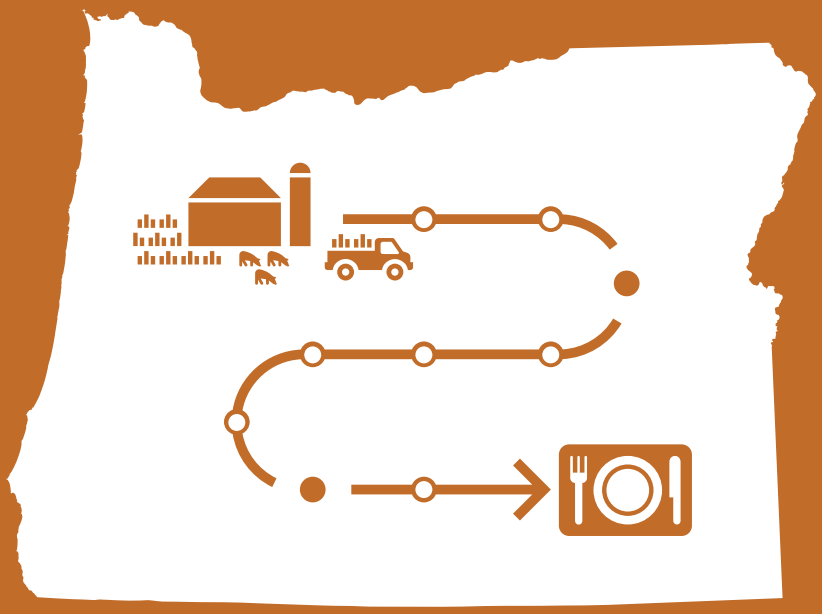

Oregon Food Infrastructure Gap Analysis

Where Could Investment Catalyze Regional Food System Growth and Development?

ecotrust

This research was made possible through a generous grant from Meyer Memorial Trust. We at Ecotrust appreciate the ongoing support and partnership of an organization so thoughtfully pursuing reliable prosperity for all Oregonians.

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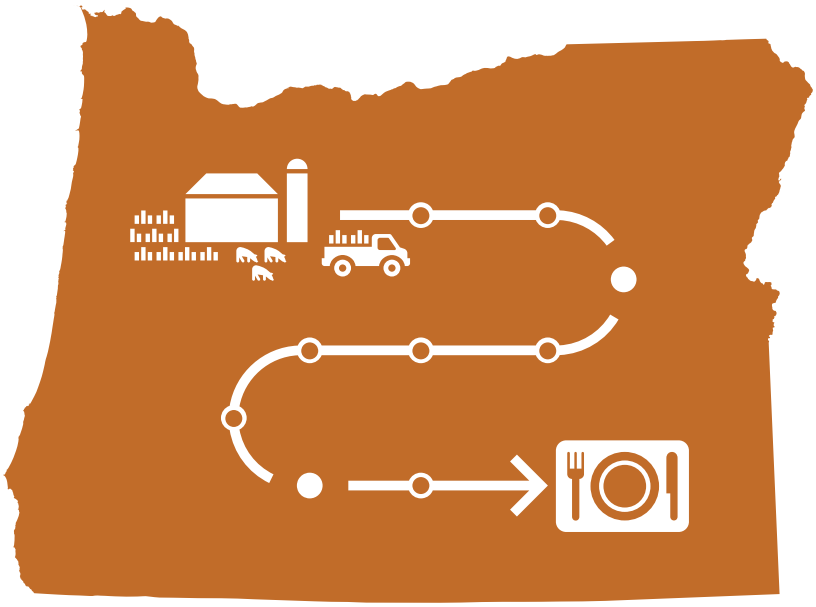

Oregon Food Infrastructure Gap Analysis

Where Could Investment Catalyze Regional Food System Growth and Development?

By Ecotrust, with Matthew Buck
Funded by Meyer Memorial Trust

April 2015

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9

Small Grains and Legumes

Photo courtesy JR Anderson

9.1. Introduction to Small Grains at the National Level

Small grains are a family of cereal crops that include wheat, rye, rice, oats, barley, and less common varieties of the same such as triticale, spelt, emmer, and kamut.

Wheat is further divided into six classifications:[160]

- Hard Red Winter (HRW)
- Hard Red Spring (also referred to as Dark Northern Spring, DNS)
- Hard White (includes both spring and winter varieties)
- Soft Red Winter
- Soft White
- Durum

The hard wheat varieties have higher levels of protein and are typically used for making all-purpose flour and breads. Spring varieties have higher proteins than winter varieties. Durum, a spring wheat, with the highest levels of protein, is commonly used for semolina and Italian style pastas. The soft wheat varieties have lower protein and are typically used for Asian noodles, cakes, pastries, crackers, muffins, and biscuits.

With barley, there is a distinction between malt quality barley (for brewing and distilling) and feed barley for animals. Within each of these there are subcategories for specialized applications. Approximately 51 percent of the US barley crop goes to animal feed, 44 percent is used for malt production, 3 percent as seed, and only 2 percent for food products.[161]

The National Agricultural Statistics Service reports regularly on production of small grains.[162]

Crop	Harvested Area	2014 Bushels	Pounds per Bushel	2014 Pounds
Wheat	46.5 million acres	2.04 billion	60	122.4 billion
Winter Wheat		1.38 billion		82.8 billion
Spring Wheat		601 million		36.1 million
Durum Wheat		57.1 million		34.3 million
Oats	1.04 million acres	70.5 million	32	2.26 billion
Barley	2.46 million acres	180 million	48	8.64 billion

Table 9.1: Production of small grains.

The Economic Research Service tracks per capita consumption of grains as food (farm level weights). The figure for barley does not include malt barley used for production of alcohol or animal feed.[163] (2010 figures are presented, as more current figures are not available for all categories.)

[160] "What Classes," US Wheat Associates, (n.d.).

[161] "Industry Facts," Barley News (n.d.).

[162] "Small Grains: 2014 Summary," USDA, NASS, 2014.

[163] "Food Availability (Per Capita) Data System: Overview," USDA, ERS, 2014.

Table 9.2: Per capita consumption of grains as food.

Flour and Cereal Products	2010
White and Whole Wheat Flour	122.4 lbs.
Durum Flour	12 lbs.
Rye flour	0.5 lbs.
Oat products	5.2 lbs.
Barley products	0.7 lbs.

Related estimates are that Americans on a per capita basis consume an average of 53 pounds of bread and 19.5 pounds of pasta per year.[164]

Small grains are commonly grown in rotations with legumes (pinto beans, black beans, chickpeas, lentils, field peas, etc.), other minor grains (millet, sorghum, amaranth, quinoa, buckwheat, teff, etc.), oil seeds (flax, safflower, sunflower, canola, mustard, etc.), and other forage crops (clover, alfalfa, etc.). These rotations can stretch three to nine-plus years, and are intended to control weeds/pests and promote soil health and fertility.

Figures for total US production of common legumes are:

Table 9.3: Total US production of common legumes.

Legumes	2012
Pinto Beans	1.35 billion lbs.
Navy Beans	491 million lbs.
Great Northern Beans	122 million lbs.
Black Beans	374 million lbs.
Red Kidney Beans	171 million lbs.
Dry Lima Beans	53 million lbs.
Other Dry Beans	629 million lbs.
Dried Peas, Chick Peas and Lentils	1.5 billion lbs.
Total	**3.19 billion lbs.**

Approximately 20 percent of US beans [165] and more than 70 percent of dried peas and 90 percent of chickpeas and lentils[166] are exported.

Economic Research Service estimates for per capita consumption of legumes includes breakouts for six bean types and a summary for "other dry beans."[167]

9.2. Segmentation, Key Issues, and Trends

2012 US Census figures for concentration of market value show that nationally there were 503,315 growers of grain, oilseeds, dry beans and dry peas.[168] About 81 percent of those growers manage fewer than 500 acres. The top 17 percent of those growers—most of whom manage 1,000 acres or more—represented 75 percent of all sales.

Grain can be grown in a "dryland" system taking advantage of natural precipitation (common in the Pacific Northwest), or with the aid of irrigation. Tillage (plowing) is commonly used to control weeds, prepare fields for planting, and incorporate crop stubble back into the soil. However, tillage contributes to water and wind erosion, and over time can result in a "hard pan" of compacted soil, which resists absorption of water and penetration

[164] "Wheat Info," National Association of Wheat Growers, (n.d.).

[165] "Production Facts & FAQs," US Dry Bean Council, (n.d).

[166] "USA Dry Pea, Lentil & Chickpea Production," USA Dry Pea & Lentil Council, (n.d).

[167] "Food Availability (Per Capita) Data System: Overview," USDA, ERS, 2014.

[168] "Farms by Concentration of Market Value of Agricultural Products Sold: 2012," USDA, NASS, 2012.

Legumes	2012
Pinto Beans	2.7 lbs.
Navy Beans	0.9 lbs.
Great Northern Beans	0.2 lbs.
Black Beans	0.7 lbs.
Red Kidney Beans	0.4 lbs.
Dry Lima Beans	0.1 lbs.
Other Dry Beans	1.6 lbs.
Dried Peas, Chickpeas, and Lentils	0.1 lbs.
Total	**6.7 lbs.**

Table 9.4: Per capita consumption of legumes.

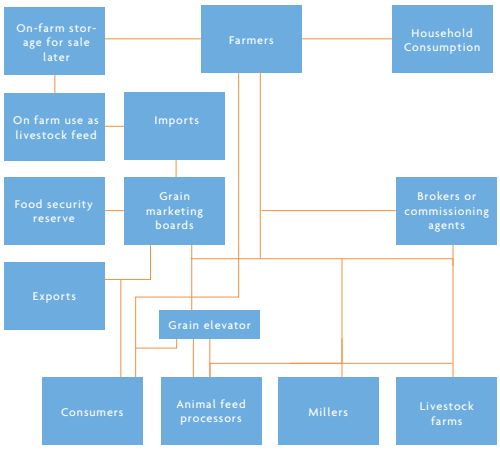

Figure 9.1: Wheat industry process flow.

by plant roots. This has led to the development of "conservation tillage" techniques (such as strip till, ridge till, and mulch till), which maintain at least 30 percent soil coverage. A further extension of that strategy is "no-till" or "direct seed," with farmers using specialized machinery to "drill" seeds and fertilizers directly into the residue of the previous crop and minimize soil disturbance. This has been shown to reduce erosion and increase soil "tilth" (higher organic matter and more open structure) which in turn increases the ability of soil to retain moisture—critical in dryland farming.

Wheat is a traded commodity, with prices typically set in three key US wheat markets: the Chicago Board of Trade, the Kansas City Board of Trade and the Minneapolis Grain Exchange.
Farmers commonly deliver wheat and other grains to a local elevator, but may store a portion of the crop on-farm or in contracted storage for their own use or with plans for later sale at a better price.

Consumer interest in alternatives to "conventional" grains and legumes has been stoked by:

- Concerns for health and food safety:
  - Increasing interest in whole grains and heirloom grains.
  - Increasing interest in legumes as a source of protein.
  - Belief that a gluten-free diet will lead to better health.
  - Concerns about GMO crops and use of pesticides such as glyphosate.
- Concern for the environment:
  - Water quality issues due to farm run-off related to the use of commercial fertilizers and pesticides.
  - Soil erosion and the flow of excess nutrients and bio-solids into water systems, with linkages between Midwest grain production and the growing "dead zone" in the Gulf of Mexico.
- Interest in unique, high-quality local foods and a desire to support local farm economies.
  - Resurgence of interest in artisan bread and home baking.
  - Emerging craft brewing and distilling industry.

Alternative value options to conventional commodity grains and legumes discussed in this report include:

- Organic
- Non-GMO
- No-Till/Direct Seed
- Heritage and specialty grains and legumes
- Local products from small and mid-sized farms offering one or more of the above attributes.

9.2.1 Organic

"Organic" certification is regulated by the USDA, requires a third-party audit, and regulates the origin of fertilizers and pesticides used on the farm. Consumers associate organic with the absence of chemical fertilizers or pesticides, although approved amendments and treatments may be used. Buying organic is also seen as a way to avoid GMO exposure. ERS figures

show that acreage dedicated to organic grain production in the US increased 94% from 2001 to 2011 (from 454,600 acres to 883,600 acres). During the same period, acreage dedicated to organic dry beans, lentils and peas increased 91% percent (from 24,400 to 46,500 acres).

ERS figures also show that farmers received a significant premium for organic grain. For example, in 2013 farmers received an average price of $7.03 per bushel of hard red winter wheat for conventional ($0.12/pound) versus over $14.00 for organic ($0.23/pound).[169]

9.2.2. Non-GMO

There are currently no GMO varieties of wheat, oats, or dried beans approved for human consumption. However, there are GMO varieties of corn, soybeans, canola, and alfalfa, which may be grown in rotations with wheat. The Non-GMO Project identifies wheat as a "monitored crop" due to reported incidences of contamination and risk for cross-pollination.[170] Non-GMO Project Verified claims to be the fastest growing label in the natural products industry, representing $7 billion in annual sales and more than twenty-one thousand verified products, including grains, beans, flours, and baked goods.

9.2.3. No-Till/Direct Seed

Food Alliance and the Pacific Northwest Direct Seed Association have developed certifications for "No-Till" or "Direct Seed" systems. Consumer understanding of no-till is limited, but the term has increasing credence with commercial buyers for bakery ingredients, baking mixes, and finished goods.

9.2.4. Heritage and Specialty Grains

There is increasing interest in so-called heritage grains—Einkorn, Emmer, Kamut, and other rare "landrace" varieties of wheat, barley, oats and rye which claim to offer unique flavor and baking qualities—and in specialty grains, including Amaranth, Buckwheat, Millet, Quinoa, Spelt, and Teff. Many of the specialty grains are marketed to offer better nutrition than conventional grain varieties and as a gluten-free alternative to wheat and barley.

9.2.5. Local and Regional

There are a growing number of examples around the country of independent farmers and small groups of farmers investing in small-scale seed cleaning and milling capacity in order to market whole grains, beans, and flours direct to consumers or to commercial food buyers (retail, restaurants, food service). Oregon examples include Camas Country Mill (Eugene, Oregon) and Green Willow Grains (Tangent, Oregon). Traceability and source-identity have emerged as key issues in grains, according to retail buyers we interviewed.

Shepherd's Grain (regional—California, Idaho, Oregon, Washington, western Canada) offers an example of growers organizing to develop a brand and work with value-chain partners (millers, distributors, food product manufacturers,

[169] "Organic Production: Overview," USDA, ERS, 2013.

[170] "What Is GMO," The Non-GMO Project, (n.d).

commercial bakers, foodservice, retail brands, etc.) to enable flow of products to markets.

9.3. Markets for Alternative Grains

Price differences for flour and grain/legume products observed in Portland January 2015 include:

Table 9.5: Price differences for flour and grain/legume products observed in Portland, January 2015.

	Major Grocer	New Seasons Market	Hummingbird Wholesale Buyers' Club
Packaged All-Purpose Flour			
Kroger	$0.42/lb.		
Western Family		$0.49/lb.	
Gold Medal	$0.59/lb.	$0.59/lb.	
Stone-Buhr	$0.75/lb.	$0.99/lb.	
Fisher - Shepherd's Grain: NW—Sustainable		$1.00/lb.	
King Arthur	$1.02/lb.		
Camas Country Mill: Oregon Grown			$1.28/lb.
Gold Medal: Organic	$1.32/lb.		
Bob's Red Mill: Organic	$1.34/lb.	$1.26/lb.	
Camas Country Mill: Organic, Oregon Grown			$1.55/lb.
Green Willow Grains: Organic, Oregon Grown		$1.60/lb.	
Camas Country Mill: Heirloom Red Fife, Oregon Grown			$2.57/lb.
Packaged Rolled Oats			
Bob's Red Mill	$3.00/lb.	$2.00/lb.	
Bob's Red Mill: Organic		$2.75/lb.	
Green Willow Grains: Organic, Oregon-Grown		$3.00/lb.	
Packaged Dried Legumes			
Pinto Beans	$0.80/lb. Kroger		
Green Lentils	$1.39/lb. Kroger	$2.36/lb. Bob's Red Mill	
Navy Beans	$1.49/lb. Kroger		
Black Beans	$1.59/lb. Kroger		
Red Kidney Beans	$1.90/lb. Kroger		
Green Lentils: Organic	$2.99/lb. Simple Truth		
Black Beans: Organic	$2.99/lb. Simple Truth		
Bulk Goods			
All-Purpose Flour	$0.69/lb.	$1.29/lb. Organic	
Rolled Oats	$0.89/lb.		
Rolled Oats: Organic	$1.69/lb.	$1.49/lb.	$1.07/lb. Montana
Dry Green Lentils	$1.12/lb.	$2.19/lb. Organic	$1.44/lb. Hunton's Farm, Oregon
Dry Black Beans	$1.49/lb.	$2.69/lb. Pacific NW	$1.49/lb. Organic, North Dakota
Dry Navy Beans	$1.64/lb.	$2.99/lb. Organic	$1.55/lb. Organic
Dry Pinto Beans	$1.89/lb.	$2.19/lb.	$1.39/lb. Organic
Dry Red Kidney Beans	$2.24/lb.	$2.69/lb.	$1.68/lb. Organic

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.

9.4. Demand for Small Grains and Legumes in Oregon

Understanding market demand is critical to evaluating potential investments to increase production and profitability of local and alternative grains and related rotation crops.

9.5. Consumer Spending on Grains and Legumes

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.[171] This includes $188 spent on cereals and cereal products, and another $356 spent on bakery products—both for at home consumption. Spending on legumes is not called out.

In 2014 Packaged Facts reported,

> "The biggest shift in bread consumption over the last 10 years is the increase in whole wheat bread [accounting for 53.8% of usage rates for bread in 2013 vs. 45% in 2004]." That report continued: "Shelf-stable breads should continue to decline in both volume and dollars. More consumption of higher-priced, healthier breads could mitigate overall volume drops and prop up dollar sales."[172]

Using population data and the figures above, it is possible to form estimates of the consumer market for grains and legumes in Oregon, at the county level or for municipalities.

[171] "Region of residence: Annual expenditure means, share, standard errors, and coefficient of variation," Consumer Expenditure Survey, US Bureau of Labor Statistics, 2014.

[172] "56% of US shoppers say they are cutting back on white bread, says Packaged Facts," Elaine Watson, William Reed Business Media, 2014.

The estimates for Oregon consumption of grain and grain products are as follows:

Geographic Unit	Wheat Flour	Durum Flour	Rye Flour	Oat Products	Barley Products
Oregon (pop. 3,919,020)	185M lbs.	18.1M lbs.	754K lbs.	7.8M lbs.	1.1M lbs.
Multnomah Co. (pop. 756,530)	35.6M lbs.	3.5M lbs.	146K lbs.	1.5M lbs.	204K lbs.
Jackson Co. (pop. 206,310)	9.7M lbs.	952K lbs.	40K lbs.	413K lbs.	56K lbs.
City of Bend (pop. 79,109)	3.7M lbs.	365K lbs.	15K lbs.	158K lbs.	21K lbs.
City of La Grande (pop. 13,048)	614K lbs.	60K lbs.	2.5K lbs.	26K lbs.	3.5K lbs.

Table 9.6: Estimated Oregon consumption of grain and grain products.

NASS published 2013 assessments of price spreads for flour (high protein wheat approximately $0.12/pound versus all purpose flour approximately $0.53/pound.).[173] These indicate that wheat may be less than 23 percent the retail cost of flour.

Related estimates are that Americans on a per capita basis consume an average of 53 pounds of bread and 19.5 pounds of pasta per year.[174] For Oregon, this translates to about 208 million pounds of bread and about 76 million pounds of pasta annually. One estimate is that artisan breads, for which local and specialty flours may be most desirable, represented 30.6 percent of bread sales in 2014.[175]

A useful conversion when considering the figures above is that about 1 pound of flour is used to produce a 1.5 pound loaf of bread.[176] This suggests that the large majority of the 185 million pounds of wheat flour consumed in Oregon is in the form of bread and other finished baked goods.

BLS figures for consumer spending at retail for consumption at home break down as follows.

Table 9.7: Consumer spending on wheat flour and products at retail.

Geographic Unit	Wheat Flour & Cereal Products	Baked Products
Oregon (pop. 3,919,020)	$283,375,292	$536,604,277
Multnomah Co. (pop. 756,530)	$54,702,938	$103,586,415
Jackson Co. (pop. 206,310)	$14,917,800	$28,248,600
City of Bend (pop. 79,109)	$5,720,189	$10,831,848
City of La Grande (pop. 13,048)	$943,471	$1,786,572

[173] "Farm-to-Food Price Dynamics," Randy Schnepf, Congressional Research Service, 2013.

[174] "Wheat Info," National Association of Wheat Growers, (n.d.).

[175] "Category share of bread sales in the United States in 2014, by bread type," Statista, 2015.

[176] "Wheat Info," National Association of Wheat Growers, (n.d.).

NASS published 2013 assessments of price spreads for bread (high protein wheat about $0.12/pound versus white bread about $1.41/pound). These indicate that wheat may be less than 9 percent the retail cost of bread.[177]

The estimates below are for Oregon consumption of legumes:

Geo. Unit	Pinto Beans	Navy Beans	Great Northern Beans	Black Beans	Red Kidney Beans	Dry Lima Beans	Other Dry Beans	Peas, Chickpeas, Lentils	TOTAL
Oregon pop. 3,919,020)	4.1M lbs.	1.4M lbs.	302K lbs.	1.1 M lbs.	603K lbs.	150K lbs.	2.4 M lbs.	151K lbs.	10.1M lbs.
Multnomah Co. (pop. 756,530)	786K lbs.	3.5M lbs.	58K lbs.	204K lbs.	116K lbs.	29K lbs.	466K lbs.	29K lbs.	1.95M lbs.
Jackson Co. (pop. 206,310)	214K lbs.	952K lbs.	16K lbs.	56K lbs.	32K lbs.	8K lbs.	127K lbs.	8K lbs.	532K lbs.
Bend (pop. 79,109)	82K lbs.	365K lbs.	6K lbs.	21K lbs.	12K lbs.	3K lbs.	49K lbs.	3K lbs.	204K lbs.
La Grande (pop. 13,048)	13.5K lbs.	60K lbs.	1K lbs.	3.5K lbs.	2K lbs.	500 lbs.	8K lbs.	500 lbs.	34K lbs.

Table 9.8: Estimated Oregon consumption of legumes.

ERS reports about three-fourths of all dry beans are purchased at retail stores for home consumption.[178]

Geo. Unit	Retail Beans (75% total)	Foodservice Beans (25% total)
Oregon (pop. 3,919,020)	7.58M lbs.	2.52M lbs.
Multnomah Co. (pop. 756,530)	1.46M lbs.	.49M lbs.
Jackson Co. (pop. 206,310)	399K lbs.	133K lbs.
Bend (pop. 79,109)	153K lbs.	51K lbs.
La Grande (pop. 13,048)	26K lbs.	8K lbs.

Table 9.9: Estimated Oregon purchase of dry beans at retail and foodservice.

The December 2014 "all bean" price paid to farmers was $34 per hundredweight (S0.34/pound).[179] ERS figures for a category that includes beans suggest that production, processing, packaging, and wholesale may account for about 60 percent of the end retail price.[180]

The dollar figures above for wheat and baked goods are estimates. Consumer spending estimates account only for the resident population, and do not take into account spending by tourists, business travelers, or others who may be present or pass through. Consumer spending figures also do not account for purchases by entities such as schools, hospitals, nursing homes, or prisons that do not pass the cost of food directly to consumers. (These purchases are addressed in more detail below, where information is available.)

177 "Farm-to-Food Price Dynamics," Randy Schnepf, Congressional Research Service, 2013.

178 "Dry Beans," USDA, ERS, 2012.

179 "Bean Prices Rise," Northwest Bean Growers Association, 2014.

180 "Marketing Bill Dollar," USDA, ERS, 2015.

It should also be reiterated that the large majority of grain and bean products consumed come from lowest-cost commodity producer/processors. This has bearing for interpreting the scope of the implied market opportunities.

9.6. Market Channels

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

9.6.1. Direct Market

A small number of farmers are beginning to market grain and beans directly to consumers through farmers markets, CSAs (community supported agriculture), and "Fill Your Pantry" events organized by Willamette Farm and Food Coalition (WFFC), Ten Rivers Food Web, and other organizations.

WFFC reported that 630 shoppers attended one Fill Your Pantry event in Eugene in 2013, purchasing 27,500 pounds of products from 12 participating farms for total sales of $34,000. A total of 5 such events are known to have been held in Oregon in 2013.

Small Oregon farm and milling operations include:

- Camas Country Mill (Junction City)
- Green Willow Grains (Brownsville)

(A third small mill—Butte Creek Mill in Eagle Point—appears to be packaging its own branded products, but offers no information on its sources for wheat, beans, and other products.)

Lonesome Whistle Farm offers a grain and bean CSA, which for a $300 share price provides 80 pounds of dry goods (avg. $3.75/pound including:

- 20# dry beans (four varieties)
- 10# Dakota black popcorn
- 10# Tri-color polenta
- 5# Corn Flour
- 5# Soft White Pastry Flour
- 10# Red Fife Wheat Flour
- 5# Dark Northern Rye Flour
- 5# Emmer/Farro Berries
- 10# Oats

There may be less than 100,000 pounds of wheat flour and 50,000 pounds of dried beans being sold direct to consumers by Oregon farmers. If true, this would be 0.05 percent of wheat flour and 0.5 percent of dry beans consumed in the state.

9.6.2. Processing/Manufacturing—Baking and Other Processed Foods

There are a growing number of examples of food processors/manufacturers sourcing grains and legumes raised and processed in the Pacific Northwest to be featured as ingredients in products.

Oregon is home to a good number of baking establishments that represent potential markets for flour. US Census County Business Patterns data for 2013 show the following:

Establishments by Number of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249	250-499	500-999
Bakeries and Tortilla Manufacturing	169	58	33	40	20	5	9	3	1
Retail Bakeries	80	35	19	22	3	1			
Commercial Bakeries	55	14	8	12	11	2	6	1	1
Frozen Cakes, Pies, and Other Pastries	6	1	1		1		3		
Cookies and Crackers	14	4	4	3	1	1		1	
Dry Pasta, Dough, and Flour Mixes	10	3	1	1	4	1			
Tortillas	4	1		2				1	

Table 9.10: Number of Oregon baking establishments by number of employees.

Dave's Killer Bread's Oregon Grains bread, which reportedly sourced 95 percent of ingredients from within one hundred miles of the bakery in Milwaukie, Oregon, is perhaps the most widely known example of truly local sourcing of wheat for bread. (However, there do not appear to be any current references to that bread, originally introduced in 2011, on the company website.) Tabor Bread in Portland is also very forward with the fact that grains are sourced primarily from Camas Country Mill in Eugene, Oregon.

Shepherd's Grain has been successful supplying its Northwest grown and processed flours to Continental Mills for packaged baking mixes, and to commercial bakeries offering wholesale (Fairlight Bakery, McTavish Shortbread, etc.) and retail (Grand Central Baking, St. Honoré Baking, etc.) products. Shepherd's Grain lists about forty bakery locations in Oregon that utilize their flour.

Central Bean Company (Quincy, Washington) also supplies beans from Northwest farmers to processors including Truitt Family Foods (Salem, Oregon) and the Better Bean company (Portland, Oregon). Truitt now offers canned black, pinto, kidney, garbanzo, and navy beans in foodservice and retail, as well as a new packaged hummus. Better Bean offers prepared beans, bean dip, and chili fresh in refrigerated containers.

There is also a growing market for beans and peas processed into protein-rich snack foods, which may lead to new business development and ingredient sales opportunities for Oregon growers.

Total sales of Oregon grain and beans to manufacturers are not known. Sales of regionally identified products, traceable to a farm or specific group of farms, likely represent less than 1 percent of total supply.

However, if 10 percent of the approximately 64 million pounds of artisan breads consumed in Oregon annually were prepared with local/regional flour, the resulting need would be for at least 4.2 million pounds of flour.

If we assume that 80 percent of bean/lentils are purchased in a processed form (canned, in soups, etc.) and that 5 percent came from local/regional sources, the resulting need would be for 400,000 pounds of beans/lentils.

9.6.3. Manufacturing—Brewing and Distilling

Breweries and distilleries are important potential markets for local malt barley, wheat, and other grains.

Establishments by Number of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Breweries	48	27	6	6	3	3	3
Distilleries	17	8	3	2	3	1	

Table 9.11: Oregon breweries and distilleries by number of employees.

Rogue Spirits now operates its own farm from which they harvested 1,063,521 pounds of malting barley in 2014. Rogue also has a proprietary malting operation.

Christiansen Farms near McMinnville grows barley and operates a custom micro-malting facility, which supplies Portland-based House Spirits Distillery (makers of Aviation Gin and Medoyeff Vodka). That facility can reportedly process 68 tons of malt annually, which equates to roughly thirty-four acres of production.[181]

According to the Brewers Association, Oregon is home to 214 craft breweries, which produced a total of 1.4 million barrels of beer in 2014. Each barrel of craft beer utilizes an average of 65 pounds of malt, suggesting a need for a total of 91 million pounds of malt in Oregon each year.[182]

Oregon is now home to 69 distilleries, which generated $53 million in annual sales in the state—almost 12 percent of Oregon's total liquor sales in 2011.[183] That sales figure suggests production of at least 1.5 million liters (derived using a high average retail cost of $35/liter). According to Pro Brewer, approximately 222 pounds of grain will support a 600-liter mash, which will yield 32 to 35 liters of pure alcohol, which can in turn be diluted to 80 to 87

[181] "Malting: the latest craft," Dave Thomas, Brewer & Distiller International, 2013.

[182] "Potential for Increased US Malting Barley Acreage," American Malting Barley Association, Inc. 2012.

[183] "Starting Your Own Craft Distillery," OLCC, (n.d).

liters of finished 80 proof spirits.[184] If half of Oregon's spirit production is from grain (as opposed to potatoes or fruit) that suggests a need for at least 2 million pounds of malt annually.

The combined figure of 93 million pounds of malt represents about half of Oregon's annual barley production. Assuming 1:1 ration in pounds of malt to grain, 93 million represents 22,000 to 25,000 acres of production. According to Mike Moran, "Shepherd's Grain's annual production of barley in 2014 was about 11,000 acres. So at the right price there are very real opportunities." However, lack of regional malting capacity makes it unlikely that Oregon barley can be marketed in large quantities to either industry as a local product in the near future.

9.6.4. Retail

US Census County Business Patterns data indicate there were 763 grocery stores. Many grocery stores are outlets of major chains, like Safeway and Kroger, which both carry natural and organic products from local, multiregional, and national companies. As an example, selected Fred Meyer stores in Portland carry Grand Central Baking artisan breads.

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 in Oregon), Zupan's (4 stores), and about a dozen cooperative grocery stores (like People's Food or Oceana Natural Food), that may be interested in relationships with local suppliers.

Figures for consumption of wheat flour, after factoring out flour consumed in the form of bread, suggest grocery stores in Oregon sell a total of 47 million pounds of bulk and packaged flour—an average of 60,000 pounds per store.

Nationally, sales of fresh bread and rolls were $5.8 billion for the 52 weeks ending August 11, 2013. In-store bakeries represent 25 percent of bread sales and reportedly average $1,565 per week per store.[185] That suggests average bread sales per store of $325,000 annually, with an average of $81,380 from in-store bakeries. If artisan loaves represent one-third of sales, at $3 to $4 per loaf, that suggests a need for about 27,000 pounds of flour to supply artisan bread in each store.

Per capita bean consumption and the 75 percent share of dry beans sold through retail, suggests that grocery stores sell an average of about 10,000 pounds of dry beans and lentils annually. It is assumed that 80 percent are sold in processed form (canned, etc.).

If the 80 independent stores in Oregon prioritized local/regional flour in artisan breads and had local/regional flour and dry (unprocessed) beans/lentils representing 50 percent of total bulk and packaged good sales, the resulting

[184] "Whiskey," probrewer.com, (n.d.).

[185] "Ahead of Its Time," Charlotte Atchley, Baking & Snack, 2011.

need would be 4.6 million pounds of flour and 80,000 pounds of dry beans annually.

If the remaining 683 conventional grocery stores had local/regional packaged/bulk flour representing 5 percent of sales and packaged/bulk dry (unprocessed) beans/lentils representing 10 percent of sales, the resulting need would be 2 million pounds of flour and 137,000 pounds of beans/lentils.

The combined total is 6.6 million pounds of flour and 217,000 pounds of dry beans/lentils.

9.6.5. Restaurants

US Census County Business Patterns 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 be engaged in procurement of local products (though primarily through wholesalers).

However, certain categories of casual restaurants, such as pizzerias (17 percent of all restaurants) and sandwich shops, will buy large quantities of flour, prepared dough, or finished breads—and may be seeking to differentiate themselves based on the quality of dough or breads. Portland's 5-store Hot Lips Pizza chain, for example, sources flour from both Shepherd's Grain and Camas Country Mill. Shepherd's Grain lists a total of 34 restaurants in Oregon that source their flour.

If the top 10 percent of pizzerias used local/regional flour, the total need could be for more than 2,000,000 pounds of flour. If the top 10 percent of all full-service restaurants (not including pizzerias) used local/regional flour for in-house baking, that would require an additional 500,000 pounds of flour.

Per capita bean consumption and the 25 percent share of dry beans sold through foodservice, suggests that most restaurants source an average well below 200 to 300 pounds of beans and lentils annually. However, some Mexican-themed fast casual restaurants such as Chipotle and the local Laughing Planet Burrito chain may source significantly larger quantities, potentially well over 5,000 pounds annually per outlet.

If the top 10 percent of full service restaurants and at least 20 Mexican-themed fast-casual restaurants sourced local/regional dry beans and lentils, that would imply a need for at least 200,000 total pounds.

9.6.6. 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 grain and legume purchases from six regional hospitals. Combined, the six institutions representing 1,726 total hospital beds, reported purchasing:

Table 9.12: Purchasing of bean and grain prducts by six hospitals.

Product	Pounds/Yr.
Bread/Rolls	93,645
Tortillas	15,438
Pasta	16,014
Oats/Oatmeal	15,048
Granola	915
Dried Beans	8,676
Dried Lentils	936

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 9.13: Estimated demand for bean and grain products by hospitals.

Product	Pounds/Yr.
Bread/Rolls	325,967
Tortillas	53,738
Pasta	55,743
Oats/Oatmeal	52,380
Granola	3,185
Beans	30,200
Lentils	3,258

The totals for bread, rolls, and tortillas suggest a need for at least 250,000 pounds of flour annually.

Adding the 12,403 beds in Oregon's licensed nursing care facilities would triple the market estimate, but it has not been shown those facilities would follow a similar procurement pattern.

Conclusions should be tempered with the knowledge that price remains a major consideration for foodservice in healthcare. Most grain and bean purchases reported are from large, conventional suppliers, with dry goods reportedly coming from SYSCO and FSA and breads from Franz Bakery. The added value of local products from smaller farm suppliers may not be enough to justify paying a price premium.

However, some hospitals do report purchases from Grand Central and Marsee Baking, which are likely single-serving pastries and rolls destined for cafes and other retail within the institution. In these cases, foodservice managers are able to pass added costs on to the end consumers.

9.6.7. 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 healthier, 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, serves 11,000 breakfasts (24 percent participation) and 21,000 lunches daily (46 percent participation).
Portland Public Schools does list Bakeworks (Vancouver, Washington), Bob's Red Mill (Milwaukie, Oregon), Don Pancho (Salem, Oregon), Roadrunner Pizza (Gladstone, Oregon), Shepherd's Grain (Reardon, Washington), and Truitt Family Foods (Salem, Oregon) as suppliers. The school district has previously specified use of Shepherd's Grain flour in contracts for provision of baked goods. PPS also helped develop and trial a three-bean chili working with Truitt Family Foods.

In 2013, the Bend-LaPine School District (with 24,653 students enrolled) also ordered 12,500 pounds of hard white spring wheat flour and 2,500 pounds of pastry flour from Camas Country Mill.

School nutrition formulas suggest 3.75 pounds of mixed white and whole-wheat flour to provide 50 2-ounce servings of bread/rolls. If bread/rolls from local/regional flour were featured in breakfasts and lunches 8 times per month, PPS would require 2.3 million total servings—in turn requiring 173,000 pounds of flour.

One pound of dry beans yields 6 cups of cooked beans. Each cup serving contains about 15 grams of protein (approximately 0.5 ounces). If lunches featuring a one-half-cup serving of cooked beans were offered twice a month through the school year, PPS would require 378,000 servings—requiring 31,500 pounds of dry beans.

Extrapolating to the 567,000 students enrolled in districts across Oregon suggests a need for 2,130,000 pounds of flour and 388,000 pounds of dry beans.

Extending that scenario to the approximately 190,000 students enrolled in Oregon universities and colleges suggests a need for 762,000 pounds of flour and 130,000 pounds of dry beans.

The combined total is 2.9 million pounds of flour and 518,000 pounds of dry beans/lentils.

9.7. Demand Summary

Combining the estimates provided for retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for 9.3 million pounds of malt, at least 16.4 million pounds of flour, and about 1.4 million pounds of mixed legumes. The total represents 10 percent of malt barley, about 8.8 percent of flour, and about 14 percent of legumes consumed in Oregon.

The breakdown by channel for flour is as follows:

- Retail: 40% ~6.6 million lbs.
- Manufacturing 25.5% ~4.2 million lbs.
- Education: 18% ~2.9 million lbs.
- Restaurants: 15% ~2.5 million lbs.
- Hospitals: 1.5% ~250,000 lbs.

The breakdown by channel for legumes is as follows:

- Education: 38% ~518,000 lbs.
- Manufacturing 29% ~400,000 lbs.
- Retail: 16% ~217,000 lbs.
- Restaurants: 15% ~200,000 lbs.
- Hospitals: 2% ~32,500 lbs.

9.8. Oregon Small Grains and Legumes Production

The 2012 USDA Census of Agriculture shows a total of 2,479 farms in Oregon with sales of grains, oilseed, dry beans, and/or dry peas. Associated production was reported as follows.

Crop	Farms	Acres Harvested	2012 Bushels	Lbs./ Bushel	2014 Pounds	% OR Consumption
Wheat	1,968	906,013	57.5 million	60	3.45 billion	1,865%
Winter Wheat	1,653	782,209	49.7 million		2.98 billion	
Spring Wheat	648	122,897	7.8 million		468 million	
Durum Wheat	7	907	57,700		3.5 million	19%
Rye	17	876	16,700		1 million	133%
Oats	271	18,899	1.65 million	32	52.8 million	677%
Barley	335	53,898	3.9 million	48	187 million	170% (for food)
Dry Beans	116	10,742			264 million	2,640%
Dry Peas	61	8,885			196 million	13,000%
Lentils	4	(D)			~150,000	

Table 9.14: Estimated Oregon production of grains and beans.

9.9. Segmentation

Oregon is fortunate to have a community of growers for wheat, rye, oats, and barley that is well diversified by scale, with many midsized and smaller-scale operations that could potentially benefit from branding and local/regional marketing strategies. For example, there are 109 midsized oat growers (harvesting 25 to 99 acres) that represent 34 percent of Oregon's production.

USDA Agricultural Census data does not provide segmentation for growers of dry beans, peas, or lentils.

9.10. Support Infrastructure for Small Grains and Legumes

The majority of firms in the region cleaning, packaging, processing, and/or trading seed and grain crops are oriented to commodity export.

9.10.1. Commodity Wholesalers

The County Business Patterns Survey shows Oregon firms trading in grain and dry beans.

By # of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Grain & Bean Wholesalers	50	23	12	8	3	2	2

Table 9.15: Grain and bean wholesalers by number of employees.

9.10.2. Seed Cleaning Capacity

A survey of eleven regional seed-cleaning facilities commissioned in 2014 by Shepherd's Grain had operators reporting the region is at or near capacity for cleaning pulse and seed crops. There are typically only narrow or seasonal opportunities for toll processing. Furthermore, there is very limited capacity for identity-preserved processing (requiring chain of custody for small-batch processing and dedicated storage) or for handling of specialty crops (such as teff, the grains of which are so small that they leak out of conventional processing lines and storage facilities).

9.10.3. Milling Capacity

The County Business Patterns Survey shows Oregon firms milling grain and oilseeds.

By # of Employees	Total	1-4	5-9	10-19	20-49	50-99	100-249
Grain and Oilseed Milling	15	5	2	2	4	1	1
Flour Milling	4	2	0	0	2	0	0
Rice Milling	1	1	0	0	0	0	0
Malt Manufacturing	1	0	0	0	1	0	0
Soybean and Other Oilseed Processing	2	0	1	1	0	0	0
Fats and Oils Refining and Blending	2	0	0	0	1	1	0
Breakfast Cereal Manufacturing	5	2	1	1	0	0	1

Table 9.16: Grain and oilseed milling establishments by number of employees.

9.10.4. Distribution

A number of regional brokers and distributors have expressed interest to Ecotrust and to growers in securing additional supplies of regionally grown grains and legumes, including Glory Bee Foods, Hummingbird Wholesale, and others.

9.10.5. Markets for Animal Feed

Ecotrust's analysis of potential for development of local/regional chicken and hog production in Oregon suggests a need for at least 134 million pounds of animal feed. This suggests opportunities for synergy between regional seed and legume growers, seed cleaning and milling facilities, brewers and distillers, and processing, retail and possibly other waste streams.

9.11. Paths Forward

A 2010 Agricultural Marketing Service study concludes that for farmers,

> "the investment required to grow grains for human consumption is both that of learning how to produce food-grade grains and accessing

> or purchasing the equipment and facilities to clean, dry and store them. Farmers need to market their grains at a price that covers their investment in education and capital. Millers need customers who are willing to deal with the potential inconsistencies of flours milled from locally grown grains. Bakers need to understand the unique characteristics of local flour and how to work with it, and be comfortable with the inevitable growing pains associated with an expanding market. Finally, consumers need ways to support bakers when product availability fluctuates."[186]

There appear to be a number of potential paths for further development of local/regional grain and legume food enterprises in Oregon.

9.11.1. Vertically Integrated Small Farm/Processor/Direct Market Model

Entities like Lonesome Whistle Farm and Green Willow Grain demonstrate a "hyper-local" approach, which offers close connection to a specific farm, and access both to unique products and to products with unique characteristics and story. Lonesome Whistle markets exclusively direct to consumers. Green Willow has also placed organic, branded, packaged products in select retail stores.

Despite the efforts of Willamette Food and Farm Coalition and others to organize "Fill Your Pantry" events and otherwise facilitate purchasing, such hyper-local products remain relatively difficult to procure and significantly more expensive than more readily available alternatives. In addition, while home cooks and bakers may value variability in availability and characteristics of products as a sign of authenticity, this makes it difficult for most commercial entities to incorporate these products in supply chains.

Ecotrust has estimated there may currently be less than 100,000 pounds of wheat flour and 50,000 pounds of dried beans sold direct to consumers annually by Oregon farmers. There may be opportunities for both growth and replication of existing farm-direct businesses. There are a number of entities around the state interested in development of very small-scale milling and seed cleaning capacity—and equipment at the scale that Lonesome Whistle Farm operates is both available and reasonably affordable. Consumer interest seems likely to support hyper-local options where they are not now currently available.

However, given the limitations of the model, Oregon consumption of single source products seems unlikely to exceed 0.25 percent of wheat flour (500,000 pounds, five times over current estimate) or 1 percent of dry beans (200,000 pounds, four times over current estimate).

[186] "From Farm to Bakery," Sarah Johnson, New State Department of Agriculture and Markets, 2012.

9.11.2. Vertically Integrated Farmer-Entrepreneur and Supply Partner Model

Camas Country Mill processes and markets products both from owner Tom Hunton's farm and from three other partner farm suppliers. Camas Country Mill has entered distribution through Hummingbird Wholesale and is also selling to institutions such as schools. The supply partner model facilitates achievement of scale, however goods remain priced a significant margin over conventional alternatives. Tom Hunton has also expressed intent to limit growth of the business and geographic distribution of products as part of his personal belief in the meaning and value of "local."

Absent the artificial constraint set by the owner, there may be opportunities to grow Camas Country Mill or replicate the model on a limited basis. However, during start-up such a business may face competition from hyper-local competitors (as above), and as the business achieves scale, it will face increasing competition from the entities described in the following two sections.

9.11.3. Brand/Distributor Coordinated Supply Pool Model

With connections to retail and consumer-buying-club accounts in western Oregon and in select cities from San Francisco, California, to Bellingham, Washington, distributor Hummingbird handles significant quantities of a wide diversity of products. Hummingbird has a growing network of farmers in and around Oregon that grow specialty grain and legumes to meet the company's needs—but with increasing demand the company reports ongoing shortages for various organic wheat varieties, dry beans and lentils, sprouting seeds (such as alfalfa), spelt, teff, sunflower seeds, and wild rice.

Farmers contracting with Hummingbird find a reliable market paying a fair price for high-quality products, and have received encouragement and support to conduct trails of new crops varieties and cropping systems.

With its existing farm supplier pool and significant experience with specialty grain, legume, and seed varieties, Hummingbird will likely enjoy a competitive local market advantage in those categories for the foreseeable future. Hummingbird has secured investments from Lane County Economic Development and from RSF Social Finance. Their network of existing customers, product diversity, and volumes allow them to incorporate new, unique, and limited-quantity items cost effectively. Larger broadline distributors, in contrast, will have no choice but to source commodity versions of those products nationally and internationally. As a result, Hummingbird seems well positioned for continued growth

9.11.4. Farmer Owned Joint Marketing Value Chain Model

Columbia Plateau Producers (CPP) markets wheat for Shepherd's Grain brand flours, which are in turn marketed to West Coast manufacturers, bakeries, restaurants, and food service companies. The brand is also extended to marketers of packaged baking mixes and retail flour. Since 2002, Shepherd's Grain has grown from its two founders to include nearly sixty farm families

in Oregon, Washington, California, Idaho, and western Canada. Members are third-party certified by Food Alliance for sustainable practices, including use of direct-seed/no-till. Columbia Plateau Producers has not invested in its own infrastructure to date, but instead has worked through value-chain partners to secure needed storage, milling, and distribution. Sales of wheat for all-purpose, baking, whole wheat and pastry flours totaled $6.5 millon in 2014. Customers have included Bon Appétit Management Company, Grand Central Baking, Krusteaz Baking Mixes, and others. Farmer members have also sold Food Alliance–certified legumes to Central Bean Company and other customers. Shepherd's Grain has significant first-to-market advantage as a farmer-branded, certified-sustainable, regional flour, and seems well positioned for continued growth.

9.11.5. Path Forward

The small farm/processor direct market model and farmer entrepreneur model above seem viable on a small scale, but unlikely to have significant impact on the food system due to inefficiencies and higher product costs. As one producer described, "It is another dilemma of the middle. Small hyper-local can survive on the high premiums a small percentage of consumers will spend, and large scale can work with economies of scale benefits. Like the farm in the middle, the processor in the middle is a tough model."

The other two models incorporate products from farms in Oregon and elsewhere in the region. It is not clear that "Oregon Grown"–branded flour, specialty grain, or packaged dried legume products would be more appealing to consumers and commercial food buyers than the already well-received local/regional options offered by Hummingbird Wholesale and Shepherd's Grain.

Rather than investing in start-up and development of competing Oregon brands, it seems more strategic to invest in continued growth of Hummingbird Wholesale and/or the Shepherd's Grain brand and their ability to incorporate additional Oregon farmer suppliers and members. (Full disclosure: Amanda Oborne of Ecotrust is now a member of the Shepherd's Grain board of directors.)

9.12. Conclusions

There appears to be meaningful demand and opportunity to develop new markets for local/regional grain and legume products. Oregon has significant productive capacity in most product categories, and has significant numbers of midsized and smaller growers suited to production of differentiated and branded goods.

Combining the estimates provided for manufacturing, retail, restaurants, hospitals, and educational institutions suggests there is potential demand in Oregon for 9.3 million pounds of local malt, at least 16.4 million pounds of local flour, and about 1.4 million pounds of mixed local legumes. The total represents 10 percent of malt barley, about 8.8 percent of flour, and about 14 percent of legumes consumed in Oregon.

Farmer-members of Columbia Plateau Producers have been successful developing value-added markets for wheat grown in direct-seed/no-till systems. However, realizing the full environmental and productive benefits of those systems requires rotations of other grain, seed, and pulse crops. The challenge to maximizing economic returns and ensuring financial sustainability is developing value-added market opportunities for all the crops in those rotations.

With that in mind, for development of the regional food system, investments in milling capacity to increase local/regional flour production are probably secondary to investments in seed cleaning and storage, pressing of oil seeds, and other infrastructure to support marketing of products other than wheat.

Priority opportunities may include:

- Malting facilities to enable development of identity-preserved specialty malts for the brewing and distilling industry.

- Seed cleaning and storage facilities to enable expanded production and marketing of identity-preserved heritage and specialty grains, and dried beans and lentils.

In addition, Ecotrust's analysis of potential for development of local/regional chicken and hog production in Oregon suggests a need for at least 134 million pounds of animal feed. This suggests opportunities for synergy between regional seed and legume growers, seed cleaning and milling facilities, brewers and distillers, and processing, retail and possibly other waste streams.