

Submitted to:

Far West Agribusiness Association
J.R. Simplot Company
Northwest Food Processors Association
Pacific Coast Shellfish Growers Association
Washington Association of Wheat Growers
Washington Association of Wine Grape Growers
Washington Cattlemen's Association
Washington Dairy Products Commission
Washington Farm Bureau
Washington Friends of Farms & Forests
Washington State Grange
Washington State Potato Commission
Washington State Tree Fruit Association
Washington State Water Resources Association
Washington Wine Institute
Yakima County Farm Bureau

Submitted by:





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EXECUTIVE SUMMARY

Agriculture and Food Processing activities extend into every county in Washington State. Dairy production stretches across both sides of the Cascades; apples, wheat, potato and other field crops cover the rural landscapes across the state; finfish and shellfish farms in Puget Sound and the coast raise seafood sold to buyers as far as New York and Japan; and cattle ranches produce some of the highest quality beef in the U.S. Many of these activities thrive because of the natural assets endowed to Washington farmers and food producers—rich soil created by the Missoula Floods, the Cascade rain shadow and ideal temperate zones. Washington’s premium wine industry thrives on some of the highest quality grapes in the world produced in the Columbia River Basin.

Why do Agriculture and Food Processing Activities Matter?

Rural communities across the state rely on Agriculture and Food Processing¹ as the primary employers and drivers of economic activity and tax base. Processors rely on local farmers for key inputs, and communities across the state rely on the success and vitality of farming activities.

The existing state tax incentives for Agriculture and Food Processing matter for two important reasons. First, although farmers purchase production inputs like any other industry, these are often purchased as retail goods at retail prices, despite the fact that those goods are intermediate inputs similar to wholesale purchases that are not taxed in other industries. While a machine or fuel may be bought at retail, these purchases are no different than when a manufacturer procures machined parts or industrial materials.

Second, farming and food processing are low margin, highly competitive industries. Rural communities across the state face the prospect of losing major food processing employers due to more advantageous incentives offered in other states or regions. Local processors must compete with producers not just in neighboring states and provinces, but also in China and other countries.

Competitiveness extends to farmers, as well. Agriculture is a highly volatile and risky industry. Farmers must make large investment decisions up to a year or more in advance, with no ability to predict a set of variables that could make or break their profitability, or even put them out of business. These include weather, global prices, and trade barriers, among others. When years are good, farmers invest in necessary equipment and other inputs and save for the bad years; when years are bad, the incentives help farmer simply stay in business. Farmers and processors are important employers—when these businesses either shut down or relocate, the communities they were based in suffer.

Agriculture and Food Processing: Big Impacts

In 2013, **164,400 jobs** in Washington were tied to Agriculture and Food processing activities statewide, including 34,000 farm proprietors. Factoring in the total impact of these activities, an **estimated 220,600 jobs** were supported statewide, either directly or through business transactions and personal income expenditures. Nearly **\$36 billion** in

¹ In this study, “food processing” refers to both food and beverage processing, such as French fries and wine.

business revenues were supported by these activities, through direct activities and multiplier effects, and **\$8.7 billion** in income.

These impacts owe to the highly **exportable** orientation of Agriculture and Food Processing, with the majority of sales going to customers outside Washington (either elsewhere in the U.S. or overseas).

Agriculture and Food Processing activities paid \$91.7 million in direct state taxes in 2013. The industry's indirect and induced activities supported additional state fiscal revenues of \$271.2 million, resulting in a total fiscal impact to the state of **\$362.9 million** in 2013. **For every dollar in state investments in agriculture and processing activities, \$1.30 is generated in state tax payments through direct and secondary impacts.**

Farming is Risky

Farmers lose money, make money, and break even throughout a 10-year window. They face the ongoing threats of bad weather, volatility in global commodity prices, and increases in variable operating costs such as fuel. As **price takers**, farmers cannot pass on a reduced price per bushel of wheat or hundred weight of potatoes or other products, to their vendors, and thus must absorb these losses. Geopolitical events, such as tariffs and other trade barriers, can have large negative impacts on farm sales.

As **weather takers**, farmers must make bets almost a year in advance about what to grow and rely on good climate and environmental conditions to produce a healthy yield. Sudden changes in the global supply or demand for agriculture commodities, such as wheat, can have dramatic effects on the welfare of farming families and their communities.

Farming is the Foundation of a Statewide Economy & Pillars of Many Local Communities

Farming belongs to a much larger economic system that ties together farmers, processors, supporting activities and distribution networks in their local communities and beyond. In many counties across Washington State, farming is a critical anchor of communities and regional economies. Farmers rely on both exports and demand from local processors. Soil preparation and tillage services, contract labor, marketing and other services are all critical to the success of a harvest, and local economies provide these services.

Regional Strengths

Although farming occurs throughout Washington, the vast majority of farms that generate more than \$250,000 in sales are in Eastern Washington. Some of these counties, including Grant, Whitman and Yakima, are ranked first in the nation for production of sweet corn, wheat and apples. At \$1.73 billion, Grant County topped Yakima by slightly more than \$11 million to have the highest cash receipts for animal and crop production in 2012. Concentrations of Food Processing and Wholesale & Distribution facilities are

present both near production areas and major ports in Western Washington, with King County having 25% and 33% of the state’s jobs in these categories, respectively.

Farming and Food Processing activities factor most prominently in the central portion of Washington, where employment for agriculture-related industries accounts for more than 20% of total covered employment in many counties. For these counties, agriculture and related industries are essential to sustaining the local economy. Yakima, in particular, is a hotspot for agricultural employment – based on statewide totals in 2013, it accounted for 28% of Crop Production jobs, 25% of Animal Production jobs and 48% of Agriculture Support Activities jobs. Its \$437 million in milk sales in 2012 also makes it, by far, the state’s dominant milk producing county.

Access to Local Processors is Crucial

Food Processing activities in Washington are an important driver of jobs in agriculture. In 2013, these processing activities supported 19,000 crop and animal production jobs statewide through supply chain relationships. In other words, **20% of all agriculture jobs in the state rely on demand from food processors.**

Food processors require support from many other industries, including from other manufacturers, equipment mechanics, and logistics firms. Further down the supply chain, farmers are a source of demand for specialized agriculture-related services like soil preparation, field monitoring, post-harvest activities, and product marketing.

Some crops, such as wheat, are primarily sold to wholesalers for out-of-state distribution and involve little processing. Others, such as potatoes and grapes, are highly dependent on local food processors to sell their harvest. For instance, roughly 90% of all potato sales by value are sold to local processors (fresh, frozen, potato chips and dehydrated). As Food Processing plants are often located near production areas, these facilities can serve as vital employment centers in rural communities.

Processors and farmers often work closely together on planting and storage techniques, seed/plant choice and mitigating issues related to pests and other threats. In some cases, proximity between processors and farmers is essential in order to facilitate collaboration between processors and growers as well as helping to reduce shipping costs for the raw commodity. Improved storage technologies have transformed agriculture and processing from purely seasonal into a year-round employer, another factor important to small communities with limited employment opportunities. Communities dependent on processors that operate multiple plants nationally or internationally may be vulnerable if companies find other locations to be more cost-effective. The loss of a processing facility can mean the end of farming as a viable economic activity.

Family Businesses

Farms are most often family-run businesses. In many cases, farming is an important—but not all—of a family’s income. Larger family farms are intergenerational and are run and managed by members of the household, plus hired labor. In 2012, more than 80% of Washington’s farm operations were organized as family or individual farms, according to the National Agricultural Statistics Service (NASS).

State Tax Programs are Critical to Manage Volatility and Preserve Local Economies

Tax incentives, especially sales and use tax exemptions, help mitigate some of the risk due to market price volatility.

In addition to the various food processing companies that operate in Washington, producers have established their own processing cooperatives. A number of these local operations greatly benefit from the state's food processing B&O tax incentives; **because they are grower-owned, all of the tax savings accrued by these cooperatives are subsequently returned back to farmers in their rural communities throughout Washington State.**

Agriculture and Food Processing is Constantly Innovating

Food processing is an active and continuous source of innovation. Many of the activities integral to food processing, such as grading, sorting, and cutting of raw commodities, are complicated and require sophisticated equipment. Food processors are also under constant cost pressure; innovation extends to new recipes and value-added products. Reacting to consumer demand, food processors are moving from single-vegetable packages, for example, to vegetable medleys that offer consumers greater nutritional variety and provide a larger margin to processors. On the primary processing side, beef ranchers are reacting positively to mobile processing units, which reduce transportation costs and can be more humane than trucking live cattle to existing processing sites.

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1.0 INTRODUCTION

1.1 Background and Purpose

This project serves as quantitative and qualitative assessment of the Agriculture and Food Processing cluster in Washington State. This study examines the economic and fiscal impacts of Agriculture and Food Processing and the dynamics of the agriculture value-added supply chain. This study then estimates the importance of select Washington State tax incentives related to Agriculture and Food Processing.

1.2 Methods

The analysis relies on custom data analysis, interpretation of secondary data sources, and perspectives and insights from local industry leaders gathered through individual interviews. Data reported and the sources of information are as follows:

- Information on Agriculture and Food Processing firms, jobs, farms and ranches, occupations, and wages from the Bureau of Labor Statistics' Quarterly Census of Employment and Wage data (QCEW data), the U.S. Census of Agriculture, and seasonal employment estimates from the Washington State Employment Security Department.
- Business revenues—from sales of commodities and finished goods—from the Washington State Department of Revenue and U.S. Census of Agriculture.
- Input-model transaction tables published by the Washington State Office of Financial Management and IMPLAN.

1.3 Terms Used Throughout This Report

Food Processing refers in this study to both food and beverage processing. However, only activities that rely on Washington-grown or raised commodities are included in this definition. This definition thus includes products such as French fries and wine, but excludes commercial bakeries and soft drink manufacturers.

Covered employment refers to all employees working in a firm and protected by the unemployment insurance system. Covered employment includes all employment except self-employed workers, unpaid family workers, workers in certain not-for-profit organizations, and several other small (primarily seasonal) worker categories. Roughly 90% of workers in Washington are classified as covered employment, though this percentage varies by industry sector.

Farm proprietor is defined according to the U.S. Bureau of Economic Analysis as an establishment that produces, or normally would be expected to produce, at least \$1,000 worth of farm products—crops and livestock—in a typical year and does not employ additional workers (excluding the labor of non-paid family members). Many small family farms and ranches are classified as farm proprietors. Farm proprietor employment includes both family members working on a family farm and business partners.

Farm and ranch operations estimates are collected by the National Agricultural Statistics Service, a program under the U.S. Department of Agriculture (USDA).

Operations refer to the business address of an operator. For example, if a farm proprietor has farms across three land parcels, one operator is counted, not three. Farm establishments represent operations with employees on payroll, also referred to as covered employment. Most farm operations in Washington are proprietorships, not business establishments.

1.4 Organization of Report

The report is organized into chapters, as follows:

- **Agriculture and Food Processing Profile.** A description of the Agriculture and Food Processing cluster, including a cluster map graphically articulating the diversity and breadth of industry connections across the state economy.
- **Supply Chain and Production Costs Analysis.** A discussion of the Agriculture and Food Processing supply chain, including visualization of activities and estimation of costs throughout the supply chain.
- **Agriculture and Food Processing by County.**
- **Economic and Fiscal Impacts.** Estimates of the total jobs, labor income, business revenues, and tax payments to the state associated with Agriculture and Food Processing activities.
- **Review of Select Tax Incentives.** Discussion of relative importance of existing Washington State tax incentives to the Agriculture and Food Processing cluster, including interview findings.
- **Sensitivity Analysis.** An assessment of the relative impacts of select existing state tax incentives on the vitality of farming activities in Washington.
- **Competitiveness Analysis.** A discussion of the relative competitiveness of Washington for food processors compared with other states and provinces, and the impact a decline in food processing could have on local farmers.
- **Summary and Conclusions.** An interpretation of the overall significance of the cluster and implications for the future of the industry.

In addition, the report includes inset boxes, or vignettes, that present topics important to this study or illustrative of key concerns but may not fit neatly into the chapter outlines. The vignettes draw from data analysis found throughout the report, as well as stakeholder interviews and research.

2.0 AGRICULTURE AND FOOD PROCESSING PROFILE IN WASHINGTON STATE

In this analysis, the Agriculture and Food Processing cluster refers to activities related to the production, processing, and distribution of Washington State-sourced commodities and derived products. Based on this definition, all Agriculture activities are included, but only Food Processing activities that involve the processing of commodities produced in Washington State. This definition therefore includes such commodity processing activities as wine, French fries, and frozen vegetables, but excludes commercial bakeries, soft drink manufacturing, and other forms of processing that do not utilize Washington-sourced agriculture commodities.

2.1 Agriculture and Food Processing Subsectors

This report breaks out subsectors of Agriculture and Food Processing as follows:

- **Crop Production and Animal Production.** This segment of the supply chain refers to the growing and raising of crop and animal-based commodities, such as wheat, grapes, beef, and milk. The North American Industry Classification Systems (NAICS) codes associated with these activities are 111 (Crop Production) and 112 (Animal Production). Farms and ranches are the primary economic units in this grouping, though size for each can vary from small family farms to much larger operations. As discussed shortly, the employment footprint of these crops and livestock goods varies according to the labor required to harvest each. Apples and cherries, for instance, require much greater labor per unit of volume compared with wheat, which is more mechanized.
- **Agriculture Support Services.** These activities include horticulture services, contract machine harvesting, soil preparation, management services, storing, grading, cleaning, and packing crops, as well as cooperatives that provide these activities plus marketing and export assistance (e.g., Chelan Fruit and its subsidiary, Chelan Fresh Marketing). NAICS codes associated with these activities include 1151 (Support Activities for Crop Production) and 1152 (Support Activities for Animal Production). Added in this group are wholesalers and retailers specializing in farm supplies, such as seed and equipment (NAICS code 424910).
- **Food Processing.** These activities include the production of intermediate goods, also referred to as ingredient goods, and consumer packaged goods (CPGs) that are sold for direct household purchase. Processing of raw commodity goods can range from packaging, labeling, and shellfish preparation (e.g., shucking and canning) to the production of wine, beer, and French fries. The location of many food processing activities has traditionally been a function of commodity weight and associated shipping costs—commodities that undergo significant transformation, with much of its weight shed during the manufacturing process, are often processed close to the commodity origin so as to mitigate these costs. There thus exists a strong geographic relationship between many farm and livestock commodities and the processing of these items. As discussed later in this report, Food Processing activities are also active sources of technological and process innovation in Washington.

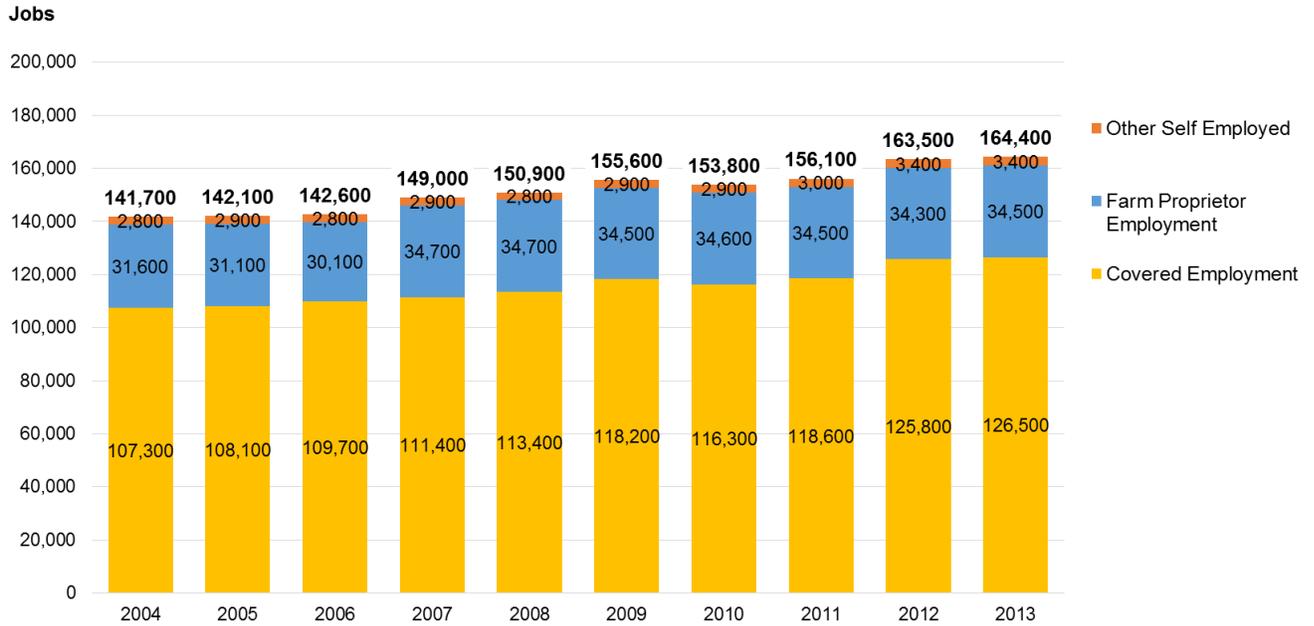
- **Wholesale & Distribution.** Final products, either as processed food and beverages or as packaged commodities (e.g., apples), then need to be warehoused and either sold domestically or exported. Activities include warehousing and storage, wholesaling, markets for final agriculture and farm-raised seafood products, and inland water freight transportation (NAICS code 483211), the latter representing the barge transport of agricultural commodities down the Columbia to regional and international seaports for shipment to foreign markets.

A full list of all industry codes used in this study for data analysis is provided in **Appendix A**.

2.2 Employment

In 2013, an estimated 164,400 jobs were directly tied to Agriculture and Food Processing activities (**Exhibit 2.1**). Of this, the majority (125,100) were covered jobs with employers. Self-employed workers constituted 37,800 jobs, of which 34,500 were farm proprietors. Between 2004 and 2013, the cluster added in net 22,400 jobs, representing a compound annual growth rate (CAGR) of 1.6%.

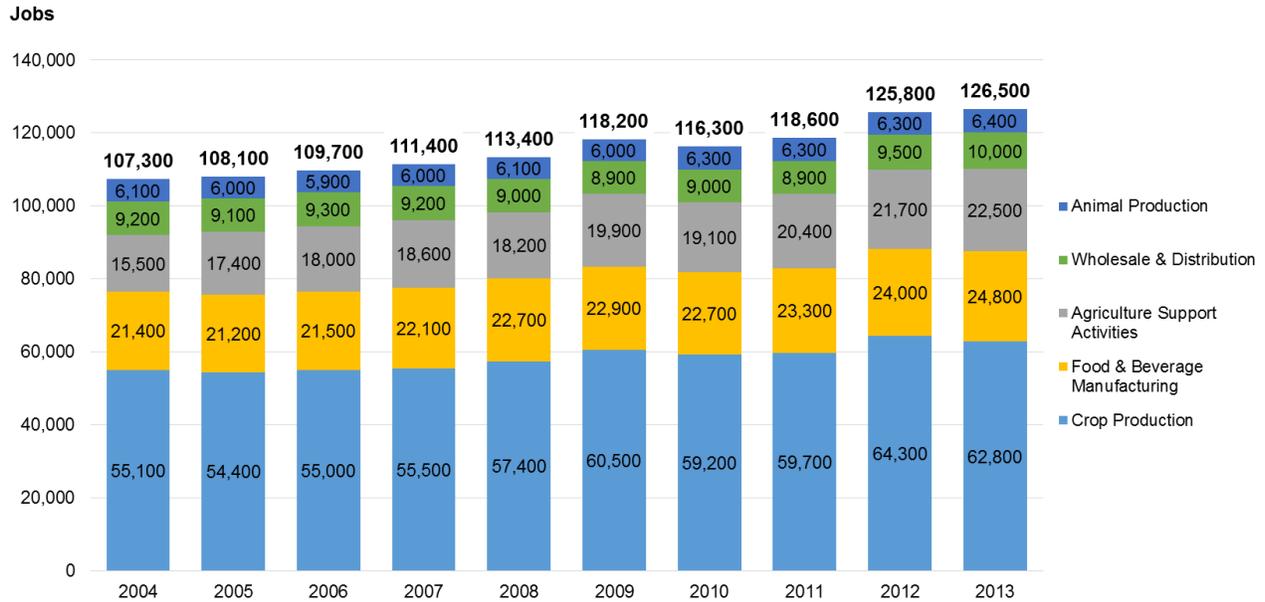
Exhibit 2.1. Agriculture and Food Processing Employment, Washington State, 2004-2013 (est.)



Sources: Sources: U.S. Bureau of Labor Statistics, 2014; U.S. Department of Agriculture, 2014; U.S. Census Bureau, 2014; Community Attributes Inc., 2014.

The Crop Production segment of the cluster employed 62,800 workers in 2013 (**Exhibit 2.2**); along with Animal Production and farm proprietors, primary activities in 2013 totaled 103,700 workers. Agriculture Support Activities employed 22,500 workers, followed by Food Processing with 24,800 workers in 2013.

Exhibit 2.2. Employment by Segment, Washington State, 2004-2013



Sources: Sources: U.S. Bureau of Labor Statistics, 2014; U.S. Department of Agriculture, 2014; U.S. Census Bureau, 2014; Community Attributes Inc., 2014.

The largest group of employees engaged in Crop Production and Animal Production activities in 2013 was crop, nursery, and greenhouse laborers at more than 51,000 jobs. The next-largest category, farm and ranch workers, employed more than 5,000 workers. The remaining major occupations by employment comprise agricultural equipment operators (4,250), first-line supervisors of farming workers (2,390), and packers (950).

Crop Production

The largest activity by employment within Crop Production and Animal Production in 2013 was apple orchards, with 25,260 workers (**Exhibit 2.3**). Other fruit farming employed 13,150 workers, followed by all other miscellaneous crop farming (5,210) and grape vineyards (3,480), the latter owing to the continued growth of the winery industry in Washington. Between 2009 and 2013, Crop Production grew at a compound annual growth rate of 0.9%.

Exhibit 2.3. Top Crop Production Activities by Employment, Washington State, 2013

Rank Activity	2009	2013	CAGR, 2009-2013
1 Apple orchards	23,850	25,260	1.4%
2 Other fruit farming	13,760	13,150	-1.1%
3 All other miscellaneous crop farming	4,990	5,210	1.1%
4 Grape vineyards	3,100	3,480	2.9%
5 Other vegetable and melon farming	2,720	3,260	4.6%
6 Nursery and tree production	3,110	2,840	-2.2%
7 Berry, except strawberry, farming	2,300	2,460	1.7%
8 Potato farming	1,450	1,610	2.7%
9 Wheat farming	1,520	1,580	1.0%
10 Floriculture production	1,410	1,310	-1.8%
All Crop Production Activities	60,510	62,840	0.9%

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Animal Production

The largest single activity within the Animal Production segment has been dairy cattle and milk production, with 3,650 hired workers in 2013 (**Exhibit 2.4**).

Exhibit 2.4. Top Animal Production Activities by Employment, Washington State, 2013

Rank Activity	2009	2013	CAGR, 2009-2013
1 Dairy cattle and milk production	3,300	3,650	2.6%
2 Shellfish farming	630	660	1.2%
3 Beef cattle ranching and farming	510	590	3.7%
4 Chicken egg production	510	540	1.4%
5 Cattle feedlots	460	380	-4.7%
6 Finfish farming and fish hatcheries	140	170	5.0%
7 Horses and other equine production	160	120	-6.9%
8 Apiculture	50	90	15.8%
9 All other animal production	80	60	-6.9%
10 Fur-bearing animal and rabbit production	30	40	7.5%
All Crop Production Activities	5,900	6,300	1.7%

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Agriculture Support Activities

The eight activities that collectively constitute Agriculture Support Activities summed to 22,460 workers in 2013. The largest category was other post-harvest crop activities, a category that covers activities related to the preparation of harvested crops for either food processing or final sale (**Exhibit 2.5**). Specific activities include crop cleaning, sun drying, shelling, curing, soil preparation, sorting, grading, packing, and cooling. This segment of the supply chain has seen year-over-year increases in employment for three straight years, growing at a compound annual rate of 5.5%. Since 2009, these services in aggregate have grown at a rate of 3.1% per year.

Exhibit 2.5. Agriculture Support Services Employment, Washington State, 2013

Rank Activity	2009	2013	CAGR, 2009-2013
1 Other postharvest crop activities	13,040	14,340	2.4%
2 Farm supplies merchant wholesalers	3,190	3,340	1.2%
3 Farm labor contractors and crew leaders	1,750	2,760	12.1%
4 Farm management services	620	560	-2.5%
5 Soil preparation, planting, and cultivating	370	520	8.9%
6 Support activities for animal production	490	450	-2.1%
7 Farm product warehousing and storage	300	400	7.5%
8 Crop harvesting, primarily by machine	110	90	-4.9%
Total	19,870	22,460	3.1%

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Examples of firms engaged in support activities include Stemilt Growers, headquartered in Chelan County, and Skagit Farmers Supply (**Exhibit 2.6**).

Exhibit 2.6. Examples of Agriculture Support Activities by Company, Washington State, 2014

Company Name	County	Location Type	Total Employees	NAICS Code	Description
Stemilt Growers, LLC	Chelan County	HQ	1,600	115114	Other postharvest crop activities
Crunch Pak, LLC	Chelan County	Single Location	700	115114	Other postharvest crop activities
Trout-Blue Chelan-Magi, Inc.	Chelan County	HQ	675	115114	Other postharvest crop activities
Custom Apple Packers, Inc.	Okanogan County	HQ	350	115114	Other postharvest crop activities
Skagit Farmers Supply	Skagit County	HQ	300	424910	Farm supplies merchant wholesalers
Stemilt Management, Inc.	Chelan County	HQ	290	115116	Farm management services
Tidewater Barge Lines, Inc.	Clark County	HQ	258	483211	Inland water freight transportation
Northwest Tart Cherries Inc	Franklin County	Single Location	250	115114	Other postharvest crop activities
Anderson Hay & Grain Co., Inc.	Kittitas County	HQ	250	424910	Farm supplies merchant wholesalers
E. W. Brandt & Sons, Inc.	Yakima County	HQ	250	115114	Other postharvest crop activities
Chiawana, Inc.	Yakima County	Single Location	200	115114	Other postharvest crop activities
Eakin Fruit Company	Yakima County	Single Location	200	115114	Other postharvest crop activities
Conrad & Adams Fruit, LLC	Yakima County	Single Location	200	115114	Other postharvest crop activities
Larson Fruit Company	Yakima County	Single Location	170	115114	Other postharvest crop activities
Highland Fruit Growers Inc	Yakima County	Single Location	150	115114	Other postharvest crop activities
Roche Fruit Co., Inc.	Yakima County	Single Location	150	115114	Other postharvest crop activities
Washington Fruit	Yakima County	Single Location	150	115114	Other postharvest crop activities
Townline Growers, Inc.	Whatcom County	Single Location	150	115112	Soil preparation, planting, and cultivating

Sources: Hoover's Business Data, 2014; Community Attributes Inc., 2014.

Food Processing

The largest subsectors by employment in Food Processing in 2013 were frozen fruit and vegetable manufacturing (6,030), fruit and vegetable canning and drying (3,240), followed by wineries (2,820; **Exhibit 2.7**). As discussed above, employment presented here represents covered workers. In some industries, such as wine production, businesses are family-run with no additional workers under payroll, and are thus not captured under covered employment estimates. Between 2009 and 2013, employment in this segment grew at an annual compound rate of 2.0%, with the largest growth over this period occurring among breweries (12.5%) and wineries (8.4%).

Exhibit 2.7. Top Food Processing Activities by Covered Employment, Washington State, 2013 (est.)

Rank Activity	CAGR,		
	2009	2013	2009-2013
1 Frozen fruit and vegetable manufacturing	5,980	6,030	0.2%
2 Fruit and vegetable canning and drying	3,830	3,240	-4.1%
3 Wineries	2,040	2,820	8.4%
4 Animal, except poultry, slaughtering	2,540	2,700	1.5%
5 Frozen specialty food manufacturing	1,210	1,590	7.1%
6 Coffee and tea manufacturing	1,070	1,400	7.0%
7 Dairy product, except frozen, manufacturing	1,100	1,210	2.4%
8 Poultry processing	1,090	1,190	2.2%
9 Breweries	650	1,040	12.5%
10 Meat processed from carcasses	1,040	990	-1.2%
All Food & Beverage Processing	22,960	24,840	2.0%

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

*Note: see **Appendix C** for an explanation of coffee and tea manufacturing.

Food Processing Innovation

Conversations with food processors revealed the importance of constantly innovating not only to improve food quality and safety but also to reduce costs and increase efficiency. Some have found innovative methods of using waste produced during processing. Others are exploring less energy intensive processes that extend the shelf life of processed foods, such as high pressure processing (HPP). Typically, these foods would be subject to thermal processing like pasteurization that use heat to kill bacteria. Though effective, heat can degrade food quality and reduce its nutritional value. HPP, proven to be equally effective as thermal processing, can be conducted at room or refrigerated temperatures.

Another innovative approach involves the commercial application of microwave technology to make packaged foods safer. Funding from the USDA's National Institute of Food and Agriculture has supported Washington State University and its partners in creating a microwave-assisted pasteurization process, which is more efficient than traditional processes and provides higher-quality products that can, in some cases, be refrigerated instead of frozen, making them more appealing to consumers and less

expensive to ship for processors. Both of these technologies can help companies comply with the FDA's 2011 Food Safety Modernization Act, which requires food processors to implement measures to prevent contamination.

Processors and distributors have developed strategies to increase efficiency and competitiveness by sharing capital investments. One regional example is NORPAC, a vegetable processor in Salem, Oregon. Instead of continuing the standard practice of trucking its packaged products to a cold storage facility and then shipping them to consumers, the company built a storage and distribution facility right next door to its processing plant, eliminating a significant step in the shipping process. This center is operated by its warehousing and distribution partner, Henningsen Cold Storage Co.

Technological innovation has also substantially changed fruit packing houses. They now use equipment like optical scanners to capture an image of the entire apple's surface area and near infrared imaging technology to detect internal defects. Much of this is driven by consumer demand worldwide for nearly perfect products. One consequence is that fruit that may have been deemed fit only for juice or sauce is now considered suitable for a wider range of value-added processing. New technology does present some challenges for processors; according to one processor, "new technology and equipment allows packers to designate new grades, which has resulted in [my company] receiving poorer quality products and causes problems because our equipment is designed to handle peeler quality only, nothing less." However, this new technology now allows the grading of fruit, allowing fruits which may have been deemed unusable to be used for more value added products.

Simplot, a large potato processor, has found creative ways to reuse its waste products, helping to diminish negative environmental impacts of processing activities as well as energy costs. At their Moses Lake plant, an anaerobic digester converts potato waste into biogas, which is then burned in the plant's boiler. The company also purchases waste hydrogen from Eka Chemical, located across the street, to reduce its reliance on more expensive natural gas. The plant's treated wastewater is used to irrigate a nearby alfalfa field, providing the grower with substantial cost savings. Additionally, Simplot uses potato starch recovered from process water in a polymerization process for paper manufacturing.²

²http://www.simplot.com/sustainability/story_detail/moses_lake_plant_honored_for_environmental_excellence

Wholesale & Distribution

Wholesale & Distribution involves the shipment and sale of grains, other raw commodities, and finished products, as well as the retail of these goods at local markets. Companies represented in this segment of the cluster include Tri-Cities Grain, a wheat grain consolidator and wholesaler along the Columbia River. Wholesaling constituted the largest type of activity within this grouping by employment (**Exhibit 2.8**). Among wholesalers, the largest employment in 2013 was within fruit and vegetable merchant wholesalers (5,260 workers; 4.2% annual growth between 2009 and 2013).

Exhibit 2.8. Wholesale & Distribution Activities Employment, Washington State, 2013

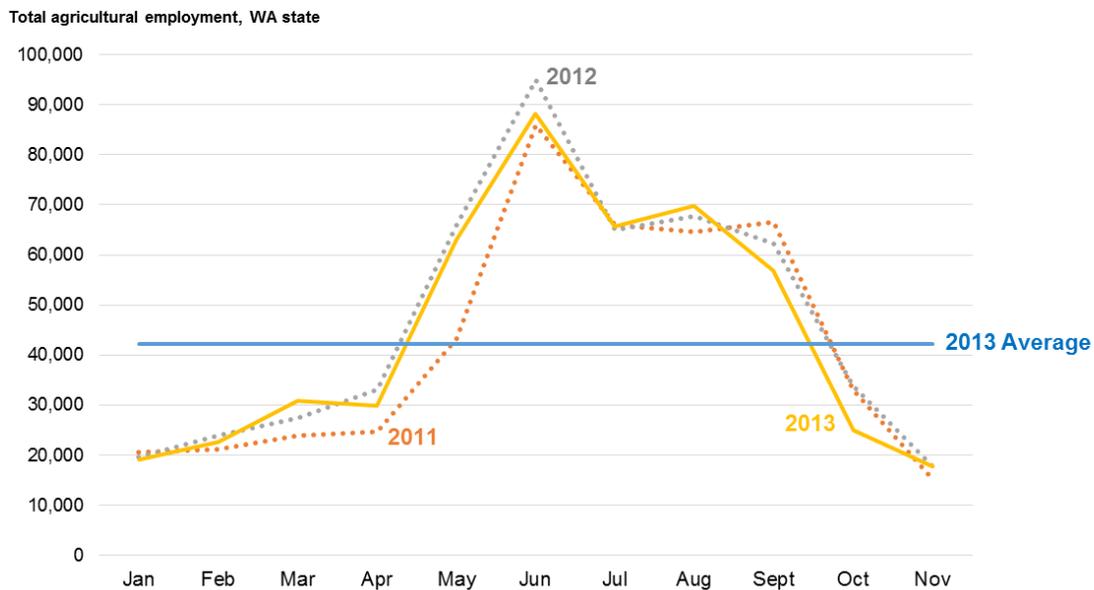
Rank Activity	2009	2013	CAGR, 2009-2013
1 Fruit and vegetable merchant wholesalers	4,470	5,260	4.2%
2 Fruit and vegetable markets	950	1,280	7.7%
3 Nursery and florist merchant wholesalers	940	880	-1.6%
4 Meat and meat product merchant wholesalers	690	680	-0.4%
5 Grain and field bean merchant wholesalers	580	640	2.5%
6 Inland water freight transportation	340	310	-2.3%
7 Other farm product raw material merch. whls.	120	140	3.9%
8 Livestock merchant wholesalers	150	140	-1.7%
Total	8,240	9,330	3.2%

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Seasonal Agriculture Employment

The data presented in this study reflect annual averages. However, a great many additional workers—and families—are directly engaged in the agriculture industry during certain parts of the year, especially during harvesting season. Farm owners typically have a full time staff to engage in planting and upkeep year-round and hire additional staff late in the summer for the harvest. With this in mind, average employment over the course of a year does not tell the full story of employment in agriculture. **Exhibit 2.9** below displays the full range of seasonal employment in Washington’s agriculture sector. In 2013, employment rose dramatically during the summer months and stayed high through September before dropping steadily to yearly lows during the winter, a season with very little work for farm owners to complete compared to harvest season.

Exhibit 2.9. Seasonal Agriculture Employment, Washington State, 2013

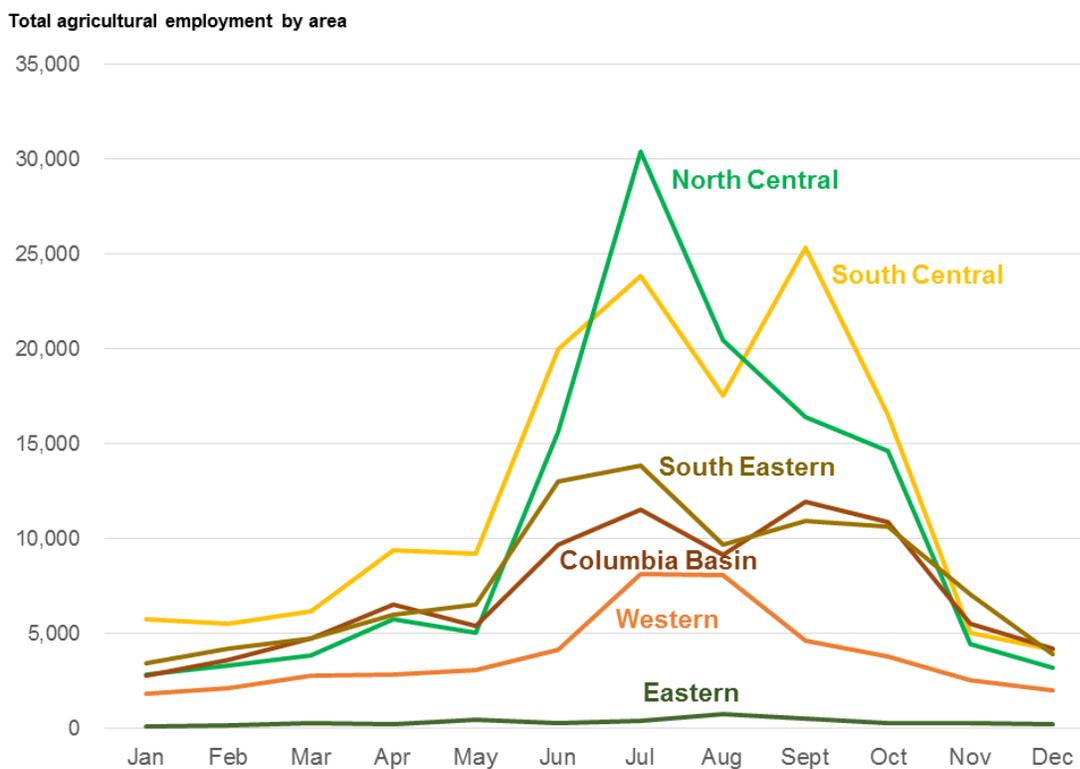


Sources: Washington State Employment Security Department, 2014; Community Attributes Inc., 2014.

Exhibit 2.10 below breaks out seasonal employment in Washington by general area. Seasonal employment in agriculture increased the most rapidly in North Central Washington, a region that includes (apple and cherry orchards), and remained the flattest in Eastern Washington, a region that includes (wheat and cattle). The chief crops in North Central Washington are apple orchards, which rely heavily on a seasonal workforce capable of harvesting the large production in the region.

Harvest employment is critical to the economic contributions of agriculture. Once the first hard freeze occurs in the autumn, any unharvested crop is destroyed and the economic opportunity associated with those crops is lost.

Exhibit 2.10. Seasonal Employment in Agriculture by Area, Washington State, 2013



Sources: Washington State Employment Security Department, 2014; Community Attributes Inc., 2014.

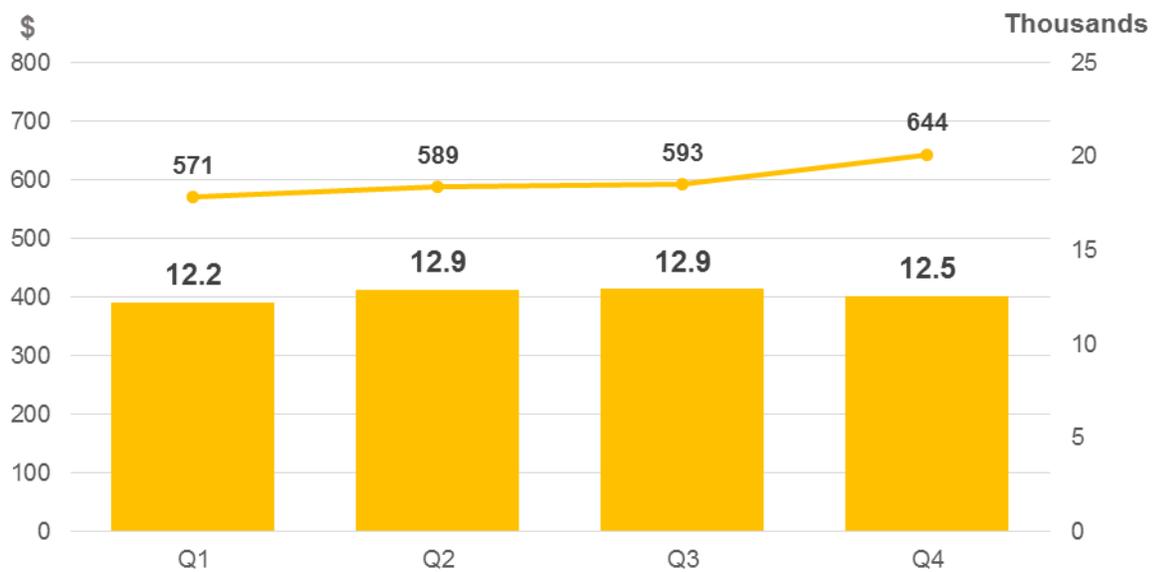
Seasonal employment represents, largely, individuals employed to harvest crop during the late summer and fall months. Any unharvested crop at the end of the season is essentially unrealized income for the farm owner; an apple left hanging on a tree is one less apple to be sold. For crops with a tight harvest window, seasonal labor shortages can have a dramatic impact on the harvest.

Hop farmers in Washington—a sector accounting for over three quarters of the nation’s hop production—as well as apple farmers have been having trouble with a shortage of seasonal workers. For one hops grower, harvesting truck drivers switching farms mid-

harvest resulted in a harvest that took four days, or roughly 10%, longer than it should have.³

For seasonal employees in Crop Production and Animal Production, weekly wages during 2013 Q4, which covers the bulk of harvest season, are 22% and 13% higher, respectively, than Q1 wages in the same year. At the same time, Crop Production employment was 52% higher in 2013 Q4 than it was in Q1, while Animal Production employment was 16% higher. **Exhibits 2.11** and **2.12** below displays the changes in employment and weekly wages for Animal Production and Crop Production, respectively, for 2013 Q1-Q4.

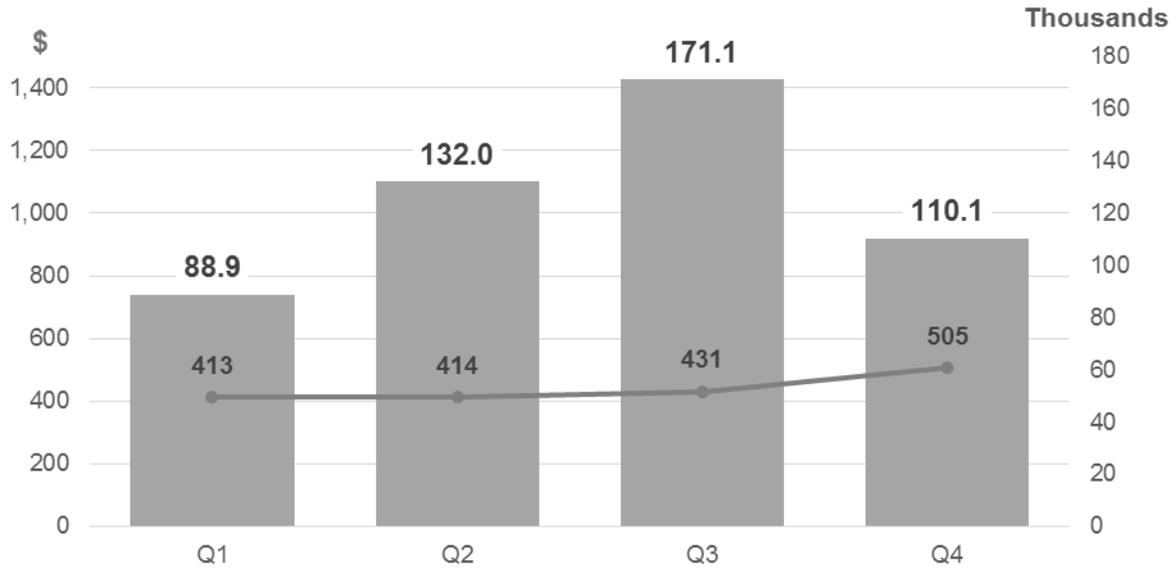
Exhibit 2.11. Animal Production Quarterly Employment and Weekly Wages, Washington State, 2013



Source: Bureau of Labor Statistics, 2014. Community Attributes Inc., 2014.

³ Associated Press. (2014, September 29). Washington's Breweries have Hop Farmers Racing to Meet Demand. Seattle, Washington, US.

Exhibit 2.12. Crop Production Quarterly Employment and Weekly Wages, Washington State, 2013



Source: Bureau of Labor Statistics, 2014. Community Attributes Inc., 2014.

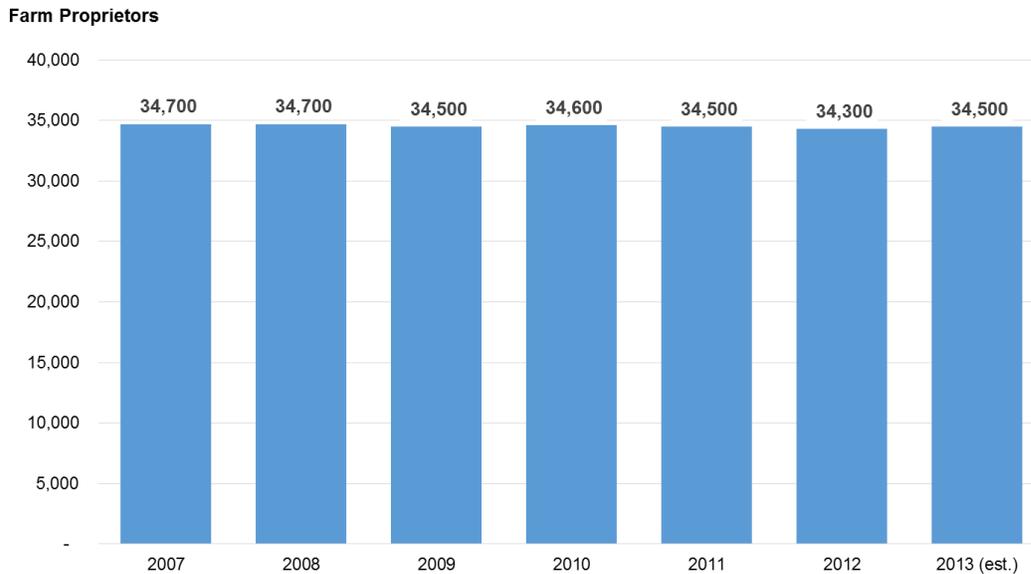
Non-Employers and Farm Proprietors

A large share of the Agriculture and Food Processing supply chain workforce are self-employed workers. This category includes farm proprietors, such as family farms, and workers who are self-employed either as registered individual proprietorships or single-worker corporations, or as a belonging to a partnership establishment.

Farm proprietorships are an important segment of the agricultural workforce. Several of the farmers interviewed in this study were sole proprietors operating multi-generational farms first established as homesteads or shortly after the completion of the Grand Coulee Dam and development of the Columbia River Basin Irrigation Project in the 1950s.

In 2013, there were an estimated 34,500 such proprietorships in Washington, constituting the vast majority of Washington's farm operations (**Exhibit 2.13**). These totals represent self-employed individuals and partnerships, and thus exclude corporate farming operations.

Exhibit 2.13. Farm Proprietors Employment, Washington State, 2007-2013 (est.)



Sources: U.S. Bureau of Economic Analysis, 2014; U.S. Census Bureau, 2014; Community Attributes Inc., 2014.

Self-employment is also important in other segments of the supply chain. An estimated 3,360 individuals were associated with non-employer establishments in 2013, covering both individual proprietorships, non-employing corporations and partnerships (**Exhibit 2.14**). The largest industry for supply chain-related employment was support activities for crop production, with an estimated 990 workers in 2013, followed by specialty food stores (940 workers).

Exhibit 2.14. Non-Employer Establishments and Associated Workers by Industry, Washington State, 2013

Description	Category	Associated Workers
Support activities for crop production	Agriculture Support Activities	990
Support activities for animal production	Agriculture Support Activities	940
Grocery and related product merchant wholesalers	Wholesale & Distribution	610
Other food manufacturing	Food and Beverage Manufacturing	350
Warehousing and storage	Wholesale & Distribution	140
Fruit and vegetable preserving and specialty food manufacturing	Food and Beverage Manufacturing	120
Farm product raw material merchant wholesalers	Wholesale & Distribution	110
Seafood product preparation and packaging	Food and Beverage Manufacturing	40
Animal slaughtering and processing	Food and Beverage Manufacturing	40
Dairy product manufacturing	Food and Beverage Manufacturing	20
Total		3,360

Sources: U.S. Census Bureau, 2014; Community Attributes, Inc., 2014.

2.3 Wages

Total agricultural wages include both payroll-based wage and salary disbursements for hired agriculture labor and farm proprietor income. In agriculture, a large share of farmer income is accrued as proprietor income; in many cases, farm proprietors do not pay themselves a monthly salary, with income reflecting end-of-year net profits from farming activities. This is much less the case with other segments of the cluster, which have much lower percentages of economic activity generated by proprietors and non-employer establishments.

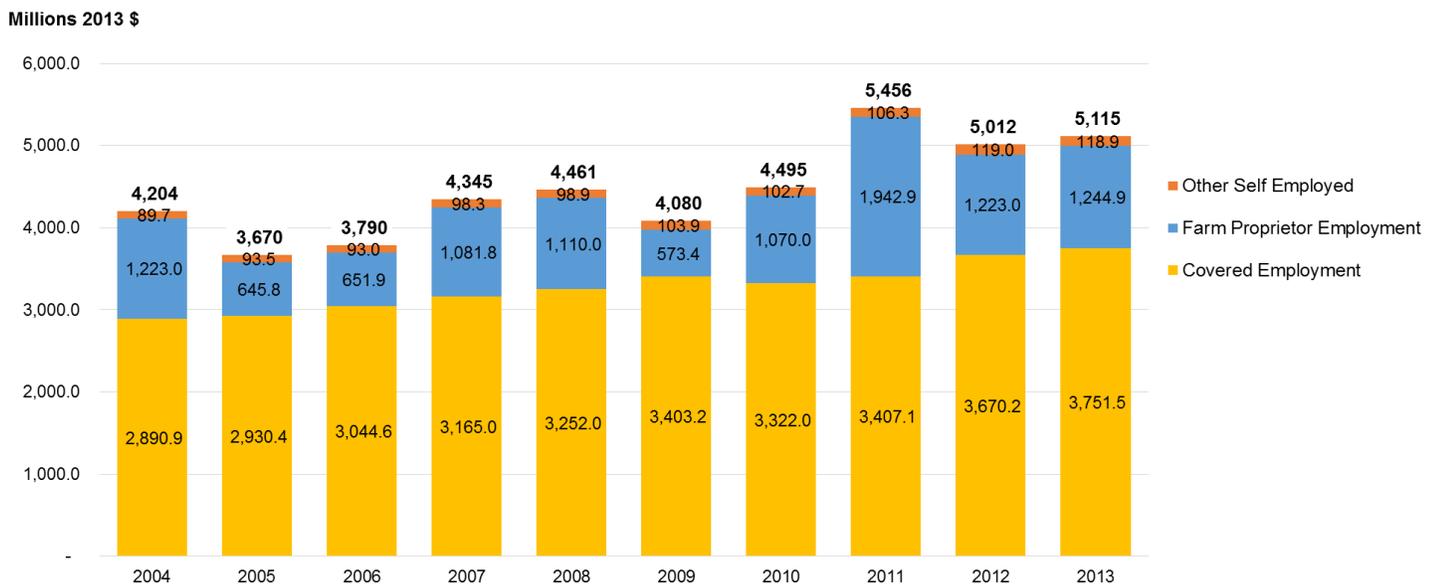
In 2013, Agriculture and Food Processing income summed to \$5.0 billion (**Exhibit 2.15**). The largest share of income was paid among hired workers in the form of labor income, summing to nearly \$3.7 billion. Of this amount, the majority were in Crop Production activities (\$1.4 billion), followed by Food Processing (\$985.9 million). Among the self-employed, farm proprietors earned more than \$1.2 billion in income in 2013, or about \$36,100 per farm proprietor. Adjusted for inflation, total income peaked in 2011 at nearly \$5.4 billion, before declining 8.2% in 2012 and then growing almost 2.2% year-over-year in 2013 (**Exhibit 2.16**).

**Exhibit 2.15. Agriculture and Food Processing Income (less benefits),
Washington State, 2004-2013 (millions, 2013\$)**

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Crop Production	1,074.9	1,066.2	1,104.7	1,160.2	1,216.7	1,284.5	1,244.5	1,285.4	1,431.4	1,435.4
Animal Production	173.3	170.7	169.1	175.4	184.8	185.2	194.5	191.4	194.6	199.5
Agriculture Support Activities	445.2	487.3	524.0	544.0	547.4	602.9	568.4	601.0	667.2	691.1
Food and Beverage Manufacturing	809.6	814.4	846.6	875.1	902.4	922.5	906.9	917.7	943.7	985.9
Wholesale & Distribution	310.6	314.2	320.0	326.4	323.7	332.8	329.0	335.4	359.2	370.1
Subtotal, Covered Jobs	2,813.7	2,852.8	2,964.5	3,081.1	3,174.9	3,327.8	3,243.3	3,330.9	3,596.1	3,682.0
Farm Proprietors	1,223.0	645.8	651.9	1,081.8	1,110.0	573.4	1,070.0	1,942.9	1,223.0	1,244.9
Other Self-Employed	83.9	87.2	87.1	91.8	92.6	97.5	95.9	99.7	112.8	113.3
Subtotal, self-employed	1,306.9	733.0	739.0	1,173.5	1,202.6	670.9	1,165.9	2,042.7	1,335.8	1,358.2
Total Income	4,121	3,586	3,703	4,255	4,378	3,999	4,409	5,374	4,932	5,040

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

**Exhibit 2.16. Agriculture and Food Processing Income (less benefits),
Washington State, 2004-2013 (millions, 2013\$)**



Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Average wages followed a similar pattern, peaking in 2011 before declining by more than \$4,000 per job in 2012 before rebounding slightly in 2013 to roughly \$31,100 (**Exhibit 2.17**).

Exhibit 2.17. Average Wages per Segment, Washington State, 2004-2013 (2013\$)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Crop Production	19,687	19,782	20,270	21,094	21,382	21,408	21,236	21,750	22,471	23,077
Animal Production	28,416	28,446	28,668	29,235	30,293	31,396	31,363	30,382	31,393	31,667
Agriculture Support Activities	28,724	28,003	29,111	29,249	30,075	30,297	29,760	29,463	30,746	30,716
Food and Beverage Manufacturing	37,833	38,416	39,378	39,598	39,753	40,107	39,954	39,385	39,320	39,754
Wholesale & Distribution	38,399	39,186	39,229	40,617	40,897	42,509	42,035	42,427	42,065	40,703
<i>Subtotal, Covered Jobs</i>	<i>26,842</i>	<i>27,009</i>	<i>27,653</i>	<i>28,309</i>	<i>28,601</i>	<i>28,743</i>	<i>28,564</i>	<i>28,679</i>	<i>29,152</i>	<i>29,633</i>
Farm Proprietors	38,702	20,766	21,656	31,175	31,987	16,621	30,925	56,317	35,656	36,084
Other Self-Employed	32,045	32,229	33,231	33,896	35,305	35,832	35,414	35,449	34,986	34,963
<i>Subtotal, self-employed</i>	<i>38,160</i>	<i>21,743</i>	<i>22,642</i>	<i>31,384</i>	<i>32,235</i>	<i>18,111</i>	<i>31,272</i>	<i>54,648</i>	<i>35,595</i>	<i>35,983</i>
Total Income	29,582	25,752	26,500	29,083	29,503	26,191	29,224	34,910	30,636	31,096

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Crop Production

Among crop producer activities, the largest wage outlays were among apple orchards (\$533.0 million in outlays in 2013). This largely owes to more labor-intensive nature of apple orchards compared with other subsector within Crop Production; orchards employed more than one third of all hired workers in crop production in 2013. However, wages among orchards on an annualized basis were just \$21,000 a year, compared with \$35,200 among potato farming (**Exhibit 2.18**).

Exhibit 2.18 Largest Crop Production Subsectors by Wage Outlays, Growth and Average Wage, Washington State, 2009 & 2013 (mils 2013\$)

Rank	Description	2009 (mils \$)	2013 (mils \$)	CAGR, Avg Wage, 2009-2013	2013
1	Apple orchards	460.1	533.0	3.7%	21,100
2	Other fruit farming	237.9	249.8	1.2%	19,000
3	All other miscellaneous crop farming	143.2	155.3	2.0%	29,800
4	Other vegetable and melon farming	74.4	92.9	5.7%	28,500
5	Nursery and tree production	77.9	76.4	-0.5%	26,900
6	Grape vineyards	63.6	70.4	2.6%	20,200
7	Potato farming	51.2	56.7	2.6%	35,200
8	Berry, except strawberry, farming	45.4	52.9	3.9%	21,500
9	Wheat farming	38.1	43.3	3.2%	27,300
10	Hay farming	32.4	38.2	4.3%	29,800
	All Crop Production Activities	1,284.5	1,435.4	2.8%	22,800

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Animal Production

The average annual wage among hired workers in Animal Production was \$31,200 in 2013. Total wages summed to nearly \$200 million in outlays, of which 58% were among dairy activities (\$115 million) with an average annual wage of \$31,500. Controlled for inflation, total wages over the 2009 to 2013 period grew by 1.9% per year, based on a compound annual growth rate (**Exhibit 2.19**).

Exhibit 2.19. Largest Animal Production Subsectors by Wage Outlays, Growth and Average Wage, Washington State, 2009 & 2013 (mils 2013\$)

Rank	Description	2009 (mils \$)	2013 (mils \$)	CAGR, Avg Wage, 2009-2013	2013
1	Dairy cattle and milk production	103.5	115.0	2.7%	31,500
2	Shellfish farming	17.9	18.9	1.3%	28,700
3	Chicken egg production	16.9	17.1	0.3%	31,500
4	Beef cattle ranching and farming	12.8	15.1	4.3%	25,700
5	Cattle feedlots	16.2	14.7	-2.5%	39,000
6	Finfish farming and fish hatcheries	5.9	6.9	3.8%	41,200
7	Horses and other equine production	3.9	3.0	-5.9%	25,900
8	Apiculture	1.8	2.6	10.7%	31,000
9	Fur-bearing animal and rabbit production	0.8	2.0	25.0%	54,600
10	All other animal production	1.9	1.3	-9.5%	23,300
All Animal Production Activities		185.2	199.5	1.9%	31,200

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Food Processing

The largest share of wage outlays in the processing segment of the cluster in 2013 were in frozen fruit and vegetable manufacturing, a subsector that includes the many frozen potato products manufacturing in Eastern Washington. The overall average wage in Food Processing in 2013 was \$39,800 per worker (**Exhibit 2.20**). The highest average wages were among grain and oilseed milling (\$52,700), non-frozen dairy product manufacturing (\$51,500), and frozen specialty food manufacturers (\$50,400).

The skills required in Food Processing require more advanced training than in Crop Production and Animal Production, resulting in greater wage outlays as a share of total costs. For example, nearly 69% of all hired workers in Crop Production are employed as farmworkers and laborers, with a median annual wage of \$21,870. By comparison, among beverage manufacturers, the highest share of the workforce (11%) in 2013 were machine setters, operators, and tenders⁴ with an annual median salary of \$31,220.⁵

Exhibit 2.20. Largest Food Processing Subsectors by Wage Outlays, Growth and Average Wage, Washington State, 2009 & 2013 (mils 2013\$)

Rank	Description	2009 (mils \$)	2013 (mils \$)	CAGR, Avg Wage, 2009-2013	2013
1	Frozen fruit and vegetable manufacturing	237.8	247.7	1.0%	41,100
2	Fruit and vegetable canning and drying	154.5	136.3	-3.1%	42,100
3	Animal, except poultry, slaughtering	86.7	90.1	1.0%	33,400
4	Wineries	62.9	80.5	6.4%	28,500
5	Frozen specialty food manufacturing	58.9	80.0	7.9%	50,400
6	Dairy product, except frozen, manufacturing	66.8	62.4	-1.7%	51,500
7	Coffee and tea manufacturing	48.2	56.7	4.1%	40,400
8	Meat processed from carcasses	43.2	45.5	1.3%	45,900
9	Grain and oilseed milling	37.1	42.4	3.4%	52,700
10	Poultry processing	32.0	41.0	6.4%	34,500
	All Food Processing	922.5	985.9	1.7%	39,800

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

⁴ Full occupational title is “Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders.”

⁵ Sources: Washington State Employment Security Department, Occupation-Industry Matrix, 2014; U.S. Bureau of Labor Statistics, Occupational Employment Statistics, 2014.

Agriculture Support Activities

Total outlays for Agriculture Support Activities summed to \$691.1 million in 2013, a 3.5% compound annual increase over 2009. More than half of total wages paid out were within other postharvest crop activities, including crop cleaning, sun drying, soil preparation, curing, sorting, grading, packing, and cooling. The average wage within this segment of the cluster in 2013 was \$30,700 (**Exhibit 2.21**).

Exhibit 2.21. Largest Agriculture Support Activities by Wage Outlays, Growth and Average Wage, Washington State, 2009 & 2013 (mils 2013\$)

Rank	Description	2009 (mils \$)	2013 (mils \$)	CAGR, 2009-2013	Avg Wage, 2013
1	Other postharvest crop activities	351.7	396.3	3.0%	27,600
2	Farm supplies merchant wholesalers	161.3	177.3	2.4%	53,100
3	Farm labor contractors and crew leaders	33.1	52.3	12.2%	19,000
4	Farm product warehousing and storage	15.7	21.3	7.9%	53,300
5	Soil preparation, planting, and cultivating	12.6	15.2	4.8%	29,200
6	Farm management services	12.8	13.4	1.1%	24,000
7	Support activities for animal production	12.5	12.8	0.5%	28,200
8	Crop harvesting, primarily by machine	3.2	2.5	-5.6%	26,900
	All Agriculture Support Activities	602.9	691.1	3.5%	30,700

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Wholesale & Distribution

In 2013, total wages in this segment reached \$429.3 million, representing a 1.8% compound annual growth rate since 2009. Nearly half of all wages paid were within fruit and vegetable merchant wholesalers, owing to large share of fruit and vegetable production that goes unprocessed and sold as raw product to markets and distributors both within and outside Washington (e.g., apples).

The average wage among inland freight transportation workers was \$92,400 in 2013, due in large part to the advanced piloted skills and certifications needed for barge operations. The average wage for grain and field bean merchant wholesalers was second among this grouping, at \$68,100 per hired worker in 2013 (**Exhibit 2.22**).

Exhibit 2.22. Largest Wholesale & Distribution Activities by Wage Outlays, Growth and Average Wage, Washington State, 2009 & 2013 (mils 2013\$)

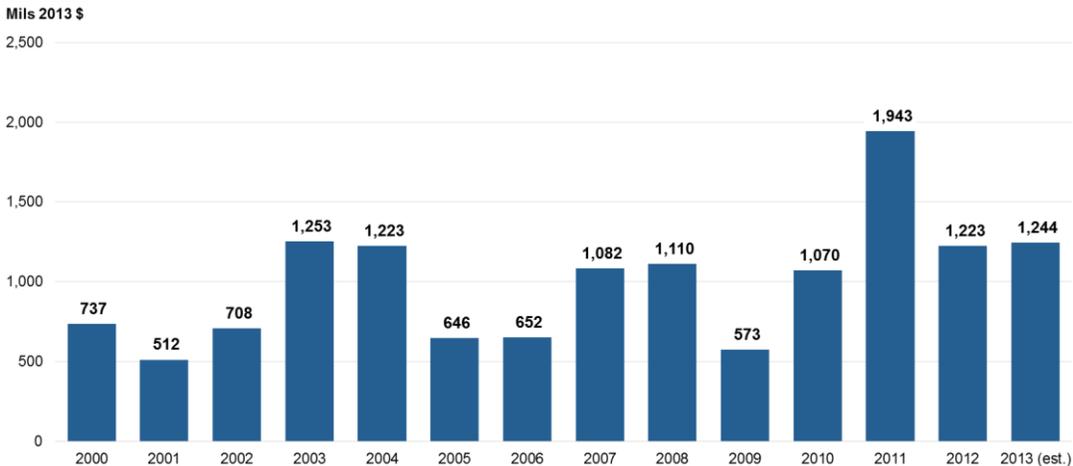
Rank	Description	2009 (mils \$)	2013 (mils \$)	CAGR, 2009-2013	Avg Wage, 2013
1	Fruit and vegetable merchant wholesalers	177.7	200.2	3.0%	38,100
2	Grain and field bean merchant wholesalers	37.6	43.8	3.9%	68,100
3	Dairy product merchant wholesalers	32.1	32.3	0.2%	50,100
4	Fruit and vegetable markets	23.7	32.0	7.7%	24,900
5	Meat and meat product merchant wholesalers	31.5	29.7	-1.5%	43,600
6	Inland water freight transportation	26.2	28.5	2.1%	92,400
7	Nursery and florist merchant wholesalers	27.6	25.7	-1.8%	29,200
8	Other farm product raw material merch. whls.	6.3	7.7	5.1%	54,100
9	Livestock merchant wholesalers	2.2	2.5	4.1%	18,300
All Wholesaling & Distribution Activities		362.7	399.9	2.5%	37,000

Sources: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Non-Employers and Farm Proprietors

As discussed above, farm proprietors constitute an important and large segment of the agriculture industry in Washington. Farm proprietors are often family farms, reporting no long-term hired employees or farm hands. In 2013, income accrued among farm proprietors totaled an estimated \$1.24 billion, though significantly down from a peak two years earlier of an inflation-adjusted \$1.93 billion (**Exhibit 2.23**).

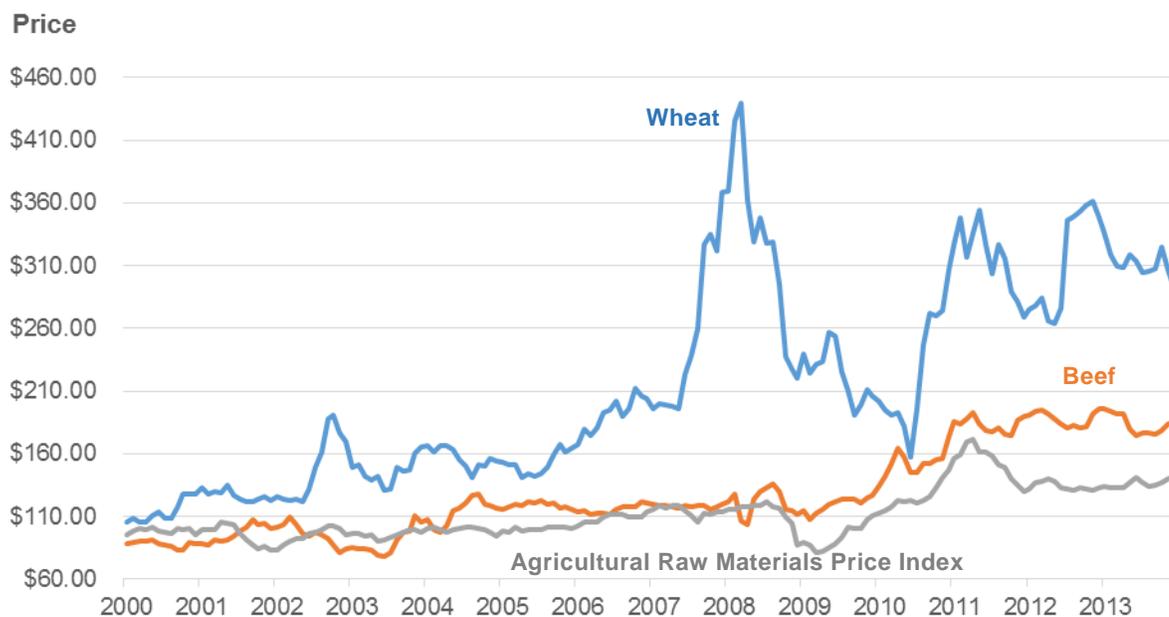
Exhibit 2.23. Farm Proprietors Gross Income, Washington State, 2000-2013 (millions)



Sources: U.S. Bureau of Economic Analysis, 2014; U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Farm proprietors do not typically pay themselves yearly wages, according to interviewees; income is instead based on remaining revenues after all farming expenses have been paid for. **Exhibit 2.24** below displays agricultural raw commodity prices from 2000 to 2013. The broad swings in commodity prices globally help explain the variability in farm proprietors' income over the same period. Wheat prices were particularly volatile from 2000 to 2013, with a minimum price of \$105.11 per ton in April of 2000 and a maximum price of \$439.72 per ton in March of 2008. Beef, on the other hand, remained closer to the International Monetary Fund's Agricultural Raw Materials Price Index.

Exhibit 2.24. Wheat and Beef Prices, Agricultural Raw Material Price Index, World, 2000-2013



Sources: International Monetary Fund, 2014; World Bank, 2014; Community Attributes Inc., 2014.

2.4 Farm Diversity

There are multiple ways of breaking out **farms by size**. While different crop types have different sales and acreage breakouts and each type of crop has a different distribution of operations by sales, it is efficacious for the purposes of this study to use the same yearly sales value breakouts across Washington’s Agriculture and Food Processing segments.

For sales data, NASS includes detailed breakouts for operations that receive less than \$250,000 in annual sales. The USDA calculates that, in 2013, a farm receiving less than \$172,800 in sales would not be able support an operator above the poverty line. This is the chief qualifier in determining if a farm is eligible for participation in the Limited Resource Farmer Program. For this reason, sales lower than \$250,000 (the closest NASS breakout that contains the USDA limit for poverty-equivalent sales) represent the smallest sales category in this study.

Based on interview feedback and NASS data, the following size breakouts will be used:

- Farms with less than \$250,000 in yearly sales.
- Farms with between \$250,000 and \$500,000 in yearly sales.
- Farms with between \$500,000 and \$1,000,000 in yearly sales.
- Farms with more than \$1,000,000 in yearly sales.

Legal farming entities are defined for tax purposes by cross-referencing multiple categories including whether or not a farm is a corporation; whether or not the farm is

family held, a partnership, or neither; whether or the farm is institutional, research, or a part of a reservation; and whether or not the farm owner is the primary operator. Taking the colloquial phrase “family farm” and attaching it to these definitions misrepresents the character and nature of these activities. For example, some farms that are owned and operated by a family are classified as a corporate farm, and vice versa.

Part time farm operations compose the bulk of total operations in Washington at 89.2% (**Exhibit 2.25**), while large farms account for only 1,586 of the 37,249 registered farming operations in the state.

Exhibit 2.25. Farms by Annual Sales, Washington State, 2012

Size	Sales	Number of Farms Share	
Part Time Farms	Less than \$250,000	33,228	89.2%
Small Farms	\$250,000-\$499,999	1,286	3.5%
Medium Farms	\$500,000-\$999,999	1,149	3.1%
Large Farms	\$1,000,000 or more	1,586	4.3%
Total	All	37,249	100%

Source: U.S. Department of Agriculture, 2013; Community Attributes Inc., 2014.

2.5 Business Revenues

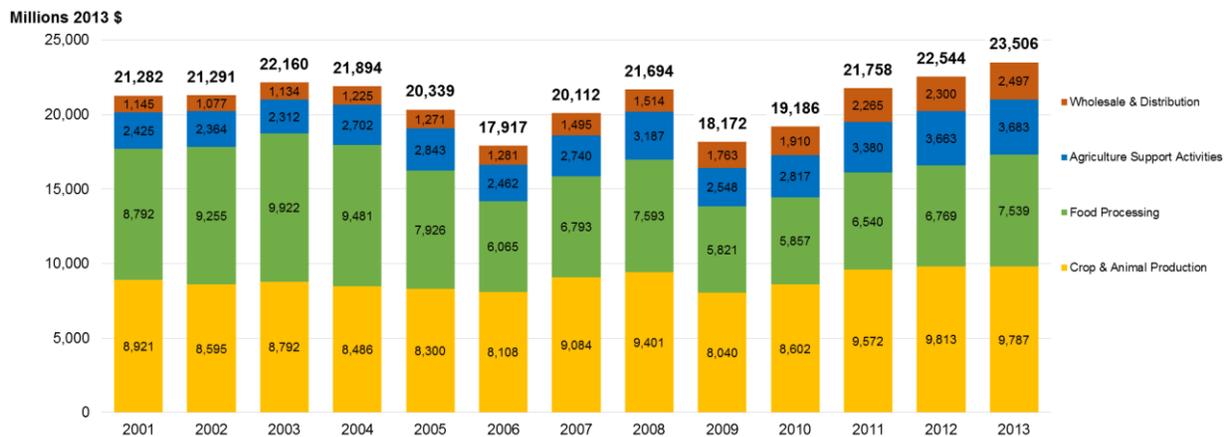
Business revenues data come from two sources. For agriculture output (including Crop Production and Animal Production), the primary source is the National Agriculture Statistics Service (NASS), a service of the U.S. Department of Agriculture, and the U.S. Bureau of Economic Analysis (BEA). Estimates are based on production value of agricultural output and cash receipts of marketing of agricultural products. For other activities, the primary source is the Washington State Department of Revenue’s reported gross business income (GBI) totals by industry, which represents gross receipts among non-agriculture activities.⁶

⁶ In Washington State, agriculture output that is wholesaled is exempt from the business and occupation (B&O) tax; no data is thus collected from these sales. The only agriculture GBI thus reported by the Department of Revenue are retail sales by farms, i.e., direct sales of agricultural output to households.

Overall, the Agriculture and Food Processing cluster in 2013 was directly responsible for \$23.5 billion in sales (**Exhibit 2.26**). Importantly, as discussed further below, a large share of these sales represent supply chain transactions. For example, a significant share of potato production from farms is sold to food processors, who then transform the raw product into processed food that is resold to larger corporations (e.g., restaurant chains, supermarkets) or distributors for export. The health and vitality of the food processing sector in Washington is thus critical to the success of many farmers across the state, particularly among potato and fruit and vegetable growers.

Of this \$23.5 billion in total revenues, an estimated \$9.8 billion was generated among Washington State farmers and ranchers. Of this, sales of crops totaled more than \$7.1 billion, followed by \$2.7 billion in livestock and animal products (e.g., milk). The wholesaling and distribution of agricultural output accounted for \$2.5 billion in sales, followed by \$7.1 billion in sales by Food Processing activities (**Exhibit 2.27**). Controlled for inflation, since 2009 sales within the cluster have increased by 31.5%, or 7.1% per year (CAGR).

Exhibit 2.26. Business Income, Washington State, 2001-2013 (millions 2013 \$)



Sources: U.S. Bureau of Economic Analysis, 2014; Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

Exhibit 2.27. Agriculture and Food Processing Cluster Revenues by Segment, Washington State, 2001-2013 (millions, 2013 \$)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Crop Production	5,735	5,809	6,177	5,759	5,520	5,782	6,240	6,865	5,981	6,162	6,797	7,189	7,121
Animal Production	3,186	2,787	2,616	2,728	2,780	2,327	2,844	2,536	2,059	2,440	2,775	2,624	2,666
Agriculture Support Activities	2,425	2,364	2,312	2,702	2,843	2,462	2,740	3,187	2,548	2,817	3,380	3,663	3,683
Food and Beverage Manufacturing	8,792	9,255	9,922	9,481	7,926	6,065	6,793	7,593	5,821	5,857	6,540	6,769	7,539
Wholesale & Distribution	1,145	1,077	1,134	1,225	1,271	1,281	1,495	1,514	1,763	1,910	2,265	2,300	2,497
Total	21,282	21,291	22,160	21,894	20,339	17,917	20,112	21,694	18,172	19,186	21,758	22,544	23,506

Sources: U.S. Bureau of Economic Analysis, 2014; Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

Apples constituted the largest commodity in Washington by sales in 2013, with output by production value equal to \$2.2 billion. Milk sales reached nearly \$1.3 billion, followed by sales of wheat at \$978.3 million and potatoes at \$787.2 million (**Exhibit 2.28**).

Among these commodities, sales are split between fresh pack sales (i.e., with no additional value-added other than packaging) and sales to processors. For example, more than 95% of all apples produced in Washington are sold as fresh pack, with remainder used for juice, cider, and other processed food and beverage production. For other Washington commodities, such as grapes, essentially all production is sold to processors, either for juice production (46.2% of grape tonnage, or 16% of all grape production by value) or for wine production (53.8% by tonnage, or 84% by production value). Other crops that tends towards processing over fresh pack include potatoes, hops, and most types of livestock⁷.

Many agriculture products are also highly exportable, thus serving as net importers of income into the state through sales. According to the Washington State Department of Agriculture⁸, in 2012, the state exported more than \$15.1 billion in food and agricultural products, of which \$8.8 billion were of Washington State origin.⁹ For example, in 2013 Washington exported \$844 million in apples, of which the largest markets were in Canada, Mexico, Taiwan and India.¹⁰

Exhibit 2.28. Leading Crop and Animal Product Sales, Washington State, 2013 (millions \$)

Rank	Commodity	Value (mils \$)	Rank Nationally
1	Apples	2,189.1	1
2	Milk	1,298.9	10
3	Wheat	978.3	4
4	Potatoes	792.0	6
5	Cattle (Including Calves)	706.4	17
6	Hay	683.7	11
7	Cherries	379.0	2
8	Grapes	278.6	2
9	Pears	225.4	1
10	Hops	202.1	1

Sources: U.S. Department of Agriculture, NASS, 2014; Community Attributes Inc., 2014.

⁷ U.S. Department of Agriculture. (2014). National Agriculture Statistics Service. Washington D.C.

⁸ Washington State Department of Agriculture. (2014, August 7). Export Statistics. Olympia, WA. Retrieved from <http://agr.wa.gov/marketing/international/statistics.aspx>

⁹ The difference relates to products that are grown in Washington, versus those only consolidated in the state. For example, the state-of-origin export series published by the U.S. Department of Commerce credits Washington State as the state-of-origin for large amounts of soybean exports, even though soybeans are not grown in large amounts within Washington. The reason is because soybeans grown in the U.S. Midwest are shipped to warehouses in Washington and consolidated before passing through U.S. Customs.

¹⁰ U.S. Department of Commerce, International Trade Division. (2014). State Origin Export Statistics. Washington D.C.

Washington was the nation's leading producer of several commodities in 2013, including apples, pears and hops, and the second-largest producer of cherries and grapes (behind only California).

Among Agriculture Support Activities, the largest single activity by gross receipts in 2013 was farm supplies merchant wholesalers, an industry that includes sellers of seed, equipment, and other farming inputs; between 2009 and 2013, businesses in this category saw sales increase in Washington by nearly 11% per year (based on 2013 dollars). Animal slaughtering, less poultry, was the largest activity by sales within food processing, generating more than \$1.3 billion in gross receipts in 2013. Within the Wholesale & Distribution segment of the supply chain, fruit and vegetable merchant wholesalers sold nearly \$2.8 billion worth of goods in 2013 (**Exhibit 2.29**).

Exhibit 2.29. Largest Activities by Gross Business Receipts among Other Segments of Supply Chain, Washington State, 2009 & 2013 (millions, 2013 \$)

Segment	Rank, 2013 Activity	2009	2013	CAGR, '09-'13
Agriculture Support Activities	1 Farm supplies merchant wholesalers	2,092	3,141	10.7%
	2 Other postharvest crop activities	202	269	7.4%
	3 Support activities for animal production	72	76	1.5%
	4 Soil preparation, planting, and cultivating	66	55	-4.6%
	5 Farm product warehousing and storage	40	53	7.5%
Food and Beverage Manufacturing	1 Animal, except poultry, slaughtering	1,124	1,335	4.4%
	2 Coffee and tea manufacturing	520	1,178	22.7%
	3 Grain and oilseed milling	484	1,122	23.4%
	4 Frozen fruit and vegetable manufacturing	757	693	-2.2%
	5 Fruit and vegetable canning and drying	952	674	-8.2%
Wholesale & Distribution	1 Dairy product merchant wholesalers	512	756	10.2%
	2 Fruit and vegetable merchant wholesalers	509	701	8.3%
	3 Meat and meat product merchant wholesalers	285	379	7.3%
	4 Grain and field bean merchant wholesalers	194	289	10.5%
	5 Fruit and vegetable markets	82	112	8.2%

Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

Washington's Apples in China

In 2012, Chinese authorities placed import restrictions on Washington's red and golden delicious apples—the only two American varieties that are allowed to be exported to China—after seeing apple pests like speck rot, bull's-eye rot, and Sphaeropsis rot in imported apples. China is simultaneously the world's largest apple grower and importer.

Collaborating with the USDA's Animal and Plant Health Inspection Service (APHIS) for two years, the two nations have come to an agreement in December 4, 2014, implementing new food safety measures like additional cold storage and inspection protocols to alleviate Chinese concerns.

“When we are talking about US apple export, we are talking about Washington State apple export,” commented Mark Wen, president of the Washington State China Chamber of Commerce, “90 percent of U.S. apple export is from Washington State.” China imported more than 60,000 tons of Washington apples in 2010, and “opening the door for Washington apples is great news for Washington's apple industry.”¹¹

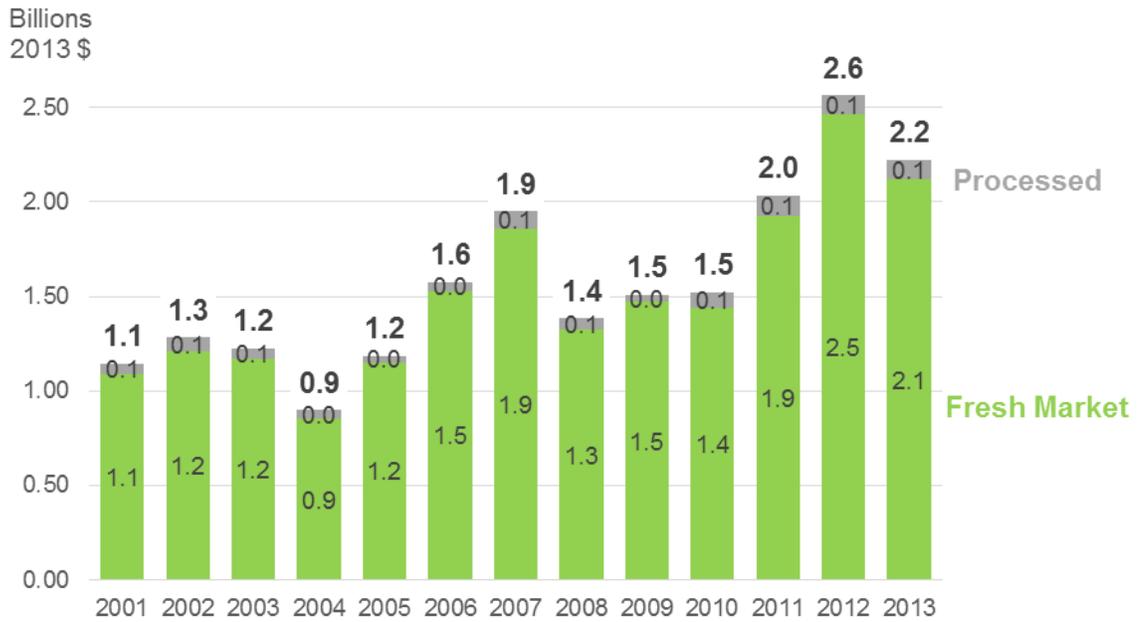
¹¹ Deng, Yu, “China Lifts Ban on Washington State Apples,” China Daily, http://usa.chinadaily.com.cn/us/2014-11/04/content_18860699.htm

Historic Production Values

Production values are based on farm gate sales¹² of commodities by Washington farmers. Sales can vary widely from year to year based on a variety of factors, ranging from weather conditions and effects on supply and global markets.

Exhibit 2.30 below details historic production values of apples in Washington from 2001 to 2010. Fresh market apples represented no less than 94% of total value during this period, with a peak of 97.7% share of total value in 2009.

Exhibit 2.30. Historic Production Value of Apples, Washington State, 2001-2010 (billions, 2013 \$)

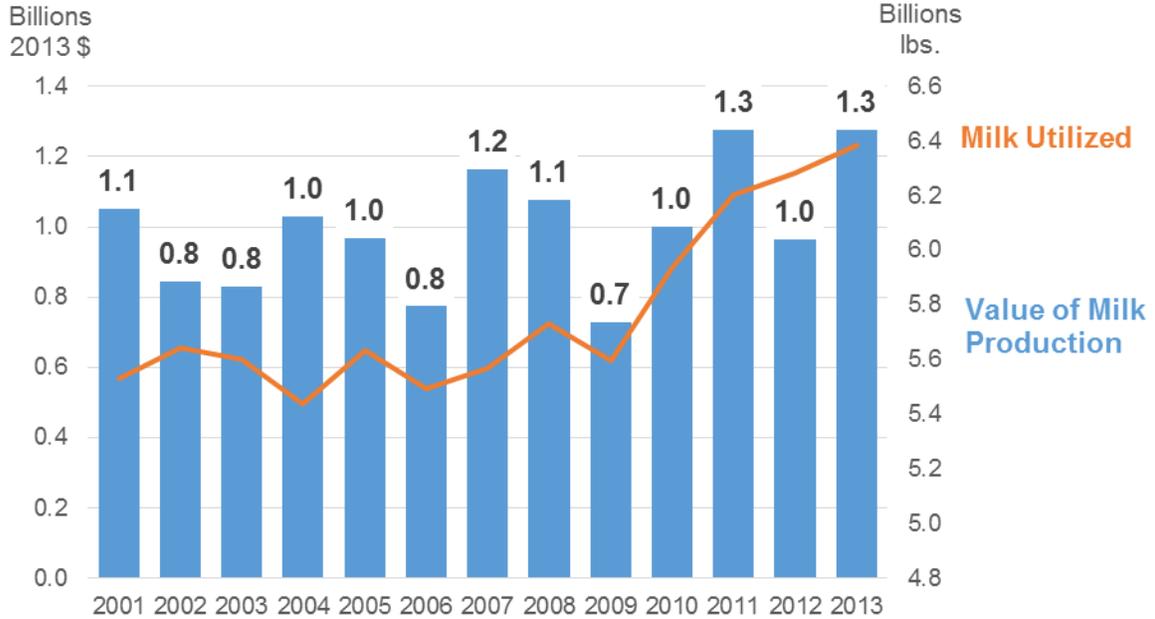


Sources: NASS Census, 2010; NASS Survey, 2013; Community Attributes Inc., 2014.

¹² Farm gate sales are sales direct sales from the producer or farm.

Exhibit 2.31 is a summary of the value of milk production in Washington from 2001 to 2011. Overlaid are pounds of milk utilized (the pounds of milk used either for fluid milk products or for processed dairy products) by year, illustrating the volatility of this commodity.

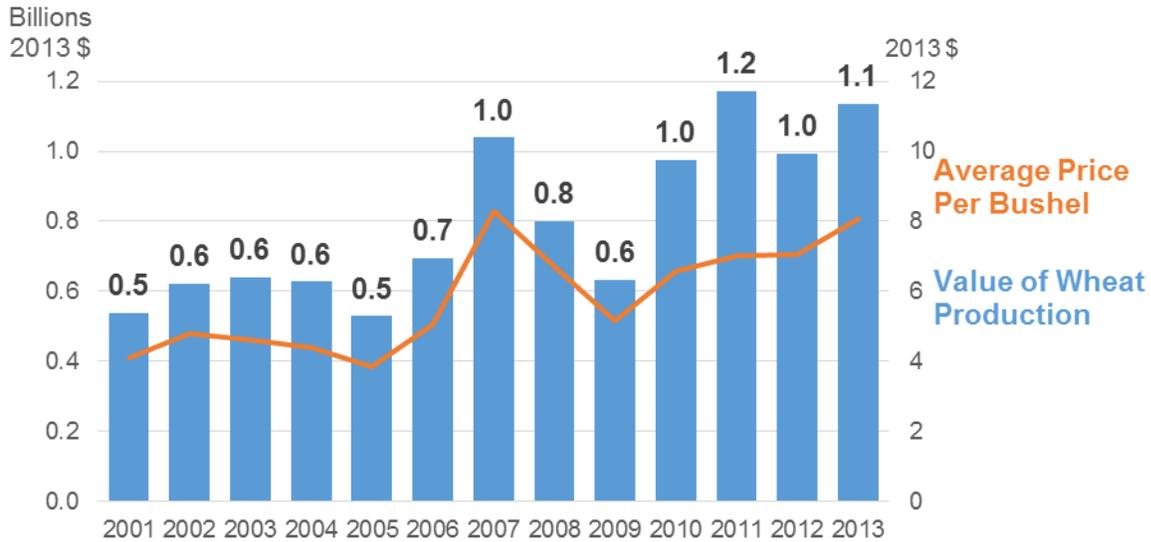
Exhibit 2.31. Historic Production Value of Milk, Washington State, 2001-2011 (billions 2013 \$)



Sources: NASS Census, 2010; NASS Survey, 2013; Community Attributes Inc., 2014.

Exhibit 2.32 shows the relationship between the historic total value of wheat production in Washington State and the average price per bushel from 2001 to 2011. The total value of wheat production is closely tied to the average price per bushel, decreasing in tandem over the 11-year period. Prices per bushel of wheat changed significantly during this period, including a low of \$3.85 per bushel in 2005 to a high of \$8.30 per bushel in 2007.

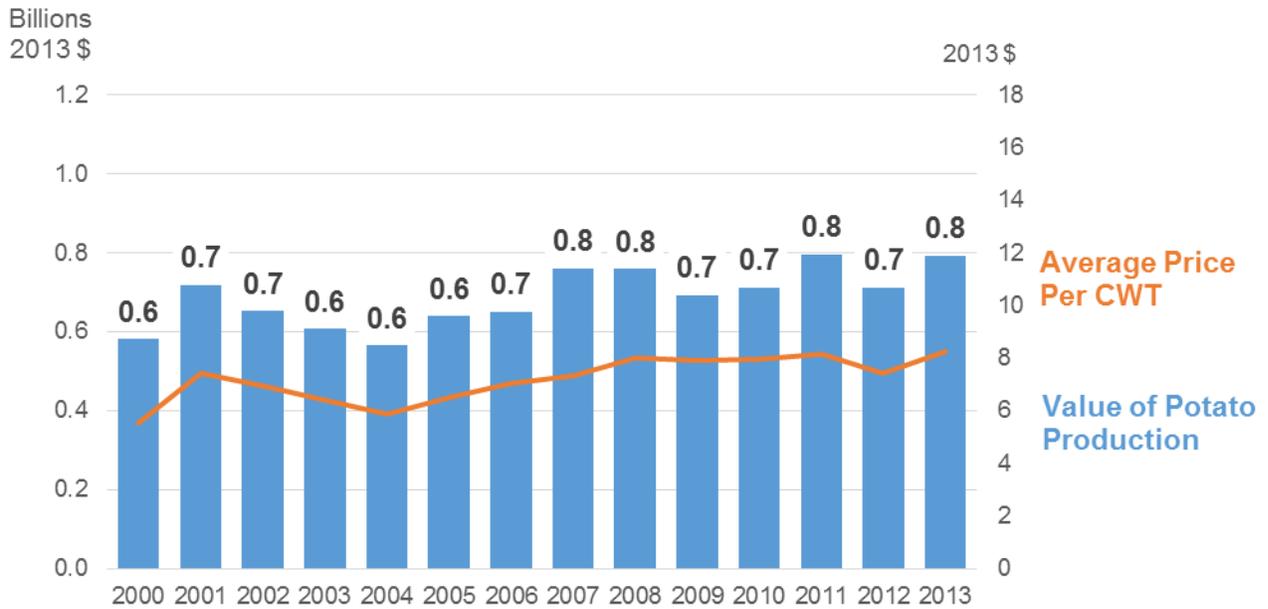
Exhibit 2.32. Historic Production Value of Wheat, Washington State, 2001-2013 (billions 2013\$)



Sources: NASS Census, 2010; NASS Survey, 2013; Community Attributes Inc., 2014.

Exhibit 2.33 is a summary of the total value of potato production in Washington State overlaid with the average price per hundredweight. Though less volatile than wheat, the price of potatoes has still changed significantly over time, rising from a low of \$5.53 per hundredweight in 2000 to \$8.25 in 2013; between 2008 and 2010, the price per hundredweight of potatoes ranged from \$8.00 in 2008 to \$7.95 in 2010.

Exhibit 2.33. Historic Value of Potato Production, Washington State, 2000-2013 (billions 2013\$)



Sources: NASS Census, 2010; NASS Survey, 2013; Community Attributes Inc., 2014.

3.0 SUPPLY CHAIN LINKAGES AND PRODUCTION COSTS

The Agriculture and Food Processing supply chain is a vertically integrated system of commodity production, transportation, support services (e.g., storage and packing), processing, and shipment locally, domestically, and internationally through Washington's intermodal transportation system. This section describes the supply chains and associated production costs of crops and agricultural products.

3.1 Supply Chains by Major Segment

Potato Processing

Potatoes in Washington State are primarily sold as inputs into processing, or what is referred to as intermediate goods. The largest single purchaser of potatoes as an intermediate good in Washington are frozen food manufacturers (approximately 66.9% of all potato production by value), followed by dehydration processors (7.7%), potato chips manufacturers (2.4%), and other potato-based food manufacturers (1.1%). Fresh packing activities purchase 11.0% of Washington potatoes by production value¹³.

Processors thus constitute the most important source of demand for potato growers in the state. According to one interviewee, 88% of total potatoes raised in the Columbia River Basin go to processing. If these operations went away, farmers would be forced to switch to other crops.

Potato processors typically locate in close proximity to potato farmers. In addition to mitigating transportation shipping costs for the heavy, unprocessed product, close proximity between farmer and processor allows collaboration on storage practices, quality control, and other measures needed to ensure the health of the potato crop prior to processing.

Major frozen potato processors in Washington include Lamb Weston (potato division of ConAgra), Simplot Food Group, and McCain Foods. For potatoes to be used later in the calendar year growers or processors will store the harvested crop in climate controlled storages for an extended period. Farmers typically lease or own and operate potato storage facilities. One farmer described their refrigeration storage facility as having 15,000 ton storage capacity and 200 times standard refrigeration capacity to keep stock cool. Potatoes are typically stored until late summer, when the early season crop is harvested.

Farmers are responsible for raising and harvesting a crop, and getting into storage. Farmers bear risk growing processing potatoes and have no flexibility to share risk with the consumer if quality and condition issues occur.

Farmers and Processors Have a Symbiotic Relationship

Processors depend on the health of the local agriculture crop. If a farmer's crop is damaged and not fit for processing, the processor will be forced to procure a similar crop from another location, resulting in higher costs. Contracts with processors are

¹³ Brady, M. (2011). *The Economic Impact of Potatoes in Washington State*. Pullman: Washington State University.

renewed annually in the late fall or early spring, sometimes after the crop has been planted.

Prices paid by frozen processors for raw processing potatoes are negotiated as a group through organizations like the Potato Growers of Washington; there are similar organizations for other commodities. In a highly competitive food processing industry, increased costs on the part of the processor are passed along to the farmer through lower prices offered for the raw commodity. All farmers interviewed in this study described themselves as price takers— as the lowest rung of the agriculture value chain, they are unable to pass along losses to additional suppliers.

Skagit Valley Vegetables

The decline of food processing in Northwest Washington helps illustrate the strong, symbiotic linkages between farmers, processors, and suppliers, as well as the resiliency of farmers to adapt to sudden changes.

In the 1960s and 1970s, nine different processors operated in the northwest corner of Washington, handling a wide range of crops grown in the region, including broccoli, cauliflower, and 40,000 acres worth of green peas. At the height of the vegetable industry in Skagit County, a few hundred growers negotiated annual contracts with local processors through the Northwest Farm Crops Association. The region's maritime climate provided advantageous growing conditions for certain crops, particularly water-intensive vegetables that would otherwise need to be irrigated.

The business climate for farming began to change in the 1980s. The U.S. Midwest and Columbia River Basin emerged as strong competitors for frozen vegetable manufacturing. These regions, unlike Northwest Washington, needed irrigation, but this was offset by advantageous average growing temperatures and sunlight conditions; these regions also allowed for greater scalability of production and better production efficiencies. Already a low margin industry, processors in Skagit and elsewhere were under increasing pressure to cut costs and began to either close or relocate to lower cost regions. In 2000, National Frozen Foods closed its plant in Burlington; Twin Cities Foods ended its frozen pea production in the area in 2007. Similarly, Bellingham Frozen Foods was acquired by a Walla Walla-based processor and processing activities were consolidated with Eastern Washington production. Plants in Ferndale and Mount Vernon were shuttered in the late 1980s and 1990s. Old processing plants were sold and repurposed, razed, or left vacant. Some facilities were repurposed as cold storage facilities serving the Northwest fishing industry.

The impact of these closures affected both farmers and the broader supply chain. Processing operations typically employed around one hundred workers, many of these positions family-wage jobs in accounting, specialty maintenance, and management, plus between four and five hundred seasonal workers.

The closure impacts extended to supporting businesses. Each type of vegetable requires specialty machinery for sorting and processing, as well as mechanics and maintenance services for processing equipment. For mechanics who made their careers in specialty

equipment work, the options were few—either retrain for another industry or relocate to a region with processors.

Most of the farms in the region relied on selling their crops to local processors. With a decline of processing, farmers were forced to adjust their crops to keep their businesses viable. At the time, the fresh potato packing industry was small in Northwest Washington and not a major component of an average farmer’s portfolio.

Many farmers began to see prices shift in their main crops and chose to switch production to other crops, anticipating and preempting plant closures. While the market for Skagit’s historical vegetable offerings slowly shrank, farmers found that they could produce high quality red potatoes—a crop not traditionally grown in large volumes in the region. Packing sheds grew from just two in the 1970s to 10-12 packing sheds today. While other regions are able to produce more red potatoes at a lower cost (e.g., California and Minnesota), Skagit County farmers have been able to compete with a high quality red potato.

According to one interviewee, “Farmers are pretty resilient, but the initial impacts [of plant closures] were there. They forced the farmers to retool, retrain, and do whatever they had to do to survive.” When plant closures catch farmers by surprise, however, “we do see when farmers lose the farm, but the land is typically bought by other local farmers and evolves into another business model. Most of the time, things right themselves.” Adjustment also varies by crop portfolio.

While many farmers were able to adapt, this process took many years. And while many of the processing activities relocated to other parts of Washington, in the current era regions outside Washington are increasingly competitive for these investments, resulting in a net loss for the state.

Wheat

The wheat industry in Washington is reliant on exporting of the raw grain commodity, either domestically or to international markets. The international nature of Washington wheat makes it very responsive to international wheat production. Forward contracts are the primary means of transaction for most wheat farmers. The 2014 harvest in Walla Walla county was roughly 25% lower than average due largely to a particularly harsh winter, which, when combined with increased global production, resulted in lower total value of sales for Walla Walla wheat growers.¹⁴

Wheat growers typically sell their harvested crop to a grain consolidating wholesaler, such as Tri-Cities Grain. The grain is delivered to a wholesaler, who then loads it on a barge and transports it down the Columbia River to Portland or another major downstream port before being shipped abroad. When barge capacity is reached, a more expensive but more flexible option is to ship product by truck or rail to the port.

¹⁴ Porter, A. (2014, September 19). Weather Lowers State’s Wheat Crop Yield. *Union Bulletin*. Walla Walla, Washington.

Fees paid by the consolidator, such as to the grain terminal operator at the port and barge shipping fees, are typically subtracted from the price paid to farmers; increases in these costs are therefore largely absorbed by the farmer. According to one interviewee, shipping costs from Pasco to Portland can average \$0.42 per bushel; this amount is thus factored into the per bushel prices paid by consolidators to farmers.

Water is a critical input. Wheat farmers rely on access to water, either through irrigation or through rainfall. Throughout Washington, wheat farmers have different situations regarding water access. Some dry-land farmers have access to irrigation, others have well permits, and others rely fully on unpredictable weather patterns. Some farmers with well permits are experiencing shortages due to low and falling aquifer levels. Water is one of the determining factors in a good or bad yield each year. A farmer can manage inputs and costs to the best of their ability, and employ best practices for crop production, but if water access is poor, the crop can still be bad, which translates into lower returns. This unpredictability plays an important role in risk management strategies employed by farmers.

Costs are also a function in part of water quantity. In wet years, more fertilizer is needed, making costs higher. While yields may be higher, so are associated production costs. Additionally, other costs remain constant, whether the yield is good or bad. When negotiating a forward contract, a wheat farmer must be confident that their crop will yield the quantity they are contracting. If the rainfall is poor and their yield suffers, the farmer has to make up the cost of the forward contract for the portion that they were unable to deliver.

Farmers also need to replace important machinery components, such as blades on combines, on a regular basis. Used combines can cost \$250,000, while new combines run upwards of \$700,000 and typically need to be replaced every 10 to 15 years.

Apples

Washington is, by far, the largest producer of apples in the country. Most of the production and processing occurs in Eastern Washington, and, from there, fresh and processed products are distributed domestically and internationally. Apple growers aim to sell as much of their product as possible to the fresh market in order to maximize their returns. They deliver their harvest to packing houses, where each apple is sorted and assigned a grade to determine if it is of good enough quality to be sold fresh. Fruit designated to be sold fresh is then packed, stored and distributed for wholesale. Apples deemed to be of lesser grade, which comprise about 17% of the harvest, are sent to a processor, such as Tree Top, based in Prosser. Since Tree Top is a grower-owned cooperative, the farmers are responsible for all shipping costs to the packing houses and processing plants, though they are able to pass freight costs along to other processors who use their products.

Fruit of relatively high quality is minimally processed and converted into fresh slices to be sold at fast-food restaurants and similar establishments. The next grade down are made into frozen slices and sold as ingredients for use in apple pies and other products. All other apples above sauce or juice grade are dried to different moisture levels to be further processed by others into products like cereal and snack foods. Domestic

processors like Tree Top generally avoid making apple juice concentrate, which has become a commodity since growers in China ramped up production in the mid-1990s, providing a steady supply of cheap product. Since local processors cannot compete with such low prices, they focus instead on diversifying their offerings to create value.

Prior to founding Tree Top, growers either left apples unfit for packing in the field or sold them for cattle feed. Processing these lower grade apples has allowed growers to sell almost all of the fruit they produce, an amount that has grown steadily over time.¹⁵

Implementation of high-density planting techniques has allowed farmers to use more efficiently natural resources and adapt rapidly to changing incentives in the market. For example, shipments of the Honeycrisp variety went from zero in 2000 to over 2,800 carlots¹⁶ in 2010. Additionally, innovations have helped apple producers maintain the quality of harvested fruit, such as improved controlled atmosphere storage technology and products that delay ripening. Extending the saleable time period for fresh apples has transformed this once seasonal industry into a year-round employer of workers for storage, packing and processing facilities¹⁷.

Dairy

Dairy farmers are an important part of Washington State's agriculture sector. Farmers typically sell milk to a local cooperative or to a larger processor. Darigold, one of the state's largest dairy processing employers, is a unique processor in that it is owned by the farmers that use it to process their milk. Once milk is sold to a cooperative or processor, it is hauled to the processing site. Darigold provides transportation itself with field staff to assist in loading.

Roughly 90% of milk produced in Washington is processed in the state. Once milk has been processed, it is either sent directly to market for sale and consumption as milk, cheese, yogurt, or cream or, for processed foods with longer shelf lives, it can be exported from the state or country, serving in particular a large Asian market.

Aside from milk production, dairies contribute to Washington's food processing sector through cull cows. Cull cows are dairy cows that have ceased producing milk and are slaughtered for processing. Roughly 10% of the economic contribution of dairy processing in the state comes from cull cow processing.¹⁸

Purchasing feed is the largest recurring cost for dairy farmers, composing roughly half of that farmer's expenses. Prices for chief feed crops have varied dramatically in recent years. Corn prices, for example, have swung between \$300/ton and \$700/ton while hay has varied from \$200/ton to \$300/ton. As an input, feed can be sourced locally, and many dairies do just that. Other high recurring costs include hired labor, which makes up roughly 10% of expenses, and maintenance and repair, which makes up roughly 6% of expenses.

¹⁵ Globalwise Inc. (2012). *Washington Apple Industry Economic Contributions*. Vancouver, WA.

¹⁶ A carlot is 1,000 40 pound boxes.

¹⁷ Ibid.

¹⁸ 2013 Updated Dairy Economic Impact, Washington State University.

Beef

In Washington there are several different segments of the cattle industry. Commercial cow and calf producers raise calves (steers and heifers) of up to 600 lbs. The calves are then sold to yearling operations; if the cattle are big enough (roughly 750 lbs per head) they might go into a feedlot where they will be fed until they reach the weight of about 1,400 lbs.

During the production of a calf several inputs are utilized: livestock feed, breeding cattle, pharmaceuticals, semen for artificial insemination, replacement parts, and off-road diesel. Once cattle reach the finish weight of about 1400lbs/head, they are shipped to a packer to be harvested (either Tyson or AgriBeef Foods in Washington).

Another specialized segment of the industry is the purebred seed stock producer. Purebred seed stock breeders produce purebred bulls, cows, and heifers that other cow/calf and seed stock producers purchase to improve the genetic stock of their herds. Purebred seed stock producers in Washington State compete with purebred seed stock breeders across the country. The Sale and Use tax exemption on breeding cattle is especially important to ensure for a level field when Washington purebred seed stock producers market their cattle in Washington State and across the country. Purebred bulls that are of the highest quality are sometimes purchased by artificial insemination (AI) studs where the bulls can be collected, allowing cattle producers from across the country or around the world to utilize genetics in their operations. The current tax structure allows Washington's farmers and ranchers to compete on an even field with neighboring states and provinces.

Shellfish and Finfish Farming and Processing

Aquaculture refers to farm-raised shellfish and finfish. Unlike most forms of terrestrial farming in Washington, the majority of aquaculture activities are highly vertically integrated. For example, Taylor Shellfish Farms, the largest shellfish farmer in the state, owns and operates its own tidelands, nurseries for raising oysters, clams, mussels and geoducks, shucking operations, freezing, packaging and even retail operations—a farm-to-table product.

Equipment for shellfish farming and processing constitutes one of the largest expenses in the industry. Equipment needs include both small (20-foot by 60-foot) fishing boats and large floating nursery systems and grading machines. Due to the specifications required for shellfish farming and processing, most farmers and processors need to fabricate their own equipment, repurpose other types of farming equipment, and/or source machines from outside the U.S. For example, one interviewee initially purchased a blueberry grading machine to be used for oysters but ultimately had to purchase more efficient processing equipment from Europe. In another instance, a fish grading machine purchased in Iceland was repurposed for oyster grading. Many shellfish farmers use live holding equipment designed for fish.

Taylor Shellfish Farms is unique as the owner and operator of its own fabrication shop. The company currently has 12 employees for on-site welding and fabricating large boats and in-water nursery equipment, as well as repair issues on boats purchased from other

suppliers. Nurseries alone can cost around \$750,000, so in-house manufacturing can help save the company significant costs. Similarly, the company saves nearly up to 50% of the costs by building their own 20-foot by 60-foot oyster fishing boats.

In addition to equipment, major costs associated with shellfish farming and processing include seed, labor, transportation, and fuel (Diesel #2, or 2-D). Shipping costs include both the transportation of young oysters to Hawaii in the winter to avoid hibernation (and decelerating growth) in the colder waters of Puget Sound, and the shipping of shellfish product by refrigerated truck. Most labor is unskilled, and thus less expensive, with the one exception of geoduck farming and the need for skilled divers.

Most finfish farming in Washington involves Atlantic salmon raised in net pens in the Puget Sound. Atlantic salmon are ideal for farming in cold marine waters because of their consistent growth performance, disease resistance and broad consumer appeal. Repeated, failed attempts by state fisheries managers to establish wild populations in Washington revealed that the only viable method of raising this species in Northwest waters was through the use of salt water net pens. Efforts were made to farm native Chinook salmon as well, but they proved unsuccessful, resulting in the current reliance on the Atlantic species.

The largest producer is American Gold Seafoods, a subsidiary of Icycle Seafoods, which has been operating farms for over 30 years. Currently, they have five sea water farms and two hatcheries across 21 acres and produce about 15 million pounds (gutted weight) of salmon a year, which is sold directly to wholesalers. In 2010, Icycle Seafoods closed its last processing plant in the state and instead contracts with a small local firm to process its farmed fish. Washington also has a large steelhead trout farm in Okanogan County along the Columbia River, operated by Pacific Seafood's Pacific Aquaculture division. This farm produces over eight million pounds of fish annually, which is marketed to wholesalers throughout North America.

Equipment needed for finfish farming include net pens, workboats for transferring fish between sites, feed barges and well-boats to transport live fish to the processing facility. With the exception of feed, finfish farming's other production inputs (seed, labor and fuel) are similar to those associated with shellfish farming. Barriers to new entrants are substantial because the aquatic lands and deep water lands that may be used for shellfish and finfish farming are owned entirely by the State. The Department of Natural Resources determines who may lease these lands/waters and charges a use fee in addition to requiring that operators obtain all necessary permitting through the Department of Ecology. According to one interviewee, the cost to start up a new farm can run into the hundreds of thousands of dollars plus attorneys' fees, and the State has not issued any new permits since 1987.

3.2 Production Costs Incurred by Farmers

Production costs vary among farmers in many ways. The type of crops farmed or animals raised are obvious divisions in production costs. Within the same crop production line, costs vary by farm, too. One key factor is location, and the soil types and climate conditions that come with location choices. Most Washington farms fall into

one of two regions, as defined by the USDA, called the Fruitful Rim and the Basin and Range (See **Appendix G** for a map of these USDA regions).

The Fruitful Rim is a region that covers most of Eastern Washington, but also extends into Oregon and as far as northern California. The Basin and Range region similarly extends across multiple states, and includes areas of Eastern Washington adjacent to the Idaho border. The Basin and Range also covers northern Idaho and central Oregon. Measuring the impacts across both USDA-defined regions helps capture many—but not all—important geographic, ecological, and climatic considerations affecting yield, such as rainfall.

Exhibit 3.1 summarizes total production costs for the chief agricultural activities investigated in this study. The sector with the greatest total production costs in 2012 was fruit and tree nut farming by far, exceeding the next-highest activity’s production costs by 143%. Apple farming composes the bulk of fruit and tree nut farming in Washington State, while Oilseed and grain farming in Washington State is largely composed of the state’s wheat farmers, with almost no soy farming.

Washington’s agriculture sector comprises several large segments, such as apple farming, dairy farming, potato farming, and wheat farming, along with multiple small segments, such as hog, pig, sheep, and goat farming. This composition is reflected in the total production costs of each segment.

**Exhibit 3.1. Total Production Costs by NAICS,
Washington State, 2012 (thousands \$)**

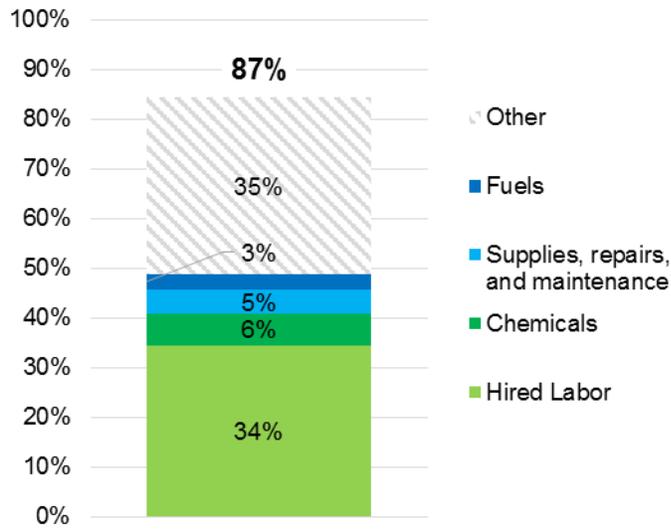
Activity	Total Production Costs, 2012
Fruit and tree nut farming (1113)	2,505,620
Dairy cattle and milk production (11212)	1,029,534
Vegetable and melon farming (1112)	997,547
Oilseed and grain farming (1111)	857,816
Other crop farming (1119) Total	726,707
Cattle feedlots (112112)	617,395
Animal aquaculture and other animal production (1125,1129)	298,763
Beef cattle ranching and farming (112111)	295,139
Greenhouse, nursery, and floriculture production (1114)	287,807
Poultry and egg production (1123)	197,358
Sheep and goat farming (1124)	18,619
Hog and pig farming (1122)	7,250
Total	7,839,555

Sources: NASS, 2012; U.S. Agriculture Census, 2014; Community Attributes Inc., 2014.

Fruit and tree nut farmers, as an industry, have the highest absolute production costs in Washington’s agricultural sector, largely due to the state’s apple orchards. For fruit and tree nut farmers, the highest production costs come in the form of wages paid to farm laborers, which composes 39.7% of total expenses. Apple farmers in particular face high labor costs due to seasonal harvest needs combined with a shortage of seasonal laborers

in recent years.¹⁹ **Exhibit 3.2** below shows the top four expenses of apple farmers as a share of gross income. **Importantly, gross income is before accounting for costs, which are considerable across all farming types.** The data reported below and in subsequent exhibits is also only for one period of time—farmers make money, lose money, and break even across a five to ten year window. Furthermore, operating costs as a share of gross revenues do not account for fixed costs, which can be significant.

Exhibit 3.2. Top Four Operating Expenses for Apple Orchards as Percentage Share of Gross Income, Washington State, 2012



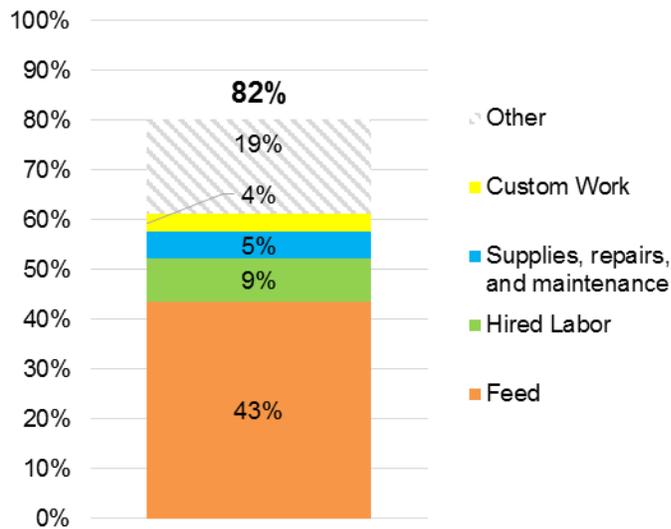
Sources: NASS, 2012; U.S. Agriculture Census, 2014; Community Attributes Inc., 2014.

¹⁹ Associated Press. (2014, September 29). “Washington’s Breweries have Hop Farmers Racing to Meet Demand. Seattle, Washington,” US.

Dairy cattle and milk production relies very heavily on feed. **Exhibit 3.3** summarizes the top four expenses of dairy cattle and milk producers in Washington State as shares of income. Dairy is an important component of the state’s agricultural sector, and dairies are important consumers of wheat, corn, and hay, three crops that are commonly used as cattle feed. Prices for these crops can change significantly, resulting in unstable production costs year-to-year.

Organic producers of milk, interviewees have said, are able to charge a more consistent price for their product compared to regular milk. The cost of feed, however, remains unstable.

Exhibit 3.3. Top Four Operating Expenses for Dairy and Milk Production as Percentage Share of Gross Income, Washington State, 2012

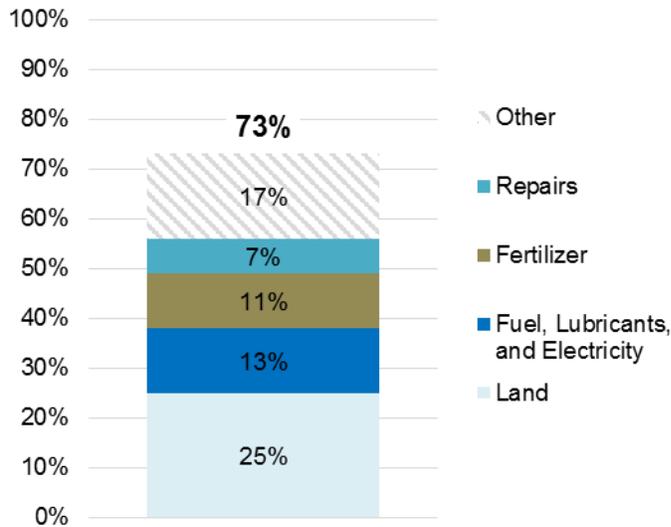


Sources: NASS, 2012; U.S. Agriculture Census, 2014; Community Attributes Inc., 2014.

Wheat farming is a significant segment of Washington’s agriculture sector, constituting the fourth-highest total production costs in 2012. One of the major contributions to the state economy from wheat farmers are raw grain exports. Unlike apple orchards, hired labor is not among the top four expenses for wheat farmers. However, land rent fertilizer, fuel, lubricants and electricity, and repairs are large factors for wheat farmers in Washington. In the Fruitful Rim, land rent and fuel, lubricants and electricity represent more than 34% of total costs, while in the Basin and Range land rent and fertilizer comprise 35% of total costs.

Exhibit 3.4 shows the top four expenses for wheat farmers in the Fruitful Rim as shares of gross returns. Land is the single largest expense as a share of gross returns. The second largest expense are fuel, lubricants and electricity, which are 13% of gross returns. Fuel, lubricants and electricity represent over 27% of total operating costs for Fruitful Rim wheat farmers. Additionally, fertilizer represents almost 24% of operating costs, and chemicals are almost 8%, together these inputs represent almost 32% of total operating costs.

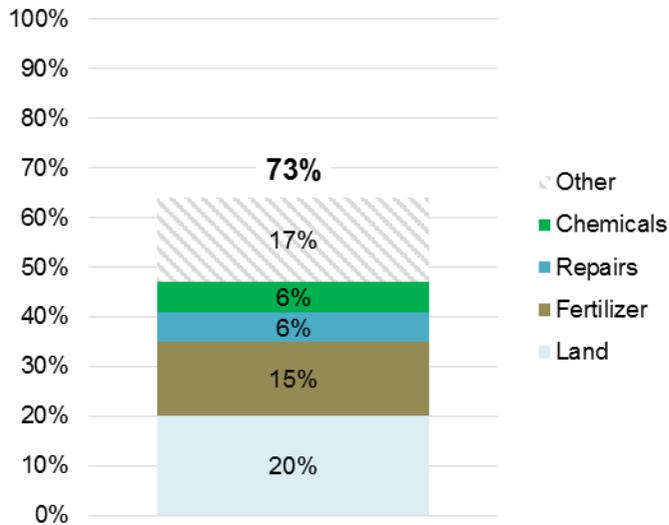
Exhibit 3.4. Top Four Operating Expenses for Wheat Farming (Fruitful Rim) as Percentage Share of Gross Returns, Washington State, 2013



Source: USDA ERS, 2013; Community Attributes Inc., 2014.

Wheat farmers in the Basin and Range on average experience lower costs than Fruitful Rim wheat farmers, but also see lower yields. These characteristics are driven primarily because of the need for irrigation in the Fruitful Rim, which increases costs, but also increases yields. **Exhibit 3.5** shows the top four expenses for wheat farmers in the Basin and Range as a share of gross returns. Similar to farmers in the Fruitful Rim, land is a large share of expense for Basin and Range wheat farmers. Unlike farmers in the Fruitful Rim, fuel, lubricants and electricity are not among the top four expenses in the Basin and Range. Fertilizer is the second largest expense as a share of gross returns, followed by chemicals and repairs. Fertilizer and chemical expenses together comprise 21% of gross returns. Fertilizer comprises over 37% of operating expenses, followed by repairs at 15%, and chemicals at over 14%. Together fertilizer and chemicals are over 52% of total operating expenses for wheat farmers in the Basin and Range.

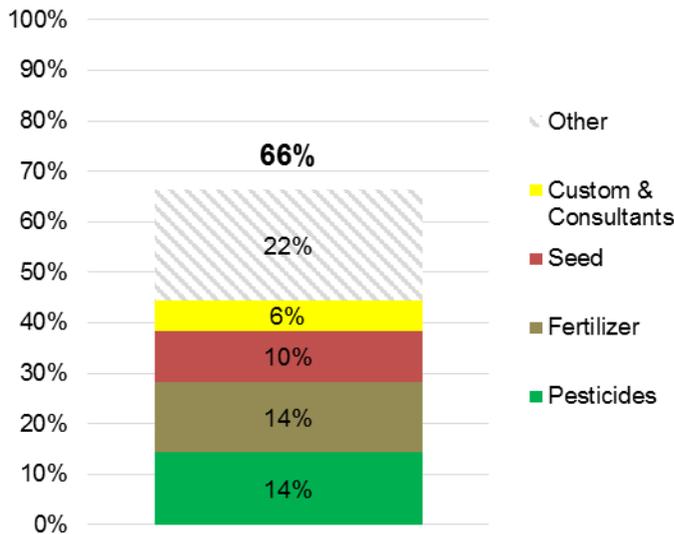
Exhibit 3.5. Top Four Operating Expenses for Wheat (Basin and Range) as Percentage Share of Gross Returns, Washington State, 2013



Source: USDA ERS, 2013; Community Attributes Inc., 2014.

Potato farmers face high costs associated with the fertilizers, lime, soil conditioners and chemicals that are central to producing potatoes. Taken together, these expenses make up over 28% of their total expenses. Fertilizer and chemicals together make up almost 43% of operating costs. Seed and custom work are also significant expenses for potato farmers. Overall, the top four expenses for potato farmers are over 44% of gross returns. Potato farmers enjoy climate conditions that are well suited for growing potatoes. The sandy, loamy soil in the Columbia Basin in particular is a major reason why potato farms are concentrated in the area. **Exhibit 3.6** below breaks out the top four expenses for potato farmers as a share of gross returns.

Exhibit 3.6. Top Four Operating Expenses for Potatoes as Percentage Share of Gross Returns, Washington State, 2013



Source: University of Idaho, College of Agricultural Economics and Rural Sociology, 2013.

Water Access

Excellent agriculture relies on climate, soil, and water. Dividing Washington into three major regions regarding water access, West, Central and East, the state has good climactic conditions during the growing season—long days and cool nights—as well as rich, loamy soils deposited by the Missoula Floods in Central and Eastern Washington. The only piece of the puzzle that nature didn’t provide to Central and Eastern Washington is water.

The construction of the Grand Coulee Dam was undertaken to irrigate the surrounding land, making it the largest reclamation project in the nation. However, the original project remains incomplete. Of the million acres of irrigation promised at the onset of the construction of the dam, 650,000 acres were delivered water. Farmers that were promised water but weren’t part of the 650,000 irrigated acres lobbied for and were granted deep well permits in the 1980s; there was a mutual understanding that, when the project eventually expanded to these areas, farmers would give up their well permits. As time went on and expansion was delayed, farmers increasingly relied upon the Odessa aquifer. Today, the rate at which the aquifer is replenishing itself is lower than the rate at

which it is being depleted and wells in the Odessa area have been failing with increasing regularity.

Farmers who rely year-round on water—such as potato growers—who are the verge of a well failure face a tough choice: either bear the risk that wells might fail (and thus under-irrigate a crop) or switch some acreage to dry land wheat. Dry land wheat farmers rely entirely on nature to water crops, and a good year of rainfall can mean a profitable year. “We don’t irrigate,” explained one wheat farmer, “so the biggest challenge is relying on mother nature to let it grow. I need to try to guess how much water I have to work with in the upcoming year.” Depending on weather predictions, farmers can plant more or less crop, leaving differing acreages fallow each year.

Even farmers in irrigation districts face variable water issues. In Washington, water is considered a state resource; residents pay for the conveyance of water, not the water itself. For farmers in irrigation districts, this means paying an assessment to the district based on how many acres of land need to be irrigated. For some districts, that assessment is as high as \$134/acre. Assessment money goes to the district to repay capital debt, pay for maintenance, and undertake capital improvements. Several factors interact when determining assessments, including the age and efficiency of the system and the size of the area served.

Food processors also intensively use water in Washington. Potato processors, for example use water at multiple points in the processing sequence. First, potatoes are washed and cleaned with water. Second, potato wastewater produced during processing activities is watered down so that it can be reused in other activities, like farming, or exit safely as runoff. Potable water is also used during final processing of potatoes.

Washington water rights fit into a hierarchy of seniority: of two farmers with rights to the same water source, the farmer with the earlier right has priority access to the water. When water supply at a source is limited, junior rights holders experience water interruption, which can limit water access to as little as 38% of the water right. Major interruptions have happened five times since the late 1970s, and the broad workgroup of planners, stakeholders, and partners driving the Yakima River Basin Integrated River Management Plan are working to bring up water certainty to no less than 70%. The project is well underway with more than \$130 million in government money invested.

By 2020, the Washington State Departments of Agriculture and Ecology have set a goal to make an additional 423,000 acre-feet of water available for agriculture. The Kachess Reservoir Inactive Storage Project, a planned reservoir-access project, would make 200,000 acre-feet of water available. Working with the Bureau of Reclamation, the Washington State Department of Ecology has undertaken several canal widening projects that will make it easier to get available water to the farms that need it.²⁰

²⁰ Bud Hover, “WSDA Present 2020 Water Goals to the Governor,” July 29, 2014

Exhibit 3.7 summarizes the top four expenses by share of total expenses of the remaining animal-related ranching and farming activities in Washington State. Feed is a consistently high cost for farmers and ranchers, composing up to 68% of total expenses. Feed is either the largest or second-largest recurring cost in animal-related farming and ranching. Cattle feedlots face the same high feed costs that dairy farmers face. Other significant costs across animal-related agriculture include hired farm labor and property taxes.

Exhibit 3.7. Top Four Operating Expenses for Other Animal-Related Activities as Percentage of Total Expenses, Washington State, 2012

Rank	Animal aquaculture and other animal production	Beef cattle ranching and farming
1	Hired farm labor (28.4%)	Feed (27.3%)
2	Feed (21.6%)	Other livestock and poultry purchased or leased (12.5%)
3	All other production expenses (17.2%)	Property taxes (8.8%)
4	Property taxes (6.2%)	Supplies, repairs, and maintenance (7.0%)

Rank	Poultry and egg production	Sheep and goat farming
1	Feed (68.0%)	Feed (24.2%)
2	Other livestock and poultry purchased or leased (10.4%)	Property taxes (19.7%)
3	Hired farm labor (6.7%)	Interest, real estate (13.2%)
4	All other production expenses (2.7%)	All other production expenses (8.3%)

Rank	Hog and pig farming	Cattle feedlots
1	Feed (33.9%)	Other livestock and poultry purchased or leased (49.4%)
2	Property taxes (16.8%)	Feed (42.0%)
3	Interest, real estate (12.4%)	All other production expenses (2.5%)
4	All other production expenses (7.9%)	Hired farm labor (1.8%)

Sources: NASS, 2012; U.S. Census of Agriculture, 2014; Community Attributes Inc., 2014.

Exhibit 3.8 below breaks out the top four recurring expenses for the remaining agricultural activities in the state. For other crop farming, labor is the most significant expense at 17%. The same is true of greenhouse, nursery, and floriculture production, with a more significant 40% share of expenses.

Exhibit 3.8. Top Four Operating Expenses for Other Types of Crop Production Expenses as Percentage of Total Expenses, Washington State, 2012

Rank	Other crop farming	Greenhouse, nursery, and floriculture production
1	Hired farm labor (17.0%)	Hired farm labor (40.7%)
2	Fertilizer, lime, and soil conditioners (11.2%)	Seed, plants, vines, and trees (14.4%)
3	Cash rent for land, buildings, and grazing fees (11.2%)	All other production expenses (12.6%)
4	Supplies, repairs, and maintenance (10.0%)	Supplies, repairs, and maintenance (7.0%)

Sources: NASS, 2012; U.S. Census of Agriculture, 2014; Community Attributes Inc., 2014

3.3 Production Costs Incurred by Food and Beverage Processors

Food processors procure much of their inputs from local sources; this is especially the case for perishable commodities, such as many types of agricultural commodities. In order to estimate inputs required for processing activities, a hybrid approach was developed leveraging both the Washington State Input-Output Model transactions table and IMPLAN social accounts matrices. These two sources provide estimates on the breakout of intermediate goods and services purchased by food processors. The Washington State Input-Output Model was the primary source for estimating the share of Crop Production sales sold to food and beverage processors, while IMPLAN was consulted for other major purchases.

In 2013, an estimated 18.5% of all combined Food Processing purchases were made for locally produced animal products (e.g., milk, beef, farm-raised shellfish), with another 12.8% for crops (e.g., potatoes, grapes) and 8.0% from other food and beverage processors (**Exhibit 3.9**). The flip side of these percentages is that, in the case of Animal Production, nearly half of all Animal Production by value in 2013 in Washington State was sold not to consumers, but instead to dairy processors, e.g., Darigold and AgriBeef. Likewise, crop producers on average sold 12.9% of their output by dollar value to food and beverage processors, including essentially all grapes produced in the state and the vast majority of potatoes, while exporting—either elsewhere to the U.S. or abroad—approximately 72% of output by value.

Importantly, across all segments of Food Processing, nearly 60% of total purchases by value were made from Washington State producers; this compares, for instance, with just 8.0% in Aerospace.

Exhibit 3.9. Major Local Purchases by Food Processing Activities, Washington State, 2013 (millions \$)

Rank Input	Amount (mils \$)	Share of Total Purchases
1 Animal Production	1,324.2	18.5%
2 Crop Production	921.7	12.9%
3 Food & Beverage Processing	571.6	8.0%
4 Wholesale	349.1	4.9%
5 Other Construction	206.8	2.9%
Total Local Purchases	4,250.4	59.3%

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.²¹

²¹ Note: as discussed throughout this analysis, the Food Processing segment of the supply chain reflects only those processing activities that intensively utilize Washington State commodities. As such, the direct requirements, or commodity inputs, presented in the exhibit above reflect estimates of local (Washington) input purchases among only those activities, and are thus different from estimates for all processing activities that may easily be derived from the Washington State Input-Output Model. However, imports play a much larger role among several omitted processors, notably seafood processing and soft drinks.

4.0 AGRICULTURE AND FOOD PROCESSING BY COUNTY

4.1 Overview

National Context

Counties in Washington rank among the most productive nationally for apples, wheat and sweet corn (**Exhibit 4.1**). The state dominates apple production – four out of the top five counties nationwide for orchard acreage are in Eastern Washington, where Yakima and Grant had over twice the amount of the third-ranked county, Okanogan. For wheat, Whitman produced nearly 33 million bushels, as compared to nearly 20 million produced in second-ranked Lincoln. Grant and Benton each harvested over 25,000 acres of sweet corn, making them the first- and second-most productive counties nationwide, respectively.

Exhibit 4.1. Top Counties for Apples, Wheat and Sweet Corn, United States, 2012

Apples			Wheat			Sweet Corn		
County	State	Acres in Production	County	State	Bushels Produced	County	State	Acres Harvested
Yakima	Washington	47,045	Whitman	Washington	32,943,471	Grant	Washington	25,856
Grant	Washington	38,625	Lincoln	Washington	19,744,297	Benton	Washington	25,392
Okanogan	Washington	18,050	Chouteau	Montana	19,486,328	Renville	Minnesota	24,186
Wayne	New York	17,613	Ward	North Dakota	17,041,630	Portage	Wisconsin	23,829
Benton	Washington	12,319	Cavalier	North Dakota	17,032,116	Palm Beach	Florida	22,918

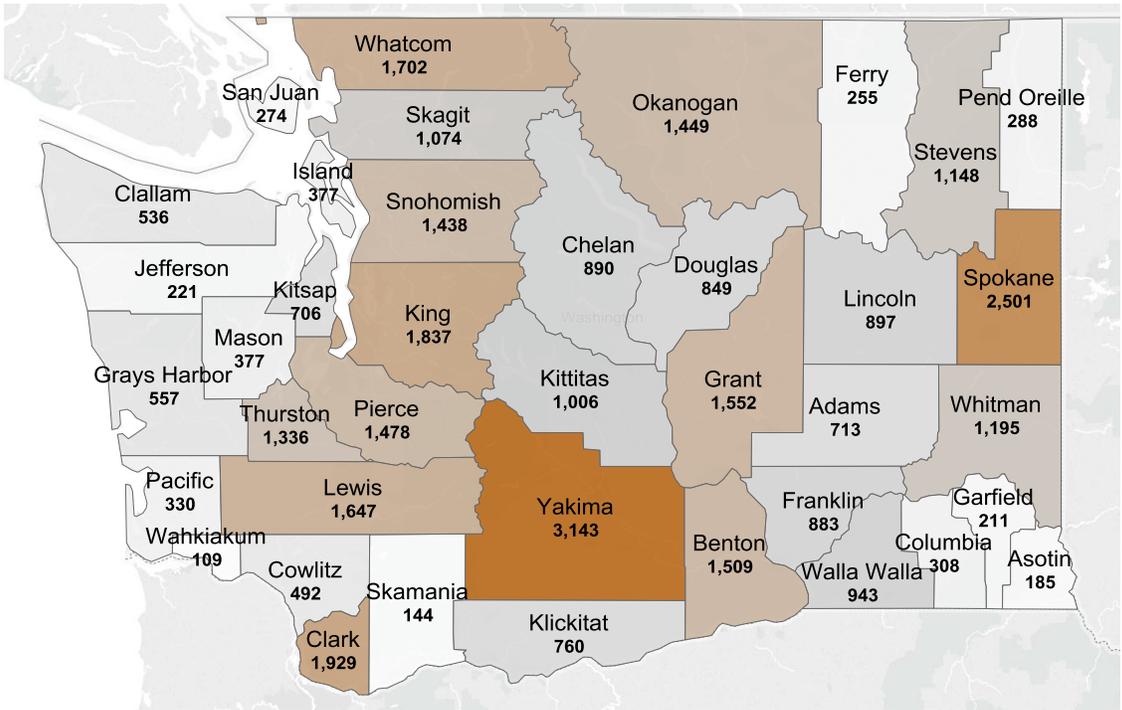
Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014.

Geographic Distribution of Agricultural Activities

Agricultural activities are distributed unevenly throughout Washington due to climate and access to distribution infrastructure, including ports and highways. Much of the state's cropland land is east of the Cascade Mountains, where conditions are generally more favorable for production. Agricultural support activities and food and beverage processors are often located near production areas, so those counties with high production levels also tend to have strong numbers in these associated industries.

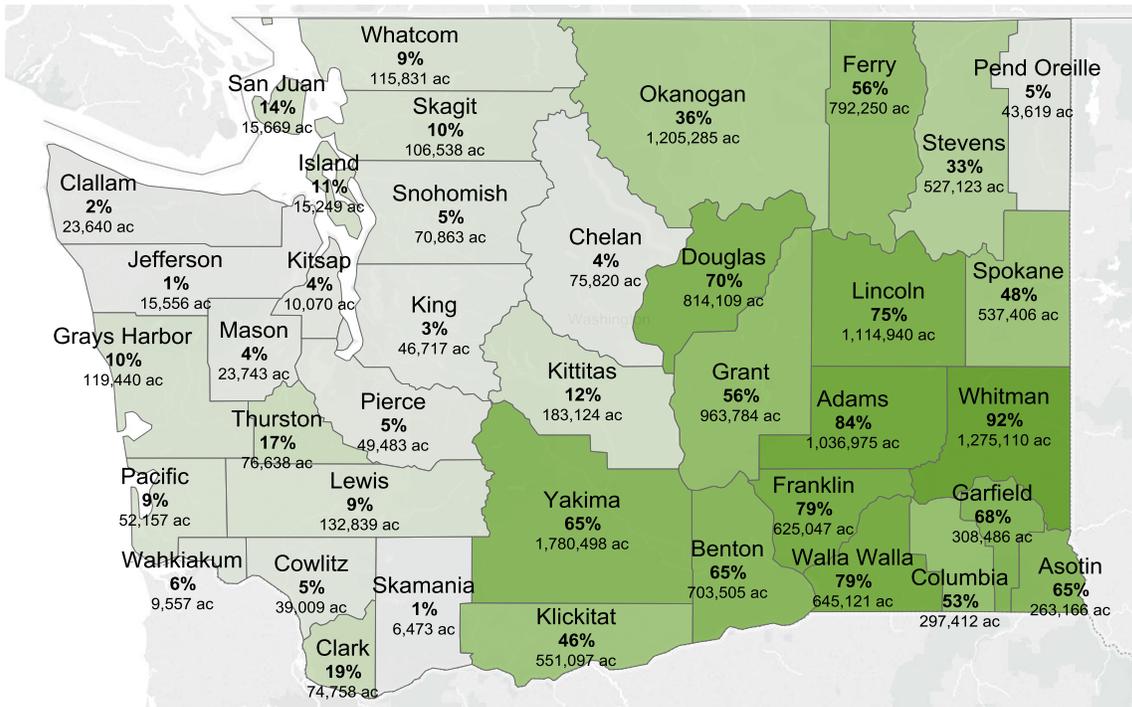
Exhibit 4.2 is a map of the total number of farms by county. Farms are present in every county in the state, with the greatest numbers in Spokane and Yakima. Though these counties have the most farms and acres of land in farms, farmland comprises at least 75% of total county land area in Adams, Lincoln, Franklin, Walla Walla and Whitman, as seen in **Exhibit 4.3**. This exhibit also shows the heavy concentration of agricultural land in Eastern Washington compared to the western part of the state.

Exhibit 4.2. Total Number of Farms by County, Washington State, 2012



Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014

Exhibit 4.3. Land in Farms, Percent of Total County Land Area and Acres, Washington State, 2012



Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014.

Farm Income

Exhibit 4.4 presents agriculture cash receipts from crop and animal production in 2012, which reveals a wide range of county income levels, with a low of \$3 million in Skamania to a high of \$1.7 billion in Grant. The exhibit also provides an overall snapshot of changes in income over time for each county, starting in 2004. Years with the highest level of income are highlighted in blue. While Washington State has seen an overall increase in cash receipts since 2004, income in Ferry, Kitsap and Skamania has dwindled.

Exhibit 4.4. Agriculture 2012 County Cash Receipts (thousands), Washington State, 2004-2012 trend

County	2012	2004 - 2012	County	2012	2004 - 2012
Grant	1,733,700		Kittitas	80,600	
Yakima	1,722,300		Clark	65,100	
Benton	806,700		Columbia	52,300	
Franklin	685,000		Garfield	41,500	
Walla Walla	508,800		Grays Harbor	39,300	
Adams	493,000		Pacific	38,500	
Whatcom	439,600		Mason	32,200	
Whitman	352,200		Cowlitz	30,300	
Skagit	328,800		Stevens	30,000	
Chelan	322,800		Asotin	18,100	
Okanogan	314,900		Island	17,500	
Douglas	281,700		Clallam	14,000	
Spokane	161,900		Jefferson	8,300	
Lincoln	155,200		Kitsap	7,900	
Snohomish	148,300		San Juan	4,600	
King	143,700		Wahkiakum	4,000	
Thurston	128,300		Ferry	3,700	
Lewis	122,400		Pend Oreille	3,700	
Pierce	93,900		Skamania	3,000	
Klickitat	85,400		Total, Washington	9,522,900	

Source: Bureau of Economic Analysis, 2014; Community Attributes Inc., 2014

Grain-growing counties saw a large increase in income in 2006 to 2007 because of the spike in global food prices, increased demand for ethanol and a severe drought in Australia that dramatically reduced wheat, barley and oat production. **Exhibit 4.5** presents year over year percent change in cash receipts for grain in Washington from 2004 to 2012. Cash receipts for grain rose by 50% from 2006 to 2007, with oats showing the greatest gain of 108%. After peaking in 2007, county farm incomes dropped as a result of the recession and began to recover a couple of years later, a pattern also mirrored at the statewide level.

Exhibit 4.5. Grain Cash Receipts Percent Change, Washington State, 2004-2012

Grain	2004	2005	2006	2007	2008	2009	2010	2011	2012
Corn	20%	-9%	2%	81%	50%	-19%	23%	31%	10%
Oats	-23%	-60%	43%	103%	-1%	-32%	16%	-9%	51%
Wheat	12%	-19%	19%	45%	-9%	-3%	12%	25%	10%
Other grains	-4%	-12%	-1%	83%	-8%	-22%	-8%	67%	33%
TOTAL	11%	-18%	16%	50%	-5%	-6%	11%	29%	13%

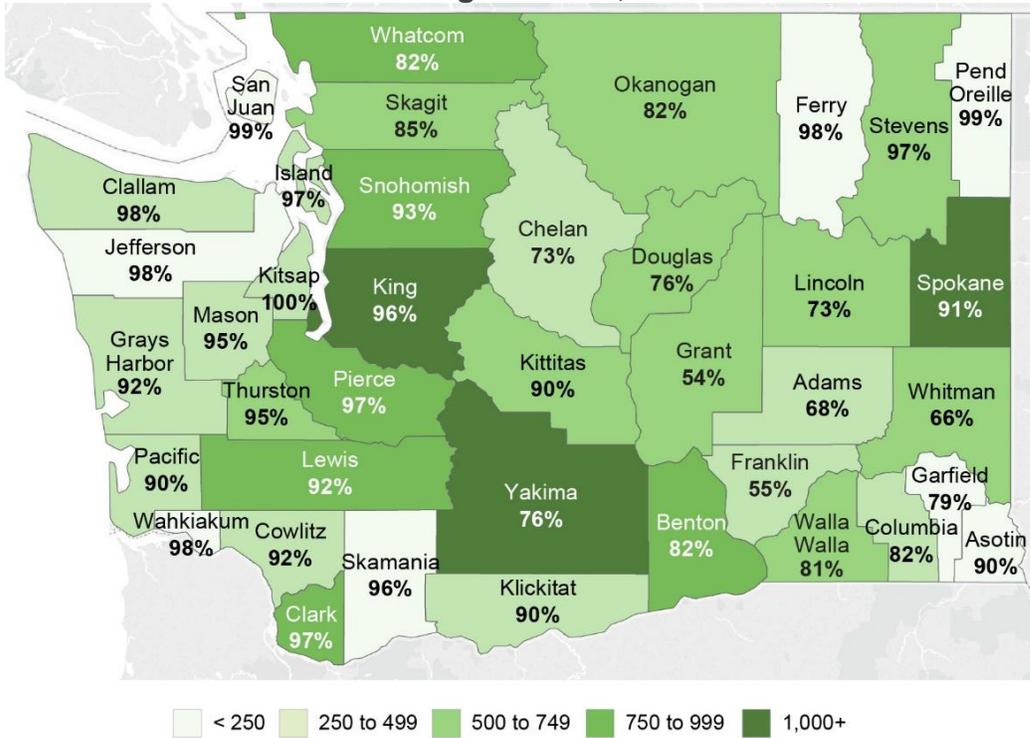
Source: U.S. Bureau of Economic Analysis, 2014; Community Attributes Inc., 2014

4.2 Farm Size

Data on farm sales from the USDA Census of Agriculture are limited to \$500,000 and above at the county level, so the number of large farms (those with sales above \$1 million) cannot be separated from medium farms. The following exhibits illustrate the distribution of farms in three categories – part time farms (less than \$250,000); small (\$250,000 to \$500,000); and medium and large combined (over \$500,000) – along with the percent of total farms for each.

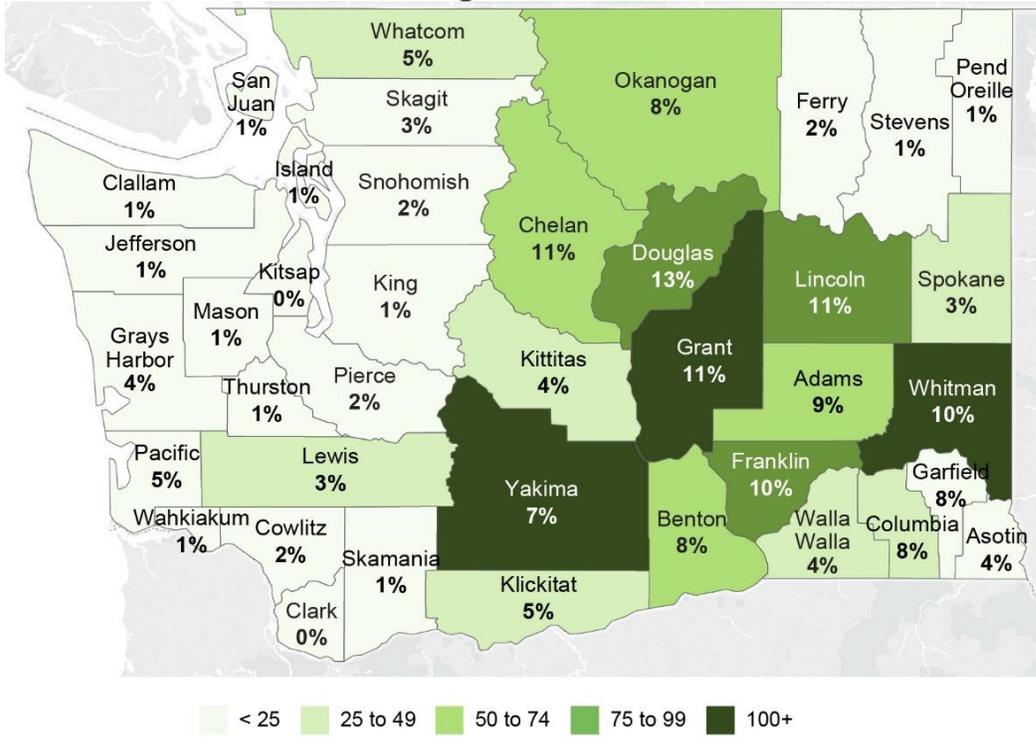
Exhibit 4.6 shows that part time farms are widely distributed throughout the state, with King, Spokane and Yakima each having over a thousand farms in this category. These farms account for 90% or more of farms in many counties, particularly those in Western Washington. Small, medium and large farms are mainly located in Eastern Washington, as illustrated by **Exhibits 4.7 and 4.8**. Around a third of farms in Franklin and Grant had sales above \$500,000; Grant and Yakima each had over 300 farms in this top category.

Exhibit 4.6. Percent Total of Part Time Farms by County, Washington State, 2012



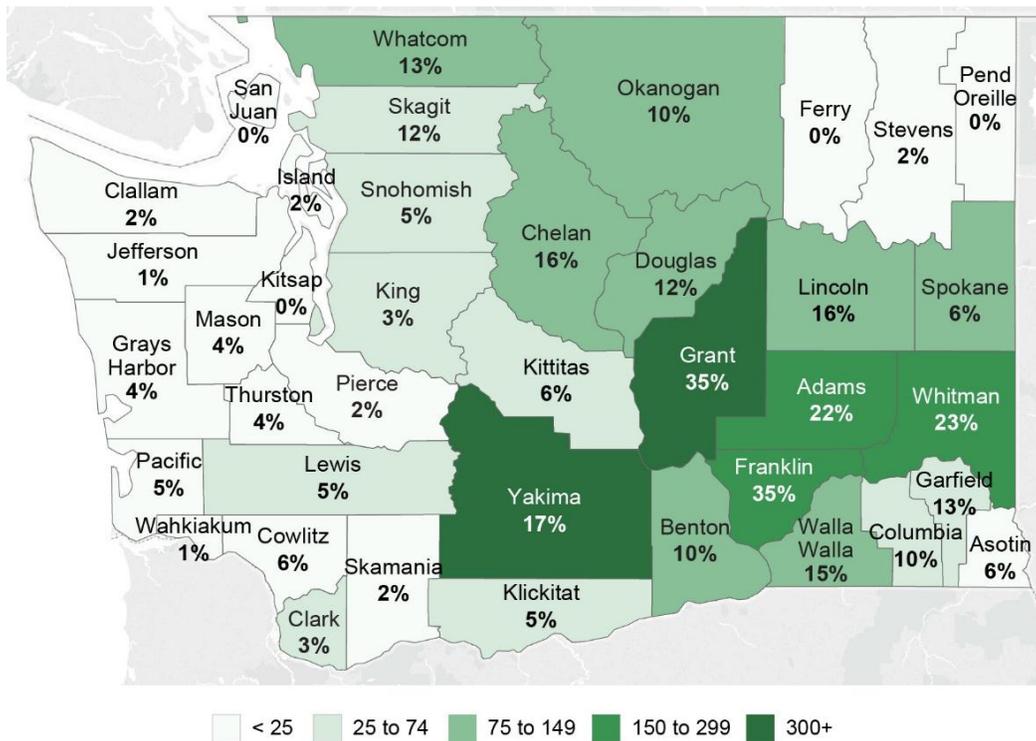
Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014.

Exhibit 4.7. Percent Total of Small Farms by County, Washington State, 2012



Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014.

Exhibit 4.8. Percent Total of Medium and Large Farms by County, Washington State, 2012



Source: USDA Census of Agriculture, 2014; Community Attributes Inc., 2014.

4.3 Employment and Wages

Consistent with the physical distribution of farmland in the state, employment and wages for Crop Production, Animal Production and Agriculture Support Activities are highest in Eastern Washington counties, with the exception of Animal Production in Whatcom (**Exhibit 4.9**). King County, with its major shipping ports and large population centers, is the primary location for Food Processing as well as Wholesale & Distribution activities.

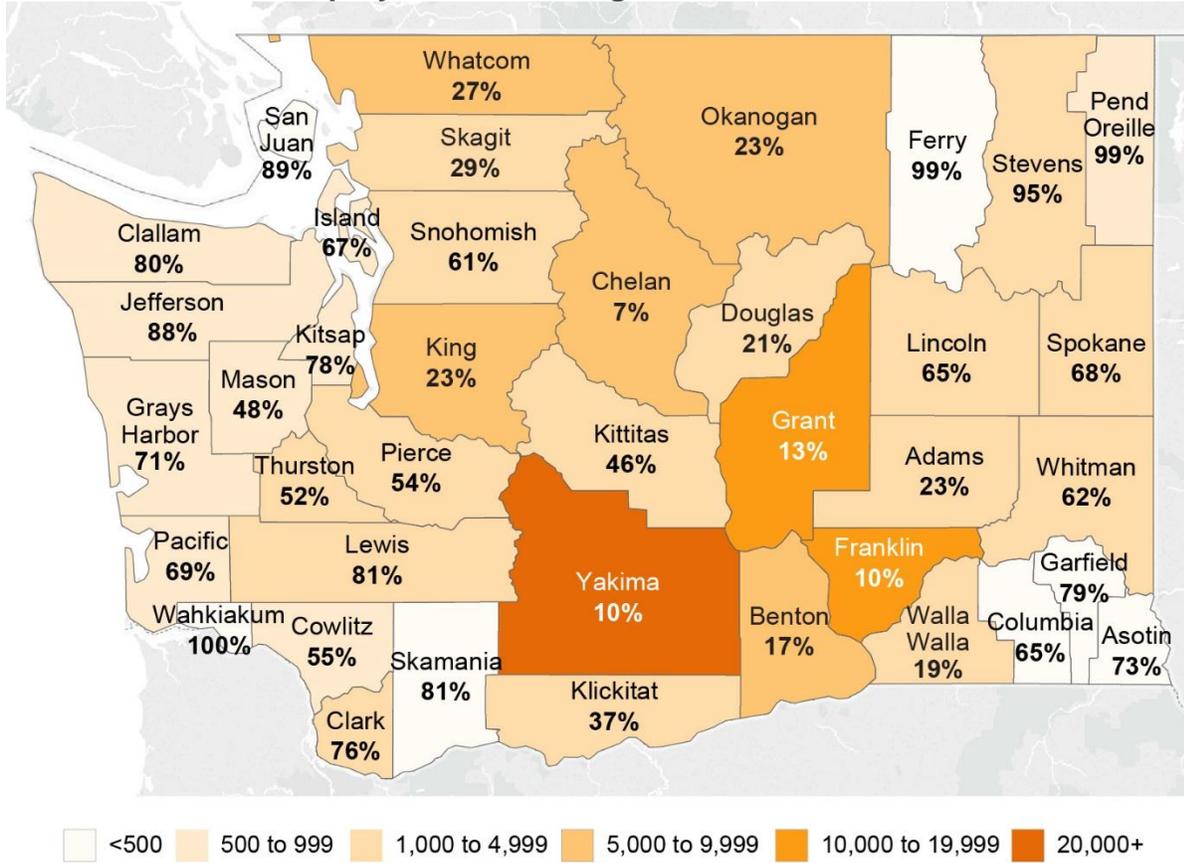
Exhibit 4.9. Top Counties for Agricultural and Food Processing Covered Employment by Share of State Total and Wages, Washington State, 2013

County	Covered Employment	Share of State Total	Wages (\$1,000s)	County	Covered Employment	Share of State Total	Wages (\$1,000s)
<i>Crop Production</i>				<i>Food & Beverage Processing</i>			
Yakima	17,550	28%	411,700	King	2,690	25%	113,700
Grant	8,180	13%	183,500	Franklin	2,450	23%	89,900
Chelan	6,210	10%	120,100	Benton	2,140	20%	90,300
<i>Animal Production</i>				<i>Wholesale & Distribution</i>			
Yakima	1,510	25%	49,400	King	2,660	33%	136,200
Whatcom	710	12%	19,800	Chelan	1,780	22%	60,800
Franklin	570	9%	19,100	Yakima	1,260	15%	44,800
<i>Agricultural Support Activities</i>							
Yakima	8,070	48%	229,800				
Franklin	1,780	11%	48,000				
Grant	1,590	9%	3,300				

Source: Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Covered employment data only capture a portion of total agricultural and food and beverage processing employment across Washington due to substantial numbers of farm proprietors and other self-employed workers in some counties. Self-employment accounts for over 90% of all Agriculture and Food Processing employment in Ferry, Pend Oreille, Stevens and Wahkiakum (**Exhibit 4.10**), which appear to have little to no employment in these industries when viewed solely in terms of covered employment. Though the addition of self-employed workers provides a more complete picture of Agriculture and Food Processing employment, Yakima, Grant and Franklin still have the highest employment numbers out of all counties.

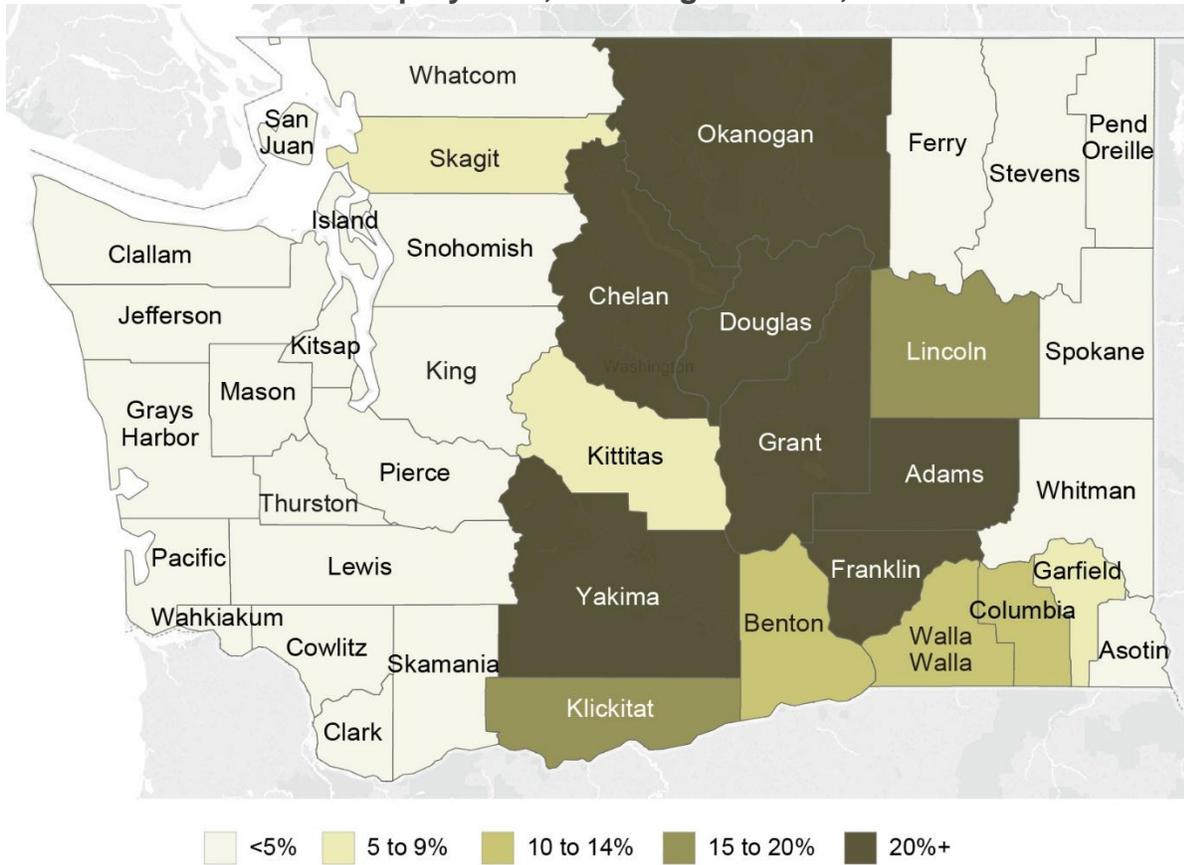
Exhibit 4.10. Percent Self-Employed Agricultural and Food Processing Employment, Washington State, 2013



Source: Bureau of Labor Statistics, 2014; U.S. Census, 2014; Bureau of Economic Analysis, 2014; Community Attributes Inc., 2014.

The relative importance of Agriculture and Food Processing covered employment across Washington varies widely between counties. **Exhibit 4.11** presents all Agriculture and Food Processing covered employment as percent of total covered employment for each county. Although employment in these categories for Adams, Okanogan and Douglas is low relative to other counties, Agriculture and Food Processing jobs comprise over 20% of their total covered employment.

Exhibit 4.11. Percent Total of Agricultural and Food Processing Covered Employment, Washington State, 2013

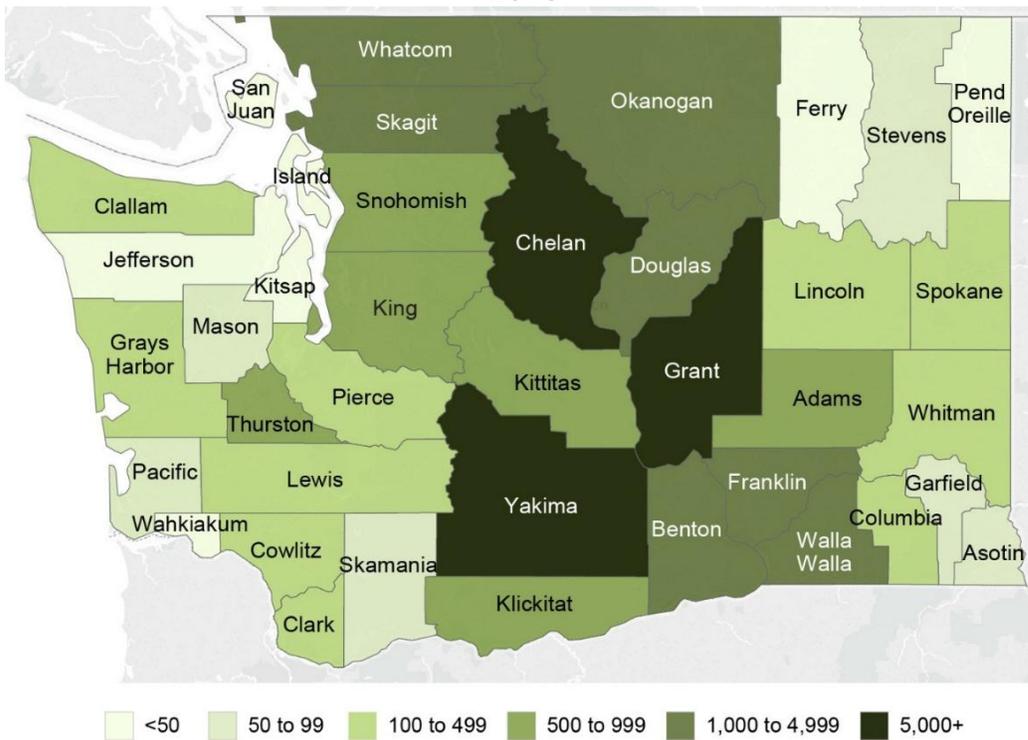


Source: Bureau of Economic Analysis, 2014; Community Attributes Inc., 2014.

Crop Production and Animal Production

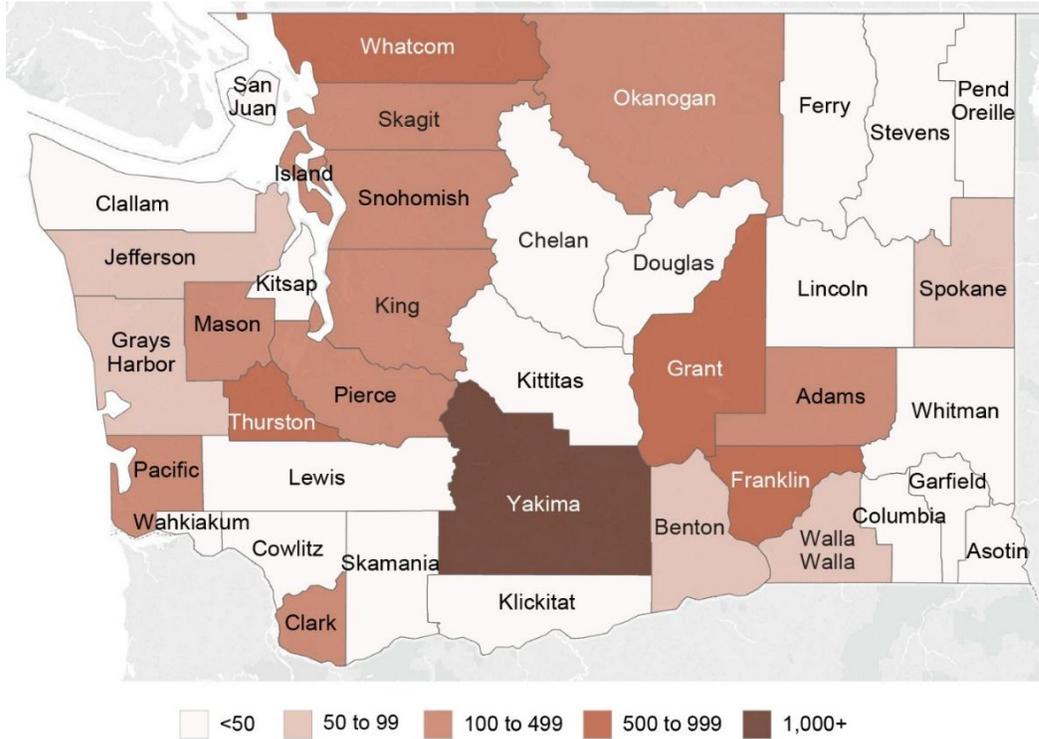
Just as all counties have some amount of land in farms, the majority of counties also have some level of crop and/or animal production employment. **Exhibit 4.12** presents Crop Production covered employment, which is primarily concentrated in Chelan, Grant and Yakima counties, all of which have over 5,000 employees. Animal Production covered employment is less widely distributed and numbers overall are much smaller than those for Crop Production, as seen in **Exhibit 4.13**. Yakima is the only county with more than 1,000 employees engaged in animal production; Whatcom, the second-largest employer for Animal Production, has about half the amount of Yakima.

Exhibit 4.12. Crop Production Covered Employment, Washington State, 2013



Source: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Exhibit 4.13. Animal Production Covered Employment, Washington State, 2013

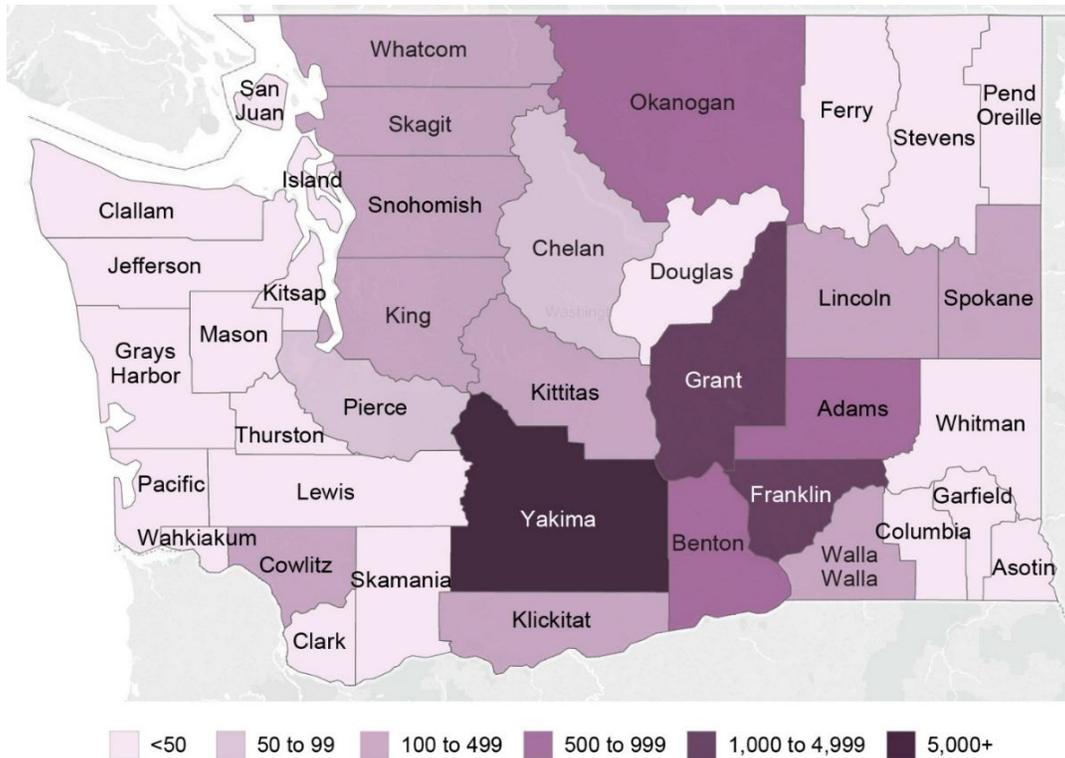


Source: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Agriculture Support Activities

Agriculture Support Activities covered employment, shown in **Exhibit 4.14**, is highest in Yakima, Franklin and Grant counties, all of which have more than a thousand employees in this industry. As this category includes activities that involve preparing agricultural products for food processing and final sale, the locations of these jobs would be expected to generally follow the same patterns of both production and food and beverage processing.

Exhibit 4.14. Agricultural Support Activities Covered Employment, Washington State, 2013

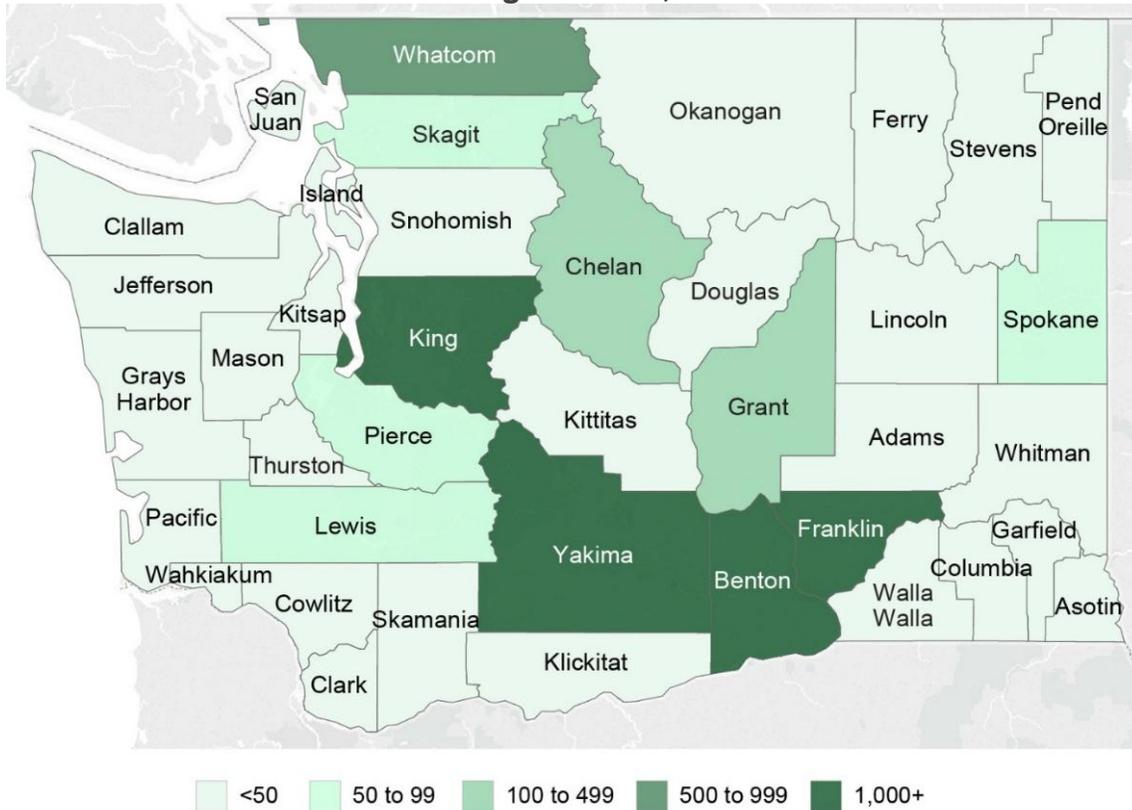


Source: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014

Food Processing

As discussed elsewhere in this report, Food Processing facilities are frequently located near production areas to minimize freight costs, especially for commodities with high water content like apples and potatoes. Processing plants are also frequently located in the vicinity of ports to streamline movement of products into distribution networks. King County, with its major port facilities, has the most Food Processing covered employment in the state, followed by Franklin, Benton and Yakima, counties with high levels of Crop Production (**Exhibit 4.15**).

Exhibit 4.15. Food Processing Covered Employment, Washington State, 2013



Source: U.S. Bureau of Labor Statistics, 2014.

Mobile Processing Units

Washington State law requires USDA-approved slaughter for meat sold by the cut or package, so farmers hoping to reach a larger market must process their animals in an inspected facility. As small processing plants have closed due to the consolidation of the meat processing industry, smaller farms have found it prohibitively expensive to transport their animals to the nearest facility, which may be hundreds of miles away. USDA-inspected mobile animal processing units can be driven directly to a farm, saving farmers the cost of transporting their animals, and require considerably less investment than traditional brick-and-mortar plants. Mobile processing units also help avoid potential neighborhood/community resistance to the construction of a new animal processing facility. These units, which can process either larger livestock or poultry and rabbits, are available in a number of different counties throughout Washington as a result of farmer-driven demand.

The Island Grown Farmers' Cooperative in San Juan County has operated a mobile livestock slaughter unit—the first in the nation—since 2002. Counties in the Southern Puget Sound region have had a mobile meat processing unit since 2008 due to the efforts of the Puget Sound Meat Producers Cooperative. Through the North Cascade Meat Producers Cooperative Producers (NCMPC), Island, Skagit, Snohomish, and Whatcom counties will have a mobile unit in early 2015. Since these units can be used for slaughtering only, farmers also need access to a USDA inspected cut and wrap facility. For example, the NCMPC has an established partnership with Del Fox Meats in Stanwood to provide these services.

In the state's northwest counties, the Community Agriculture Development Center, has a mobile poultry processing unit (MPPU) available to farmers in Ferry, Pend Oreille and Stevens. Counties in the northwestern region also have access to a MPPU through the Northwest Agriculture Business Center in Mount Vernon, an effort that was spurred by the closure of the last remaining custom slaughter facility in the area.²²

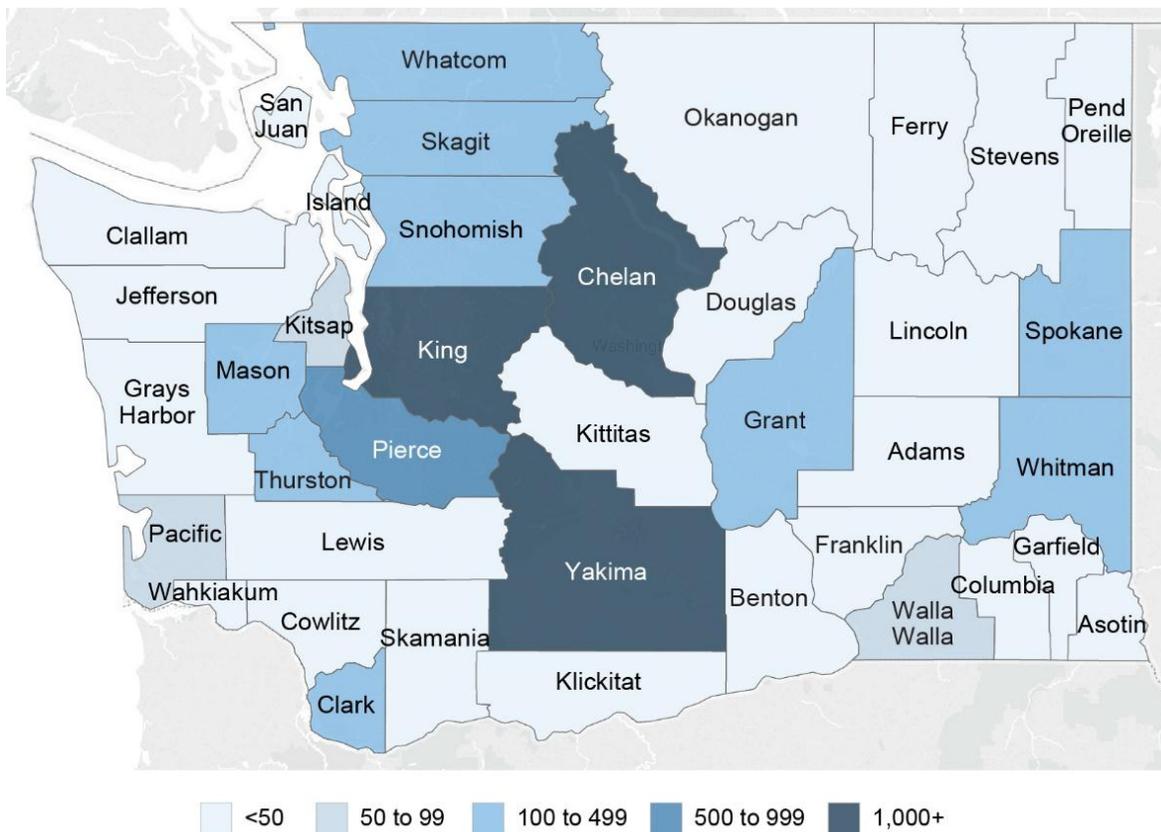
²² "Niche Meat Processors Assistance Network's Mobile Slaughter Unit Manual," 2010, <http://smallfarms.wsu.edu/animals/processing.html>

Wholesale & Distribution

Wholesale & Distribution covered employment is smaller in scale and more sparsely distributed throughout Washington compared to Food Processing, as shown in **Exhibit 4.16**. The pattern broadly follows that of Agriculture Support Activities and Food Processing, both of which have employment categories that directly tie into Wholesale & Distribution activities, such as export assistance under Agriculture Support Activities.

Clark, King and Pierce counties all have port facilities that support warehousing and distribution activities, creating employment in this category. Counties with large-scale agricultural production, such as Chelan, Whitman and Yakima, also have a high levels of Wholesale & Distribution employment in order to move products, whether fresh or processed, out into the market domestically or internationally.

Exhibit 4.16. Wholesale & Distribution Covered Employment, Washington State, 2013



Source: U.S. Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

4.4 Clustering of Production and Value-Added Activities

As indicated by the preceding analysis, which is supported by qualitative information gathered from interviews, industries that process agricultural products or support agricultural production are often located near farms to minimize transportation costs. This is especially true for crops that have relatively high water content – processes like dehydration reduce water weight, making subsequent freight to wholesale and distribution networks far more efficient. The following exhibits map Crop Production and Animal Production cash receipts and milk sales by county with their respective category of food processing employment, scaled by number of employees on site.

Crop Production and Crop Processing Employment

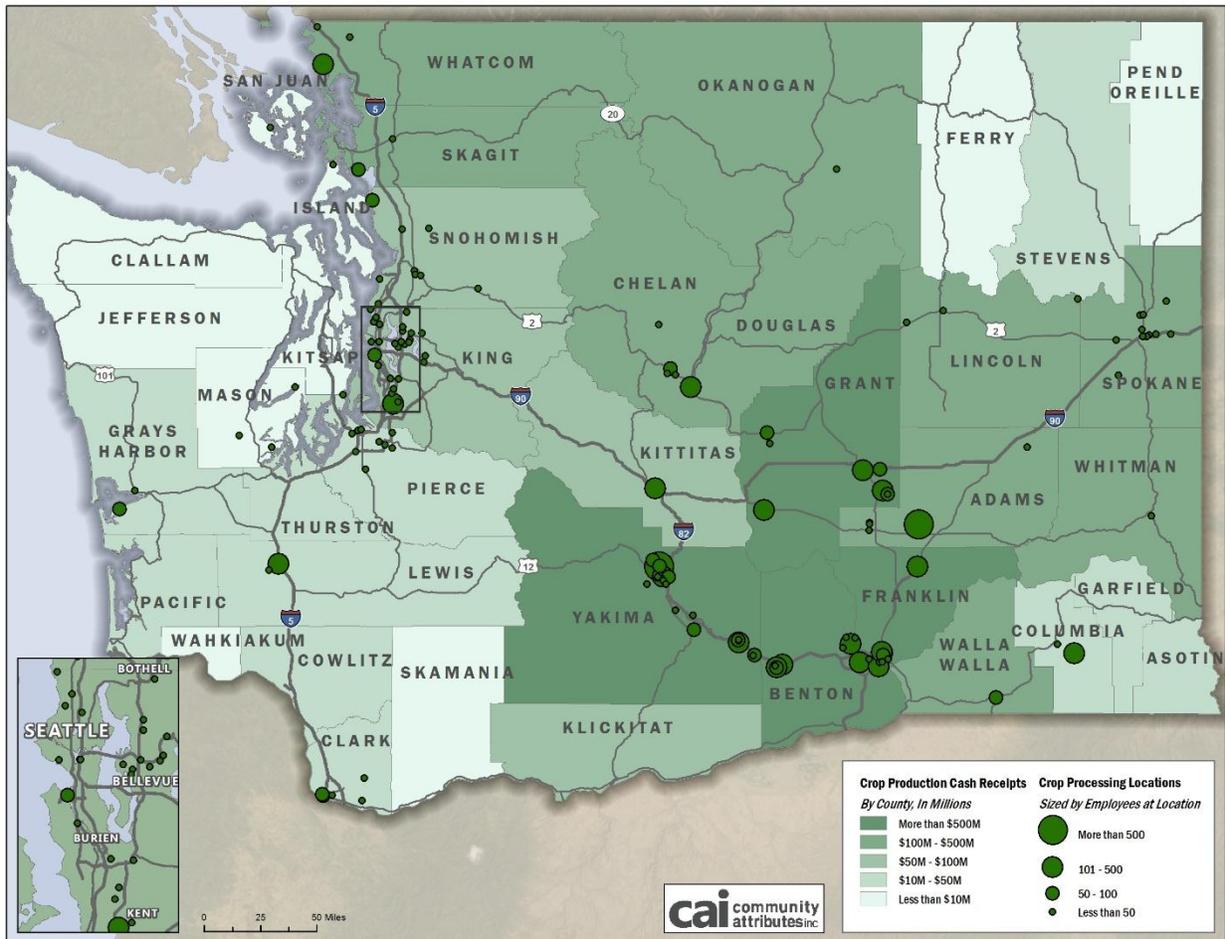
Exhibit 4.17 displays Crop Production cash receipts overlaid with crop processing locations. Here, the geographic association between production and processing is clear; where cash receipts are highest, processing employment is the greatest. Crop Production is concentrated in Benton, Franklin, Grant and Yakima counties, all of which feature abundant, fertile farmland and an excellent growing climate for crops like sweet corn, potatoes, wheat and apples.

Many crop processors are thus strategically located in a rough ring in the south central portion of the state that is defined by Interstate-90 to the north and Interstate-82 and US Route 395 to the west and east, respectively. Yakima and the Tri-Cities have the largest number of processors, including major employees such as ConAgra Lamb Weston (potatoes) and grower-owned Tree Top (apples) in Selah and Del Monte (sweet cherries, plums, pears and apples) in Yakima. These locations are ideal because they provide easy access to highways that connect the processing plants to distribution infrastructure as well as growers in the vicinity.

Washington counties, particularly those west of the Cascades, are also known for their production of red raspberries. Whatcom County produced over 90% of the state's total in 2013, while Skagit and Snohomish accounted for 2.5%. Much of the crop is processed into purees, juice stock or are individually quick frozen (IQF). Berry processors are generally located near these production areas in cities like Lynden and Ferndale (Whatcom), but in some cases, the harvested crop may be transported to Eastern Washington to be processed.

Crop processing employment is high in the Puget Sound region, particularly in the Seattle area, which also holds true for animal and dairy processing. The area's ports, both sea and air, makes it an ideal location for processing, warehousing, packaging and distribution-related activities.

Exhibit 4.17. Crop Production Cash Receipts and Crop Processing Employment, Washington State, 2012



Source: Bureau of Economic Analysis, 2014; Hoovers, 2014; Community Attributes Inc., 2014

Animal Production and Animal Processing Employment

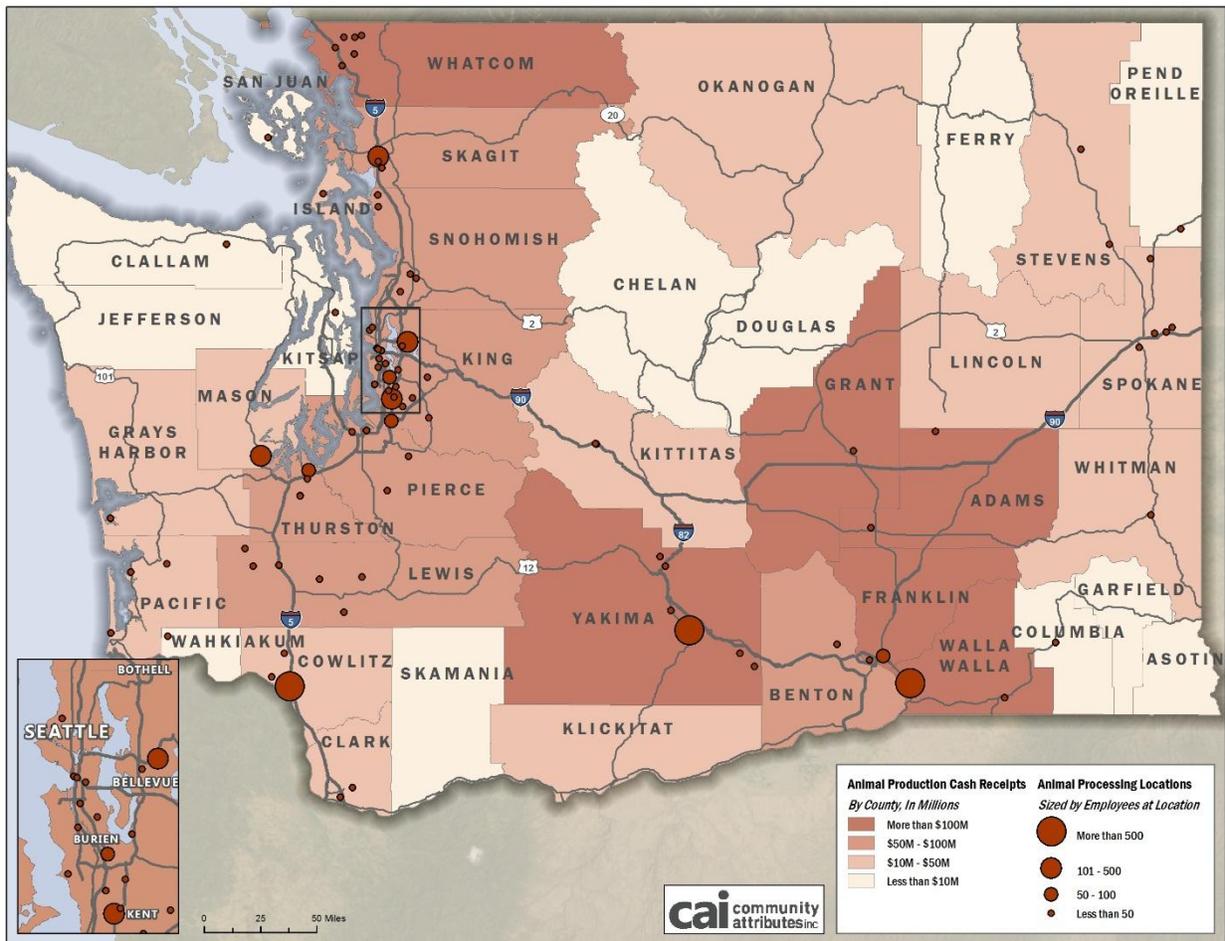
Exhibit 4.18 presents Animal Production cash receipts and locations of animal and animal by-product processors. Similar to the previous exhibit, counties with the highest amount of cash receipts also had higher levels of associated processing employment, though Animal Production cash receipts are slightly more evenly distributed between Eastern and Western Washington. The Interstate-82 corridor leading to Interstate-90, along with feeder roads in Franklin and Walla Walla counties, is prominent. Large operations in this area are Tyson Foods (beef) near Pasco and Washington Beef, LLC, in Toppenish.

Given its relatively low level of production, Cowlitz has an unusual concentration of animal processing employment, mostly attributed to the Foster Farms poultry processing plant in Kelso, which was the company's first new facility outside of California. This location near I-5 and the Port of Longview supports the company's focus on distribution in the Pacific Northwest. In the northwestern counties, Whatcom and Skagit have

relatively high levels of cash receipts and employment. Perdue Foods-owned Draper Valley Farms (chicken) in Mt. Vernon is the largest single employer in the area.

The Island Grown Farmers Cooperative in San Juan County has operated a mobile unit, the first in the nation, since 2002. Through the North Cascade Meat Producers Cooperative Producers, Island, Skagit, Snohomish and Whatcom counties will have a mobile unit in early 2015. They also have an established partnership with Del Fox Meats in Stanwood to provide the cutting and wrapping services unavailable through the mobile unit.

Exhibit 4.18. Animal Production Cash Receipts and Animal Processing Employment, Washington State, 2012



Source: Bureau of Economic Analysis, 2014; Hoovers, 2014; Community Attributes Inc., 2014.

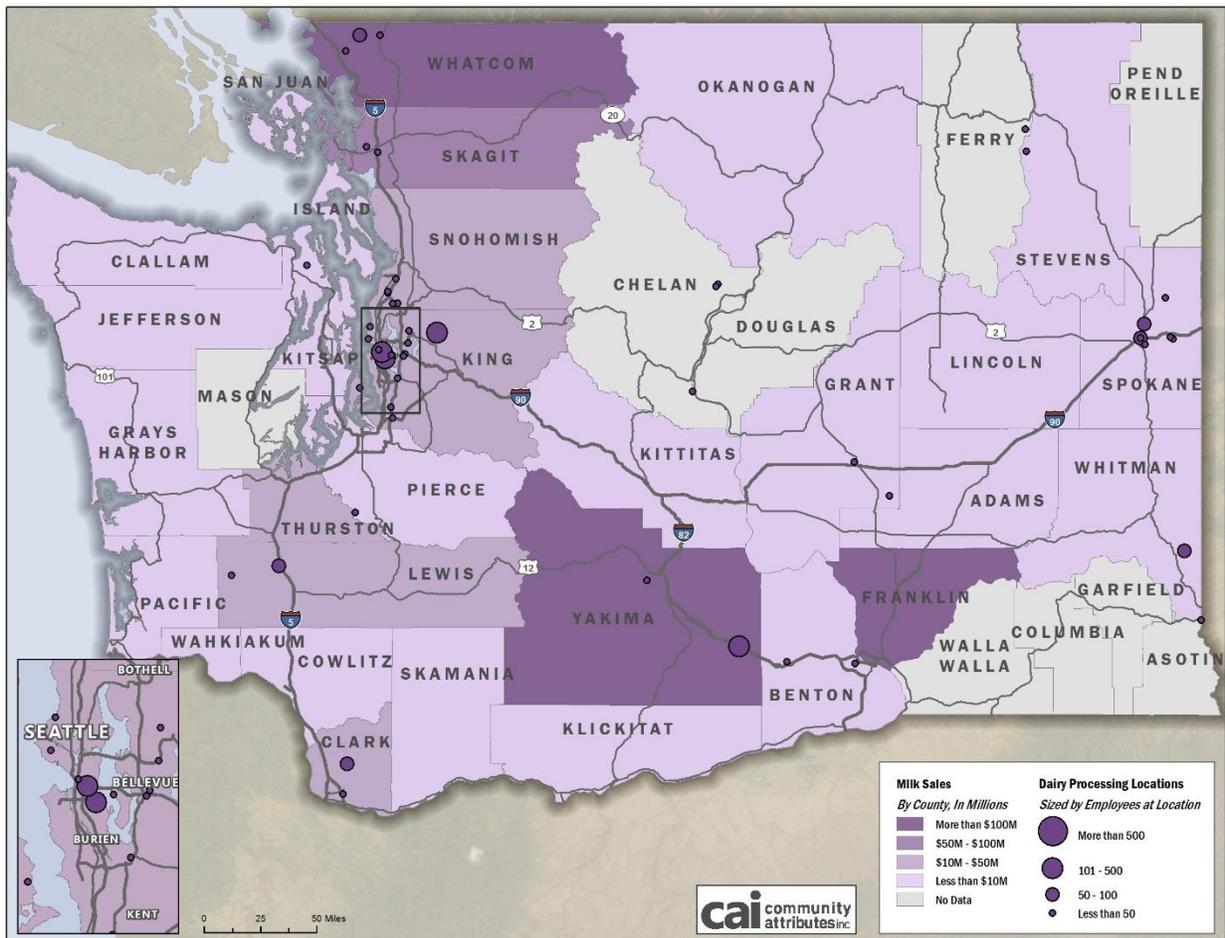
Milk Production and Dairy Processing Employment

Milk sales and dairy processing employment are mapped in **Exhibit 4.19**. The distribution of milk sales share some similarities with the previous exhibit because animal production cash receipts includes data from animal products like milk. However, the pattern is dissimilar to Crop Production and Animal Production and processing because of climate factors and access to distribution networks. Counties with higher levels of

milk sales are predominately clustered in the western part of the state. The notable exceptions of Franklin and Yakima counties reflect a larger trend where dairies are shifting east due to limited land availability and higher land costs in Western Washington (see box).

Dairy processors are concentrated in more urbanized areas with few locations in counties with high levels of milk sales, unlike crop and animal processing. This is due to the nature of fresh milk, which requires little processing unless it is converted into other products. Processors receive no reduction in transportation costs by processing fresh milk near production areas because they are not reducing the water weight of the raw product prior to distribution. As a result, they may choose to locate near major distribution points, such as Darigold in Seattle, to expedite movement of milk into the market.

Exhibit 4.19. Milk Sales and Dairy Processing Employment, Washington State, 2012



Source: USDA Census of Agriculture, 2014; Hoovers, 2014; Community Attributes Inc., 2014.

Shifts in Dairy Production

An important trend in recent decades has been the movement of dairy production from the western slopes of the Cascades into Eastern Washington. Washington currently ranks 10th in the nation for dairy production. At approximately \$1.3 billion in sales, milk was second only to apples as the state's most valuable agriculture commodity in 2013. In 2012, the dairy industry included 480 farms and 262,000 head of cattle. Of these, 34 farms and roughly 4.3% of the state herd were certified organic, and 50% of local dairy production is exported. Almost every county in the state had at least one dairy farm in 2012. Whatcom had the most dairy farms, but Yakima, with more than twice Whatcom's number of milk cows, was by far the most productive, accounting for nearly 40% of the state's total milk sales.

Although milk and dairy products are important contributors to the state's agricultural economy, Washington's geography limits the dairy industry's growth potential. The Cascades create two very different weather patterns on either side of the range. On the western side, rainfall and temperatures are more stable, creating ideal foraging land and climate for cows. The proximity to major ports and cities also makes land closer to the coast highly desirable. These factors used to be enough to draw dairies to the region.

As land has become increasingly scarce in the area due to development and competition with high-value crop producers, dairies have been forced to move east to find affordable, plentiful land, causing the majority of production to shift away from traditional dairying areas. The central part of the state, starting on the eastern slopes of the Cascades, has less frequent and stable rainfall, but a more developed irrigation system than elsewhere in Washington.

Given the additional transportation cost of locating dairy farms in Eastern Washington, many dairies are choosing instead to wait for competitors or similar farms to close on the western side of the Cascades. These dairies then purchase or lease the land and upgrade the facilities to their specific needs.²³

²³ Chapman, Shirley, "Washington Limited by Geography," AgWeb Dairy Today, April 2 2014, http://www.agweb.com/livestock/dairy/article/washington_limited_by_geography_NAA_Dairy_Today_Guest_Editor/; Washington Dairy Farmers, wadairy.com.

5.0 ECONOMIC IMPACTS OF AGRICULTURE AND FOOD PROCESSING IN WASHINGTON STATE

Economic impacts refer to direct, indirect, and induced impacts of Agriculture and Food Processing activities in Washington State. Direct jobs refer to all jobs, wages, and business revenues among all relevant activities defined as belonging to the Agriculture and Food Processing supply chain in Washington, as delineated in **Section 2** of this analysis. Indirect impacts reflect jobs, wages, and revenues supported by direct activities through business-to-business transactions, such as the many input purchases between and among industries within the supply chain. Lastly, induced impacts represent additional jobs, wages, and business revenues generated or supported by the spending of a share of income earned among directly and indirectly employed workers, e.g., revenues and resulting jobs and income supported in retail industries by food processing workers spending disposable income on local services.

One of the challenges in estimating the economic impacts of the supply chain is the calculation of final demand and the avoidance of double-counting. Final demand refers to the sale of Agriculture and Food Processing goods and services to households, as exports (foreign and domestic), or to government; sales of goods and services to other producers are considered “intermediate sales” and excluded from this total. The reason has to do with double-counting of the value of these goods and services. For example, when a potato is sold to a food processor, the value of that commodity is carried over into the sales of the processed good (e.g., frozen French fries) when it is then sold to a distributor or restaurant chain.

Some (but not all) of the agriculture jobs in Washington State are supported through food processor demand for agricultural products—these agriculture jobs are therefore reflected as “indirect” jobs in the calculation of economic impacts of food processing. For example, as discussed above, roughly 95% of apples are sold as fresh pack and wholesaled; only the remaining 5% (by value) would be subject to double-counting when purchased by Washington-based apple juice and cider producers. Conversely, potato growers in Washington sell an estimated 90% of their crop to food processors as an input, and grape growers sell close to 100% of their crop to wineries and juice producers. In the latter, for example, the value of the grapes would be captured in the final sale of wine and grape juice. These activities thus illustrate an extensive value-added food production process.

The remainder of this section begins by detailing the contributions of each segment of the supply chain separately. The total economic impact of the supply chain is then presented, with adjustments for the above-discussed double-counting of impacts. A more in-depth explanation of methods used in this analysis can be found in **Appendix D**.

5.1 Economic Impacts per Segment of the Supply Chain

The sections below detail the specific economic impacts of each segment of the supply chain, separate from other activities delineated in this analysis.

Crop Production

Crop Production in Washington State directly involved an estimated 94,100 workers in 2013, including both hired workers and farm proprietors, and more than \$7.1 billion in business revenues. Added to these revenues, more than \$1.8 billion in additional sales were generated through the purchasing of goods and services in support of agriculture production, such as fertilizers, farm equipment, and many of the other expenses discussed in **Section 3**. These companies in turn purchased additional inputs needed to provide these goods and service to crop producers. Based on these sales, an additional 7,600 workers were supported through these activities, i.e., indirect jobs, along with an additional \$397 million in labor income (**Exhibit 5.1**). A share of total direct and indirect income tied to Crop Production—a sum of nearly \$3.0 billion—was then re-spent throughout the economy, supporting an additional 34,700 workers, with the largest impacts in waste management and agriculture services (5,600 jobs), other retail (a category that includes online sales; 4,900 jobs), and food services and drinking places (3,500 jobs).

Exhibit 5.1. Crop Production Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	94,100	7,600	34,700	136,400
Labor Income (mils \$)	2,823	397	1,697	4,917
Business Revenues (mils \$)	7,121	1,840	5,321	14,282

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

In total, Crop Production activities supported (through direct and multiplier effects) 136,400 jobs, more than \$4.9 billion in labor income, and \$14.3 billion in business revenues. For every dollar of business revenue generated by growers, an additional \$1.00 is generated elsewhere in the economy, and every job is associated with a total of 1.44 jobs across the economy.

Animal Production

Animal Production activities directly generated an estimated \$2.7 billion in business revenues, based on activities of ranchers, aquaculture farmers, and other livestock activities. These revenues corresponded with 9,600 jobs (including hired workers and proprietors) and \$345 million in labor income. Factoring in business-to-business transactions and induced impacts, Animal Production supported a total of \$5.3 billion in revenues and 24,200 jobs across the state in 2013 (**Exhibit 5.2**). Crop Production was a major supplier, with indirect sales to Animal Production of \$252 million, including cattle feed.

Exhibit 5.2. Animal Production Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	9,600	7,100	7,500	24,200
Labor Income (mils \$)	345	363	366	1,074
Business Revenues (mils \$)	2,666	1,528	1,146	5,340

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

Agriculture Support Activities

The largest type of activity within Agriculture Support Activities in 2013 was other post-harvest crop activities, including activities related to the preparation of harvested crops for either food processing or final sale, such as packaging. Among activities in this segment, total business revenues summed to \$3.7 billion. However, a large share of these jobs, wages, and business revenues are supported through the purchases of crop and animal producers, such as soil preparation. Many of these activities are thus captured through the economic impacts of primary commodity producers.

Factoring in indirect and induced impacts, these activities supported more than \$6.3 billion in business revenues in 2013 and 40,800 jobs (**Exhibit 5.3**). The largest impacts through business-to-business transaction were in other construction activities (\$105.5 million) and credit intermediation and related activities (e.g., financial services and borrowing of credit for business operations; \$105.0 million).

Exhibit 5.3. Agriculture Support Activities Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	24,400	4,700	11,700	40,800
Labor Income (mils \$)	941	273	574	1,787
Business Revenues (mils \$)	3,683	836	1,796	6,314

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

Food Processing

Food Processing activities generated more than \$7.5 billion in business revenues in 2013, supporting 25,400 jobs and more than a \$1 billion in labor income. This segment of the supply chain, as an important purchaser of raw, locally produced commodities, helps to drive business revenues, employment, and wages among some primary producers and supporting activities, such as the case with potatoes.

Indirect business revenues supported by processors totaled \$6.0 billion in 2013 (**Exhibit 5.4**). Based on IMPLAN modeling, Washington-sourced Crop Production and Animal Production purchases by processors constituted approximately 12.5% of all purchases (including other inputs and value added). The largest indirect revenue impacts from processing were in Animal Production (\$1.4 billion), Crop Production (\$1.1 billion), and among other food and beverage processing firms (\$695.7 billion).

The total impact of food processors in 2013 summed to \$17.7 billion in business revenues and 85,300 jobs with total wages of over \$4.2 billion. An estimated 10,100 jobs within Crop Production—or approximately 17% of all Crop Production jobs in Washington—were supported through Crop Production sales to processors. Essentially all Animal Production jobs are supported by processing demand.

Exhibit 5.4. Food Processing Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	25,400	32,900	27,000	85,300
Labor Income (mils \$)	1,258	1,652	1,330	4,241
Business Revenues (mils \$)	7,539	6,040	4,163	17,742

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

Processors in Communities

Once the largest asparagus cannery in the world, Green Giant's plant in Dayton, the county seat of Columbia County, closed its doors in 2005 after nearly 70 years in the asparagus business. The plant was once a major component of the local economy, so much so that nearly twenty years ago, locals created a massive outline of the Jolly Green Giant out of paving stones on a steep hillside. Fifty full time and roughly 1,000 seasonal jobs were eliminated from Dayton, a city with 2,600 residents at the time. "Maybe because we're so small and the factory was such a huge percentage of who we were that we have felt so much that we were *the* valley of the Jolly Green Giant," explained Jennie Dickinson, Director of Dayton's Chamber of Commerce.²⁴

²⁴ Return of the Green Giant, Wren and Dian McClurg, Waitsburg Times, 2011

http://www.waitsburgtimes.com/news/2011-02-17/Touchet_Valley_News/Return_Of_The_Green_Giant.html. Jolly Green Giant Left Town, But His

Image Remains, Harriet Baskas, OPB, 2007 <http://www.opb.org/news/article/jolly-green-giant-left-town-his-image-remains/>.

Green Giant’s closure in Dayton reflected a combination of market forces and geopolitical issues. As part of the War on Drugs, the federal government began offering incentives to Andean farmers to switch their crops from coca leaves to vegetables under the Andean Trade Preference Act (ATPA). The lower cost of producing asparagus in South America encouraged Green Giant to start purchasing asparagus elsewhere.

From two years before the ATPA went into effect to two years after, Washington’s harvested acreage of asparagus dropped from over 22,000 acres to under 16,000 acres. When the Green Giant plant closed, Washington asparagus production dropped even more dramatically to less than 7,000 acres. By 2012, just over 4,000 acres were being harvested annually. Most of the loss was seen in Franklin, Yakima, and Walla Walla counties. As a crop, asparagus takes more time to establish than other vegetables, as long as four years. As a result, the cost of shifting production prematurely is higher for asparagus than for annual crops like wheat, encouraging farmers to be more cautious about shifting production.

Seneca Foods, the company that operated Green Giant’s plant, is still in Dayton. Instead of canning food, the company is involved in seed research, and employs 25 people.

Wholesale & Distribution

Wholesale & Distribution activities represent the forward linkages of the Agriculture and Food Processing supply chain—the shipment and wholesaling of raw commodities and markets for those goods. In 2013, Wholesale & Distribution activities directly generated \$2.5 billion in business revenues. Factoring in multiplier effects of these activities, nearly \$4.0 billion in business revenues were supported across the state (**Exhibit 5.5**). These revenues in turn supported 20,200 jobs with total wages of \$1.0 billion, or approximately \$49,800 per worker.

Wholesale & Distribution activities support other wholesaling activities, too. Approximately \$70.2 million in additional sales within wholesaling were supported by business-to-business demand from Wholesale & Distribution businesses.

Exhibit 5.5. Wholesale & Distribution Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	10,800	2,800	6,600	20,200
Labor Income (mils \$)	523	163	321	1,007
Business Revenues (mils \$)	2,497	490	1,006	3,993

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

5.2 Economic Impacts of the Entire Supply Chain

To present a comprehensive assessment of the cluster’s statewide economic impact, supply chain linkages and value-added activities need to be considered. In some cases, agricultural commodities output is not sold directly to wholesalers for domestic or international distribution, but to local food processors who then use these commodity

goods as inputs into a manufacturing process, e.g., French fries, frozen packaged vegetables, or wine. These commodities are thus referred to as intermediate inputs, and must be subtracted from economic impact totals for the cluster to avoid double-counting the value of these goods.

Final demand refers to the sale of goods and services to end users. In other words, total sales less sales to intermediate users. In 2013, final demand from the combined activities of the Agriculture and Food & Processing supply chain summed to \$19.5 billion, reflecting some output deductions due to grain, vegetable, and fruit sales to processors, as well as the sale of goods from one processor to another.

Similarly, the majority of Agriculture Support Services directly supporting the production of crops and animal producers were thus deducted. The majority of Animal Production activities were deducted due to the majority of related sales as intermediate products to meat and dairy processing.

The \$19.5 billion in final demand revenues were directly associated with 128,900 employees (hired and proprietors) and more than \$4.0 billion in wages, less benefits (**Exhibit 5.6**). This final demand supported a total of 220,600 jobs statewide in 2013.

Exhibit 5.6. Agriculture and Food Processing Economic Impacts, Washington State, 2013

Type of Impact	Direct	Indirect	Induced	Total
Jobs	128,900	31,500	60,200	220,600
Labor Income (mils \$)	4,043	1,757	2,940	8,740
Business Revenues (mils \$)	19,488	6,712	9,359	35,559

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

These impacts can be translated into multipliers to describe the ripple effects of these activities across the economy. For example, for every \$1 in direct final demand sales, another \$0.82 is created through business-to-business transactions and spending of personal income throughout the economy. Likewise, each direct job is associated with almost one additional job across the economy (**Exhibit 5.7**). Additionally, each dollar of direct labor income creates another \$1.16 in labor income throughout the economy. For every \$1 in final demand more than 11 jobs are supported throughout the economy.

Exhibit 5.7. Agriculture and Food Processing Supply Chain Economic Multipliers, Washington State, 2013

Total output per \$ final demand	\$1.82
Total jobs per direct job	1.71
Total labor income per \$ direct income	\$2.16
Total jobs per \$ mil final demand	11.32

Sources: Washington State Office of Financial Management, 2014; Community Attributes Inc., 2014.

One major driver of these impacts is the apple industry. In 2012-13, the apple industry—including orchard production, fresh packing, processing, marketing, and research—directly generated \$3.4 billion in revenues. These activities in turn supported an additional \$4.1 billion in business revenues among other sectors of the economy across the state, resulting in a total economic impact of \$7.5 billion. The apple industry supply chain, inclusive of the segments discussed above, during the 2012-2013 season directly employed over 39,300 workers and supported 21,900 jobs through indirect and induced impacts. The industry directly paid over \$955 million in labor income in 2012-13, with an additional \$1.05 billion in income payments through indirect and induced effects.²⁵

²⁵ Globalwise, Inc. and Belrose, Inc., (2014). *The Washington Apple Industry*. Vancouver, WA.

6.0 FISCAL IMPACTS OF AGRICULTURE AND FOOD PROCESSING IN WASHINGTON

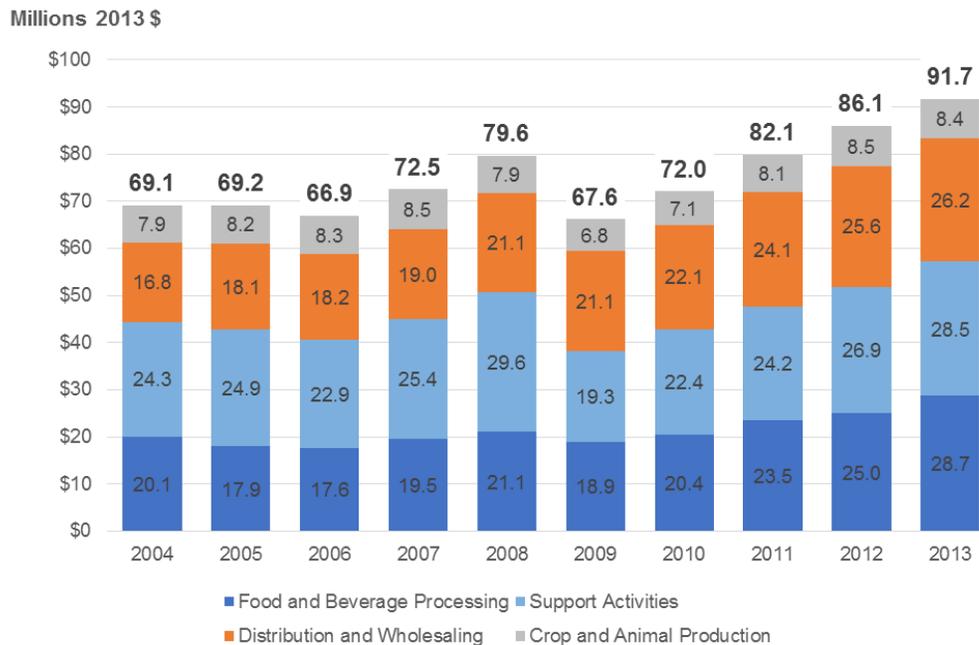
6.1 Overview

Washington State's Agriculture and Food Processing cluster has both direct and indirect fiscal impacts. Crop and Animal Production, Wholesale & Distribution, Food Processing, and Agriculture Support Activities totaled \$91.7 million in direct fiscal impacts in 2013.

6.2 Direct Impacts

Exhibit 6.1 below summarizes the taxes paid by Washington's agricultural sector from 2004 to 2013 adjusted to 2013 dollars. Total taxes paid by the sector dropped in tandem with the 2008-2010 recession, and have since recovered at a consistent rate. From 2009 to 2013, total taxes paid by the sector increased by roughly 8% per year, peaking in 2013 at \$91.7 million. The largest direct tax contributions in 2013 came from Food Processing, with \$28.7 million in payments.²⁶

Exhibit 6.1. Direct State Tax Payments by Segment, Washington State, 2004-2013 (millions, 2013 \$)



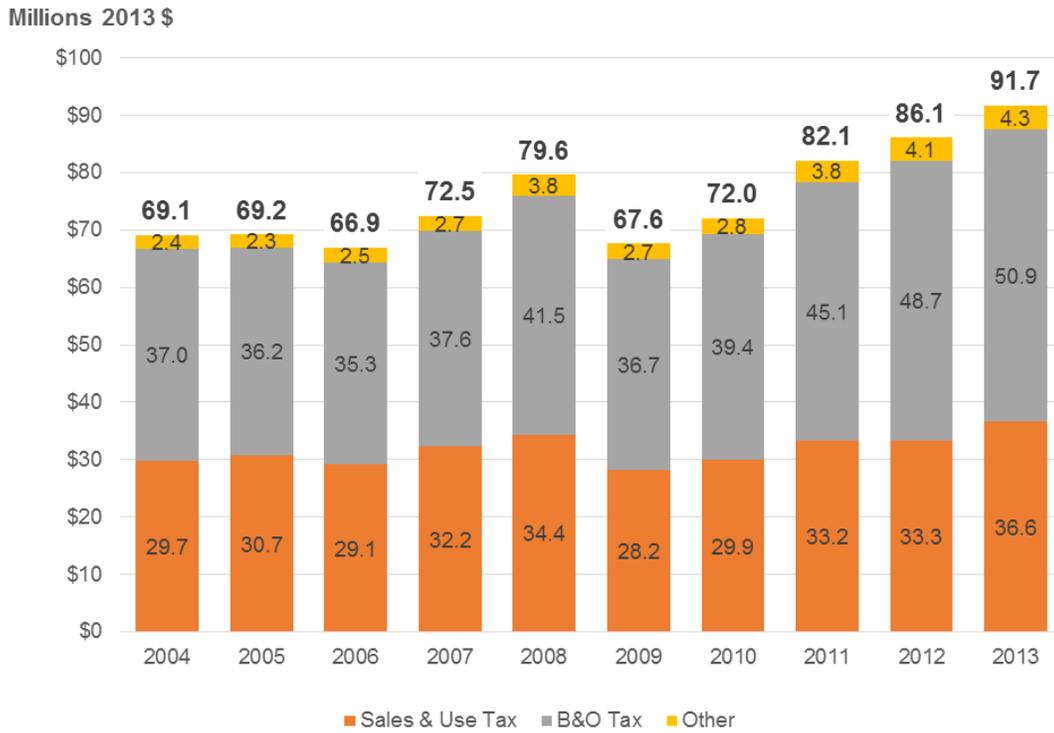
Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

²⁶ Shellfish processing tax data is not captured with the existing level of detail in NAICS reporting. To estimate the direct fiscal impact of shellfish processing, the ratio of GBI to tax payments for NAICS 31171, seafood processing, was applied to the GBI of shellfish processors in Washington State.

Exhibit 6.2 below describes the breakdown of taxes paid by the sector from 2004 to 2013, adjusted to 2013 dollars. The dip in taxes paid from 2005 and 2006 coincides with the state Legislature's decision to change the preferential B&O rate for certain food processors to a full exemption.

B&O taxes paid throughout the supply chain accounted for more than 55% of the direct impact in 2013. The “other” category of taxes includes quantity taxes and public utility fees.

Exhibit 6.2. Direct Fiscal Impacts of Agriculture by Tax Category, Washington State, 2004-2013 (millions, 2013 \$)



Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

6.3 Total Fiscal Impacts

Fiscal impacts stretch beyond the direct payments made through activities identified in this analysis. Total fiscal impacts include supporting activities that earn taxable business revenues through supply chain linkages with Agriculture and Food Processing activities, as well as revenues generated through induced (income-supported) spending throughout the economy. In 2013, Agriculture and Food Processing activities supported, either directly or through multiplier effects, \$362.9 million in state taxes (**Exhibit 6.3**). The largest share of this came from sales and use taxes (\$202.7 million), with \$133.2 million coming from B&O taxes.

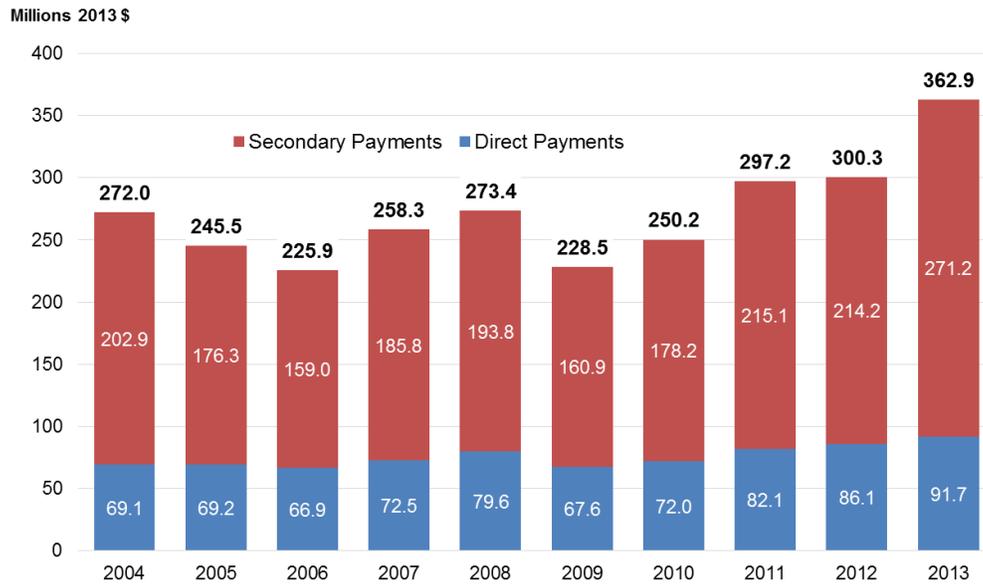
Exhibit 6.3 Total Fiscal Impacts of Agriculture and Food Processing Activities, Washington State, 2013 (millions)

Tax Type	Direct	Secondary	Total
	Payments	Impacts	
Sales and Use Taxes	36.6	166.2	202.7
Business & Occupation	50.9	82.2	133.2
Other	4.3	22.7	27.0
Total	91.7	271.2	362.9

Sources: Washington State Office of Financial Management, 2014; Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

Over the 2004 to 2013 period, direct cluster activities supported tax revenues—through direct tax payments and multiplier effects of more than \$2.7 billion, adjusted for inflation (**Exhibit 6.4**). Of this total, \$2.0 billion were drawn from business revenues supported through business-to-business transactions and household expenditures (induced) across the economy, based on 2013 dollars. In other words, over the entirety of the 2004 to 2013 period, every dollar of final sales generated by activities belonging to the Agriculture and Food Processing cluster in Washington supported \$0.14 cents in state tax revenues.

Exhibit 6.4. Total Fiscal Impacts of Agriculture and Food Processing Activities, Washington State, 2004-2013 (millions, 2013 \$)



Sources: Washington State Office of Financial Management, 2014; Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

7.0 REVIEW OF SELECT TAX POLICIES IN WASHINGTON STATE

7.1 Overview and History of Tax Initiatives

Overview

The Washington State legislature, along with state and federal legislatures nationwide, has a long history of adjusting tax rates to specific industries to support and sustain those industries. Tax policies that lower tax rates or eliminate taxes paid for a particular industry are commonly referred to as tax “incentives.” Tax incentives, or tax preferences, regardless of the term, are designed to help industries for which some other default tax rate is believed to create excessive friction for the industry to thrive, or in some cases because the default tax rates seems unfair or illogical. Legislatures have many reasons to grant varying tax rates to specific industries.

Agricultural producers and food and beverage processors in Washington State can make use of tax incentives related to sales and use taxes, B&O taxes and estate taxes. Food processors can benefit from up to 113 tax credits, deferrals and exemptions in their business activities and input costs. The rationale behind the largest credits is that sales tax should be levied on a finished product sold to its final user and not on inputs that go towards the completion of that product. “Sales tax is supposed to be charged on an end-use product,” explained one interviewee, “after a product has been finalized and put to sale to consumers, so feed, seed, and fertilizer are all inputs into a finished product.”

Washington has seven major incentives available to food processors, supported by six major incentives for food processing input activities. **Exhibit 7.1** provides a brief description of these incentives by category. While Washington has many more sales and use tax incentives that are relevant to this study, the ones listed below are the most widely used and account for the greatest value saved.

Exhibit 7.1. Summary of Agriculture-Related Tax Incentives, Washington State, 2014

Type of Incentive	Eligibility	Rate
<i>Sales and Use Taxes</i>		
Farm Machinery Replacement Parts	<ul style="list-style-type: none"> - Replacement parts, including installation, and repairs for farm machinery, equipment and qualifying farm vehicles - Value of sold or harvested agricultural products from year prior must be at least \$10,000 	Full exemption
Fuel Used on Farms	<ul style="list-style-type: none"> - Non-highway uses of fuel used to produce agriculture - Approved uses are soil preparation, crop cultivation and crop harvesting 	Full exemption
Horticultural Services for Farmers	<ul style="list-style-type: none"> - Labor or service charges only - Includes pruning, soil preparation, pesticide and herbicide application, sprinkler system installation and maintenance 	Full exemption
Livestock Medicine	<ul style="list-style-type: none"> - Pharmaceuticals administered to an animal raised for the purpose of producing an agricultural product for sale 	Full exemption
<i>B&O Taxes</i>		
Fruit and Vegetable Manufacturing	<ul style="list-style-type: none"> - Products sold out of state by fresh fruit and vegetable manufacturers - Activities include canning, preserving, freezing and dehydrating 	Full exemption
Dairy Products Manufacturing	<ul style="list-style-type: none"> - Products must be at least 70% dairy and sold out of state - May be byproducts of manufacturing dairy products 	Value of products deducted from income
Grain and Unprocessed Milk Wholesaling	<ul style="list-style-type: none"> - Unprocessed milk, wheat, oats, dry peas, lentils, triticale, canola, corn, rye and barley sold at wholesale 	Full exemption
<i>Other</i>		
Farm Property	<ul style="list-style-type: none"> - Land must be farmed by decedent or family member at time of decedent's death - Farm is min. 50% of estate's total adjusted value - Min. 25% of estate's value consists of farmland that was actively managed for at least five of the last eight years 	Value of farms and timberlands deducted from property's taxable value
Commercially Grown Fish/Shellfish	<ul style="list-style-type: none"> - Tuna, mackerel and jack fish - Commercially grown fish and shellfish under control of grower - Food fish shipped from outside Washington - Food fish raised from eggs or fry by fish farmers 	Full exemption from enhanced food fish tax

Source: Washington Department of Revenue, 2014, Community Attributes Inc., 2014.

History and Current Status

B&O tax incentives for the manufacturing of dairy products and fruit and vegetables are not new—they date back to 1965 and 2001. The fruit and vegetable incentive became a full exemption in 2005, and the dairy incentive became a full exemption the following year. In 2012, both incentives were extended to July 2015.

Exhibit 7.2 presents the value of food processing B&O tax incentives for fruit and vegetable processors and dairy product processors, along with the number of participants for each, since 2005. The changes in B&O tax savings roughly parallels that of cash receipts at the state level for vegetables and dairy products. In 2005, fruit and vegetable processors realized about \$2.6 million in savings; processors received more than double that amount in 2012. Dairy product processors exempted \$372,000 worth of B&O taxes in 2006 and approximately \$1.2 million in 2012. The number of processors taking advantage of these tax savings has grown over time, particularly in the case of fruit and vegetable processors, who had around 40 participants at the beginning of the exemption period and increased to 185 in 2012. Participants in the dairy product processing exemption have increased from four participants in 2006 and 17 in 2012.

Exhibit 7.2. B&O Tax Exemption Savings for Fruit & Vegetable and Dairy Product Processors, Number of Participants, Washington State, 2005-2012



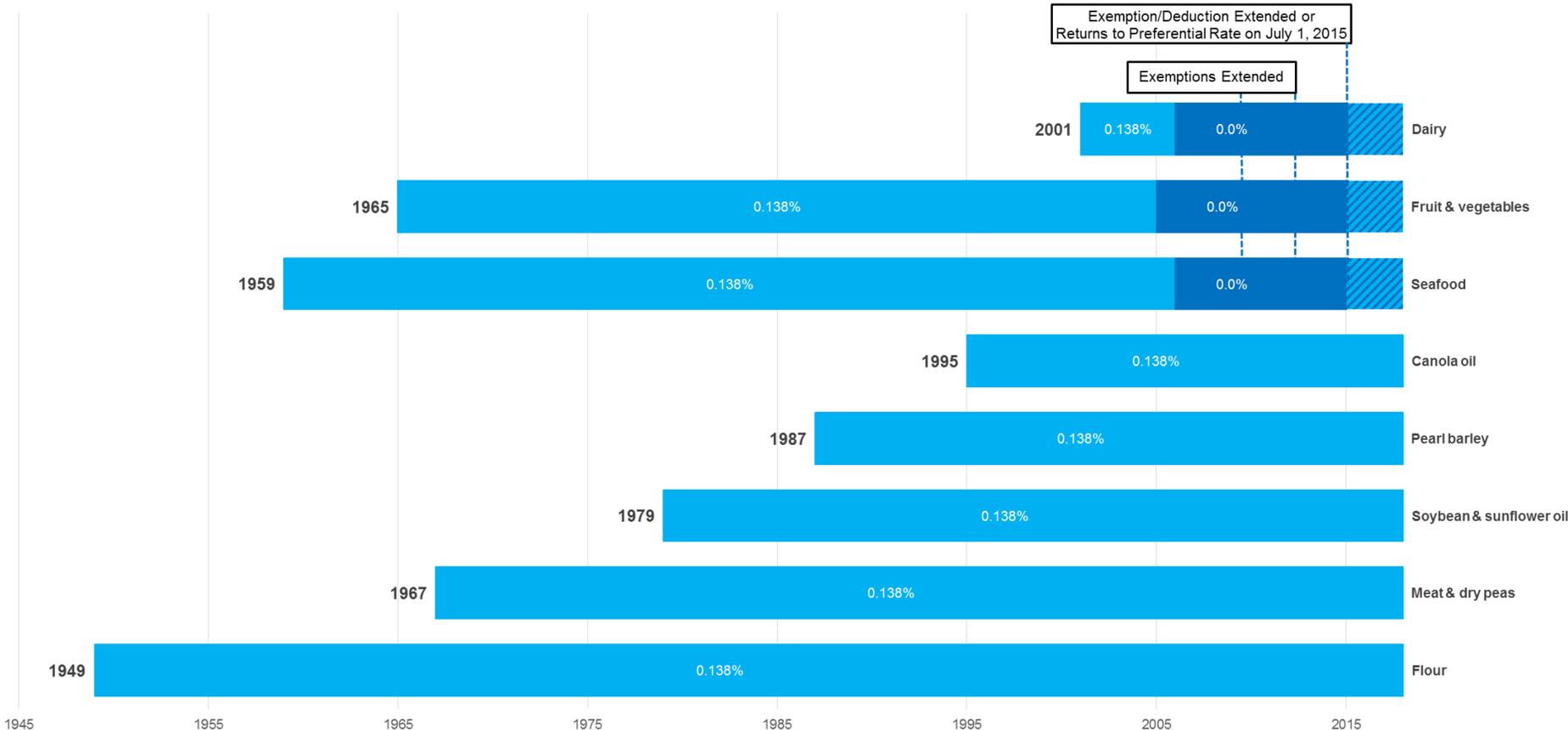
Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

The Joint Legislative Audit & Review Committee (JLARC), a non-partisan government entity that reviews select tax incentives in the state of Washington, released a preliminary report in July 2014 on incentives that are up for review in the coming months. For the state's Agriculture and Food Processing tax incentives, JLARC's preliminary recommendation was to create measurable benchmarks for success, as the state

legislature failed to provide an explicit public policy objective when the exemptions and deferrals were proposed and passed in 2005. Measurable performance targets and metrics would be used to evaluate if and when it would be appropriate to move the B&O exemptions and deferrals back to the preferential rate. Additionally, JLARC recommended that legislators consider adopting a uniform preferential B&O rate or exemption/deduction across all Food Processing activities.

Exhibit 7.3 shows the historical context for the state's major incentives, including the tax percentage saved over time. The 2001 dairy processing tax incentive, for example, began at a preferential rate of 0.138% before rising to a full exemption of 0.484% in 2006. The full exemption was extended in both 2009 and 2012 and is up for review again in the coming months. On July 1, 2015, the exemption will either return to the preferential rate of 0.138% or continue as a full exemption for an additional three years, depending on the deliberations of the state Legislature.

Exhibit 7.3. In-State Food Processing B&O Tax Incentive Rates over Time, Washington State, 1945-2018 (percentage saved)

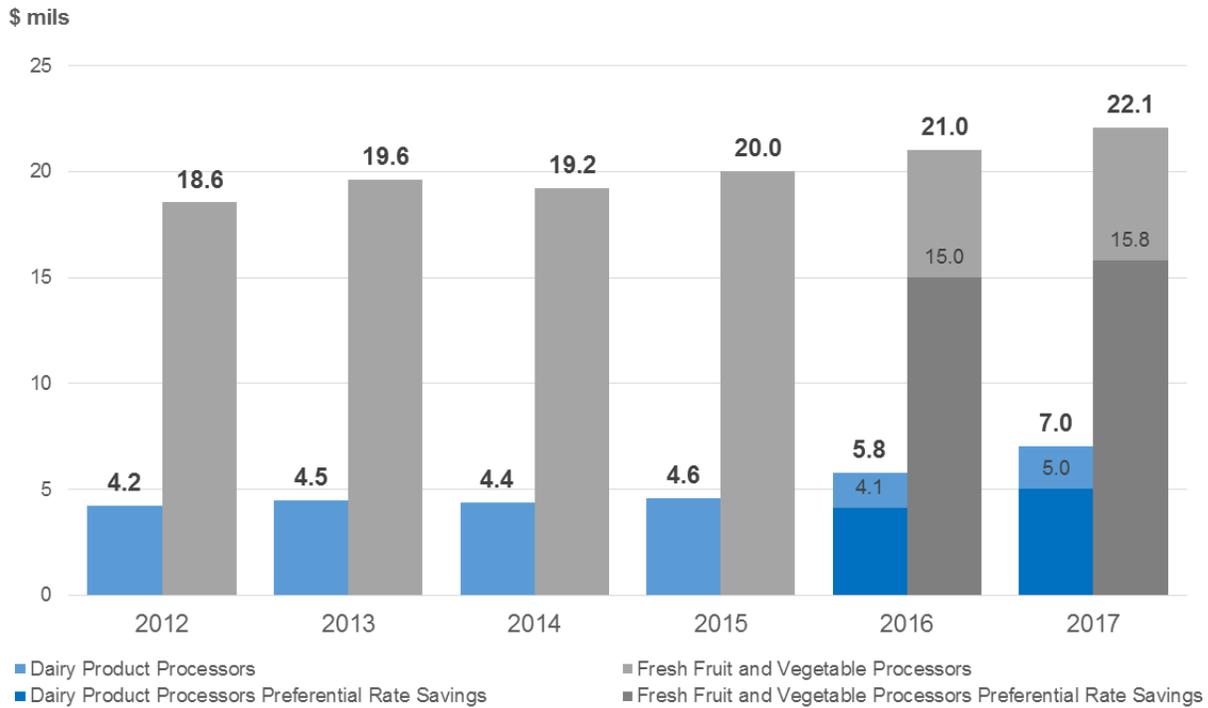


Sources: Washington State Joint Legislative Audit Review Committee, 2014; Community Attributes Inc., 2014.

7.2 Value of Tax Incentive by Type

Exhibit 7.4 summarizes the estimated value of the dairy product processor and fruit and vegetable processor B&O exemptions under review during the 2015 Legislative session. Should the exemptions expire, they will return to a preferential rate of 0.138%, for 2016 and 2017, the estimated savings at the preferential rate are included.

Exhibit 7.4. Dairy Processor and Fruit & Vegetable Processor B&O Tax Incentive Estimated Values, Washington State, 2012-2017 (\$ mils)



Sources: Washington Department of Revenue, 2014; Community Attributes Inc., 2014.

7.3 Use of Tax Incentives in Washington State

Exhibit 7.5 below summarizes the top ten beneficiaries of the dairy product B&O tax exemption by share of reported exemption realized in 2012. The greatest share of the dairy product processing B&O exemption realized was Darigold's 88% share in 2012. The remaining 12% share comprises exemptions realized by Safeway, Andersen Dairy, ConAgra Foods Lamb Weston, Country Morning Farms, Appel Farms and others. It is important to emphasize that Darigold ultimately represents a cooperative of farmers, making it unique from other beneficiaries listed below. In 2012, there were 340 farmers belonging to the Darigold Cooperative in Washington, resulting in an average of less than \$3,100 per farmer.

Exhibit 7.5. Top Reported Beneficiaries by Share of Dairy Product Processing Realized B&O Tax Exemption, Washington State, 2012

Rank	Business Name	Amount	Share	Implied Out of State Sales
1	Darigold, Inc.	\$1,048,938	88%	\$760,100,000
2	Safeway, Inc. (other grocery)	\$36,226	3%	\$26,250,420
3	Safeway, Inc. (ice cream plant)	\$31,387	3%	\$22,744,312
4	Andersen Dairy, Inc.	\$24,493	2%	\$17,748,471
5	ConAgra Foods Lamb Weston, Inc.	\$15,398	1%	\$11,158,304
6	Country Morning Farms, Inc.	\$12,049	1%	\$8,731,123
7	Appel Farms LLC	\$11,585	1%	\$8,395,065
8	Smith Brothers Farms, Inc.	\$6,286	1%	\$4,555,181
9	Grande Cheese Company	\$1,114	<1%	\$807,290
10	Rocky Run Goat Dairy LLC	\$117	<1%	\$85,043

Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

The fruit and vegetable processing B&O tax exemption's top ten beneficiaries by share of reported exemption realized in 2012 is summarized in **Exhibit 7.6**. The share of reported savings is much less concentrated here than with the dairy products processing B&O exemption; the top beneficiary, ConAgra Foods Lamb Weston, accounted for 18% of exemptions realized.

Exhibit 7.6. Top Reported Beneficiaries by Share of Fruit & Vegetable Processing Realized B&O Tax Exemption, Washington State, 2012

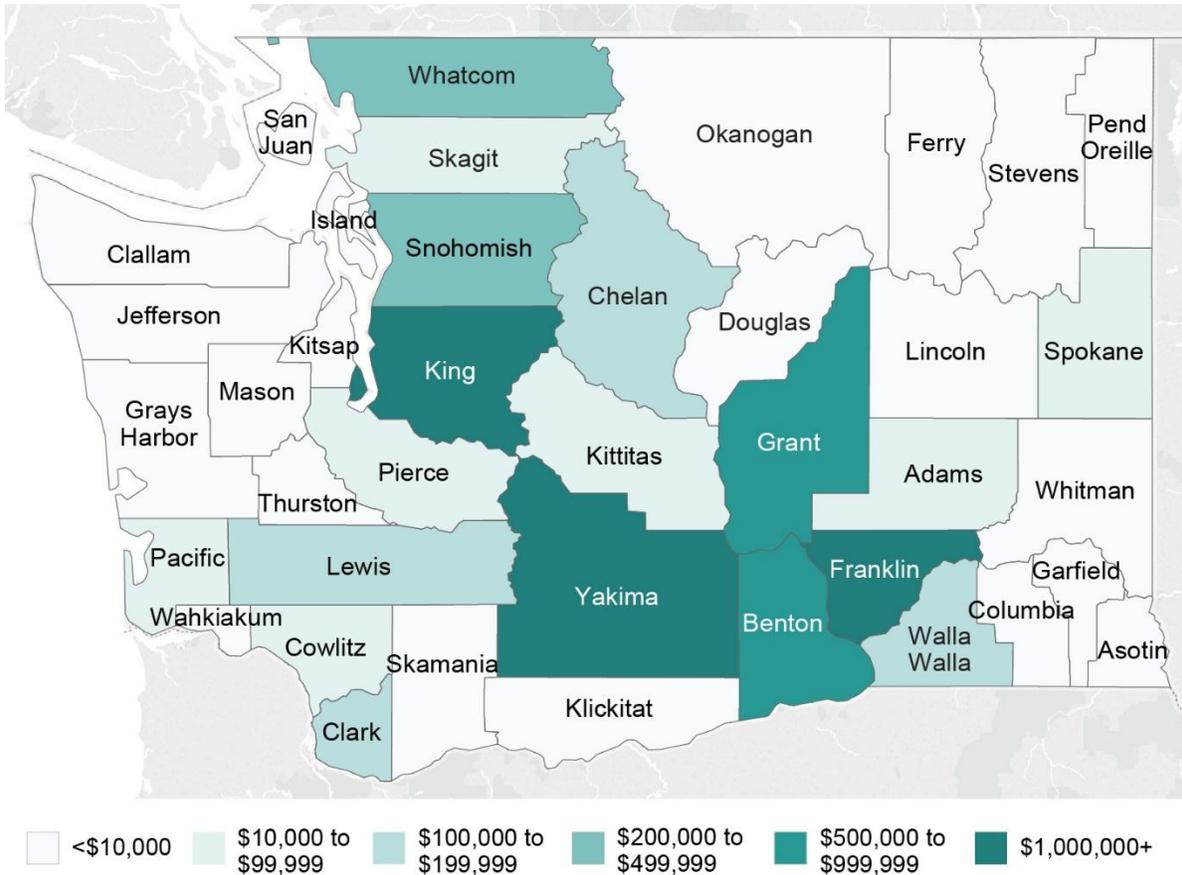
Rank	Business Name	Amount	Share	Implied Out of State Sales
1	ConAgra Foods Lamb Weston, Inc.	\$923,396	18%	\$669,127,471
2	Ste. Michelle Wine Estates, Ltd.	\$588,213	11%	\$426,241,391
3	Tree Top, Inc.	\$297,597	6%	\$215,649,775
4	Bybee Foods, LLC	\$290,886	6%	\$210,786,848
5	Del Monte Corporation	\$218,340	4%	\$158,217,601
6	Oregon Potato Company	\$173,512	3%	\$125,733,333
7	Stockpot, Inc.	\$164,969	3%	\$119,542,754
8	National Frozen Foods Corporation	\$162,074	3%	\$117,444,928
9	Twin City Foods, Inc.	\$153,078	3%	\$110,926,029
10	Lamb Weston BSW, LLC	\$132,750	3%	\$96,195,862

Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

7.4 Use of Tax Incentives by County

Exhibit 7.7 shows the county-level distribution of benefits from agriculture-related processing B&O tax exemptions. The distribution is consistent with employment levels for Food Processing and Wholesale & Distribution, which are highest in Franklin, King and Yakima counties.²⁷

Exhibit 7.7. Total Value of Agriculture-Related B&O Tax Exemption Savings by County, Washington State, 2012



Sources: Washington State Department of Revenue, 2014; Community Attributes Inc., 2014.

²⁷ Not all participating firms publicly report their tax savings, so data is incomplete.

8.0 FARMING AND RANCHING RISK AND SENSITIVITY ANALYSIS

Farmers face enormous risks year in and year out. As commodity producers and representing the lowest rung of the food supply chain, farmers are referred to as **price takers**. Their revenues are subject to global commodity prices and they generally cannot pass on lower prices to suppliers or wait for better prices. Farmers are also **weather-takers**. They must plan nearly a year in advance with limited information about future weather patterns that can either drive strong yields or be damaging to the planted crop. Farmers must thus manage risks that affect yield and price, the core drivers of their economic vitality.

The current tax incentives availed to farmers thus represent a means to mitigate the risk profile and thin margins associated with farming activities. While in some years farmers net strong profits, in other years they lose money. The average farming household thus puts aside net earnings as savings to mitigate losses during years of poor weather conditions or unfavorable global commodity prices, among other factors. Isolating the relative contributions of tax exemptions for one year can thus be a misleading estimate. In most cases, the effects of tax exemptions on a farming household's bottom line will vary from year to year.

The analysis in this section explores these risks, the range of impacts on the profitability of select farming activities, and the extent to which the loss of three existing sales tax exemptions—for farm fuel, fertilizer and chemicals, and farm machinery replacement parts—could further affect the viability of farming.

8.1 Taxes Paid by Farmers

Most farm output is sold via wholesale, either to commodity consolidators or processors. The current B&O tax exemption on these sales means that the only revenue-based farm sales subject to state taxation are direct-to-consumer transactions, such as at a farmer's market. Crop and Animal Product producers paid \$8.4 million in taxes to the state in 2013, of which \$2.9 million was in the form of business and occupation (B&O), equal to 0.09% of total estimated revenues generated among farmers and ranchers.

However, this total excludes farmer payments on many inputs that are not subject to sales and use tax exemptions. These include computers and other office and related inputs. Moreover, most farmers run their family business out of their homes; many of the costs associated with their business are thus shared with housing requirements and household purchases, and are thus difficult to separate as inputs into commodity production.

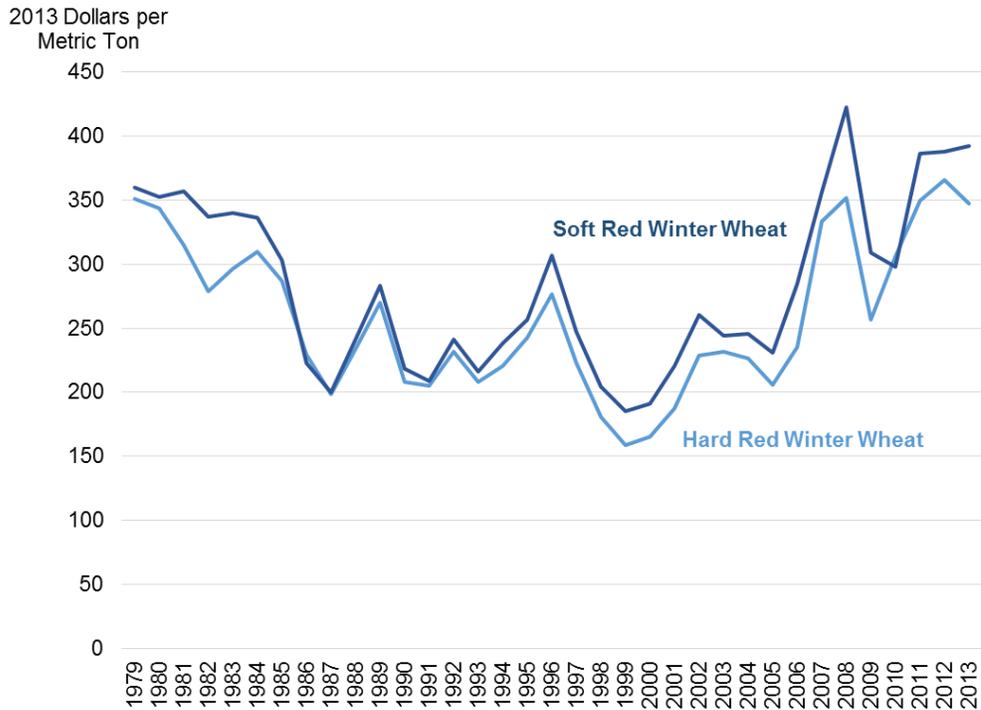
8.2 Price Volatility

Farmers in general face price volatility and tight returns. Wheat farmers in Washington especially experience these forms of volatility. Prices per bushel of wheat or hundred weight of potatoes will vary widely from year to year, driven by factors well beyond the influence of farmers, local and state officials, and even the U.S. government in many cases.

Interviewees noted that swings in grain prices from year-to-year result in unpredictable profits for farmers. Over a 10-year period, one wheat farmer explained that just two of those years can be expected to be very successful. For wheat farmers, the price that they can charge per ton of grain is the most important element in profitability.

The global price for wheat has seen dramatic swings over time. As demonstrated in **Exhibit 8.1** over time the price of wheat has risen as high as \$317 per metric ton and fallen as low as \$120 per metric ton. The highest price occurred in 2008 and the lowest in 1999.

Exhibit 8.1. Global Prices for Wheat, 1979-2013

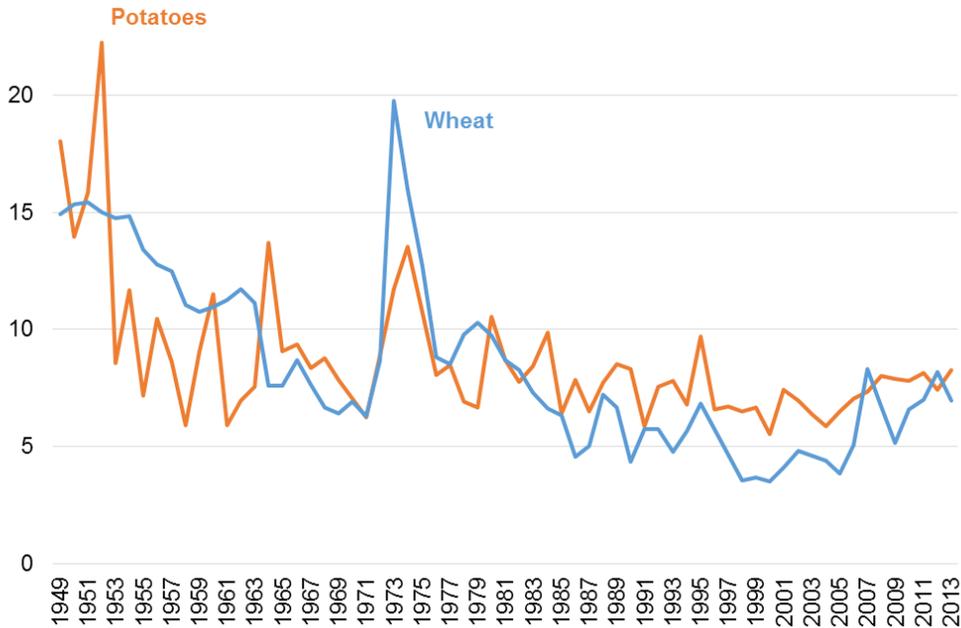


Source: World Bank, 2014; Community Attributes Inc., 2014

Potato prices are less volatile than wheat prices, but there are spikes and dips in prices over time. The price for potatoes in Washington has been trending slightly downward over time, as has the price of wheat. In the past ten year period, the price of potatoes has flattened, averaging at just over \$7.42 per cwt. Wheat saw a large decrease in prices through the early 2000's, and is now seeing a slight increase in prices. As of 2013, the price for wheat in Washington was just under \$7 per bushel (**Exhibit 8.2**).

Exhibit 8.2. Wheat and Potato Prices, Washington State, 1949-2012

2013 Dollars per Bushel



Source: NASS Survey, 2013; Community Attributes Inc., 2014.

**8.3 Breakeven Estimates by Select Commodities—
Understanding a Farming Bottom Line**

Prices and Revenues

Historic prices both globally and within Washington demonstrate the price volatility that farmers can experience over a 10-year period. As price takers, wheat and potato farmers rely on market prices to cover their costs. Throughout a 10-year period there is an average price that any individual farmer must receive in order to be profitable on average. This price, the *breakeven price*, can be calculated using cost and return budgets developed by the United States Department of Agriculture Economic Research Service (USDA ERS) and the University of Idaho College of Agricultural Economics and Rural Sociology.

These breakeven prices illustrate one hypothetical example of the cost and return budget of wheat or potato farmers, assuming no change in the current tax rates farmers of these crops are subject to. The data is not an exhaustive representation of all farmers' costs and returns. These exhibits are intended only to illustrate the challenges to farming and

the challenges to profitability; they are not representative of the situation of any individual farmer, but of a hypothetical situation.

Exhibit 8.3 shows the price volatility that wheat farmers in the Fruitful Rim experienced over the 10-year period from 2004 to 2013. The estimated breakeven price is the average annual price per bushel wheat farmers would have to receive over the 10-year period in order for their gross value of production to exceed total costs, adjusted for inflation.

Exhibit 8.3. Wheat Prices Received and Ten-Year Average Breakeven Price, Fruitful Rim, Washington State, 2004-2013



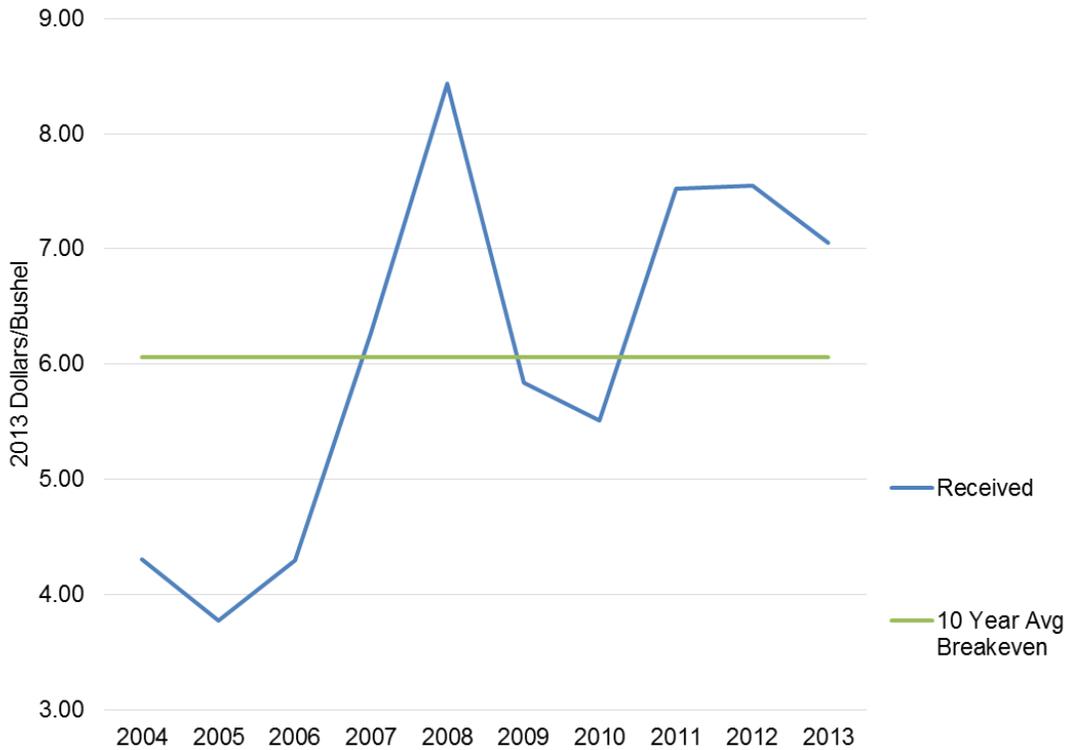
Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

As interviews of wheat farmers in Washington illustrate, price volatility is one of the most important factors in determining profitability. The price of wheat received by farmers in the Fruitful Rim from 2004 to 2013 sunk as low as \$3.82 per bushel and rose as high as \$8.46 in real dollars. As shown in **Exhibit 8.3**, the price of wheat fluctuates wildly around the price at which a Fruitful Rim wheat farmer just breaks even. When the price of wheat spends more time below the breakeven price than above in this 10-year period, this means that Fruitful Rim wheat farmers actually suffer negative overall returns to risk within this 10-year period.

Wheat farmers in the Basin and Range region experience the same price volatility as wheat farmers in the Fruitful Rim. Prices in the same time period swung between \$3.78 and \$8.43 per bushel. However, the profit margin of these farmers is somewhat protected due to lower costs on average. The breakeven price for wheat farmers in the

Basin and Range is \$6.06 as compared to \$6.81 for those in the Fruitful Rim (**Exhibit 8.4**). It is clear in the exhibit that the Basin and Range wheat farmer had more years in which the price of wheat received was higher than the 10-year average breakeven.

Exhibit 8.4. Wheat Prices Received and Ten-Year Average Breakeven Prices, Basin and Range, Washington State, 2004-2013

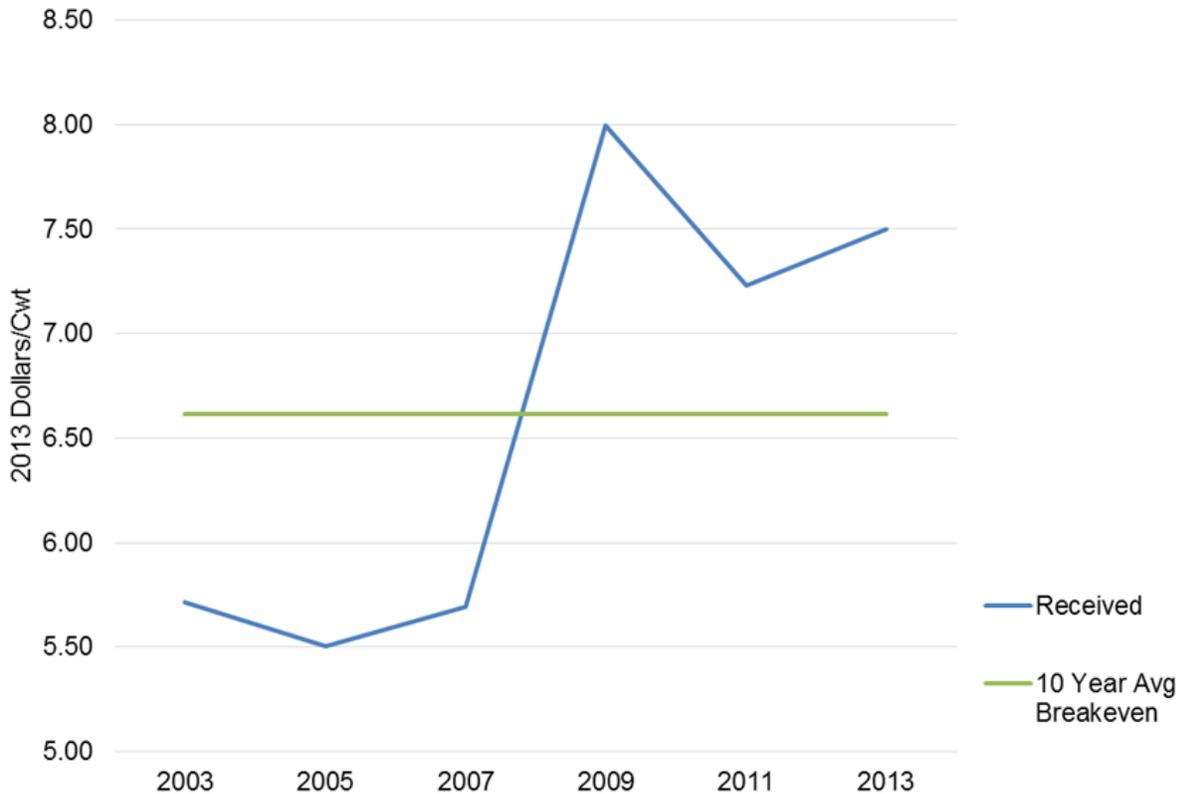


Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Potato farmers in Washington have high operating costs, in particular because of fertilizer and chemical inputs required for production. However, unlike wheat farmers, potato farmers in Washington do not experience the same price volatility. This does not imply that potato farmers do not also experience risk.

Potato farmer's prices had relatively fewer dramatic swings in prices over the 10-year period 2004 to 2013 as compared to wheat farmers. However, potato farmers also spent about half of the last 10-year period below the price at which they could cover costs (**Exhibit 8.5**). Over this time period their 10-year average returns to risk were just below \$0 per acre, implying that potato farmers just about broke even within this 10-year period.

Exhibit 8.5. Potato Prices Received and Ten-Year Average Breakeven Prices, Washington State, 2004-2013



Sources: University of Idaho, College of Agricultural Economics and Rural Sociology, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Returns, Costs and Returns to Risk

Budgeting for farmers is more complex than a simple gross revenues less operating costs structure. Revenues or **total gross returns** are the value of the primary product (affected by yield and price) plus the value of any secondary product. For example, the USDA ERS Cost and Return budgets for wheat consider straw and grazing as secondary products.

Costs are significantly more complex. Variable costs include operating inputs. For potato farmers this includes seed, fertilizer, pesticides, custom work and consulting, machinery and repairs, fuel, labor, and crop insurance, among others. Operating costs for potato farmers average more than 50% of total costs per acre. Wheat farmer's operating costs include seed, fertilizer and chemicals, custom operations, fuel, and others. For the wheat

farmer, operating costs are approximately 40% of total costs. Some of these costs remain constant whether the yield is good or bad, driven by per acre operations. It costs the same amount to run the combine in good and bad years. Other costs vary based on the quantity of rainfall in each year. For example, more fertilizer is required in a wet year than in a dry year. The farmer has some forward knowledge of how great variable costs will be when planning a budget a year in advance, but other costs as well as yields are subject to the unpredictability of weather, global prices, and other factors.

One interviewee reported a relatively strong profit in an otherwise difficult year for wheat growers, but part of this success owed to an intentional delay in the replacement of important farm machinery parts.

Fixed or overhead costs are more complex than variable costs. These costs include opportunity costs, or the value of an alternative activity sacrificed in favor of the current activity. An example of opportunity cost is the loss of rental income for the land being used to farm. The opportunity cost of land is often the single largest expense as a share of total costs for farmers. Other fixed costs include insurance costs for equipment, depreciation and interest on equipment, opportunity cost of labor, and taxes. After calculating all variable and fixed costs, the farmer can calculate the value of production less total costs, or **returns to risk**, which represents the ability to cover all costs each year on a per acre basis. Returns to risk is somewhat akin to profit, but returns to risk acknowledges opportunity costs, as well.

8.4 Relative Impacts of Tax Rates on Farmers

The agriculture industry across the state of Washington enjoys several important tax exemptions. Three such exemptions that are particularly important for farmers are the sales and use tax exemptions on (1) fertilizer and chemical sprays, (2) farm machinery replacement parts, and (3) fuel used on farms. These tax exemptions play an important role in helping Washington farmers remain competitive and help mitigate price volatility and off-set high land and operating costs per acre.

Washington wheat farmers expressed that tax incentives are enormously important in maintaining profitability. One farmer indicated that fertilizer alone makes up roughly 30% of costs, which if taxed would add an unexpected and very large expense. Another farmer noted that the sales tax is supposed to be an end-user tax, but fertilizer and fuel are used as inputs into a final product. The farmer cannot pass the sales tax on to consumers, and for a commodity like wheat with very thin profit margins, the additional cost of a sales tax could make wheat farming noncompetitive.

Different tax rates would affect individual farmers differently, because they have different cost compositions. Farming conditions are different on each farm. **Exhibits 8.6, 8.7 and 8.8** illustrate three scenarios each for Fruitful Rim wheat farming, Basin and Range wheat farming, and potato farming. These scenarios compare impacts due to the sales and use tax exemptions on farm machinery replacement parts, fuel used on farms, and fertilizer and chemicals, as well as the impact of the loss of these exemptions. However, these scenarios are intended only to illustrate select scenarios and are not intended to be exhaustively representative of income statements for all farmers. Each scenario demonstrates the hypothetical increases to operating cost if three sales and use tax exemptions were to be eliminated. Within each scenario, the products that are currently tax exempt are assigned as a share of operating costs. These are hypothetical shares informed by interviews and cost structures from USDA ERS cost and return data and University of Idaho Department of Agricultural Economics and Rural Sociology cost and return data.

A series of hypothetical scenarios are presented below. All scenarios in all three exhibits demonstrate the impacts to wheat or potato farmers if they were to lose the existing sales and use tax exemptions. Total operating cost would increase, resulting in a decrease in per acre returns to risk. All hypothetical exemptions are based on 10 year averages, including inflation-adjusted input and wholesale prices.

In all scenarios presented below, while the estimated increase in costs due to a loss in sales and use tax exemptions is low relative to total costs, they are significant relative to the estimated net earnings on a per acre basis. For example, if fertilizer and chemicals constitute 30% of total operating costs for wheat farmers in the Fruitful Rim (a very likely scenario, based on interview feedback), the value of the existing sales and use tax exemptions would equal \$3.30 per acre (**Exhibit 8.6**).

If fertilizer and chemical sprays represent 35% of total cost, the hypothetical tax savings are \$4.90 per acre (Scenario 2). With 10-year average harvested acreage of 2.2 million acres, the sales and use tax exemption could hypothetically total almost \$11 million in savings per year.

Exhibit 8.6. Wheat Ten-Year Average Tax Scenarios, Fruitful Rim, Washington State, 2004-2013

Share of Operating Cost	Cost per Acre	
	Operating Cost	Tax Savings
Scenario 1		
Farm Machinery Replacement Parts @ 5%	\$ 8.50	\$ 0.70
Fuel Used on Farms @ 15%	25.50	1.60
Fertilizer and Chemical Sprays @ 30%	51.00	3.30
Sub-Total	85.00	5.60
Total	\$ 169.90	
Scenario 2		
Farm Machinery Replacement Parts @ 10%	\$ 17.00	\$ 1.40
Fuel Used on Farms @ 10%	17.00	1.40
Fertilizer and Chemical Sprays @ 35%	59.40	4.90
Sub-Total	93.40	7.70
Total	\$ 169.90	
Scenario 3		
Farm Machinery Replacement Parts @ 15%	\$ 25.50	\$ 2.10
Fuel Used on Farms @ 30%	51.00	4.20
Fertilizer and Chemical Sprays @ 35%	59.40	4.90
Sub-Total	135.90	11.20
Total	\$ 169.90	

Sources: USDA ERS, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

The total hypothetical savings due to sales and use tax exemptions range from \$5.60 per acre to \$11.20 per acre. For a wheat farmer in the Fruitful Rim with 1,700 acres, this amounts to \$9,520 to \$19,040. For a larger farm with 8,000 acres, these savings could be as high as \$89,000. The loss of these savings would be borne by the farmer, as they have no way to pass this expense on to the end-use consumer.

The 10-year average total operating costs per Scenario are fixed in **Exhibit 8.6**. Plausible 10-year average revenues for an acre of wheat grown in the Fruitful Rim are about \$380 (based on an average yield of 62.86 bushels per acre and average prices of \$6.04 per bushel), for the 10-year period between 2004 and 2013. When combined with the value of a secondary product the plausible total value of production over a 10-year

period is approximately \$390 per acre. In order to determine the returns to risk on a per acre basis, total costs including opportunity costs, are combined with total value of production. Total per acre costs for wheat grown in the Fruitful Rim, over the same 10-year period are approximately \$433, of which approximately \$170 is operating costs. Comparing this estimated total value of production and total costs, opportunity costs included, shows an operating loss, or return to risk of approximately -\$43 per acre.

As the farmer has no way to pass increased costs on to the consumer or processor, the potential loss of sales and use tax exemptions also puts at risk a farmer's ability to qualify for financing. Like all types of businesses, farmers often rely on bank loans in order to cover expenses until they sell their product after harvest. In order to receive a bank loan, farmers have to submit a budget for the year with projected profits. Without the sales and use tax exemptions, the additional costs from the tax are subtracted from the profit margin on their budget, which in some cases could reduce profit margins below the level required by banks. Not only are costs higher for these farmers, but their ability to finance their operations throughout the year could be impacted.

Exhibit 8.7 demonstrates the additional cost per acre for wheat farmers in the Basin and Range region. Farming requires a different emphasis on machinery, chemicals, and fuel than in the Fruitful Rim. In the Basin and Range region, sales and use taxes could range from \$7 per acre to over \$8.50 per acre. Across all wheat farmers, with 10-year average harvested acreage of 2.2 million, the savings could hypothetically be as high as \$19 million. A farmer in the Basin and Range with 1,700 acres has hypothetical savings of \$12,000 to as high as \$14,700. A larger farm with 8,000 acres would see additional costs if the tax incentives were to be removed of \$56,000 to \$69,600.

Exhibit 8.7. Wheat Ten-Year Average Tax Scenario, Basin and Range, Washington State, 2004-2013

Share of Operating Cost	Cost per Acre	
	Operating Cost	Tax Savings
Scenario 1		
Farm Machinery Replacement Parts @ 15%	\$ 20.10	\$ 1.60
Fuel Used on Farms @ 15%	20.10	1.60
Fertilizer and Chemical Sprays @ 50%	66.90	5.50
Sub-Total	107.10	8.70
Total	\$ 133.90	
Scenario 2		
Farm Machinery Replacement Parts @ 10%	\$ 13.40	\$ 1.10
Fuel Used on Farms @ 5%	6.70	0.50
Fertilizer and Chemical Sprays @ 55%	73.60	6.00
Sub-Total	93.70	7.60
Total	\$ 133.90	
Scenario 3		
Farm Machinery Replacement Parts @ 10%	\$ 13.40	\$ 1.10
Fuel Used on Farms @ 10%	13.40	1.10
Fertilizer and Chemical Sprays @ 45%	60.20	4.90
Sub-Total	87.00	7.10
Total	\$ 133.90	

Sources: USDA ERS, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Potato farmers have higher costs than wheat farmers. Fertilizer and pesticides alone could be 50% of total operating costs, which is well over \$1000 per acre. Given these high costs, potato farmers see higher savings due to tax incentives, which would translate into higher costs if farmers were obligated to pay standard sales tax rates on inputs.

Exhibit 8.8 indicates that the hypothetical savings from sales and use tax exemptions for fertilizer and chemicals could be as high as \$90 per acre. The total additional cost of fertilizer and chemicals alone could be almost \$15 million across the industry in Washington. Scenario 2, in which each tax exempt portion of operating cost is the lowest, the total impact due to the loss of these tax exemptions could be over \$13 million.

A potato farmer with 1,100 acres of potatoes may see hypothetical savings ranging from \$95,000 per year to \$121,000 per year. A larger farmer with 4,000 acres of potatoes could see savings of \$345,000 to \$441,000 per year. As price takers negotiating with processors, these farmers would be forced to absorb all of these costs if these tax exemptions were to go away.

Exhibit 8.8. Potato Ten-Year Average Tax Scenario, Washington State, 2014

Share of Operating Cost	Cost per Acre	
	Operating Cost	Tax Savings
Scenario 1		
Farm Machinery Replacement Parts @ 5%	\$ 112.10	\$ 9.20
Fuel Used on Farms @ 5%	112.10	9.20
Fertilizer and Chemical Sprays @ 40%	896.70	73.50
Sub-Total	1,120.90	91.90
Total	\$2,241.80	
Scenario 2		
Farm Machinery Replacement Parts @ 2%	\$ 44.80	\$ 3.70
Fuel Used on Farms @ 5%	112.10	9.20
Fertilizer and Chemical Sprays @ 40%	896.70	73.50
Sub-Total	1,053.60	86.40
Total	\$2,241.80	
Scenario 3		
Farm Machinery Replacement Parts @ 5%	\$ 112.10	\$ 9.20
Fuel Used on Farms @ 10%	224.20	18.40
Fertilizer and Chemical Sprays @ 45%	1,008.80	82.70
Sub-Total	1,345.10	110.30
Total	\$2,241.80	

Sources: University of Idaho, College of Agricultural Economics and Rural Sociology, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

8.5 Break-even Prices and Sales & Use Tax Exemptions

Exhibit 8.9 Washington’s sales and use tax exemptions help offset some of the volatility in prices. Without the sales and use tax exemptions wheat farmers in the Fruitful Rim enjoy, their breakeven cost over a 10-year period would on average be \$0.12 per bushel higher. This additional \$0.12 per bushel, assuming an average production of 139 million bushels per year in Washington, amounts to just over \$16.5 million per year in savings for wheat farmers alone.

Exhibit 8.9. Wheat Prices Received and Estimated Breakeven Prices, Fruitful Rim, Washington State, 2004-2013



Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Exhibit 8.10 shows the current 10-year average breakeven price with the breakeven price in a situation in which the three sales and use tax exemptions are eliminated for Basin and Range wheat farmers. The wheat farmers of the Basin and Range would also experience increased risk due to an increase in the breakeven price, however, the risks are not as extreme as those for wheat farmers in the Fruitful Rim, as the increase is not as extreme. The Basin and Range wheat farmer breakeven price would increase by \$0.13 per bushel. This amounts to an approximate tax savings of just over \$18 million per year, assuming 10-year average production of 139 million bushels.

One interviewee noted that sales and use tax exemptions are hugely important for potato farmers. For a farm with 1,100 acres of land, sales and use tax exemptions can be as high as \$50,000 per year. According to this interviewee, the loss of those exemptions could negatively impact profitability by 25%. The majority of Washington potatoes are sold to processors, and farmers that primarily sell to processors note that as price takers they have no way to pass additional costs on to consumers, thus tax exemptions are very important in maintaining their profit margins. The largest competitor states, California and Idaho, have similar tax incentives, which mean that these tax incentives for Washington farmers are an important factor in remaining competitive. However, potato farmers that sell fresh potatoes commented that they did not have the same experience regarding market prices and the need for tax incentives.

Exhibit 8.10. Wheat Prices Received and Estimated Breakeven Prices, Basin and Range, Washington State, 2004-2013



Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Case Study: Olsen Farms

“When I started in 1996, I was doing about \$5,000 to \$10,000 in yearly sales,” began Brent Olsen, owner of Olsen Farms in Colville. “Today I do just under a million in sales.” Olsen Farms sells specialty potatoes and sustainably raised beef, pork, and lamb throughout the year.

Olsen Farms’ journey from small sales to the million-dollar sales mark wasn’t easy, and Brent, along with his mother, Merna, and his wife, Kira, found a way to contend with the ups and downs of market prices that stymie farmers worldwide. Importantly, Olsen Farms’ experience would be hard to replicate by other, larger commodity producers in Washington.

“When we started, we were selling mainly to grocery stores,” explained Brent, “but when the price started getting too low, we switched over to selling mainly to restaurants.” Restaurants, Brent explained, are more willing to pay higher prices for specialty products—and pay consistent prices. With more than twenty varieties of heirloom and specialty potatoes to offer, Olsen farms has come to cater to chefs looking for unique products. Today, roughly two thirds of Brent’s sales are to higher-end restaurants like Ray’s Boathouse and Sitka & Spruce in Seattle. The remaining third of sales are direct to consumers at farmers markets, where Brent has built relationships with local residents over the years.

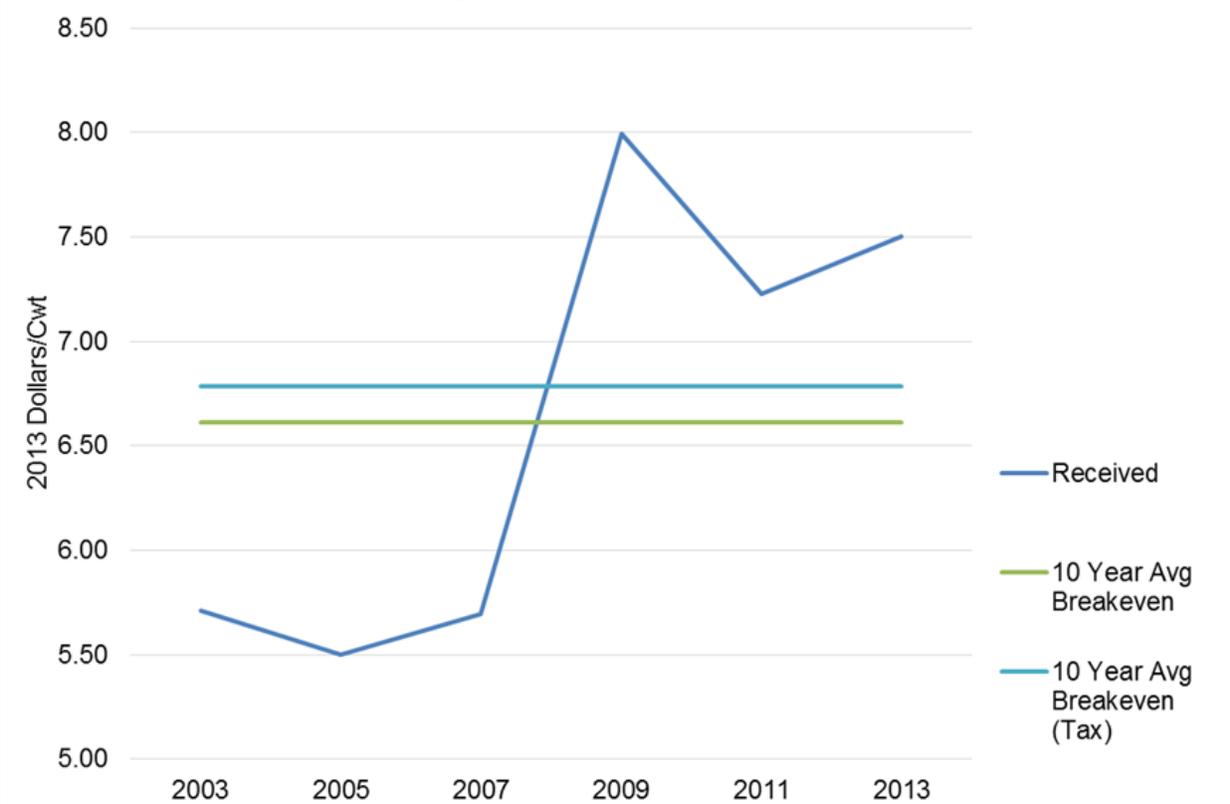
His business is almost entirely vertically-integrated. Except for a neighbor’s barley that feeds Brent’s pigs and the ranges in Eastern Washington that feed his lambs, all animals graze and feed on Brent’s property. The livestock is processed at Smoke Ridge Meats, Brent’s USDA-certified processing facility. Like other Washington farmers, Brent relies on WSU for information on agriculture. Brent, however, has a unique line: his sister, Nora, who earned her M.S. and Ph.D. from WSU. Today, she is the president of the Potato Association of America.

Brent spends about half of any given week on the farm—more, if there are problems on the farm—and the other half trucking his offerings to Seattle and Redmond, where his local sales team helps him staff farmers markets and make timely deliveries to restaurants.

By selling fresh products directly to consumers and restaurateurs, Olsen Farms is more insulated from fluctuating commodity prices compared with other farmers. While this strategy has worked well for Brent, he knows that not everyone can follow the same path: “the farmers markets are saturated,” he explained. “The waiting list for the University District Farmers Market is over 10 years.”

Exhibit 8.11 shows the price per cwt that potato farmers in Washington received from 2004 through 2013, as well as the 10-year average breakeven price for these farmers, and the 10-year average breakeven price in a scenario without the discussed sales and use tax exemptions. The 10-year average breakeven price is roughly \$0.18 lower than the breakeven price in a scenario without the sales and use tax exemptions for farm machinery replacement parts, fuel used on farms, and fertilizer and chemicals. With an average production of 93.8 million cwt of potatoes each year in Washington, the \$0.18 in additional sales required is an approximate savings of \$16.9 million per year for potato farmers in Washington.

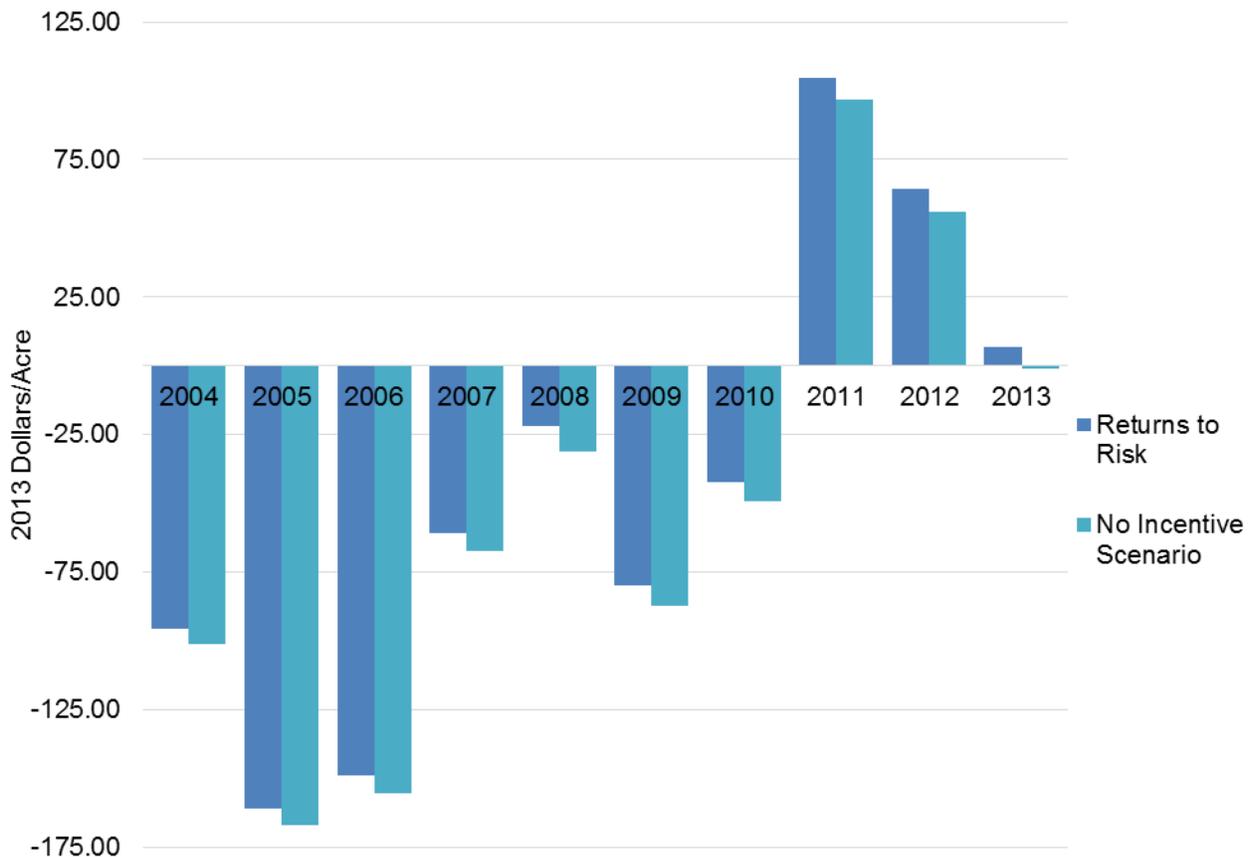
Exhibit 8.11. Potato Prices Received and Estimated Breakeven Prices, Washington State, 2004-2013



Sources: University of Idaho, College of Agricultural Economics and Rural Sociology, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes, Inc., 2014.

Exhibit 8.12 shows the **returns to risk**²⁸ for a Fruitful Rim wheat farmer from 2004 through 2013, with and without the sales and use tax exemptions. The experience of each farmer regarding costs and returns is unique to his/her situation, however this exhibit demonstrates the volatility of the market price of wheat, and how wheat farmer's profitability can swing dramatically from year-to-year. As this exhibit clearly shows, Fruitful Rim wheat farmers saw negative returns to risk for seven years, however, their situation within the past three years has been more positive. Additionally, this comparison shows that in any situation the wheat farmer is negatively impacted by the loss of the tax incentives.

Exhibit 8.12. Wheat Returns to Risk, Fruitful Rim, Washington State, 2004-2013



Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

²⁸ Returns to risk represents the farmer's ability to cover all costs each year on a per acre basis. It is similar to profit, however, it acknowledges opportunity costs as well as variable costs or operating costs.

Exhibit. 8.13 demonstrates even more clearly the volatility in profitability experience by wheat farmers on a year-to-year basis. The exhibit also illustrates how wheat farmers in the Basin and Range experienced fewer years in which total costs exceeded gross returns. However, like wheat farmers in the Fruitful Rim, wheat farmers in the Basin and Range would experience worse returns to risk every year without the sales and use tax incentives.

Wheat farmers, whether in the Basin and Range or in the Fruitful Rim, clearly face challenges due to the volatility of wheat prices. Equally clear is that wheat farmers experience years of negative profitability, as well as years of high profitability, all determined by the market price of wheat. Yet the sales and use tax exemptions in Washington help wheat farmers mitigate risks.

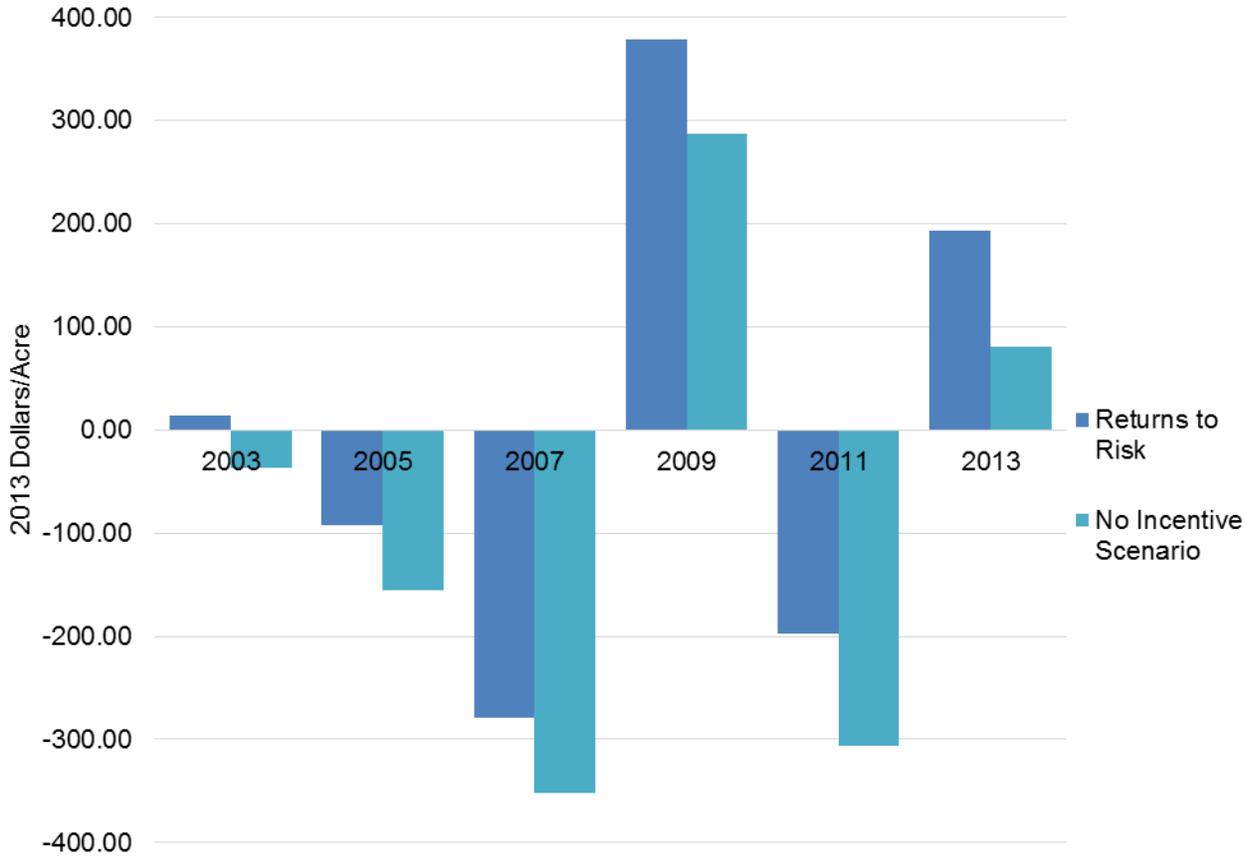
Exhibit 8.13. Wheat Returns to Risk, Basin and Range, Washington State, 2004-2013



Sources: USDA ERS, 2013; JLARC, 2012; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

Potato farmers also experience years of unprofitability. As price takers, if there are decreases in the market price for potatoes, they can experience years when gross returns do not cover total costs. **Exhibit 8.14** shows how severe the impacts of losing sales and use tax exemptions could be for the returns to risk of potato farmers. In 2003 potato farmers had positive returns to risk, however with additional taxes, those returns would have been negative and negative at a greater magnitude than they were positive in actuality.

Exhibit 8.14. Potato Returns to Risk, Washington State, 2004-2013



Sources: University of Idaho, College of Agricultural Economics and Rural Sociology, 2013; NASS, 2013; Washington State Department of Revenue, 2014; Federal Reserve Bank of St. Louis, 2013; Community Attributes Inc., 2014.

9.0 FOOD PROCESSING COMPETITIVENESS ANALYSIS

9.1 Overview of Washington's Food Processing Competitors

Washington's food processing industry is compared with the following states and provinces: California, Texas, Idaho, New York, and Alberta, Canada. For U.S. states, only the following NAICS categories are used to describe Food Processing:

- Grain and oilseed milling
- Fruit and vegetable canning and drying
- Dairy product, except frozen, manufacturing
- Animal, except poultry, slaughtering
- Meat processed from carcasses
- Poultry processing
- Coffee and tea manufacturing
- Perishable prepared food manufacturing
- All other miscellaneous food manufacturing
- Wineries
- Breweries

These categories represent Washington's chief Food Processing activities that use mostly local products, thus they offer the most useful data for assessing Washington's relative competitiveness. For employment and wages, non-employers (sole proprietorships and partnerships) make up a very small portion of total workers in food processing. In Washington, for example, non-employer workers make up less than 3% of jobs in the industry, accounting for fewer than 600 positions. For that reason, only covered employment information will be reviewed. Canadian data on food and beverage processing breakdowns are incomplete, only reporting at the industry level (e.g. agriculture, manufacturing). Thus, other metrics are used to characterize Alberta's food processing industry.

Food Processing Employment

Exhibit 9.1 reviews key aspects of Food Processing in Washington and selected competitor states.²⁹ California, the nation’s largest agricultural producer, is also the nation’s largest food processor. California average employment by establishment is roughly half the national average. Idaho has the lowest number of establishments and total employment. New York is a major food processor relative to its agricultural sector—thanks in no small part to a large, developed dairy processing sector.

Exhibit 9.1. Food and Beverage Processing Covered Employment and Establishments, Washington and Top Competitors, 2013

State	Establishments	Employment
California	2,467	99,301
Idaho	118	4,723
New York	578	22,807
Texas	828	52,275
Washington	642	14,326
US Total	13,978	888,099

Source: Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

9.2 Profile of Washington’s Competitors and Industry Tax Incentives

Alberta, Canada

Alberta is Canada’s third-largest potato producer and is the country’s largest exporter of seed potatoes. Geographically close to Washington, Alberta exports roughly 75% of its processed potatoes to the United States. Nearly 52,500 acres of potatoes were planted in Alberta in 2013, and the province produces over 700,000 tons of potatoes every year. Major facilities owned by corporations like ConAgra Foods, Lamb Weston and McCain Foods Plants allow Alberta to process 80% of all potatoes grown in the province.³⁰ Canadian food processing competitiveness in the past decade has largely been driven by regional trade agreements, exchange rate impacts and regulatory changes.³¹ Recent years have seen renewed effort to reduce the so-called red tape costs of food processing in Alberta and Canada as a whole.

²⁹ Not all data is available for all states. Idaho data is available for miscellaneous food manufacturing, perishable prepared food manufacturing, meat processed from carcasses, animal slaughtering, fruit and vegetable canning and drying, and grain and oilseed milling; Washington data is available for all the above, as well as Poultry processing, coffee and tea manufacturing, and wineries; and Texas and Washington data is available for all segments.

³⁰ Potato Growers of Alberta, 2013.

³¹ Seguin, Bob “Drivers of Canadian Food Processing Competitiveness”, February 2014.

Alberta businesses have the lowest overall business taxes in Canada due to low corporate income taxes, no capital tax, no general sales tax, no payroll tax and the lowest gasoline tax among Canadian provinces.

Alberta also actively engages in several business attraction programs. The University of Minnesota has developed a toolkit for Alberta that includes strategies for business expansion. The Economic Developers Association of Alberta hosts the Community Economic Development Training Program, which offers a course that covers the fundamental business retention and expansion strategies of the province. The course allows local economic development committees and councils to learn more about attracting business. These two programs give local economic development groups the information and methods required to attract business without having to bear the costs of developing such methods.

Alberta is considering the establishment of a Potato Promotion and Marketing Agency that would operate based on domestic production and import levies to fund its marketing and research activities. The industry is currently conducting a feasibility study to assess such an agency.

Tax Incentives for Agriculture and Food Processing in Major Competitor States
Exhibit 9.6 outlines the major tax incentives offered by Washington’s competitor states. Compared to Washington, most other states have fewer, more broad incentives. The only other chief competitor state approaching Washington’s number of specific incentives is Texas, which offers 29 different tax incentives to food and beverage processors and farmers. California offers the greatest potential savings on a single credit with the potential to save 9.75% in state and local sales taxes on diesel for agricultural aircraft. On the processing side, the greatest potential savings can be found in New York, at 8.75%, with Texas close behind at 8.25%.

**Exhibit 9.6. State Agriculture Tax Incentives,
Washington’s Top Competitors, 2014**

State	Description	Tax Rate Exemption	Max Local Surtax Exemption
CA	Manufacturing Sales & Use Tax Exemption	4.19%	2.50%
	Farm Equipment, Machinery, and Parts Sales & Use Tax Exemption	5.50%	2.50%
	Diesel When Sold for Use in Agricultural Aircraft Sales & Use Tax Exemption	7.25%	2.50%
ID	Processing Sales Tax Exemption	7.50%	0.50%
NY	Home Food Processing Sales Tax Exemption	4%	4.75%
	Purchases by Manufacturers of Raw Materials, Ingredients, and Compounds Sales Tax Exemption	4%	4.75%
	Purchases of Machinery or Equipment Used to Manufacture or Process Food for Sale	4%	4.75%
TX	Purchases of Machinery or Equipment used Exclusively in the Production of Food or other Agricultural Products for Sale, Sales & Use Tax Exemption	6.25%	2%
	Purchases of Machinery or Equipment used Exclusively in the Processing, Packing, or Marketing of Agricultural Products by an Original Producer at a Location Operated by the Original Producer Sales & Use Tax Exemption	6.25%	2%

Sources: California Tax Service Center, 2014; Idaho State Tax Commission, 2014; New York Department of Taxation and Finance, 2014; Texas Comptroller of Public Accounts, 2014; Community Attributes Inc., 2014.

California

California is the country’s largest agricultural producer with more than 80,500 farm establishments, which received more than \$42 billion for their output in 2012. According to the USDA Census of Agriculture, milk was the top valued commodity in 2012, accounting for \$6.9 billion. Potato production accounted for more than \$200 million in value. Given the size of California’s agricultural sector, it is no surprise that the state is also an important food processor with more than 2,400 food processing facilities employing nearly 100,000 workers earning average yearly wages of roughly \$46,200. California is also the nation’s leading wine producer, home to more than 1,300 wineries.

The state offers fewer tax credits for food processors than Washington, but they are more comprehensive. The most valuable of these is the manufacturing sales and use tax exemption, which eliminates the state’s 4.19% sales tax for food manufacturers purchasing food processing equipment and any food processing R&D equipment up to \$200 million in exempt taxes. Farmers benefit from the state’s two other sales and use tax exemptions for farm equipment and diesel used for agricultural aircraft.

California is home to one of the nation's oldest food processing associations, the League of Food Processors. This group represents the interests of California's immense, well-established food processing segment, providing a framework for food processors to get legislative information, business practice information and industry connections. California enjoys a reputation as a global center of agriculture and food processing that has grown organically in tandem with the state's development. California's strong reputation as a wine producing region is also a boon to the state's well-established wine segment.

The California Association for Local Economic Development has also formalized local economic development efforts, providing a framework for business attraction and retention for small towns that would not normally be able to afford such efforts.

Idaho

Idaho is the top producer of potatoes in the U.S., accounting for 31% of the national total, though its greatest cash receipts in 2012 came from milk, valued at \$2.4 billion. Potatoes, with cash receipts of \$964 million, were the second-highest commodity and accounted for over 345,000 acres planted in 2012. Roughly 64% of potatoes grown in Idaho are grown for processing, slightly less than the 69% national average.³² Idaho is home to more than 100 processing establishments employing a workforce of about 4,500.

Food processors qualify for the broad processing sales tax exemption, effectively saving processors 7.5% on purchases of materials and equipment used in processing. This exemption falls under the Idaho production exemption, a category defined by engagement in producing a product for resale and includes farming, mining, ranching, fabricating, manufacturing and processing activities. The intent of this broad exemption category is to apply sales tax only to end-use products, not to product inputs.

Idaho's single exemption, subdivided by sector, creates a simple system for food processors of all sizes while simultaneously qualifying specific incentives with the goals of the broader preference. This acts as a buffer for legislative action; it is easier to repeal or avoid renewing small, specific and disjointed incentives than it is to repeal large and interconnected incentives. There is also a broad sales tax exemption for farmers and ranchers that falls under an umbrella production exemption, which functions similarly to the manufacturing exemption.

Idaho's comprehensive potato marketing programs have been very effective. The programs are supported by a 12.5 cent per cwt potato tax paid by potato growers and first handlers, similar to the Washington Potato Commission's annual assessment. This tax goes towards public relations, national advertising, retail programs, international market development, potato research and six field sales directors that call on all retail and food-service customers. Idaho potatoes as a brand enjoy customer recognition, which has in turn led to public awareness of the importance of potato growing and processing to the state economy. The state also benefits from substantial capital

³² Paul Lewin, "The Role of Agricultural Processing in Idaho's Economy: Status and Potential", University of Idaho Extension, 2013.

investments in processing, an excellent irrigation system and an arid climate that naturally deters fungal growth. An important limitation of Idaho's potato segment is its distance from major population centers.³³

In 2011, Idaho added a hiring incentive—Hire One—that provides an income tax credit to employers for the total gross wages of each new employee during the first year of employment.

New York

New York, second only to Washington in apple production nationally, also grows a large quantity of vegetables and ranks high in dairy milk production. While its 26th-place national ranking for value of agricultural products sold does not make it a major producer, it is a massive food processor with more than 500 processing establishments. Food processing employees – a workforce of roughly 22,000 – earn an average of \$45,000 annually. New York has about 90 dairy product manufacturing establishments that employ a combined 8,400 workers.

New York State has three major, comprehensive exemptions in food processing: a sales tax exemption for home food processors; a sales tax exemption for purchases by manufacturers of raw materials, ingredients and compounds; and a sales tax exemption for purchases of machinery or equipment used to manufacture or process food for sale. These exemptions cover the state's 4% sales tax as well as local surtaxes, the highest of which is 4.75%.

New York's major non-fiscal factors in competitiveness are an important aspect of its strong food and beverage processing industry. First and foremost, food processors in New York enjoy proximity to major markets unlike anywhere else in the country. Affordable land and established infrastructure in Fulton County in particular have given it an edge in attracting food and beverage processors; the county has enjoyed several major recent relocations, including Pata Negra, a meat curing company, and CG Roxane, a major bottled water manufacturer.

The Rochester Institute of Technology's Center for Integrated Manufacturing Studies has developed an initiative to support the region's food processing cluster, providing training programs and informational services to any business in the region that is part of the food processing supply chain.

Texas

Texas was the top state in the U.S. for Animal Production, which was valued at over \$18 billion in 2012. In addition to its large, established agriculture and food processing sectors, Texas also has a reputation for aggressive business recruitment. The state is home to more than 240,000 farm operations averaging 524 acres in size. Its food processing industry employs 52,000 workers earning \$40,600 in average yearly wages across more than 800 facilities. Texas ranks second in the nation for value of shipments in food processing.

³³ Paul Lewin, "The Role of Agricultural Processing in Idaho's Economy: Status and Potential", University of Idaho Extension, 2013.

Exhibit 9.7 shows a complete list of agriculture and food processing tax incentives in Texas. Texas has a network of overlapping incentives with many small, specific gaps. Out of these incentives, the most significant to processors are sales tax exemptions for: 1) machinery or equipment used exclusively in the production of food or other agricultural products for sale and 2) machinery or equipment used exclusively in the processing, packing, or marketing of agricultural products by an original producer at a location operated by the original producer. Other notable incentives include a sales tax exemption for beverage bottling and a sales tax refund for gasoline used in non-highway purposes. Like Washington, Texas does not have a state income tax.

Texas's substantial food processing cluster is built largely on poultry processing, with the massive Tyson Foods and Pilgrim's Pride companies as its foundation. Specialized support has grown around these two large players, including attractive infrastructure and established supply chains. In a broader sense, Texas is perhaps the most aggressive and visible business attractor, marketing its low taxes, large infrastructure programs and abundant skilled workforce. Texas is consistently ranked in the top five competitive states for its business climate by business publications including *Area Development*, *Business Facilities*, *Site Selection*, and *CEO* magazines, as well as CNBC.

Exhibit 9.7. Agriculture and Food Processing Tax Incentives, Texas, 2014

County appraisal district assessment valuation Property Tax Exemption
Agricultural credit association regulated by the Farm Credit Administration Franchise Tax Exemption
Nonprofits organized for agricultural purposes (fairs) Franchise Tax Exemption
Farmers cooperative societies Franchise Tax Exemption
Manufacturing (bottling, processing) Sales Tax Exemption
Replacement or repair parts for farm vehicles Sales Tax Exemption
Flour, sugar, bread, milk, eggs, fruits, vegetables, similar groceries Sales Tax Exemption
Repair or purchase of supplies and equipment and services Sales Tax Exemption
Seeds and annual plants, the products of which are commonly recognized as food, or are usually raised to be the regular course of business Sales Tax Exemption
Animals, the products of ordinary food Sales Tax Exemption
Horses and mules Sales Tax Exemption
Water Sales Tax Exemption
Feed for farm and ranch animals or wild game Sales Tax Exemption
Fertilizer, fungicides, insecticides, herbicides, defoliant and desiccants used exclusively in the production of food or other agricultural products for sale Sales Tax Exemption
Medications for farm or ranch animals Sales Tax Exemption
Machinery or equipment used exclusively in the production of food or other agricultural products for sale Sales Tax Exemption
Tangible property incorporated into a structure used exclusively for poultry carcass disposal Sales Tax Exemption
Components of irrigation systems used on a farm or ranch Sales Tax Exemption
Electricity or natural gas used in agriculture Sales Tax Exemption
Machinery or equipment used exclusively in the processing, packing, or marketing of agricultural products by an original producer at a location operated by the original producer Sales Tax Exemption
Buildings and structures used for poultry carcass disposal or additions to free-stall dairy barns or dairy structures used for maternity purposes Sales Tax Exemption
Labor to construct a new road Sales Tax Exemption
Purchase of road materials to build, repair, or maintain feed alleys Sales Tax Exemption
Containers used to transport produce or poultry Sales Tax Exemption
Machinery and equipment used in an agricultural aircraft operation Sales Tax Exemption
Exempt items for which sales tax was paid Sales Tax Refund
Gasoline used in non-highway purposes Fuel Tax Refund
Dyed diesel Fuel Tax Exemption
Farm machines, trailers, and semitrailers used primarily for farming and ranching Motor Vehicle Tax Exemption

Source: Texas Administrative Code, Title 34; Community Attributes Inc., 2014.

9.3 Processors with Facilities in Washington and Elsewhere

Several of Washington's major food and beverage processors who have benefitted from the state's tax incentives operate facilities out of state. Such companies include Darigold, Tree Top, ConAgra Foods Lamb Weston in Richland and Pasco, and Del Monte Foods. These processors have a unique perspective with regards to Washington's tax incentives in that the barriers to moving some or all of their production to existing out of state facilities could be lower than the barriers for smaller processors with no locations outside of Washington. It is important to note that these processors' activities, by nature, intensively use local products; while production equipment can be trucked out of state, food production is tied to the land.

Darigold, which receives 88% of the total value of dairy processing B&O exemptions in 2013, operates six milk production plants, a culture plant and a cheese plant in Washington State. Outside of the state, it operates four Class I plants (Boise, Bozeman, Medford and Portland) and two dried milk production plants (Caldwell and Jerome). With more than \$216 million in out of state sales in the same year, Darigold is an important exporter for Washington State.

Tree Top, a major Washington fruit processor, operates four fruit processing facilities in Washington, centered on multiple facilities in Selah that, taken together, employ more than 300 people. Its fruit and vegetable B&O tax exemption was approximately \$297,600 in 2012. Tree Top operates a facility in Oxnard, California that employs approximately 50 people, as well as two facilities in Oregon that operate seasonally, following the harvest of apples, pears, apricots, peaches and strawberries. Tree Top's Medford, Oregon plant produces conventional and organic baby food from fruit purees.

Darigold and Tree Top are unique from other processors in Washington because they are both farmer-owned cooperatives. Darigold represents more than 600 family dairies in California, Idaho, Oregon and Washington; Tree Top has more than one thousand apple and pear grower members.

ConAgra Foods Lamb Weston, which received 18% of the value of fruit and vegetable processing B&O tax exemption in 2013, operates numerous processing plants, primarily for potatoes, outside of Washington State. It employs about 4,500 workers in the Columbia River Basin and has around 300 employees in its Kennewick, Washington, headquarters. The company has 20 facilities worldwide with locations in Oregon, Idaho, Minnesota, Louisiana, and Alberta, Canada. Lamb Weston's estimated out-of-state sales were in excess of \$190 million in 2012.

Del Monte Foods, a multi-national corporation, is headquartered in San Francisco and operates 11 food processing facilities and three distribution centers around the country. It received about \$218,300 in fruit and vegetable processing B&O tax exemptions for its vegetable and fruit processing activities in Washington. The company also has several vegetable processing plants in Wisconsin as well as one in Texas.

9.4 Feedback from Interviewees on Washington's Competitiveness

Importance of Tax Incentives

Washington's agriculture-related tax incentives help farmers keep their costs relatively low compared to other states. Most of the savings gained through tax incentives for food processors and agricultural producers lie on the B&O side, a tax structure not found in any of Washington's competitor states. Interviewed farmers consistently cited B&O and sales and use tax incentives as huge factors in remaining competitive. Since most farmers sell wholesale to market and processors, any added costs in crop production are absorbed by farmers. "Sales tax is supposed to be charged on an end-use product, after a product has been finalized and put to sale. Feed, seed and fertilizer are inputs into a finished product...sales tax is 8%, so if they eliminate that [exemption], I lose 8%, and I can't pass that on to consumers," said one farmer.

Reducing competitiveness for farmers would have a significant impact on the processors those farmers sell to, threatening the state's food processing sector. For low-intensity food processors, such as vegetable processing, interviews revealed that their equipment is small and easy to relocate; so, if the cost of inputs in food processing become attractive enough in other states, "then that decision will be made," according to one processor.

Potato farmers also mentioned sales tax exemptions as a huge factor in their national competitiveness. Describing the impact of eliminating tax incentives on competitiveness, one farmer said, "In agriculture, we sell commodities wholesale, so we can't pass those costs on to consumers; we would need to find out how we can eat those costs internally, and we just can't." Another farmer said, "I think if incentives go away, we are non-competitive with every other state in the United States."

Food processors repeatedly cited tax credits as the make-or-break element for competitiveness. Without the incentives, one processor said, dramatic measures would have to be taken to absorb the added cost: "new capital investments won't happen and new employees can't be hired." Tax issues can be the difference between opening a new plant in Washington and opening or expanding a plant in Idaho. Interviewees noted that Idaho in particular offered better and more consistent tax incentives and that Texas' government is much more open to aiding businesses.

Regardless of their exact value, processors find it difficult to plan ahead due to the uncertainty surrounding renewal of tax incentives. The three-year sunset attached to food processing tax incentives in the state is reportedly a barrier to capital and R&D investments, as processors "need a longer time frame to make investments make sense...we don't necessarily need an increase in amount. The IRS gives seven to 12 years for equipment depreciation, which is a much more realistic time frame" for incentives.

Linkages between Farmers and Food Processors

As suggested by the exhibits showing county Crop Production and Animal Production cash receipts and related food processing locations in **Section 4.4**, farmers and food processors have developed strong connections that benefit both parties. Since proximity

to food production is vital for food processing, processors have limited options in where they can reasonably move or open new plants. Processors also have a role in the operations of its farmers. For instance, potato processors regularly inspect growers' crop and recommend improvements for crop management and storage. The processor has a strong vested interest in ensuring the crop is healthy and meets all required health and safety and quality standards for use.

Food processors sometimes transport product from site storage to their processing facilities themselves. Other farmers are responsible for transporting their product to processors, and are later reimbursed by processors. For potato farmers, the majority of farm output goes directly to food processors, so the economic health of the latter is critical for local potato farmers. Remove local processors, and the farmers will need to find new markets for their crop and transport that crop at cost or bear large costs to switch machinery and production to a different crop. As one grower stated, "There are eight [food processors] within 100 miles. If those went away, 50% of the product we raise would have to be switched to another crop."

Farmers often negotiate with processors as a group through organizations like the Potato Growers of Washington. One farmer noted that the contract with his processor is subject to annual renewal, so any cost adjustments for the processor, such as reduced tax incentives, can be passed down to him relatively quickly in the form of lower prices for his product. Input costs, market share and tax rates all factor into costs for the processors. Margins are very narrow in the food processing industry because it is highly competitive. To maintain market share, costs need to be passed down, making farmers price takers.

Some producers have eliminated their dependence on local processors by establishing their own food processing cooperatives. This strategy helps to reduce the risk of losing access to processing plants, but these companies still weigh the merits of maintaining facilities in Washington versus adjacent states, which may offer more financial benefits. One such processor, when addressing their excess facility capacity, stated that they are considering consolidation to increase efficiency and would prefer to shift more production into Washington from Oregon, but the loss of tax incentives could cause them to do the reverse.

Regulatory Issues and Cost of Compliance

Processors and growers felt that state regulations in Washington were overly burdensome, particularly in terms of food safety. The rise in concern regarding food safety nationally has increased costs of compliance for producers and processors. While acknowledging the overall importance of such requirements, they expressed frustration at rules that seem excessive, such as using potable water for irrigation and completely fencing off orchards to exclude wild animals.

Food handling and safety regulation can be especially onerous to small farms, explained one food processor. Certifications, audits and food safety and traceability regulations all place the regulatory burden on producers. Smaller operations are less able to absorb costs associated with more stringent rules, and as price takers, they cannot pass these along. While large producers are able to spread the cost of compliance across thousands

of acres, those costs are concentrated in smaller areas for smaller farmers. Additionally, some regulations are viewed as arbitrary, since retailers are not always held to the same food safety standards, rendering precautions taken during production and processing potentially worthless.

Advancements in testing technology has also resulted in more stringent standards for both producers and processors. As one processor observed, agencies that could only detect potential health threats at parts per million previously can now set acceptable levels at parts per billion or trillion. Producers of all varieties are subject to myriad water regulations, including extensive testing for bacteria and limits on discharge volumes to reduce pollutants in waterways. Adhering to food safety standards is a priority for processors, so they are “always trying to stay ahead and prevent any contamination.” Still, this can present serious challenges to processors when the raw materials they receive from growers already exceed regulatory maximums for toxins like arsenic and lead, which can naturally occur in soil containing volcanic ash.

Interviewees cited the regulatory environment in California as a cautionary tale, noting the business climate, lack of government support, high taxes and strict environmental regulation with high cost of compliance as factors contributing to a “mass exodus” of food processors from the state. Because every state has its own regulatory laws, processors with plants in other states or Canada may choose to invest in operations located in states with fewer regulations.

10.0 SUMMARY AND CONCLUSION

Agriculture and Food processing activities have big impacts within Washington State. In 2013 these activities supported an estimated 220,600 jobs throughout Washington. Additionally, Agriculture and Food processing supported almost \$36 billion in business revenues and \$8.7 billion in income. The fiscal impacts of these activities are also important, totaling \$362.9 million in state taxes.

Farms and processing activities support communities. Many farms are family run businesses, and constitute a large portion of these families' incomes. Often a family farm will support several members of the family, as well as hired labor. Additionally, the tax incentives benefiting local farmers and processing cooperatives channel these benefits back into their local communities.

Eastern and central Washington are especially dependent on farming. Agriculture and Food processing account for more than 20% of total covered employment in many counties in central Washington. Grant, Whitman, and Yakima counties are ranked first in the nation for production of wheat and apples; Grant County had \$1.73 billion in cash receipts, and Yakima County accounted for 28% of Crop Production jobs and 48% of Agricultural Support Activities jobs. Throughout Washington's counties there exists a complex ecosystem that binds together farmers, processors, supporting activities, and distribution networks, which support local communities and the state as a whole.

Food processors, agriculture, and supporting activities have strong ties to each other. Agriculture throughout Washington is highly dependent on demand from food processors; 20% of all agriculture jobs in the state rely on this demand. In turn food processors rely on supporting activities as well, including manufacturers and logistics firms. Farmers also rely on supporting activities, creating demand for soil preparation, and product marketing, and other activities.

Farmers face risks both through price volatility and dependence on weather. Each year farmers make advance decisions on the following year's production, banking on good weather conditions to produce good yield. Additionally farmers are price takers and must absorb any reduction in prices or increase in costs, which can create very tight profit margins. This volatility leads farmers to evaluate profitability on a 10-year cycle, as they can experience years of very high returns followed by years of negative returns. Tax incentives help mitigate some of the risk due to price volatility. Over a 10-year period the sales and use tax exemption could total as much as \$665 million for potato farming in Washington alone, which these farmers would absorb as increased cost being unable to pass these costs on further down the supply chain.

Agriculture and Food processing have a symbiotic relationship. Food processing activities often locate near production areas, which reduces transportation costs, and creates employment centers within their communities. This relationship is mutually beneficial. However, when processors move to more cost-effective locations the communities they move from suffer, it can even spell the end of farming that commodity within the community. Farmers have in some instances established their own processing

cooperatives. In addition to providing security these cooperatives pass the savings from B&O tax incentives back to farming communities throughout the state.

The existing state tax incentives for Agriculture and Food Processing matter for two important reasons. First, although farmers purchase production inputs like any other industry, these are often purchased as retail goods because many farmers are small operations. While a machine or fuel may be bought at retail, these purchases are no different than when a manufacturer procures machined parts or industrial materials, and should be viewed as such.

Second, farming and processing are low margin, highly competitive industries. Rural communities across the state face the prospect of losing major food processing employers due to more advantageous incentives offered in other states or regions. Local processors must compete with producers not just in neighboring states and provinces, but in China and other countries, as well.

Competitiveness extends to farmers. Agriculture is a highly volatile and risky industry. Farmers must make large investment decisions up to a year or more in advance, with no ability to predict a set of variables that could make or break their profitability, or even put them out of business. These include weather, global prices, and trade barriers, among others. When years are good, farmers invest in necessary equipment and other inputs and save for the bad years; when years are bad, the incentives help farmer simply stay in business. Farmers and processors are important employers—when these businesses either shut down or relocate, the communities they were based in suffer.

Food processing also spurs constant innovation. Innovation not only simplifies complex and labor intensive tasks such as sorting, but also increases efficiency and reduces costs. Changing consumer demand also puts pressure on food processors to provide ever changing products.

Agriculture and Food processing activities are critical sectors to Washington's economy, and have large impacts for local economies and communities. These activities take place in every county within the state, with Dairy production and cattle ranching on both sides of the Cascades, fruit orchards and field crops stretching across the rural landscapes of the state, and finfish and shellfish farming in the Puget Sound. Washington produces some of the best quality agricultural products in the world, and communities throughout Washington rely on Agriculture and Food processing activities.

APPENDIX

Appendix A. NAICS Codes

Category	NAICS Industry	Category	NAICS Industry
Agriculture Support Activities	115112 Soil preparation, planting, and cultivating		3112 Grain and oilseed milling
	115113 Crop harvesting, primarily by machine		311411 Frozen fruit and vegetable manufacturing
	115114 Other postharvest crop activities		311412 Frozen specialty food manufacturing
	115115 Farm labor contractors and crew leaders		31142 Fruit and vegetable canning and drying
	115116 Farm management services		31151 Dairy product, except frozen, manufacturing
	115210 Support activities for animal production		311611 Animal, except poultry, slaughtering
	493130 Farm product warehousing and storage	Food & Beverage	311612 Meat processed from carcasses
	424910 Farm supplies merchant wholesalers	Processing	311613 Rendering and meat byproduct processing
Animal Production	112111 Beef cattle ranching and farming		311615 Poultry processing
	112112 Cattle feedlots		311710* Shellfish Processing share of seafood processing
	112120 Dairy cattle and milk production		311920 Coffee and tea manufacturing
	112310 Chicken egg production		311991 Perishable prepared food manufacturing
	112320 Broilers and meat type chicken production		311999 All other miscellaneous food manufacturing
	112420 Goat farming		312120 Breweries
	112511 Finfish farming and fish hatcheries		312130 Wineries
	112512 Shellfish farming		424430 Dairy product merchant wholesalers
	112910 Apiculture		424470 Meat and meat product merchant wholesalers
	112920 Horses and other equine production		424480 Fruit and vegetable merchant wholesalers
	112930 Fur-bearing animal and rabbit production	Wholesale & Distribution	424510 Grain and field bean merchant wholesalers
112990 All other animal production		424520 Livestock merchant wholesalers	
Crop Production	111130 Dry pea and bean farming		424590 Other farm product raw material merch. whls.
	111140 Wheat farming		424930 Nursery and florist merchant wholesalers
	111150 Corn farming		445230 Fruit and vegetable markets
	111191 Oilseed and grain combination farming		483211 Inland water freight transportation
	111199 All other grain farming		
	111211 Potato farming		
	111219 Other vegetable and melon farming		
	111331 Apple orchards		
	111332 Grape vineyards		
	111334 Berry, except strawberry, farming		
	111336 Fruit and tree nut combination farming		
	111339 Other fruit farming		
	111421 Nursery and tree production		
	111422 Floriculture production		
111940 Hay farming			
111998 All other miscellaneous crop farming			

*Shellfish processing based on a small share of total seafood processing.

Appendix B. Data Source Limitations

The National Agricultural Statistics Service (NASS) is a USDA entity charged with describing the nation's agriculture sector with quantitative information. The most recent iteration of agricultural reporting agencies was first created in 1861 during the Lincoln administration. NASS relies on self-reported data broken out into large increments. Acreage, for example, is reported in the following increments:

- 1 to 9.9 Acres
- 10 to 49.9 Acres
- 50 to 69.9 Acres
- 70 to 99.9 Acres
- 100 to 139 Acres
- 140 to 179 Acres
- 180 to 219 Acres
- 220 to 259 Acres
- 260 to 599 Acres
- 500 to 999 Acres
- 1000 or more Acres

These increments are largely a result of the nature of the nation's agriculture sector at NASS' inception in the nineteenth century: a large number of small farms. NASS data, though limited by its self-reported nature and focus on what would today be considered very small farms, is nevertheless the best data available. This self-reported data is based on how an operation is organized for tax purposes, resulting in a mix of establishments and firms reporting as single legal entities; a corporate farm with multiple crops in the same geographic area could report multiple operations on the same establishment, or report a single operation for the entire firm, depending on how that corporation reports its sales for tax purposes.

Appendix C. Local Inputs: Coffee & Tea Manufacturing

Companies in the NAICS classification for Coffee & Tea Manufacturing are an important and highly visible component of Washington's beverage processing segment. The largest coffee and tea manufacturers in the state, including Starbucks' Tazo Tea blending facility in Kent, utilize local inputs in the manufacturing of bottled tea products. IMPLAN modeling revealed that coffee and tea manufacturing was a significant utilizer of local inputs, especially fruit. Apples, one of Washington's most important agricultural commodities, are utilized by coffee and tea manufacturers, and enter the consumer market as bottled tea beverages and as flavoring elements in tea leaf blends.

Appendix D. Input-Output Analysis and Removal of Double-Counting

Economic Impact Analysis

The primary tools for estimating the broader impacts of the Agriculture and Food Processing cluster in Washington State were the Washington State Input-Output (I-O) Model for year 2007, published in 2012, and IMPLAN. The Washington State I-O Model provides a data-rich rendering of the state economy across 52 sectors. The transactions table, which underpins the I-O model, provides estimates of intermediate purchases, sales, and final demand across all modeled sectors. The complex analysis of the model, published online by the Washington State Office of Financial Management, allows analysts to model the impacts of economic activities when output, labor, wages, and first round direct purchases/requirements are known.

In order to apply the input-output model for multiple years of analysis, implicit price deflators were used to adjust previous year totals to 2013 (the most recent modeling year). Direct requirements for farming, processing, and related activities were estimated by applying the calculated shares of purchases for each sector to each year of output, derived from the 2007 transactions table, as well as IMPLAN social accounting matrices, and recent studies by Washington State University on direct requirements for select activities, based on IMPLAN and richer, survey and interview-informed analysis.

The economic impacts of Agriculture and Food Processing in Washington include direct, indirect, and induced effects, the total impact being the sum of these impacts. Analysis begins with a transactions table, constructed from multiple data sources by Beyers and Lin³⁴. This table captures all transactions between and within industries and final demand, the latter including personal consumption expenditures (i.e., household consumption), domestic and foreign exports, investment, and federal, state, and local expenditures. Total output in an economy is thus the sum of inter- and intra-industry purchases, also referred to as intermediate transactions, and final demand. The input-output transactions table is governed by an important accounting identity requiring that all purchases in an economy must equal all output. Within the transactions matrix, the sum of each column represents all purchases by an industry or source of demand, and will equal the amount sales and output by that activity.

For example, in the latest transactions table, the input-output sector “Software Publishing and Internet Service Providers” in 2007 purchased nearly \$5.3 billion in non-labor inputs from other industries in Washington. Added to this, the sector paid \$9.7 billion in wage and salary outlays (including non-wage benefits), plus \$8.3 billion in other value added activities (e.g., profits, dividend payments) and \$10.1 billion in imported (domestic and foreign) inputs; these amounts total \$33.4 billion, exactly equal to total sales, or output, by the Aerospace industry in Washington (**Exhibit D.1**).

³⁴ Beyers, W. & Lin, T.-w. (2012). *The 2007 Washington State Input-Output Model*. Olympia, WA: Washington State Office of Financial Management. Retrieved from http://www.ofm.wa.gov/economy/io/2007/I-O_2007_report.pdf.

Exhibit D.1. Example of Input-Output Transactions Table

	Software Publishers & Internet Service Providers	Intermediate Sales	Personal Consumption Expenditures	Private Investment	Government Expenditures	Exports	Total Final Demand	Total Output
...								
Software Publishers & Internet Service Providers	306.3	2,698.2	434.2	82.6	1,474.9	28,663.0	30,654.6	33,352.8
...								
Total Intermediate Purchases	5,289.3							
Labor Income	9,658.2							
Other Value Added	8,289.7							
Imports	10,115.7							
Total Purchases	33,352.9							

Sources: Washington State Office of Financial Management, 2012; Community Attributes Inc., 2013.

The columns of a transactions table thus represent production functions for each modeled industry. Direct requirements coefficients, also referred to as technical coefficients, are the share of total purchases for each input. For example, in 2007, according to 2012 Washington Input-Output Model, the Software Publishing and Internet Service Providers industries in Washington purchased \$240.4 million in goods and services from the industry category “Architectural and Engineering /Computer Systems Design and Related Services,” translating into a direct requirements coefficient of 0.0072, or 0.72% of all purchases made by Software Publishing and Internet Service Providers based in Washington State (\$240.4 million / \$33.4 billion).

Once a matrix of direct requirements is calculated, a series of equations are used to relate changes in demand in one sector of the economy to changes in gross output to across the entire economy. Inter-industry transactions, denoted “O,” is equal to a vector X of gross output per industry multiplied by the matrix of direct requirements, denoted “A.”

$$(1) O = AX$$

The vector of gross output per industry, X, is the sum of inter-industry output (transactions) and final demand. In the above example, \$41.7 billion in total output in aerospace is equal to \$842.8 million in inter-industry sales plus \$40.8 billion in final demand.

$$(2) X = O + D$$

Combining equations (1) and (2) results in industry gross output equaling the sum of industry output multiplied by direct requirements plus final demand:

$$(3) X = AX + D$$

Rearranging this equation:

$$(4) D = (1-A)X, \text{ and}$$

$$(5) X = D(1-A)^{-1}, \text{ the } (1-A)^{-1} \text{ inverse matrix referred to as the “Leontief Inverse.”}$$

Finally, input-output modeling is primarily used to assess economy-wide changes given a change in one or more activities, resulting in equation (6):

$$(6) \Delta X = (1-A)^{-1}\Delta D$$

Adjusting for Double Counting

In order to calculate the combined impact of all direct activities analyzed in this study, more accurate estimates of final demand must be completed. Final demand refers to the final sale of goods and services to end users or to additional value-added processing outside Washington State (either domestically or overseas), and thus excludes inter- and intra-industry sales. For example, a large share of agriculture sales are not sold to end users or outside buyers, but to processors within Washington, such as potato sales to processors in Benton County. The value of these potatoes is thus captured in the sale of processed foods; adding both would thus result in an over counting of the value of these activities, both directly and broader economic impacts across the state. Put another way, a share of farming jobs in Washington is supported by demand from state-based processors—these jobs are captured in the indirect effects of processing in Washington. Adding both farming-based economic impacts and processor-based impacts would result in double-counting of some jobs and revenues.

In order to adjust for the above issues, the impact analysis is run in two phases. In the first phase, the impacts of each segment of the cluster is estimated separately. Then, indirect sales between each segment are subtracted from the combined direct revenue totals, resulting in a new estimate of total cluster-based final demand. While the cluster had an estimated combined revenue impact of \$23.5 billion, the final demand from these activities summed to \$19.5 billion.

Appendix E. Breakeven and Sales Tax Incentive Analysis

Breakeven Price Analysis

Washington wheat farmers experience a great deal of volatility in production, climate and prices. This volatility leads wheat farmers to calculate profitability on a 10 year basis. In order to more fully explore the volatility wheat farmers experience and how often the value of production exceeds costs over a 10 year period, the breakeven price for wheat is calculated for the period 2004 to 2013. The breakeven price is the price at which a wheat farmer, given yearly production and costs, will have zero profits (the value of production less total costs is equal to zero).

The United States Department of Agriculture (USDA) Economic Research Service (ERS) publishes Cost-and-Return budgets by USDA Farm Resource Region for wheat producers. Washington wheat production is divided between two regions, “Fruitful Rim” and “Basin and Range.” Each of these regions has distinct cost structures, thus each region is examined separately. The breakeven price is dependent on the specific cost structure outlined, as well as the given bushel per planted acre yields, which differ across regions, all of which are provided by the USDA ERS.

Within this analysis it is assumed that the given yields and prices are accurate, as are the cost structures for each region. The breakeven price is then calculated using a function that forces the value of production less total costs equal to zero by changing the price of wheat. This then provides the price at which wheat production just covers costs per acre, but does not yield any value over costs.

Tax Incentives Analysis

Another important source of concern for farmers in Washington regarding profitability is the potential loss of certain tax incentives. Of particular concern are the sales and use tax incentives for Farm Machinery Replacement Parts, Fuel Used on Farms, and Fertilizer and Chemical Sprays. In order to explore how the potential loss of these incentives could impact the profitability and breakeven prices for wheat in Washington a pro forma analysis is conducted using the Cost-and-Return budgets for Fruitful Rim and Basin and Range wheat production.

The analysis starts with the Joint Legislative Audit and Review Committee (JLARC) Biennial Beneficiary Savings estimates of benefits accrued through each of the three sales and use tax incentives listed above, for all types of agriculture in Washington. These biennial savings are then converted to annual savings. From these annual savings the approximate value of sales subject to these tax incentives is estimated by determining the non-preferential tax rate through the Washington State Department of Revenue. The Washington State sales tax rate is 6.5%, the highest local and state combined rate is 9.6%, the lowest local and state combined rate is 7.0%, and the median sales and use tax rate is 8.2%. Using the median sales tax rate it is possible to estimate the annual value of purchases made by Washington farmers that would accrue the biennial beneficiary savings calculated by JLARC.

The estimated value of purchases is then compared to the Total Field Crop Expenditure in Washington from the Ag Census, 2012. These expenditures are broken out into broad

categories, of particular interest are “Supplies, Repairs and Maintenance,” “Gasoline, fuels, and oils,” “Fertilizer, Lime, and Soil conditioners,” and “Chemicals.” These three categories roughly correspond to the three tax incentives under examination. However, it can also be assumed that within these categories there are purchases not subject to the tax incentives under examination. Therefore, it is necessary to compare the taxable value estimated from the JLARC beneficiary savings with the total expenditures provided in the Agriculture Census data, followed by calculating the approximate share of total expenditures within each category that is subject to the tax incentives. This can be achieved by simply dividing the value of purchases subject to preference by total expense within each category.

It could be assumed that the share of expenditure that is subject to tax preference is consistent across all agricultural industries, however, this could be inaccurate. Therefore, the total expenditures for field crops is determined by combining Oilseed and Grain Farming expenses with Other Field Crop expenses, then calculating the shares of expenditure that are subject to tax preference for Field Crops specifically. The estimated Field Crop shares of expenditure are consistent with the shares calculated for all agricultural industries.

Another check on the accuracy of these estimates is to determine wheat production’s share of Washington total expenses within the Agriculture Census. First, wheat’s share of total field crop planted acreage in Washington is determined using data on planted acres from the National Agricultural Statistics Service (NASS). Next, the expense per acre for field crops is calculated using the Ag Census Expenses by Category data and the Field Crop Planted Acreage from NASS. Then the wheat share of total field crop planted acreage is applied to the field crop expense per acre. These values are then compared to the values within the Fruitful Rim and Basin and Range Cost-and-Return budgets from USDA ERS. Therefore, it is concluded that the per acre expenses calculated from the Ag Census and NASS data is comparable to the per acre expenses reported in the USDA ERS budgets.

Thus, it is possible to proceed by determining within the Cost-and-Return budgets from ERS the value per acre of added tax in a situation without the three tax incentives. The share of taxable expense is applied to its broad category within the budget, then the total expenses are added together, lastly the median tax rate is applied to this total expense. This provides the additional tax for the no preference scenario for the Fruitful Rim and Basin and Range cost structures. These additional taxes are added to the total allocated overhead, and thus the total cost. Then the same process of calculating breakeven prices as outlined above is applied. It is therefore possible to estimate both the increase in tax per acre for wheat farmers in Washington and the 10 year average price for wheat farmers must receive in order to cover costs.

Appendix F. Food Processing Employment

Dairy Product Manufacturing

Exhibit F.1 shows food processing detail in dairy product manufacturing. The segment yields high wages to employees, with a national average wage of nearly \$60,000. As in other segments, wages in California are significantly higher than in other states while wages in Washington are consistently lower. California establishments average 85 employees while Washington establishments average just 44; not only is California home to more than six times as many dairy manufacturing establishments as Washington, each establishment employs nearly twice as many people with average annual wages \$25,000 higher.

Exhibit F.1. Dairy Manufacturing, Except Frozen, Covered Employment and Establishments, Washington and Top Competitors, 2013

State	Establishments	Annual Wage	Employment
California	175	\$76,804	14,850
Idaho	-	-	-
New York	89	\$60,736	8,470
Texas	60	\$59,436	4,800
Washington	27	\$51,064	1,180
US Total	1,374	\$59,904	112,950

Source: Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Coffee and Tea Manufacturing

Exhibit F.2 shows the breakdown of coffee and tea manufacturing. This segment is unique in food processing because the states with the highest share of sector employment and establishments have the lowest wages. Washington and California each account for nearly 10% of establishments and employment but both have wages more than 10% lower than the nation's average. California, which typically pays higher average wages to workers in food processing than other states, pays \$6,000 below average. In Washington, where wages are typically lower than the nation's average, that effect is multiplied; wages in coffee and tea manufacturing are more than \$10,000 below average.

Average employment per establishment rests in the 20-35 range with no correlation between state share of employment and size of establishments. The fact that segment composition is similar across states combined with the breakdown of wages by total employment and food processing wages by state suggests that the states with more employment in this sector have more employees in low-wage, direct processing positions compared to high-wage management positions.

Exhibit F.2. Coffee and Tea Manufacturing Covered Employment and Establishments, Washington and Top Competitors, 2013

State	Establishments	Annual Wage	Employment
California	55	\$43,680	1,970
Idaho	-	-	-
New York	29	\$54,756	600
Texas	27	\$55,172	870
Washington	55	\$38,740	1,370
US Total	571	\$49,660	17,740

Source: Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Wineries

Exhibit F.3 shows winery establishments, employment and wages in Washington and available competitor states. Washington is the second-largest producer of wine in the U.S. behind California. California accounts for 42% of all winery establishments and 64% of winery employment. California's trend of high pay in food and beverage processing holds with regards to wineries; annual wages are 25% higher than average in California wineries.

Washington's market share is much lower, but still competitive, making up almost 10% of establishments and close to 6% of employment. The distribution of employees among establishments in Washington is very different from California: California wineries employ 21 workers on average while Washington wineries employ only eight. This characterizes Washington wineries as relatively small, which accounts in part for the state's low wages in this segment.

Exhibit F.3. Wineries Covered Employment and Establishments, Washington and Top Competitors, 2013

State	Establishments	Annual Wage	Employment
California	1,306	\$54,392	27,660
Idaho	-	-	-
New York	152	\$27,248	1,810
Texas	124	\$22,672	990
Washington	296	\$30,004	2,390
US Total	3,111	\$43,524	43,130

Source: Bureau of Labor Statistics, 2014; Community Attributes Inc., 2014.

Breweries

Washington's brewers enjoy a wealth of local inputs. The state produces 77% of the nation's hop crop, primarily in the Yakima Valley. Combined with Washington's large wheat and barley growing agricultural segments, Washington brewers can source the entirety of their mash bills from within the state. California has the highest annual brewery employment in the U.S. with 4,271, followed by Colorado with 3,663. **Exhibit F.4** shows average annual establishments, employment and wages for select competitor states in 2013. Washington has the lowest average employment per establishment in the top 10 states by employment at 13.2 employees per establishment. The national average is 29.7 employees, with Wisconsin and Ohio leading in employment per establishment at 56.7 and 48.3 employees respectively. Similar to wineries, the low employment per establishment in Washington State can account in part for low average annual wages.

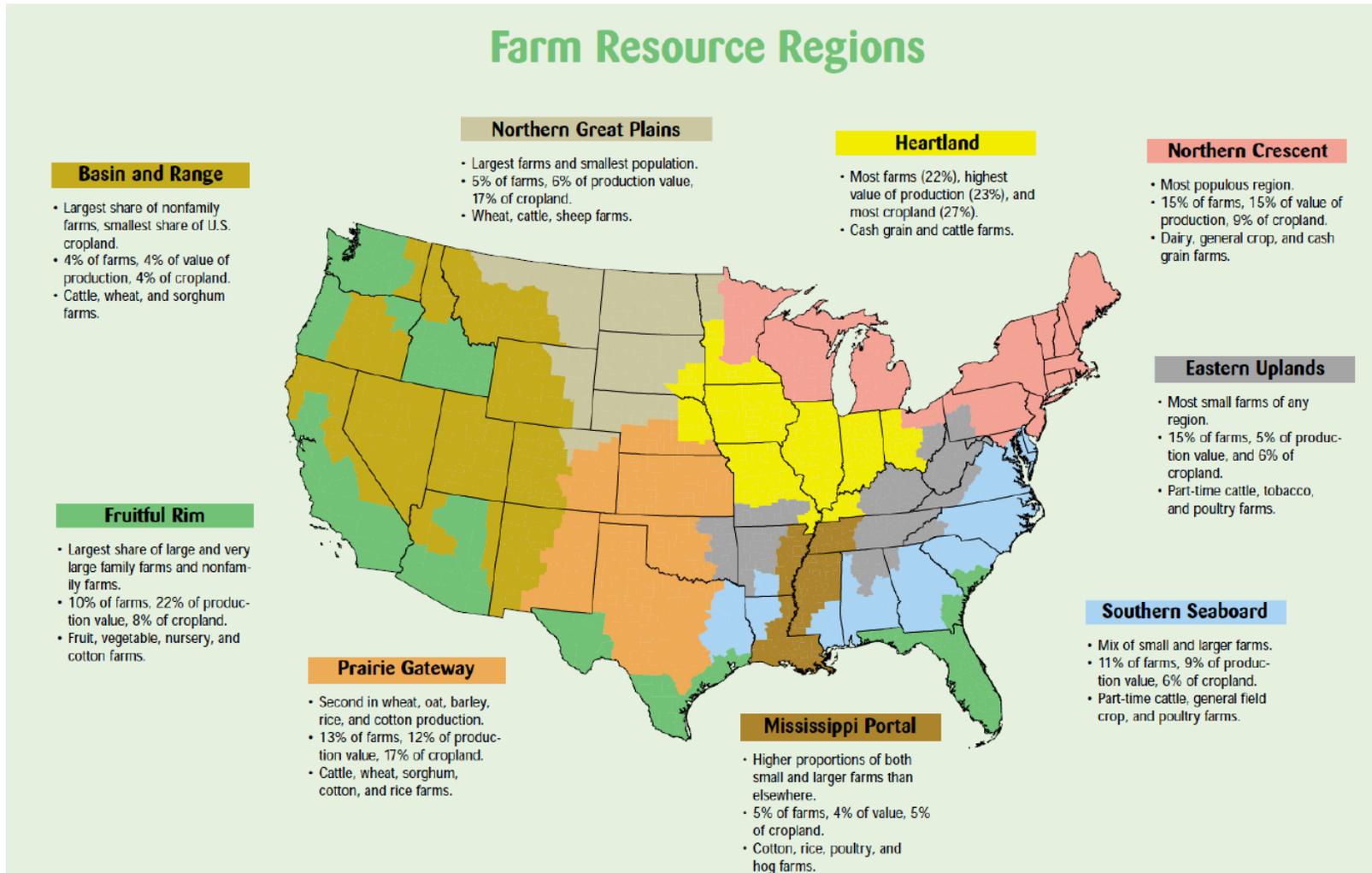
Exhibit F.4. Breweries Covered Employment and Establishments, Washington and Top Competitors, 2013

State	Establishments	Annual Wage	Employment
California	104	\$56,795	4,271
Idaho	23	\$22,636	202
New York	52	\$56,461	1,814
Texas	63	\$82,121	1,932
Washington	79	\$28,815	1,043
US Total	1,162	\$59,299	34,496

Source: Bureau of Labor Statistics, 2014;³⁵ Community Attributes Inc., 2014.

³⁵ It is important to note that for small and specialized segments like Breweries (NAICS 312120), suppressed data for even a few establishments can make a large difference in wages and employment.

Appendix G. USDA Economic Research Service Farm Resource Regions



Source: United States Department of Agriculture Economic Research Service, 2000.

Appendix H. List of Interviewees

Name	Affiliation
Jeff Ahner	Frito Lay
Jared Balcom	Potato Farmer
Nicole Berg	Wheat Farmer
Dwaine Brown	Tree Top
Rex Calloway	Calloway Northwest, Potato Farmer
Alan Cook	Icicle Seafoods
Bill Dewey	Taylor Shellfish
Anne George	Washington State Hops Commission
Chris Hales	Tree Top
Chris Heron	Wheat Farmer
Bobbi Hudson	Pacific Shellfish Institute
Brad Isaak	Wheat Farmer
Dennis Koong	U.S. Department of Agriculture
John Lallas	McCain Foods
Paul Morris	Potato Farmer
Brent Olson	Potato Farmer
Gary Price	Tree Top
Steve Rowe	Darigold
Ted Schirky	Potato Farmer
Todd Scholz	Pea and Lentil Council
Alan Schreiber	Washington Asparagus Commission
Mike Schwisow	Washington State Water Resources Association
Chris Scott	Quincy Foods
Randy Seuss	Wheat Farmer
Mike Shelby	Western Washington Agricultural Association
Shelby Stoolman	ConAgra Foods
Dan Swecker	Washington Fish Growers Association
Dan Wesen	Wesen Farms (Dairy)
David Zepponi	Northwest Food Processors Association