatively small. Nonetheless, wheat production has a strong impact on labor requirements in other industries and in agricultural communities. Wheat sales create thousands of jobs in transportation, wholesale trade, business services, and other industries.

Workers are critical to a successful agricultural industry in Washington. Unfortunately, the future availability of workers is threatened by high turnover in the industry and efforts by the Immigration and Naturalization Service (INS) to crack down on illegal immigration. The INS estimated that illegal immigrants accounted for up to 40 percent of Washington's agricultural workforce in 1997. With an estimated 45 percent of agricultural workers not returning to farm jobs in the succeeding year, the workforce could be depleted rapidly if the INS were successful in keeping new illegal immigrants out of the country and in deporting those already here. Guest worker proposals have been introduced in Congress to replace those here illegally, but passage is far from assured. Farm operators favor such programs, but some farm worker groups, who maintain that the programs would depress farm labor wages, oppose guest worker programs (see *Is H-2A, A-OK?* and *Earned Amnesty: Fair Play or Foul?*).

AGRICULTURAL EMPLOYMENT

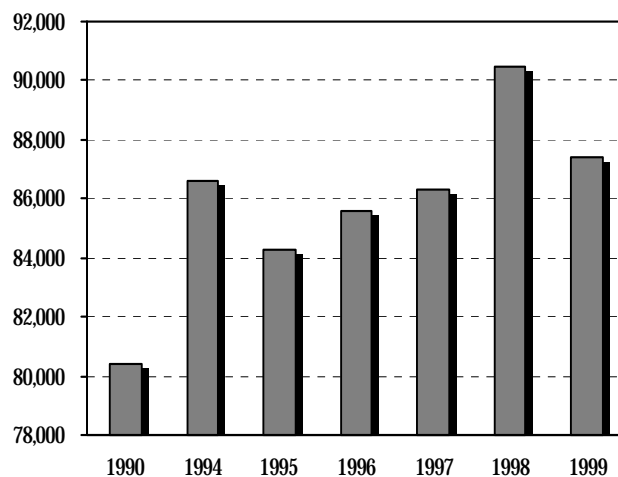
Agriculture is a major source of employment in Washington. Though a mature industry, it continues to expand as growers increase production in labor-intensive, high-valued crops such as tree fruits, grapes, and potatoes. Growth in employment, however, is erratic because of changes in weather conditions and in other factors affecting crop size, harvest conditions, changes in consumer preferences and overall demand and competition in U.S. and foreign markets. Total agricultural employment including farm operators, unpaid family workers, year-round, and seasonal workers was 87,400 in 1999. Among the state's goods-producing industries, only contract construction and transportation equipment employed more workers. Indirectly, agriculture accounted for thousands of additional jobs in food processing, transportation, and wholesale trade; at feed, seed, and chemical distributors; farm equipment dealers and others. Food and kindred product firms alone employed an average of 41,000 workers in 1999, while fruit and vegetable wholesale houses employed an average of 8,500.

Between 1990 and 1998, agricultural employment increased 10,100 or 12.6 percent. Most of the increase was in deciduous tree fruits, mainly apples, and in on-farm crop preparation services and farm management services. Bearing acreage of apple trees alone increased from 136 to 172 thousand acres over the period. Between 1998 and 1999, however, total agricultural employment slipped 3,100 largely because of a smaller apple crop in the latter year. Other crops have expanded or contracted and have influenced farm employment opportunities, but apple production is the state's major employer of farm workers and normally determines the overall trend. Growth in agricultural employment in the 1990's mainly resulted from increasing apple exports to Asia and Mexico. Future trends are uncertain. Unless markets expand, it appears that additional apple production will depress already low prices. About 25 percent of the commercial apples grown in the state are currently exported. Domestic consumption of apples has been relatively flat. Export markets have proven volatile in recent years because of instability in the economies of several Asian nations, a trade dispute with Mexico and protectionist measures in several other countries, notably Japan. Efforts to expand markets with new apple varieties and promotional efforts to educate consumers on the health benefits of eating apples, however, hold promise.

Of the other crops expanding, the most notable were potatoes, grapes, and sweet cherries. Washington now grows over 40 percent of the nation's Concord grapes and has become an important producer of wine grapes and premium wine as well. Grape acreage in the state increased 9,200 or 31 percent from 1990 to total 39,000 acres in 1999. Potato

acreage in the state has also grown substantially in the state since 1990 from 133 to 170 thousand acres. The major impetus is the growing demand for French fried potatoes. Sweet cherries are another expanding crop with acreage increasing 32 percent from 1990 to a total of 18,000 acres in 1999. Export demand has also been growing for this crop. Asparagus was the crop with the largest decline in acreage. From a peak of 32,000 acres in 1989, planted fields fell to 22,000 by 1998. The reduction has resulted from uncertainty over the future labor supply in this labor-intensive crop and uncertainty over the future availability of necessary pesticides. Considerable time and money is also required to bring new asparagus fields into production.

Figure 3
Total Agricultural Employment
Washington State, 1990, 1994-1999



Four Out of Every Five Farm Jobs in Eastern Washington

Over 80 percent of all agricultural jobs in the state in 1999 were in eastern Washington (represented by Agricultural Reporting Areas 2 through 6, see *Figure 1*). Warm summer weather, abundant water for irrigation and fertile soil combine to make the area one of the most productive agricultural areas in the nation. Tree fruits, grapes, potatoes, hops, onions, and asparagus are the leading crops in the irrigated areas east of the Cascade Range, while the dryland area is one of the major wheat producing areas of the nation. Approximately 12 percent of all jobs in eastern Washington are in agricultural production. A major share of the other jobs such as those in food processing are directly dependent on farm production or on the income generated by it.

In western Washington (represented by Agricultural Reporting Area 1, *see Figure 1*), agriculture accounts for less than 1 percent of the jobs. Farm jobs there are dwarfed by employment at firms producing aircraft, lumber, industrial machinery, computer equipment, software, and at trade and service establishments. Nonetheless, outside of major urban areas, agriculture is an important source of jobs. Western Washington leads the state in the production of several agricultural commodities including milk, eggs, commercial broilers, berries, and flower bulbs. Production of beef, numerous vegetables, and nursery products are also important. Over two-thirds of the state's 248,000 milk cows in 1999 were located in western Washington. Whatcom County led the state with 26 percent of the total. Other major dairy counties in western Washington with over 10,000 head included Snohomish, Skagit, King, and Thurston. Milk was the state's most valuable farm commodity in 1998 with a value of over \$847 million.

Broilers and eggs were also important farm commodities in the state with production values of \$82 and \$69 million, respectively, in 1998. Lewis County alone produced approximately 38 percent of the state broiler total in 1997, according to the Census of Agriculture. Clark and Snohomish counties were also important commercial broiler producers. According to the 1997 Census of Agriculture, the first five of the state's counties in terms of the market value of agricultural products sold were in eastern Washington. Sales in some western counties, however, were substantial. Whatcom County led the west side with a market value of about \$242 million and ranked 6th in the state. Adjoining Skagit County ranked 9th with sales of \$172 million. Other leading western counties included Thurston, with sales of \$121 million, Snohomish with \$113 million, and King with \$94 million.

Yakima Leads State

While most farm jobs are located in eastern Washington, 21,880 or 25 percent of all farm jobs in 1999 were in the South Central area, which consists of Yakima and Klickitat counties. Nearly 95 percent of the area's farm jobs were in Yakima County alone. The county's agriculture is diversified, and it leads the state in many farm commodities and the nation in a number of others. Approximately 20 percent of all workers in the county are employed in agriculture, and many others work in food processing, produce warehouses, transportation, and other industries dependent on agriculture. Yakima leads the state in apple, cherry, pear, and nectarine tree acreage. It also ranks 1st in acreage planted in hops, grapes, mint, and sweet corn (for processing) and is second in asparagus. The county ranks 1st in the number of cattle and 2nd in milk cows and beef cows. Nationally, Yakima was the leading county in apple, cherry, and hop production and was 2nd in pears.

The state's second largest agricultural area in terms of farm employment was the North Central area composed of Chelan, Douglas, Okanogan, and Kittitas counties. In 1999 agricultural employment in the area averaged 18,560, which represented 21 percent of the state's farm jobs. The area is not as diversified as the south central areas but specializes in tree fruits in the irrigated areas and in wheat and beef production in dryland areas. Major labor-intensive crops are apples, pears, and cherries. The area is also noted for raising beef cattle and wheat. Okanogan County ranked 2nd in 1999 in the number of beef cattle with 28,900 head, only slightly below Yakima County which had 29,600. Kittitas County with over 14,000 head is also a major beef producer. Okanogan ranked 3rd in the state and nation in 1997 in apple and production and 3rd in the state in pear production. Chelan County ranked 4th nationally in apple production. Douglas County is a major wheat area, ranking 6th in the state in 1998 when it produced 9.9 million bushels.

The South Eastern area, containing Benton, Franklin, and Walla Walla counties, is agriculturally diversified and leads the state in the production of several crops. An estimated 13,810 or almost 16 percent of the state's agricultural jobs were located in the area in 1999 and over 12 percent of all jobs in the area were in agricultural production. Labor-intensive crops include apples, cherries, grapes, asparagus, onions, and potatoes. Franklin County led the state in asparagus production and was 2nd in storage onions, potatoes, and alfalfa and 4th in grape production. Benton County led the state in grape production and also ranked high in the production of storage onions and potatoes. Walla Walla County, of course, produces the famous sweet onion named after it and is also a leading producer of nonstorage onions and potatoes.

The Columbia Basin area, which consists of Grant and Adams counties, also grows a wide variety of crops on its extensive irrigated acreage. The most labor-intensive crops are apples, storage onions, and potatoes. Total agricultural employment in the area was 10,740 in 1999, which represented over 12 percent of the state's farm jobs. About one-fourth of all jobs in the area were located on farms. Grant County alone ranked 2nd in the state in the market value of agricultural products sold in 1997 with a total of \$804 million. Yakima County was first with \$873 million. Grant led the state in the production of potatoes, storage onions, and alfalfa and ranked 3rd in the production of apples and grapes and 4th in cherries. Adams County also ranked high in the production of these crops. Sugar beets continued to make a comeback in the Columbia Basin with the opening of a new sugar refinery near Moses Lake. The facility was reportedly operating normally in 2000 after having mechanical difficulties in the previous year. An estimated 35,800 acres of sugar beets were harvested in the Columbia Basin in 1998. Record sugar beet acreage was 91,700 acres in 1973 prior to the closure of the former sugar refinery in Moses Lake.

The Eastern area consists of nine counties that border on Canada, Idaho, and Oregon. The area is one of the major wheat producing regions of the nation. Whitman and Lincoln counties, included in the Eastern area, ranked 1st and 2nd in the nation, respectively, in wheat production, according to the 1997 Census of Agriculture. Whitman also ranked 1st in the nation in barley production and Lincoln County 3rd. The area, however, employs relatively few farm workers because grain production is highly automated from planting through harvest. Including farm operators, family, and hired workers, the area employed 5,700 agricultural workers in 1999, less than 7 percent of the state total. Nonetheless, grain production is the mainstay of the area economy because of the income generated by the crops, which creates jobs in transportation, wholesale trade, business services, and other industries.

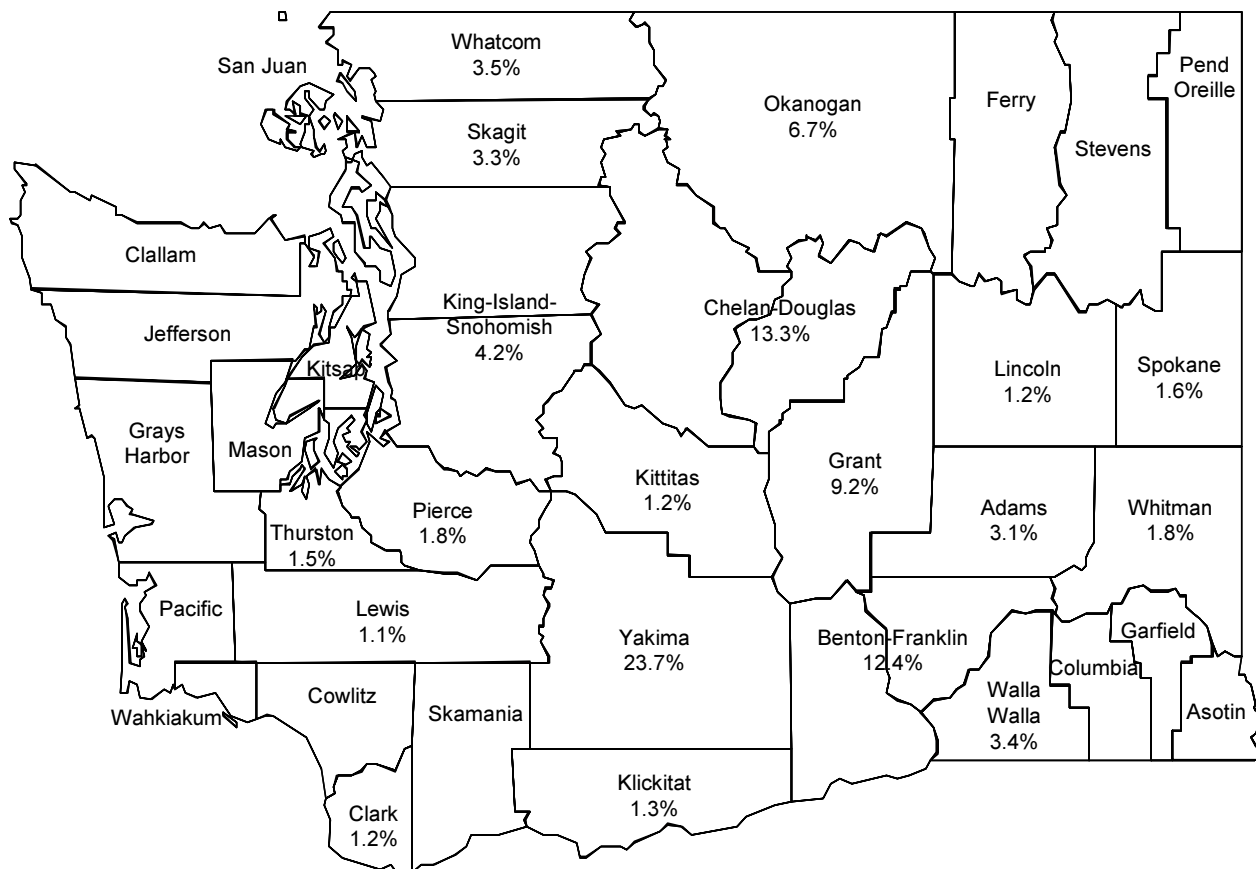
Tree Fruits Lead Expansion

A breakdown of total agricultural employment by industry, including farm operators, unpaid family, and hired work-

ers, is not available for 1999 but is available for hired workers from Employment Security Department tax records by agricultural classification for 1998. Since 1990 this data series, covered employment, includes nearly all hired workers with the exception of school youth, certain family members, and most corporate officers. Annual averages of the hired worker data show agricultural worker employment increased 14 percent between 1990 and 1998, from 65,400 to 74,600. Most of the growth occurred at farms raising deciduous tree fruits, mainly apples, cherries, and pears, where hired worker employment rose 4,100 over the eight-year period. Notable expansions also occurred in grapes, up 500; nurseries, up 900; general farms, up 1,500; and in agricultural services, up 3,600.

The increased employment in tree fruits resulted from substantial growth in apple, cherry, and winter pear acreage since 1990. Bearing apple acreage alone rose from 136 to 172 thousand for an increase of over 26 percent, while bearing sweet cherry acreage rose nearly one-third, from 13.6 to 18.0 thousand. Winter pear growers added 10 percent to

Figure 4
*County Percentage of Total Agricultural Employment**
Washington State, 1999



*Percentage not shown for areas with less than 1.0 percent of state total.
Source: Washington State Employment Security Department

Table 3

Total Employment, Agricultural Employment and Percent Agricultural Employment Washington State and Selected Areas, 1999

Area	Total Employment	Agricultural Employment	Percent Agricultural Employment
Washington	2,930,600	87,360	3.0%
Western	2,319,420	16,690	0.7%
Eastern	611,240	70,690	11.6%
Agricultural Area			
Columbia Basin	42,840	10,740	25.1%
Adams	8,080	2,700	33.4%
Grant	34,760	8,040	23.1%
North Central	85,660	18,560	21.7%
Chelan & Douglas	50,370	11,360	23.1%
Kittitas	14,060	1,050	7.5%
Okanogan	21,230	5,880	27.7%
South Central	111,340	21,880	19.7%
Klickitat	8,240	1,150	14.0%
Yakima	103,100	20,730	20.1%
South Eastern	113,250	13,810	12.2%
Benton & Franklin	88,800	10,870	12.2%
Walla Walla	24,450	2,940	12.0%
Eastern	258,150	5,700	2.2%
Lincoln	4,560	1,040	22.8%
Spokane	199,300	1,360	0.7%
Whitman	18,850	1,560	8.3%
Other Eastern Areas	35,440	1,740	4.9%

Note: Total employment and agricultural employment have been adjusted to eliminate the effect of multiple job holding.

Detail may not add to total because of rounding.

Source: Employment Security Department, LMEA

bearing acreage between 1990 and 1998, advancing from 12,000 to 13,200. Acreage in other tree fruits such as apricots, Bartlett pears, peaches, and prunes declined slightly over the period, but the cutbacks in those were dwarfed by the expansion in apples, cherries, and winter pears. While the employment trend was definitely up, the gain over the period was erratic year to year because of the influence of weather conditions on crop size and the tendency of apple trees to alternate between large and small crops. While hired employment in apples rose 4,100 from 1990, it rose 2,300 between 1997 and 1998 alone because the 1998 crop was nearly 16 percent greater than in the previous year. When 1999 data become available, they may well show a decline from 1998 because the 1999 crop was considerably smaller.

Employment at general farms also posted a substantial gain. Most general farms in the state, however, grow fruit as well as other crops and they undoubtedly increased their apple, cherry, and winter pear acreage. Consolidation of farms was also likely a factor in pushing employment up at general farms. Hired employment at nurseries added about 20 percent from 1990. Since nurseries basically serve local markets, the growth is likely a reflection of the increasing

population in the Pacific Northwest as well as the expansion in the tree fruit industry and its diversification into new varieties of apple trees. Employment at vineyards rose about 35 percent from 1990 to 1998. Employment growth of 500 in grapes was in line with their expanded acreage, which rose from 29.8 to 39.0 thousand over the eight-year period. An increase of 500 or 14 percent in field crop employment resulted from added acreage in a number of crops including sugar beets, which has been staging a comeback, mint, hay, grass seed, and hops. Hop yard acreage was up from 1990 but has been declining in the last few years because of an over supply of hops. Hop acreage rose from 25,663 in 1990 to 31,678 in 1996 but fell to 26,673 in 1998 with a drop of 4,500 acres between 1997 and 1998 alone. Not surprisingly employment in field crops declined 200 between 1997 and 1998 although it remained above its 1990 level.

Agricultural services posted the largest relative gain between 1990 and 1998, adding 3,600 hired workers for a gain of 65 percent. Farm management services alone added nearly 2,000. Employees of farm management service firms often include workers hired for cultivation, harvesting, and other services. Their services provide an option to owners who wish to partially or fully retire. Crop preparation service firms added 1,100 workers from 1990 to sort, grade, and pack apples, potatoes, onions, and other commodities on the farm. Larger crops, of course, require more workers to prepare fruit and vegetables for market.

Some Farm Industries Have Fewer Workers

While employment in most agricultural classifications increased between 1990 and 1998, employment in wheat and other cash grains fell 400 while 1,600 fewer workers were employed in vegetables and melons. Wheat acreage harvested was up about 3 percent from 1990, but the value of production was lower in 1998 even before any adjustment for inflation. Obviously wheat growers have had to trim expenses wherever possible. Employment in vegetables and melons dropped nearly 1,600 over the eight-year period. Carrot, storage onion, and sweet corn acreage has expanded substantially since 1990, but the harvests of these crops are automated. Asparagus, on the other hand, is a very labor-intensive crop, and its acreage declined from 30,000 in 1990 to 22,000 in 1998. Growers are concerned over the future availability of workers as well as necessary pesticides. Because of these uncertainties, they are reluctant to invest the time and cost to bring new fields into production.

Seasonal Employment Lower

Data on all hired workers for 1999 from Employment Security tax records were not yet available for this report but were available for seasonal agricultural workers from the

Table 4
Hired Agricultural Workers
Washington State, 1990, 1995, and 1998 Annual Averages

	Covered Employment*			
	Annual Average			Change 1990-98
	1990	1995	1998	
Total**	65,390	67,070	74,634	9,244
Agricultural Production, Crops	54,263	55,042	59,798	5,535
Wheat, Corn, Other Cash Grains	2,692	2,214	2,275	-417
Irish Potatoes	1,963	1,678	1,968	5
Field Crops, Exc. Cash Grains	3,723	4,129	4,248	525
Vegetables & Melons	4,832	3,532	3,243	-1,589
Berry Crops	1,928	1,854	2,032	104
Grapes	1,374	1,446	1,857	483
Deciduous Fruit Trees	30,966	32,008	35,079	4,113
Ornamnt Floricl/Nursry Prods	4,084	4,626	4,936	852
General Farms & Other	2,701	3,555	4,160	1,459
Ag Production, Livestock	5,589	5,539	5,677	88
Dairy Farms	3,207	3,342	3,429	222
Agricultural Services**	5,538	6,489	9,159	3,621

*Covered agricultural employment includes nearly all hired workers. Major exceptions are school youth, certain family members, and most corporate officers.

**Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.

Source: Employment Security Department, LMEA

In-Season Farm Labor Survey thanks to the more than 600 growers who voluntarily participate each month. Seasonal employment fell 7,400 from 1998 to average 31,800 in 1999. Approximately 89 percent of the decline resulted from lower employment in tree fruits. The number of seasonal jobs in apples alone fell 4,900 over the year because of a 16 percent smaller crop. Apple production in the previous year set an all-time record. Employment in sweet cherries fell 700, also because of a smaller crop. Utilized production in cherries fell 31 percent from 1998 because of poor pollination resulting from cool spring weather. Employment in pears and other tree fruits were also lower in 1999. While smaller crops were a factor in the employment reduction in 1999, more difficulty in hiring workers may also have contributed. Lower employment, however, was partially offset by expanding the working hours of those seasonal employees who were employed. Workers who were employed in agriculture only in 1999 averaged 724 hours compared with an average of 720 hours in 1998. An increase of 4 hours amounts to a sizable expansion considering the thousands of individuals employed in agriculture.

While tree fruits, apples and cherries in particular, accounted for most of the reduction in seasonal employment, growers of most other crops also cut back because cool spring weather reduced their production as well. Average annual employment in asparagus was down over 200 with production in 1999 lower by 11 percent. Employment in

both potatoes and miscellaneous vegetables was down 300. Among the few agricultural industries with higher employment were strawberries and nurseries, which each added 200 to their annual averages.

Annual averages are useful in comparing employment changes between years or comparing industry levels, but it masks changing levels within the year. Agriculture employment is extremely volatile because of variations in harvest periods and changing weather conditions. While seasonal farm employment averaged 31,800 in 1999, it rose from a low of 12,600 in January, when the only major activity was pruning, to a high of 59,500 in July when apple thinning and the cherry and a number of other harvests were underway. It then dropped back to 39,500 in August when apple thinning and the cherry and some other harvests were winding down. Seasonal employment then rose to 53,100 in September with the beginning of the fall apple and potato harvests, the hop harvest and an expansion in the pear harvest. In October it rose to 59,000 as the apple harvest reached its peak level with over 44,000 seasonal workers including 40,500 directly engaged in harvesting. By December, seasonal agricultural employment fell to its low of the year of approximately 12,000 with all major harvests completed for the year.

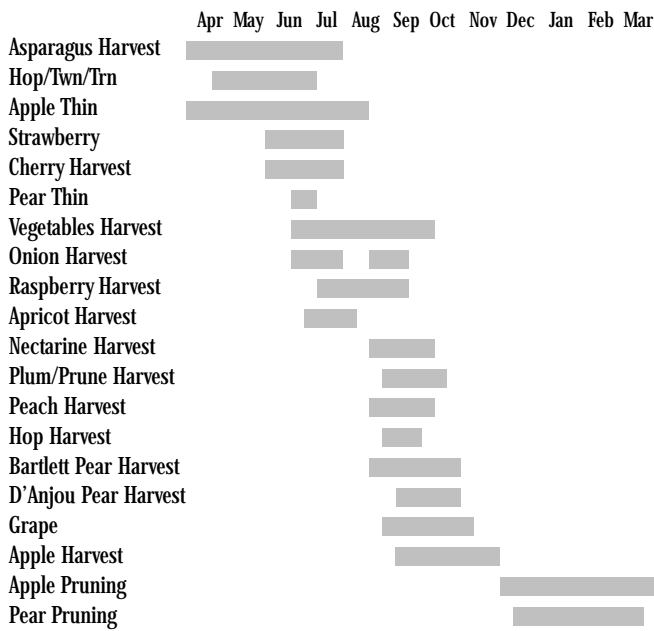
Review of 1999 Seasonal Activity

The year began with unseasonably warm weather in January, which facilitated outdoor work. The major activity was fruit tree pruning as usual for the month. Seasonal farm employment totaled 12,600 statewide with 7,700, or 61 percent, pruning fruit trees. An estimated 6,800 were pruning apple trees alone. Pruning was also the major activity in grapes, strawberries, and raspberries. Approximately one-third of the seasonal workers were employed in the South Central area (Yakima) and 25 percent in the North Central area (Wenatchee). Apple tree pruners working for hourly pay earned an average of \$5.98 per hour, while those paid on piece rate earned 40 cents to \$5.00 per tree in the South Central area and \$5.85 per hour and 12 cents to \$4.50 per tree in the North Central area. Trees, of course, vary widely in size from seedlings to mature, which accounts for the wide variation in pay per tree. An estimated 2,200 workers were employed in western Washington counties where most worked at raspberry farms and at nurseries. Raspberry pruners earned an average of \$5.69 per hour, while pay for nursery workers averaged \$6.25 per hour. Nursery workers were planting and tending bedding plants for upcoming spring sales.

The weather continued to be mild for winter in February, and seasonal employment moved up 2,100 to total 14,700. Grape growers added over 800 workers to prune and train grapevines. Tree pruning expanded moderately as did work at nurseries where some early plants were being harvested. About three-fourths of the nursery employment

was in western Washington. Nursery harvesters averaged \$6.55 per hour. The hothouse rhubarb harvest was underway west of the Cascades; the harvesters earned \$5.74 per hour. Spring wheat and peas were being planted in lower elevations of eastern Washington.

Figure 5
Estimated Periods of Seasonal Agricultural Work in Washington State



Daffodils Mark Beginning of Spring

With spring fast approaching, seasonal employment moved up 4,700 to a total of 19,400 in March. In western Washington the daffodil flower harvest was underway and employment by bulb growers rose 400. Flower harvesters earned an average of \$6.38 per hour. Nurseries added nearly 900 workers with shipments of bedding plants starting. Apple tree pruning wound down with the number of pruners declining 1,600 but total seasonal employment at apple orchards rose 400 as growers hired workers to cultivate, weed, irrigate, and spray their orchards. Cherry growers added about 700 workers with an increase in pruners and general orchard workers. Vegetable growers were also expanding their workforce for cultivating, irrigating, and other pre-harvest work. Employment in asparagus and onions rose 300 each, and potato growers added 500. The number of miscellaneous seasonal workers was up 600 from February with most hired for cultivation and general fieldwork.

Asparagus Harvest Begins

The asparagus harvest began as usual in April, which pushed seasonal employment up 5,500 to a total of 24,900.

Employment in asparagus alone rose 5,600. Harvesters in the South Central area paid by the hour averaged \$5.74 while those paid piece rates averaged 19 cents to 25 cents per pound. A wide variety of other vegetables were being planted and cultivated throughout the state, although seasonally cool weather delayed the planting of some. Potato growers added 300 workers to plant and tend their crop and an additional 500 were employed in miscellaneous vegetables. Bulb growers added 200 as the beginning of the tulip flower harvest overlapped the end of the daffodil picking. Partially offsetting these gains, fruit tree pruning declined. The number of apple pruners fell 4,300, but the hiring of hundreds of hand thinners and several hundred field workers limited the reduction in apple orchards to 1,200. The seasonal decline in pruning also lowered employment in cherries, pears, and grapes.

Asparagus Harvest Peaks but Fewer Jobs in Apples

Seasonal employment in asparagus jumped 2,300 from April to its annual peak of 8,200 in May. Crop development, though, was two to three weeks later than usual because of cooler than normal weather. Hop yards employed an additional 400 workers to train vines to grow up supporting twine, but employment in several other crops fell. Declining employment in apples, grapes, potatoes, and bulbs offset the expansion and overall seasonal employment in the state dipped 200 over the month.

Most of the asparagus employment was in the South Central (Yakima) and South Eastern (Walla Walla) areas, 46 and 48 percent respectively, and the remainder was in the Columbia Basin (Moses Lake) area. Total asparagus employment was approximately 1,500 lower than the previous year because of cooler weather. Preliminary estimates indicate production was down about 11 percent between 1998 and 1999. Employment in apples fell 2,400 over the month because of a decline in pruning (down 800) and thinning (down 2,000). Thinning employment was well below normal for the month because apple trees set less fruit than in the previous year and because of cool weather, which delayed development. Grape growers employed 600 fewer workers with a decline in pruning and planting. Potato growers cut their payrolls by 400 with planting complete. Employment in bulbs was down 200 with both the daffodil and tulip flower harvests complete for the year.

Harvests Push Employment Up Over 18,000

Cooler than normal temperatures continued to delay crop development in June. Nonetheless, total seasonal farm employment jumped 18,300 from May to total 43,000 in June because of the beginning of the cherry and strawberry har-

vest and a step up in apple and pear fruit thinning. Employment in apple thinning alone rose 14,600 as growers saw the need to increase fruit spacing to produce larger apples, which command a higher price. Hand thinners in the South Central (Yakima) area paid on an hourly basis averaged \$6.52. An additional 700 workers were employed in pear orchards as thinners. The beginning of the cherry harvest added 5,200 workers for a total of 5,800 with 2,800 in the South Central area, 2,100 in the South Eastern (Walla Walla) area and only 800 in the North Central (Wenatchee) area where crops develop somewhat later. Employment at cherry orchards was well below its year-earlier level when over 14,000 workers were harvesting cherries. Utilized production of cherries was down 31 percent over the year because of the cool spring, which resulted from poor pollination. The strawberry harvest was also beginning late for the year but provided jobs for an additional 600 workers. Onion producers added nearly 1,100 workers with the beginning of the Walla Walla sweet onion harvest and the need for additional weeders. The number of workers in miscellaneous vegetables rose 600, mainly weeders. Carrot weeders in the Columbia Basin (Moses Lake) earned \$5.81 per hour.

On the downside in June, the asparagus harvest was past its peak and employment in that crop fell 1,300 while potato and hop growers reduced their payrolls 300 each. Potato growers needed fewer workers to sort, grade, and pack last year's crop, as supplies were nearly gone. Hop growers needed fewer workers to train hop vines and the planting season was over.

Seasonal Employment at Peak in July

An expansion in the cherry and strawberry harvests, the beginning of the raspberry harvest and growth in other farm activities pushed total seasonal employment in the state up 16,500 from June to 59,500 in July, peak employment for the year. Employment in cherries alone rose 10,200 to its highest level of the year of nearly 16,000. Over 6,000 of the increase was in the North Central area where crops develop later. Cherry harvesters paid on an hourly basis earned an average of \$5.85 per hour in the North Central area in July. Apple growers added 3,000 workers with many of the new workers doing a variety of orchard jobs such as propping branches, which were being weighted down by developing fruit. Employment in "other tree fruit" moved up 1,400 in July with additional workers needed for the apricot harvest and the harvest of early peaches and prunes. Pear growers added over 600 workers to thin fruit prior to their harvest.

In other crops, the strawberry harvest employed 2,200 new workers to reach its peak of 3,100 workers in July, while the raspberry harvest began with the addition of 2,100 workers. Strawberry harvesters average \$6.48 per hour and mechanical raspberry harvesters \$6.81 per hour in western Washington. The early onion harvest boosted employment

by 600 in that crop. The only crop showing a sizable loss for the month was asparagus where employment fell 6,000 as the harvest was drawing to a close.

Harvest Activity Slows in August

Seasonal agricultural employment fell in August as usual with the completion of the cherry harvest, the near completion of the strawberry harvest and a decline in fruit thinning. The statewide job total in seasonal farm work fell nearly 20,000 from July to total 39,500 in August. Employment in the cherry harvest alone fell 14,300. Apple payrolls dropped 7,100 with thinning virtually complete with harvest time nearing. The harvest of some early apple varieties moderated the loss. The strawberry harvest was rapidly winding down, and the number of workers in that crop fell 2,200. The sweet onion harvest was completed, which pared seasonal employment an additional 900.

Partially offsetting the losses in August were gains in several crops. The beginning of the early pear harvest added nearly 1,200 workers, while an additional 1,100 workers were employed in the harvest of early potatoes. The expansion of the raspberry harvest boosted employment in that crop by 1,000. The blueberry harvest started and increased seasonal payrolls by about 500. The wheat/grain harvest was underway with an additional 600 workers in that activity.

The cucumber harvest was also beginning with growers adding 800 workers. A wide variety of other vegetables were also being harvested throughout the state including broccoli, cauliflower, lettuce, and radishes. Employment in miscellaneous vegetables rose 900 over the month. In western Washington, harvesters of broccoli averaged \$8.00 per hour; cucumber harvesters, \$6.50 per hour; and cauliflower harvesters, \$6.00 per hour.

Apple and Pear Harvests Underway in September

Seasonal agricultural employment shifted back into high gear in September with the beginning of the main apple, pear, and potato harvests. Other major harvests included hops and storage onions. Seasonal employment rose 13,600 from August to total 53,100 in September. The start of the fall apple harvest added 13,600 workers alone. Apple harvesters in the South Central area paid on an hourly basis averaged \$6.06 per hour while those in the North Central area averaged \$6.16 per hour. The pear harvest rose to its peak in September and added 3,400 workers. The hop harvest was also underway in the Yakima Valley with 1,800 workers added over the month and total seasonal employment of 2,700 in the crop in September. Other major harvests underway during the month were fall potatoes and storage onions. Potato growers added nearly 1,000 workers while storage onion producers added over 300. Potato workers operating mecha-

nized harvest equipment averaged \$7.02 per hour in the Columbia Basin (Moses Lake) area. The cucumber harvest expanded to its peak level in September and boosted employment by 400.

A number of other harvests were either completed or winding down during September and partially offset the job gains during the month. The raspberry and strawberry harvests were completed with employment reductions of 2,800 and 1,000, respectively. The end of the cherry harvest reduced employment 1,500 over the month, while the near completion of the wheat/grain harvest reduced employment 800 in that activity. Several stone fruits were still being harvested including peaches, prunes, and nectarines but the completion of the apricot harvest lowered employment in "other tree fruits" by 900.

Apple Orchards Add 17,000 in October

Seasonal agricultural employment rose 5,800 from September to total 59,000 in October as an expansion in the apple harvest and growth in several vegetable harvests offset reductions in a number of other agricultural crops. Employment in apples rose 17,000 from September to a total of 44,000 in October. October marked the peak of the apple harvest as usual, however, the peak in 1999 was down 9,700 from the peak in 1998. The drop resulted from a decline of 16 percent in utilized production between 1998 and 1999. Apple production set an all-time high in the state in 1998. The number of workers in "miscellaneous vegetables" increased 1,200 over the month. Normally employment would decline in this category in October, but this year a cool spring and early summer weather delayed the harvest of several crops. Vegetable harvests in October of 1999 included cabbage, carrots, cauliflower, celery, green onions, squash, spinach, peppers, and pumpkin.

The pear harvest was winding down in October and employment fell 4,300. "Other tree fruit" employment fell 800 with the completion of the peach, nectarine, and prune harvests. In other crops, the completion of the hop harvest lowered seasonal employment 2,400 while the end of the blueberry harvest reduced employment another 700. Employment in onions was down 400 with the storage onion harvest past its peak. The fall potato harvest was still very active in October with 2,700 seasonal workers, but it was down about 200 from September.

Harvests Come to a Close

Seasonal activity was drawing to a close in nearly all activities except pruning in November with most harvesting over for the year. Total seasonal farm employment fell 40,100 from October to 18,900 in November. Employment in apples alone dropped 33,500 with total seasonal employment in the industry down to 10,500. About 6,500 workers were still harvesting late apple varieties such as the Fuji. Others were sorting, grading, and packing apples; pruning; cleaning up orchards; and repairing and storing equipment. The pear harvest was complete and employment in that industry was down 1,500 over the month. Employment in miscellaneous vegetables was down 2,300 with numerous harvests completed. Harvests of carrots, cabbage, celery, and pumpkins continued. The potato harvest was nearly complete, but about 900 workers were still employed by growers to pack, sort, and grade this year's harvest. Bulb growers, nurseries, and onion and other vegetable growers employed other sorters, graders, and packers. Other noteworthy agricultural activities included the sugar beet harvest and the grain corn harvest.

Pruning Time Again

The end of the late apple and vegetable harvests reduced seasonal agricultural employment to its lowest level of the year in December. The total was down 6,900 from November to an estimated 12,000 in December. Employment at apple orchards fell 5,500; about 6,500 harvesters saw their jobs end by December, but the overall loss in the industry was partially offset by a seasonal increase in pruning. Over 4,000 workers were pruning apple trees in the final month of 1999 with seasonal employment at apple orchards totaling 4,900. Those not employed as pruners were sorting, grading, and packing apples or busy with orchard cleanup and equipment repair and maintenance. Pruning was also the major activity in pears, grapes, and raspberries. Employment in pears, in fact, increased 500 from November with all of the gain in pruning. Seasonal employment in grapes and raspberries slipped from November, but several hundred pruners were employed in these crops in December. Other seasonal agricultural workers in December were doing general maintenance and repair work or grading, sorting, and packing a wide variety of commodities such as potatoes, onions, beans, and nursery products.

HOURS AND EARNINGS

Annual earnings of agricultural workers averaged \$13,830 in 1998 or less than 42 percent of the annual earnings of all workers covered by the Employment Security Act and federal civilian employees working in Washington, which averaged \$33,071 (Covered employment and federal civilian employment represents about 85 percent of total employment; the largest group of non-covered workers is the self-employed, which includes many farm operators.). Average earnings in agriculture are relatively low for a variety of reasons. While there are many professional and managerial workers and skilled tradespersons employed in agriculture with wages commensurate with those in non-farm industries, formal training is not required for the majority of the workers in agriculture. The only job requirement for most farm jobs is the physical ability to do manual labor. As with similar jobs in other industries, there is generally a plentiful supply of these workers, and the wage rate needed to attract and retain them is relatively low.

In addition, most agricultural jobs are highly seasonal. Only a minority of the jobs provide year-round employment. Most jobs, in fact, last only for a few weeks during harvest periods. Then workers must move on to succeeding harvests or to other seasonal farm work but there is usually a period in between when they are unemployed. Moreover, even during major harvests, they often work less than 8-hour days or full weeks. The number of hours they work depends on crop conditions, the specific activity (planting, irrigation, harvesting, or sorting, grading/packing), size of the crop, and weather conditions.

Even within agriculture there is a wide range of earnings by industry and activity. Some farm industries are less seasonal and require more skilled workers than others. Average annual earnings by agricultural classification ranged from a high of \$20,131 for dairies to a low of \$10,029 for workers in berry crops in 1998. Dairies require workers year-round, seven days a week. Most milkers work at least 40-hour weeks all year except for vacation periods because it is essential that cows be milked twice a day when they are fresh. Dairy operators must have a dependable workforce and they pay accordingly. Moreover, many dairies are located in western Washington where they face competition from nonagricultural industries for workers.

Other agricultural sectors with higher than average earnings included potatoes, general farms, nurseries, field crops, and cash grains. Potato workers were also among the higher paid farm workers with annual average earnings of \$18,272. Planting and harvesting of potatoes is mechanized, and growers need skilled equipment operators and truck drivers who earn more than most farm workers because their skills are transferable to other industries. The industry also employs a

sizable number of sorters/graders/packers for several months after the harvest. While these are seasonal jobs, the work is inside and is not interrupted by adverse weather, and the workers are normally employed for full days. Wheat, corn, and other cash grain workers also earned above average pay in agriculture, \$15,677, because many of these workers were equipment operators and truck drivers. General farm workers averaged \$16,855 in 1998. This classification includes mushroom farms, which is a non-seasonal activity where workers are employed inside, normally for full workweeks. General farms also include highly diversified operations where workers can move from one crop or activity to another without losing as much working time as other agricultural workers. Nursery workers averaged \$16,106; while following a definite seasonal pattern much of the work is inside and workers are generally employed for full 8-hour days. Workers in field crops were close behind with an average of \$16,022. Hops are the major seasonal activity in this group. While their work is seasonal and outdoor, they too are generally employed for full days. Weather conditions normally do not interfere with hop vine training, twining, and other hop yard work.

Agricultural industries with below average earnings included berries and tree fruits. Berry farms employ the vast majority of their workers for only a few weeks each year for the harvest. Even during harvest periods, cold snaps often delay maturity resulting in partial days of work or less than full workweeks. Annual earnings at berry farms averaged \$10,029. Tree fruits, which employ by far the largest number of seasonal workers, had a relatively low average, \$11,225. Some skilled harvest workers have substantial daily earnings, but because the great majority of tree fruit workers are employed for only the relatively short harvest periods, average annual earnings are low.

Average annual earnings in agriculture were not only well below that of all covered and Federal civilian workers, but the disparity increased between 1997 and 1998. Earnings of all covered workers and Federal civilian workers rose \$2,316, or 7.5 percent, over the year compared with an increase of \$677, or 5.1 percent, for all agricultural workers. Part of the reason for the smaller gain for agriculture was a drop in the average for agricultural service workers from \$15,127 in 1997 to \$14,683 in 1998. The loss largely resulted from a lower average in farm management services which added almost 1,000 workers; most of whom were probably employed for short-term cultivation and harvesting services at specific farms. Thus, while wages paid by farm management service firms were substantially higher in 1998, the average per employee was lower.

Table 5
Average Annual Earnings of Workers in Covered Employment and Agricultural Employment, Washington State, 1998

Industry	Annual Average
All Covered & Federal Civilian Workers	\$33,071
All Agricultural Workers*	\$13,830
Agricultural Production, Crops	\$14,461
Wheat, Corn & Other Cash Grains	\$15,677
Irish Potatoes	\$18,272
Field Crops, Except Cash Grains	\$16,022
Vegetables and Melons	\$12,495
Berry Crops	\$10,029
Grapes	\$11,578
Deciduous Fruit Trees	\$11,225
Ornamental Floriculture/Nursery Products	\$16,106
General Farms & Other	\$16,855
Agricultural Production, Livestock	\$19,475
Dairy Farms	\$20,131
Agricultural Services*	\$14,683

*Excludes SIC 074, 075, and 078; veterinary, livestock, landscape, lawn-garden, and tree services.

Source: Washington State Employment Security Department

Earnings of Individual Farm Workers Lower

Average annual earnings in an industry represent the total earnings of all workers in that industry divided by the average monthly number of workers employed in the industry during the year. The total number of individual workers, however, is significantly greater than the average number because of turnover and because many workers are only employed for part of the year. Agriculture, of course, is highly seasonal and many individual jobs last only a few weeks, and most workers are not able to work year-round in agriculture. Consequently, the total number of workers who are employed in agriculture during a year is considerably greater than the monthly average. An average of 74,600 workers was employed in agriculture in 1998, but the number of individual workers for that year totaled 161,400. And while annual earnings in agriculture averaged \$13,830 in 1998, the average for individual workers who were employed in agriculture during the year was \$7,654. While most of the workers were not employed all year in agriculture, it does include their earnings in nonagricultural industries. Even including work in other industries, however, most farm workers worked and earned considerably less than most year-round workers.

Average annual data for 1999 on all hired agricultural workers were not yet available, but the number of workers undoubtedly declined because of the smaller apple crop. Data on individual workers, however, were available; the number of workers fell from 161,400 to 152,600 between

1998 and 1999 while their average hours worked rose slightly and their average annual earnings increased moderately.

Compared to the average full-time work schedule of approximately 2,000 hours during a year, agricultural workers averaged 855 hours in 1999 or about 5 months of full-time work. Those who worked in agriculture exclusively averaged even less, 724 hours, while those who worked in both farm and nonfarm jobs during the year averaged 1,159 hours. As could be expected, nonagricultural jobs boosted their earnings considerably. Compared to the overall average of \$7,995 for all agricultural workers, those who worked in nonfarm jobs as well averaged \$11,047 for the year, while those who held only farm jobs averaged \$6,671. Approximately 30 percent of those who worked in agriculture during 1999 were also employed in another industry. The need to find alternative work when seasonal farm jobs are not available is obvious given their low earnings. Many seasonal farm workers, however, have only a limited ability to speak English and have difficulty obtaining nonagricultural jobs where fluency in English is required.

The average for individual workers includes only paid employment in Washington, and there are a considerable number of migrant farm workers who work in more than one state. Nonetheless, the average is higher than the median found by the National Agricultural Worker Survey (NAWS). In the 1994-1995 period, the NAWS survey found that the median personal income of agricultural workers from farm and nonfarm jobs was between \$5,000 and \$7,500,

Table 6
Average Annual Hours and Earnings of Agricultural Workers Washington State, 1995-1999

	Number of Workers	Average Annual Hours	Average Annual Earnings
All Agricultural Workers*			
1995	149,650	777	\$6,411
1996	154,870	788	\$6,606
1997	155,980	835	\$7,294
1998	161,410	850	\$7,654
1999	152,590	855	\$7,995
Agricultural Only Workers*			
1995	105,770	658	\$5,383
1996	110,620	664	\$5,503
1997	108,870	705	\$6,116
1998	113,170	720	\$6,424
1999	106,410	724	\$6,671
Worked in Agricultural and Nonagricultural Industries			
1995	43,880	1,062	\$8,890
1996	44,250	1,097	\$9,361
1997	47,110	1,136	\$10,017
1998	48,250	1,153	\$10,541
1999	46,180	1,159	\$11,047

*Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.

Source: Washington State Employment Security Department

and their median earnings from farm work only was between \$2,500 and \$5,000. A number of reasons can account for the higher Washington data; the state data are the arithmetic mean rather than the median, it is for a period 4 to 5 years later and wages in West Coast states are generally higher than those for the nation. Taking these factors into consideration the data from the NAWS survey and the Washington data are generally consistent and both point to exceptionally low earnings for farm workers.

Hours and Earnings Increase

The number of individual agricultural workers declined from approximately 161,400 in 1998 to 152,600 in 1999 for a loss of 8,800. The number who worked in agriculture only fell 6,800, while the number who worked in both agriculture and nonagricultural industries was down about 2,100. Annual working hours, however, advanced from 850 to 855 hours for all agricultural workers and from 720 to 724 hours for those who only worked in agriculture. The decline in the number of workers largely resulted from a reduction in the size of the apple crop between 1998 and 1999. Utilized production of the crop fell 16 percent between the two years.

Also noteworthy is that annual average hours have been increasing in agriculture. Average annual hours for agricultural only workers rose each year between 1995 and 1999, from 658 hours in 1995 to 724 hours in 1999. The growth in hours resulted from the expansion in apple and cherry orchards. Orchards require more work outside of the harvest for planting, pruning, spraying, irrigation, and orchard maintenance than most other agricultural crops. Other possible reasons for the growth in working time are the diversification by many growers into raising more types of tree fruits, which permit employing workers for longer periods of time by moving them to succeeding activities and harvests. The growing competition for workers may also encourage growers to keep workers employed as long as possible.

Earnings Vary Widely Among Workers

Although average earnings of those who worked in agriculture are low, the distribution of earnings suggests that for many of those workers employment is not their primary means of support. The average earnings of the 106,400 workers who were employed in agriculture only was \$6,671 in 1999, but 27,800, or 26 percent, earned \$1,000 or less and another 14,100, or 13 percent, earned from \$1,001 to \$2,000. Many were likely school-age youth who lived at home. In many cases their earnings were necessary to further their education or contribute to the support of their families. Some who earned \$2,000 and below included migrant workers who may have come to Washington to work only in a specific activity such as the apple harvest. Most of those workers also had earnings in other states as well. On the other

end of the earnings distribution, 24,600, or 23 percent, of those who worked in agriculture only had earnings of \$10,001 and over. Many of these individuals had year-round farm jobs.

The 30 percent of all agricultural workers who were employed in nonfarm jobs during 1999 earned considerably more than those who worked only in agricultural jobs; \$11,047 compared to \$6,671. Only 11 percent working in nonfarm jobs too had total earnings of \$2,000 or less compared to 39 percent for agricultural only workers, while 39 percent of the farm-nonfarm individuals had total earnings of \$10,001 and over compared to 23 percent of the agricultural only workers. Working in nonfarm jobs also helped many qualify for unemployment compensation benefits, which is extremely important to workers in highly seasonal industries. Washington requires 680 hours of covered employment to qualify. Of those who worked in farm jobs alone in 1999, only 39 percent had sufficient hours to qualify, while 67 percent of those who also worked in nonfarm jobs qualified.

Table 7
Hours and Earnings of Agricultural Workers
Washington State, 1998

	1998
All Agricultural Workers	152,590
Average Hours Worked	855
Average Hourly Earnings	\$9.35
Average Annual Earnings	\$7,995
Average Number of Employers	2.53
Workers in Agriculture Only	106,410
Average Hours Worked	724
Average Hourly Earnings	\$9.21
Average Annual Earnings	\$6,671
Average Number of Employers	2.00
Worked in Agricultural and Nonagricultural Industries	46,180
Average Hours Worked	1,159
Average Hourly Earnings	\$9.53
Average Annual Earnings	\$11,047
Average Number of Employers	3.75

Source: Employment Security Department, LMEA

Top Earnings at Dairies

Individual earnings in agriculture also varied widely by industry, though it should be noted that many workers were employed in more than one farm industry during the year. The average agriculture only worker was employed in two farm jobs in 1999. The earnings variation by industry is largely a reflection of how seasonal the industry is and what proportion of the workers operate trucks, tractors, combines and other farm equipment or have other specialized skills. Dairy workers earned the highest annual and hourly earnings, \$10,482 and \$11.14. Dairy work-

ers must operate and maintain milking machines, milk storage tanks, and refrigeration equipment. They are also required to work weekends and holidays. It is important for dairies to have a stable and trained workforce since cows must be milked seven days a week. *Table 5* shows that the annual average for individuals was below the industry average. Turnover accounts for this difference.

Other higher paying farm classifications included crop preparation service firms, nurseries, grapes, and wheat. Earnings in crop preparation services averaged \$5,909 annually and \$9.68 per hour. Since firms in this activity provide their services to numerous farms, workers are employed longer than in most other seasonal farm activities. Nursery workers averaged \$5,720 annually and \$9.32 per hour. Much nursery work is under cover and not limited by weather conditions, which provide employees with more working hours than those engaged in outside activities. Grape workers earned \$4,974 annually and \$9.96 per hour, while wheat workers earned \$4,072 annually and \$10.24 per hour. Much of the grape and all of the wheat harvest are mechanized requiring growers to pay rates to retain skilled workers who could transfer their skills to other industries.

The lowest average for individual workers was in berries and vegetables. Berry workers averaged \$2,289 and \$7.73 per hour while vegetable workers earned \$2,836 annually and \$8.32 per hour. The harvest of both vegetables and berries is often interrupted by cool weather. The cool

Table 8

*Average Annual and Average Hourly Earnings of Individuals in Major Agricultural Industries Washington State, 1999**

	Annual Average Earnings	Percent of Agr. Empl.	Average Hourly Wage
Crops			
Wheat	\$4,072	3.6	\$10.24
Potatoes	\$3,974	4.5	\$9.59
Field Crops, Exc Grains NEC	\$3,924	8.5	\$8.39
Vegetables	\$2,836	8.6	\$8.32
Berries	\$2,289	5.5	\$7.73
Grapes	\$4,974	5.4	\$9.96
Tree Fruits	\$3,950	54.1	\$8.20
Nursery Production	\$5,720	8.7	\$9.32
Livestock			
Beef, Feedlots	\$5,212	0.6	\$10.07
Beef, Except Feedlots	\$5,196	0.7	\$9.58
Dairy	\$10,482	3.8	\$11.14
Agricultural Services**			
Crop Preparation Services	\$5,909	12.8	\$9.68
Farm Management Services	\$2,234	3.5	\$8.38

*Many workers were employed in more than one agricultural industry; data include earnings in the listed industry only.

**Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.

Source: Employment Security Department, LMEA

weather delays maturity, which reduces the earnings of the harvest workers who are paid on a piece-rate basis. Tree fruits, the state's major employer of seasonal farm workers, was also one of the lower paid industries with average annual earnings of \$3,950 and average hourly earnings of \$8.20. Earnings were low because thousands of workers were hired for relatively short harvest periods resulting in a low annual average.

Workers Earn More in Nonfarm Jobs

Those who worked in both agricultural and nonagricultural jobs worked longer and had higher earnings in their nonfarm job than in agriculture. Their annual hours in 1999 averaged 1,159, but 658 hours were in nonagricultural jobs while they averaged 501 hours in agriculture. Overall annual earnings averaged \$11,047 with \$6,966 from nonfarm jobs and \$4,080 from agricultural work. As might be expected, hourly pay in the off-farm jobs was higher, \$10.59 compared to \$8.14. It is noteworthy that their average hourly pay in agriculture of \$8.14 was also well below the average for those who only worked in agriculture of \$9.21. The fact that their hourly pay in farm work was below that of the agricultural only workers suggest that they were more likely to hold lower paying, short-term farm jobs, which gave them an added incentive to find jobs outside of agriculture.

Table 9

Average Annual Hours and Earnings of Workers Employed in Both Agricultural and Nonagricultural Jobs Washington State, 1999

Industry	Average Annual Hours	Average Hourly Earnings	Average Annual Earnings
Total	1,159	\$9.53	\$11,047
Agricultural*	501	\$8.14	\$4,080
Nonagricultural	658	\$10.59	\$6,966

*Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.

Source: Employment Security Department, LMEA

Many Nonfarm Jobs Related to Agriculture

The nonfarm jobs held by agricultural workers can be found in all major industries, but approximately one-third were in those directly related to agriculture. Fresh fruit and vegetable warehouses accounted for 21.9 percent, 5.7 percent were in canned fruits and vegetables, and 5.1 percent were in frozen fruits and vegetables. Most of these facilities are located in eastern Washington agricultural areas so those workers can shift to these jobs from farm jobs without chang-

ing their place or residence. In addition, most of those who hold these jobs are Hispanic so there is not the language barrier that would be found in many other nonagricultural jobs. Jobs in these industries are also highly seasonal and hourly earnings comparable to those in agriculture. A number of these workers held more than one nonfarm job during the course of the year. Agricultural only workers held an average of two jobs during 1999, while those who also worked in nonagricultural industries averaged about four jobs. Those who worked in fresh fruit and vegetable warehouses averaged \$2,626 in that industry for the year with an hourly earnings average of \$7.90. Averages in canned fruit and vegetables were \$4,057 and \$9.29 per hour, while those who worked in frozen fruits and vegetables averaged \$4,716 and \$9.33 per hour. Another large source of jobs for agricultural workers was retail trade, in which nearly one-fourth of farm workers employed in nonagricultural industries worked. Retail outlets employing these workers were restaurants, including fast food; convenience stores; and gasoline stations. Hourly earnings in retail trade for these workers averaged \$8.15 with average annual earnings of \$3,950.

The highest paying nonfarm jobs held by workers employed in both agriculture and nonagriculture were in education where hourly pay averaged \$17.63 and annual earnings averaged \$12,361. Most of these individuals, however, were teachers and non-teaching school employees who held farm jobs during the summer months. Construction also provided relatively high-paying employment for farm-nonfarm workers. Slightly over 10 percent of farm workers who worked in nonagricultural jobs found employment in the building trades where they averaged \$13.59 per hour and earned \$5,479 in 1999.

Table 10
Employment and Earnings of Agricultural Workers in Nonagricultural Industries Washington State, 1999

Selected Industries	Percent of Workers	Average Annual Hours	Average Annual Earnings
Contract Construction	10.3	\$13.59	\$5,479
Canned Fruits & Vegetables	5.7	\$9.29	\$4,057
Frozen Fruits, Vegetables & Juices	5.1	\$9.33	\$4,716
Lumber & Wood Products	2.8	\$10.58	\$6,884
Trucking & Warehousing	4.5	\$11.31	\$4,837
Wholesale Fresh Fruit & Vegetables	21.9	\$7.90	\$2,626
Retail Trade	23.7	\$8.15	\$3,950
Temporary Help Agencies	7.3	\$8.13	\$1,952
Education	4.2	\$17.63	\$12,361
Social Services	2.0	\$8.81	\$4,687

Source: Employment Security Department, LMEA

Many Workers Leave Agricultural Jobs

While it is relatively easy for unskilled workers, even those unable to speak English well, to find seasonal employment in agriculture, wages are low and working time often too short to earn an acceptable living. As a result, turnover in agriculture is high. Of the 161,400 individuals who worked in agriculture in 1998, only 86,600, or 54 percent, were employed in agriculture in 1999. Many found higher-paying, more stable employment in nonfarm industries. The 74,800, or 46 percent, who dropped out included 21,100 who worked exclusively in nonfarm jobs in 1999. Agriculture clearly needs thousands of new workers each year to replace those who leave.

Table 11
Labor Turnover in Agricultural Employment Washington State, 1998-1999

Agricultural Workers	Number	Percent
Total Workers in 1998	161,362	100.0%
Worked Agriculture in 1998 and 1999	86,558	53.6%
Separations, Worked Agriculture 1998, not 1999	74,804	46.4%
Separations, Employed in Nonag Industries in 1999	21,084	28.5%

Source: Employment Security Department, LMEA

Annual earnings of the former agricultural workers who were employed in nonfarm jobs in 1999 averaged \$11,225, well above the average earnings of all agricultural workers of \$7,995 and also above the \$11,047 average of workers who were employed in both agricultural and nonagricultural jobs in 1999. Averages in the industries in which the former agricultural workers were employed in 1999, see Table 12, were generally well below the overall average because many worked in more than one nonfarm job since a large proportion of the jobs were seasonal or part time.

Approximately 65 percent of their jobs were in retail trade, wholesale trade, and food products. A sizable number of the former agricultural workers probably worked nonfarm jobs as well as in agriculture in 1998. When they were able to obtain sufficient hours in their higher-paying nonfarm job, they no longer worked in agriculture. About one-third worked in retail trade where their jobs averaged \$4,970, low but well above the average of \$3,950 earned in retail trade by workers who still held farm jobs in 1999. The bulk of the retail jobs were at eating and drinking places. Wholesale trade, primarily fresh fruit and vegetables, was the next largest source of jobs—17 percent. Their annual earnings in wholesale trade averaged \$8,260. Food processing, mainly canned and frozen food plants, was another major job source for former farm workers. In these jobs they averaged \$8,440. Contract construction and business services also were major sources of nonagricultural jobs. Approximately 13 per-

Table 12
Employment and Earnings of Former Agricultural Workers
by Nonfarm Industry
Washington State, 1999*

Industry	Number of Workers**	Percent of Workers**	Annual Average Earnings
All Industries	21,084	100.0%	\$11,225
Contract Construction	2,757	13.1%	\$8,243
Food and Kindred Products	2,935	13.9%	\$8,440
Lumber and Wood Products	870	4.1%	\$10,566
Transportation Equipment	364	1.7%	\$15,378
Trucking and Warehousing	874	4.1%	\$9,253
Wholesale Trade	3,562	16.9%	\$8,260
Retail Trade	7,186	34.1%	\$4,970
Business Services	2,509	11.9%	\$4,227
Amusement and Recreation	701	3.3%	\$4,248
Health Services	999	4.7%	\$8,834
Education Services	1,177	5.6%	\$12,336
Social Services	724	3.4%	\$5,595
Federal Government	382	1.8%	\$12,740

*Workers employed in agriculture in 1998 but employed in nonagriculture only in 1999.

**Some workers were employed in more than one industry.

Source: Employment Security Department, LMEA

cent of the nonfarm jobs were in construction where the average was \$8,243 for the year. Business services, with 12 percent of the jobs, had average annual earnings of only \$4,227, but most of those jobs were with temporary employment agencies, which are short term by nature. The industries with the highest annual earnings averages, which employed a significant number of individuals who worked in agriculture in 1998 but not in 1999, were transportation equipment, \$15,378, and education, \$12,336, but they accounted for relatively few of the jobs held by the former agricultural workers.

Farm Work Highly Seasonal

Many industries in Washington are highly seasonal, and few are more seasonal than agriculture. January normally marks the low point for seasonal jobs in the state. Thousands of temporary sales workers are terminated following the December holidays. Hotels, motels, amusement parks, and other tourist-related businesses are at their annual lows. Outdoor work in logging and construction is generally precluded by weather conditions. Agriculture, of course, is at its low point with harvest work completed by December and most fieldwork not possible until the return of spring weather. Employment in agriculture-related industries such as food processing and wholesale fruit and vegetable operations are also at their annual lows. Claims for state regular-entitlement unemployment compensation from all claimants totaled 129,600 in January 1999, while

claims from workers last employed in agriculture numbered 10,600. Seasonal work in agriculture was largely limited to pruning fruit trees and berry and grape plants. A few hundred other workers were sorting, grading and packing fruit, potatoes, and onions, planting nursery bedding plants, and repairing equipment.

By April the return of spring weather expanded employment opportunities throughout the economy but especially in outdoor industries such as agriculture, construction, and logging. Total claims fell to 106,700, down 22,813 or 18 percent. The number of agricultural claimants, however, fell proportionately more, declining 3,900 or 37 percent. With the return of spring weather, field work including planting and cultivation was well underway throughout the state, daffodil buds were being picked in western Washington while the asparagus harvest was beginning in early areas of eastern Washington. Claims continued to fall through July with summer tourist business and outdoor employment expanding. In agriculture the harvest of cherries, raspberries, sweet onions, and early potatoes were underway along with fruit thinning and general field work such as irrigation, spraying, and cultivating. Total claims were down 42,800 or 33 percent, from January, while claims from agricultural workers were down 6,900 or 65 percent.

Claims from agricultural workers temporarily jumped 1,900 to total 5,600 in August because of the completion of the cherry harvest and the near completion of the raspberry harvest and a seasonal decline in hand fruit thinning. The beginning of the fall apple harvest in September, however, saw claims from agricultural workers fall to its lowest point of the year, 3,500, which was 7,100 or 61 percent below its January level. Claims from farm workers remained at 3,500 in October with the apple harvest continuing. Total regular claims, all industries, continued to fall through the summer and reached their low point of 75,600 in September, down 53,900 or 42 percent below their January 1999 level.

Overall claims and claims from former agricultural workers were sharply higher in December with harvests and summer-related activities over for the year. Total claims, all industries, rose to 103,500, up 35 percent from their low in September. Claims from former agricultural workers rose to 8,600, more than double the September-October low of 3,500. January saw the usual further deterioration in weather conditions limit outdoor work even more and the layoff of thousands of temporary holiday workers. Total claims for regular unemployment benefits rose to 122,600 but remained 7,000 or five percent below their year-earlier level due to a stronger economy. Claims from former farm workers increased to 9,200 with pruning being the only major activity in January. The total, for agricultural workers, however, was down 1,400, or 13 percent over the year.

Table 13
*Claims for Regular Entitlement Unemployment Insurance**
Selected Industries and Months
Washington State, 1999 and January 2000

Month/Year	All Industries	Agriculture**
January 1999	129,513	10,581
February 1999	115,778	8,141
March 1999	119,047	7,758
April 1999	106,670	6,665
May 1999	98,055	5,564
June 1999	92,429	4,650
July 1999	86,668	3,731
August 1999	87,668	5,608
September 1999	75,640	3,521
October 1999	75,703	3,546
November 1999	91,952	7,882
December 1999	103,492	8,583
January 2000	122,548	9,227

**Includes claimants who filed at any time during the month.*

***Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.*

Source: Employment Security Department, LMEA

HISPANIC FARM WORKERS

Farm Workers are Mainly Hispanic Males

Agricultural workers in the state are predominately Hispanic and male. A large proportion of the Hispanic workers migrated to the state from rural Mexican villages where employment opportunities are scarce and even openings for unskilled jobs can be highly competitive. By contrast, it is relatively easy to obtain seasonal jobs in the United States during harvest periods. While seasonal agricultural work provides only a limited income, it provides more than they could earn in rural Mexico. Most have little formal education, and they typically do not speak English well. Their lack of education and limited English speaking ability prevents many of them from obtaining employment in most nonfarm industries.

The characteristics of farm workers are available for those who filed for unemployment compensation. Not all farm workers, of course, file for Washington unemployment benefits. Some migrant farm workers file for benefits against other states in which they had earnings. In addition, approximately 52 percent of all 1999 agricultural workers who worked in the state did not have the required 680 hours of employment to qualify. This included 61 percent of those who only worked in agriculture and one-third of those who were employed in both agriculture and nonagricultural industries during the year. Nonetheless, the data from those who did file show that a preponderance were Hispanic. Of the 9,200 agricultural workers who filed claims in January 2000, 78 percent were Hispanic, 20 percent were white and 2 percent belonged to other ethnic groups. The proportion of all farm workers who were Hispanic was probably even higher than indicated by the claims data. White workers account for a disproportionate share of year-round workers who are more likely than seasonal workers to have the necessary hours to qualify for benefits.

The proportion of workers by ethnic group varied within agriculture. In crops, which is by far the largest employer of agricultural workers, Hispanics accounted for 81 percent of the employment. In livestock, however, only 47 percent were Hispanic. Livestock is less seasonal than crops and employs a larger proportion of year-round workers. Dairies account for over one-half of the employment in livestock. In agricultural services, 65 percent of the workers were Hispanic. The largest divisions in this industry are crop preparation services (crop cleaning, sorting, grading, and packing) and farm management services. The latter includes workers hired to plant, cultivate, and harvest crops as well as individuals employed in management and administrative positions.

The great majority of farm workers are male. Although women can be found in all farm occupations, they outnumber males in only a few agricultural activities. Based on the characteristics of claimants in January 2000, males accounted for 72 percent of all agricultural workers, 76 percent of the workers in crops, 81 percent of livestock workers, but only 48 percent of those employed in agricultural services. Within the services group, women represented a large proportion of the workers in crop preparation service and likely a majority of the administrative workers in farm management services. Sizable administrative staffs are required to process payrolls, pay bills, keep production records, and prepare tax and other reports. Women fill many of these positions in agriculture as they do in other industries.

Table 14

Crop and Livestock Claimants for Regular Entitlement
Unemployment Insurance by Sex and Ethnicity
Washington State, January 2000*

Claimants	All			Agricultural Services
	Agricultural Workers**	Crops	Livestock	
Total	9,227	7,599	178	1,450
Sex				
Male	6,625	5,785	144	696
Female	2,602	1,814	34	754
Ethnicity				
White	1,847	1,275	90	482
Black	28	24	0	4
Hispanic	7,220	6,193	83	944
Native American	26	21	0	5
Asian	68	55	5	8
Unknown	38	31	0	7

*Includes all workers who filed a claim during the month.

**Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.

Source: Employment Security Department, LMEA

Educational Levels Low for Most Farm Workers

Educational opportunities for youth in rural Mexico are limited, which is reflected in the educational levels of the Hispanic farm workers in Washington. By contrast, there is considerable effort in the U.S. to keep young people in school until they graduate from high school. Nearly 73 percent of the Hispanic workers who were last employed in agriculture and filed claims in January 2000 had completed 8 or fewer years of school. Only 7.3 percent of White claimants reported having completed fewer than 9 years of school. Approximately

Table 15

*Years of School Completed by Regular Entitlement Unemployment Compensation Claimants by Ethnicity
Washington State, January 2000**

School Years Completed	Total	White	Hispanic
All Claimants	100.0%	100.0%	100.0%
8 or Less	59.3%	7.3%	72.9%
9-11	16.9%	21.1%	15.8%
12	17.6%	48.1%	9.6%
More than 12	6.2%	23.4%	1.7%

**Excludes SIC 074, 075, and 078; veterinary, landscape, lawn-garden, and tree services.*

Source: Employment Security Department, LMEA

10 percent of the Hispanic claimants had completed 12 years of school compared with 48 percent of White claimants, while about 23 percent of the White claimants had completed over 12 years of school compared to less than 2 percent of the Hispanic claimants.

More Hispanic Farm Operators

Hispanics dominate the state's seasonal agricultural workforce but relatively few are farm operators. Part of the reason for this is that most Hispanic farmworkers are relatively new to the state, many have been legalized only recently and few have the resources to purchase farms. Nonetheless, the number of Hispanic farm operators is increasing. According to the 1997 Census of Agriculture, there were 625 Hispanic farm operators in 1997, up from 378 in 1992. Of the 1997 total, 426 owned the farm they operated, 120 were part owners, and 79 were tenants. Acreage farmed totaled over 130,000 for an average of 209 acres. Approximately 40 percent were growing fruit and 18 percent were in beef production. Total sales from the Hispanic farms totaled \$118.6 million for an average of approximately \$190,000 per farm.

MIGRANT FARM WORKERS

Migrant Farm Worker Data

The operative assumption is that Employment Security's UI database provides one of the best available counts of resident seasonal farm workers. It is not designed, however, to count non-resident migrant farm workers. The challenge, therefore, is to identify a database or combination of databases that can provide a comprehensive count of non-resident migrant farm workers. A relatively exhaustive search of federal, state, and local government and non-profit entities suggests that no such databases exist. That is not to say that there are no data related to migrant workers in Washington. Several organizations, for example, maintained databases that captured at least some aspect of the state's migrant worker population:

- Washington State Health Care Authority.** The Washington State Health Care Authority (HCA) serves as a clearinghouse for data on migrant and seasonal worker visits to federally funded medical and dental clinics in Washington. The HCA database contains unduplicated counts of migrant worker visits by each health care clinic. The count from clinic to clinic, however, is not screened for duplication. Therefore, while the site-specific data represent a useful gauge of migrant worker presence by

area, the statewide summary might be less so due to duplication. The HCA is quick to point out that there are both federally funded and non-federally funded health clinics and that their data do not capture migrant worker visits to the latter. More importantly, they do not capture migrant workers who did not visit a federally funded health clinic during their swing through Washington. Equally important is the fact that many migrant workers who need health care services do not seek it.

- Migrant Student Records Center.** The Migrant Student Records Center (MSRC) maintains a count of migrant students by school district and school site while they are here in Washington. The school district count is also maintained on a month-by-month basis, which provides some indication of the seasonal influx in the area. The MSRC acknowledges that one limitation of the data is that not every migrant worker who comes to Washington with children enrolls those children in school as required. Additionally, migrant workers with children who are in Washington at the same time as the summer break would not show up in the database since their children are not required to be enrolled in summer school. The data do not provide a count of the parent(s) of these students, though the MSRC intends to start col-

Table 16

*Migrant Visits to Federally Funded Health Clinics
Washington State, CY 1998*

	Unduplicated Users	Migrant Users	Migrant Share
State Total	349,365	72,372	20.7%
Female	193,468	37,316	19.3%
Male	155,897	35,056	22.5%
45th Street Clinic	8,553	27	0.3%
Columbia Basin Health Association	11,963	5,637	47.1%
Columbia Valley Community Health	10,921	5,189	47.5%
Community Health Association of Spokane	6,888	75	1.1%
Community Health Care	23,159	638	2.8%
Community Health Center - La Clinica	18,864	13,249	70.2%
Community Health Center of Snohomish County	15,671	52	0.3%
Cowlitz Family Clinic	2,453	101	4.1%
Family Health Center	8,576	4,118	48.0%
Moses Lake Community Health Center	10,267	1,646	16.0%
Providence Health and Education Center	3,890	584	15.0%
Puget Sound Neighborhood Health Center	18,862	9	0.0%
Sea-Mar Community Health Center	45,943	7,862	17.1%
Southwest Washington Health District	2,963	44	1.5%
The Opportunity Center	5,058	134	2.6%
West Coast Community Center	5,374	141	2.6%
Yakima Neighborhood Health Center	13,937	2,587	18.6%
Yakima Valley Farm Worker Clinic	58,989	30,279	51.3%

Source: Primary Care Services, Washington State Health Care Authority

Table 17**Migrant Student Count
Washington State, Academic Year 1998-1999**

	Native American	Asian	African American	Hispanic	White	Total
Regular School	281	57	36	20,760	361	21,495
Summer School	37	7	0	4,594	72	4,710
Alternative/Night School	30	5	1	796	12	844
Early Childhood Education	1	0	0	2,295	9	2,305
Out-of-School Regular	38	7	11	6,071	55	6,182
Out-of-School Summer	2	0	0	1,332	36	1,370
MSRS I/R Regular	225	6	2	3,414	47	3,694
MSRS I/R Summer	2	0	0	873	33	908
Grand Total	616	82	50	40,135	625	41,508

*Note: Each category represents a unique count for that category. The Grand Total is cumulative and can contain duplicates.
Source: Washington State Migrant Student Records System*

lecting these data and other demographic data in the future. Of course, a major limitation of this database in providing a comprehensive count of migrant workers in Washington, even if it does count parents in the future, is that it still will not capture migrant workers who do not have children or do not bring them into the migrant stream.

- **National Agricultural Workers Survey.** Conducted by the U.S. Department of Labor (DOL), the National Agricultural Workers Survey (NAWS) provides information on the demographics and working and living conditions of U.S. farm workers. It accomplishes this by locating and sampling farm workers across the U.S. in three cycles each year (to account for seasonality) and avoids undercounting by arranging to interview respondents at their homes or other acceptable locations. The NAWS asks questions about household and family composition, employment, education, migration patterns, language ability, wages, benefits, working conditions, health, safety, housing, income, assets, use of social services, and legal status. According to the latest NAWS (March 2000), in 1998, the average U.S. farm worker was a relatively young, undocumented, Hispanic, foreign-born male, probably from Mexico, who had a 6th grade education and did not speak or read English well, if at all. He had spent 24 weeks in farm work and five additional weeks in non-farm work making \$5.94 an hour and was living below the U.S. poverty line (less than \$10,000 per year). However valuable, the NAWS provides an exclusively national picture of farm workers in the U.S. The DOL does not regard the sample size at the region, state, and county levels to be statistically valid and therefore does not provide any sub-national disaggregation of the data. While the NAWS farm worker characteristics might reasonably be applied to farm workers in Washington, the adequacy of the fit cannot be statistically confirmed.

Despite the dearth of comprehensive data on migrant workers in Washington, there is no lack of interest in counting this population. At this time, at least three state agencies—Employment Security, Department of Health, and Department of Labor and Industries—have an expressed need for such data to support programmatic efforts. The Department of Health, for example, is seeking data on migrant workers that could be plugged into a balanced scorecard to be used to address migrant worker housing. They have had limited success developing that scorecard because of the lack of data on migrant farm workers.

Due to the transient nature of this population, any reliable count of migrant workers in Washington will ultimately require a stratified (seasonal) survey to gather statistically valid data, something that has never been done. This is not, of course, to say that it cannot be done. One might, for example, conduct a Washington-specific variation of the NAWS to effectively capture undocumented migrant workers. That survey information can then be merged with trend data extracted from Unemployment Insurance (UI) employment and wage records and related employer data. Such a data extract could identify individuals who worked in agricultural industries (e.g., SIC 01, 02, and parts of 07) by Social Security number and track their hours and earnings as they moved in (and possibly out) of the agriculture industry. This could help to establish the number of migrant workers who enter and leave Washington and when they do so, as well as identify the geographic pattern and timing of their migration while they are here. This would provide much needed data to support policy initiatives addressing migrant worker housing and health care as well as agricultural labor supply and demand.

A more sweeping and potentially more valuable project would be to track the same migrant workers on an interstate basis as they engaged in the *western migratory stream*. The western migratory stream is the term used to

Table 18*Selected U.S. Farm Worker Characteristics, 1998*

<i>Age (mean)</i>	31.3 years	<i>Current Legal Status</i>	
<i>Sex</i>		U.S. Citizen	22%
Male	80%	Green Card	24%
Female	20%	Unauthorized	52%
<i>Ethnicity</i>		Work Authorization	2%
Hispanic	90%	<i>Migrant Status</i>	
Non-Hispanic	10%	Migrant/Shuttle	56%
<i>Ethnicity, if Hispanic</i>		Non-Migrant/Settled	44%
Mexican	79%	<i>Family Income</i>	
Mexican American	6%	Below Poverty Line (\$0-\$9,999)	61%
Puerto Rican	3%	Above Poverty Line (\$10,000 and up)	39%
Other Hispanic	12%	Hourly Wage (mean)	\$5.94
<i>Primary Language</i>		<i>Method of Payment</i>	
Spanish	84%	Hourly	77%
English	12%	Piece Rate	20%
Other	5%	Combination Hourly/Piece	2%
<i>Ability to Speak English (if not primary language)</i>		Salary	1%
Not at all	45%	<i>Benefits</i>	
A little	28%	Health Insurance	71%
Somewhat	8%	Unemployment Insurance	45%
Well	19%	Worker's Compensation	33%
<i>Ability to Read English</i>		Cash Bonus	15%
Not at all	53%	Paid Holidays/Vacations	11%
A little	22%	<i>Method of Recruitment</i>	
Somewhat	7%	Applied on Own	26%
Well	19%	Employer	3%
<i>Place of Birth</i>		Referred by Relative/Friend/Acquaintance	70%
Mexico	77%	<i>Years of Anticipated Farmwork</i>	
United States	19%	Less than one year	8%
Latin America, Except Mexico	2%	1-3 years	19%
Asia and Pacific Islands	1%	4-5 years	4%
Other	1%	5 years or more	7%
<i>Home Base</i>		5 years or more and as long as able	47%
U.S.	58%	Other	15%
Abroad	42%		

Source: 1998 National Agricultural Workers Survey, U.S. Department of Labor

describe the agriculture-related harvesting activities that take migrant workers through Washington and other states like California, Oregon, Idaho, Montana, Texas, and, to a lesser extent, Arizona, New Mexico, Colorado, Utah, Oklahoma, and Nevada. This would be more valuable because it would provide a truer picture of total hours and earnings and industry attachment as these individuals migrated from state to state over time.

Migrant Farm Worker Issues

Developing an accurate census of migrant farm workers in Washington is more than an academic exercise. As the following issues underscore, the absence of an accurate census adversely affects the ability to craft policies and programs (e.g., housing, public health, fair labor standards, etc.) related to migrant farm workers. In the absence of quantifiable data, it is difficult to grasp the breadth of an issue or deduce its fiscal impacts.

Housing. Housing has perhaps been the most visible and contentious issue associated with migrant farm workers. Migrant farm worker housing is an issue for virtually all of Washington's agricultural sectors, but it is of particular visibility during the cherry harvest, the first big labor-intensive crop of the season after asparagus. The issue is not so much whether some kind of accommodations should be provided (growers, farm worker advocates, and government entities generally agree that it should) but, rather, how much and of what quality.

Past attempts to provide housing for migrant workers who harvest Washington cherries pitted growers and state government regulators against the federal Occupational Safety and Health Administration, with the latter threatening to fine growers who participated in what it felt was an inadequate state program. Caught in the middle were migrant workers who, in the absence of grower participation in the state's licensed tent program, were largely left to their own devices. That meant returning to practices that prompted the tent

program in the first place—mainly sleeping in cars or camping along riverbanks without adequate cover or sanitation. While there are other options like staying in state-run campgrounds and motels, they tend to be too pricey for workers who are trying to save as much of their earnings as possible.

In anticipation of this year's harvest season, state and federal agencies, farm worker advocates, and grower groups came to agreement on new rules that went into effect in March of 2000. The impetus for this effort was SB5599, which empowered the Department of Health and Department of Labor and Industries to jointly license, operate, and inspect temporary worker housing and enforce temporary housing rules. This included jurisdiction over cherry harvest camps. Growers do not have to provide housing, but if they do, it must be an approved shelter (e.g., the state Department of Health has 100 six-person tents available). They must also provide potable hot and cold running water, toilets, sinks, showers, a septic system, an enclosed cooking area, electricity, lighting, and a refrigerator. The new spirit of cooperation holds a glimmer of hope that migrant worker housing issues will continue to be addressed. Nevertheless, empirical evidence suggests that the total amount of housing available is inadequate based on the estimated 16,000-plus migrant workers who are expected to show up for the harvest.

The state licensed tent program is only one aspect of a large effort to develop housing for migrant workers. The state legislature also approved SB5594 during the 1999 session, which included \$40 million for a ten-year housing program, \$8 million of which will be spent in 2000. Another \$750,000 in state funds was provided to help growers with infrastructure requirements such as those that accompany the tent program.

Though not often mentioned, public health is the underlying reason for the strict state and federal standards for migrant worker housing. Public health, though, is a much broader issue than simply housing. The rising incidence of communicable diseases like tuberculosis has public health officials concerned. Under particular scrutiny are immigrants—legal and illegal alike—who are more likely to be carriers of infectious diseases, especially if they are poor and came from environments that were congested, unsanitary, and did not provide routine health care.

INS Crackdown. Evidence is mounting that the number of illegal immigrants in the U.S. has grown despite passage of the Immigration Reform and Control Act (IRCA) of 1986, legislation that was supposed to stem that tide by imposing stiff fines and prison terms on employers who hired undocumented workers. The INS estimates the number of illegal immigrants in the U.S. at 5 million and growing by 275,000 each year. For years, the upward trend did not itself present enough of an issue to warrant a crackdown on the "problem" because it occurred in the midst of a relatively robust

national economy and acute regional labor shortages. Instead, it was data showing that 85 percent of those apprehended by the INS were involved in criminal activity that finally prompted Congress to give the INS more tools and funds to intercede.

Toward that end, the INS has increased the number of Border Patrol agents on the country's southern border and is employing increasingly sophisticated sensing technology. In fact, because most Border Patrol agents have been diverted to this activity, there have been fewer INS raids on domestic fields and warehouses. Moreover, the INS has been given broad legal tools such as the ability to arrest individuals without a warrant and deport them without a hearing if they were previously arrested as well as open deportation orders so individuals can be deported quickly without waiting for another order to be processed.

On the domestic front, while there are fewer work site raids, they do still occur. One prominent example is the recent INS raid on 13 fruit warehouses in Yakima, which resulted in the firing of nearly 600 workers who did not have legal documents. A more likely INS strategy down the road, however, will be stepped up audits of employer I-9 forms for fraudulent Social Security numbers or other invalid identification. Further down the road is universal electronic verification of worker status as reflected in pilot programs currently underway to determine if the use of such systems to screen prospective hires for valid Social Security numbers is efficient and effective enough to mandate its use by all employers. Most observers agree that the technology is there. The are differing opinions, however, as to whether the political will is there to fully implement a program that will clearly hurt employers. In any event, a universal electronic verification program is not likely to be implemented anytime soon since a number of other federal agencies already have identification programs in place. There is agreement again, though, that if it does come to pass, the effect will be to exacerbate labor shortages in the state's agriculture industry by virtue of having cast a chilling effect on the hiring of undocumented workers in the U.S. A possible upside, according to agricultural employers, is that the audits and verification systems will underscore the dearth of legal workers to fill jobs, which will put pressure on Congress to consider an expanded H-2A or amnesty program (see *Is H-2A, A-OK?* and *Earned Amnesty: Fair Play or Foul?*).

Meanwhile, efforts to reduce illegal immigration will get no help from the legal residency or work permit process. Nationally, an estimated 1 million individuals are waiting for their first green card while another 660,000 await renewals. Nationally, the average wait is around 3 years, though it is lower in states like Washington (eight months on average) where there is less immigration activity than, say, California, Florida, New York, or Texas. Moreover, the wait is not expected to get any better as the INS has not hired any additional workers to handle the increased activity.

Settling Out. Though the Employment Security Department's administrative data cannot pick this up, empirical evidence shows that there is a relatively steady trend of settling out among migrant workers. Settling out occurs when a migrant worker stops participating in the migrant stream and instead settles down in one location. A factor driving the current trend is the sheer availability of alternative employment opportunities available due to the acute labor shortage in sectors other than agriculture. While these tend to be low-skill, low-wage jobs in warehouses, restaurants, hotels, and other service sectors, they nevertheless represent labor competition that growers did not have to face in the past. Of course, the economy could soften—and with it labor demand in competing sectors—so the settling out trend in this regard may be short term in nature.

A more pronounced pattern of settling out would certainly occur if amnesty legislation (like that currently being debated) becomes law (see *Earned Amnesty: Fair Play or Foul?*). This was the case previously, for example, when the IRCA legislation resulted in increased settling out as migrant workers, particularly those who had been undocumented, were able to use their newly obtained residency to pursue more stable jobs. Of course, settling out is not an option for all migrant workers. Resident migrant workers who remain in the migrant stream tend to do so for one of two reasons; they are very good at field work and earn wages (even at piece rate) that exceed what they could make in a more conventional job or they have few skills that can be transferred to other jobs. In any event, growers in general are watching with mounting anxiety as incremental settling out exacerbates an already tight labor situation, and as an amnesty bill could impose an even higher cost still.

Unionization. The International Brotherhood of Teamsters' ability to organize workers at Stemilt Growers in Wenatchee was a prominent example in 1999 that migrant

workers in Washington's agriculture industry could be successfully organized. For its part, the AFL-CIO's Executive Council issued a resolution in February 2000 supporting immigrant workers' rights regardless of legal status, including opposition to employer sanctions and support for a worker amnesty program. It is not a forgone conclusion, however, as the Teamsters' thus far unsuccessful attempt to simultaneously organize the Washington Fruit and Produce Company in Yakima shows (that issue is presently before the National Labor Relations Board and may not be decided for several years). Furthermore, an April 2000 employee vote to decertify the Teamsters union that represented them at Sunspiced, a fresh-packing potato firm in Moses Lake, after 20 years shows that retaining a union presence—even a long standing one—is not assured.

Nevertheless, there is wide belief that the trend toward greater consolidation in Washington's agriculture industry could set the stage for more successful attempts than not (see *The Latest, Greatest Family Farm*). Simply put, the industry's shift from one of a large number of small, independent growers, packers, and shippers to one of a few larger, integrated grower-packer-shipper firms removes some of the traditional logistical obstacles to organizing. Big barriers were the limited resources available to reach lots of mobile workers who often worked for many different employers during the harvest. In the past, dissatisfied workers simply left for another company. They can not do so as readily in a consolidated industry. The competitive pressures that have brought about consolidation are also squeezing margins, prompting many growers to press for greater worker output without a commensurate increase in costs, including wages. Furthermore, the increasing shortage of agricultural workers means that employers will have to address the issues of workers they have, including collective bargaining, rather than turn to other workers.

OUTLOOK AND NEW DEVELOPMENTS

Agriculture's Future: Bright or Blight?

Some industry observers see the future of Washington farming as bright, citing in particular the trade deals that have opened new export markets and which are expected to continue doing so. For example, China alone appears to hold tremendous growth opportunity for Washington agriculture over the next 10 to 20 years. Washington's agriculture industry can also count on the efforts of its various commissions and associations to increase market demand both here and abroad.

The bottom line, however, is that foreign and domestic market demand are critical to Washington's agricultural industry. While inroads have been made, the industry faces challenges as well. The following highlight some of those inroads and challenges:

Apples. On the home front, Washington's signature Red Delicious apple experienced the biggest sales decline among the increasingly greater number of apple varieties. According to Washington Apple Commission (WAC) surveys, consumers say the apple lacks the taste and crispness they expect. The WAC, however, hopes to address these quality-related concerns through a number of research initiatives. In the meantime, the USDA bought an extra 9 million pounds of apples in 1999 for the national school lunch program and other food assistance programs, a move that helped the state's financially-strapped apple growers, and will continue to do so into the future if the government continues the practice.

On the international front, Asia was where most of the developments occurred with respect to Washington apples. Washington, the world's largest apple exporter, was finally able to further open Japanese markets. This came after the World Trade Organization ruled that Japan illegally required the U.S. Department of Agriculture (USDA) to repeatedly test for codling moths on apples (though no problems were found over two years) simply to keep out the fruit. As a result, Japan allowed imports of Gala, Fuji, Braeburn, Granny Smith, and Jona Gold apples in 1999 to join the Red and Golden Delicious varieties already available. The WAC hopes Japan will buy a million boxes a year while others warn that Japan will continue to try and protect its growers in other ways, making it premature to count on a big increase in export sales.

Southeast Asia is expected to be the fastest-growing market for Washington apples over the next 5 to 6 years. Before apple exports declined during the Asian economic crisis, Asia was a market for almost half of Washington's apple

exports. As Asia works its way back to stability, however, the apple markets should rebound. Indeed, Washington apple exports to Asia were stronger than expected in 1999 as Taiwan, Indonesia, and the Philippines beat the forecasts. Unfortunately, Taiwan, Washington's largest apple market, implemented new pesticide regulations effective January 1, 2000 that appear to be in retaliation for U.S. import curbs on lychees (an Asian tree fruit), which received no tolerance for the pesticide used on that fruit. More broadly, there is a concern in the U.S. over the possible formation of a free trade agreement within the Association of Southeast Asian Nations (ASEAN). Australia and New Zealand, both big apple producers, are member nations and, therefore, stand to benefit the most from any ASEAN free trade agreement. Any further reduction of tariffs among ASEAN member nations would put U.S. exports at an even greater price disadvantage, something that could offset the quality appeal of Washington apples.

Washington now competes head-to-head with Australia, New Zealand, and China in the Asian apple market. Because the Asian competitors' apples are cheaper, Washington must compete on quality rather than price. Toward that end, Washington apple growers have launched a branding campaign that revolves around the little sticker identifying a Washington apple as such. Shoppers pay more for these apples, but know they are getting a better quality product. China (including Hong Kong) with its growing middle class is a strong market for Washington apples. Singapore, which hosts the world's busiest container port, is one of the easiest places in the world to export apples because of its geographic location, efficient port, lack of tariffs, and larger grocery stores. Unlike the Chinese, who are attracted to an apple's redness, Singaporeans prefer the less colorful Fuji apple. Malaysians consider price a big factor, but Washington apples still out-sell Chinese apples in Malaysia.

Competition with China came full bore when that country "dumped" apple juice concentrate on the world market. Severely impacted, U.S. producers of apple juice concentrate responded by filing an anti-dumping lawsuit with the U.S. Department of Commerce demanding a 91 percent duty on imported apple juice concentrate from China. The government ultimately imposed a five-year, 52 percent tariff on Chinese concentrate imports retroactive to August 1999, which nevertheless had the desired effect of driving Chinese apple juice concentrate out of the U.S. market. On May 15, 2000, the International Trade Commission also ruled that China illegally flooded the U.S. with below-cost apple juice concentrate.

Here in North America, Mexico, Washington's second largest export market, has a stronger economy and its apple consumption may rise with its 17 percent minimum wage increase. Under a work plan for apple exports worked out with the Mexican government, Washington shippers foot the \$800,000 a year cost of sponsoring the permanent presence in this state of eight Mexican inspectors and their supervisor to check for the oriental fruit moth infestation. Washington apple growers believe that if the USDA were less restrictive of avocados and mangos imported from Mexico, apple exports to Mexico would encounter fewer barriers. An annually adjusted floor price for Washington apples was established in 1998 as part of an agreement to end Mexico's anti-dumping investigation.

Pears. Washington, the world's largest pear exporter, cannot officially ship pears to China due to phytosanitary concerns. Nevertheless, thousands of boxes make their way into the country by way of Hong Kong. If a formal agreement can be reached, China could be a stronger market for pears than it already is. Taiwan and Singapore are the largest Asian markets for Northwest pears, where exports continue to increase. Also, 95 percent of pears exported to Mexico are from the Pacific Northwest. In fact, nearly 2 million boxes were shipped during the 1998-99 season and that figure could rise to 3 million in the future.

Cherries. Washington is the world's biggest cherry exporter. With respect to the exporting of this delicate hard-to-ship product, continuing consolidation and emergence of dominant retailers overseas has been a positive for cherries as those retailers introduce better distribution channels, speedier deliveries, and improved refrigeration capabilities. Moreover, once the economies of Japan, Southeast Asia, and Latin America recover, growth in cherry exports to those foreign markets should resume. In fact, effective July 1999, Japan allowed imports of two new cherry varieties, Lapin and Sweet Heart. Mexico's demand grew a little and South America has shown growing market potential. In fact, Washington cherry growers successfully developed a new market in Brazil in 1999. Australia, potentially the largest new market after China could be receiving 100,000 boxes within 3 to 4 years. Taiwan, however, is Washington's largest cherry market and in a marketing move aimed squarely at Taiwanese consumers, Northwest cherry growers are recruiting a group of teenagers to work in a Washington cherry orchard as part of a TV show. Speaking of power retailers, the 4-pound clear plastic boxes with hinged lids have been doing well among U.S. consumers at Price/Costco over the last two years. There has also been a good reception from domestic consumers to the new, smaller, inexpensive 2-pound bags compared to bulk sales.

Berries. Washington, the nation's largest raspberry producer, is hoping that recent studies showing that raspberries contain ellagic acid, a potential cancer cell growth inhibitor,

will boost sales. Serbia, the world's second largest raspberry producer, has lower costs of labor and production, but was effectively eliminated as a competitor after the war in Kosovo restricted or destroyed the transportation infrastructure growers needed to get their raspberries to processors. Meanwhile, Washington cranberry growers, most of whom are located in the Long Beach area, experienced slow business due to domestic oversupply. In response, Ocean Spray Cranberries cut 100 jobs in April 1999.

Stone Fruit. Shippers of stone fruits (i.e., peaches, plums, nectarines, apricots, and prunes) are hoping no more fumigation is needed to export these fruits to British Columbia, Canada. Fumigation is currently done as a quarantine treatment for the oriental fruit moth, which is not found in that province. Non-fumigated fruit looks better and has a longer shelf life.

Wheat. Japan, the Northwest's most stable wheat market, buys about 20 percent of the region's soft white wheat exports each year for use in cookies, cakes, and noodles and pays in cash, not credit. Grain sanctions against Iran, Libya, and Sudan were lifted effective July 1999 and the new market could be worth \$2 billion for the U.S. Of the three countries, Iran was a huge market for Northwest wheat before the 1979 Iranian Revolution. The Northwest had 53 percent of Iranian wheat market, a share that would be worth \$176 million a year today. China opened its markets to Northwest wheat in April 1999 after 27 years, a move that could mean tens of millions of dollars for the region's wheat growers. This is good news for Washington, which has 84 million bushels of wheat in storage. The agreement gives Northwest wheat farmers the right to compete for the 7.3 million metric ton market, the quota China has placed on imported wheat. China also agreed to reduce the tariff on U.S. wheat from 20 percent to 1 percent for the first 7.3 million metric tons.

Trade Agreements. In November 1999, China agreed to cut agricultural tariffs from 31.5 percent to 14.5 percent by January 2004 as part of its aim to become a full member of the World Trade Organization. These cuts could boost agricultural trade with U.S. to \$3 billion over the next 5 years, making China the fourth biggest U.S. agricultural trading partner after Japan, Canada, and Mexico. The tariff cuts, which could benefit Washington, are to be implemented by January 2004 and include the following: (1) U.S. beef, 45 percent to 12 percent; (2) U.S. pork, 20 percent to 14.5 percent; (3) U.S. poultry, 20 percent to 10 percent; (4) U.S. cheese, 50 percent to 12 percent; (5) U.S. grapes, 40 percent to 13 percent; and (6) U.S. wine, 65 percent to 20 percent.

Having already signed the North America Free Trade Agreement (NAFTA) and the General Agreement on Trade and Tariffs (GATT), the U.S. is now turning its attention to revising the International Plant Protection Convention (IPPC)

to achieve harmonization of quarantine procedures for the free trade of planting material. Among the options are the following: modify IPPC guidelines, implement official eradication/containment programs, enact mandatory certification programs, regulate domestic pests, or take no action.

Abandon Agriculture. Some industry observers see the future of Washington agriculture as particularly uncertain. One agricultural economist has even suggested that the U.S. abandon agriculture rather than continue to suffer losses and instead import 100 percent of the nation's food supply. He argues that that would aid developing countries by providing them with trade opportunities and providing the U.S. with the opportunity to export agricultural know-how. Ultimately, he sees agriculture as entry-level compared to technology-related sectors and believes the U.S. would benefit more from putting resources into the latter. This is a controversial opinion to be sure, but one that is out there.

Is H-2A, A-OK?

H-2A refers to the section of an act passed by Congress in 1943 that allows agricultural employers to recruit and employ foreign workers in temporary and seasonal jobs if not enough qualified domestic workers can be recruited. The lesser known H-2B program covers food processing workers. The programs have not been widely used over their 50-plus year history and certainly not in Washington where, until this year, not a single employer had used either program since their inceptions. There are a couple of reasons why. First, the application processes are widely recognized as burdensome, starting with the 300-page applications and progressing through compliance requirements. Second, a surplus of undocumented workers with false documents and the obstacles associated with verifying the legitimacy of those documents has provided little incentive to use the H-2A and H-2B processes.

Use of these programs is expected to change dramatically, though, as the federal government steps up efforts to crack down on undocumented workers and those who employ them. As noted, the INS has increased the number of Border Patrol agents on the country's southern border and employs increasingly sophisticated sensing technology. Moreover, it can now arrest individuals without a warrant and deport them without a hearing if they were previously arrested. It also has open deportation orders so individuals can be deported quickly without waiting for another order to be processed.

Domestic crackdowns on undocumented workers by the INS and Social Security Administration (SSA) are also on the rise. One prominent example is the recent INS raid on 13 fruit warehouses in Yakima, which resulted in the firing of nearly 600 workers who did not have legal documents. Furthermore, pilot programs are underway to determine if the use of electronic data verification systems to

screen prospective hires for valid Social Security numbers is efficient and effective enough to mandate its use by all employers. Most observers agree that the technology is there. There are differing opinions, however, as to whether the political will is there to fully implement a program that will clearly hurt employers. There is agreement again, though, that if it does come to pass, the effect will be significant labor shortages in Washington's agriculture industry. All of this is supposed to have a chilling effect on the hiring of undocumented workers in the U.S.

Combine this with the political wrangling and stalemate over federal guest worker legislation and you have a realization in Washington that the H-2A and H-2B programs might be the only viable alternatives left for obtaining needed labor. Indeed, the Washington State Employment Security Department reported that for the first time since 1986, it processed ten H-2A applications for a western Washington bulb-growing operation. Several central Washington asparagus growers approached the department about the H-2A program, though they ultimately chose not to proceed.

The Yakima-based Northwest Growers Association (NGA) was formed in 1999 to help agricultural employers prepare H-2A and H-2B applications and negotiate with the federal Department of Labor. The NGA structure allows employer members to take advantage of staff, expertise, and economies of scale needed to process H-2A and H-2B applications in a timely manner and maintain regulatory compliance—something most employers would not be able to do individually. Moreover, it sets a mechanism in place before anticipated labor shortages hit, rather than waiting until they become critical. Though employers must pay the prevailing wage, advantages include lower employee turnover, more productive workers, and a legal workforce. H-2A workers are guaranteed wages, housing, and transportation while H-2A employers are guaranteed a legal workforce. In fact, the NGA represented the central Washington asparagus growers mentioned above. Moreover, the NGA has seen its membership rise to more than 150 over the past year as employers appear to be preparing for anticipated agricultural labor shortages.

The Agricultural Job Opportunity Benefits and Security Act of 1998 was the 105th Congress' attempt to create a successor to the H-2A and H-2B programs. It would have streamlined the guest worker process by establishing: (1) a national voluntary registry of legally authorized nonimmigrant agricultural workers, (2) streamlined procedures for admitting and extending the stay of nonimmigrant agricultural workers to fill jobs left open after use of the registries, (3) market-based or prevailing wages, (4) fair labor standard protections, and (5) employer-paid housing and transportation. It was passed overwhelmingly by the full Senate but, opposed by farm worker advocacy groups and organized labor and threatened with a veto by President Clinton, never made it to the House for consideration.

Earned Amnesty: Fair Play or Foul?

In the meantime, the 106th Congress is also considering legislation that streamlines guest worker programs—and more. The latest proposal is the Agricultural Job Opportunity Benefits and Security Act of 1999 (AgJOBS), which was introduced in late October 1999 through the Immigration Subcommittee of the Senate Judiciary Committee. AgJOBS would do two key things. First, it would replace the current H-2A program by instead granting legal temporary nonimmigrant status to the estimated 500,000-600,000 undocumented individuals who worked in agriculture for at least 150 days or 880 hours in the 12 months before the act was introduced. Second, it would make eligible for permanent U.S. residency those individuals who worked in agriculture for at least 180 days in five of the seven years after the act was introduced. The latter provision has been rejected by farm worker advocates who view it as akin to “indentured servitude” and who also object to the fact that there is no opportunity for individuals to obtain U.S. citizenship.

The United Farm Workers union and other farm worker advocacy groups oppose AgJOBS, which they liken to the Bracero Program, a war-time emergency labor program designed to fill farm labor shortages as Americans left to fight World War II. That program, which was extended several times after the war, eventually granted temporary visas to 4 to 5 million Mexican citizens from 1942-64 (400,000 per year at its peak).

Instead of the federal guest worker program, the United Farmer Workers (UFW) union and other farm worker advocacy groups support a blanket amnesty program for undocumented workers, with no strings attached. They have received the formal support of the AFL-CIO. The last time such a program was made available was in 1986 through the Immigration Reform and Control Act (IRCA). That program enabled 2.7 million undocumented individuals (1 million of whom were estimated to be agricultural workers) to become legal residents upon proving that they had lived continually in the U.S. for at least six years.

Labor Shortage Affects Agriculture

It is widely known that employers in Washington, particularly those in the Puget Sound region’s high technology sector, face acute labor and skill shortages. Much less well known is the fact that the state faces similar labor shortages due to factors such as INS crackdowns and settling out (see *Migrant Worker Issues*) as well as a costly and burdensome H-2A program. By and large, Washington agricultural employers found it difficult to recruit and retain enough workers to harvest their crops in a timely manner. One observation was that there were more women, more families, more locals, and fewer qualified workers, which translated into less workforce stability. In fact, more workers than usual

left in the middle of the harvest. While the severity of the labor shortage varied from one growing region to another, it is generally agreed that the situation materialized across the board and will get worse before it gets better. As such, employers facing tighter labor markets are being pressed to become more pro-active and creative in their worker recruitment efforts and to pay more to keep the workers they get. This translates into higher labor costs with respect to recruitment budgets and wage outlays.

Many employers decided early on to simply pay higher wages, with some including end-of-harvest bonuses as an incentive for workers to stay through the entire harvest. Others changed pay schedules from biweekly to weekly so workers would not have to go as long without cash. Many employers boosted advertising on Spanish-language radio and in Spanish-language newspapers. Some employers hired labor contractors to secure needed workers. In somewhat more creative turns, some employers sent letters to employees thanking them for past work and inviting them back for the next season (including follow-up letters if the response is low). Still others traveled to regions where their workers live during the off-season to recruit in person while some even sent “care packages” to workers as a way of saying thanks and encouraging them to return. Another proactive approach has been to educate state and federal legislators as to the nature of the labor shortage and lobby them to support programs like H-2A reform that might ease the situation.

The bottom line is that the agricultural labor shortage is real and will only become more acute in the near term. As a result, employers need to prepare for increased competition for labor due to labor shortages and plan for subsequently higher labor costs in the coming years.

Workers Need Not Apply: The Quest for Better Machines

Against the backdrop of contentious agricultural labor issues and agricultural labor shortages, considerable time and effort have been invested in research and development to improve productivity and efficiency at all stages of agriculture (farm to market). The cost-benefit ratio for these activities has been enhanced by the tremendous technological advances of the past two decades. Real progress has been made toward mechanizing and computerizing some of the most labor-intensive aspects of agriculture: harvesting, sorting, and packing. Driving these efforts is ever-present consumer demand for higher quality and lower cost as well as market pressures from foreign and domestic competition (e.g., California, China, Latin America) and retail consolidation. Additionally, the unsettled nature of the current and future agricultural labor situation and the anticipated hike in labor costs (already one of the costliest inputs to agriculture) are certainly considerations as well.

Unlike wheat and other grains, mechanical harvesting of soft fruit for the fresh market has long been regarded as impractical because (unlike human hands) machines were too rough on delicate fruit for which appearance was critical. That premise is being severely challenged as efficient, effective mechanical harvesting of Washington cherries, a soft fruit produced primarily for the fresh market, moves steadily toward reality. This is particularly noteworthy because Washington cherry farmers historically experience intense demand for labor compressed into a narrow timeframe of only 1 to 2 months. Moreover, the labor situation in the cherry industry has fueled fierce debate with respect to living situations of migrant seasonal farm workers. If mechanical harvesting, sorting, and packing of cherries proves to be practical and is adopted on a large scale by the industry, the labor implications would be dramatic. It is estimated that more than 16,000 migrant farm workers currently converge on Washington for the cherry harvest alone. Indeed, development of these machines was prompted in large part by the fact that Washington cherry growers could not compete with foreign countries on labor costs.

Toward that end, the U.S. Department of Agriculture is in Washington this season testing a machine that harvests stemless cherries. Additionally, machines currently exist that can color sort and package stemless cherries at a rate of 70-80 per second, day and night. These machines are expensive and their efficiencies have not justified their costs in an environment of available cheap labor. But there is another dynamic at work and it underscores the term, *stemless* (none of the new machines can harvest or sort cherries that have stems attached). These technologies are being seriously considered only now because of the apparent early success shown by Costco in marketing stemless cherries to its members, which has major retail food chains taking notice. For years, the conventional wisdom has been that consumers prefer stemmed cherries to stemless cherries. That is being challenged in a way that could convert Washington's cherry industry from one of the most labor-intensive to one of the least labor-intensive.

To be sure, these developments are being watched closely for possible application to other major Washington soft fruits like apples, peaches, and pears—all of which currently require significant labor during the harvest. Lest the potential labor implications be downplayed, it should be noted that production of another significant Washington agricultural product—wine grapes—is already harvested almost entirely by machine despite having once been a labor-intensive undertaking as well. Last year, 25,000 cultivated acres produced 71,000 tons of grapes to supply 135 wineries. This did not go unnoticed by other growers who are studying the grape industry's practices for potential application to their labor-intensive crops.

Following the harvest, attention turns to sorting and packing, particularly with respect to soft fruits and vegetables destined for the fresh market. Here, too, significant strides are being made toward making sorting and packing less labor-intensive. The automatic sorting and packing of stemless cherries has already been mentioned. But great progress is also being made with respect to Washington's number one agricultural export—apples.

The first generation of automated color sorting and size weighing equipment for apples was introduced in the late 1970s and early 1980s, principally in response to consumer demand for more consistent quality. That aim was achieved as was lower per unit production costs, but the equipment did not impact on the size of the workforce because the all-important task of culling defects was still an exclusively manual operation. In fact, the need for human sorters grew as apple production increased. Today, the introduction of even more powerful software and computer processing capability has made possible even faster and more consistent quality sorting and weighing. But truly revolutionary change is on the horizon and it could completely remake the industry in the relatively short span of 10 years, if not sooner. Currently undergoing trial runs are a new wave of equipment that sort for internal and external defects (e.g., rot, browning, bruising) as well as test for firmness, sugar content, and acidity using infrared and ultrasound technology. While these advancements, too, are being driven by continuing consumer demand for consistent quality, there is added urgency due to pricing pressures from foreign competition and retail consolidation. The potential long-term impact on the size and nature of the future workforce cannot be ignored, especially since experts believe this new technology will eventually reduce the need for sorters by 60 percent to 70 percent. These advances will also impact growers since more precise sorting and packing means that second and third rate fruit will be more readily identified and rejected (see *precision agriculture*).

Berkeley Instruments and Columbia Basin Instruments (both based in Richland, Washington) are two companies working under research grants from the Washington Tree Fruit Research Commission to develop machines that can determine whether apples are good or bad with respect to firmness or crispness. Berkeley Instruments recently unveiled a near-infrared device while Columbia Basin Instruments is currently testing an air pressure chamber device. Both are vying to make their devices the industry standard. These are the most promising developments following more than a decade of previous research that yielded few results.

The packing of white- and yellow-flesh stone fruit like pears, peaches, nectarines, and apricots typically requires manual labor from start to finish because those fruits bruise very easily—much more so than apples, for example. That is changing, however, as automated fruit packing equipment has been engineered to handle these delicate fruits quickly

but gently. Like the apple sorting and sizing equipment cited previously, this equipment is twice as fast as the traditional hand-packing process. The difference between the equipment designed thus far for stone fruit and that designed for apples is that the former has not made as many advances toward eliminating manual labor to sort defects and pack the fruit into trays.

Looming in the background are risk-based ergonomics rules proposed by the state Department of Labor and Industries (L&I) in November 1999. These rules would require employers with 50 or more “caution zone jobs” to educate, train, and reduce the hazards posed by those jobs within two years. Most agriculture-related jobs are believed to fall within the definition of “caution zone jobs” because they require physical labor that involves awkward positions, pinching or gripping heavy objects, highly repetitive motion, or heavy, frequent, or awkward lifting. L&I estimates the cost of compliance to be \$29 per worker per year. The state’s agriculture industry had hoped to be exempt from the rule (which is the case federally with respect to ergonomics standards developed by the Occupational Health and Safety Administration), but that did not happen. Agriculture industry representatives say they will be hard pressed to comply and be competitive at the same time. However, L&I has built in a 3-5 year implementation period during which it hopes to work with industry groups to establish “best practices” and encourage voluntary participation before moving into the compliance stance. Though that question remains unanswered, it is likely that the rules would entice the agriculture industry to more aggressively embrace technologies that remove physical labor from the process.

On an aside, *precision agriculture* is the term coined to describe the use of technology to help farmers maximize production by uniformly managing the soil. Precision agriculture uses powerful computers and software to analyze soil samples and calculate the most efficient and effective combination of water, fertilizer, and pesticides to specific patches of ground with applications being pinpointed by global positioning systems. Farmers, of course, have long tried to manage the soil. It is only now, however, that powerful, relatively inexpensive computing tools give them the ability to do so with great precision. Old habits die hard, though, with only 1 to 2 percent of eastern Washington farmers currently practicing precision agriculture. Still, more and more are expected to take it up as the research data confirm the advantages and as environmental and conservation issues translate into closer scrutiny of industry practices by state and federal regulators (see *A Symbolic Battle: Apples vs. Salmon*). Though precision agriculture does not provide any dramatic labor efficiencies, it does hold out the promise of more efficient and productive use of agricultural land.

Agricultural Biotechnology: Bounty or Beast?

Agricultural biotechnology involves modifying DNA, the genetic material of living organisms, by inserting a single gene or even several genes into plants or animals to produce a specific new characteristic. While the technique may be new, the approach certainly is not. Plants have been genetically modified for hundreds of years through the more traditional methods of selective breeding and crossbreeding. These methods, however, are often imprecise because they introduce thousands of genes from the parent plants or animals into the new ones, causing them to have multiple characteristics of both parents. Biotechnology is more precise because it introduces a specific gene or genes to achieve a specific outcome or outcomes. Because biotechnology is more precise, the desired characteristics are isolated more quickly than is the case, for example, with traditional crossbreeding. The science is being used, for example, to produce genetically enhanced seeds that produce crops with resistance to specific diseases resulting in less pesticide usage, while at the same time increasing yields. Researchers are now creating ways to boost the nutritional value of foods.

Here in the U.S., introduction of the first commercially available food products derived from genetically modified plants, namely tomatoes and potatoes, was accompanied by lots of media hype. Still, those products were accepted by American consumers and have been marketed for several years now. In fact, more than 75 million acres of genetically modified products were grown for market in the U.S. in 1999, up dramatically from 8 million acres in 1996. The seemingly high level of U.S. consumer confidence in genetically modified plants bolstered the agricultural biotechnology industry, which now has millions of acres of genetically modified plants under cultivation in pursuit of new plants that could benefit growers, processors, and consumers. In Washington State, genetic engineering is one tool being used to improve the quality of tree fruit as it pertains to such characteristics as firmness, sugar content, nutritional content, storability, ripening time, and disease and pest resistance. It is also being used to make trees shorter and narrower (more trees per acre and easier maintenance and harvesting) as well as more disease resistant and less water dependent without sacrificing but, rather, boosting yields.

Recently, though, a consumer backlash to genetically modified food products has been gaining momentum in Europe and Asia. In Europe in particular, politically powerful farmers have successfully pressed their governments to curtail importation of a number of genetically engineered agricultural commodities. For example, European governments have been slow to permit importation of biotechnology-derived food products even if they have been proved safe to

humans, animals and the environment, which has disrupted trade. The European Union's relatively prolonged approval of genetically modified corn in 1998, for example, led to a loss of around \$200 million for U.S. exporters. While questions about agricultural biotechnology certainly exist, the European opposition appears to be less related to food safety than it is to self-preservation. European farmers rely heavily on government subsidies and pesticides, and biotechnology—a field within which the U.S. is the world leader—represents a real threat to their livelihoods if it takes hold in their markets. Similar factors are thought to be driving the issue in Asia as well.

Concern is mounting among U.S. growers that that backlash could affect not only agricultural exports to Europe and Asia, which have already banned certain varieties of genetically modified wheat and other grains, but other foreign markets and possibly the U.S. as well if the backlash takes hold. Indeed, the ensuing debate over genetically modified food—as illustrated by the debate over whether or not to require FDA labeling of such food—is proof that the issue has quickly grabbed the public's attention here in the U.S. This has understandably had a chilling effect on the willingness of growers here in Washington to introduce genetically modified products into their operations even though they embrace agricultural biotechnology and believe in its benefits. Indeed, that appears to be transpiring here in Washington with respect to potatoes—the state's third largest agricultural commodity—growers are being told by large processors that the nation's major fast food chains are opting not to purchase French fries made from genetically engineered potatoes. Also affected are growers of corn, cotton, and soybeans (mainly in the American Midwest) who have significantly cut back on genetically engineered varieties of those crops this year. Ultimately, if consumers in foreign or domestic markets on which Washington growers depend do not want genetically engineered food, there will be little incentive to embrace it no matter how much better the quality or yield. There would actually be a greater impact on Washington growers if consumer tastes and preferences shift even further toward a fuller embrace of organically grown crops since only a few such crops are presently grown in Washington in large quantities. That appears to be happening, enough so that the USDA is speeding toward unveiling an organic certification and labeling program in 2002.

To allay fears, the U.S. Food and Drug Administration (FDA), the federal agency responsible for food safety and labeling, is quick to point out that every genetically modified product evaluated by its scientists for market approval has met FDA requirements. That is not to suggest, however, that all will and that there might not be legitimate safety concerns. There is concern, for example, that introducing a new

gene into a plant's existing genetic structure can potentially disrupt a plant's other genes and, in the process, alter its growth, fertility, nutrient, and toxin levels. There is also concern that pollen from a genetically modified plant might pass on traits like herbicide resistance to the very weeds it was supposed to kill or natural pesticides that kill beneficial insects. Because this can happen in any type of crossbreeding, conventional or biotech, there are already federal rules in place that require extensive field testing over several seasons to ensure that all new plants are safe. Field tests are overseen by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service. Moreover, the National Academy of Sciences (NAS) released a report in April 2000 stating that there is no evidence that genetically engineered foods pose a special risk because they are produced using a new process. In other words, biotech food is safe. The NAS endorsed the current regulatory process, but said agencies needed to do a better job of educating the public about the science involved and more openly involve the public in the review processes or continue to risk a backlash. It is considered the most authoritative report to date because of its NAS pedigree.

In any event, there did not appear to be much that agricultural biotechnology was going to impact in terms of labor supply and demand, at least not in Washington. Here, genetic modification research was aimed primarily at achieving better quality rather than greater yields (quantity). Of course, better quality fruit and vegetables has the ability to boost consumer demand by increasing attractiveness of the commodity to the public, which could affect labor demand if the increased demand for the commodity is great enough to spur increased production. Furthermore, inasmuch as some of the genetic modification research was aimed squarely at developing trees that are easier to prune and harvest, the backlash and its chilling effect can be seen as having limited productivity as well as efforts to ease the burden on laborers.

To dispel the notion that this will bring agricultural research to a screeching halt, it should be pointed out that biotechnology and genetic engineering are not the only forms of agricultural research, simply the most controversial. For example, the Washington Tree Fruit Research Commission, U.S. Department of Agriculture's Agricultural Research Service, and Washington State University have teamed up to conduct more than \$3.5 million in non-biotech, fruit tree-related research that focuses on such things as tree physiology, water management, quality testing, nutrients, entomology, and rootstock management. Moreover, millions and millions of more dollars of agricultural research is going on outside of Washington, much of which has carryover benefit for Washington growers.

A Symbolic Battle: Agriculture vs. Salmon

At face value, the goal seems admirable enough—recovery of the more than two dozen varieties of salmon, steelhead, and cutthroat trout listed under the federal Endangered Species Act of 1973 (ESA). Part of the impact area, however, is the region encompassing the Columbia and Snake rivers—the *life-blood* of both the threatened fish and eastern Washington's agricultural industry.

To the fish, the Columbia and Snake rivers are environments within which they spend critical periods of their life, in particular spawning. The more water diverted from the rivers, the more diminished their environment and chance for survival. To eastern Washington's agriculture industry—from growers and irrigators to food processors and barge operators to the communities they all support—the Columbia and Snake rivers are a critical resource upon which their existence is predicated. No water, no business. For them, the issue boils down to the cost and availability of water from the Columbia-Snake river system for irrigation, industrial use, and transportation.

Just how irrigation-dependent are Washington farmers? This question is answered by way of data on irrigated land from the *1997 U.S. Census of Agriculture* (the next agricultural census will be conducted in 2002). Data on irrigated land are suggestive of an area's dependence on water. The greater an area's dependence on water for agricultural purposes, the greater presumably will be the impact of water resource issues on its agricultural industry.

There were more than 1.7 million acres of land under irrigation in Washington in 1997, which translates into 36 percent of all harvested land in the state. The figure also shows that after having declined from 1982-87, the total acreage of irrigated land reported in Washington expanded 12 percent over the subsequent decade. At the sub-state level, nearly three-quarters of all irrigated land in the state could be found in just five eastern Washington counties: Grant (26 percent), Yakima (16 percent), Franklin (13 percent), Benton (9 percent) and Adams (9 percent). All told, more than 90 percent of all irrigated land in the state is in eastern Washington.

The growing conflict between industrial use and protection and restoration of endangered fish runs represents a major water resource issue that will significantly affect Washington's agriculture industry. Currently, the uncertainty threatens local economies dependent on irrigated agriculture and food processors and has deterred additional investments (both new plant and equipment and expansion of existing plant and equipment). Taken together, these initiatives—in part because of their complexities—represent some of the most daunting challenges facing Washington's

agricultural sector. Water for the purposes of irrigation, for inexpensive electricity, and for transportation to market are viewed as critical comparative advantages in the Northwest.

Most of these challenges are spelled out in a five-year, \$20 million U.S. Army Corps of Engineers study commissioned by the National Marine Fisheries Services (NMFS). The study considered the key factors affecting endangered fish runs—habitat restoration, hatcheries, harvest, and hydroelectric power—and proposed various remedies for consideration by Congress. Two of those factors, *habitat restoration* and *hydroelectric power*, have direct bearing on the state's agriculture industry.

Habitat Restoration. Generally speaking, habitat restoration for endangered fish boils down to making more water available in the Columbia and Snake rivers and their tributaries to produce a better environment for the fish (i.e., cooler, deeper water and swifter downstream flows). Agricultural irrigation has been the focus of this attention because it is a highly visible source of water diversion. Not surprisingly, the past year has produced several high-profile water disputes between irrigators and the NMFS.

One of the first disputes occurred in Okanogan County's Methow Basin over water diversion from tributaries that feed the Methow River. The NMFS, U.S. Fish and Wildlife Service (USFWS), and U.S. Forest Service (USFS) felt that irrigation ditches were adversely affecting endangered fish because they diminished flows and their screens did not adequately keep out fish (the latter also being a violation of state law). Because the ditches cross USFS land, the agency required ditch operators to secure temporary, ten-year special permits. Mindful of the ESA, the USFS declined to renew the permits until the NMFS completed a biological assessment. In response, the ditch operators filed a lawsuit claiming that the USFS and NMFS violated their constitutional rights by "taking" property (water) without compensation. The USFS said the special use permits show that access to the water was not an easement or right but, rather, an action requiring authorization and therefore subject to federal law, including the ESA. In any event, the lawsuit, if the courts allow it to proceed, could set a precedent on property rights. Many Washington agricultural communities are watching this case closely as the NMFS has made clear its intention to apply similar standards in other parts of the state.

In what also looks to be another water rights test that could affect irrigation districts statewide, a lawsuit was filed by a Yakima Valley citizens' group against local dairies claiming that their manure-contaminated water does not meet water quality standards. The group wants the court to find that the water is property of the state and federal governments and therefore subject to the Clean Water Act. The Roza-Sunnyside Joint Board of Control argued that Congress specifically exempted irrigation return flows from the Clean Water Act and that the district owns the water in its canals.

Irrigation districts believe that if canal water is regulated like a river, they will be hard-pressed to implement dredging and weed control measures needed to ensure water delivery. Irrigation districts have undertaken efforts to ensure that return water meets strict federal and state standards, but feel that that needs to be in their purview.

Finally, a group called Common Sense Salmon Recovery filed a lawsuit claiming that the NMFS mismanaged salmon recovery by allowing over-harvesting and unchecked predatory activities and not counting hatchery fish. The group is a coalition of the Building Industries Association of Washington, Washington Association of Realtors, Washington Cattlemen's Association, and Washington Farm Bureau, and also has the support of the Washington Growers Clearing House Association. The Columbia-Snake River Irrigators Association (CSRIA), however, did not join new group or support its lawsuit because it believes the lawsuit sends the wrong message in a politically charged atmosphere. The CSRIA argues that the lawsuit gives the impression that agriculture is pointing fingers elsewhere and not shouldering its share of responsibility, which is not the case.

Some in the agricultural industry are taking a more pragmatic position, urging their colleagues to voluntarily participate in watershed management rather than face the consequences of mandatory water policy directives that might otherwise come down from the NMFS and other federal and state entities. For example, though Governor Locke's proposal to limit the amount of water drawn from Washington rivers and streams to restore endangered fish runs met strong resistance from agriculture interests and lawmakers in the state legislature, the Governor pointed out that if the state did not act more quickly and aggressively to restore endangered fish runs, the NMFS and courts would intervene and issue directives over which the state and local communities would have little say or control. In other words, farmers and irrigators can continue to argue that water is a private property right rather than a public resource, but the ESA has generally carried the day (e.g., timber industry and the Northern Spotted Owl) before the public and Congress. Indeed, there is a growing body of opinion in Washington's agriculture communities that agrees with that assessment and feels that the industry needs to be actively engaged in crafting solutions or risk letting others decide their fate.

In fact, local governments have the authority to engage in watershed planning and manage water resources under HB2514, which was passed by the Washington Legislature and was signed into law by the Governor in 1999. HB2514 provides for the establishment of local watershed management programs to assess water resources (which includes assessing in-stream flows and total maximum daily load sediment levels) and develop strategies for addressing water needs and habitat protection. HB2514 also provides funding for local watershed planning groups. Critical to the

legislation's passage was the fundamental belief that communities have the greatest knowledge about the historic uses of the water and the greatest stake in managing the water over the long term. To date, several promising initiatives have gotten under way.

The Columbia Basin Groundwater Management Area (GWMA), which encompasses three counties, one million acres of irrigated land, and 15,000 farmers, was established as a local alternative to state and federal intervention to address nitrate groundwater contamination. It has steadily built itself into a 500-member organization involving representatives of virtually every water user in the region. Critical to the program's drawing power is its proactive stance, emphasis on voluntary compliance, and emphasis on local involvement and control. The program has chalked up a few successes to date. For starters, it was able to get its members to acknowledge that groundwater contamination did indeed result from agricultural fertilizers and build consensus on the need to develop a plan for reducing those nitrate levels. That translated into the ongoing joint effort with Washington State University to develop fertilizer and irrigation management guidelines for the region. The Columbia Basin GWMA is optimistic that its current structure qualifies it to address other issues, namely endangered species recovery efforts.

The Sunnyside and Roza Irrigation Districts are attempting to do the same. The districts, which encompass about 175,000 irrigated acres, voted through their joint board to reduce water delivery to members who send too much sediment-rich, chemical-tainted water into the Yakima River. This decision followed the U.S. Bureau of Reclamation's announced plan to reduce Yakima Valley irrigation use by 7.5 percent to aid endangered fish through conservation measures like piping, metering, and re-regulation of reservoirs. These measures could save up to 165,000 acre-feet of water per year over the long term and boost the Yakima River's water level. The NMFS and Department of Ecology are also engaged in efforts to aid the fish, so the specter of intervention by those agencies was a consideration as well. District farmers will have to reduce the sediment in return water to 5 percent of what is currently allowed by 2002 or have their water allocation halved. This will require most farmers to invest in new equipment and technology to change their current irrigation practices. Those who file voluntary plans qualify first for irrigation district grants to finance these improvements. To aid that effort, the Sunnyside-Roza Joint Board of Control supported SHB1677 during the 1999 session, which gave irrigation districts the ability to finance low interest loans for private conservation projects, not unlike the rights public utility districts already have for things like energy and water conservation projects. The 1999 session also produced HB1549, which allowed irrigation districts to renew water rights that might otherwise lapse while develop-

ment was put on hold by federal agencies complying with the ESA. Both are now in state statute.

Also with respect to voluntary compliance is a provision in the ESA that protects farmers and landowners from legal action if they have a Habitat Conservation Program (HCP) in place. An HCP is based on the Natural Resource Conservation Service's Field Office Technical Guides (FOTG) and is approved by the NMFS and USFWS. An HCP offers a number of advantages, including regulatory certainty and protection from third party lawsuits. It also includes incidental taking permits, which allow the taking of endangered species if the action that caused the taking was legally provided for in an approved HCP. Finally, it provides a "safe harbor" provision that sets endangered species targets at a baseline level that does not change even if the targets are raised. This should be an incentive for farmers and landowners to be proactive in creating a plan that reflects the needs and values of their community rather than a one-size-fits-all solution imposed by federal or state government. An HCP is usually drafted by county government, though that is not required. For example, the Foster Creek Conservation District in Douglas County designed its own HCP. It also took a proactive, preemptory stance with its HCP covering species other than fish that were of concern to state and federal officials. This way, if those species are listed in the future, the HCP already covers them and will not have to be drafted over again. That said, drafting an HCP takes time and money and that does not include the cost of implementing the plan once it is approved. Preparing the physical document and accompanying Environmental Impact Statement are the two biggest costs, though there is grant money available from federal, state, and non-profit entities to help defray some of the cost.

The Agriculture, Fish and Water (AFW) process is one component of Governor Locke's salmon recovery strategy. Chief among its goals is to update the FOTG to ensure that it complies with the ESA and Clean Water Act (CWA). One group, primarily made up of growers, will look at conservation practices. Another, comprised mainly of irrigators, will address water use and water quality in addition to conservation practices. Another component of the governor's salmon recovery strategy is the Salmon Recovery Funding Board, chaired by former EPA head William Ruckelshaus, which has \$40 million to spend on strategic, coordinated habitat restoration efforts that it believes are based on the best science available.

Dr. Darryll Olsen, a resource economist who represents the CSRIA, argues that Washington needs a comprehensive water use policy to direct coordinated efforts. Until that occurs, anything can happen, including federal government intervention and cessation of local control. Olsen argues, for example, that in the absence of a comparable state plan, there is no way to counter a NMFS water management plan for the Columbia-Snake River Basin that would spill millions

of acre-feet of water from reservoirs during the spring and summer and, in his opinion, waste water and wrest control from the states without producing any more fish or social or economic benefit. As such, Olsen has developed an alternative plan for the Columbia River Basin that includes generating more electricity from federal dams and using the additional revenue to develop water conservation projects, building additional water storage within key watersheds to aid fish, and promoting water conservation and water transfers and exchanges programs, which he believes will reduce demand for new water permits.

The bottom line appears to be that Washington growers and irrigators are going to have to develop more efficient water management practices, crops that use less water, or both. Failure to do so invites the loss of water rights and with it the attendant impact on agricultural employment if crops cannot be sufficiently irrigated.

Hydroelectric Power: The strategies for restoring fish habitat are controversial and far-reaching in their effect on the region's irrigators. However, much more controversial and even more far-reaching in terms of economic impact (at least as far as agriculture-related industries are concerned) is talk of breaching four Lower Snake River federal hydroelectric dams located in southeast Washington—Ice Harbor, Lower Monumental, Little Goose, and Lower Granite.

Breaching involves redirecting the river around a dam's semi-permanent concrete structure by "breaching" or breaking through its earthen flanks. While USFWS biological reports state that breaching would effectively promote fish recovery, preliminary impact studies commissioned by the NMFS and prepared by the U.S. Army Corps of Engineers make it clear that the economic cost would be significant, with a disproportionate degree of the impact falling on economic activities like river barging, electricity production, and irrigation. The Corps study estimated that breaching would cause reservoirs to empty and river levels to drop, resulting in the loss of 1,200 megawatts of electricity (about 5 percent of total BPA production), irrigation for 37,000 acres of farmland, and 140 miles of navigable waterway between Pasco and Lewiston.

The Corps study estimates that breaching would result in a net economic loss of \$246 million a year regionally. Consumers, for example, could expect to pay \$1.50 to \$5.30 more a month for electricity since BPA would have to develop other resources to replace the electricity currently generated by the dams. That having been said, BPA customers currently pay 40 percent less than the national average and the prospect of lower cost electricity through future energy deregulation offers a potential offset over the long run (though costs would certainly rise in the short term). Irrigation systems would need to be modified to adjust to new water levels at a cost of \$300 million to compensate for the loss of the Ice Harbor dam. If that cannot be done, property

values along that stretch of the Snake River would plunge \$194 million. Agricultural shippers would lose the efficient, reliable barge system they have used to maintain lower shipping rates against other transport modes. In its absence, shipping costs for eastern Washington agricultural producers would increase 28 percent as they turn to less efficient, more expensive truck and rail systems.

Over the short term, an estimated 21,000 temporary jobs will be needed to breach the dams, improve or construct roads and rail lines, build new grain elevators and other grain-handling capacity at ports like Pasco, and build new natural gas-fired turbines to replace the hydroelectric power. Over the long term, there would be an estimated permanent loss of around 3,000 jobs among those who currently operate the dams, work on farms irrigated by water behind Ice Harbor dam, and operate barges that will be rendered inoperable when the river level drops. Conversely, there would be an estimated permanent gain of 2,300 jobs for expanded trucking and railroad operations, operating natural gas-fired power plants, and from tourism associated with a restored river.

For his part, Governor Locke and most of the state's congressional delegation have come out against breaching in the belief that the costs exceed the benefits. The Governor cautioned lawmakers and affected parties, however, that the state must develop and implement a scientifically sound salmon restoration plan or cede to the federal government a primary role in the effort. In other words, non-action is not an option. Congress will ultimately decide whether to authorize and fund breaches, though states, interest groups, and federal entities will certainly be able to weigh in and influence the debate.

Less dramatic options would be introduction of fish-friendly improvements at the dams, increased flow/spills/drawdowns, new bypass systems, and transporting fish by barge and trucks around the dams. While these alternatives all have certain success ratios, it appears clear from studies that breaching, while not inevitable, does have a greater chance of success.

Despite all the information at hand, the NMFS has yet to issue a recommendation. In fact, as late as April 2000, the NMFS indicated that it would not be issuing a recommendation in May-June as promised. Indeed, a recommendation is not likely to be issued in 2000 at all. This has led to charges that the NMFS, the Corps, the USFWS, and other federal agencies responsible for hammering out the recommendations are playing politics. The sweeping economic impacts outlined in the preliminary reports provided fuel for a highly polarized and politicized atmosphere. Moreover, this issue, though regional in appearance, is national in tenor, and not just because the ultimate decision rests in Washington, D.C. The outcome could establish precedent on issues such as endangered species and property rights that are at the cen-

ter of court battles in other regions across the nation. It would also appear that no one wants to "pull the trigger" on this politically controversial and polarizing issue and risk unnecessarily alienating key constituencies or making political enemies during a presidential election year.

The relationship between the irrigation and navigation dams in Washington and the most irrigation-dependent counties in the state is clear. All are contiguous to the Columbia River and dependent on the dams for their water. Consequently, there can be no doubt as to the importance of future water resource policy on these counties and the state's agricultural industry in general. For that reason, this is possibly the most critical issue facing Washington's agriculture industry—one with future implications almost too enormous to quantify and whose complexity and uncertainty make it all the more difficult to manage. The only certainty is that all of the options on the table will cause some degree of economic disruption and dislocation.

A peripheral impact of this conflict between agriculture and endangered fish will be felt on the long-term competitiveness of Washington's agriculture industry. The uncertainties inherent in the water rights debate spawned by ESA, CWA, and other federal and state regulations translate into increased costs for energy and water as well as increased costs for locating new facilities or expanding and upgrading current facilities whose permits are delayed. Together, these increase the cost of capital, discourage investment, and limit quick response to market changes. This, in turn, erodes the long-term competitiveness of Washington's agriculture industry.

The Latest, Greatest Family Farm

The 1997 Census of Agriculture confirmed long-standing trends that have concerned agriculture industry experts: young people are not going into farming. The number of new farmers has shrunk from about 700,000 in 1990 to around 365,000 today. A decline in the number of farms and the fact that farm families have fewer children than before explains this shrinkage. The average farm in Washington is getting larger while the average farmer is getting older. In 1992, Washington had 2,301 farmers under 35 and 3,973 over 70. In 1997, it had 1,521 farmers under 35 and 4,254 over 70. As such, the average age of Washington farmers rose from 53.1 in 1992 to 54.2 in 1997. Nationally, the farmers' average age of 54.3 in 1997 was up from 53.3 in 1992. The average age of the Washington farmer was just under the national average, but growing slightly faster. The national proportion of farmers age 55 and over has risen from 47 percent in 1992 to 61 percent in 1997.

Farmers are typically older than others in the civilian labor force. Because of increasing average life spans in the U.S., self-employed older farmers can continue to farm

to an advanced age. They do so by substituting capital for labor. In other words, even though the number of farmers has declined, there have been rapid increases in labor productivity to maintain farm output. As such, the aging of the farm population or its diminishing size has not adversely affected the nation's food supply, nor is it expected to in the near future.

While there is a larger share of older operators in agriculture, the future of farming in America depends on continued entry by new farm operators. However, the share of farmers under 35 has declined from 15 percent in 1954 to 8 percent in 1997.

Federal and State legislation has been enacted that favors young farmers and farmers with less than 10 years experience. The Taxpayer Relief Act of 1997 helped farmers whose capital comes from their family by substantially increasing the size of farms or other small businesses that can be transferred tax-free. The act also made important changes to special valuation and installment payment provisions. These changes made it easier to transfer the family farm across generations by reducing the likelihood of the farm or its assets being sold to cover estate taxes. Furthermore, the Agricultural Credit Improvement Act of 1992 created a beginning farm ownership down payment program. Moreover, the U.S. Secretary of Agriculture is currently considering six recommendations submitted by the Advisory Committee on Beginning Farmers and Ranchers to promote: (1) adequate funding for Farm Service Agency (FSA) loans, (2) tax law changes regarding state agriculture bond programs, (3) assessment of FSA's beginning farmer and rancher programs, (4) federal-state beginning farmer and rancher partnerships, (5) more trained staff to process loans, and (6) funding for the Small Farmer Outreach Training and Technical Assistance program.

While the typical farmer in Washington is aging, the average farm size has been growing. The number of Washington farms owned by individual families fell 7 percent while the number of farms held by partnerships and corporations rose 8 percent. The number of corporate farms rose from 2,042 in 1982 to 2,776 in 1997, but most were family-held corporations with 10 or fewer stockholders. Only 255 were not family-owned and they farmed about 235,000 acres. One of the reasons for farm consolidation is that more and more farmers are unable to interest their children in farming. While this may seem dire, farm consolidation has produced efficiencies that benefit consumers. Fifty years ago, Americans spent 24 percent of their disposable income on food and beverages. In 1998, that share was 10 percent, leaving the remaining 14 percent or \$20.8 billion available for non-food consumption.

On the other hand, a couple of Microsoft millionaires and other investors formed Farmland Acquisition, Research and Management Limited Liability Co. (FARMLLC) and purchased land in the Sammamish Valley. Their goal is to turn agriculture into a profitable enterprise and save scenic open space where they live. They reached their first year's goal of 70 acres, which comprises 7 percent of the farmland in north-east King County. FARMLLC intends to demonstrate that the best and highest use of farmland is farming: fruit and vegetables raised on some parcels, longer leases to new farmers, a demonstration garden for people that are considering farm life, and greenhouses producing greater yields and year-round income and employment. It plans to penetrate the growing market for high-quality organic produce by selling straight from the farm, cutting out warehouse expense and educating consumers as to where food originates. They are directly targeting suburban traffic that passes the farm, farmers markets, local restaurants, and some local grocery stores. FARMLLC hopes people will view their operation as a neighborhood farm doing good business.

AGRICULTURE IN AGGREGATE

What with all the focus on high profile sectors like technology and aircraft, it is important to remember that agriculture, too, is a major source of employment in Washington. Total agricultural employment including farm operators, unpaid family workers, year-round, and seasonal workers was 87,400 in 1999—and increasing as growers expanded production in labor-intensive, high-valued crops. The average number of hours worked also increased in agriculture from 658 hours in 1995 to 724 hours in 1999, mostly due to the same expansion activities cited above. The impact was most evident in eastern Washington, where over 80 percent of all agricultural jobs were based in 1999. Growth in this sector can be erratic, however, due to weather conditions and factors affecting crop size, harvest conditions, changes in consumer preferences, and overall demand and competition in U.S. and foreign markets. Agriculture also accounted for thousands of indirect jobs in food processing, transportation, wholesale trade, warehousing, distribution, farm equipment, and elsewhere (food and kindred products employed 41,000 workers in 1999, while fruit and vegetable wholesalers employed 8,500).

In Washington, annual earnings of agricultural workers averaged \$13,830 in 1998 or less than 42 percent of the \$33,071 for all workers covered by the Employment Security Act. Average earnings in agriculture are low for a variety of reasons: formal training is not required for a majority of the jobs, most of the jobs require only the ability to do manual labor, most of the jobs are highly seasonal and do not provide year-round employment, and there is generally a plentiful supply of workers. Of course, there is a wide range of earnings by sector, activity, and skill level in agriculture with average earnings ranging from a high of \$20,131 for dairies to a low of \$10,029 for workers in berry crops in 1998.

Beyond the nuts and bolts of employment and earnings, this is a challenging time for Washington's agriculture industry. Environmental and conservation measures related primarily to compliance with the Endangered Species Act threaten to weaken several comparative advantages traditionally enjoyed by Washington's agriculture industry: an adequate and reliable water supply, low electricity rates, and efficient water transportation. Erosion of these comparative advantages is expected to translate into higher costs of doing business for all players. For those on the margin, it may well represent a breaking point and heighten the pace of agriculture industry consolidation.

Add to this a strong national and regional nonagricultural economy and you have, for the first time, real concern over the availability of labor, particularly as it per-

tains to the harvesting of labor-intensive crops like fruit. Competition for skilled and semi-skilled labor from other sectors of the economy has bid up wages and salaries for growers and food processors alike. Additionally, stepped up verification of individuals' work status by the federal government will also chip into the supply of available labor. Calls for adequate housing for migrant workers have risen to new levels. All of these factors also represent increases in the cost of doing business.

The good news is that Washington's agriculture industry continues to be among the most efficient and productive. Nevertheless, however efficient and productive Washington's agriculture industry may be, it will also continue to face increasing challenges from foreign and domestic competitors. How each of the commodities that comprise the state's agriculture industry competes in those markets will impact the growers' bottom line and, consequently, their ability to be a long-term source of employment. The state's cherry industry is a good example. Worldwide cherry production is rising and Washington's ability or inability to compete will determine the fate of the thousands upon thousands of jobs each year that are sought out mainly by migrant workers.

The tool to which many Washington growers had looked to provide a comparative advantage—biotechnology—faces daunting challenges as the chasm between science and public perception steadily widens. As it stands, a science raft with cutting-edge developments that promised to make agriculture more productive than ever could be shelved for lack of markets for its products. There are, of course, other non-biotechnology-related scientific developments that will continue to help growers produce higher quality, less resource intensive commodities. Increased productivity and efficiency gains will also continue to be reaped by way of increasingly sophisticated machinery and equipment.

Taken together, the increased cost of doing business and increased foreign and domestic competition has raised the stakes for Washington's agriculture industry and present it with an unusually complex array of challenges that need to be taken on simultaneously. While agriculture will continue to be a major industry in Washington, how the industry responds to these challenges promises to alter the nature of agricultural employment in the state. Basically, it is no longer enough to grow the industry whether in terms of production or employment. The emphasis now must be on lowering per unit costs, a necessary move that has long-term implications for, among other things, the most costly production input in agriculture—employment.

Appendix I - Agricultural Reporting Areas Defined

As used in this report, an agricultural reporting area is a geographic division within the state which:

- (1) is reasonably integrated in terms of farm labor market characteristics, and
- (2) has a supply of, or demand for, seasonal hired farm workers, and
- (3) employs 500 or more seasonal hired farm workers at any time of the year.

On the basis of these criteria, the six agricultural reporting areas in Washington State have been defined as follows:

Ag-reporting Area & Number	Counties
Western 10-52-01	Clallam, Clark, Cowlitz, Grays Harbor, Island, Jefferson, King, Kitsap, Lewis, Mason, Pacific, Pierce, San Juan, Skagit, Skamania, Snohomish, Thurston, Wahkiakum, Whatcom
South Central 10-52-02	Klickitat, Yakima
North Central 10-52-03	Chelan, Douglas, Kittitas, Okanogan
Columbia Basin 10-52-04	Adams, Grant
South Eastern 10-52-05	Benton, Franklin, Walla Walla
Eastern 10-52-06	Asotin, Columbia, Ferry, Garfield, Lincoln, Pend Oreille, Spokane, Stevens, Whitman

Appendix II - Employment of Seasonal Workers by Activity in Washington, Statewide and by Agricultural Reporting Areas, 1999

Washington State

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
State Totals	12,585	14,711	19,384	24,933	24,694	43,020	59,512	39,530	53,127	58,981	18,860	11,954	31,774
Apples, Total	7,243	8,171	8,604	7,362	4,931	17,173	20,217	13,089	27,020	44,002	10,456	4,943	14,434
Apple Pruning	6,802	7,372	5,725	1,468	652	0	0	0	0	251	595	4,269	2,261
Apple Thinning	0	0	199	2,647	679	15,256	14,278	2,418	0	0	0	0	2,956
Apple Harvester	0	0	0	0	0	0	450	3,684	23,249	40,536	6,509	0	6,202
Apple Sort, Grade, Pack	245	340	313	450	528	214	178	666	519	609	537	141	395
Other Apple Activities	196	459	2,367	2,797	3,072	1,703	5,311	6,321	3,252	2,606	2,815	533	2,619
Cherries, Total	469	403	1,122	809	583	5,764	15,957	1,676	144	0	71	134	2,261
Cherry Pruning	454	384	568	224	9	6	0	0	0	0	43	122	151
Cherry Harvester	0	0	0	0	0	4,333	12,537	1,307	0	0	0	0	1,515
Other Cherry Activities	15	19	554	585	574	1,425	3,420	369	144	0	28	12	595
Pears, Total	507	484	613	496	383	1,073	1,721	2,900	6,317	2,037	506	989	1,502
Pear Pruning	492	479	519	394	262	111	65	0	0	0	293	922	295
Pear Thinning	0	0	0	0	23	702	1,362	0	0	0	0	0	174
Pear Harvester	0	0	0	0	0	0	0	2,417	5,927	1,931	0	0	856
Other Pear Activities	15	5	94	102	98	260	294	483	390	106	213	67	177
Other Tree Fruit Workers	165	340	338	580	1,061	679	2,095	1,968	1,090	336	186	171	751
Grape Workers	648	1,483	1,724	1,443	859	1,509	1,951	1,146	1,271	1,144	966	811	1,246
Blueberry Workers	4	5	4	7	4	18	170	639	706	45	28	71	142
Raspberry Workers	721	614	347	302	269	170	2,254	3,209	409	641	717	598	854
Strawberry Workers	178	112	115	112	295	939	3,145	978	19	31	0	0	494
Bulb Workers	141	76	513	711	525	300	455	502	320	316	216	169	354
Hop Workers	60	124	617	901	1,276	972	798	825	2,673	307	330	103	749
Nursery Workers	975	1,246	2,136	2,128	1,828	2,088	2,536	1,370	1,174	886	1,333	1,146	1,571
Wheat/Grain Workers	13	54	98	136	426	271	561	1,188	409	202	142	90	299
Asparagus Workers	12	14	348	5,907	8,193	6,849	876	118	140	16	10	22	1,875
Cucumber Workers	0	0	0	0	5	93	93	873	1,286	0	0	0	196
Onion Workers	543	557	812	402	307	1,401	2,160	1,255	1,585	1,207	887	666	982
Potato Workers	384	315	833	1,103	720	407	768	1,849	2,827	2,659	777	415	1,088
Misc Vegetable Workers	307	419	315	861	1,027	1,629	1,525	2,428	2,474	3,668	1,330	924	1,409
Other Seasonal Workers	215	294	845	1,673	2,002	1,685	2,230	3,517	3,263	1,484	905	702	1,568

Western Area 1

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	2,099	2,145	3,095	3,279	3,166	3,781	7,947	8,130	6,390	4,393	2,712	2,297	4,120
Blueberry Workers	4	5	4	7	4	18	170	639	706	45	28	71	142
Raspberry Workers	721	614	347	302	269	170	2,254	3,209	409	641	717	598	854
Strawberry Workers	178	112	115	108	206	792	2,407	419	19	31	0	0	366
Bulb Workers	141	76	513	711	525	300	455	502	320	316	216	169	354
Cucumber Workers	0	0	0	0	5	93	93	873	1,286	0	0	0	196
Potato Workers	172	156	196	19	36	31	9	11	391	334	436	291	174
Misc. Vegetable Workers	37	40	3	178	280	517	565	736	1,657	1,959	380	261	551
Nursery Workers	787	1,064	1,842	1,571	1,395	1,614	1,650	937	770	568	697	721	1,135
Rhubarb Workers	46	67	37	188	144	169	127	116	0	0	8	17	77
Other Seasonal Workers	13	11	38	195	302	77	217	688	832	499	230	169	273

Appendix II - Continued

South Central Area 2

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	4,282	5,088	6,677	7,680	8,566	14,452	19,974	11,075	16,931	18,796	4,735	4,005	10,188
Apples, Total	3,254	3,349	3,040	2,127	1,344	5,099	6,926	4,163	7,744	16,001	3,019	2,320	4,866
Apple Pruning	3,153	3,190	2,276	362	147	0	0	0	0	11	311	2,016	956
Apple Thinning	0	0	37	510	321	4,671	3,788	703	0	0	0	0	836
Apple Harvester	0	0	0	0	0	0	450	846	6,548	14,824	926	0	1,966
Apple Sort, Grade, Pack	30	4	0	0	0	0	0	252	265	262	215	5	86
Other Apple Activities	71	155	727	1,255	876	428	2,688	2,362	931	904	1,567	299	1,022
Cherries, Total	57	46	687	224	446	2,844	6,223	196	100	0	46	23	908
Cherry Pruning	53	46	226	0	3	0	0	0	0	0	41	14	32
Cherry Harvester	0	0	0	0	0	2,065	4,844	0	0	0	0	0	576
Other Cherry Activity	4	0	461	224	443	779	1,379	196	100	0	5	9	300
Pears, Total	432	326	380	245	174	471	1,165	1,668	3,428	870	307	847	859
Pear Pruning	428	326	351	230	154	0	0	0	0	0	293	838	218
Pear Thinning	0	0	0	0	0	304	984	0	0	0	0	0	107
Pear Harvester	0	0	0	0	0	0	0	1,597	3,418	870	0	0	490
Other Pear Activities	4	0	29	15	20	167	181	71	10	0	14	9	43
Other Tree Fruit, Total	0	327	294	253	540	252	1,747	1,410	870	15	33	18	480
Other Tree Fruit Pruner	0	319	215	42	28	60	0	0	0	0	0	9	56
Other Tree Fruit Harvester	0	0	0	0	0	0	1,478	1,321	755	0	0	0	296
Other Tree Fruit Activities	0	8	79	211	512	192	269	89	115	15	33	9	128
Grapes, Total	425	864	895	668	396	780	1,085	685	951	896	678	539	739
Grape Pruning	377	630	423	172	165	429	332	300	111	45	46	513	295
Grape Harvester	0	0	0	0	0	0	0	73	186	210	7	0	40
Other Grape Activity	48	234	472	496	231	351	753	312	654	641	625	26	404
Asparagus Workers	12	14	336	2,305	3,761	3,374	311	77	117	16	10	22	863
Hops, Total	60	99	486	810	1,147	929	774	801	2,525	300	320	103	696
Hop Twining & Training	0	0	0	496	825	314	80	15	0	0	0	0	144
Hop Harvester	0	0	0	0	0	0	0	205	1,833	0	0	0	170
Other Hop Activity	60	99	486	314	322	615	694	581	692	300	320	103	382
Onion Workers	0	0	0	0	0	0	281	355	308	112	0	0	88
Potato Workers	0	0	19	14	9	10	106	295	142	8	0	0	50
Misc. Vegetable Workers	0	28	88	241	169	165	496	663	369	287	113	76	225
Other Seasonal Workers	42	35	452	793	580	528	860	762	377	291	209	57	416

Appendix II - Continued

North Central Area 3

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	2,815	3,323	3,647	4,286	2,863	7,341	15,157	7,678	12,770	16,761	3,579	1,735	6,830
Apples, Total	2,524	2,874	3,135	3,687	2,282	5,541	7,566	4,494	9,890	15,475	3,239	1,382	5,174
Apple Pruning	2,219	2,371	1,837	474	111	0	0	0	0	240	168	1,110	711
Apple Thinning	0	0	162	2,103	267	4,603	5,560	992	0	0	0	0	1,141
Apple Harvester	0	0	0	0	0	0	0	1,171	7,858	13,688	1,938	0	2,055
Apple Sort, Grade, Pack	215	336	313	450	528	214	178	414	254	347	322	136	309
Other Apple Activities	90	167	823	660	1,376	724	1,828	1,917	1,778	1,200	811	136	959
Cherries, Total	121	209	162	219	69	790	6,811	1,309	26	0	5	64	815
Cherry Pruning	121	209	139	125	0	0	0	0	0	0	0	64	55
Cherry Harvester	0	0	0	0	0	446	4,794	1,215	0	0	0	0	538
Other Cherry Activities	0	0	23	94	69	344	2,017	94	26	0	5	0	223
Pears, Total	75	153	233	251	209	562	556	1,063	2,686	1,167	191	116	605
Pear Pruning	64	153	168	164	108	111	65	0	0	0	0	84	76
Pear Thinning	0	0	0	0	23	398	378	0	0	0	0	0	67
Pear Harvester	0	0	0	0	0	0	0	820	2,509	1,061	0	0	366
Other Pear Activities	11	0	65	87	78	53	113	243	177	106	191	32	96
Other Tree Fruit Workers	82	8	3	44	171	335	48	540	38	10	129	153	130
Other Seasonal Workers	13	79	114	85	132	113	176	272	130	109	15	20	105

Columbia Basin Area 4

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	1,994	2,310	2,800	3,219	3,494	5,742	6,937	5,731	9,017	10,270	2,951	1,877	4,695
Apples, Total	1,170	1,627	1,782	993	1,037	3,314	3,252	2,551	5,384	7,109	1,002	758	2,498
Apple Pruning	1,148	1,490	1,187	300	318	0	0	0	0	0	91	714	437
Apple Thinning	0	0	0	23	83	2,967	2,765	723	0	0	0	0	547
Apple Harvester	0	0	0	0	0	0	0	310	4,913	6,700	494	0	1,035
Other Apple Activities	22	137	595	670	636	347	487	1,518	471	409	417	44	479
Cherries, Total	144	58	203	182	21	12	1,267	154	11	0	16	12	173
Cherry Pruning	133	39	148	92	0	6	0	0	0	0	0	12	36
Cherry Harvester	0	0	0	0	0	0	1,250	92	0	0	0	0	112
Other Cherry Activities	11	19	55	90	21	6	17	62	11	0	16	0	26
Pear Workers	0	5	0	0	0	40	0	169	203	0	8	26	38
Mint Workers	10	16	11	90	270	106	141	213	212	9	6	8	91
Other Tree Fruit Workers	77	0	7	202	283	6	10	10	0	11	24	0	53
Asparagus Workers	0	0	0	513	506	605	0	0	0	0	0	0	135
Onion Workers	356	362	302	75	90	582	821	422	978	742	755	666	513
Potatoes, Total	145	156	378	767	519	298	476	960	1,842	2,017	278	109	662
Potato Harvester	0	0	0	0	0	0	0	73	281	621	27	0	84
Potato Sort, Grade, Pack	96	110	180	478	282	76	32	588	704	772	118	83	293
Other Potato Activities	49	46	198	289	237	222	444	299	857	624	133	26	285
Misc Vegetable Workers	29	16	11	51	178	126	101	470	75	76	43	16	99
Wheat/Grain Workers	0	2	4	17	139	98	88	389	39	70	38	15	75
Nursery Workers	16	24	41	166	155	231	305	216	156	112	422	225	172
Other Seasonal Workers	47	44	61	163	296	324	476	177	117	124	359	42	186

Appendix II - Continued

South Eastern Area 5

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	1,257	1,665	2,916	6,065	6,228	11,390	8,879	6,009	7,460	8,539	4,680	1,849	5,578
Apples, Total	295	321	647	555	268	3,219	2,473	1,881	4,002	5,417	3,196	483	1,896
Apple Pruning	282	321	425	332	76	0	0	0	0	0	25	429	158
Apple Thinning	0	0	0	11	8	3,015	2,165	0	0	0	0	0	433
Apple Harvester	0	0	0	0	0	0	0	1,357	3,930	5,324	3,151	0	1,147
Other Apple Activities	13	0	222	212	184	204	308	524	72	93	20	54	159
Cherries, Total	147	90	70	184	47	2,118	1,656	17	0	0	4	35	364
Cherry Pruning	147	90	55	7	6	0	0	0	0	0	2	32	28
Cherry Harvester	0	0	0	0	0	1,822	1,649	0	0	0	0	0	289
Other Cherry Activities	0	0	15	177	41	296	7	17	7	0	2	3	47
Other Tree Fruit Workers	6	5	34	81	67	86	290	8	182	300	0	0	88
Grape Workers	223	619	829	775	463	729	866	461	320	248	288	272	508
Asparagus Workers	0	0	12	3,089	3,926	2,870	565	41	23	0	0	0	877
Hop Workers	0	25	131	91	129	43	24	24	148	7	10	0	53
Onion Workers	187	195	510	327	217	819	1,058	478	299	353	132	0	381
Potatoes, Total	67	3	240	303	156	68	177	583	452	300	63	15	202
Potato Harvester	0	0	0	0	0	0	24	132	112	108	0	0	31
Potato Sort, Grade, Pack	67	0	0	225	108	0	46	365	265	60	0	0	95
Other Potato Activities	0	3	240	78	48	68	107	86	75	132	63	15	76
Misc Vegetable Workers	195	268	176	203	256	652	236	443	373	1,346	786	554	457
Wheat/Grain Workers	0	0	24	42	239	120	224	151	53	79	59	75	89
Nursery Workers	107	48	92	145	35	43	437	92	144	80	98	100	118
Strawberry Workers	0	0	0	4	89	147	738	559	0	0	0	0	128
Other Seasonal Workers	30	91	151	266	336	476	135	1,271	1,464	409	44	315	416

Eastern Area 6

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Total	138	180	249	404	377	314	618	907	552	222	203	191	363
Wheat/Grain, Total	13	52	70	77	48	53	249	648	317	53	45	0	135
Wheat/Grain Harvester	0	0	0	0	0	0	0	47	0	0	0	0	4
Wheat/Grain Eqpmt Operator	0	0	10	22	12	0	181	537	253	40	0	0	88
Other Wheat/Grain Activity	13	52	60	55	36	53	68	64	64	13	45	0	44
Nursery Workers	65	110	161	246	243	200	144	125	104	126	116	100	145
Other Seasonal Workers	60	18	18	81	86	61	225	134	131	43	42	91	83

Appendix III - Total Agricultural Employment in Washington State Statewide and by Area, 1999 (Benchmark: March 1999)

	Annual Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Washington	92,700	60,580	67,240	75,040	83,590	89,890	123,580	129,860	110,220	120,650	122,650	69,380	59,760
Bellingham MSA	3,200	2,290	2,490	2,710	2,740	3,190	4,040	5,320	4,550	3,520	2,710	2,440	2,350
Bremerton PMSA	220	160	200	220	240	240	260	270	240	230	210	200	170
Olympia PMSA	1,470	1,340	1,430	1,470	1,520	1,580	1,590	1,700	1,580	1,580	1,360	1,270	1,270
Richland-Kennewick-Pasco MSA	11,630	6,850	7,700	8,800	11,760	13,260	19,790	14,970	12,510	14,190	14,050	8,660	7,080
Seattle-Bellevue-Everett PMSA	3,880	3,010	3,360	3,680	4,100	4,320	4,420	4,700	4,240	4,050	3,890	3,430	3,330
Spokane MSA	1,390	1,080	1,200	1,360	1,510	1,600	1,680	1,700	1,580	1,470	1,320	1,140	1,070
Tacoma PMSA	1,640	1,380	1,440	1,800	1,630	1,660	1,850	2,100	1,860	1,740	1,570	1,330	1,320
Chelan-Douglas MSA	12,440	7,390	8,500	8,990	9,050	9,320	16,430	21,450	14,900	20,010	18,130	8,270	6,820
Yakima MSA	22,200	14,710	15,870	17,860	19,240	21,540	30,800	30,110	26,160	29,660	32,370	14,610	13,470
Adams	2,870	1,500	1,680	2,170	2,500	2,960	3,650	4,310	3,990	3,930	4,220	2,050	1,470
Asotin	180	130	140	160	200	200	250	230	210	200	160	150	140
Clallam	270	200	230	260	270	290	310	340	310	280	250	220	220
Clark	1,060	760	910	940	970	1,050	1,340	1,660	1,360	1,120	960	860	770
Columbia	270	200	220	250	280	270	300	340	360	270	270	220	200
Cowlitz	560	400	430	430	610	470	750	840	690	640	560	480	470
Ferry	140	110	120	130	150	160	170	180	160	150	130	110	110
Garfield	260	190	210	240	260	290	300	340	360	290	230	200	190
Grant	8,560	5,210	5,880	6,730	7,390	7,990	11,310	11,200	9,910	11,490	12,930	7,240	5,440
Grays Harbor	370	280	300	360	380	400	440	440	410	400	460	320	290
Jefferson	90	80	90	100	100	100	110	120	100	90	90	80	70
Kittitas	1,100	770	840	980	1,280	1,040	1,170	1,150	1,360	1,370	1,550	870	760
Klickitat	1,210	860	960	1,050	1,190	1,160	1,460	1,700	1,430	1,490	1,550	950	730
Lewis	1,030	880	960	1,040	1,100	1,140	1,170	1,240	1,160	1,050	940	880	840
Lincoln	1,060	770	860	990	1,130	1,160	1,230	1,350	1,440	1,140	970	860	810
Mason	130	100	110	120	130	150	160	150	140	140	130	130	120
Okanogan	6,270	3,090	3,880	3,950	5,010	5,410	7,500	8,990	7,390	10,080	11,880	4,480	3,600
Pacific	260	210	230	250	270	290	300	310	290	280	280	220	210
Pend Oreille	150	110	130	140	150	170	180	190	170	160	130	120	120
Skagit	3,110	2,340	2,370	2,800	2,730	2,660	3,390	4,650	4,590	3,870	3,420	2,290	2,180
San Juan	80	60	70	80	80	90	100	100	90	80	70	60	60
Skamania	50	30	40	40	50	50	50	50	60	60	70	40	30
Stevens	760	580	670	740	800	870	920	950	870	810	730	620	590
Wahkiakum	80	60	70	70	80	90	90	100	90	80	70	60	60
Walla Walla	3,130	2,220	2,330	2,640	3,020	3,020	4,190	4,630	3,570	3,020	3,510	3,210	2,180
Whitman	1,590	1,210	1,340	1,500	1,660	1,730	1,870	1,960	2,100	1,700	1,480	1,290	1,220

Indicated numbers include wage and salary employment as well as owners and unpaid family workers. The numbers have not been adjusted for multiple job holders (those who work for more than one employer during the reference period).

Detail may not add to indicated totals due to rounding.

GLOSSARY

Crop

Any horticultural product grown, harvested, or collected.

Livestock

Any animal product tended, grazed, or fed.

Crop/Livestock Activities

Names of agricultural crops or livestock activities going on during the survey. Some examples of agricultural worker activities are: apple harvester, apple pruner, asparagus cutter, cherry picker, grape pruner, hop twiner, potato packer, vegetable weeder, cattle worker, wheat truck driver, etc.

Hired Workers

All hired workers including full-time, part-time, seasonal, and casual employees regardless of age. Paid family members are considered hired workers.

Seasonal Hired Workers

All hired workers who have been employed less than 150 calendar days.

Foreign (H2-A) Contract Workers

All hired workers who reside in foreign countries and are legally contracted by farmers to work temporarily in the United States. Foreign hired farmhands are always considered seasonal workers—even if they are hired for more than five months of work.

Origin

The locality or foreign country where the hired workers normally reside.

Local Workers

Hired worker who daily commutes from home to the job.

Intrastate Migratory Workers

Hired worker whose established residence is within Washington, but who is not within commuting distance of the job.

Interstate Migratory Workers

Hired worker whose established residence is outside of Washington and not within commuting distance of the job.

Pay Rates

The Hourly Pay Rate is the rate of money paid per hour worked. The Piece Rate Pay is the rate of money paid per task completed. Three examples are:

- (1) Picking red apples pays \$10.00 per 850 pound bin filled,
- (2) Picking strawberries pays \$0.12 per pound picked, and
- (3) Pruning trees pays \$5.00 per large tree pruned.