

Oregon Food Infrastructure Gap Analysis

**Where Could Investment Catalyze Regional
Food System Growth and Development?**

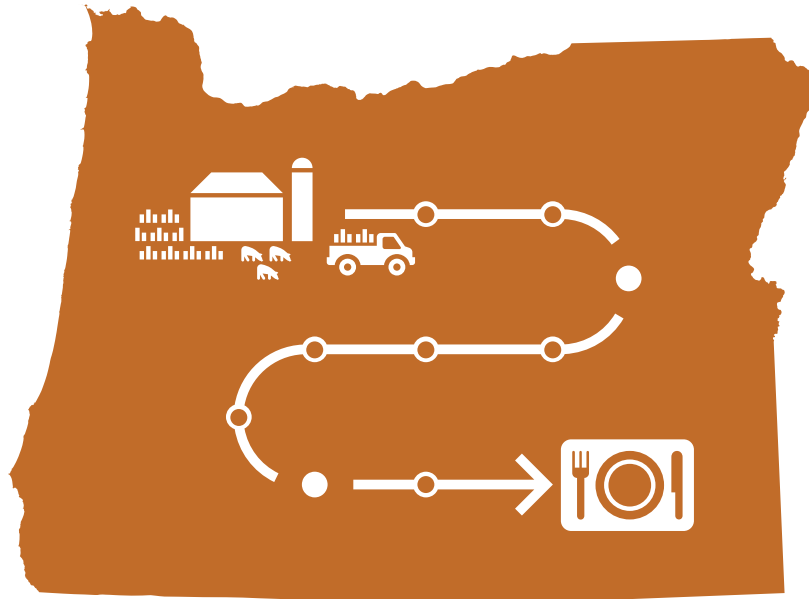
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Food System Growth and Development?**

By Ecotrust, with Matthew Buck
Funded by Meyer Memorial Trust

April 2015

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Storage Crops





Photo courtesy Leah Harb

10.1. Introduction to Storage Crops at the National Level

“Storage crops” include both vegetables and fruits that can, with the right handling, be kept for a period of weeks or months after harvest in marketable condition. This chapter addresses commonly eaten vegetables for storage, including: beets, cabbage, carrots, garlic, onions, potatoes, pumpkin, turnips, and winter squash. Other vegetables for storage that are not addressed in detail include: Brussels sprouts, celeriac, celery, kohlrabi, leeks, parsnip, rutabaga, shallot, and sweet potatoes.

Successful storage depends on the crop in question entering a natural period of dormancy. For many root vegetables, this involves controlling respiration (by lowering temperature) and providing a moist environment to mimic conditions in the ground. Some crops, such as garlic and onions, need dry conditions to encourage dormancy. Different varieties are also grown specifically for storage.

Growing for Market provides a summary of storage times and conditions.¹⁸⁷

| Product | Storage Time | Temperature | Humidity |
|---------------|--------------|-------------|------------------|
| Pumpkins | 5 months | 50–60F | 50-70% humidity |
| Winter Squash | 1+ month | 50–55F | 50-70% humidity |
| Potatoes | 5 months | 40–50F | 90% humidity |
| Onion | 6 months | 32F | 65-70% humidity |
| Beets | 3–5 months | 32F | 90-100% humidity |
| Turnip | 4–5 months | 32F | 90-100% humidity |
| Cabbage | 6 months | 32F | 90-100% humidity |
| Carrot | 6 months | 32F | 90-100% humidity |

Table 10.1: Storage crop storage times and conditions.

Many crops need to be “cured” before entering storage. In roots and bulbs, the process of curing refers to the product drying and/or developing new tissue in order to heal wounds. During curing, potato skins harden and small cuts seal over. Garlic and onions begin to dry out and the opening at the neck of the bulb closes.

¹⁸⁷ “Extend the Selling Season with Storage Crops,” Growing for Market, 2011.

Simple guidance for small farmers on harvesting, curing, and storage requirements include:

| Cool Storage (45–60°F) | Harvesting and Curing |
|------------------------|--|
| Garlic | Dig when plant is still 60% green. Fewer than six leaves should appear healthy. Cure in a warm (80 degrees Fahrenheit or warmer), well-ventilated place for at least two weeks. Trim back tops to 4 inches, and then cure another week. Trim again before storing. |
| Onion | Pull when at least half of the tops are dead or have fallen over. Avoid harvesting in wet weather. Cure in a warm (80 degrees or warmer), shady, well-ventilated place for a week. Trim back tops, and then cure two weeks more. Trim again before storing. |
| Potato | Harvest before soil temperatures fall below 55 degrees to minimize bruising. Protect from sun. Wash only to remove clods of soil. Cure in a cool, dark, moist place (55 to 60 degrees) for two to three weeks. |
| Pumpkin | Cut ripe fruits from the vine, leaving a short stub of stem attached. Wipe with a damp cloth to remove soil. Cure in a well-ventilated place with warm room temperatures (70 to 80 degrees) for one to two weeks. |
| Winter squash | Cut ripe fruits from the vine, leaving a short stub of stem attached. Wipe with a damp cloth to remove soil. Cure in a well-ventilated place with warm room temperatures (70 to 80 degrees) for one to two weeks. |

Table 10.2: Cool storage crop harvesting and curing guidelines.

| Cold Storage (32–45°F)* | Harvesting and Curing |
|-------------------------|--|
| Beet | Harvest before hard freeze. Trim tops to one quarter-inch, but do not trim roots. Wash in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity. |
| Cabbage | Harvest before outermost leaves start losing color, or before hard freeze. Remove outer leaves. Refrigerate in plastic bags to maintain humidity. |
| Carrot+ | Harvest before hard freeze. Trim tops to one half-inch. Wash gently in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity. |
| Turnip+ | Harvest before hard freeze. Trim tops to one half-inch, but do not trim roots. Wash in cool water. Pat dry. Refrigerate in plastic bags to maintain humidity. |

* Very low temperatures (32 to 35 degrees) can further prolong storage life of these vegetables.

+ Sensitive to ethylene given off by apples and other fruits, and from decaying plant tissues.

Table 10.3: Cold storage crop harvesting and curing guidelines.

Crops for fresh market may be hand harvested and some roots crops cured in the field. However, at commercial scale, crops are more likely to be harvested mechanically and transported to temperature and humidity-controlled packing/storage sheds, with forced air circulation to avoid variation in conditions and exposure to ethylene.



By total production, the most common storage crops are potatoes, onions, carrots, and cabbage.

Table 10.4: Common storage crop production by pounds and farm value.

| 2012 Ag Census/NASS/ERS | Total Pounds | Farm Value |
|-----------------------------------|----------------|-----------------|
| Potatoes (fresh market) | 11,853,500,000 | \$1,085,781,000 |
| Onions (storage for fresh market) | 5,400,000,000 | \$554,708,000 |
| Carrots (fresh market) | 2,338,800,000 | \$619,391,000 |
| Cabbage (fresh market) | 2,241,500,000 | \$408,195,000 |
| Pumpkin (fresh market) | -1,650,564,000 | Unknown |
| Garlic (fresh market) | 431,900,000 | \$227,090,000 |
| Winter Squash (fresh market) | -299,880,000 | Unknown |
| Beets (fresh market) | -157,134,000 | Unknown |
| Turnips (fresh market) | -157,134,000 | Unknown |

10.2. Segmentation, Key Issues, and Trends

2012 US Census figures¹⁸⁸ show number of farms and acreage dedicated to specific crops¹⁸⁹. Breakdowns by acreage are provided for the major crops.

Table 10.5: Production acreage of common storage crops.

| Crop | Farms | Acres | Percent of Farms with <1 Acre | # of Farms over 100 acres / % Total Acres |
|------------------------------|--------|---------|-------------------------------|---|
| Beets (fresh market) | 3,592 | 5,644 | - | - |
| Cabbage (fresh market) | 4,035 | 54,302 | 65% | 146 / 78% |
| Carrots (fresh market) | 4,266 | 70,244 | 85% | 108 / 94% |
| Garlic (fresh market) | 3,306 | 12,027 | - | - |
| Onions (fresh market) | 5,937 | 107,463 | 76% | 303 / 82% |
| Potatoes (fresh market) | 19,750 | 544,587 | 72% | 1,122 / 94% |
| Pumpkin (fresh market) | 15,490 | 73,947 | - | - |
| Turnips (fresh market) | 1,090 | 3,790 | - | - |
| Winter Squash (fresh market) | 6,371 | 548 | - | - |

Consumption of many storage crops is actually decreasing year on year. The Packer notes that consumption of cabbage, squash, and turnips “skews older,” meaning that younger consumers are less likely to buy these foods.¹⁹⁰ However, opportunities are noted to promote brightly colored carrots and beets as healthy foods, high in antioxidants. There are also recommendations to prominently feature more expensive varieties of specialty potatoes and organic versions of cabbage and other storage crops.

¹⁸⁸ “2012 Census, Volume 1, Chapter 1: US National Level Data,” USDA, Census of Agriculture, (n.d).

¹⁸⁹ “Farms by Concentration of Market Value of Agricultural Products Sold: 2012,” USDA, NASS, (n.d).

¹⁹⁰ “Cabbage,” The Packer Produce Universe, (n.d).



A 2014 Food Marketing Institute study listed the following reasons for Buying Locally Grown at Retail:

- 86% Freshness
- 75% Support local economy
- 61% Taste
- 56% Like knowing source/how produced
- 39% Nutritional value
- 39% Price
- 31% Enviro. impact of long distance transportation
- 30% Appearance
- 24% Long term personal health effects

In addition to the availability of storage crops on the conventional commodity market, there are also growing markets for the following:

- Organic
- Local products from small and mid-sized farms

10.2.1. Organic

“Organic” is regulated by the USDA and requires a third-party audit. Consumers associate organic with the absence of chemical fertilizers or pesticides, although approved amendments and treatments may be used.

The Environmental Working Group publishes a list of 50 produce items for which it cautions consumers to seek organic certification based on pesticide residue testing. Potatoes (#12), carrots (#22), winter squash (#25), onions (#46), and cabbage (#48) all appear.¹⁹¹

ERS studies of selected crops show growth in organic production of potatoes and carrots at the national level and in Oregon:¹⁹²

Table 10.6: Organic production of potatoes and carrots in Oregon.

| Crop | Acres 2000 | Acres 2011 | % increase |
|----------|------------|------------|------------|
| Potatoes | 5,433 | 13,256 | 144% |
| Oregon | 180 | 1,654 | 812% |
| Carrots | 5,665 | 12,080 | 113% |
| Oregon | 1 | 12 | 1,100% |

¹⁹¹ “All 48 Fruits and Vegetables with Pesticide Residue Data,” Environmental Working Group, (n.d.).

¹⁹² “Organic Production: Overview,” USDA, ERS, 2013.



ERS figures also show that farmers received a significant premium for organic storage crops:¹⁹³

Table 10.7: Organic premium for storage crops.

| 2013 Organic Premium | Low | High |
|----------------------|------|------|
| Cabbage | 135% | 222% |
| Carrots | 114% | 217% |
| Onions | 17% | 128% |
| Potatoes | 150% | 165% |

10.2.2. Local and Regional

There are a growing number of independent farmers marketing direct to consumers or to commercial food buyers (retail grocery stores, restaurants, food service).

A 2014 National Grocery Association survey indicates that the availability of locally grown produce and other packaged foods are major influences on grocery shopping decisions, with 87.2 percent of consumers regarding this as “Very or Somewhat Important.”

A 2014 National Restaurant Association survey on the top 10 menu trends, included:

1. Locally sourced meats and seafood
2. Locally grown produce
3. Environmental sustainability

According to the 2012 USDA Census of Agriculture, a total of 6,680 Oregon farmers reported sales direct to consumers (18.8 percent of all farmers) and 1,898 Oregon farmers reported sales direct to a retailer (5.4 percent).¹⁹⁴

10.3. Pricing for Storage Crops

Price differences for storage crops observed in Portland April 2015 include:

Table 10.8: Price differences for storage crops observed in Portland, April 2015.

| Product | Major Grocer (conventional) | New Seasons Market (certified organic) |
|-------------------------------------|-----------------------------|--|
| Beets | \$2.49/lb. | \$2.99/lb. |
| Cabbage (green) | \$0.99/lb. | \$1.29/lb. |
| Carrots | \$0.69/lb. | \$1.49/lb. |
| Garlic | \$2/lb. | \$5.99/lb. |
| Onions (sweet) | \$1.29/lb. | \$1.49/lb. |
| Potatoes (russet) | \$0.79/lb. | \$1.49/lb. |
| Turnips | \$1.49/lb. | \$2.99/lb. |
| Winter Squash (acorn and butternut) | \$1.29/lb. | \$1.79/lb. |

¹⁹³ “Organic Prices: Overview,” USDA, ERS, 2014.

¹⁹⁴ USDA Census of Agriculture.



As with other products studied in this report, despite the potential to realize higher prices overall for differentiated products, midsized and smaller scale farmers pursuing niche markets must earn a margin that enables profitability in spite of typically higher per unit production, processing, and marketing costs.

10.4. Demand for Storage Crops in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local storage crops.

10.5. Consumer Spending on Storage Crops

According to the Bureau of Labor Statistics, the average household (2.6 persons) in the western US spent \$7,180 in 2013 on food at home (59 percent) and away (41 percent) in 2013. This includes \$283 spent on fresh vegetables of all types for at home consumption. Spending on storage crops is not called out.¹⁹⁵

However, The Packer offers an estimate of total retail sales for 2012 with average pricing:¹⁹⁶

Table 10.9: Total retail sales of selected storage crops.

| | Pounds | Sales | Avg. per lb. |
|--------------------|---------------|-----------------|--------------|
| Beets | 19,013,461 | \$33,249,207 | \$1.75 |
| Cabbage | 470,920,215 | \$286,287,777 | \$0.61 |
| Carrots | 855,940,149 | \$1,083,274,373 | \$1.27 |
| Garlic | 54,809,915 | \$181,995,259 | \$3.19 |
| Onions | 1,565,855,630 | \$1,598,938,111 | \$1.02 |
| Potatoes | 4,328,642,789 | \$2,654,199,086 | \$0.61 |
| Pumpkin | 331,245,765 | \$126,519,534 | \$0.38 |
| Turnips | 14,426,890 | \$16,778,129 | \$1.16 |
| Squash (all types) | 433,175,789 | \$600,189,036 | \$1.39 |

A 2001 ERS report suggests that 67 percent of fresh-market onions are purchased at retail and consumed at home. The remaining 33 percent of fresh-market onions are consumed through the foodservice sector, with 12 percent through fast-food establishments.

According to a 2007 ERS report, 80 percent of fresh-market carrots are purchased at retail and consumed at home, including a growing quantity of fresh-cut or “baby” carrots. The remaining 20 percent of fresh-market carrots are consumed through the foodservice sector, with 3 percent through fast-food establishments.

The 2007–2010 National Health and Nutrition Examination Survey (NHANES) suggests that 63 percent of potatoes are consumed at home. The remaining

¹⁹⁵ “Region of residence: Annual expenditure means, shares, standard errors, and coefficient of variation,” Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

¹⁹⁶ “Lettuce,” The Packer’s Produce Universe, (n.d).



37 percent of potatoes are consumed through the foodservice sector, with 14 percent through fast-food establishments.

That same study suggests that on average about one-third of all vegetables are consumed outside the home (12.7 percent in full service restaurants, 12 percent in fast food restaurants, and 8.4 percent through other channels such as school food service).

The ERS also tracks per capita consumption (retail weight), which allows estimates of per capita and household spending on fresh-market storage crops.¹⁹⁷

Table 10.10: Estimated per capita and household spending on fresh-market storage crops.

| Crop | Per Capita Pounds (2012) | % Purchased Retail | Estimated Per Capita Spending | Estimated Household Spending |
|---------------|--------------------------|--------------------|-------------------------------|------------------------------|
| Beets | 0.5 | 66% | \$0.58 | |
| Cabbage | 6.3 | 66% | \$2.54 | |
| Carrots | 7.6 | 80% | \$7.72 | |
| Garlic | 1.9 | 66% | \$4.00 | |
| Onions | 18.6 | 67% | \$12.71 | |
| Potatoes | 34.1 | 63% | \$13.10 | |
| Pumpkin | 4.7 | 66% | \$1.18 | |
| Turnips | 0.1 | 66% | \$0.08 | |
| Winter Squash | 0.5 | 66% | \$0.46 | |
| Total | 74.3 | | \$42.37 | \$110.15 |

Using population data and the figures above, it is possible to form estimates for total consumption of storage crops in Oregon, at the county level or for municipalities.

| POUNDS | Beets | Cabbage | Carrots | Garlic | Onions | Potatoes | Pumpkin | Turnips | Winter Squash |
|---------------|-------|---------|---------|--------|--------|----------|---------|---------|---------------|
| Oregon | 1.9M | 25M | 29.8M | 7.4M | 73M | 134M | 18.4M | 392K | 1.9M |
| Multnomah Co. | 378K | 4.8M | 5.8M | 1.4M | 14M | 25.8M | 3.5M | 76K | 378K |
| Jackson Co. | 103K | 1.3M | 1.6M | 392K | 3.8M | 7M | 970K | 21K | 103K |
| Bend | 40K | 498K | 601K | 150K | 1.5M | 2.7M | 372K | 8K | 40K |
| La Grande | 6.5K | 82K | 99K | 25K | 243K | 445K | 61K | 1.3K | 6.5K |

Table 10.11: Estimated Oregon consumption of storage crops.

¹⁹⁷ "Mushroom Sales Top \$1 Billion 4 Years in a Row," Hodan Farah Wells, Jennifer Bond, Suzanne Thornsby, USDA, ERS, 2014.



This suggests that consumer spending at retail for storage crops in Oregon may be as follows:

| RETAIL SPENDING | Beets | Cabbage | Carrots | Garlic | Onions | Potatoes | Pumpkin | Turnips | Winter Squash |
|-----------------|--------|---------|---------|--------|--------|----------|---------|---------|---------------|
| Oregon | \$2.3M | \$10M | \$30M | \$16M | \$50M | \$51M | \$4.6M | \$300K | \$1.8M |
| Multnomah Co. | \$437K | \$1.9M | \$5.8M | \$3M | \$9.6M | \$10M | \$892K | \$58K | \$347K |
| Jackson Co. | \$119K | \$523K | \$1.6M | \$825K | \$2.6M | \$2.7M | \$243K | \$16K | \$94K |
| Bend | \$46K | \$200K | \$611K | \$316K | \$1M | \$1M | \$93K | \$6K | \$36K |
| La Grande | \$7.5K | \$33K | \$101K | \$52K | \$166K | \$171K | \$15K | \$1K | \$6K |

Table 10.12: Estimated consumer spending on storage crops at retail in Oregon.

ERS price-spread figures suggest that in 2012 the farm price for fresh market potatoes is about 17 percent of the final retail price.¹⁹⁸ The average across a “market basket” of fresh vegetables was 23 percent of the final retail price. This has bearing on evaluating the real scope of opportunity in markets referenced above.

10.6. Market Channels

Storage crops make their way from farm to market through a number of channels both direct and wholesale.

10.6.1. Direct Market

Oregon farmers reported a total of \$44.1 million in sales direct to consumers in 2012—an average of just over \$6,600 for each farm reporting direct sales. It can be assumed that at least two-thirds of sales through farmers’ markets, farm stands, CSAs, and other direct market channels are of fresh produce—representing about \$29 million. BLS consumer spending figures suggest that 46 percent of fresh produce sales will be for vegetables. Estimates above suggest that as much as 39 percent of that subtotal for vegetables will be for storage crops.

This implies as much as \$5.2 million spent on storage crops through direct market, a majority of which will be organic or marketed as “grown with organic practices.” If true, this would be about 3 percent of total spending on storage crops in Oregon.

10.6.2. Grower-Shippers

The Oregon Potato Commission lists thirteen grower-shippers located in Oregon.

- Amstad Produce, Sherwood
- Baggenstos Farms, Sherwood
- Bud-Rich Potato, Hermiston
- Cal-Ore Produce, Inc., Hermiston
- Circle C Marketing, Malin
- Gold Dust Potato Processors, Merrill
- Malin Potato Co-op, Inc., Merrill

¹⁹⁸ “Price Spreads from Farm to Consumer: Overview,” USDA, ERS, 2015.

- Riverside Potato, Inc., Merrill
- South Basin Packing, Umatilla
- Strebins Farms, Troutdale
- Tualatin Valley Potato, Sherwood
- John Walchli, Hermiston
- Wong Potatoes, Inc., Klamath Falls

Four additional potato grower-shippers located close to the Oregon border in California and Washington are also listed.

Grower-Shippers of onions in Oregon identified by USA Onions include:

- Baker Packing Co., Ontario
- Curry & Company, Hermiston
- Eastern Oregon Produce Vale
- Fiesta Farms, Inc., Nyssa
- Frahm-Fresh Produce, Ontario
- Golden West Produce, Nyssa
- Jamieson Produce, Inc., Vale
- Murakami/Potandon Produce, LLC, Ontario
- Oregon Trail Produce, Inc., Nyssa
- Owyhee Produce, Nyssa
- Schiemer Farms, Nyssa
- Snake River Produce, Nyssa
- Standage Farms, Inc., Vale
- Treasure Valley Farms, Ontario
- West Wind Produce, Ontario

10.6.3. Processing/Manufacturing

Many Oregon growers produce storage crops that are destined for processing—either minimally processed as canned or frozen, or included in manufactured/processed goods such as soups or chips. The 2012 USDA Agricultural Census shows Oregon farmers raising beets, cabbage, carrots, garlic, onions, potatoes, pumpkins, and winter squash for processing. About two-thirds of Oregon's potatoes and 41 percent of onions go to processing.

The Oregon Potato Commission lists four potato-processing companies headquartered in Oregon:

- Diamond Foods/Kettle Foods, Salem (Chips)
- Oregon Potato Company, Boardman (Dehydrated Products)
- Reser's Fine Foods, Beaverton (Refrigerated and Frozen Specialty Products)
- Shearers, Hermiston (Chips)

Six additional potato-processing companies in California, Idaho, and Washington are also listed. (Additional plants that may be owned by out-of-region interests are not identified here.)

Oregon processors handling beets, carrots, onions, potatoes, pumpkins, squash, and other products include NORPAC (Salem), Stahlbush Island Farms (Corvallis), and National Frozen Foods (Albany).

10.6.4 Retail

In 2012, there were 763 grocery stores in Oregon.¹⁹⁹ Many are outlets of major chains, which carry conventional and organic produce from local farm suppliers. Both Safeway and Fred Meyer stores in Portland carry storage crops packed by Oregon- and Washington-based businesses. Products are sometimes identified as local with shelf-tags. In other cases, it is necessary to read packaging labels for clues as to the origin of products.

There are also about 80 independent or natural food stores, like New Seasons Market (12 stores), Market of Choice (9 stores), Whole Foods Market (8 stores), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may have strong relationships with local suppliers.

Estimates based on ERS figures suggest that per-week stores sell an average of 2,122 pounds of fresh potatoes, 1,231 pounds of onions, 601 pounds of carrots, and a combined total of 900 pounds of other storage crops. If the 80 independent stores in Oregon had 80 percent local fresh onions and potatoes and 40 percent local procurement of other fresh storage crops, and the remaining 683 chain grocery stores in Oregon had 50 percent local potatoes and onions and 20 percent local procurement of other storage crops, the need would be:

| Crop | Independent | Chain | Total | OR Consumption |
|---------------|-------------|------------|------------|----------------|
| Beets | 54,240 | 231,535 | 285,775 | 14.6% |
| Cabbage | 683,420 | 2,917,347 | 3,600,767 | 14.6% |
| Carrots | 999,324 | 4,212,198 | 5,211,522 | 17.5% |
| Garlic | 206,111 | 879,835 | 1,085,946 | 14.6% |
| Onions | 4,096,573 | 21,859,056 | 25,955,628 | 35.6% |
| Potatoes | 7,062,002 | 37,682,402 | 44,744,404 | 33.5% |
| Pumpkin | 509,853 | 2,176,434 | 2,686,286 | 14.6% |
| Turnips | 10,848 | 46,307 | 57,155 | 14.6% |
| Winter Squash | 54,240 | 231,535 | 285,775 | 14.6% |

Table 10.13: Estimated Oregon demand for storage crops at retail.

¹⁹⁹ "2012 County Business Patterns (NAICS)," CenStats, US Census, 2012.

10.6.5. Restaurants

US Census data indicate there were 3,974 full-service restaurants (not including limited service “fast food”) and 123 catering companies in Oregon in 2012. The top 10 percent may be considered “fine dining” and more likely to procure local products (though primarily through wholesalers). If 397 Oregon restaurants procure 100 percent of storage crops locally, that implies a need for:

Table 10.14: Implied demand for storage crops at fine dining restaurants in Oregon.

| Crop | Pounds | OR Consumption |
|---------------|-----------|----------------|
| Beets | 24,886 | 1.3% |
| Cabbage | 313,561 | 1.3% |
| Carrots | 297,846 | 1.0% |
| Garlic | 94,566 | 1.3% |
| Onions | 1,020,513 | 1.4% |
| Potatoes | 1,603,663 | 1.2% |
| Pumpkin | 233,926 | 1.3% |
| Turnips | 4,977 | 1.3% |
| Winter Squash | 24,886 | 1.3% |

10.6.6. Farm to Hospital

Health Care Without Harm (HCWH) is an international environmental health organization that supports sustainable food procurement at hospitals and healthcare facilities. A 2007 survey by Oregon Center for Environmental Health resulted in detailed reports of purchases from six regional hospitals. Combined, the six institutions represented 1,726 hospital beds and reported purchasing:

Table 10.15: Purchasing of onions and potatoes by six Oregon hospitals.

| Product | Pounds/Yr. |
|-------------------------|------------|
| Onions (fresh, whole) | 8,916 |
| Potatoes (fresh, whole) | 32,880 |
| Potatoes (cut or diced) | 172,560 |

Extrapolating from those six institutions to Oregon’s thirty-three private hospitals and 6,008 total hospital beds, this suggests hospitals could represent an annual market for:

Table 10.16: Estimated demand of onions and potatoes by Oregon hospitals.

| Product | Pounds/Yr. | % OR Consumption |
|-------------------------|------------|------------------|
| Onions (fresh, whole) | 31,036 | <0.1% |
| Potatoes (fresh, whole) | 114,451 | 0.5% |
| Potatoes (cut or diced) | 600,661 | |

With an additional 12,403 beds in Oregon’s licensed nursing care facilities, there is potential for the health care sector’s demand to be even greater.

A 2012 survey by Oregon Physicians for Social Responsibility tracked purchasing of selected products by 3 hospitals (1,198 staffed beds), 2 retirement and nursing care facilities (831 independent and assisted living units), the Portland Public School district (46,000 combined enrollment with



46 percent lunch participation), and Multnomah County Corrections (1,310 beds with 79 percent average occupancy). Purchases by those entities were as follows:

Table 10.17: Purchasing of storage crops by select Oregon institutions, 2012.

| Crop | Total Purchases (lbs.) | OR Purchases (lbs.) | % from OR |
|----------------------------|------------------------|---------------------|-----------|
| Carrots, whole | 30,510 | 5,920 | 19.4% |
| Carrots, Cut | 26,585 | 0 | 0.0% |
| Onions, Whole | 37,005 | 6,605 | 17.8% |
| Onions, Diced | 43,493 | 10,500 | 24.0% |
| Potatoes, Whole | 133,265 | 67,500 | 50.7% |
| Potatoes, Cut/French Fried | 180,695 | 10,660 | 5.9% |
| Garlic, peeled | 5,442 | 0 | 0.0% |
| Parsnips, whole and cut | 11,365 | 10,540 | 92.7% |
| Squash & Pumpkins, whole | 9,298 | 5,330 | 57.3% |
| Squash & Pumpkins, cut | 320 | 0 | 0.0% |

With the information provided it was not possible to disaggregate hospital purchasing. However, the inability of these institutions to find fresh-cut carrots, peeled garlic, or fresh-cut squash and pumpkins from Oregon suppliers is telling. Anecdotally, food system advocates regularly hear that access to minimally processed product is a major barrier to institutions interested in purchasing locally grown storage crops.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

10.6.7. Farm to School

School Food FOCUS is a national collaborative that is working with fifteen large school districts across the US (including Portland Public Schools and the Beaverton School District) to make school meals nationwide more healthful, regionally sourced, and sustainably produced.

In Oregon, approximately 24 percent of school food budgets are spent on local food—the highest percentage in the nation. (USDA, 2014) Schools, with limited budgets and limited ability to prepare fresh foods, offer an interesting procurement challenge. Portland Public Schools (PPS) has enrollment of about 46,000 students, and serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).

PPS lists a number of local farmer suppliers on its website.²⁰⁰

²⁰⁰ "Real Food with Local Flavors," Portland Public Schools, (n.d).

A survey by Ecotrust of the top seven largest Oregon school districts showed schools buying:

Table 10.18: Purchasing of storage crops by the seven largest Oregon K-12 public school districts.

| Crop | Pounds |
|-------------------------|---------|
| Beets—fresh cut | 3,800 |
| Cabbage—fresh cut | 6,100 |
| Carrots—whole | 5,000 |
| Carrots—fresh cut | 125,480 |
| Onions—whole | 2,400 |
| Onions—fresh cut | 1,200 |
| Potatoes—whole | 57,000 |
| Potatoes—fresh cut | 6,000 |
| Turnips—fresh cut | 2,600 |
| Winter Squash—fresh cut | 11,000 |

Ranges for district purchasing were provided in the aggregated survey results. With the top response assumed to be Portland Public School District (the state’s largest), it is possible to extrapolate from the 46,000 PPS students to the 567,000 students enrolled in districts across Oregon. That exercise suggests a potential need across all districts for:

Table 10.19: Estimated demand for storage crops by K-12 public school districts in Oregon.

| Crop | Pounds | Combined | % OR Consumption |
|-------------------------|---------|----------|------------------|
| Beets—fresh cut | | 30,815 | 1.6% |
| Cabbage—fresh cut | | 61,630 | 0.2% |
| Carrots—whole | 61,630 | 875,152 | 2.9% |
| Carrots—fresh cut | 813,522 | | |
| Onions—whole | 12,326 | 24,652 | <0.1% |
| Onions—fresh cut | 12,326 | | |
| Potatoes—whole | 616,304 | 677,935 | 0.5% |
| Potatoes—fresh cut | 61,630 | | |
| Turnips—fresh cut | | 30,815 | 7.9 percent |
| Winter Squash—fresh cut | | 73,957 | 3.8 percent |

Assuming this procurement scenario holds true at the college and university level, it is possible to extend the scenario to the approximately 190,000 students enrolled in Oregon universities and colleges, thereby increasing the required totals by about one-third.



1.6 Demand Summary

Combining the estimates provided above for retail, restaurants, hospitals, and educational institutions suggests that Oregon farm and food businesses offering local and organic fresh and fresh-cut storage crops could capture significant percentages of the in-state market.

Table 10.20: Estimated percentage of Oregon consumption of in-state storage crop production.

| Crop | Pounds | % of OR Consumption |
|---------------|------------|---------------------|
| Beets | 351,500 | 19% |
| Cabbage | 3,996,300 | 16% |
| Carrots | 6,673,300 | 22% |
| Garlic | 1,180,500 | 16% |
| Onions | 27,040,000 | 37% |
| Potatoes | 47,965,000 | 36% |
| Pumpkin | 2,920,200 | 16% |
| Turnips | 103,100 | 26% |
| Winter Squash | 409,000 | 21% |

Retail represents more than 70 percent of market opportunity in most categories. However, schools, which are actively encouraging students to try and regularly eat a wide variety of vegetables may represent a critical opportunity for growers of beets, cabbage, turnips, and other crops that “skew old” to develop a new generation of consumers.

10.8. Oregon Storage Crop Production

The 2012 USDA Census of Agriculture shows the number of farms in Oregon reporting production and sale of various storage crops.

The production estimates that follow are based on crop budgets published by Oregon State University, using a midrange figure for yield per acre that might be expected.

| Crop | Farms | Acres | Production in Pounds | % Oregon Consumption |
|------------------------------------|-------|--------|----------------------|----------------------|
| Beets (fresh market) | 120 | 89 | 1,246,000 | 63.6% |
| Cabbage (fresh market) | 85 | 681 | 16,003,500 | 61.0% |
| Carrots (fresh and for processing) | 411 | 823 | 24,690,000 | 80.8% |
| Garlic (fresh and for processing) | 175 | 1,248 | 16,848,000 | 186.9% |
| Onions (fresh market) | 502 | 12,011 | 600,550,000 | 773.9% |
| Potatoes (fresh market) | 547 | 14,352 | 839,592,000 | 603.5% |
| Pumpkin (fresh market) | 521 | 1,477 | 44,310,000 | 240.6% |
| Turnips (fresh market) | 15 | 290 | 8,700,000 | 2,219.9% |
| Winter Squash (fresh market) | 125 | 548 | 16,440,000 | 839.0% |

Table 10.21: Oregon production estimates of storage crops.

Oregon farmers are capable of meeting 100 percent of local demand for garlic, onions, potatoes, pumpkin, turnips, and winter squash, and more than 60 percent of demand for beets, cabbage, and carrots. However, these products are

not consistently being identified as local, which is limiting opportunities for added value.

The critical shortages across all categories are likely for certified organic crops. Grocery retailers that have made certified organic crops an integral part of their brands, such as Whole Foods Market nationally, or New Seasons Market locally, have experienced significant growth, and are likely to continue to do so.

Breakdowns by size of operation are provided for onions and potatoes. Production of onions is concentrated in Malheur and Morrow counties. Production of potatoes is concentrated in Baker, Klamath, Malheur, Morrow, and Umatilla counties. About 78 percent of fresh-market onion growers (390 farms) and 80 percent of fresh-market potato growers (438 farms) harvest less than 1 acre. Based on total dollar value potatoes (#7) and storage onions (#8) are both top-ranked commodity crops for Oregon. Oregon is actually the leading producer of storage onions (representing 27 percent of US production) and the third-ranked producer of garlic.²⁰¹

10.9. Oregon Storage Crop Infrastructure

10.9.1. Cold Storage and Packing

A number of grower-shippers are listed above, which combined likely have sufficient capacity to grow, store, pack, and distribute quantities of potatoes and onions sufficient to meet in-state demand.

The situation is less clear for other storage crops. Detailed information is not available from the USDA Agricultural Census for most of these crops, and they do not have related grower associations providing information and advocating for the interests of their members.

According to the Agricultural Census, only 2 percent of Oregon farms (761 total) report having their own on-farm packing facility. The majority of farmers raising storage crops can therefore be assumed to be contracting storage and packing services, or more likely to be selling crops outright at harvest—which are then pooled with product from other farms and packed under the handler's brand.

It has been reported that most farmers prefer to contract for storage, rather than invest in an on-farm facility that will be only partially utilized or empty for major portions of the year. Further exploration of the capacity and willingness of storage service providers to segregate and preserve the identity/origin of products, and of the potential need for dedicated or on-farm facilities would be valuable.

²⁰¹ "Oregon Agriculture: Facts and Figures, July 2014," Oregon Department of Agriculture, (n.d).

10.9.2. Packaging

A look at enterprise budgets for potatoes and onions reveals that the cost of consumer packaging (plastic bags or mesh nets) can actually exceed the cost of the product inside. There are relatively few suppliers of the heavy-duty tinted film used for potatoes, and costs for petroleum products of all types have been increasing. This raises an interesting question whether there are packaging alternatives that could be developed and/or produced by Oregon companies.

10.9.3. Fresh-Cut Processing

The inability of schools, hospitals, and other institutions to source sufficient quantities of fresh-cut carrots, onions, potatoes, and other crops from Oregon suppliers suggests that additional processing capacity may be required. Further research is necessary to determine whether this is the case, or whether other challenges are complicating procurement (loss of identity with pooled products of indeterminate origin, high cost of goods from Oregon suppliers, etc.).

10.9.4. Special Equipment

It has been reported that there is no commercial garlic peeler accessible to small or midsized farmers in Oregon. This may be an opportunity for vertical integration or offer of copacking services.

10.10. Conclusions

Oregon farmers are capable of meeting 100 percent of local demand for garlic, onions, potatoes, pumpkin, turnips, and winter squash, and more than 60 percent of demand for beets, cabbage and carrots.

Ecotrust's assessment of demand for locally produced storage crops found market potential ranging from 16 percent (cabbage, garlic, pumpkin) to 36-37 percent (onions, potatoes) of Oregon consumption. In reality, in-state sales of Oregon storage crops may already exceed those percentages. However, these products are not consistently being identified as local, which is limiting opportunities for added value.

Products like fresh market beets, cabbage, turnips and squash, which are typically sold loose with no or minimal packaging (stickers, twist ties), do not lend themselves to consumer branding and marketing. However, retailers do see increasing value in being able to identify the origin of products (place and even farm name) for customers. This should create competitive advantages for Oregon growers (ability to capture shelf space) and in some cases opportunity to sell direct to retailers.

Grower-shippers of retail packed onions and potatoes would likely benefit from a stronger and more prominent statement of origin to distinguish their products, thereby providing them with stronger differentiation in local markets from the traditional commodity supply stream. Consumers may not notice when the only reference to Oregon is in the company address in small print at the bottom of the bag or on the closure of a mesh bag.

Institutional interest in sourcing more Oregon grown and fresh-cut processed products is worth further exploration. It is not clear that the demand signal is reaching farmers who may have opportunity for vertical integration or to pursue copacking, or existing in-state processors who may be able to capture market share from suppliers from outside Oregon. The need for additional processing capacity and specific pieces of equipment (garlic peeler) should also be more closely studied.