RETURNING GRAIN TO THE LOWER-WILLAMETTE VALLEY: PROSPECTS AND BARRIERS FOR LOCAL FOOD SECURITY

By

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ABSTRACT

A critical link is missing between food production and food consumption. This gap can be overcome by encouraging the production of staple food crops and emphasizing regional and community consumption of locally produced food. In order to re-establish local food security in the Willamette Valley, it is imperative that essential infrastructure be re-established in support of local food production and processing. To increase local food security, production of food crops within agricultural communities must increase, and grain infrastructure must be built to efficiently process locally grown grain. Using the case of the lower-Willamette Valley, this research seeks to answer three questions: 1) how has the agricultural history of grain crops and grass-seed in the lower-Willamette Valley changed since the European immigration, and does this history support a transition to grain crops; 2) what are the barriers to transitioning to grain crops in support of increased food security in this region; and 3) how does grain production, processing and infrastructure fit into the region's long-term food security and sustainability goals. These questions are answered by conducting a literature review to reveal the rise and fall of both grain and grass-seed in the region, and additionally using remotely sensed images to visually expound on the changed agricultural landscape of the lower-Willamette Valley for three consecutive decades. Interviews and focus groups with regional grass-seed and grain farmers illuminate numerous barriers to transitioning to grain crops. Lack of grain infrastructure was noted as a major barrier to increasing food security through local food production. In order to illustrate the connection between grain infrastructure and food security, ArcGIS is used to map out grain infrastructure within the study area. Lastly, the imagery of the changing landscape and the grain infrastructure map are examined in conjunction with community food security and sustainability goals in the cities of Eugene and Corvallis, Oregon to assist these

communities in reaching their food security and sustainability goals. This research determines that re-energizing the Willamette Valley grain-market by way of the local food security and community sustainability efforts is only effective if done collaboratively between farmers, local businesses, city and county leadership and the community because of the innate difference between the national-international market where grass-seed is prevalent and the local-regional market of grain.

Key Words : *Agriculture, Community Food Security, Food Production System, Foodshed, Grain Infrastructure*

"Food production, in all its diversity, will remain the single most important form of human land use, and in the centuries to come, the vast majority of our calories will continue to be produced on land." Louise Fresco, 2009, pg 4

1 INTRODUCTION

Prior to the globalization of food production and distribution in the 20th century, the Willamette Valley was largely self-reliant concerning regional food security. However, in response to the industrial revolution and a shift in U.S. government emphasis in support of centralized large-scale food production, grass-seed became the dominant crop in the region. More recently, increasing concerns related to the economy, health, unpredicted catastrophic events, a changing climate, and aspirations for decreased reliance on fossil fuels and more environmentally sustainable practices are encouraging communities in regions like the Willamette Valley to diversify and to return to the food crops once grown in the area. The Willamette Valley boasts a favorable climate for growing a diverse array of vegetables, beans and grains, and is especially conducive to cool season and winter crops due to the mild and wet winters. However, the number of grain processing facilities and infrastructure began to decline between the 1940's and 1970's as the global food market introduced cheaper food than could be produced in the Willamette Valley. Larger industrial and mechanized agriculture with centralized processing facilities became standard, and regional grain

infrastructure shut down (Pimentel, 2008). At the time, grass-seed was a more economically viable alternative to growing grain. The Willamette Valley became the self pronounced *"grass-seed capital of the world."* Smaller, self-sustaining farms were replaced by larger, conventional grass-seed farms for which the valley is now known. Today, the grass-seed industry is in the midst of an economic downward spiral, and farmers are debating how to respond to the flooded grass-seed market and decrease in demand for grass-seed.

One suggestion is a return to staple food crops such as grain, which would help satisfy regional long-term food security, as well as help revitalize community economic sustainability by strengthening the relationship between producers and consumers and keeping money local (Evans, 2002; Feenstra, 1997; Niles, 2008; Winter, 2003). There is a market for locally produced grain. People are interested in buying local for reasons relating to health, food quality, food safety, animal welfare, environmental sustainability, and social equity (Niles, 2008; Winter, 2003). The process of producing foods locally is more transparent; consumers can visit the farm and know whether or not the food was sustainably produced. While a market for local grains exists, barriers prevent the proliferation of grain production, including the lack of infrastructure, stringent federal food regulations, social expectations and economic constraints. Grain storage and processing facilities no longer exist locally to process and store grain at a commercial capacity. Products which incorporate locally grown grain are not generally available or convenient for purchase by local consumers. If locally grown grain is going to successfully compete with imported commercial grain products, identified barriers like re-establishing regional grain infrastructure must addressed.

1.1 Purpose of Research

The purpose of this research is to identify barriers toward the establishment of local sources of grain in the lower-Willamette Valley and to create a map of the grain storage and processing facilities as part of the greater regional food infrastructure in the region. This information will be useful for local policy-makers and other interested stakeholders to achieve the overarching goal of increased food security in the lower-

Willamette Valley. The food security and sustainability goals of both Eugene and Corvallis, being the two largest communities in the lower-Willamette Valley, will be reviewed to gauge the plausibility of increasing regional reliance on locally produced grain. The data compiled will become part of *The Southern Willamette Valley Bean and Grain Project* headed by the Willamette Farm and Food Coalition (WFFC) and the 10 Rivers Food Web. Their project is designed to evaluate and identify deficiencies within the food system infrastructure of the Willamette Valley and work toward year-round accessibility to locally sourced foods.

1.2 *Terminology*

While much of the terminology used throughout this paper has multiple meanings outside of the context of food and agriculture, it will be defined here as it is intended for this research. *Food security* refers to the idea that a community has a food system which can provide long term access to timely and reliable food sources (Maxwell, 1996; Feenstra, 1997). This research is concerned with community food security rather than individual food security, which primarily refers to poverty-driven access to nutritionally adequate foods. *Community food security* is the ability of a community to cope when faced with economic fluctuations that influence elements of a food system; food systems being the elements that produce, distribute and supply food to its members (Maxwell, 1996). The term *foodshed* describes the physical geographic area on which food is consumed, encompassing the lifespan and travels of food from farm to plate and is interconnected with the social and cultural structure of a community (Getz, 1991; Kloppenburg et al., 1996; Feenstra, 1997). *Industrial agriculture* is referring to large-scale, centralized agriculture which is the predominant method of grain production in the United States. Consumers of industrially processed food are considered largely passive and increasingly located long-distances from the food's origin (Morgan, 2000; Norberg-Hodge, 2002). *Local-food* is generally equated with social empowerment and environmental action, because the producers and consumers have opportunity to play active and influential roles within a local-food network (Hinrichs, 2003; Morgan, 2000). *Grain infrastructure* refers to the organized system of production, storage and

distribution of grain crops prior to human consumption (Belasko, 2005). For the purposes of this paper, *grain milling* refers only to human consumptive products, specifically bread baking and flour milling which includes meal from all grains except rice (Fujii, 1999). *Community Supported Agriculture* (CSA) is a direct-market partnership between a farm and a local consumer, in which the participants pay up front for their yearly share of food from a given farm, and the producer commits to providing a weekly assortment of food grown on their farm (Hinricks, 2003).

1.3 Study Area and Study Questions

This study seeks to evaluate the potential to meet regional food security and sustainability goals in the lower-Willamette Valley by exploring the history of grain production in the region and to clarify barriers to transitioning from grass-seed to grain crops. Three specific research questions will be explored using the lower-Willamette Valley as the study area:

1) How has the agricultural history of grain crops and grass-seed in the lower-Willamette Valley changed since the European immigration, and does this history support a transition to grain crops?

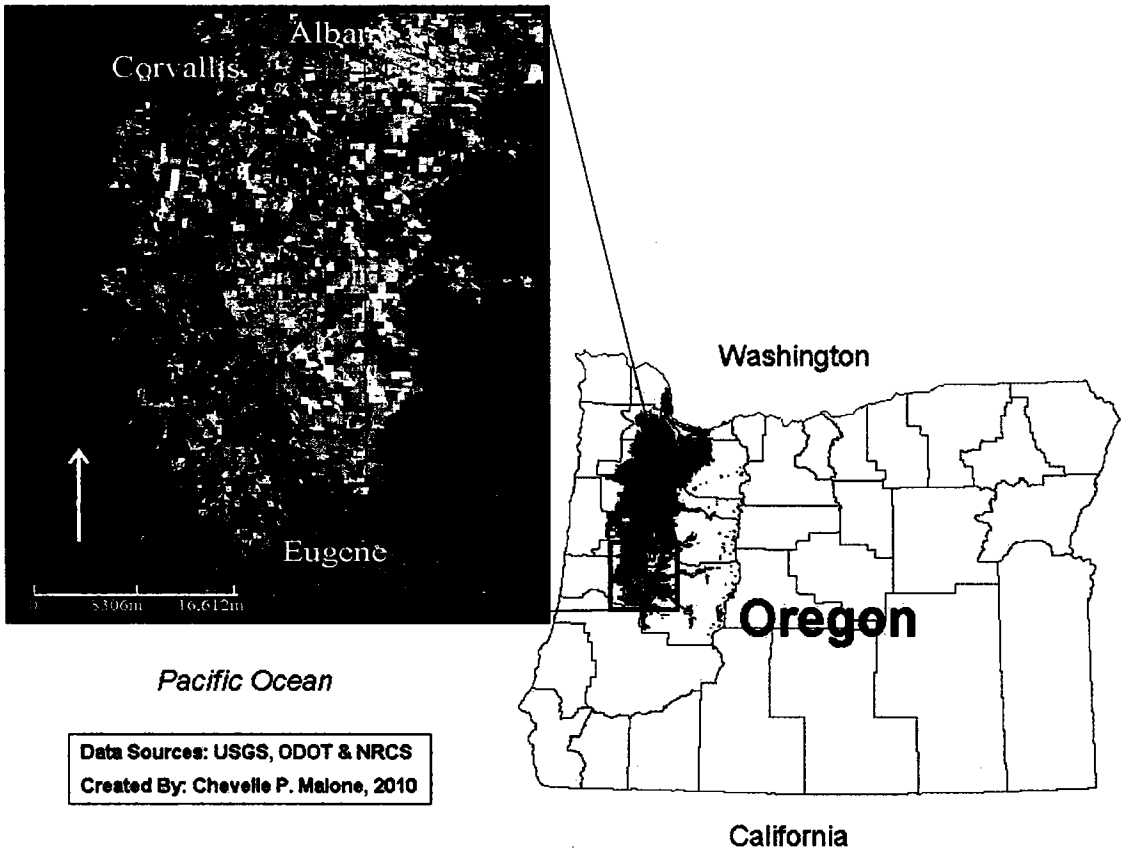
2) What are the barriers to transitioning to grain crops in this region?

3) How does grain production, processing and infrastructure fit into the region's long-term food security and sustainability goals?

The study area (Figure 1) is part of the southern-Willamette Valley and will be referred to as the lower-Willamette Valley for the purposes of this paper. This area was chosen because of its rich agricultural history and conflicting affiliation with the declining commercial grass-seed market and the developing interest in strengthening regional food security. The study area is bordered by the city of Eugene to the south, the city of Corvallis to the north, the Cascade Mountain range to the east and the Oregon Coast Range to the west. The Willamette River runs from south to north, through the length of the Willamette Valley to its confluence at the Columbia River. Political boundaries of significance include the county boundaries of Lane, Benton and Linn Counties. The cities of Eugene and Corvallis are the focus for the regional food

security goals application of this research. The climate is classified as a mid-latitude Mediterranean climate, equating to consistently mild, wet winters and warm, dry summers. This type of climate is advantageous to growing grass-seed, and adaptable to various farm size, scale and intensity level. The lower Willamette Valley is approximately 494,210.76 acres (2,000 sq/km); roughly one third the size of the entire Willamette Valley.

Figure 1 Lower-Willamette Valley Study Area



2 METHODOLOGY & SOURCE MATERIAL

In order to assess how locally grown grain can successfully compete with imported commercial grain products, barriers were identified and evaluated using the following methods: literature review, semi-structured interviews with farmers, focus groups with stakeholders, remote sensing analysis of the study area, and the construction of a grain infrastructure map compiled using ArcGIS.

2.1 Literature Review

In order to establish the agricultural history within the study area, a literature review was conducted to explore the history of grain crops, grass-seed, grain infrastructure and national-international farming policy of the lower-Willamette Valley. Book, articles and historical records were analyzed to delineate the agricultural history of grain in of the lower-Willamette Valley, as well as to identify the regional food security goals in both Eugene and Corvallis, Oregon.

2.2 Remote Sensing

Satellite imagery of the Willamette Valley over the course of three decades was analyzed In order to visually convey land-use changes, specifically any evidence of a shift from growing grain or grass-seed. Landsat Thematic Mapper images taken during the summer months (June-July) across three decades were selected to compare agricultural land-use during the primary summer growth season in the Willamette Valley. The best images available from June or July were selected in order to see the landscape during the peak of agricultural growth, just prior to harvest. The images selected were taken in June 1985, June 1997 and July 2009. Images taken before 1985 were either un-available or of inferior quality, and were not included in the analysis. Data processing techniques include importation of existing Landsat Thematic Mapper imagery into ENVI 4.6 (ITT Visual Information Solutions) utilizing a density slice tool, NDVI (Normalized Difference Vegetation Index) and ROI (Region of Interest) band threshold tool. Atmospheric correction was completed on all images, and bands 3, 4 and 5 were used to most accurately define agricultural features and landscape differentiations (Tucker, 1979; Odenweller, et all, 1984).

2.3 Interviews & Focus Groups

In order to identify the barriers to transitioning to grain crops within the lower-Willamette Valley, semi-structured interviews and focus groups with regional grass-seed and grain farmers were conducted. The focus groups were organized by non-profit organizations and attended by farmers, business owners and interested stakeholders

from within the lower-Willamette Valley community. These focus groups were conducted in the fall of 2009 and spring of 2010. From these focus groups, a purposive sampling approach was used to identify ten interested grain and grass-seed farmers. The interviews were conducted between March and April of 2010 and represented a diverse group of participants who were not restricted by gender, age, or ethnic group (see Table 1). The participants were selected based only on their involvement or interest in grain production. The scale of farm ranged from small homesteading farms (less than five acres), medium sized market-gardens (greater than five, but less than 50 acres) and large-scale conventional farms (anything greater than 50 acres). Farms were located within the study area in the cities of Corvallis, Eugene, Junction City, Shedd, Coburg, Sweet Home, and Tangent.

Table 1 Grain Interviews

	Scale	Total Acreage	Gender/Age	Growing Grain
1	Conventional	>1200 Acres	Male/50+	Yes
2	Conventional	>900 Acres	Male/50+	Yes
3	Conventional	>900 Acres	Female/50+	No
4	Market-Garden	<20 Acres	Male/50+	Yes
5	Market-Garden	<20 Acres	Male/50+	Yes
6	Market-Garden	<20 Acres	Male/50+	Yes
7	Market-Garden	<10 Acres	Female/<35	Yes
8	Market-Garden	<10 Acres	Male/ <35	Yes
9	Homestead	<5 Acres	Male/<35	Yes
10	Homestead	<5 Acres	Male/50+	Yes

2.4 ArcGIS

ArcGIS was used to map out historic and planned grain infrastructure within the study area in order to analyze grain processing infrastructure as a barrier to returning grain to the lower-Willamette Valley. The resulting grain infrastructure map (Figure 4) shows the close proximity of prime agricultural land to grain infrastructure, and is used to illustrate the connection between food production and processing with regional food security. Historical and planned sites for grain processing and storage infrastructure were annotated on the map based on locations identified through interviews and the

literature review. An interesting discovery is that all of the storage and processing facilities are located along the railways for quick turn-around between processing and shipment. Today, there are no commercial grain mills or grain storage infrastructure operational in the lower-Willamette Valley; however, two planned sites are noted on the Lower-Willamette Valley Grain Infrastructure Map and are discussed in section 7.1.

3 PROFILE OF FARMING IN THE WILLAMETTE VALLEY

The following section will broadly explain the agricultural transition between grain and grass-seed in the lower-Willamette Valley. During the early European settlement period, agricultural practices in the Willamette Valley were local in scope and generally concentrated on food production for sustainment. The climate of the lower-Willamette Valley, well known for mild wet winters which became the backbone for high yielding grass-seed in later time, first sustained countless varieties of grain (Al-Falahi, 1964). Wheat and other grains were standard crops grown in the Willamette Valley during the 19th century; however, the development of commercial grain-trading firms and the implementation on national-international policy on grain exporting brought agricultural industrialization to the Willamette Valley (Lerman, 1991). By the late 1800s, eastern Oregon began to dominate the Pacific Northwest grain market. As the Willamette Valley agricultural sector struggled to compete with Eastern Oregon, the U.S. government was also making demands for large-scale quantities of flax in support of World War II for the manufacture of canvas, tents and parachutes for military use. This marks a key event in the Willamette Valley's transition to grass-seed. The lower-Willamette Valley agricultural sector transitioned to take ownership of the then profitable grass-seed industry (Bowen, 1978).

3.1 Historical Timeline

Historian A.G. Walling illustrated the productivity and diversity of the Willamette Valley's food capabilities in 1884 by painting a picture of productive soils yielding a variety of grains such as: hops, wheat, oats, barley and flax (Walling, 1884; Rackham, 2002). Wheat was touted as a staple agricultural product and was popular in grain

markets throughout the world (Walling, 1884). Wheat was the most important agricultural product produced in the Willamette Valley in the mid-1800s (Bowen, 1978). Wheat is considered a staple crop because of its high nutritional value and long storage life; additionally, its seed can be replanted or sold, and it can be used as feed for livestock. Wheat was also a valued commodity as a foreign trade export (Laeth, 1981).

Increased mechanization and efficiency of reaping and threshing equipment were brought about by the industrial revolution. In its infancy, wheat and grain production was inefficient and labor intensive due to the traditional equipment available at the time. Farmers used wooden plows, seeded by hand, and manually separated grains from their stalk and husk with sickles, scythes and hand-held threshers. The first reaping machine debuted in 1831 and they continued to get larger, more powerful, and became more commonplace (Brumfield, 1968).

In 1868, the first wheat was shipped overseas from Portland, Oregon to China (Brumfield, 1968). Transportation of wheat, grains and flour within the state was limited to river freights and horse or mule drawn carriages until the Union Pacific Railroad was completed in 1883, allowing complete movement of wheat and flour from east to west, which lead to an eastern Oregon domination of the wheat industry, coinciding with the dwindling gold mining industry in the south. Eastern Oregon began to dominate the grain market with larger fields and more grain at cheaper prices than the Willamette Valley, and falling export prices of wheat following an economic crash in U.S. from 1893-1896 compelled farmers to find more economical solutions (Johannessen, 1971).

With the development of railroads, the Willamette Valley farmers began to diversify the types of crops they grew to accommodate the growing national-international market. The move toward commercial agriculture coincided with the growing urban non-farming sector (Blok, 1973). The Willamette Valley, previously dominated by smaller, family-sized self-sustaining farms shifted instead to larger farms focused on increasing incomes through greater crop yield. Stationary threshing machines were replaced by the horse-pulled combined-harvester in 1911, and by 1948

threshers were powered by fuel rather than livestock, in the form of tractor-powered combines (Brumfield, 1968). Grain crop production began to decline in response to falling export prices. As dairy farms became more prominent in Oregon, grass-seed production for forage also increased, and grass-seed prices ultimately surpassed grain prices (Blok, 1973). The average farm size and annual yield of commercial crops increased per acre while the total number of farms decreased (Blok, 1999). Grass-seed farming was more amenable to increasing farm-size and yield with lower labor costs. However, the growing number of grass-seed farms also led to an increase in the use of chemical fertilizers and pesticides (Blok, 1999).

From 1936-1950 grass-seed production surged. In 1936, there was an estimated 24,275 acres of grass-seed grown in Oregon and by 1948 that number increased to an estimated 116,780 acres, an increase of nearly 500% (Economics of Grass Seed Production, 1950). The Willamette Valley was ranked the number one producer of grass-seed in the country (Economics of Grass Seed Production, 1950). This surge in the grass-seed industry was in part spurred by World War II. The fibrous materials were used to make rope, parachutes, canvas and tents for soldiers fighting overseas. The surge was also related to a rising national interest in soil conservation, which grass-seed was purported to address. While the growth in the grass-seed industry began to level out by the 1950s, it was deeply embedded in the agriculture of the lower-Willamette Valley.

Research in the 1950s was focused on decreasing cultivation and production time, increasing yield and profitability, and the introduction of more grass and forage seed varieties (Oregon's Agricultural Progress, 1952). Grass-seed was used across the country; forage grasses were used to provide pasture and hay for livestock and as cover-crops to prevent soil erosion, and turf grasses became popular for landscaping in urban areas for businesses and residential areas (Ehlke, 1990). The types of grass-seed grown in the Willamette Valley are primarily related to landscaping (turf and lawn) and farming (pastures and intermittent cover crops): common rye grass, perennial rye grass, chewings fescue, Alta fescue and highland bentgrass. In 1950, a Tall Fescue breeding

program was initiated, which is a breed of grass-seed used in turf, pastures and lawn (Oregon's Agricultural Progress, 1950). An estimated 80-90% of the grass-seed produced was sold to non-Oregon residents (Oregon's Agricultural Progress, 1950).

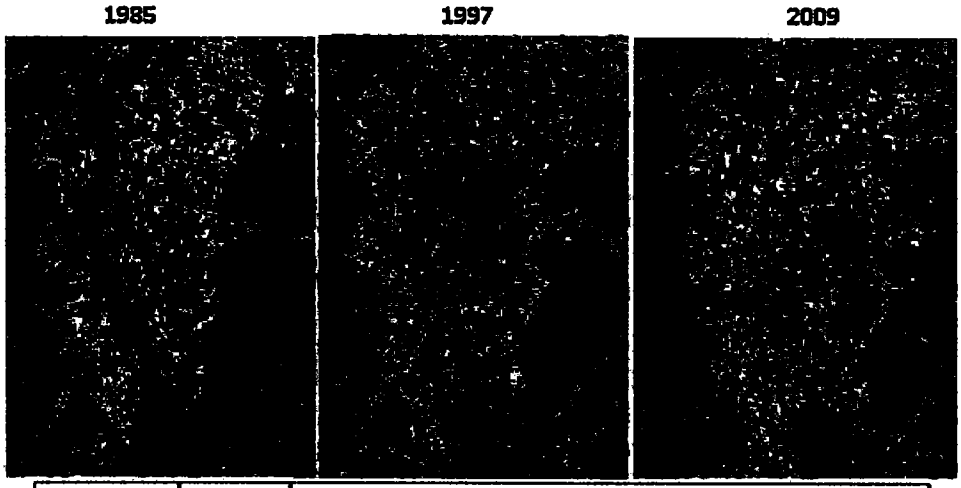
By the 1960's, wheat was still considered a major income producing crop, with new high yielding varieties being introduced combined with increased use of nitrogen fertilizers and chemical pesticides (Rossner, 1968). A study done at Oregon State University found that the irrigation practices common in western Oregon wheat farming were unnecessary in the Willamette Valley which would seem to make wheat a promising crop choice (Al-Falahi, 1964; Rossner, 1968). A University of Illinois publication dated 1981 cited wheat as "the most important food grain produced in the United States" (Laeth, 1981, 1). However, the foothold established by grass-seed did not abate.

By 1983, grass-seed was considered the primary agricultural land-use in the lower-Willamette Valley and had the highest most economic value (OSU Extension). Grain, while still listed as one of the top three agricultural products in the Northern Willamette Valley was no longer registered as primary crop in the lower-Willamette Valley (OSU Extension). In 1998, Oregon was ranked 14th nationally for wheat production, growing 2.5% of all U.S. wheat; more than 92% was grown in Eastern Oregon using irrigation while less than 8% was grown in the Willamette Valley without irrigation (USDA, 1998).

Since 1985, the agricultural use of land in the lower-Willamette Valley has continued to expand (see Figure 2). Figure 2 shows side-by-side land-use comparisons over the course of three decades of the lower-Willamette Valley. The imagery depicts a small, 1-2% expansion of agricultural and urban areas into the forested landscape to the east and west (Table 2). Of more interest is the level of vegetation during the summer months, which provides evidence for shifting agricultural patterns. More healthy vegetation existed during the summer of 1997 and 2009 than existed during the summer of 1985. Additionally, the study area shows 51% of bare earth or urban area in 1985, while in 1997 and 2009 the percentage goes down to 30% and 26% respectively (Table 2). Urban growth was not reversed in the last 30 years, so the likely answer is

related to the harvest time of different crops. Grass-seed is harvested in July/August, but grain crops like winter wheat are harvested a month or two earlier in the June/July timeframe. This data illustrates the likelihood that more grain crops were grown in 1985 than today, which corresponds with historical records of a continued decline in grain crops in the lower-Willamette Valley.

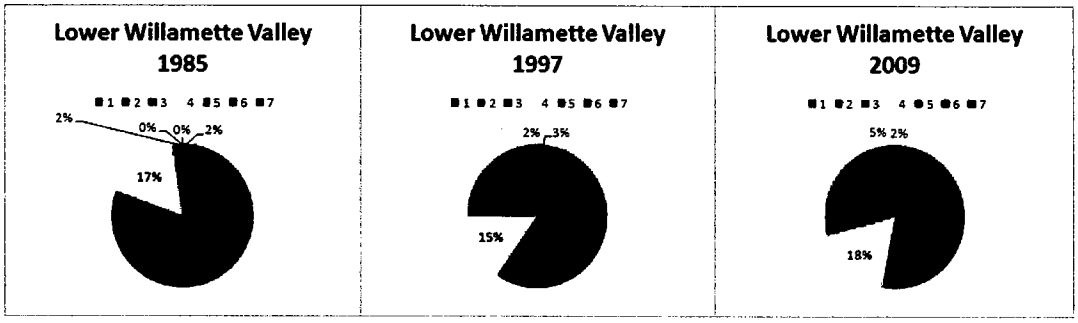
Figure 2 Lower-Willamette Valley Land-Cover Classifications



Value/Pixel	Color	Feature
0-30		Water Body
31-62		Mountainous Forest Landscape
63-94		Bare Earth (Harvested Agriculture or Urban Area)
95-126		Agriculture (Seedling/Beginning Growth)
127-158		Agriculture (Intermediate Growth)
159-190		Agriculture (Nearly Harvestable)
191+		Harvestable Full Grown Vegetation

Data Source: USGS Created By: Chevelle P. Malone, 2009

Table 2 Land-Cover Classification Breakdown



3.2 Farming Today

The grass-seed revolution is in sharp decline due to an economic downturn and departure from grass-seed demands nationwide, and farmers are struggling to find their place in the modern market. Recognizing a need to change the agricultural focus in order to avoid future economic crisis, the Oregon Department of Agriculture organized a meeting in the fall of 2009 to generate an informative discussion between farmers, planners and other interested stakeholders in the Willamette Valley. Given the existing over-stock of grass-seed in the market, farmers must transition to alternative crops or risk further economic crisis. The meeting allowed farmers to discuss alternative agricultural possibilities, as well as to connect state planners with the agricultural community. The participants discussed the need to diversify and move to organic crops to take advantage of the growing interest in local and sustainably produced food.

4 WILLAMETTE VALLEY GRAIN INFRASTRUCTURE

Grain infrastructure is a necessary component that connects producers to consumers; it transforms inedible seeds into versatile and substantial foodstuffs in a commercially viable capacity. The following section highlights the development and eventual demise of grain infrastructure within the lower-Willamette Valley, and includes a supplemental Grain Infrastructure Map (Figure 4).

4.1 Grain Transportation

Transportation is a primary element of food system infrastructure; it is the system with which grain is moved from the field to the processing site, and on to temporary storage, packaging and final shipment to the consumer or retail outlet (Pimentel, 2008). Initially, grain was transported in individual sacks by wagon, but farmers found it was more economical to transport grain in bulk. Trains and barges became the primary method for transporting grain until paved roads and vehicles improved enough to provide competition (Oregon Wheat Commission, 1972). This competition between trucks and railroads forced railway systems to modernize and gain efficiency. Oregon's port on the Columbia River moved soft white wheat short distances between Oregon

and Washington State (Leath, 1981). By the 1970's grain was primarily transported by truck, railroad and by barge in Oregon; with barges being the primary mode of transportation due to the proximity and extensiveness of the Columbia River Port (Leath, 1981).

4.2 Grain Storage Infrastructure

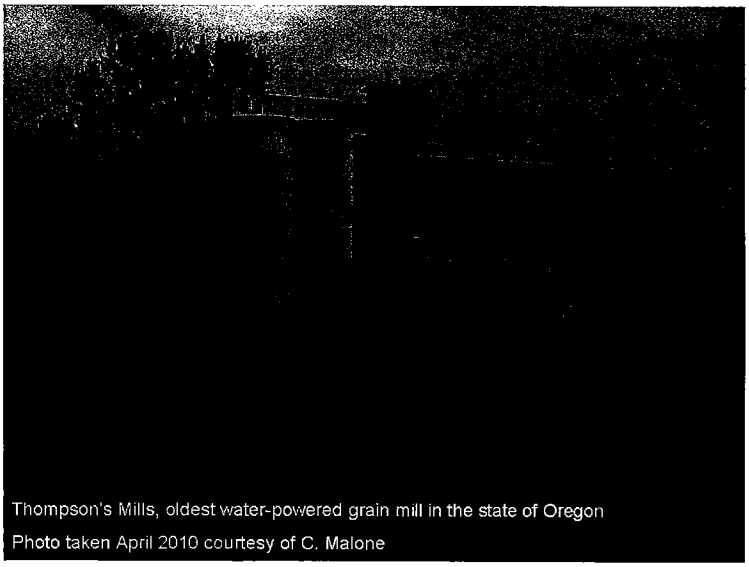
The transition to transporting grain in bulk in the 1920s required a system of elevators to temporarily store all of grain. Grain elevators were used to store and combine grains, which allowed various quality and grades of grain to mix together. This is no longer permissible under current national regulatory statutes of traceability and quality assurance (Elbehri, 2007). The three types of elevators used for grain storage are called: country, terminal and port elevators; each one representing a particular stage of temporary storage in the transportation process (Laeth, 1981). In 1972, grain elevator operators transitioned from primarily local-regional ownership to nationally owned and operated firms (Ollinger et all, 2005). Today, only ten country elevators and export facilities exist in the state of Oregon that can transport, ship and store wheat for commercial transportation and sale. They are located outside of the lower-Willamette Valley, along with Willamette and Columbia Rivers, and are used primarily for national-international export. The closest grain elevator to the lower-Willamette Valley is located 26 miles north of Corvallis in the city of Rickreal, and is the only facility in the Willamette Valley licensed to store and transport organic wheat.

4.3 Grain Processing; the Grain-Milling Industry

The first flour mills in Oregon were established in 1835, but weren't available in the lower-Willamette Valley until the 1850s in response to the gold rush. The gold rush in 1848 is viewed as both an interruption and a stimulator of the agriculture industry in the northwest. Farming men departed south to California to seek their fortune, which stalled both the planting of grain-crops and the potential invention of more efficient agricultural technologies (Bowen, 1978). Commercial flour mills were established in Oregon to provide flour for the mining town communities that sprang up in northern

California and central and southern Oregon (Brumfield, 1968). The first mills in Oregon were powered by oxen. Boston Mills (now Thompson's Mill) was built in 1858 in what was then the town of Boston, near Tangent, OR and was the first water powered mill in the state (Figure 3). Water-powered flour mills use water from a river or man-made mill-race to move large mill-stones which crushed grain into flour.

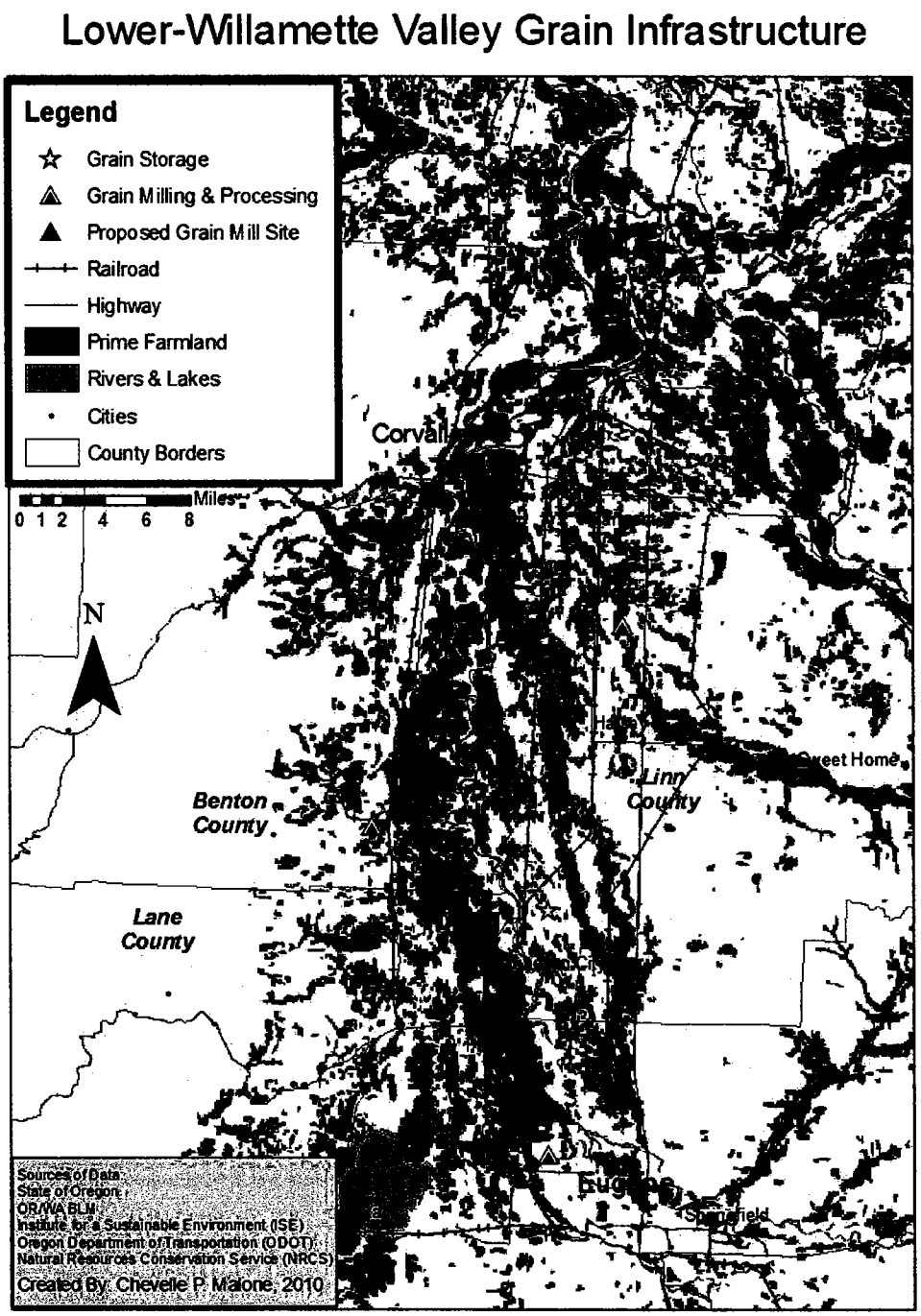
Figure 3 State Heritage Site, Thompson's Mills in Shedd, OR



Thompson's Mills, oldest water-powered grain mill in the state of Oregon
Photo taken April 2010 courtesy of C. Malone

As highlighted in section 3.1, grass-seed production surged while grain production waned between 1893 and 1950. Local-regional scale flour mills began to drop drastically, replaced by larger national firm owned multi-grain flour mills which were double the size and productivity levels of local mills (Ollinger et all, 2005). Grain processing became commercial and centralized; controlled by national and multination grain-trading and industrial-scale cooperatives (Mercier, 1999). By 1978 there were only 265 active flour mills remaining in the United States (Leath, 1981).

Figure 4 Lower-Willamette Valley Grain Infrastructure



5 GRAIN PRODUCTION BARRIERS

Barriers to food production differ in relation to the scale and size of the farm. The large-scale farmers who were interested in selling grain to local businesses found the largest barrier to producing grain was meeting the federally mandated protein levels (see Table 3, U.S. Congress). Smaller farms were more concerned with collecting enough seed to grow a sufficient amount of varied grain crops to meet the demands of their consumers. Each scale of farm has a different consumer in mind; the large scale farmers want big contracts with businesses and universities which require a large and steady supply of physically comparable crops. Smaller farms sell their crops through CSA programs and local food vendors in which case unusual varieties of grain and variations in individual seeds are more acceptable. These and other barriers to transitioning to grain crops in the lower-Willamette Valley were revealed through the one-on-one interviews and focus groups. The general themes threaded throughout the discussions include: infrastructure shortfalls, economic barriers, consumer attitudes and commercial mentality, climate effects on grain, availability of seed varieties and the limiting effects of federal mandates on grain which are discussed in the following sections.

5.1 Federal Mandates on Grain

Commercial grain-trading firms control pricing, contracts and establish grain assessment standards and have power over crop producers and grain processors (Mercier, 1999). The current global-food economy came to be in 1944; when the World Bank, the International Monetary Fund (IMF) and the General Agreement on Tariffs and Trade (GATT) were instituted as overarching regulatory bodies promoting economic globalization (Norberg-Hodge, 2002). Grain standardization mandating nutritional content such as levels of protein and gluten are the measure of grain pricing and commercial profitability. The 1947 Agricultural Act emplaced guaranteed markets and prices for specified agricultural commodities, and required farmers to maximize efficiency and value in return for being allocated tax-payer monetary support (Morgan, 2000). Farmers were pressured to adopt the most productive technologies in order to

keep their overall costs down, which often meant greater mechanization, increased chemical inputs and converting to the least labor-intensive crops (Morgan, 2000). Grain standardization limits the types of grain varieties for commercial sale; farmers with seed from the "undesirable" list are ineligible for government funding and loans, which has had an effect on what wheat varietals are available today (The Wheat Field, 1963). Protective trade polices implemented with the General Agreement on Tariffs and Trade (GATT) followed by the U.S. Farm Bill in 2002 and updated in 2007 have had an enormous impact on the agricultural community. Increasing competition for export markets, need to accommodate re-regulation under WTO mandate (McMichael, 1993; Niles, 2008). National and international regulations on the grain market and the modernization of the U.S. grain system are focused on traceability (chain of custody) and identification preservation; value is strictly related to standard grades and quality standards (Elbehri, 2007). One young man, a garden-market farmer further expressed,

> *"grains aren't really grown in the valley and that's because of the federal law mandating a certain protein level in wheat in order to be made into bread and our soils and climate don't quite meet that requirement. So if you grow wheat that has 10% protein you can't sell it as a commodity, as a high protein wheat flour even though you can still make pretty good bread with it. You just can't sell it to big bakeries, they need an exact USDA nutrition fact, they can't have variability."*

Food processors want consistency, uniformity and reliability in their output products, so they rely on large contracts of trait-specific crops (Elbehri, 2007).

Table 3 Required Protein Levels and Protein Content of U.S. Wheat Classes

Uses		Sources	
Product	Protein content (percent)	Wheat class	Protein content (percent)
Pasta	13 and above	Hard Red Spring	12-18
Hearth bread	13-14	Durum	10-16
Hard rolls	13-14	Hard Red Winter	9-14
Pan bread	11.5-13	Soft Red Winter	8-11
Crackers	10-11	White wheat	7-11
Biscuits	9.0-11.0		
Cake	9-9.5		
Pie crust	8-10		
Cookies	8-9		

Sources: S. Evans, "Wheat: Background for 1985 Farm Legislation," Agriculture Information Bulletin No 467, Economic Research Service, US Department of Agriculture, Washington, DC, 1984, and J. Halverson and L. Zeleny, "Criteria of Wheat Quality," *Wheat Chemistry and Technology*. Y Pomeranz (ed) (St Paul,MN American Association of Cereal Chemists, 1988) Enhancing the quality of US grain for international trade US Congress - Office of Technology Assessment, Washington, DC, 1989

5.2 Infrastructure Shortfalls

There are very few commercial grain processing and storage facilities which still exist in Oregon (see Figure 4), none of which are located in the lower-Willamette Valley. One woman, conventional grass-seed farmer said,

> *"with no food processing capabilities, it's just not economically feasible to grow food here and make any profit. You are limited by processing. As the processors leave, so goes the food."*

Flour grinders are available for private purchase for $200-$500, and are available for shared use at several grocery stores in Corvallis and Eugene. Fresh-milled whole-grain flour is more nutritious than commercially processed flour because the germ and bran are not removed; however, it has a short shelf-life of two weeks if not kept in a freezer. Individual flour grinders are for home use and not suitable for processing large amounts of grain for steady distribution to a community of people, businesses and restaurants. Bakeries that use local wheat are forced to have it processed in Eagle Point, OR, 172 miles south of Eugene because it is the closest commercially legal flour mill in the state of Oregon. The bread boasts a "100% local" tagline because it was made with wheat grown in Eugene and baked fresh in Eugene; however, it is not necessarily sustainable to transport the wheat 172 miles each way. The farmer and the bakery owner who jointly produced and sold the local bread were not seeing profit, but were proud to see wheat from the lower-Willamette Valley transformed into an edible product. The evolution of this process took two years to develop. A similar feat is occurring in Corvallis; locally grown wheat was processed into flour as a trial for a few local restaurants in April, 2010. Unfortunately, without a local mill, the grain has to be ground in individual increments at a local grocery store, which in not conducive to commercial retail. Farmers need a grain mill and storage facilities to provide a consistent supply of grain products and flour to local businesses.

5.3 Economic Barriers

Economic barriers are major obstacles in transitioning to grain. The financial burden for changing crops, getting new equipment and processing different crops to

meet the changing market falls on the farmer. Increasing energy prices equate to higher costs for both grain crops and grass-seed; however, grain is lower yielding, has to be transported farther for processing and is more labor intensive to reap than the homogenous grass-seed, meaning grain costs more to produce (Fresco, 2009). One commercial grass-seed farmer stated,

> *"Almost every single grain for example requires a different processing method that requires an additional piece of equipment. Each piece of equipment on average can be anywhere from 15-30k. A farmer for example might need 100K of capital investment just to be able to de-hull, clean, crush or grind the product."*

Additional costs for grain quality testing to verify the protein levels meet federal regulations increase spending further (Elbehri, 2007; U.S. Congress, 1989). To sell flour as a commodity it must meet specific physical characteristics, most notably the protein levels.

5.4 Climate Effects and Seed Varieties

The climate of the lower-Willamette Valley is more conducive to growing soft white wheat, the highest yielding grain variety in the region. Unfortunately, soft white wheat is not as popular in the Pacific Northwest; its characteristically low protein levels are more suitable for making pastries, crackers and flatbread rather than bread (Winn, 1991; Laeth, 1981). Hard white and hard red wheat varieties generally have higher levels of protein and are used in the production of bread flour, but are more difficult to grow in large quantities in the lower-Willamette Valley (Laeth, 1981; U.S. Congress, 1989). The climate also affects protein levels of wheat in the region and farmers initially found it difficult to get consistently high enough levels of protein to meet protein level requirements for wheat in the U.S. (see Table 3). Additionally, Federal laws mandate that commercially sold or used flour must be enriched with vitamins and mineral, which is not necessary at the local or small-scale processing facilities unless the bran and germ are removed as with commercial milling (Lin, 2005; U.S. Congress, 1989).

The Willamette Valley climate wheat yield and protein levels; farmers discussed the time and effort devoted to find different seeds to produce unusual varieties of grain,

and then experimenting with these varieties over time to develop seeds more acclimated to the climate that are higher yielding and have appropriate protein levels. Depending on the availability of the particular grain seed, it can take years to accumulate a sufficient amount of seed to produce consistent amounts of grain for commercial use. A young woman just starting up her market-garden scale grain and bean farm stated,

"it's hard to find seeds and it will take us 6 years to build up enough..."

However, through experimentation of different grain varieties, the barrier related to climate can be overcome. The experiments discussed in the next section show that the seeds are adaptable and will grow in lower-Willamette Valley climate, but their yield was half or less than that of the more commonly grown soft white wheat, and these new varieties are unfamiliar to most consumers.

5.5 Consumer Attitudes

Innovations in industrial processing, technology, and logistics and communication have changed the face of agriculture in the lower-Willamette Valley, changing the food-sector beyond recognition to the point where food is mass-marketed as a commodity (Elbehri, 2007; Morgan, 2000). Thinking of food as a commodity rather than a basic nutritional staple rapidly shifted consumer preferences and created a gap between consumers and producers. This divide between producers and consumers is blatantly stated in the Oregon Wheat Commission's opening statement in their 1971-1972 annual report,

> *"We a have gap in this country that many feel is almost impossible to close. It's the communications gaps between those of us who grow food and those who consume it (Oregon Wheat Commission, 1972)."*

A study conducted in Washington State suggests that the attitudes of local producers and consumers concerning the environment are not consistently connected with supporting a local-foodshed due to the competing factors affecting decision-making by producers and consumers (Selfa, et al, 2008). The separation between producers and consumers is a gap in understanding. The global food market grants

people access to foods from all over the world, regardless of season (Morgan, 2000). Additionally, studies show that Americans prefer processed refined grains over whole grains, which contain the nutrient rich bran, germ and endosperm (Lin, 2005). Commercially produced bread requires a process which removes all colored ingredients, bleaches the flour, and adds preservatives and stabilizers to prevent discoloration and decay (Belasco, 2005). Locally made, non-commercial bread has a shorter shelf-life but has more innate nutritional value and less chemical additives (Belasco, 2005). Consumers are accustomed to commercially produced breads; homogenous loafs, each one looking and tasting exactly the same as its neighbor. Local bread can be free-form or loaf, but each piece looks somewhat unique and the flavor and texture can vary based on variations in baking method and type of wheat-flour used in the baking. Local whole-wheat bread is rich, dense and heavy; seemingly a far distant cousin to any commercial loaf of white or whole-wheat bread.

5.6 Commercial Mentality

Having spent the better part of 60 years in the national-international market of grass-seed, a seemingly obvious barrier internal to farmers is transitioning to a local-regional market mindset, if the goal is to produce grain for the purpose of increased food security. The large-scale mentality of selling grain per bushel or per acre does not translate to regional and local sales of grain (Elbehri, 2007). A commercial grass-seed farmer who has been transitioning some acreage to grains stated,

> *"Once they (farmers) harvest there are a series of issues they have to look at. They have to look at marketing their product, and a lot of farmers aren't used to direct marketing. The conventional farm mode that most farmers have been operating out of for many years now with the way the industrial food system is set up now... where traditionally the farmer doesn't get involved in direct sales and it really requires somebody who can respond to customers."*

Consumers are not generally concerned with the economy of size or the scale of a farm when making decisions related to the price of food, which affects the likelihood a consumer will pay a higher price for locally produced grain (Miller, 1981). Transitioning

to a local mentality means that farmers need to sell their products per pound rather than by the bushel as they did with grass-seed.

6 FOOD SECURITY & SUSTAINABILITY GOALS

Both Eugene and Corvallis have food sustainability goals, and have begun the process of conducting food security assessments for their communities. They have food policy councils and sustainability groups which are actively involved in addressing food security issues, goals and projects. Kara Smith, a former University of Oregon student wrote her thesis on *THE LANE COUNTY FOOD POLICY COUNCIL AND RE-FRAMING FOOD SECURITY* and found that other systems like emergency food systems, alternative food networks, and community supported agriculture have emerged to bridge the gap in the conventional system; however, her work found that the local food systems worked together, but not necessarily in conjunction with the conventional global food network. The goals of interested stakeholders and planners in Eugene, Corvallis and the counties they are located are primarily concerned with increasing community food security; decreasing the percentage of imported conventionally processed food in favor of locally sourced foods. A study in Iowa found that *"small, decentralized, face-to-face direct market initiatives alone cannot sustain very many Iowa producers"* so instead the community in question sought to change the patterns of *"institutional food procurement"* and increase the amount of local food used and make the local-markets standardized (Hinrichs, 2003, 39)." Like the community in Iowa, returning grain to the lower-Willamette Valley is a means to make locally sourced food conventional. The Lane County Food Policy Council was instituted in January, 2006 as a way to address community food security. The non-profit organization, Willamette Farm and Food Coalition, working in conjunction with the Willamette Valley Bean and Grain Project and the 10 Rivers Foodweb have established a community of farmers, venders, wholesalers, bakers and other businesses to re-establish a local food network. Together they educate, plan and organize in a coordinated effort to close the food gap. With these efforts, some farmers have been able to take steps toward developing their own grain mill to support grain processing. Local food retailers are becoming more common;

Hummingbird Wholesale, Eugene Local Foods, Farmers Markets, Co-Op, and various restaurants purporting local food menus which make local food a conventional option for consumers.

6.1 Eugene, OR

Eugene has an enormous local-food influence including wholesale, restaurants and bakeries, farmers markets, online local-food retailers, food processors, community gardens, as well as a supportive city council with food security on the agenda. The Eugene City Council approved a plan to conduct a long-term food security assessment in 2009, for the possibility of future implementation as a long-term food security plan for the area. Eugene is also home to several online local food retailers serving as an alternative way to connect growers and consumers. The Willamette Farm and Food annual publication boasts ten benefits to buying locally grown grain: it tastes better, it's better for you, it preserves genetic diversity, it is GMO free, it preserves open space (as opposed to urbanization of land), it builds community, it keeps money circulating within the community, it conserves energy and reduces our carbon footprint, it keeps local farmers in business and lastly, it is the future. Eugene contains 16 restaurants that utilize between 10-50% locally purchased foods. Only four local farms grow grain for local purchase or for participation in a CSA. Several local bakeries are interested in using locally grown grains if it were made available, but currently only one bakery is producing whole-wheat bread made entirely from locally sourced wheat.

6.2 Corvallis, OR

Corvallis has several sustainable food-groups including Sustainable Corvallis and Corvallis Local Foods, both of which work closely with local farmers markets, food banks, Oregon State University, the city of Corvallis and local restaurants and food co-operatives. The Sustainable Corvallis interim goal states that by 2012, 30% of the food consumed by the Corvallis population will be grown or produced in Benton County using sustainable practices. Corvallis also conducted a community food assessment in 2006 to identify opportunities to rebuild the local food economy and strengthen community

food security using a collaborative process between various stakeholders. The resulting product serves as both a historical look at the regional food-system, as well as a current resource for producers and consumers. It showcases what farmers are growing and producing, highlights consumer needs, and additionally points out the need for local food production and processing for increased production of local foods. Corvallis also boasts the "Local 6" program which promotes the use of food that is grown or processed within the six co-located counties of Benton, Lane, Lincoln, Linn, Marion & Polk.

7 DISCUSSION; OVERCOMING BARRIERS AND RETURNING TO GRAIN

The following discussion will be centered on the ways in which regional long-term food security and sustainability goals can address the barriers mentioned in the previous sections. In general, long-term food security and sustainability goals cannot effect federal regulations, the climate or the availability of unusual strains of grain. What can be addressed through open communication between stakeholders, consumers and policy-makers are infrastructure shortfalls, economic barriers, consumer attitudes and commercial mentality.

7.1 Infrastructure Shortfalls and Economic Barriers

To address the lack of grain infrastructure in the lower-Willamette Valley, several of the large-scale grass-seed farms are in the process of developing commercial grain-mill in Halsey and Junction City, Oregon. The plan for Halsey is to include storage capacity and the ability to process several types of grain. In order to increase the current percentage of local grain in the lower-Willamette Valley foodshed, the complimentary infrastructure to support storage and commercial quality processing must be created. A successful local market and de-centralized foodshed must include commercial knowledge and networking (Morgan, 2000), which is what is happening in the lower-Willamette Valley. Individual producers and small-scale farmers do not play a significant role in national-international markets, which is why they should have a vested interest in promoting grain in the local-regional market where they have

established relationships within the community. Another potential solution can be seen in an example in Spokane, WA; freezer storage space is available for the long-term safe storage of individual or commercial bulk consumable goods. This allows urban dwelling populations to comfortably buy in bulk, which is the cheapest and most common way to purchase local foods such as grain. To address equipment issues, farmers at the focus groups discussed equipment sharing and renting options as well as utilizing a mobile grain-mill in Corvallis.

7.2 Climate Constraints, Seed Varieties and Consumer Attitudes

Some consumers are willing to pay a premium price for specialty "local" foods (Elbehri, 2007). The solution is to introduce these new varieties of grain and more traditional foods by making them accessible and convenient for consumers to try. One way to do this is by experimenting to find out what varieties of grain can be successfully grown in the Willamette Valley, and introducing these varieties to interested consumers. Several farmers in the lower-Willamette Valley began experimenting with different types of grains in 2005 by collecting a variety of seeds sourced from Europe by local seed collectors, as well as old seed strains from several university studies. The farmers experimented with buckwheat, flax, oats, spelt, triticale, barley, and 20 varieties of wheat, four types of rye, four varieties of quinoa and five varieties of amaranth. Each type was attempted over several seasons to acclimatize the seeds. Many of the grain varieties were found suitable for the lower-Willamette Valley climate. Many of these varieties are not commonly used in North American cuisine and are not commercially desirable; however, they have comparable protein values, high amino acid content, and some varieties even providing gluten-free options, which are rapidly gaining public interest.

7.3 Commercial Mentality

A local-regional supply of grain is dependent on the relationship between producers, processors, managers (city, county, state) and the community. Each of these pieces must be in place to plan in advance, and have a fall-back plan so the producers,

the farmers, aren't holding all of the liability. A support structure with planners, community members and businesses working together is the way to re-establish a local-food economy. This has begun in Eugene and Corvallis with the incorporation of local food and grains in several markets and food cooperatives, as well as in farmers markets and restaurants. Communication between stakeholders is slowly bringing local grain back into the lower-Willamette Valley.

8 CONCLUSION

This research sought to answer three questions: 1) how has the agricultural history of grain crops and grass-seed in the lower-Willamette Valley changed since the European immigration, and does this history support the successful transition to grain crops; 2) what are the barriers to transitioning to grain crops in this region; and 3) how does grain production, processing and infrastructure fit into the region's long-term food security and sustainability goals. A literature review and associated map of the grain infrastructure demonstrate the rich agricultural history of grain in the lower-Willamette Valley, which depicts the possibility of a return to sustainable, food based agriculture. The interviews and focus groups illuminated barriers farmers faced in transitioning to grain crops and the barriers producers face in general by being conjecturally removed from consumers. The resulting grain-infrastructure map highlights the historical interconnectedness between consumers and producers; the distance between consumers and producers was much smaller, and all the capabilities to process and store grain were within close proximity.

There are a multitude of reasons addressing why local food sources are beneficial; food security, closer access to and availability of healthy food, localized economic incentive, health benefits, and environmental incentives related to generating a smaller carbon footprint through a shorter food-chain. Industrial agriculture is significantly larger than individual farms and historically considered more efficient and cost effective; however, studies suggest that commercial farming is not always the most financially beneficial (Lerman, 1991). Eating locally, supporting a sustainable foodshed, and having the capability to provide food on a regional level are now on city planning agendas. A

local food supply is important because it provides economic opportunity and addresses food security issues within city-wide risk-management planning. Currently, centralized food production and globalization is the primary means of food distribution for the United States. This effectively limits the control cities have on their foodsheds and is reliant on fossil fuels and external sources to supply the food necessary to sustain communities.

A strong local-foodweb would include produce, dairy, meat and beans and grains, with the appropriate processing linked to each cornerstone: canneries, milk/bottling, slaughterhouse/packing plant and grain mills/storage infrastructure, respectively. An interview with a commercial grass-seed farmer converting to organic grains discussed her part in working to fulfill one of the four cornerstones by not only growing grains, but developing a local grain mill and storage structure. When perusing a copy of the 2005-2006 Oregon Wheat Resource Guide, the first sections that get your attention are the attorneys at law and bank lending listings. The food industry itself is disproportionately comprised of two meager entrees at the end of the directory, neither of which is located in the Willamette Valley. This is striking; not only is food not a focal point, it is merely one small option. In terms of food security, the answer is more complex than one simple solution. Pollan (2006) states,

> *"We may need a great many different alternative food chains, organic and local, biodynamic and slow, and others yet undreamed of. As in the fields, nature may provide the best model for the marketplace, and nature never puts all her eggs in one basket. The great virtue of a diversified food economy, like a diverse pasture or farm, is its ability to withstand any shock. The important thing is that there be many food chains, so that when any one of them fails—when the oil runs out, when mad cow or other food-borne diseases become epidemic, when the pesticides no longer work, when drought strikes and plagues come and soils blow away—we'll still have a way to feed ourselves."*

This research contradicts popular belief; grains can be effectively grown in the Willamette Valley. The soils in the lower-Willamette Valley contain enough moisture for grain to complete its development, however it takes knowledgeable farmers to find what strains and grain varieties are best suited to grow in the region, complementary infrastructure to process the grain and make available in greater quantities, and finally,

clear food security and sustainability goals to educate the community and ensure local grain can be incorporated in the community foodshed (Rossner, 1968).

Current literature has found that the tendency to pit 'local' against 'global' in terms of consumerism and consumption patterns is no longer valid; instead of competing, these concepts are intertwined (Crewe, 1995; Hinrich, 2003; Niles, 2008). By polarizing these two concepts, the interconnectedness of cultural and economic processes is overlooked. There is a place for a local, regional, and global market. Each sub-unit and scale of a community foodshed casts a different net in terms of what and who it supplies, which is an important concept when considering regional food security. Regionally produced foods incorporate culture, history, freshness and provide support to the local economy; a global market supplies a greater variety of products that are contingent upon the regional climate. Additionally, having multiple ways of acquiring food increases your level of food security. Crewe notes that there is a strong sense of identity that local people derive from recognizing their own regionally produced products (Crewe, 1995). The confluence of economic stress, socio-cultural changes, and environmental concerns culminates in the need for a new approach to regional food production. Having a local food supply means that a specific outbreak, like the E. coli outbreak affecting a major supplier of spinach in 2006, would be less dangerous to the general public, and the general situation would be easier to control. A local food supply also helps if a major natural disaster affected a centralized food production facility which would influence not only the local populous, but everyone reliant on that particular food. To conclude, the relevance of this study will contribute to the evolution of long-term food security and sustainability planning. Only through local support and open communications between consumers, policy makers, farmers and merchants to bridge the barriers, will a localized grain infrastructure successfully be established to increase reliance on a regional foodshed.

> *"Soil is a farmer's actual bank... Food values expressed in actual nutrients available in foods per acre are what constitute profit." Harry McCormick, Sunbow Farms*

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Dear Willamette Valley Farmer:

I am a graduate student in the Geosciences Department at Oregon State University pursuing a Master's degree in Geography under the guidance of Dr. Aaron Wolf. I am inviting you to participate in a study dealing with grain production, processing and storage infrastructure capabilities in the Willamette Valley and its significance towards reaching regional food security goals.

You are being invited to take part in this study because we believe your knowledge, experience, and opinions will help us identify and understand (1) grain production, processing and storage infrastructure capabilities in the Willamette Valley; and (2) barriers towards reaching regional food security goals within the Willamette Valley.

If you agree to participate in this study, I will ask you a series of questions regarding your experiences with grain production, processing and storage. I will also ask for your thoughts on barriers to achieving regional food security and what barriers the agricultural communities face in shifting from grass-seed to grain crops.

Your interview may be conducted in person, by e-mail, or by telephone, at your residence or another location that you choose. If you agree to take part in this study, your involvement will last for approximately one hour.

Aside from potential breaches of confidentiality, there are no risks or discomforts associated with the procedures described in this study, nor are there direct benefits. However, we hope that the information gathered from this study will contribute to improved decision making in the Willamette Valley and beyond.

The information you provide during this research study will be kept confidential to the extent permitted by law. If the results of this project are published, your identity will not be made public. To help protect your confidentiality, we will comply with the following standard protocol:

- Interviews will be conducted in a secure location, i.e., wherever you feel most protected and comfortable.
- We will remove all names and identifying features from all interview data.
- We will keep code lists and data files in separate secured locations in the Geosciences Dept. at OSU.

Findings will be presented in report form to various community organizations in both Lane and Lynn Counties (including Willamette Farm and Food Coalition, 10 Rivers Food

Web and Oregon State University) and presented at academic conferences. If the results of this project are published your identity will not be made public.

If you decide to take part in the study, it should be because you genuinely want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering.

You will not be treated differently if you decide to stop taking part in the study. You are free to skip any interview questions you prefer not to answer. If you choose to withdraw from this project before it ends, the data collected about you will still be used.

I will call you during the next week or so to ask if you are willing to participate in the study and answer any questions you may have. In the meantime, you may contact me at 808-551-4967 or by email at malonech@onid.orst.edu. Thank you for your time and consideration of this project.

Sincerely,

Chevelle Malone
M.S. Candidate

Willamette Valley Farmer's Survey

Future of Food & Agriculture in the Willamette Valley

1. Do you currently grow any grain crops? Yes/No
2. If yes, what varieties? _____
3. If not, why not? _____

_____

4. Please list any grain mills that you know of (past or present) in the Willamette Valley:

_____

_____

5. What issues do you think influence farmers considering growing grain or other food crops?

_____

_____

_____

6. Do you think producing food in the Willamette Valley should be a priority? Explain: _____

_____

_____

7. What issues do farmers face in growing grains or other food crops? _____

_____

_____

_____

8. How do you envision the agricultural community in 20 years? _____

_____

_____

_____

9. OPTIONAL: Are you interested in participating in this research project? Participation would require one interview of for approximately one hour, discussing the questions above in further detail.

Name:_____

Contact # or e-mail address:_____

Best time to contact:_____

10. Do you know anyone else who would be interested in participating? _____

_____

_____

_____