Organic Agriculture & Organic Product Market Analysis

In the State of Oregon

2023

Prepared For:
Oregon Business Development Department
in response to 2022 House Bill 5202 – Section 296

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1 INTRODUCTION & KEY FINDINGS

This document contains the full report from which the condensed report titled "Organic Agriculture & Organic Products Market Analysis" was derived. This market assessment documents economic activity in Oregon in the organic agriculture and organic food product sectors, including all packing, handling, processing, and distribution activities necessary for organic food to reach final consumers. The analysis also estimates economic activity supported by the organic economic sectors. Figures 1-1 and 1-2 below summarize estimated economic activity through the Oregon organic food value chain.

Figure 1-1: Economic Activity, Organic Agriculture & Food Value Chains, Oregon

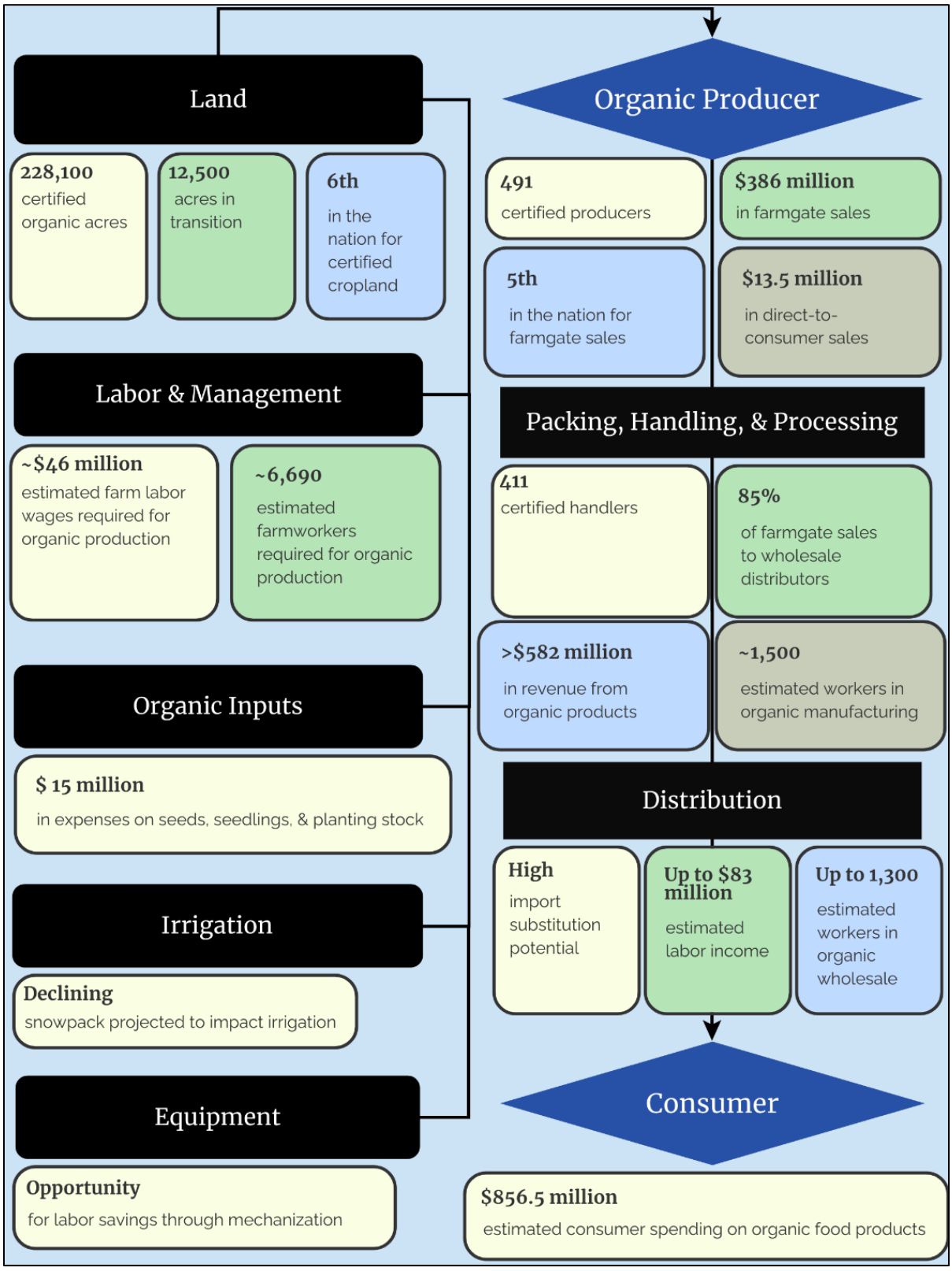
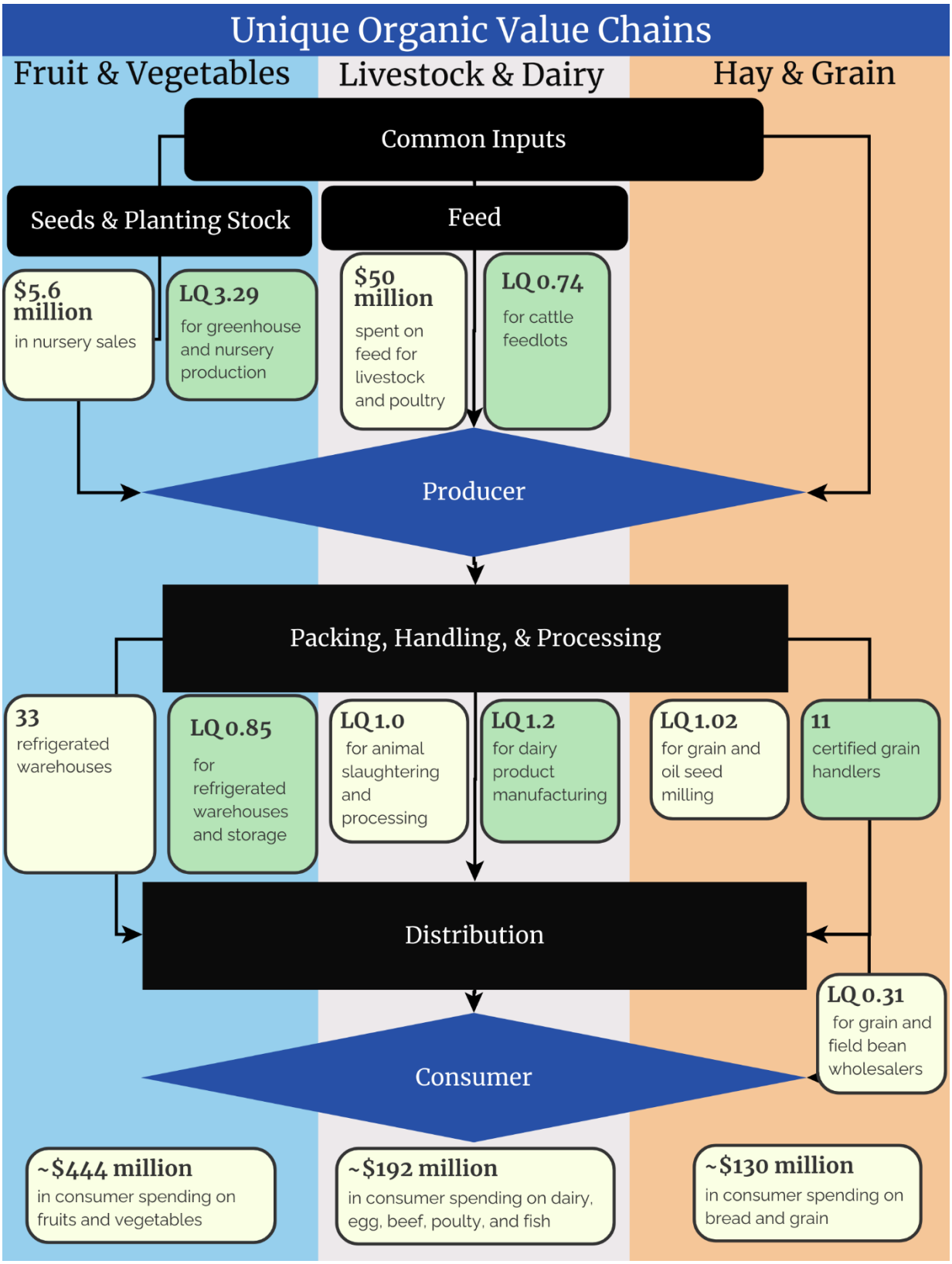


Figure 1-2: Economic Activity by Sector, Organic Agriculture & Food Value Chains, Oregon



Throughout the report we identify research and innovation needed to alleviate the challenges that present a barrier to entry for organic producers. This report also presents information on opportunities for economic growth in Oregon organic sectors. These opportunities were identified by interviewing key representatives across a broad swath of Oregon's agriculture production, distribution, and processing sectors, as well as industry experts involved in research, regulation, certification, and advocacy of organic agricultural production and products.

The key opportunities identified and evaluated in our analysis include:

- **Organic Agriculture as a Strategy for Rural Economic Development & Prosperity**
  - Regions with high numbers of organic operations had lower poverty rates and higher median household incomes relative to other agricultural production areas.
- **Import Substitution for Organic Production**
  - Data from an organic food distributor indicate that only 10 to 16% of organic food products delivered to Oregon customers are from Oregon farms, suggesting room for growth in several organic food categories across Oregon.
- **Organic Food Manufacturing Opportunity**
  - Organic food manufacturing is growing at a faster rate than general food manufacturing. The state's existing infrastructure for food production and distribution combined with the availability of organic Oregon farm production (i.e., raw agricultural inputs necessary for food manufacturing) create near-term opportunities for growth in this sector.
- **Organic as a Tool in Climate Risk Mitigation**
  - Organic practices create farms and communities that are more resilient to increasingly volatile climate conditions, such as drought.
  - Conversion of agricultural land to certified organic has the potential to reduce greenhouse gas (GHG) emissions, help meet the state's goal of 80% below 1990 levels of GHG emissions by 2050, and to become a carbon sink.
- **Environmental and Social Health Benefits**
  - Public and environmental health costs from agriculture are greatly reduced by organic practices.
  - The production of organic food reduces environmental contamination and the threat to human health from pesticides.
  - Organic food products contain fewer pesticide residues and are often safer to consume than conventional products.

Our recommendations for expanding the organic industry for the state of Oregon include:

- Data collection initiatives specific to organic value chains
- Consumer education and branding around organic
- Inclusion of organic in state plans to mitigate risks of climate change
- Protect brassica seed production in the Willamette Valley
- Promote organic as an economic development and social justice initiative

2 ORGANIC AGRICULTURE

Organic agriculture, by definition, is a production system to grow and process food using little to no synthetic fertilizers or pesticides and is meant to utilize "cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity" (National Organic Program, 1990). Oregon was the first state to pass legislation regulating organic food in 1973 and has since been a leader in the organic movement.

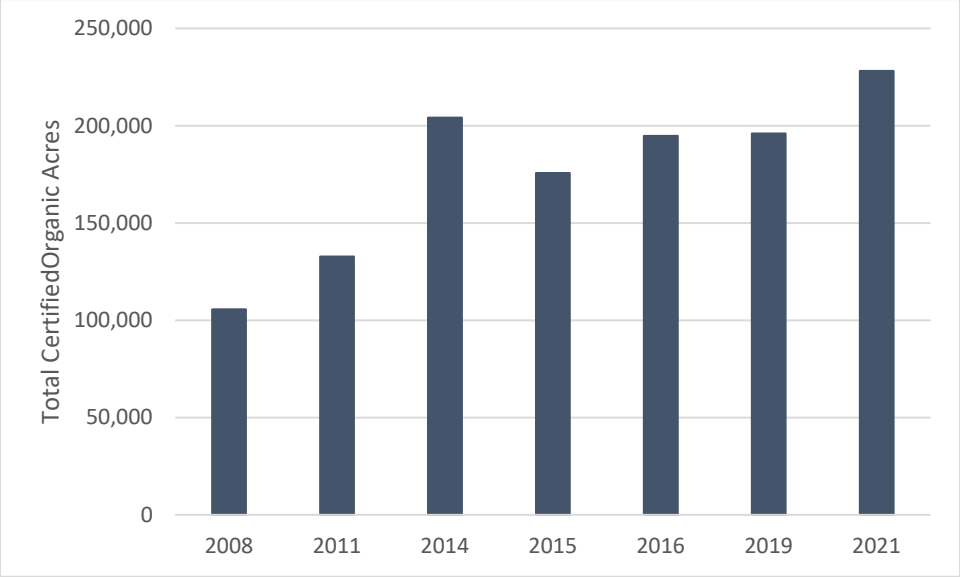
Following the growth in state organic regulations pioneered by Oregon, the Organic Food Production Act of 1990 (OFPA) led to the establishment of Title 7 Code of Federal Regulations Part 205, the USDA Organic Regulations, by the National Organic Program (NOP). These regulations provide the framework for what agricultural products can be sold and labeled as organic in the United States and consist of practice standards that are inherently beneficial to agro-ecosystems. In certified organic operations, the use of sewage sludge, irradiation, genetic engineering, and the majority of synthetic inputs (fertilizers, pesticides, herbicides, etc.) are prohibited.

2.1 ORGANIC AGRICULTURE PRODUCTION IN OREGON

This section presents the most recent information on the size of the organic agriculture production sector in Oregon, along with key challenges and opportunities by category of production.

Figure 2-1 below shows how the number of certified organic acres in Oregon have more than doubled over the last 15 years; from 105,600 in 2008 to over 228,000 in 2021. Organic cropland comprises about 61% of the total (140,300 acres), while the remaining 29% is pastureland and rangeland (National Agricultural Statistics Service, 2022).

Figure 2-1: Total Certified Organic Acres in Oregon by Year



Source: (National Agricultural Statistics Service, 2022)

In order for land to be certified organic, there is a three-year period where any prohibited substances cannot be applied to it. The amount of land in transition provides a useful indicator of the short-term

growth of organic production. In 2021, Oregon had 12,503 acres in transition, which equates to 5% of the total organic acreage in that year (National Agricultural Statistics Service, 2022).

Oregon is a national leader in organic agriculture. For at least the last 15 years, Oregon has been in the top five states for total farmgate[1] value of organic agricultural products, as is illustrated in Table 2-1 below. Oregon's total sales of organic agricultural products totaled $386 million in 2021, and peaked at $454 million in 2019.

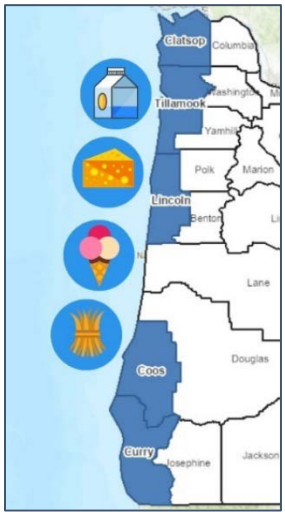
Table 2-1: Top 5 States for Total Organic Agricultural Product Sales, Farmgate

RANK	2008	2011	2015	2016	2019	2021
1st	California ($1.14 B)	California ($1.38 B)	California ($2.43 B)	California ($2.88 B)	California ($3.59 B)	California ($3.55 B)
2nd	Washington ($281.97 M)	Washington ($297.1 M)	Washington ($626.45 M)	Pennsylvania ($659.63 M)	Washington ($885.97 M)	Washington ($1.13 B)
3rd	Pennsylvania ($212.74 M)	**Oregon ($233.45 M)**	Pennsylvania ($331.5 M)	Washington ($636.25 M)	Pennsylvania ($741.76 M)	Pennsylvania ($1094.36 M)
4th	**Oregon ($155.61 M)**	Texas ($165.5 M)	**Oregon ($269.46 M)**	**Oregon ($350.9 M)**	**Oregon ($454.41 M)**	Texas ($572.21 M)
5th	Texas ($149.33 M)	Wisconsin ($132.46 M)	Wisconsin ($222.43 M)	Texas ($297.48 M)	Texas ($424.3 M)	**Oregon ($386.25 M)**

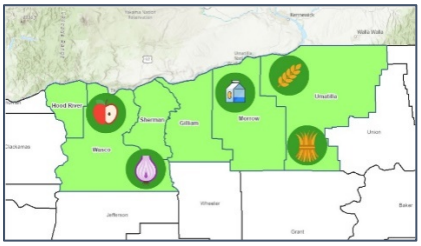
Source: (National Agricultural Statistics Service, 2022)

[1] The term 'farmgate' refers to sales at the farm level.

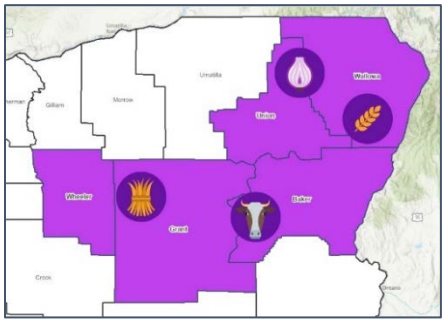
Coastal Region



Columbia Region



Northeast Region



Willamette Region

Southern Region

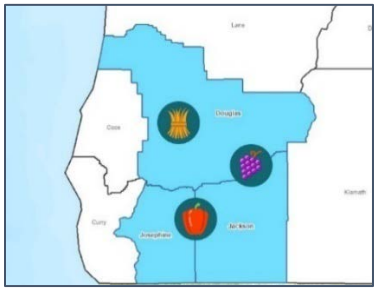
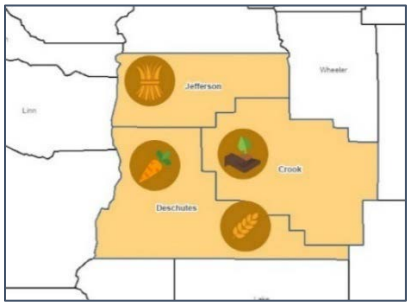


Figure 2-2: Production of Organic Agriculture by Region

Oregon is known for its diverse agricultural production zones. Across the state, only a small percentage of the total agricultural land is certified organic. While no data is available of county-level estimates of production or value of organic agriculture, information is available on county and regional production of total agriculture crops. The maps here provide details on the key agricultural production by region across the state, which represent opportunities for growth of organic production through producers transitioning conventional agriculture to organic. Key crops & products produced by region are called out with graphics in the regional maps.

Central Region



Southeast Region

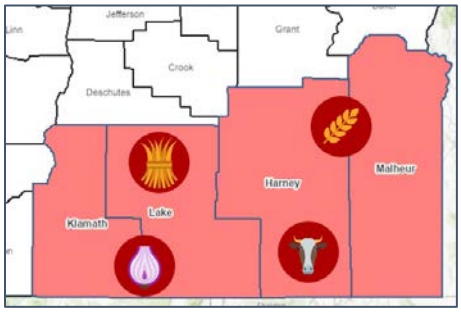
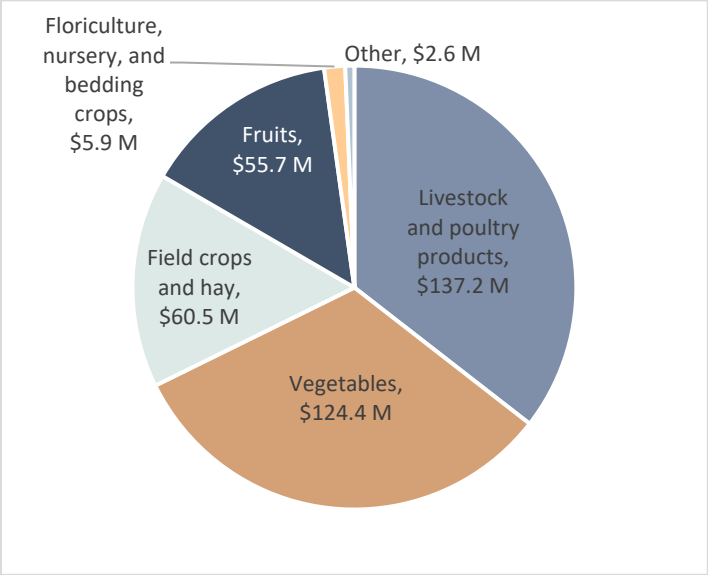


Figure 2-3 below shows the value of organic agricultural goods by crop category in 2021. Livestock and poultry products are the largest category (36% of total sales), while organic vegetables[2] follow close behind with roughly one-third of total farm sales. Field crops and hay comprise about 16% of total organic sales, with fruit earning just slightly less (at 14% of total organic farm sales) (National Agricultural Statistics Service, 2022).

Figure 2-3: Value of Organic Agricultural Products in Oregon by Category, 2021

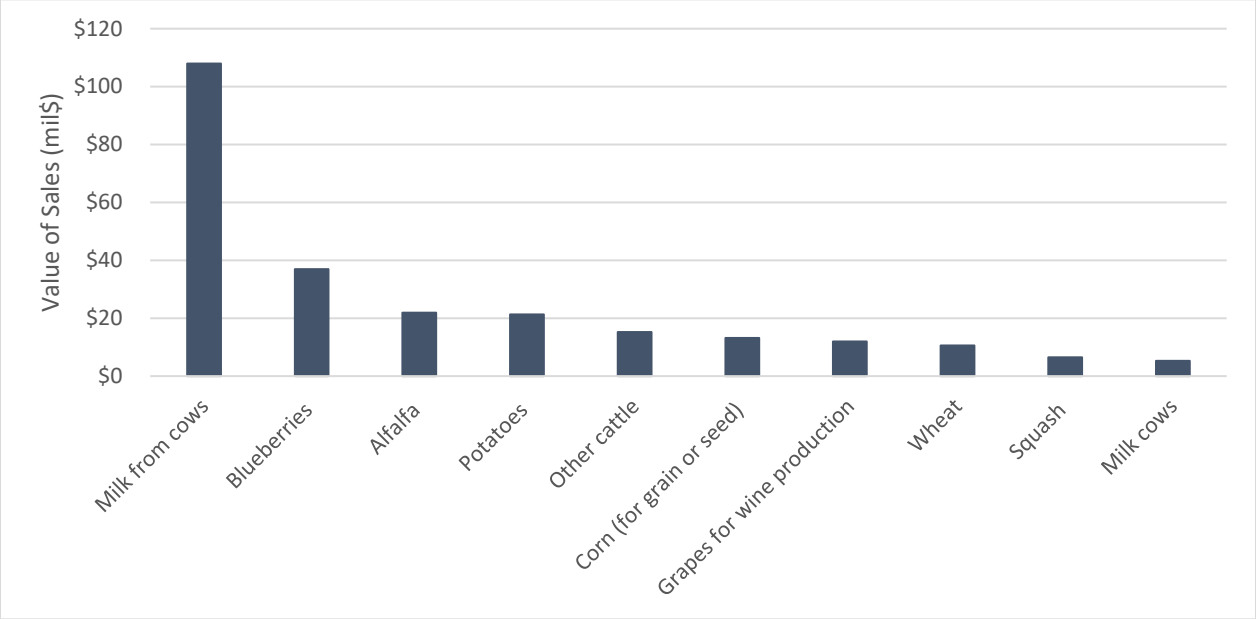


Source: (National Agricultural Statistics Service, 2022)

In terms of individual organic farm products, milk generates the highest value of sales in Oregon, totaling about $108 million in 2021. The next highest-value organic product is blueberries, generating about $37 million. Organic alfalfa and potatoes each accounted for around $21 million in farm sales. Figure 2-4 shows the top 10 organic products in Oregon by value of sales at the farmgate in 2021.

[2] Vegetables include those grown in the open and under protection, and also includes mushrooms.

Figure 2-4: Top 10 Organic Agricultural Products in Oregon by Farmgate Value, 2021 ($ millions)



Source: (National Agricultural Statistics Service, 2022)

The following sub-sections profile key organic agricultural crop categories in Oregon.

2.1.1 Livestock and Poultry Products

Livestock and poultry products are Oregon's most valuable organic product category, totaling $137 million in 2021. Organic sales of livestock, poultry, and their products comprise roughly 7% of the total sales value (including conventional) in this category.[3] Almost 80% the value of organic livestock and poultry products comes from organic milk sales ($108 million in 2021).

Compared to other states, Oregon's activity in this category is higher than the median: Oregon is 16th in the nation for number of organic farms producing livestock and poultry products and is 11th nationally for total organic revenue generated in this category. The number of organic farms fell by 17% from 2019 to 2021, while the production value increased 4%, indicating industry consolidation in recent years. Overall, the total organic sales value in this category grew 67% from 2016 to 2021, and most of this growth (84%) was due to increased organic milk sales (National Agricultural Statistics Service, 2022).

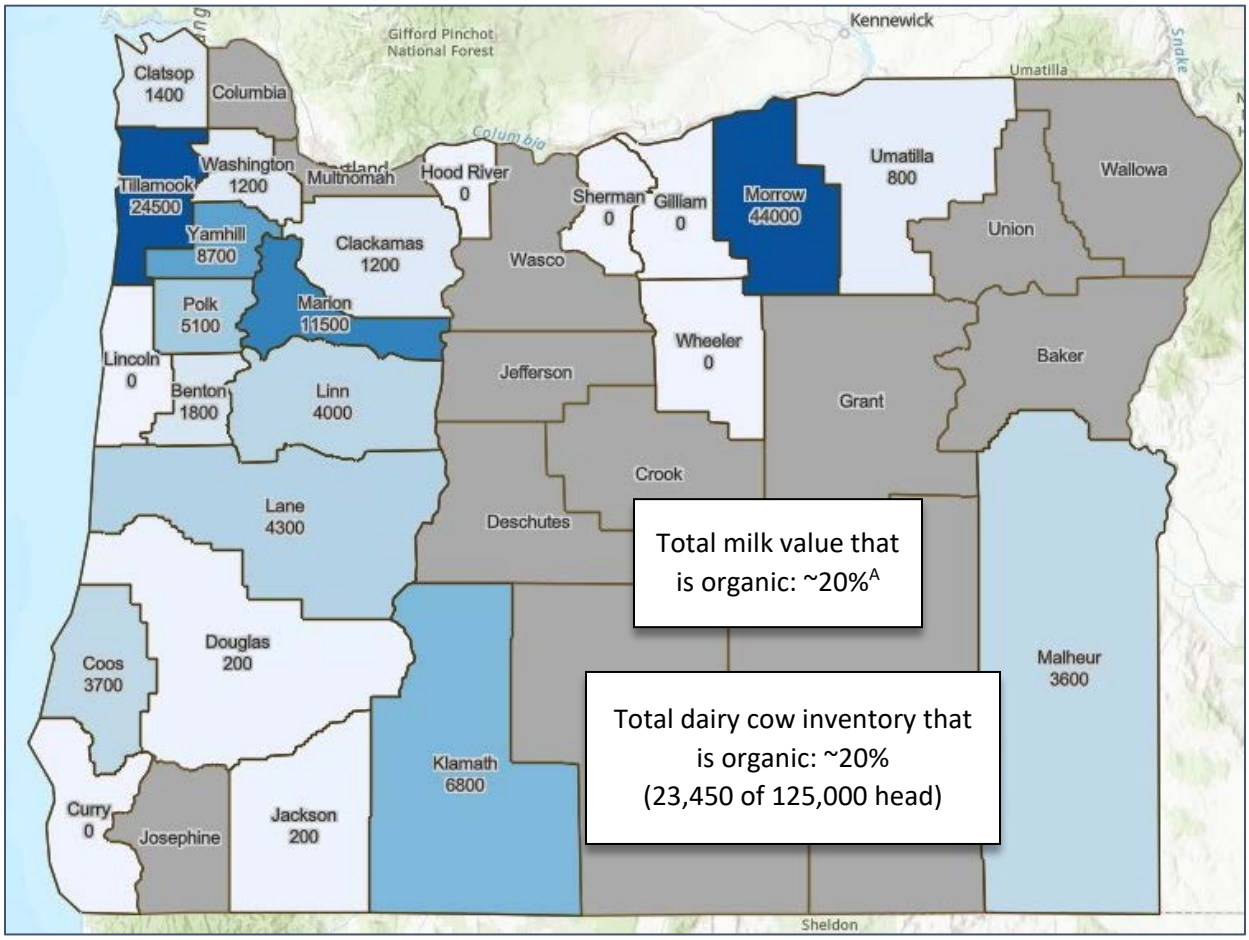
Current conditions in the organic dairy market are not favorable for producers. Organic dairy producers are being squeezed by the high cost of production (increasing costs of grain and global inflation) in the country, as well as low prices received, and supply chain issues that have led to a supply surplus that has shaped the market since 2017. Pasture and feed are critical inputs to organic dairies. Cost of purchased feed in organic operations is typically 40% higher than conventional feed. When you factor in the time requirement for transitioning, during which dairy producers would be paid for conventional milk but

[3] Estimated by taking the total value of organic livestock, poultry, and their products from the 2019 Organic Census and the total value of those products from the 2017 Census of Agriculture (National Agricultural Statistics Service, 2022; National Agricultural Statistics Service, 2017). Both values were adjusted for inflation to 2022 dollars using the Gross Domestic Product Implicit Price Deflator.

incurring organic feed prices, there is no economic reason for dairies to transition to organic production at this time. Because of this disparity, some dairy experts are suggesting there should be a subsidy to cover the increased cost of production and the conventional price while dairy farms are transitioning (Askew, 2022).

The figure below shows the concentration of all milk cows across the state by county. No data is available on certified organic inventory of milk cows by county, however the text boxes in the figure below call out what we do have data on relative to organic milk value and milk cow inventories in Oregon.

Figure 2-5: Inventory of Dairy Cows in Oregon, by County



A/ Estimated by taking the total value of milk from the 2019 Organic Census and the total value of milk from the 2017 Census of Agriculture (National Agricultural Statistics Service, 2022; National Agricultural Statistics Service, 2017). *Both values were adjusted for inflation to 2022 dollars using the Gross Domestic Product Implicit Price Deflator.* Source: (USDA.QuickStats, 2023)

2.1.2 Field Crops and Hay

Oregon is not a national leader in this broad crop category (grains, hay, and oilseeds) collectively, but there are specific crops that Oregon excels at within the category. One crop in this category that stands out for Oregon is alfalfa. Oregon is 3rd in the nation (behind California and Idaho) for organic alfalfa acres, quantity grown, and sales value. This crop has seen strong growth over the past decade (2011 to

2021): Acreage grew by more than half, quantity by about one-third, and sales value by 61%. Because demand for organic alfalfa is largely driven by the demand for feed from organic cattle, it is likely the growth in organic alfalfa was driven by the growth in organic cattle inventories (beef, dairy, and other cattle and calves, discussed above), which increased by 41% in Oregon from 2011 to 2021 (National Agricultural Statistics Service, 2022).

While organic alfalfa is a major crop for Oregon, a brief evaluation suggests there would only be enough production in the state to meet existing demand from organic dairies:

- The existing organic alfalfa production estimate (129,000 ton) would equate to roughly 26 pounds of hay per head of organic dairy cow (23,450 head).[4]
- Dairy cows require approximately 800 pounds per month or 26 pounds of alfalfa hay per day (Government of Saskatchewan, 2023)

Interviews with representatives from the organic dairy industry suggest there are companies exporting organic hay out of Oregon, due to access to ports and high demand from international areas, and a significant amount of organic alfalfa is imported into the state from Idaho and Montana (Witucki, 2023). This suggests opportunities for growth in this crop sector within the state.

Another notable crop in this category is barley. Oregon is the 2nd largest producer of organic barley in the country by quantity and sales value (behind Idaho). Oregon State University is involved in developing varieties of naked barley (barley that lacks a hull), that can be used in a variety of applications including malt (for beer), food, and feed. The US Department of Agriculture's National Institute of Food and Agriculture, through its Organic Agriculture Research and Extension Initiative (OREI), awarded OSU nearly $2 million (in 2018) to lead this project with other partners (Oregon State University, 2023). Currently, naked barley is available through Hummingbird Wholesalers, and is also used by Great Western Malt (the largest buyer and processor of malting barley in the Pacific Northwest, located in Vancouver, WA) in malting a certified organic malt. As new varieties are released there will be opportunities (likely with private investment) to market a variety of products made with naked barley. Despite its status as a leader in organic barley, harvested acreage has declined in recent years (2016 to 2021) from 15,400 to 9,250 acres (National Agricultural Statistics Service, 2022).

Oregon has an opportunity to expand its production of key organic food grade grains beyond barley, including oats, spring wheat, and corn (Wichers, 2022). Oregon is ranked 5th in terms of sales of oats for grain or seed, with 2,934 acres of organic oats in the state. Food-grade organic oats are currently experiencing record high market prices, partially due to expanded interest in oat milk as a dairy alternative (Wichers, 2022). Spring and winter wheat is also experiencing high market prices due to weather challenges resulting in poor yields across the nation (Futrell, 2022). Oregon ranks 2nd behind Montana in terms of sales of spring wheat for grain or seed, with 17,238 organic acres. Organic corn and soybean prices are also at record highs, partially due to supply chain disruption from the COVID 19 pandemic and the war in Ukraine (Futrell, 2022). Soybean production is expected to decline in 2023 nationally, with acreage being substituted with corn to capture the growing market. While the bulk of both corn and soybeans are used as organic animal feed, a portion of the 10,175 acres of corn for grain or seed produced in Oregon is utilized by processors in the state for value-added organic food products.

[4] This excludes organic beef cattle, which comprise an additional 2,275 head.

2.1.3 Vegetables

Oregon is a strong producer of organic vegetables: Nationally, it is the 4th largest producer of this crop category both in harvested acreage and sales value (behind California, Washington, and Arizona). This sector of organic agriculture is fairly concentrated. In 2021, Oregon generated about 5% of the nation's organic vegetable sales from only 46 farms. Oregon's growth in this industry has seen mixed results over the past decade. Total *acreage* of organic vegetables grew 17% from 2011 to 2021, but the total value fell 8% over the same period and fell by 15% in the last couple of years (National Agricultural Statistics Service, 2022).

One especially strong sector of organic vegetable production in Oregon are "other vegetables and herbs under protection" (such as a greenhouse). In this segment, Oregon is only 2nd to California in terms of square footage under production and sales value. This has also been an area of strong growth in recent years: From 2016 to 2021, farms more than doubled, harvested acreage grew by more than 500%, and sales value grew by 900% (National Agricultural Statistics Service, 2022). Oregon location quotients (LQs)[5] in this area reflect its strong concentration: They range from 3.29 to 4.78 for establishments, employees, and wages (Bureau of Labor Statistics, 2021). This suggests that Oregon is well-positioned to thrive in this segment.

Another strong component of organic vegetable production is potatoes. In terms of acreage and quantity produced, Oregon is 3rd in the nation behind California and Washington and in value is only 2nd to California. There has been steady growth in organic potato production over the last decade (2011 to 2021): Acreage increased by 41%, quantity by 25%, and value by 29% (National Agricultural Statistics Service, 2022).

2.1.4 Berries, Tree Fruit, and Nuts

Oregon is an especially strong producer of organic (non-citrus) fruit. In terms of farms, acreage, and sales value, Oregon is 3rd in the nation (behind California and Washington). This has also been an area of strong growth for Oregon. In the last five years of data (2016 to 2021), organic fruit acreage grew 90% and sales value grew 74% (National Agricultural Statistics Service, 2022). Oregon LQs for this sector (non-citrus fruit and tree nut farming) are roughly 3.6, reflecting Oregon's much higher-than-average level of establishments, employees, and wages (Bureau of Labor Statistics, 2021).

Blueberry production leads Oregon's organic fruit sector, comprising 88% of the total sales value. Oregon has the 2nd highest number of organic blueberry acres (behind California) and is 3rd highest for number of farms, quantity produced, and sales value (behind California and Washington). This crop has seen explosive growth over the last decade (2011 to 2021). Harvested acres grew by more than 600%, quantity produced by 13 times, and sales value by more than 500% (National Agricultural Statistics Service, 2022). LQs for berry farming (excluding strawberries) range from 4.61 to 5.1 for establishment, employees, and wages, reflecting Oregon's strong berry industry (Bureau of Labor Statistics, 2021).

Supply chains of fresh market blueberries (and other soft fruit berries) is becoming increasingly global in order to supply the consumer with fresh, organic, berries year-round. In the case of blueberries, the US is a net importer of both fresh and frozen berries, with imports from Peru and Mexico increasing

[5] Location Quotient measures a region's (in this case Oregon) industrial specialization relative to a larger geography (in this case the nation). A 1.0 LQ would mean the same proportion of jobs (on a per capita basis) in this industry are found in Oregon as in the US.

significantly over the past few years. Growers in the Pacific Northwest and Michigan used to benefit from late season premium prices as the US production season drew to a close. However, in recent years imports from Peru have been coming in as early as August and eroding some of the late season pricing. This has led to the creation of the American Blueberry Growers Alliance (formed in 2020) to seek relief from rising imports threatening the livelihoods of blueberry producers, through ongoing International Trade Commission (ITC) investigations (Kiel, 2021).

Key challenges to expanding organic fruit production involve scale of operations.[6] As mentioned above, small organic producers who are focused on direct-to-consumer channels (e.g., farmstands, CSA, farmers markets) capture more of the consumer food dollar than if working with a wholesaler / distributor. The higher price (relative to wholesale prices) allows for the producer to cover their costs and make a profit with even small operations, and high operating costs per unit of production. However, in order for an organic producer to be able to profit from selling into wholesale and distribution channels, they would need to have sufficient economies of scale (and associated production) so that their operating costs are low enough to be able to capture profit at these lower price points.

An additional challenge is competition with existing production areas outside the state. For example, in a survey of food processors across Oregon, strawberries were identified as a key crop that respondents were unable to source locally. The commercial strawberry production regions in the United States are highly concentrated. There are three distinct areas (towns) in California supplying over 90% of strawberry production in the United States, all of which are located in California: Watsonville, Santa Maria, and Oxnard (Ag MRC, 2021) (Webinar, 2019). For the most part, producers in Oregon are not able to profitably compete with these production areas in California during the same market window at the wholesaler / distributor level, for the same type of berries (namely the strawberry that ships well for fresh market consumption). However, if new varieties of strawberries could be developed that are suited to Oregon's production zones, there could be opportunities with product differentiation and branding within this sector.

Less than 10% of the fruit and tree nut values in Oregon are certified organic. Transitioning orchard land into organic production is easiest during the establishment period, as plantings usually require several years of growth before commercial levels of harvest can occur, and this aligns well with the transition period (3 years) to organic. An analysis from Washington State University on the transition of apple orchards (from conventional to organic) revealed that historical events have largely influenced producers' decisions to transition organic apple production, such as the Alar incident[7], introduction of mating disruption (MD) for codling moth control (mid 1990's), market entry of large retail chains (around 2005), and price volatility (where organic price premiums are greatest) (Kirby E. a., 2018).

Oregon is the nation's leader in organic hazelnut production, hosting 80% of country's total harvested acreage and producing 86% of the country's total sales in 2021 (National Agricultural Statistics Service, 2022). In that year, Oregon's 276 acres of organic hazelnuts produced roughly $658,000 in sales. While

[6] This challenge applies to vegetable production as well.

[7] A '60 Minutes' broadcast in February of 1989 exposed the health hazards of Alar, a chemical used as a growth regulator on tree production. Public reaction was swift, and essentially resulted in a boycott on conventional apple production. This eventually led to a ban on food uses of Alar.

this is a relatively small portion of Oregon's organic production and value, it is an organic product with a clear competitive edge in the state.

Total acreage of organic hazelnuts grew more than 150% from 2008 to 2021 but was down from a high of 455 acres in 2016. Total sales value in 2021 was 43% of the value in 2016 ($1.52 million). Total hazelnut production in Oregon is generated by only 13 farms (National Agricultural Statistics Service, 2022).

Organic hazelnut acres represent only 0.4% of Oregon's total hazelnut acreage in 2021 (61,000 acres). A variety of challenges help explain this lack of interest in growing organic hazelnuts, which include production issues, lack of infrastructure, and unfavorable market dynamics. Production challenges arise from the fact that organic growers cannot use conventional pesticides, herbicides, and fungicides. For example, in conventional production, orchard floor management is typically accomplished by using herbicides. Since organic growers cannot use these, more labor is required, which increases costs (Wiman, 2023).

Easter Filbert Blight (EFB), a fungal disease that impacts hazelnut trees, nearly destroyed the organic hazelnut industry in the 1990's and 2000's. Around 2008, Oregon State University began producing varieties of hazelnut tree that are resistant to EFB, making it less of a concern for organic hazelnut growers today, but EFB still presents some risks to organic growers (Wiman, 2023). Orchards vulnerable to the disease require labor-intensive scouting and pruning, which adds to production costs and tends to keep farms smaller (CaliforniaAgNet, 2022).

Another challenge for organic hazelnut growers is a pest called the filbertworm. Filbertworm infestations can make 50 to 60% of a hazelnut crop unsaleable (CaliforniaAgNet, 2022). Solutions to combat the worm include disrupting its lifecycle (through pheromone-disrupting chemicals that inhibit offspring production) and destroying the fallen acorns of nearby oak trees (where larvae grow). There are also some organic insecticide sprays available that can help combat the filbertworm; however, these also kill other bugs that can be beneficial, making these sprays a "double-edged sword" that help as well as harm the grower's production (CaliforniaAgNet, 2022).

Infrastructure has also presented a barrier to growing organic hazelnuts. Historically, there has been a shortage of organic processing and handling capacity available to organic hazelnut growers. In 2020, one source reported that "there are currently no dependable and cost-effective processing, storage or distribution solutions for domestic organic producers" (Elconin, 2020). This can leave organic growers with no option but to conduct their own in-house processing, which further adds to cost and labor requirements. However, the lack of options seems to be changing in recent years, as large buyers (such as Cascade Foods and Hazelnut Growers of Oregon) are increasing their purchases of organic hazelnuts and offering high prices to growers (Wiman, 2023; Birkemeier Stehman, Kaser, & White, 2023).

In addition to the production and infrastructure challenges, organic hazelnut growers face tough market conditions. The majority of the world's hazelnuts are produced in Turkey, where labor is inexpensive and contractors often pay for certification costs (Elconin, 2020; Wiman, 2023). It is often cheaper for buyers in the U.S. to import hazelnuts from Turkey than to pay for domestically grown hazelnuts (Wiman, 2023). Historically, both domestic and international demand (from Asia) for organic hazelnuts has been low, although domestic demand seems to be increasing (Wiman, 2023). These market issues have posed a challenge to hazelnut growers interested in transitioning to organic.

Despite these challenges, organic hazelnuts offer a potential growth opportunity. This is evidenced by the fact that buyers both in Oregon and Washington are offering high prices for organic hazelnuts (Birkemeier Stehman, Kaser, & White, 2023; Wiman, 2023). In response, production in the Yakima Valley in Eastern Washington is increasing (Wiman, 2023). Given the low price of conventional nuts ($0.40 per pound), the attractive price of organic nuts ($1.65 per pound) is likely to attract more organic producers (Wiman, 2023; Birkemeier Stehman, Kaser, & White, 2023).

2.1.5 Grapes for Wine Production

In 2021, Oregon producers sold $12 million in organic grapes for wine production. In 2021 there were 1,480 acres of organic grapes harvested in Oregon, which is down from 2,217 acres reported in 2016 (National Agricultural Statistics Service, 2022).

The Willamette Valley is the significant wine producing region in the state, specializing in Pinot Noir and Chardonnay. It has similar climate characteristics to Burgundy, France, and, in general, the wine industry patterns itself closely to the Burgundy area. As with the Burgundy area, there are informal connections between producers and information sharing among land managers. A few years ago, several vineyard managers from the Willamette Valley began meeting to discuss how organic production practices could be employed. This small group now goes by the name “Oregon Organic Viticulture Technical Group” and has over 30 members with some of the largest vineyards in the region participating. The local group acts as a forum for producers to share information on organic production practices as well as coordinate with Oregon State Extension on key questions and areas of concern (as well as where to place research emphasis).

Unlike other crops, price premiums associated with organic wine do not seem to be a major driving force in the growth or organic production practices. Rather, vineyards are looking to implement these practices for financial and ecological reasons. From a marketing perspective, wineries recognize that many consumers respond to the narrative of ecology protection, and organic production practices (even if the producer is not necessarily certified) fit well with that narrative. Some vineyard managers are reluctant to get certified, even if they might employ all organic production practices, simply due to the additional paperwork involved in the certification process and lack of any clear financial incentive (Shulz, 2023).

2.2 Common Challenges of Organic Production

This section identifies and evaluates commonalities across production supply chains for diverse organic crops, including land, labor, and key inputs.

2.2.1 Land

Difficulty in accessing suitable land is a common constraint to agriculture in general. Uncertainty around land tenure is a unique challenge to organic producers because of the three-year transition to organic and long-term investments needed for organic production systems in the form of soil health, conservation, and biodiversity. It has been reported that producers of color face particularly high barriers to land access, as well as limited capital and funding in the face of rising land prices, which lead to a disproportionate challenge for these producers (Merrigan K. , et al., 2022).

2.2.2 Labor

No exact figures for the current organic workforce in Oregon are available; however, data from the Bureau of Labor Statistics indicates that there were approximately 60,000 farm workers total in the state in July 2021. Rahe (2018) conducted a study that estimated the labor demands for agriculture in Oregon in 2018 (Rahe, 2018). Using this study as a framework, we estimated the workforce demand (likely unmet) for organic production considering the proportional acreage of key crops and their varying labor requirements. With adjustments for processing versus fresh market proportions of blueberries and grapes, labor requirements for greenhouse and nursery crops, general field crop labor estimates, and differing labor requirements for dairy, beef, and cow-calf operations, the labor demand for organic crop and livestock production in 2021 using Rahe's methodology is estimated be approximately **6,690 workers** (AgriFarming, 2018; Rush, 2003; Frank, 2000; Galinato, Gallardo, & Hong, 2016; USDA NASS, 2012). Based on this estimation and assuming an average hourly wage of $18/hour, this represents approximately $46 million in labor wages.

Organic production systems are more labor intensive than conventional agriculture due to higher physical management (for pest, weed, and disease control) and fertility needs (Durham & Mizik, 2021). Thus, organic producers are more greatly impacted by the increasing shortages of labor (and corresponding rise in costs) in the United States (Bampasidou & Salassi, 2019; Lohr, 2010). In a survey of farms across Oregon, conducted in 2021, Highland Economics found that nearly 75% of respondents were impacted by inadequate farm labor during seasonal peaks (Highland Economics, 2021). This reported lack of labor resulted in revenue loss for approximately half of survey respondents. Dairy, berries, and vegetables were among sectors that most often reported reduced income due to labor shortages, sectors that include three out of four of Oregon's top organic commodities: milk from cows, blueberries, and potatoes.

Considering the nearly 60,000 farmworkers in Oregon during peak the peak production season (July), the unmet labor demands for agriculture could represent thousands of jobs, if only seasonally (US Bureau of Labor Statistics, 2021). Unemployment in Oregon in July 2022 was low relative to historic rates (at 3.5%), but this represents 76,500 people (US Bureau of Labor Statistics, 2023). This may indicate that agricultural jobs, while largely available at certain times of year, do not appeal to all job seekers.

As labor wage rates have increased over the last decade across the nation, profit margins for crop producers have decreased (US Department of Agriculture, National Agricultural Statistics Service, 2021). Oregon producers' expenses for farm labor have increased by 42% since 1997 (US Census Bureau, 2023). Migrant workers in Oregon accounted for approximately 25% of hired farm labor as of 2017 (US Department of Agriculture, National Agricultural Statistics Service, 2017). Rapidly changing immigration policies can impact the availability of migrant workers to producers in Oregon. According to a report from the Migration Policy Institute, immigration policy will be a determining factor for counteracting the decreasing domestic farm worker supply to help reduce costs and increase availability of important goods and services (i.e., agricultural products) (Holzer, 2019).

In March 2022, the Oregon legislature passed House Bill (HB) 4002, imposing new overtime pay requirements for agricultural workers, along with tax credits for eligible employers to offset wage expenses associated with overtime pay (Schwabe Williamson & Wyatt, 2023). While this is likely to increase labor costs of all agricultural operations in the state, it may disproportionately impact organic

farmers because of the reliance on labor. It should also be noted that Washington and California (two neighboring states with high levels of organic production) also have similar agriculture overtime laws.

2.2.3 Water

Drought is affecting most of the American West, including Oregon, according to the US Drought Monitor. In Oregon, western regions of the state (coast and Willamette Valley) rely on plentiful rainfall to meet their water needs. The Cascades collect moisture in snowpacks, which serve as frozen reservoirs, slowly distributing water throughout the spring and summer through snowmelt. In the Columbia River Basin, snowmelt accounts for about a quarter of the water available for irrigation. As climate warms, though, that crucial snowpack is dwindling. Specifically, between 1982 and 2017 snow fell later in the year, melted earlier, and contained less water on all of Oregon's mountains (Williams K. , 2021). The associated costs with irrigation are rising as supplies dwindle, with some California farmers reporting 400% price increases (Organic Trade Association, 2022).

Even though more rainfall is projected for the future, this ultimately means less water could be spread around during the growing season as it means less storage in the frozen reservoirs (i.e., snowpack). Bill Jaeger, a professor of applied economics at Oregon State University, who has spent decades studying the state's water issues, projects that by the end of the century, snowpack could decline by as much as 94%. Further, crop evapotranspiration rates would increase along with temperatures during the growing season, increasing the demand for water at the same time supply is dwindling.

These recent trends and future projects are a significant challenge to agriculture in general. Several farms, including organic farms, have been shut down or significantly impacted as a result of these changing water supply conditions. Certain notable examples in Oregon include:

- Chris Casad owns a certified organic farm in Madras where they grow potato, squash, onion, grains, and livestock. They relocated from outside Bend where they were producing on 20 acres for direct-to-consumer markets (farmers markets) to their 360-acre operation[8] in their current location where they supply wholesale and direct to retail market channels, only to be met with water restrictions that allow them to irrigate only 20 to 30% of their cultivated land area. This has made it difficult for planning and contracting purposes, but also in recouping the investment made in scaling up their operation (capital outlays for land, equipment, potato storage, etc.). The water situation in their district (North Unit Irrigation District) has caused farmers to lease land just for the water duties so they can fully irrigate their existing parcels which in turn has led to bare / fallowed fields and more extreme dust storms. Certified organic production in this area constitutes a small portion of the total cultivated area. Through soil testing completed with Ecological Outcome Verification (EOV) on his certified organic lands, Chris has demonstrated the stark contrast in fertility and soil health characteristics on land that has been in certified organic production for nearly a decade, versus conventional acreage that he recently leased (Casad, 2023).
- Tom and Maud Powell operated an organic farm south of Medford for over 23 seasons. They grew fresh produce and sold direct to consumer through a Community Supported Agriculture (CSA) program, and grew organic seed crops. In 2022, the Powell's announced a plan to sell their land, citing inability to irrigate from their water source (Wolf Gulch) as the single reason for this

[8] Additional land is leased by Casad Family Farms.

decision. This is after they invested in efficiency improvements (transitioning to drip tape, and installing pond liners), harvesting rainwater, adopting permaculture practices, developing hedgerows, and other soil conservation practices (McClain, 2022).

- In Klamath County, water shortage has caused Bureau of Reclamation to cease all irrigation releases several times in the past few years (these represent the first time in the project's history of over 100 years). Farmers in Klamath County are planting less water-intensive crops, and many irrigation districts are seeking efficiency increases in transporting and storing water (reducing loss through leakage and evapotranspiration) (Williams K. , 2021).

2.2.4 Inputs (fertility, pest, and disease)

Organic agriculture utilizes biological processes to improve fertility and prevent pests, weeds, and disease, whereas conventional agriculture can rely on chemical inputs and controls. While conventional materials not allowed for use in organic systems are often efficient and effective, they can contribute to extractive systems that utilize only reactionary, short-term solutions with environmental and human health-related repercussions (Rodale Institute, 2023). Conventional systems thus reap immediate productivity benefits while organic systems are focused on decreasing reliance on inputs, reducing contamination risks, and building resiliency over time.

2.2.5 Fertility

Organic systems build and regenerate soil health through methods such as reduced tillage, rotational grazing, crop rotations, cover crops, and other practice standards imposed by the National Organic Program (NOP). These practices have been shown by numerous studies to result in increased soil organic matter, soil stability, carbon sequestration, and water holding capacity in organic systems, and considerably decrease groundwater contamination from nitrates (Ghabbour, et al., 2017; Mader, et al., 2002; Noll, et al., 2020; Williams, Blanco-Canqui, Francis, & Galusha, 2017). Organic agriculture's focus on soil health increases farm resiliency and productivity compared with conventional production in the face of climate-related challenges such as drought (Rodale Institute, 2022). This section explores some of the common methods of managing soil fertility in organic systems compared to conventional systems, and then identifies several programs (in Oregon and elsewhere) that could promote additional organic fertilizers available to producers.

The common characteristics of soil that organic producers manage for include: macro nutrients (Nitrogen (N), Phosphorus (P) and Potassium (K) with an emphasis on N), organic matter, minerals and soil microbes. Organic matter is an end product of any life process, such as animal and human manures, food processing waste, garbage, crop or vegetable residue, etc. When a legume crop is turned into the soil, this is referred to as "green manure." Adding these materials to fields (through disking or plowing under, spreading, or spraying) are common practices in organic production to increase both the nitrogen content and organic matter in the soil. If these inputs are incorporated into the field in undigested forms (raw) and the nitrogen content of the residue is low, the initial decomposition of the organic material by soil bacteria may draw down the nitrogen reserves (creating a deficiency) in the short term. This is just one example of the delicate nature of organic fertilizers.

The options available to the organic producer to adjust soil fertility in organic systems are more expensive and time consuming than the synthetic options available to conventional growers.[9] The simplest way to supply nitrogen (not specific to organic production) is with manufactured chemicals. 'Inorganic' nitrogen fertilizer production begins with the synthesis of ammonia (NH_3) from a mixture of gaseous nitrogen and hydrogen (H). The energy and the hydrogen for this process is generally supplied by natural gas (mostly methane, CH_4), which aids in explaining the strong position of petroleum companies in fertilizer production, and the energy dependence on conventional agriculture. Ammonia can be liquified ("anhydrous ammonia") and be applied directly to the soil as ammonium ions. Soil bacteria then gradually convert the ammonium to nitrate over time (a few weeks), but plants can absorb both forms of this fertilizer. Fertilizer is easier to handle and formulas on amount of fertility can be varied when the ammonia is made into a solid salt such as ammonium sulfate or ammonium nitrate before spreading onto fields. Finally, synthetic urea can be made from the solid salt through a reaction with carbon dioxide (Oelhaf, 1978).

Manure is a key source of nitrogen for both conventional and organic farms, and the decomposition of livestock manure produces methane (CH_4), a potent greenhouse gas. The longer manure is stored in anaerobic conditions (without the presence of oxygen), the more methane is released. Methane emissions from manure can be minimized by immediately spreading it onto cropland where it is incorporated into the soil and decomposes quickly in the presence of oxygen (Environmental Protection Agency, 2023).

Manure storage systems such as covered lagoons and digesters create anaerobic conditions that increase methane production but are designed to capture the resulting gas, and operations with these systems can convert and sell the captured methane as biogas. Threemile Canyon Farms in Boardman, Oregon, is a large certified organic dairy farm reportedly making a higher profit from natural gas sales produced by manure than from their dairy operation (Loew, 2019). However, it is important to note that the profitability of these systems disincentivizes relatively sustainable 'daily spread' practices while risking equipment failures that can result in methane leakage and potentially contribute to – rather than subvert – greenhouse gas emissions (Splitter, 2022; McKenzie, 2019; Vermont Department of Environmental Conservation, 2023).

Applying decomposed plant and animal materials (usually through composting) can speed the rate at which nutrients are available in the soil. The organic matter in the compost also helps retain moisture in the soil and can help build resiliency against deficits in irrigation supplies. There are several relevant programs promoting organic materials and compost development discussed in the bullets below:

- Metro Council (Portland) and nearby local communities have existing programs to keep food scraps out of landfills, converting them to compost at nearby facilities. In 2022, Metro Council adopted an ordinance requiring food service businesses in the Metro boundary to separate food scraps from garbage. Under this new ordinance an estimated 59,000 tons of food scraps will be collected (an expected rise from the approximately 24,000 tons collected without the ordinance). Through the 'Poop to Power Project,' the City of Portland is retrofitting their treatment plant to receive food scraps in an anerobic digester that will create biogas. Once the

[9] Access to and the cost of organic inputs is a limiting factor for organic producers, including compost (Stephenson G. a., 2012).

plant is operational, the biogas is planned to be used in commercial vehicles and will produce an additional product that will be an agricultural fertilizer (City of Portland, 2022).

- The city of Phoenix, Arizona has mitigated threats to organic farmers and improved their organic resources in recent years through the Farmland Preservation Program and a new, large scale composting facility. Through the allocation of $1 million in funds, the Phoenix City Council is helping to preserve farmland through conservation easements that keep farms and open spaces from development in perpetuity (City of Phoenix, 2023). Organic farms like Maya's Farm in South Phoenix that are under pressure from urban sprawl are able to enter into contractual easement agreements where they are paid a certain percentage of their property value through funds from the Farmland Preservation Program (City of Phoenix, 2023). The Certified Green Organics program was designed to incentivize business participation in composting their organic waste materials at the city's new compost facility, which is able to process 55,000 tons of compost per year (City of Phoenix, 2023). The compost will be available to organic farmers through WeCare Denali Organics and will provide a local source of the primary fertility input used in organic agriculture (Coker, 2017).
- The Low Carbon Fuel Standard (LCFS) program in California has been operating since 2011 and includes incentives for dairy farms to convert methane into energy to fuel vehicles and enabling them to sell offset credits. This was intended to be a 'win-win' by reducing farm emissions while allowing fossil fuel companies to mitigate their own GHG emissions through buying these offsets. The number of anaerobic digesters used to produce biogas has surged among dairy farms across the state, where there has been over $600 million invested in the program on dairy farms. Recently, environmental advocates argued the benefits of this program are exaggerated and that LCFS is encouraging the expansion of 'factory farms' (Sainato, 2022).

2.2.6 Pest & Disease

Select chemical pest control materials are approved by the NOP and allowed in organic production. However, preventative practices must be implemented and shown to be insufficient for control prior to their use. Preventative methods include the selection of resistant varieties, encouragement of beneficial insects, and cultural disease prevention (spaced plantings, removing diseased materials, etc.), the combination of which can result in overall improved pest control relative to conventional approaches (Muneret, et al., 2018).

Respondents to a survey in Oregon in 2012 identified the need for more research on organic control methods to better manage pests and diseases in organic systems (Stephenson G. , Gwin, Powell, & Garrett, 2012). Specifically, evaluating the efficacy of biological and cultural control methods to manage for key pests such as slugs, mummy berry, spotted wing drosophila, voles, and gophers, and methods for disease control on diversified farms. Nearly half of respondents in a 2021 survey indicated pest or disease management as an obstacle to organic farming (Stephenson G. , Gwin, Schreiner, & Brown, 2021).

2.2.7 Weeds

Weed control is the primary labor component of organic crop production in the form of hand and mechanical weeding, though adequate crop rotations also work to suppress weeds (Mohler & Johnson, 2009). Very few herbicides are approved for organic use beyond general farmstead maintenance (outside of the field) and within ornamental crops (Curran, 2005). As a result, organic agriculture

eliminates the use of harmful chemical weed control materials, such as glyphosate, that are used in conventional agriculture.

In a survey in 2020, 54.3% of Oregon organic farmers and 62.8% of farmers who are not pursuing organic agriculture described weed management as a major obstacle to production (Stephenson G. , Gwin, Schreiner, & Brown, 2021). The most common control practice for weeds in organic systems is the use of plastic mulch. Disposal of plastic mulch presents a challenge to organic growers, as recycling options for this material are extremely limited, costly, and require a high degree of cleaning (i.e., removal of crop residues) (WSU Extension, 2023; Agri-Plas, 2023).[10] Several biodegradable plastic mulches exist and are more are under development; however, no currently available products meet the National Organic Program standards for use in organic crop production. In most cases, this is because biodegradable mulches are often made using genetically modified corn or wheat starches, and genetic modification is an 'excluded method' per the federal organic regulations (USDA Agricultural Marketing Service, 2020).

2.2.8 Equipment

Most organic operations require some amount of equipment, from hand tools to mechanical harvesters. According to the Bureau of Labor Statistics, Oregon is represented equal to the national average for the presence of farm and garden equipment merchant wholesalers (US Bureau of Labor Statistics, 2022). Aside from highly specialized machinery, the availability of farm equipment in Oregon would not appear to be a limiting factor for organic producers, especially when considering the ability to purchase new and used equipment online through various retailers.

Despite current needs being met, there is an opportunity for Oregon manufacturers, and subsequently producers, to advance mechanization practices. Technological advancements in the agricultural industry are increasing productivity globally, and innovations in this sector can alleviate some of the labor constraints associated with organic crop production (Fuglie & Rada, 2013). Weed control technology presents the biggest advantage to organic producers, and advanced machinery such as laser weeders could significantly improve organic production efficiency (Carbon Robotics, 2023).However, it is important to note that developments in mechanization are generally geared towards large, conventional operations with the economies-of-scale necessary for expensive equipment such as GPS-guided machinery and automated irrigation systems (Sorte, Reimer, & Jones, 2021).

2.3 Common Opportunities of Organic Production

Key opportunities of public welfare associated with organic agriculture include climate risk mitigation, avoided health costs, economic development, and research & innovation. This section evaluates these opportunities.

2.3.1 Climate Risk Mitigation

Organic systems build and regenerate soil health through methods such as reduced tillage, rotational grazing, crop rotations, cover crops, and other practice standards imposed by the National Organic Program (NOP). These practices have been shown by numerous studies to result in increased soil organic matter, soil stability, carbon sequestration, and water holding capacity in organic systems, and

[10] There is one company in Oregon that takes agriculture film as a recycling input, Agri-Plas, located in Brooks.

considerably decrease groundwater contamination from nitrates (Ghabbour, et al., 2017; Mader, et al., 2002; Noll, et al., 2020; Williams, Blanco-Canqui, Francis, & Galusha, 2017). Organic agriculture's focus on soil health can increase farm resiliency and productivity compared with conventional production in the face of climate-related challenges such as drought (Rodale Institute, 2022). Increased soil health increases the water-holding capacity of the soil, decreasing irrigation water needs for a given level of plant productivity.

The production of synthetic fertility materials used in conventional agriculture is energy-intensive, contributing to 41% of energy consumption in agriculture (Smith, Williams, & Pearce, 2014). Synthetic nitrogen fertilizers, not allowed in organic crop production, account for 2.4% of global CO_2 emissions (IATP, GRAIN, Greenpeace International, 2021). Nitrous oxide (N_2O) is a byproduct of the application of nitrogen fertilizers to agricultural land, and N_2O emissions are 40% lower in organic production than conventional (Skinner, et al., 2019).

Methane emissions from the production of livestock, particularly cows, is a contributor to agricultural greenhouse gases. Livestock production in concentrated animal feeding operations (CAFOs) produce waste that is often stored in anaerobic conditions, which results in methane, a potent greenhouse gas. Organic livestock production requires pasturing and rotational grazing and land application of manure, thus drastically reducing methane emissions (National Sustainable Agriculture Coalition, 2019). Organic forage requirements for livestock can also contribute up to a 30% reduction in the digestive process (enteric fermentation) that produces methane (National Sustainable Agriculture Coalition, 2019).

Organic agriculture cultivation practices often result in higher soil carbon sequestration. Organic practices can increase soil organic matter by 15% relative to conventional systems, and stable soil organic matter comprised mostly of carbon can remain in soils for centuries (Ghabbour, et al., 2017; Stevenson, 1994). While carbon sequestration capacity is finite in agricultural storage, conservation tillage preserves the stored carbon in organic systems. Practices such as cover cropping also often minimize the exposure of bare soils to the elements, thereby increasing soil water retention and carbon holding capacity (Wszelaki & Broughton, 2022). One broad evaluation of carbon sequestration found that organic systems have the potential for 44% more stable sequestered carbon than conventional systems (Ghabbour, et al., 2017). Another study (De Gryze et al, 2010) found that switching from conventional to organic farming has the greatest potential for increased carbon sequestration relative to conservation tillage or cover cropping alone.[11]

According to the Oregon Department of Environmental Quality, agricultural in Oregon represents 8 to 9% of statewide greenhouse gas emissions, equating to roughly 5 to 7 million metric tons of CO_2 equivalent ($MTCO_2e$) annually from 1990-2015 (Oregon DEQ, 2018). Approximately 57% of agricultural emissions in 2015 were a result of methane emissions from cows, and 38% were from the application of synthetic nitrogen fertilizers. Conversion of agricultural land to certified organic has the potential to reduce GHG emissions, help meet the state's goal of 80% below 1990 levels of GHG emissions by 2050 (Oregon Department of Energy, 2023), and to become a carbon sink (CCOF Foundation, 2019).

2.3.2 Public Health

Adverse effects to human health from conventional agriculture practices often stem from the exposure of both farmers and consumers to conventional pesticide residues (Benbrook, Kegley, & Baker, 2021;

[11] As cited in (CCOF Foundation, 2019).

Merrigan K. , et al., 2022; Misiewicz & Shade, 2018). Conventional food products consistently contain three to five times as many pesticide residues as organic products (Baker, Benbrook, Groth III, & Lutz Benbrook, 2002; Gomez-Ramos, et al., 2020). An analysis of 61 studies published between 1980 and 2014 estimated that the total cost to human health from exposure to synthetic pesticides could have been as high as $15 billion in the United States in 2005 (Bourguet & Guillemand, 2016). Organic agriculture's minimal use of less toxic pest and disease control materials reduces the economic burden of pesticides on public health.

2.3.3 Economic Development

Data from the 2017 US Census of Agriculture indicates that more than half of US farm operations lose money each year (56%); this figure is even higher for all farm operations in Oregon (69%) (USDA, 2017). Many farmers rely on second jobs as a primary source of income. These operators are typically small and midsize farmers who likely find it difficult to access public and private capital, land, equipment, insurance and markets while meeting the basic needs of their families (Semuels, 2019; Inwood, 2021). Farms are vulnerable to seasonal yield variability, price fluctuations, and increasing consolidation of agricultural enterprises. All these factors hinder the independent and small-scale farmer in competing in the marketplace.

Research indicates that certified organic farms are more profitable than their non-organic counterparts (Crowder, 2014; Langemeier, 2020; Greene, 2013). Between 2012 and 2017, organic farm income doubled while the income of all US farms remained flat (Merrigan K. , et al., 2022).

In collaboration with the Organic Trade Association, Penn State developed a report in 2016 describing the economic impacts of "organic hotspots", defined as clusters of counties with high numbers of organic operations (Jaenicke, 2016). Locations considered to be organic hotspots by this report were found to have poverty rates 1.3% lower and median household incomes $2,000 higher relative to general agricultural hotspots, including 47% of counties in Oregon (Jaenicke, 2016).

It is important to differentiate local agriculture from organic agriculture in the context of economic impact and consumer preference. Supporting farms and other food producers within a consumer's community provides the benefit of knowing the source of food, and several studies have shown it can increase the consumer's community attachment and sense of place (Delind, 2006; Feagan, 2007; Shifren, Lawry, & Bhappu, 2017). A consumer may be favorable to a farm regardless of their organic status. However, certified organic operations benefit from their ability to immediately identify their practices and product composition through the organic label.

Organic producers tend to use direct to consumer markets – within or near their communities – more than conventional farms, which is often related to hiring local labor and local sourcing of production supplies (Martinez, et al., 2010; USDA ERS, 2023).

Organic food is sold at a higher premium compared with conventional alternatives. While this is seen as an economic advantage to existing organic producers and those that are considering entering the market, it stands to reason that prices may be a deterrent to the consumer (Bellows, Onyango, Diamond, & Hallman, 2008; Federal Reserve Bank of St. Louis, 2017; Jaenicke, 2016; Merrigan K. , et al., 2022). The Pew Research Center found that cost is a determining factor of whether consumers purchase organic products for 72% of respondents (Funk & Kennedy, 2016). Despite the influential role cost plays in a decision making, consumers have consistently demonstrated their willingness to pay more for

organic products for the environmental, health, and economic reasons described in this section and above (Bellows, Onyango, Diamond, & Hallman, 2008; Gundala & Singh, 2021; Funk & Kennedy, 2016; Williams & Hammitt, 2002).

2.3.4 Research & Innovation

Select chemical pest control materials are approved by the NOP and allowed in organic production. However, preventative practices must be implemented and shown to be insufficient for control prior to their use. Preventative methods include the selection of resistant varieties, encouragement of beneficial insects, and cultural disease prevention (spaced plantings, removing diseased materials, etc.), the combination of which can result in overall improved pest control relative to conventional approaches (Muneret, et al., 2018). While preventative methods can be quite successful, respondents to a survey in Oregon in 2012 identified the need for more research on organic control methods to better manage pests and diseases in organic systems (Stephenson G. , Gwin, Powell, & Garrett, 2012). Specifically, studies are needed to evaluate the efficacy of biological and cultural control methods to manage for key pests such as slugs, mummy berry, spotted wing drosophila, voles, and gophers. More than 70% of respondents in a 2021 survey indicated pest or disease management as an obstacle to organic farming (Stephenson G. , Gwin, Schreiner, & Brown, 2021).

Technological advancements in the agricultural industry are increasing productivity globally, and innovations in this sector can alleviate some of the labor constraints associated with organic crop production (Fuglie & Rada, 2013). Weed control technology presents the biggest advantage to organic producers, and advanced machinery such as laser weeders could significantly improve organic production efficiency (Carbon Robotics, 2023). However, the challenge to reaping the benefits of these developments in mechanization is that economies of scale are necessary for farms to be able to afford expensive equipment such as GPS-guided machinery and automated irrigation systems (Sorte, Reimer, & Jones, 2021).

3 ORGANIC FOOD MARKET ASSESSMENT

This section explores the value of the total organic food market in Oregon, including a discussion of key drivers of market demand and key market channels of organic food. The section also describes the entire value-added food chain, from farm to processing/distribution to consumer. Specific opportunities associated with handling, distribution, and manufacturing of organic food are explored.

3.1.1 Profile of Total Consumer Spending on Organic Food in Oregon

The Bureau of Labor Statistics (BLS) tracks data on food consumption at home and away from home. This consumer expenditure data is collected for select states, select metropolitan statistical areas (MSAs), and regional geographies. These expenditures by general categories of food are identified in the table below, both at the household level and state level (assuming 1.837 million households across the state) (US Census Bureau, 2023). Further estimates are included for *visitor* spending on food in Oregon.

Table 3-1: Food Expenditures in Oregon, 2022

	Average Annual Spending / Household	Total Market Size (Oregon)
Food Expenditures for at Home Consumption:		
Cereal and Bakery	$692	$1,271,260,000
Meat, Poultry, Fish and Egg	$1,207	$2,217,350,000
Dairy Products	$550	$1,010,390,000
Fruits and Vegetables	$1,149	$2,110,800,000
Other	$2,075	$3,811,940,000
Subtotal at home	**$5,673**	**$10,421,750,000**
Food Expenditures for Consumption Away from Home: *	$905	$1,662,190,000
Total Food Expenditures of Oregon Residents:	**$6,578**	**$12,083,940,000**
Food Expenditures of visitor spending in Oregon:		
Spending at Food Stores		$791,200,000
Spending on Food Service*		$720,000,000
Total Food Expenditures of Visitors:		**$1,511,200,000**
Total Food Expenditures		**$13,595,140,000**

Sources: (US Census Bureau, 2023) (Bureau of Labor Statistics, 2023) (Travel Oregon, 2022)
**This considers only 30% of total spending reported, to account for the food spending as a percentage of food service sales (Buckley, 2019)*

As indicated in the table above, Oregon residents spent over $12 billion on food in 2022. In addition, the state received 27.3 million visitors (person-trips) who spent $1.5 billion on food stores and food services across the state (Travel Oregon, 2022). In total, we estimate that consumer expenditures on food in Oregon approached $13.6 billion across the state in 2022 in both grocery retail sectors and food service sectors.

Based on its annual survey and other data sources, Organic Trade Association (OTA) estimates the value of organic sectors across the United States. The most recent survey indicated 6.3% of total food expenditures across the United States are for organic foods (Organic Trade Association, 2022). No data is available at the state level, but if the proportion of spending on organic food in Oregon is comparable to the national average, then **nearly $856.5 million was spent on organic food** ($13.6 billion x 6.3%) **across the state in 2022**.

Total organic food sales by category are estimated in the table below by taking the percentage of total organic spending for specific categories in the OTA survey at the national level and applying it to the total consumer expenditure estimate from above.

Table 3-2: Food Expenditures in Oregon by Organic Category, 2022

Food Category	% by category	Consumer Spending on Organic
Fruit & Veg	37.1%	$317,761,500
Beverage	14.3%	$122,479,500
Dairy & Egg	12.8%	$109,632,000
Packaged & Prepared	11.9%	$101,923,500
Breads & Grains	10.9%	$93,358,500
Snack Foods	5.9%	$50,533,500
Condiments	4.0%	$34,260,000
Meat, Poultry & Fish	3.2%	$27,408,000
TOTAL	**100.0%**	**$856,500,000**

Source: Highland Economics' estimate

3.1.2 Demand Drivers

The demand for organic food and products is driven by multiple factors on the consumer level. Organic foods are produced without the use of synthetic chemicals and are considered safer than conventional alternatives by health-conscious consumers. Organic agriculture is considered sustainable in practice, and subsequently supported by consumers who are concerned with environmental quality. The organic label helps guide consumer spending decisions based on alignment with a certain set of values, and federal regulation and oversight by accredited certifiers provide consumers with confidence in the integrity of organic products.

Health concerns have been shown by multiple studies to be one of the primary determining factors for consumers choice to purchase organic food (Bellows, Onyango, Diamond, & Hallman, 2008; Funk & Kennedy, 2016; Ghali, 2019; Gundala & Singh, 2021; Organic Trade Association, 2017; Williams & Hammitt, 2002).

- OTA found that 65% of consumers interviewed identified personal health reasons as the primary motivation behind purchasing organic products.
- A survey from the Pew Research Center found 76% of consumers purchased organic based on health benefits.
- Williams & Hammit found 60% of consumers believe organic products to be more nutritious than conventional.
- Gundala & Singh found that 48% of consumers identified health-consciousness and 19% identified pesticide-free as reasons for buying organic food.

Concern for the environment is another influential factor for consumer food buying habits (Garcia-Gallego & Georgantzis, 2011; Smith & Paladino, 2010). When consumers actively relate the organic label with increased sustainability and environmental health, they are more willing to purchase organic products (Ragavan & Mageh, 2005). However, concern for the environment is not generally the primary factor in determining willingness to buy organic food (Ghali, 2019; Tandon, Dhir, Kaur, Kushwah, & Salo, 2020). Of 770 respondents to a survey of United States consumers in the Midwest, only 15% indicated "environmental friendliness" as their primary reason for purchasing organic food (Gundala & Singh, 2021). A national survey from the Pew Research Center found about one third of respondents purchased

organic products to help the environment, while the majority were looking for healthier foods (Funk & Kennedy, 2016).

Despite the well documented environmental benefits of organic agriculture (See 'Inputs' section above), there appears to be a gap in consumer knowledge regarding what the organic label means (Merrigan, Giraud, & Greene, 2021; Stephenson G. , Gwin, Powell, & Garrett, 2012). Most consumers' perception of organic products is that they are free from chemical additives such as pesticides and growth hormones, and farmers have identified a lack of consumer education regarding the broader environmental benefits of organic agriculture as a limitation to expanding their consumer base (Suciu, Ferrari, & Trevisan, 2019; Stephenson G. , Gwin, Powell, & Garrett, 2012). Organizations like the Organic Trade Association, Oregon State University, and Oregon Tilth suggest that increased awareness of organic regulations and the associated sustainable production practice standards will help to strengthen and improve growth in the organic sector (Organic Trade Association, 2022; Stephenson G. , Gwin, Powell, & Garrett, 2012).

3.2 Food Market Channels

This section presents profiles, constraints, and opportunities surrounding market channels for organic food in Oregon.

3.2.1 Direct to Consumer Channels of Organic Food

In 2021, 127 organic farms in Oregon sold at least one product directly to a consumer. Organic sales directly from producer to consumer totaled $13.5 million in the state (about 4% of all organic sales reported by NASS). In contrast, NASS reports $254.7 million in total food value directly marketed for human consumption in the state of Oregon (in 2020, the latest report available). Thus, organic food would comprise 5.3% of total food sold direct to consumer.[12]

Fifty-one certified organic farms (about 10% of all organic farms) sold products through community support agricultural shares (CSA's) (National Agricultural Statistics Service, 2022). The popularity of direct-to-consumer channels during the pandemic increased. There are no official data released on the rise of direct-to-consumer sales during the pandemic, but articles published on the topic suggest the popularity of CSA programs, in particular, went up substantially, suggesting 50% or higher growth across the sector from the previous year and this trend is not expected to decline any time soon (Shirvell, 2021; Westervelt, 2020; Ricker, 2020). The reasons for this lasting trend are because employment with work-from-home flexibility has largely continued, which leads to more meals at home, and consumers are choosing CSA for the convenience (delivered in weekly boxes) and quality (which tends to be freshly picked and local) (Shirvell, 2021).

Farmers markets are a popular venue for growers to sell their products directly to consumers. The Oregon Farmers Markets Association (OFMA) conducts an annual survey to track farmers market operations and trends. Their most recent survey indicated that 113 organizations held 136 farmers markets across Oregon in 2021, the highest number of markets ever recorded. These markets served 3.4 million visitors and generated an estimated $61 million (down from a pre-pandemic high of 4.2 million

[12] This is not including 'exempt' farms (sales less than $5,000) who market and sell 'organic' goods but are not certified organic.

visitors and an estimated $63 million in sales in 2019) (Oregon Farmers Markets Association, 2021). It is unclear how much of these sales were from certified organic producers or processors.

3.2.2 Retail Markets

The 2021 NASS survey of organic producers in Oregon reported that sales directly from the farmer to retail markets, institutions, or food hubs accounted for $30.8 million across the state (National Agricultural Statistics Service, 2022).[13] Specific to retail markets, in 2020, the majority of organic food was sold in mainstream grocery stores (e.g., Costco, Walmart, and Safeway). Despite stereotypes of organic being a food trend in mostly upper-class, predominantly white consumers, organic's appeal spans diverse income and racial groups. A recent study found that 14% of dedicated organic consumers identify as Black, 25% as Hispanic, and 10% as Asian; each group exceeded its representation in the overall US population (OTA, 2020). While people with higher incomes and education levels purchase more organic foods than people in other demographic sectors, organic consumers come from a wide range of backgrounds (Hartman Group, 2017).

Organic fresh produce is likely a large component of the organic food moving through retail channels (fruit and vegetables accounted for over 37% of the consumer expenditures on organic food products, described above). In 2022, organic fresh produce sales across the United States totaled $9.4 billion, which was a 3% increase from the previous year (Organic Produce Network (OPN), by Category Partners, 2023). By comparison, we estimate this category accounted for nearly $318 million in Oregon alone. This estimate, along with estimates of spending on organic food at the retail level is presented in Table 3-2 above.

3.2.3 Institutional Markets

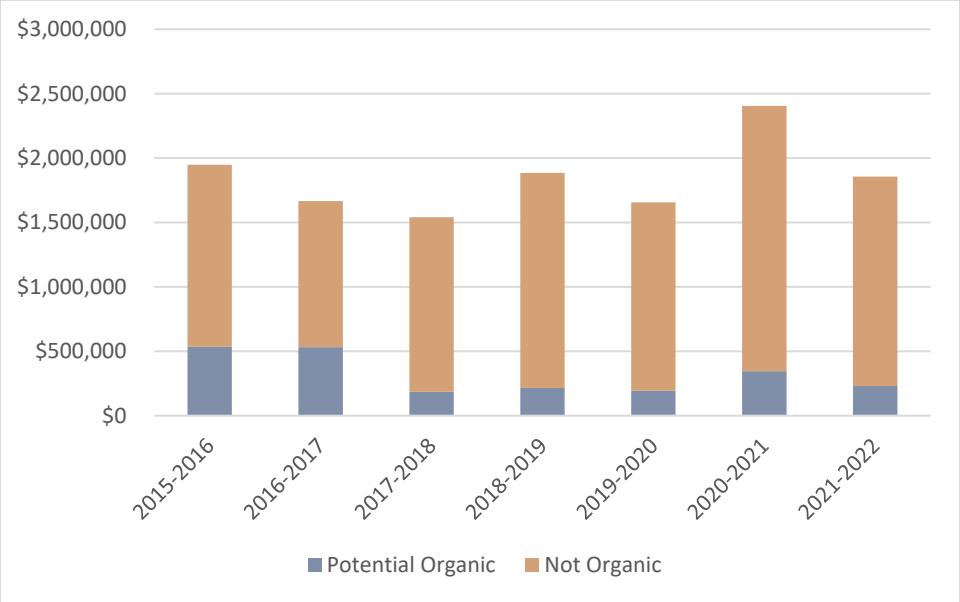
Institutional food markets include schools, universities, prisons, and hospitals. Relative to other markets, there are additional barriers to entry for organic food products in the institutional market. In particular:

- Institutions require food to be delivered and often expect it to be washed, cut, and packaged. Many schools no longer have kitchens or even knives.
- Institutions may have limited storage capacity, making large quantities of highly perishable crops difficult to manage.
- Institutional buyers tend to prefer to purchase food through their traditional distribution channels that may not offer organic options.
- Institutional buyers generally are more constrained by price as they work on fixed budgets for food buying. Organic products tend to be priced higher than conventional products.

The Oregon Department of Agriculture (ODA) and Oregon Department of Education operate the farm to school grant program, funded through the Oregon Legislature. The program allows school reimbursement for buying and featuring locally produced (in Oregon) foods. Data was provided by ODA on the reimbursements made to school districts over the life of this program. We cross-referenced the vendors to the Organic Integrity Database (OID) to estimate the value of spending that could have been on certified organic food products. The results of this cross-referencing are included in the figure below.

[13] The predominant method of distributing food to retail channels is through wholesalers / distributors.

Figure 3-1: Reimbursements of Local Food Spending, Farm to School Program, Total and Organic



Source: Highland Economics' analysis

We recognize that entities who have an organic certification also sell products that are not certified. Thus, the blue shaded bars in the figure above represent the potential certified organic value of total food spending through the farm to school program in Oregon. From this evaluation we can estimate that up to one-third of spending (in the 2016-2017 school year) was on organic products; most years the percentage of spending on organic is around 12%. These estimates indicate that the institutional food buyer sector is likely a large, albeit challenging, market opportunity for certified organic Oregon crops.

Organizations like National Farm to School Network and Farm to Institution advocate for policies allowing local food sourcing. The Oregon Health and Science University is known for providing healthy, local, scratch-prepared food (Salvia, 2016) and is a partner in the Community Supported Agriculture (CSA) Partnerships for Health program (Caffey, 2023).

3.2.4 Food Access

Organic food is generally priced higher than conventional food. The cost of organic food represents a more accurate cost of the food product, as organic producers tend not to receive public supports and subsidies like conventional commodity growers. In some cases, the higher price points are attractive to conventional producers who transition to organic in an attempt to achieve higher profit at the farmgate level. While this is generally a positive aspect of organic markets for producers, it is a fundamental challenge for the organic consumer.

While fair prices are critical for organic producers to stay afloat financially, these higher prices can put them out of reach for some lower-income consumers. Part of this dynamic can be explained by organic demand far surpassing supply and lack of investment supporting the additional costs of organic production. However, others have argued that current public policies do not do enough to bridge the gap between fair prices for organic producers and affordability and accessibility for all consumers (Merrigan K. , et al., 2022).

In Oregon, the Farmers Market Fund and partners enable SNAP participants to increase purchases of fresh, local fruits and vegetables through the Double Up Food Bucks (DUFB) SNAP incentive program. The DUFB program is administered through 65 farmers markets, 25 grocery stores, and 40 CSA's in Oregon. Participants receive a dollar-for-dollar incentive at the point of purchase. The Double Up coalition includes the Farmers Market Fund, Oregon Food Bank, Oregon Farmers Markets Association, the Portland Area CSA Coalition, and the American Heart Association, organizations that approach ending hunger, improving health, and supporting farmers from complementary perspectives. Currently, over 600,000 Oregon residents receive SNAP benefits and are eligible to participate in the DUFB program (The News Guard, 2019). It is unclear how much organic product is purchased through this incentive program, but this impacts multiple market channels and represents an opportunity for growth of the organic sector in fresh fruit and vegetable categories while also providing access to healthy food to low-income populations.

3.3 Organic Food Supply Chains in Oregon

The term supply chain refers to the steps that are involved in creating a finished product, from initial production to when it is received by the end consumer. The sections below explore the economic activity and opportunities surrounding handling, distribution, and manufacturing organic food in Oregon.

3.3.1 Handling & Distributing Organic Food

The organic 'handler' certification includes any aspect of post-harvest handling of certified organic products. This category would include packing (e.g., fresh market fruit and vegetable packing), distributing, and food product manufacturing. For purposes of this report, we discuss packing and distributing and then separately discuss manufacturing in a subsequent section.

Packing activities can occur on-farm or at a centralized facility. For certain fruit crops, like apples and blueberries, it may be economical to have centralized facilities for packing fruit and keeping them in storage. In Oregon, these facilities include Silver Mountain Packing, Firestone Pacific Foods, Oregon Berry Packing, Cascade Produce, and others. Distribution activities involve the sale of certified organic goods so that certified organic products move along the value chain. Generally, this involves buying from a producer and selling to a retailer (grocery store or restaurant), processor, or institution.

Several large national distributors operate in the state of Oregon, including Sysco, US Foods, UNFI, Performance Food Group, Kroger, and Albertsons. While organic products are generally a minority of their available products, each offers their own selection either externally sourced or internally produced organic products through their own in-house brand (Albertsons: O' Organics, Kroger: Simple Truth, etc.).

There are many regional and local distributors in Oregon as well, including several organic-focused companies that originated and operate primarily in the state. The bulleted list below includes snapshots of several of these distributors.

- **Organically Grown Company (OGC)** started in Eugene Oregon in 1978 and currently operates distribution centers in Eugene and Portland. OGC has grown into one of the largest independent organic produce distributors in the United States, servicing groceries, restaurants and food service business, and craft food producers. (Organically Grown Company, 2023).
- **Hummingbird** is an organic food distributor based in Eugene, Oregon. Established in 1972, Hummingbird was founded to provide organic, local, and sustainable food wholesale to serve a variety of food businesses including co-ops, retail chains, restaurants, and manufacturers. They source ingredients direct from farmers and offer pick up at their Eugene location and delivery in WA, OR, and CA (Hummingbird Wholesale, 2023).
- **Bridges Organic Produce** is an organic produce distributor founded in 2002 and headquartered in Portland, Oregon. They offer fruits and vegetables year-round from certified organic farms located in the Pacific Northwest, Canada, Mexico, Argentina, and New Zealand. (Bridges Organic Produce, 2023).
- **Charlie's Produce** is a regional distributor with over $2 billion in annual sales, and have distribution center in Clackamas, Oregon. They operate across the Northwest sourcing local produce and are a leading organic produce supplier in the region. (Charlie's Produce, 2023).
- **DPI Specialty Foods** is a regional distributor of value-added (frozen, refrigerated, or dried) specialty and organic products, and have a distribution center in Tualatin, Oregon. (DPI Specialty Foods, 2023).
- **Pacific Coast Fruit Company** is an independent produce distributor with a distribution center located in Portland, Oregon. Their company highlights their organic products and relationships with organic farmers. (Pacific Coast Fruit Company, 2023).
- **United Salad Company** is independent produce distributor with a distribution center located in Portland, Oregon. The company also provides packing for certain organic fruit and vegetable crops in Oregon (United Salad Company, 2023).

Other distributors offering organic products in Oregon include C&S Wholesale Grocers, McDonald Wholesale Co., and Crown Pacific Fine Foods.

Employment data for this industry is part of NAICS Industry Code 424 – Merchant Wholesalers, Nondurable. Using data from the Oregon Employment Department, we estimate that there are 8,690 employees employed in 2022 in the relevant industry sub-categories with an average annual wage of $63,500 annually for wholesaling food, as provided in the table below.

Table 3-3: Oregon Employment of Merchant Wholesalers, Relevant Non-Durable Goods

NAICS	Industry	Employment	Average Wage
42442	Packaged And Frozen Food	424	$71,881.00
42443	Dairy Products	463	$97,992.00
42444	Poultry Product	23	$66,080.00
42445	Confection	48	$66,263.00
42447	Meat & Meat Product	522	$61,404.00
42448	Fruit & Veg	2,028	$60,826.00
42449	Other Grocery And Related Products Mercht Wholesale	4,583	$61,454.00
42450	Grain & Field Bean	122	$137,847.00
42452	Livestock Merchant Wholesalers	137	$17,224.00
42459	Other Farm Product Raw Material Mrcht Wholesale	340	$45,063.00
	Subtotal	**8,690**	**$63,532.62**

Source: (State of Oregon Employment Department, 2023)

It is important to note that only a portion of the jobs and income associated with the NAICS industries would be specifically tied to organic food products. While no official estimate is available for jobs and income associated with organic food products alone, we can present a reasonable range from the above data for this industry. It is reasonable to expect at least 6% of these jobs and income would be associated with organic food (from OTA estimate of organic penetration into all food categories). On the high end, we have estimated that around 15% of all food product manufacturing occurring in the state is certified organic (see section below). We therefore estimate that the percentage of organic wholesale jobs (and associated income) in Oregon is between 6% and 15%, such that between 520 and 1,300 jobs[14] and $33 to $83 million in labor income is directly attributed to wholesale activities related to organic food in the State of Oregon.

3.3.1.1 Potential for Fraud, SOE Rule

While primary records kept by all certified entities should be able to completely trace an organic product from field to consumer, complex shipping and receiving records as well as lengthy distribution chains (where some middlemen are not required to be certified) create gaps and uncertainty in the audit process that can be overlooked. Thus, the distribution link in the organic chain is a common control point for the occurrence of organic fraud.

In 2017, Randy Constant was charged with the largest known case of organic fraud in the history of the industry. Through his organic grain business and a brokerage company that he co-owned, Constant supplemented his organic crop with non-organic grain from at least 2010 to 2017, resulting in fraudulent sales of over $142 million over the course of seven years due to the higher price of organic grains (Parker, 2021). His ability to sneak such a large quantity of uncertified organic grain into the organic market was facilitated by multiple weak points in organic enforcement.

Under-supervised distributors and the lack of ability to regulate brokers by the National Organic Program (NOP) are key drivers behind the new Strengthening Organic Enforcement (SOE) rule soon to

[14] Actual jobs specific to organic is likely on the high end of this range, as Organically Grown Company alone employs 275 people (Lively, 2023).

be in place in the US (Organic Trade Association, 2022). The rule will require more entities to attain organic certification, including those that import, export, trade, or broker organic products, and will reinforce traceability requirements across the organic value chain.

3.3.1.2 Import Substitution Opportunity

There is not much publicly available data regarding the economic activity occurring in the middle of the value chain. Specific questions addressed in this section include:

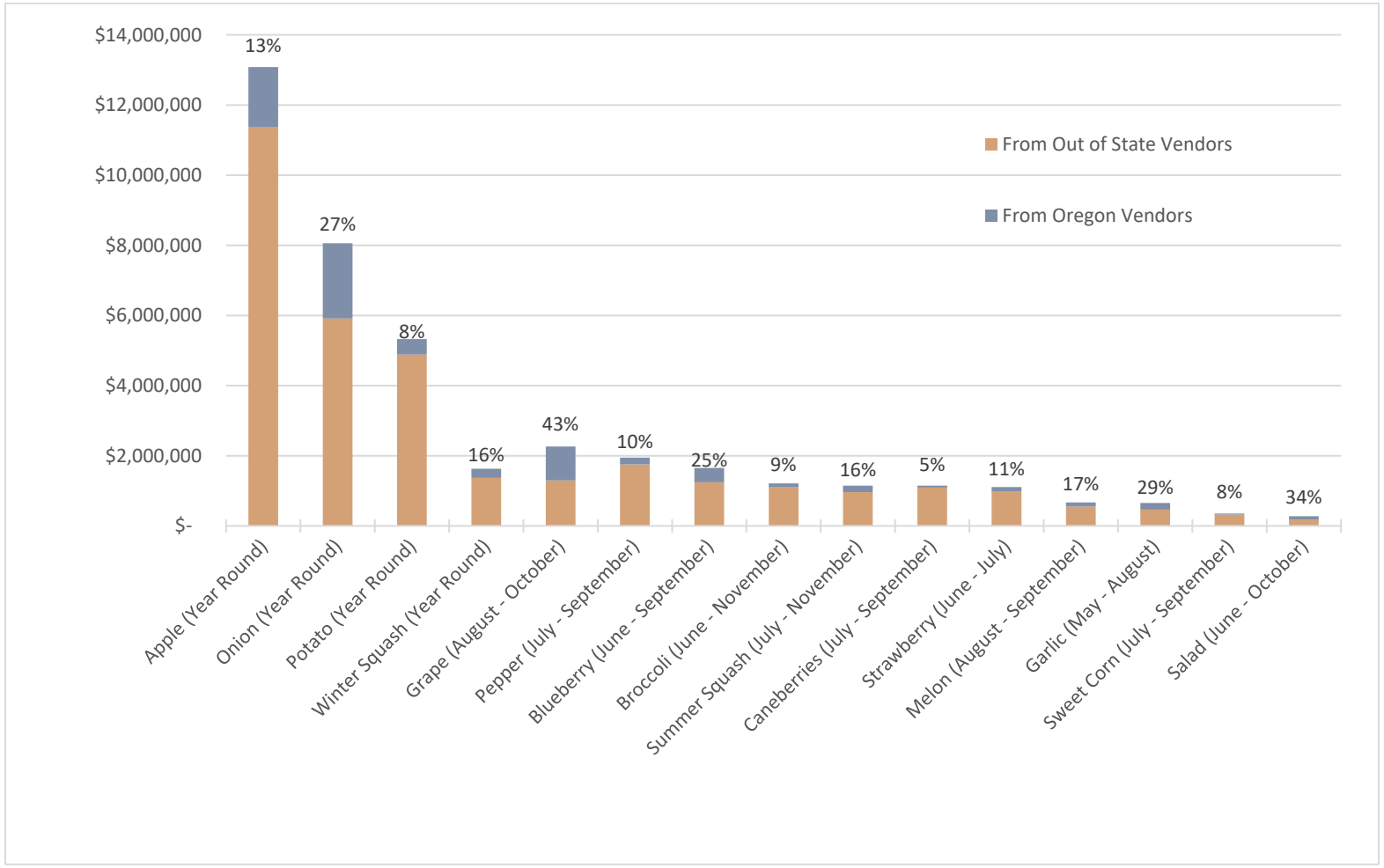
- What items and associated volumes of organic food are being imported from other origins to consumers in the state?
- Where could Oregon producers enhance production during key market windows to either relieve demand pressure from other points of origin (mainly California) and / or grow the organic food production capacity in the state?

This section explores these questions through evaluating sales data from 2022 for a key organic distributor and handler. For this section we focus on 15 crops that have existing or potential production in the state and demand (sales) documented in the financial records provided.

The data includes itemized sales organized by date of sale, product sold (grouped into generalized categories), delivery location (destination), vendor location, and origin country. Two evaluations were conducted with the data provided, including an evaluation of sales *to* Oregon vendors from Oregon sources, and out-of-state sales *from* Oregon vendors.[15] Storage crop sales (apples, onions, potatoes, and winter squash) were analyzed year-round, while all other crop sales were filtered to a conservative market window to reflect when they could have been bought and sold from an Oregon producer (i.e., broccoli bought and sold from June to November).

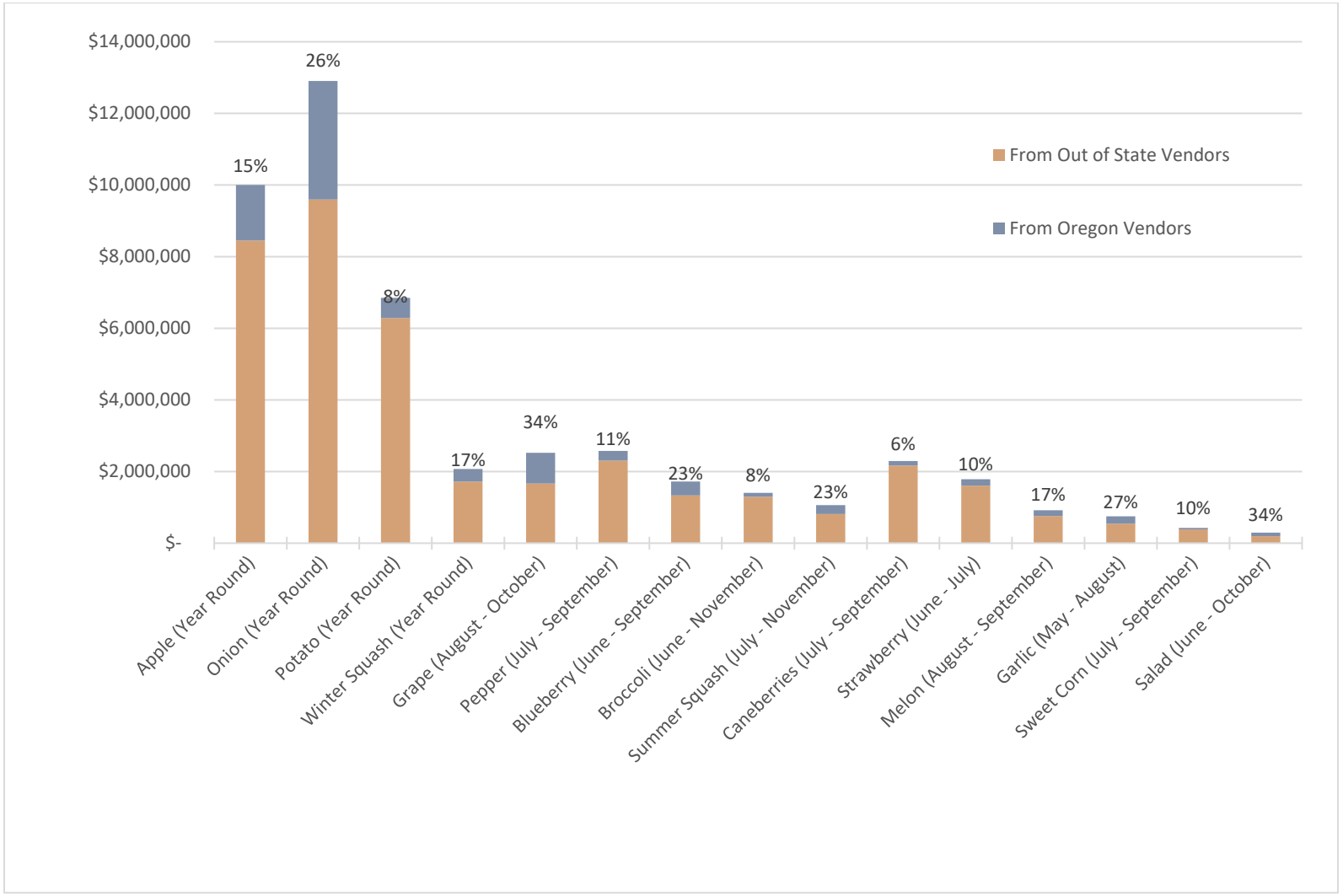
[15] While the data set specifies the location of vendor at the state level, the crop origin is only presented at the country level – meaning a crop sold to the handler from a vendor in Oregon was not necessarily grown in Oregon, but can at least be filtered to the United States. Because of this, sales from Oregon vendors displayed here are likely overrepresenting farm production in the state of Oregon.

Figure 3-2: Sales to Oregon Businesses



Source: Highland Economics Analysis of Confidential Distributor Data

Figure 3-3: Sales to Out-of-State Businesses



Source: Highland Economics Analysis of Confidential Distributor Data

Sales to Oregon accounts from this dataset represented nearly 46% of total sales by the distributor in 2022. Of the total sales to Oregon-based accounts, 16% came from Oregon vendors and 84% came from out-of-state. Of the sales to out-of-state accounts, 15% were supplied by Oregon vendors.

Less than 10% of potatoes, broccoli, cane berries (blackberries and raspberries), and sweet corn sold by the distributor to Oregon accounts came from Oregon vendors, and less than 10% of potatoes and broccoli sold to out-of-state accounts came from Oregon vendors. This means that, at least for the distributor highlighted here, 90% or more of these crops are sourced from outside the state during times when they are available from Oregon producers. **Thus, from this exercise it would be reasonable to expect that additional production from Oregon vendors could be used to substitute these goods from out-of-state suppliers.**

A representative from this distribution company suggested several reasons that further explain the discrepancies between in-state and out-of-state vendors, namely:

- Oregon producers may have redirected their sales to direct markets in recent years following the global COVID-19 pandemic, where higher profits are available compared with wholesale accounts. This may be especially true for small to mid-sized producers.
- Key producers in surrounding states such as Washington may have established relationships with the company where they have been able to supply large percentages of certain crops.
- Large grocery outlets have directly contracted with Oregon producers for their organic product in some instances, cutting out the distributor.

While the above example is specific to Oregon, it is interesting to note that the presence of trade imbalance of organic products for the United States has been widening. During the last decade, the United States imported much more organic food than it exported. In 2021, tracked organic imports reached $2.7 billion, while exports were valued at $700 million. Organic feed and grains, like corn and soybeans, remain significant import crops because there is not enough domestic supply to meet demand (Merrigan K. , et al., 2022).

3.3.1.3 Transportation Bottleneck Constraints

The bridge across the Columbia River, on Interstate 5, connecting Washington and Oregon is now over 100 years old. The bridge is a vital trade route for regional, national and international economies including organic agriculture and food products. Recent cost estimates indicate it will likely cost $6 billion for the Interstate Bridge Replacement program (Interstate Bridge Replacement Program, 2023).

Bulk grain for organic livestock feed, particularly corn and soybeans, is often transported by rail into Oregon from outside of the state. Transloading sites where grain is moved from railcars to trucks are a critical component of the distribution chain for organic grain. Depending on the specific activity occurring at the rail site, it is unclear whether these operations must be certified organic or if they will need to be once the Strengthening Organic Enforcement (SOE) rule goes into effect next year. Transloading infrastructure in Oregon is abundant based on an interview with a feedstock specialist in the dairy industry, however the number of certified organic handlers providing this service is limited and may present a barrier to the growth of Oregon's organic dairies.

3.3.2 Manufacturing Organic Food

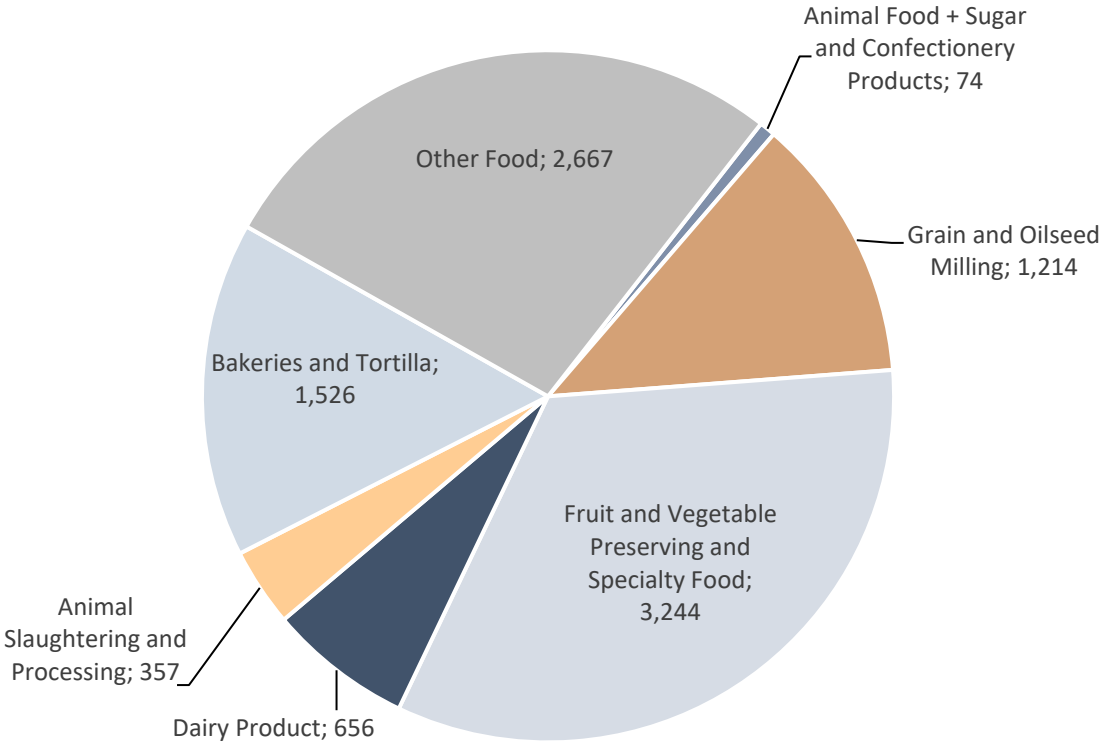
Food manufacturers 'process livestock and agricultural inputs into products for intermediate or final consumption' (Fridley, 2023). The industry adds value to raw agricultural inputs and sells outputs to wholesalers and retailers for distribution to the end consumer. Players in the manufacturing sector have infrastructure and manufacturing capacity in the state, but do not necessarily use only Oregon produced inputs. There is no comprehensive profile of certified organic food manufacturers in the state.[16] However, by cross-referencing Oregon Employment Department with Oregon Integrity Database information we build a statistical profile for organic food manufacturing jobs, wages, and revenue occurring in Oregon.

Based on Oregon Employment Department data from the most recent quarterly filing there are a total of 935 businesses across the state that fall into this industry group (food manufacturing). Of these businesses, 110 are certified organic, and employed 9,700 people in 2021.[17] Total payroll for these certified organic entities in 2021 was $510.6 million. The figure below breaks down the Food Manufacturing Industry by raw agricultural input processed (NAICS sub-category) for the entities with organic certification across the state of Oregon.

[16] As opposed to California, where the State Organic Board (SOB) requires certified organic food processors to register and report to the California Department of Health. This makes it possible to present state level reporting specific to organic food processing.

[17] This average remained the same through three quarters of 2022 (data from the 4th quarter of 2022 is not available).

Figure 3-4: 2021 Oregon Food Manufacturing Employment by Certified Organic Entities, by Subsector



It is important to note that not all of the jobs listed above are specifically involved in processing certified organic products, as it is common for food manufacturers to have multiple product lines and offer a mix of certified organic and conventional products. The level of economic activity, or revenue generated by certified organic products specifically, would be an appropriate measure of the proportion of these 9,700 jobs directly tied to certified organic products.

To estimate gross revenue by the certified organic food manufacturing entities, we rely on Dun & Bradstreet information on this sector. We find that the top 150 firms grossed over $2 million in annual sales (per entity) and accounted for $8.5 billion in revenue across the state (Dun & Bradstreet, 2023).[18] Of these firms, 63 entities were certified organic handlers who had total gross revenues of $4.1 billion, of which at least $570 million (14%) was from products that were certified organic.[19] In addition, NASS reports 12% of organic farms in Oregon (61 farms) produced processed or value-added organic products at the farm level. The total value of these products was nearly $12 million (National Agricultural Statistics Service, 2022). Total value of certified organic food manufactured in the state is at least $582 million. From this it is reasonable to expect that a minimum of 15% of economic activity around food

[18] This data does not include companies with headquarters that are outside the state of Oregon (e.g., Amy's Kitchen).

[19] Based on gross revenue collected for 46 of the 63 firms identified as certified organic.

manufacturing was in the organic sector. Thus, we find that organic food manufacturing in Oregon was responsible for approximately 1,500 jobs (in 2021) and total payroll of around $80 million.

3.3.2.1 Fruit & Vegetable Processing

Nationally, organic sales in 2021 of fruits and vegetables that were canned and frozen rose by 7.5% and 7.9% respectively over the preceding two-year period but showed decreases from 2020 to 2021 as more people were cooking at home meals during the pandemic (Organic Trade Association, 2022). In Oregon, PNW Veg Co (NORPAC) is one of the largest food manufacturers in the state, and is certified organic by Oregon Department of Agriculture (ODA). They source produce through a wide variety of growers in the Willamette Valley.[20]

In 2016, Oregon Tilth published the results of a survey of 31 food processors and manufacturers of organic products and three natural food grocers in Oregon. Respondents were asked to identify crops that they have had difficulty procuring from organic farmers in Oregon. Strawberries were identified by seven out of the 31 companies as a crop they are unable to consistently source, followed by raspberries, blueberries, and edible dry beans (five out of 31 companies). Of the 53 crops identified, most were only mentioned by two or fewer businesses as difficult to source, which Oregon Tilth noted as indicative of varied market opportunities unique to buyers (Oregon Tilth, 2016). While the authors of this report could not quantify specific market opportunities based on the data they collected for specialty crops in Oregon, their results and the data from the interviewed distributor suggest a clear presence of market gaps that could be filled by additional fruit and vegetable production from Oregon organic farms.

3.3.2.2 Dairy Products & Eggs

This is the third largest food category and accounts for nearly 13% of all organic food sales, while holding an 8% penetration rate into the overall dairy market. Organic milk and cream account for more than 50% of this category's sales (amounting to $3.8 billion across the US in 2021). For years prior to the pandemic, organic milk had been in oversupply. In 2021, milk sales remained steady in part due to consumer buying habits, which contributed to a tightness in availability. However, this tightening availability was likely also caused by transportation challenges and packaging, and not actual supply of organic milk (Organic Trade Association, 2022).

Organic yogurt accounts for 18% of sales in this category and was the only segment to maintain positive growth in 2021, with sales increasing 2.5%. With people cooking and baking at home more than normal, sales of organic heavy cream and butter surged in 2020 and 2021. Traditionally, producers had built up heavy cream inventory over the summer (as this is not a baking season), and that inventory would carry through the fall when baking picks up during the holidays. This was not the case in 2020, hence the inventories of heavy cream and butter were depleted by the time the holidays came around. Continued supply shortages in 2021 led retailers to limit the amount of butter consumers could purchase at once. This led to declines in the butter, cottage cheese, and sour cream category of sales in 2021, but annual sales remained above 2019 levels (Organic Trade Association, 2022).

[20] NORPAC is now part of OPC Family of Companies, they own or lease over 140,000 irrigated acres and have a network of processing plants in Washington, Oregon, Idaho and Michigan **Invalid source specified.**.

The Organic Valley Creamery in McMinnville, Oregon, which had been receiving 500,000 pounds of milk daily from 27 Oregon farms, burned down in 2021 (Bohnert, 2021). The facility was the only Organic Valley butter and non-fat dried milk processing location in the Pacific Northwest. Organic Valley has been facing logistical challenges since operation ceased to find alternative processing locations for their producers, which has included transporting organic milk from Oregon to California, Utah, and Idaho, resulting in lost organic revenue for the state (Chan, 2021). Rebuilding efforts are underway and expected to finish by 2023, however, the disruption in the processing of Oregon dairy highlights the need for more resilient and diversified infrastructure.

3.3.2.3 Beverages

The beverage market is the second largest organic food category, contributing over 14% of all organic food sales, with penetration rate of 4% into overall beverage sales. Organic coffee is the largest sector in this category, making up over one-quarter of all organic beverage sales with a $2.1 billion market in the United States (Organic Trade Association, 2022). In Oregon there several coffee roasting companies certified organic, including: Allan's Coffee & Tea, Inc., Stumptown Coffee Roasters, Thornton Family Coffee Roasters, Zarfas Coffee Roasters, Hood River Coffee Roasters, Caffeination Corporation (dba Columbia River Coffee Roasters), Brazilian Specialty Coffees, Groundwork Coffee PNW, Cafeto Coffee Company, Coffee Bean International (dba Farmer Bros. Co.), GoodBean Coffee, Pacific Rim Coffee Roasters, Pacifica Coffee Ltd., Strictly Organic Coffee Company, Wandering Goat Organic Coffee Co., and Longbottom Coffee and Tea.

Organic tea sales were $1.1 billion (6% growth) in the United States in 2021 (Organic Trade Association, 2022). Organic tea companies with a presence in Oregon include the East West Tea Company[21] and Smith Teamaker. Fresh juices and drinks are the second largest organic beverage category, reporting $1.7 billion in sales and accounting for 21.3% of sales in the category.

Organic alcoholic beverages accounted for a small portion of sales but saw significant growth in 2021. Organic beer now accounts for $311 million in sales annually in the United States (Organic Trade Association, 2022). Oregon has the fifth most breweries per capita when ranked against other states, at 4.4 breweries per 50,000 adults (Meunier, 2019). While there are many breweries in the state, only two (Hopworks Urban Brewery and Suzie's Brewery Company) are certified organic. There are opportunities to expand on key inputs needed for beer production (hops and malt) in Oregon. Currently, naked barley varieties are used by Great Western Malt (the largest buyer and processor of malting barley in the Pacific Northwest, located in Vancouver, WA) in malting a certified organic malt. Great Western Malt's commitment to a certified organic line of malt could expand opportunities for organic beer in the future.

While there is increasing interest in organic wine, sales across the US were flat in 2021 from the previous year, which may be partly the result of 'sober curious' trend that has emerged. Organic wine has had supply issues also. Wineries have had difficulty procuring sufficient organically certified wine grapes. Wildfires and erratic weather have brought challenges to California vineyards in particular. Organic wine's reputation has improved dramatically, but there is still confusion around labeling. Wine can be labeled 'made with organically grown grapes,' which would indicate the feedstock of grapes is organically grown but may not apply to the other substances (particularly sulfites, yeast, and other

[21] East West Tea Company is a tea manufacturer in Eugene, Oregon. The company's estimated revenue by Dun & Bradstreet puts it in the top 25 food manufacturers for the State of Oregon.

ingredients) (Organic Trade Association, 2022). In Oregon there are several wineries located in the Willamette Valley that are certified organic, including: A to Z Wineworks / Rex Hill, CH Wines dba Cowhorn Vineyard & Garden, Evesham Wood Vineyard and Winery, JK Carriere Wines, King Estate Winery, Lumos Wine Company, Quady North Winery, and Sokol Blosser Winery and Vineyard (Organic Integrity Database, 2023). However, reports indicate even more vineyards may be employing organic production practices to enhance their operations as described in the production by category section above (Shulz, 2023).

Along with the sober curious segments, beverages that are healthier and functional continued to be in demand, as kombucha sales grew along with enhanced waters and beverages made with botanicals, mushrooms, or adaptogens (Organic Trade Association, 2022). In Oregon there are several kombucha manufacturers, including Happy Mountain Kombucha, Humm Kombucha[22], OMA Organics LLC DBA Camellia Grove Kombucha Company, and Brew Dr. Kombucha.

3.3.2.4 Bread and Grains

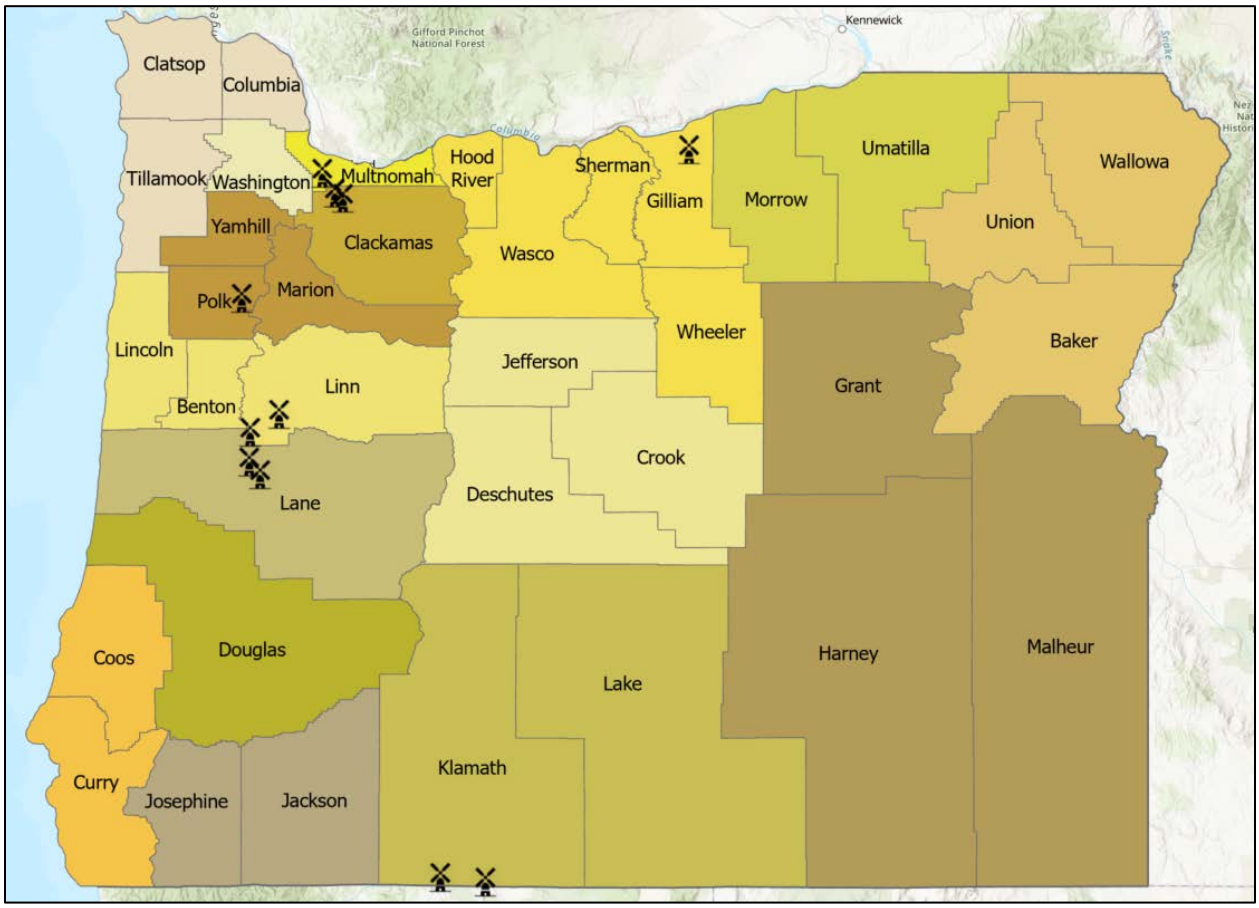
Bread and grains sales account for 11% of organic food sales with a penetration of 7.3% into the overall breads and grains industry across the US (Organic Trade Association, 2022). In Oregon, there are several large bakeries that have certified organic product lines, including: Innovative Bakery Resources, Kroger Clackamas Bakery (dba Inter-American Products), and United States Bakery (dba Franz Family of Bakeries).[23]

Currently, there are 11 certified organic processors of organic grain in Oregon that manufacture food products with food grade grain, the majority of which also process grain for animal feed. Just over a quarter of these processors are certified by the agency that shared data for this product, and the combined annual revenue from food and feed for their operations is approximately $62.9 million.

[22] Humm Kombucha, located in Bend, is one of the top 50 largest food manufacturers in the state (by revenue). All of their kombucha products are certified organic.

[23] According to Dun & Bradstreet revenue projections, United States Bakery would be the fourth largest food manufacturer in the state.

Figure 3-5: Oregon Grain Processors



Source: (Mercaris, 2023)

3.3.2.5 Snack Foods

Organic snacks were one of four food categories that maintained positive growth in 2021, with sales increasing nearly 6% to $3.4 billion across the United States. Recent trends in packaging have shifted, with consumers now demanding more large and multi-serving sizes (as opposed to the trend for smaller packaging prior to 2021). As gyms, schools, and offices began to reopen in 2021, organic nutrition bar sales saw significant growth and exceeded $1 billion in sales nationally. Organic chocolate snacks are driven by consumers seeking clean ingredients. While organic does not mean limited sugar, the parents perceive organic as an overall healthier option for kids. Organic salty snacks are the largest component of the snack food category, responsible for $1.5 billion in sales annually. Nuts, and interest in plant-based diets, continue to grow across the US and is a major driver for the snack food market (Organic Trade Association, 2022).

Betty Lou's in McMinnville is a certified organic food manufacturer in Oregon that operates in this snack food category. Their organic powdered peanut butter and antioxidant bar products are certified organic.

3.3.2.6 Frozen & Prepared Foods

Growth in the organic frozen and prepared foods in 2020 was more than double expected levels because of the pandemic and more people eating at home. Sales declined in 2021 but still remained higher than 2019 levels. This category often serves as an entry point to organic for young families. Baby food and formula had strong growth in 2021, and continued growth is expected in the organic shelf stable and fresh baby and toddler food categories (Organic Trade Association, 2022).

During the pandemic, frozen food sales accelerated as consumers stocked up on convenient options for cooking at home. This section is now more robust than ever in healthy eating options, but growth tapered off in 2021. Consumers attitudes prior to the pandemic were mixed on frozen food options. In the past there was a perception that frozen food was not healthy. Now, consumers see the frozen food options as a place for innovation in the frozen food industry, with plenty of options for clean eating.

In Oregon, Amy's Kitchen opened their White City plant in 2006. Since that time, the plant footprint has more than doubled to 450,000 square feet, and employees have nearly quadrupled to 980. The plant is dedicated to making pizza. Amy's Kitchen operates manufacturing facilities in California, Oregon, Idaho, and New York. Amy's Kitchen has cited Oregon's 'friendly business climate,' close proximity to California, cost advantages, skilled workforce specific to food manufacturing, and supportive economic development agency as key reasons for locating the manufacturing plant in Oregon (Amy's Kitchen, 2019). There are six food production lines in the manufacturing facility, making 218 different products including pizza, soups, chilis, refried beans, entrees, gluten free burritos, and non-dairy frozen desserts. While not all of Amy's Kitchen products are certified organic, the company has a goal of using as many organic ingredients as they can. The few ingredients used in food manufacturing that are not organic is due to cost and availability issues (Amy's Kitchen, 2023). In July 2022, Amy's Kitchen closed their facility in San Jose, citing abrupt cost increases, supply-chain disruptions, and tight labor market which caused their San Jose facility to lose over $1 million per month, while their other facilities were able to meet production and revenue goals (Best, 2022).

4 POLICIES SUPPORTING ORGANIC AGRICULTURE

There has consistently been pushback against organic agriculture from entities that either question its advantages or have incentive to defend conventional production practices. It is important to note that not all non-organic agriculture (hereafter referred to as 'conventional' for comparison) is the same, given the wide range of agricultural practices that are not explicitly organic (Sumberg & Giller, 2022). However, organic crop and livestock production systems implement production practices that are fundamentally differ from conventional agriculture.

One argument that is consistently made against the organic movement calls into question yield and organic agriculture's theoretical inability to feed the growing global population. However, studies that have compared yield differences across production methods are mixed. Some research has shown that, under ideal growing conditions, conventional production methods outcompete organic by yield differences of 8%-25% (Lesur-Dumoulin, Malezieux, Ben-Ari, Langlais, & Makowski, 2017), whereas other studies have found organic yields equal to or greater than conventional (Bender & Ingver, 2012; Delate, Cambardella, Chase, & Turnbull, 2015; Rodale Institute, 2022). A key variable in these studies is that ideal growing conditions are becoming less and less common given the threats posed by climate

change. In a long-term study conducted by the Rodale Institute, organic production was found to yield as much as 40% higher than conventional in drought conditions, which are becoming increasingly frequent in the United States (Rodale Institute, 2022). Another important point to consider is that while organic systems may trail conventional yields, a much wider gap exists between the amount of food produced and consumed in the United States. A report from the Environmental Protection Agency in 2021 estimated that food waste represents enough calories to feed more than four times as many food-insecure people in the United States (Jaglo, Kenny, & Stephenson, 2021). Addressing this issue begins to create a much more reasonable outlook in terms of organic agriculture's ability to feed the world.

In a report published in the American Enterprise Institute (AEI), Sumner (2022) argues that federal policies and incentive programs "favor" organic and small-scale agriculture, leading to the diversion of food production to "less productive" methods (Sumner, 2022).[24] The reality is that federal funds directed specifically toward organic and sustainable agriculture (discussed further in the subsections below) are dwarfed by spending on programs that benefit only conventional agriculture, when considering budget allocations from the 2018 Farm Bill. Of the projected $428 billion farm bill spending, only 6.8% was dedicated to conservation programs like EQIP and the CSP, which are not exclusive to organic producers and are generally more available to large agriculture operations. The vast majority of spending (76.1%) is for nutritional food programs (e.g., the National School Lunch Program, and the Emergency Food Assistance Program) which do not include organic food but do guarantee steady markets for industrial-scale conventional agriculture (Merrigan, Giraud, & Greene, 2021). Crop insurance programs (8.9% of spending) and commodity programs (7.3% of spending) are specifically designed to mitigate market fluctuations of key (primarily conventional) crops. As outlined above, organic food now represents roughly 6% of all consumer expenditures on food in the United States. If federal spending on programs benefiting organic producers kept pace with consumer spending on organic food, it would be expected that roughly $26 billion in federal spending would benefit organic producers ($428 billion x 6%). For comparison, the $300 million Organic Transition Initiative announced by the USDA in 2022 is 0.07% of the farm bill budget. This highlights a general lack of federal investment in organic agriculture, and it is hard to see how the federal programs "favor" organic producers as the AEI paper suggests.

Sumner also argues that the price and availability of organic foods is discriminatory to consumers and suggests these federal organic policies only increase the food supply of a minority crop markets to affluent consumers. This point fails to acknowledge the true cost accounting for food products. A true cost accounting approach includes the monetary value of food production's societal impacts and costs (often referred to as externalities). When all externalities of conventional production systems are considered (e.g., higher health care costs, environmental pollution, etc.) the cost of conventional foods to society are far more than their listed price. The reductions in harms and the positive impacts of organic production over time make organic food less expensive to society than conventional food. A Rockefeller study from 2021 indicates that while consumers spend roughly $1.1 trillion on food in the United States each year, the true cost of that food is nearly triple that price ($3.2 trillion) when impacts

[24] According to Influencewatch.org, between 1998 to 2016 AEI received $4.4 million in funding from ExxonMobil (Influence Watch, 2023). Conventional agriculture relies heavily on fossil-fuel based and synthetic inputs (fertilizers, pesticides, herbicides, etc.).

related to human health, the environment and society are taken into account (Rockefeller Foundation, 2021).

4.1 Federal Programs

There are several federal initiatives that provide funding to support the organic agriculture sector across the United States. This section provides a description of these programs.

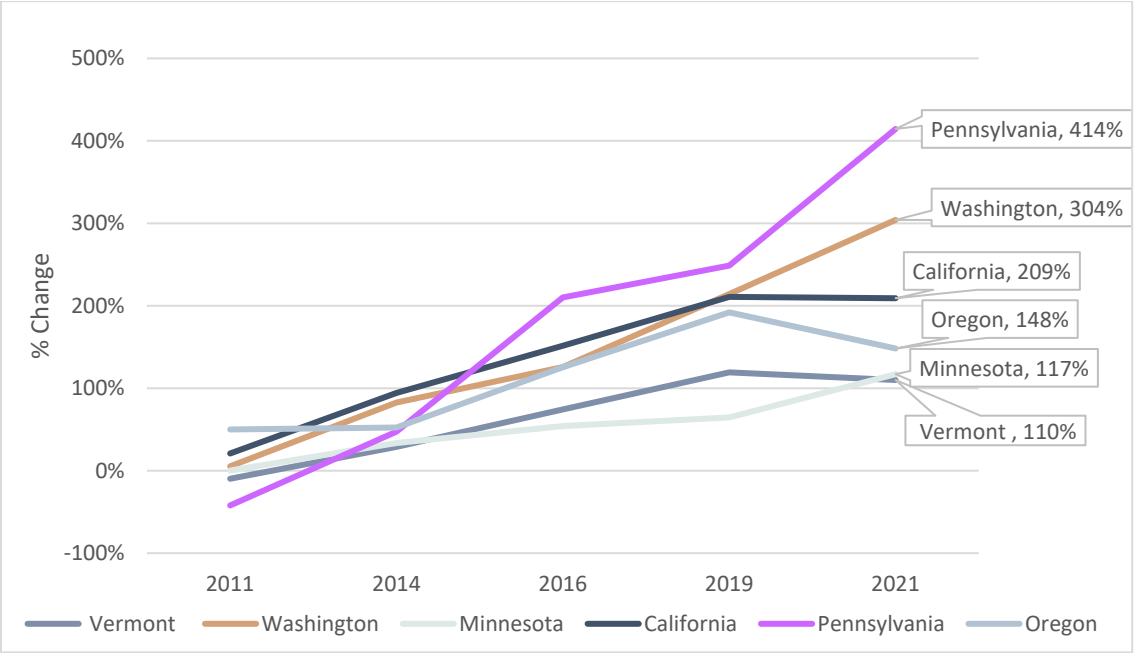
- **Organic Transition Initiative:** In late summer 2022 USDA announced they will be investing $300 million in an initiative aimed at assisting farmers and producers in building new and better markets (USDA, 2022). There are three main areas of investment including: Transition to Organic Partnership Program (TOPP), Direct Farmer Assistance, and Organic Pinpointed Market Development Support.
    - TOPP is a $100 million investment over five years in cooperative agreements with non-profit organizations who will partner with others to provide technical assistance to existing organic farms. The funding is divided among six regions, of which Oregon is in the Northwest region. Oregon Tilth is the non-profit organization leading the effort in the Northwest region and is currently forming partnerships to serve transitioning and existing organic farmers. TOPP funds will be used to:
        - Connect transitioning farmers with mentors for at least one year after certification,
        - Build paid mentoring networks to share practical insights and advice,
        - Provide community building opportunities,
        - Help producers overcome technical, cultural, and financial shifts following certification, and
        - Engage educational and training institutions (e.g., crop advisors and extension agents) on organic workforce training and education and future human capital planning (Agricultural Marketing Service, 2023).
- **Direct Farmer Assistance:** NRCS will be developing a new Organic Management conservation practice standard and offer financial and technical assistance to producers who implement the practice. USDA is investing $75 million in this effort, which will include increasing organic expertise throughout the nation and creating organic expert positions at each of its regional technology support centers. Further, USDA is investing $25 million to Risk Management Agency (RMA) for the new Transitional and Organic Grower Assistance Program (TOGA) to support transitioning and certain certified organic producers' participation in crop insurance (USDA, 2022).
- **Organic Pinpointed Market Development Support:** Through the Agricultural Marketing Service (AMS), USDA will invest $100 million to help improve organic supply chains in pinpointed markets. The intent of this initiative is to develop new and expanded markets for targeted domestic organic products by providing more resources and market certainty for producers and processors transitioning to organic or initiating new organic production and processing capacity. The Department has been seeking stakeholder input on this initiative and will be crafting specific policy in the near future (USDA, 2022).
- **National Organic Initiative, funded through Environmental Quality Incentives Program (EQIP)**: The National Organic Initiative is funded through the Environmental Quality Incentives Program (EQIP) and is a voluntary conservation program. Funding is provided for technical and financial assistance for organic farmers and ranchers, or those interested in transitioning to organic (USDA, NRCS, 2023).

- **Conservation Stewardship Program (CSP):** The Conservation Stewardship Program (CSP) is a contract program provided by the Natural Resources Conservation Service (NRCS) where farmers work with the NRCS to develop five-year conservation plans that: 1) strengthen existing conservation activities, and 2) implement new practices to address natural resource concerns on farms. The CSP has been modified in recent years to target organic and transitioning operations with opportunities to develop enhancements unique to their operations. The 2018 Farm Bill included new provisions for the CSP to specifically allocate funding for organic and transitioning operations to participate in the program. Organic regulations already require certified operations to conserve natural resources, and thus additional "enhancements" – management activities beyond minimum practice requirements – must be implemented to qualify these operations for funding. These enhancements can include implementing no-till and reduced tillage, installation of more comprehensive buffers (hedgerows, native habitat), creating more wholistic and integrated pest management plans (USDA & NRCS, Conservation Stewardship Program for Organic Producers, 2023).
- **Organic Certification Cost Share Program (OCCSP):** The Organic Certification Cost Share Program (OCCSP) is implemented by the Farm Service Agency (FSA) to provide certified organic producers and handlers reimbursement for certification fees. Applicants may receive cost share assistance up to 50% of their costs paid during the program year, with a maximum of $500 per certification scope (USDA & FSA, 2023).

4.2 State Initiatives / Programs & Comparative Analysis with Oregon

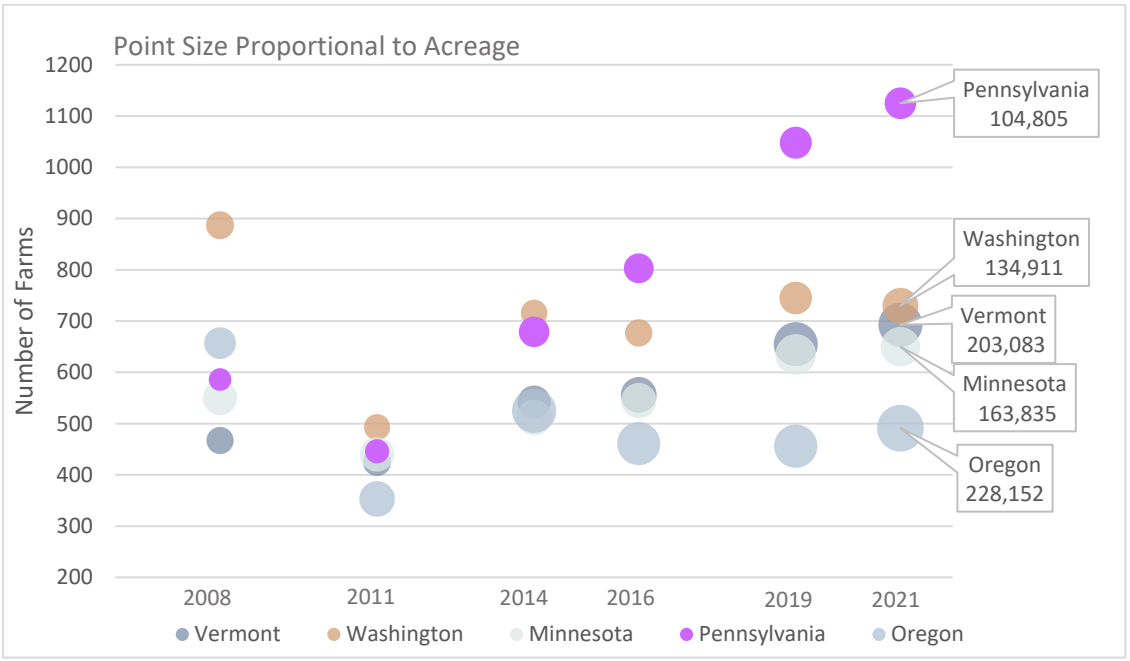
Organic sales, certified organic acreage, and the number of organic farms in the US generally shrank immediately following the 2007-2009 recession, though the consumer demand for organic food during this time and years since has spurred renewed growth in the organic sector (Greene, 2013). The COVID-19 pandemic and related shocks to the food supply chains led to increased organic sales nationally in 2020, with slowed growth in 202 (Organic Trade Association, 2022) 1. However, trends in sales at the retail level did not directly follow farm gate sales for all states. This section evaluates trends in growth of acreage and sales for organic products by state and considers (to the extent possible) what correlations there may be with programs supporting organic agriculture in these select key states.

Figure 4-1: Percent Change in Organic Sales since 2008



Source: Nation Agricultural Statistics Service, 2022

Figure 4-2: Total Farms and Acreage Growth since 2008[25]



Source: National Agricultural Statistics Service, 2022

[25] California acreage and number of farms not shown for display purposes.

4.2.1 Oregon

Oregon organic sales have increased since 2008 but dropped by nearly $70 million from 2019 to 2021. This has been accompanied by farm consolidation, with an increase in acreage and a decrease in number of farms. An economic analysis of agriculture in Oregon by Oregon State University (OSU) suggests that decreased agricultural sales (farmgate sales) in the past few years are largely attributable to the COVID-19 pandemic, which impacted farm workers, supply chains, and certain crop sales. More recently, price inflation has also played a part in reduced organic sales (Pratt, 2023). According to OSU, Oregon producers that sell to food service and retail markets were impacted by pandemic sales reductions the most. The report highlights the 5% reduction in U.S. potato utilization in 2019 and 2020, which is one of Oregon's top organic crops. Data received from a large distributor and handler in Oregon shows a 50% reduction in sales of organic potatoes from 2020 to 2022 (35% reduction of sales from Oregon), potentially indicating the lingering impact of this reduced market. Sales of milk from cows were also substantially impacted by the pandemic, as consumer demand changed from rising retail prices and prices received by farmers fell drastically (Johansson, 2021).

While there may be other factors at play when considering why Oregon organic farmers experienced this reduction in sales more heavily than other leading organic states, it is likely that Oregon's diversity of organic crops was particularly impacted by changes in consumer demand during the pandemic. Additionally, labor challenges and supply chain issues associated with the pandemic may have been more keenly felt for Oregon producers. Fortunately, farmgate sales (both conventional and organic) are expected to recover by 2023 due to multiple federal assistance policies put in place during the pandemic, including the Coronavirus Aid, Relief, and Economic Security (CARES) Act (Pitt, 2020).

Oregon initiatives and programs supporting organic are explored in further detail in a section below.

4.2.2 Pennsylvania

Pennsylvania's organic acreage and number of farms has nearly doubled since 2008 and organic sales in the state have been undergoing considerable growth since 2011, with the second largest jump from 2019 to 2021. This recent increase can be partly attributed to the provisions introduced in Pennsylvania's 2019 Farm Bill (Dmochowski, 2022). The bill includes an initiative to make Pennsylvania the nation's leading organic state, with $1.8 million in organic funding for programs that increase access to resources and financial assistance primarily through the PA Preferred Organic Initiative and Transition to Organic program. Collaboration with the Rodale Institute, one of the leading organic research institutes in the country, is a key component of the success of the implementation of state-run initiatives (Dmochowski, 2022).

Additional support for Pennsylvania's sustainable farmers, both organic and conventional, includes the Conservation Excellence Grant (CEG), which provides financial assistance for implementing best management practices on agricultural land; the Resource Enhancement & Protection Program (REAP), which offers tax credits for best management practices; and the Urban Agriculture Infrastructure Grant Program, which provides funding for improving farm infrastructure in urban areas to combat food deserts (Pennsylvania Department of Agriculture, 2023).

4.2.3 Washington

Washington organic acreage has increased while the number of farms has decreased, indicating a larger average farm size, and sales have increased three-fold since 2008. Growth in key commodity crops for

Washington, specifically apples and blueberries, have driven part of the organic sector growth in the state. Berry production has been expanding into Eastern Washington where dry climates reduce disease pressure, increasing nearly 10-fold since 2008 (Granatstein, 2022). Apples are the dominant organic crop in Washington, and they appear to have been a resilient commodity during the pandemic despite challenges in the workforce (Offner, 2020; Rosenberg, Cooke, & Walljasper, 2020).

The organic industry in Washington benefits greatly from partnership between state organizations. In collaboration with the Washington State Department of Agriculture (WSDA) Organic Program, Washington State University has collected organic production statistics (acreage, crops, sales, etc.) since 2004. This information is updated on an annual basis resulting in a current and comprehensive database used by producers, businesses, and policymakers (Kirby & Granatstein, 2023).

4.2.4 California

Acreage (not shown in the figures above for display purposes) surged to over a million acres in 2016 with smaller average farm sizes relative to 2008, then dropped to 813,710 acres in 2021 (a 73% increase from 2008). The number of California farms is up 13% since 2008. Compared with the majority of the US, California's climate is suitable for a larger array of warm weather crops like organic almonds, which only California produces. Over 60% of organic vegetable sales in 2021 came from California (US Department of Agriculture, National Agricultural Statistics Service, 2021). These unique growing conditions, as well as the size of agricultural land in the state, are main contributors to its dominance in the organic market.

Sales in California have increased two-fold since 2008 though dropped slightly from 2019 to 2021, similar to Oregon. California is often impacted by wildfires, and grapes (a top California organic crop) were heavily affected by the 2020 wildfire season (Wood, 2021). The California Certified Organic Farmers Foundation (CCOF Foundation) offers financial assistance in the form of grants for organic farmers impacted by wildfires and received four times as many applications for funding in 2020 (Mathias, 2020). The COVID-19 pandemic likely also contributed to reduced organic sales of fresh produce to food services and retail markets in 2021.

California has one of the longest histories of regulating organic products in the United States and implemented the Organic Food Act of 1979 prior to federal organic regulations. The National Organic Program (NOP) allows states to the implement their own State Organic Program (SOP) to oversee the enforcement of the USDA organic regulations within their state. An SOP must at minimum meet the restrictions enforced by the NOP but may have additional restrictions. Currently, California is the only state with their own SOP, and their certification standards include four additional requirements:

- Organic producers and handlers must register with their county agricultural commissioner.
- Organic processers must register with the California Department of Public Health.
- All organic operations must provide verification of SOP registration to their accredited certifying agent prior to granting or continuing certification.
- Accredited certifying agents must register with the California Department of Food and Agriculture (CCOF, 2023).

A bill was introduced to California Legislature in 2022 that will create an Organic Transition Pilot Program aimed at supporting new farmers and ranchers in the transition towards organic in the form of grants, research, and information (Weber, 2022). California's 2022 Scoping Plan was developed by the California Air Resources Board to map out steps for the statewide reduction of greenhouse gas

emissions with the goal of carbon neutral by 2045. The plan includes a goal of expanding organic agriculture to 20% of farming in the state (California Air Resources Board, 2022).

Of the seven states originally part of the 1922 Colorado River Compact, California is the largest user of water from the Colorado River (James, 2023). Drought has been severely impacting this source of irrigation for the past two decades, and the federal government has begun to implement regulations to this key water supply (US Department of the Interior, 2022). Cutbacks in water usage will impact southern California users substantially, and there has been conflict between the compact states regarding how this issue will be addressed (James, 2023; NPR, 2023). While the extent to which California will have to reduce its use of water from the Colorado River is yet undetermined, it is likely to impact their agricultural production capacity. Expected continued drought and water supply issues, along with additional focus on diversity of the supply chain in the organic food system, could present opportunities for other states like Oregon to capture additional market share in key high-valued organic crops previously dominated by California.

4.2.5 Vermont

Sales, farms, and acreage have grown steadily since 2008 after an initial reduction in farms in 2011. In addition to market challenges due to the pandemic, Vermont faced challenges in the dairy industry in 2021 when Horizon Organic, a buyer for 28 organic dairy farms in the state, declared it would no longer purchase in the region (Rathke, 2021). In a swift response, the Vermont Agency of Agriculture, Food and Markets (VAAFM) developed the Organic Dairy Farm Transition Support Grant program in 2022 to assist dairy farmers in operation modifications for seeking a new buyer (Vermont Agency of Agriculture, Food and Markets, 2023).

Vermont leads the nation in terms of percentage of organic agriculture in the state. With the goal of further enhancing Vermont's agricultural industry, the Vermont Agriculture and Food System Strategic Plan 2021-2030 was released by Vermont Farm to Plate to serve as a roadmap for revitalizing food systems in the state. The plan outlines current agricultural market conditions, identifies barriers, provides suggestions for advancement, and highlights opportunities for growth over the next decade.

Among the proposed outcomes of the strategic plan, the authors project increased sales of certified organic products from Vermont by 20%. Highlighting increased consumer demand, the plan suggests that facilitating this growth will require improved and dedicated marketing of Vermont food and farm products to better identify market channel opportunities and adapt to consumer trends (Claro, et al., 2021).

4.2.6 Minnesota

Minnesota has followed a similar trend in sales, farms, and acreage growth to Vermont. The strong list of resources for Minnesota organic farmers through the Minnesota Department of Agriculture (MDA) and the University of Minnesota (U of M) represent one of the highest concentrations of organic assistance programs in the nation, likely contributing to the industry's steady growth (Driscoll & Ichikawa, 2017; Minnesota Department of Agriculture, 2022). Minnesota's Organic Advisory Task Force (OATF) was created to advise state governmental and research organizations on initiatives that benefit the organic sector in Minnesota (Minnesota Department of Agriculture, 2023). The U of M's Institute for Sustainable Agriculture (MISA) conducts research and provides resources for organic and transitioning

farmers (MISA, 2023). The MDA releases organic industry status reports and maintains a comprehensive list of all certified organic farms in the state (Minnesota Department of Agriculture, 2023).

Similar to the federally administered Organic Certification Cost Share Program (OCCSP), Minnesota also has its own Transition to Organic Cost-Share Program. Through this program, Minnesota residents applying for organic certification for the first time may receive partial reimbursement for their certification fees (Minnesota Department of Agriculture, 2023).

Market challenges and supply chain issues stemming from the pandemic likely impacted organic dairy and grain corn sales (Minnesota's top organic commodities) in 2021. While not exclusive to Minnesota producers, MDA references the Whole Farm Revenue Protection policy from the USDA Risk Management Agency (RMA) as a key program for providing COVID relief to Minnesota's organic farmers (Minnesota Department of Agriculture, 2022).

4.2.7 Oregon Initiatives & Programs

This section highlights state initiatives and programs that promote organic agriculture and provide funding to support the sector in Oregon.

4.2.7.1 Oregon State University – Center for Small Farms & Community Food Systems

Oregon State University (OSU) offers a small farms program with a mission to advance sustainable agriculture, community food systems, and economic progress for Oregon's small farmers and ranchers and provide a leading-edge experience for students. This program has also been a conduit for relevant research and resources for organic farmers across the state covering planning, marketing, and technical assistance for production.

The OSU Organic Extension Program is part of the Center for Small Farms & Community Food Systems. There are three full-time Organic Extension faculty with specialties in organic vegetables, organic grain and pulse crops, and organic pasture and forage crops, who serve farms of all sizes and provide researched based information for Oregon's organic farmers (Oregon State University, 2023).

4.2.7.2 Land Use Policies

In 1973 the State of Oregon passed the Land Conservation and Development Act, which was primarily a response to rapid population growth and unanticipated urban sprawl. At the core of this Act is the Urban Growth Boundary (UGB) designation. Each Oregon city is surrounded by a UGB; a line drawn on planning maps to designate where a city expects to grow over a 20-year period. UGBs protect farm and forest resource land and prohibit urban development. Oregon's land use laws specifically state as a goal that "agricultural lands shall be preserved and maintained for farm use." This goal requires that all suitable agricultural land be zoned for exclusive farm use, severely limiting the potential for residential development on these lands (Bell, 2021). Since 2016, there have been 30 expansions or adjustments to UGBs across the state (State of Oregon, 2023).

These protections of agricultural land have likely contributed to the continuation of small-scale organic operations across the state and small farms serving direct markets. In Oregon, 1.3% of all farm operations are certified organic (491 of 37,300 operations total), ranking 11th in the country in terms of highest percentage in the US. It is worth noting that most of the 37,300 farm operations (23,500 farms) had sales less than $10,000 as of the last census. This size of farm is not likely to be certified organic as farms selling less than $5,000 annually are exempt from certifying (and can market produce as 'organic'

without a certification). Thus, a more appropriate measure for organic farms as a percentage of total farms is Oregon is likely 3.5% (491 of 13,800 farms).

In 2020, the American Farmland Trust (AFT) released report findings of "Farms Under Threat, the State of the States," which included a scorecard for every state in the nation (Agricultural Land Protection Scorecard). This involved a state-by-state analysis of policies and programs that support agricultural viability and address the loss of farmland to development. Oregon was found to have a high policy response to forces that lead to agricultural land conversion (development pressure, weakened farm viability, and challenges transferring land to a new generation) and a resulting low threat to agricultural land development.

AFT assessed six policy tools used to protect farmland, support agricultural viability, and provide access to land, including the following categories (Oregon's score, out of a possible 100 points, by category is identified in the parentheses):

1. **Purchase of Agricultural Conservation Easement (PACE) programs**, also known as Purchase of Development Rights, that permanently protect working farmland and ranchland **(12)**,
2. **Land use planning policies** that manage growth and stabilize the land base **(88)**,
3. **Property tax relief** for agricultural land that improves farm and ranch profitability **(51)**,
4. **Agricultural district programs** that encourage landowners to form areas to protect farmlands **(0)**,
5. **Farm link programs** that connect land seekers with landowners who want their land to stay in agriculture **(0)**,
6. **State leasing programs** that make state-owned land available to farmers and ranchers **(63)**.

Oregon received the highest score of all 50 states in the land use planning category of the scorecard, as well as relatively high marks in 'Property tax relief' and 'State leasing' with an overall rank in the top quartile of states (total weighted policy response score of 42 out of 100). As noted above, Oregon received scores of '0' for both 'Agricultural Districts' and 'Farm link' categories (Freedgood, 2020).

4.2.7.3 Canola Ban

In 1990, Canola was designated as a controlled crop with strict regulations on where it could be grown in the Willamette Valley, because of its ability to cross-pollinate with other brassica seed crops. In 2015, the Oregon Legislature passed HB 3382, which limited canola production in the Willamette Valley to 500 acres and tasked the Oregon Department of Agriculture (ODA) with determining where canola could be grown "in a manner that is compatible with the growing of other crops" (Mallory-Smith, et al., 2017). Accordingly, growing canola in the Willamette Valley required a permit from ODA. In cooperation with Oregon State University, Willamette Valley Oilseed Producers Association (WVOPA), and the Willamette Valley Specialty Seed Association (WVSSA), the WVSSA's map pinning system was used to track the location of canola and Brassica seed production (Oregon Department of Agriculture, 2018). A three-mile buffer between production areas is used to ensure cross-pollination does not occur. Using the system is voluntary for Brassica seed growers.

In 2019, the ODA proposed a 937,000-acre isolation area in the Willamette Valley where canola production would be prohibited. However, this proposed rule was made moot after SB 885 was passed, which maintained the restrictions on canola, required canola growers to get a license from ODA, and maintained the 500-acre cap and recommended isolation distances. The bill set a self-imposed

expiration date of June 30, 2023, after which all restrictions on canola would be lifted unless further action was taken. The 2022 legislative session ended without any action on the canola restriction, and, as of the date of this report, the ODA has not indicated it will impose any new rules on canola. Therefore, without any further action from the Legislature or ODA, the restrictions on growing canola in the Willamette Valley will be lifted. The state regulation of canola in the Willamette Valley, one of the best places for producing seed, is seen as a protection for the seed industry, which is a critical input to agriculture in general including organic production.

4.2.7.4 Oregon Agriculture Heritage Program

The Oregon State Legislature established the Oregon Agricultural Heritage Program (OAHP) in 2017 to help address the challenges of fragmentation of farmland, conversion of farmland, and planning for generational transfers. The program provides voluntary incentives to farmers and ranchers to support practices that maintain or enhance both agriculture and natural resources such as fish and wildlife on agricultural lands. OAHP was developed by a collaboration of organizations representing natural resource conservation and agriculture, including farmer and rancher representatives. Through the direction provided by ORS 541.977-ORS 541.989, OAHP offers grants for Conservation Management Plans, working with land conservation covenants and easements, technical assistance, and succession planning with producers. The purpose of OAHP is to contribute to the public benefits of the following:

- Increased economic viability of Oregon's agricultural operations and economic sector,
- Reduced conversion and fragmentation of Oregon's working lands, and
- Enhanced fish and wildlife habitat, water quality, and other natural resources of Oregon's working lands (Oregon.gov, 2023).

5 RECOMMENDATIONS

This section outlines several recommendations to the State of Oregon that could further grow the organic sector across the state.

- **Organic Data Collection Initiatives**
  - There is generally a lack of available data on organic agricultural production and organic value chains. Useful data would include: county level organic production data, distributor data on sales by point of origin and point of sale,[26] revenue and jobs at the distribution level specific to organic, and revenue and jobs directly attributed to organic food product manufacturing. Strengthening data collection and presentation would benefit planning efforts around organic food value chains, future studies evaluating economic and social impacts of organic sectors; and likely help in efforts to develop Oregon's organic food manufacturing sectors. The role of data collection activities may best be suited to independent industry organizations as part of a voluntary program, as mandating the reporting for this type of data may overly burden participants in the value chain.

[26] A couple companies were willing to share this information with us, but most were not, and there is a lack of import / export data at the state level specific to organic.

- **Consumer Education / Branding around Organic**
  - Organizations like the Organic Trade Association, Oregon State University, and Oregon Tilth suggest that increased awareness of organic regulations and the associated sustainable production practice standards will help to strengthen and improve growth in the organic sector. Informing consumers of organic production occurring in the state, and the associated social and economic benefits will help market organic products and strengthens Oregon's brand image as an environmentally healthy place to live (and eat).
- **Organic to Mitigate Risks of Climate Change**
  - Organic agriculture and relevant production practices can be incentivized as a way to mitigate and adapt to climate change. The OAHP initiative in place already can promote organic agriculture and relevant production practices. These are tools the state can use to help producers with the financial burden associated with organic transition, help close the gap on investment in organic, while funding practices that provide society with public benefits.
  - Invest in organic as a way to reduce GHG emissions, help meet the state's goal of 80% below 1990 levels of GHG emissions by 2050 (Oregon Department of Energy, 2023), and potentially become a carbon sink (CCOF Foundation, 2019).
- **Protect Brassica Seed Production in the Willamette Valley**
  - The Willamette Valley is well positioned to capture additional growth in organic seed production, but this growth would be threatened if the ban on canola is lifted in the summer of 2023. To minimize effects of lifting the ban, a buffer zone could be required to allow a sufficient distance between canola and brassica seed production in the valley as other states require (e.g., Washington State).
- **Promote Organic as Economic Development Strategy & Social Justice Initiative**
  - Initiatives that focus on organic food access, particularly fruits and vegetables, would also contribute to enhanced public health, especially for underserved demographic groups. Additional organic handling and manufacturing capacity in Oregon's food value chain would make the state more resilient to future shocks, including those related to climate change, weather events, supply chain issues, international wars, etc. There is also an immediate opportunity for state initiatives to get matching federal investment funds through the Organic Transition Initiative, thereby allowing the state to "get more bang for buck."
  - Opportunities for attracting additional high-valued organic production and food product manufacturing from areas severely impacted by climate change (California in particular) could provide future economic development in the state.
  - The economic development potential within black, indigenous, and people of color (BIPOC) communities is particularly high, and the inclusion of racial equity and social justice groups in policy efforts is important for expanding organic access and development opportunities throughout the state.

6 CONCLUSION

The organic production and food sectors in Oregon are significant components of the state's economy. There are key opportunities for economic growth in agricultural production, food manufacturing, and distribution value chains. Growth in organic production can also benefit Oregonians through enhanced local food security, increased agricultural resiliency to climate change, economic development (jobs and income), and environmental and public health. While the state is well positioned for growth in these

sectors, there are areas of regulation (ban on canola in the Willamette Valley), promotion programs, consumer branding / education, and data collection that could be implemented to further support growth in organic sectors of the economy.

The table below identifies key metrics of the profile for organic agriculture and food products in Oregon. As mentioned above, and identified in the table below, many of these metrics are not readily available in published reports. The exception is farmgate values published by NASS in the organic survey results. While this data limitation presents a constraint in accurately measuring these metrics, this study documented approaches used to derive these metrics with existing data. Primary data collection from the relevant organic entities could further refine these metrics in the future to increase the certainty of the estimates and is one of the opportunities discussed above.

Table 6-1: Organic Ag & Food Metrics, Oregon

	Farmgate	Packing, Handling, Processing	Wholesale	Retail
Production Area (acres)	228,100			
Sales / Revenue	$386 million	>$582 million*		$856.5 million*
Jobs	6,690	1,500*	1,300*	
Labor Income	~$46 million*	$80 million*	$83 million*	

**Highland Economics' analysis, presented above*

The metrics defined in this study could be used to quantify the effectiveness of the strategy or tactics that Oregon employs to support organic agriculture and food in the future (in annual, 5-year, or 10-year measures). As demonstrated in the review of state initiatives, there does appear to be a correlation between growth in the organic sector and state-sponsored initiatives supporting organic agriculture. Further, the Organic Transition Initiative creates immediate opportunities for matching federal investments in many of the areas evaluated in this report in the near term.

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