



PORT OF COLUMBIA

Artisan Grain Cluster Feasibility Study

2023



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PREPARED FOR

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Overview

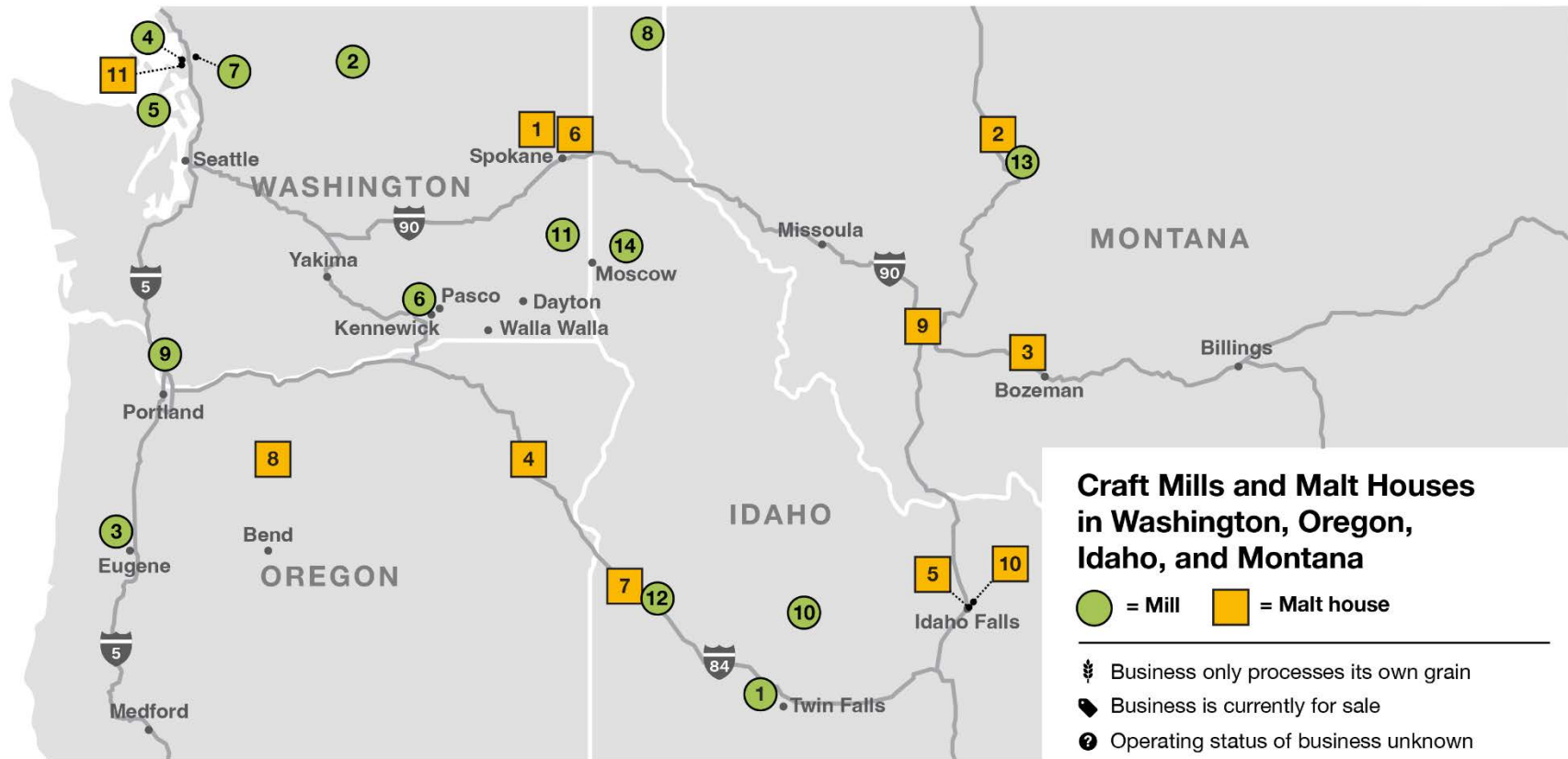
In recent years, momentum has grown to develop local and regional grain supply chains supported by emerging domestic market opportunities for value-added artisan grain products. As of June 2023, at least 14 craft mills and 10 craft malhouses were operating in the US Northwest region encompassing Washington, Oregon, Idaho, and Montana (Figure 1). These types of artisan grain businesses provide local and regional economic development and revitalization opportunities, including potential to enable grain growers to diversify and access higher-profit markets and to adopt regenerative agricultural practices, such as cover cropping.

Strengthening Washington State's local and regional artisan grain economies can support opportunities for family farms and a wide range of food systems entrepreneurs. However, insufficient grain infrastructure appropriately scaled to small and medium-sized artisan businesses is currently a bottleneck. As a result, the Port of Columbia has seen an increase in the number of grain-based artisan businesses interested in establishing operations at Blue Mountain Station, a 21-acre food park near Dayton in Columbia County, Washington.

This study was funded by a Washington State Department of Commerce Community Economic Revitalization Board (CERB) Planning Grant to explore the feasibility, optimal configuration, and next steps for developing the infrastructure for a value-added grain business cluster at Blue Mountain Station, including an immediate opportunity to locate an artisan grain malting facility ("craft malthouse"). The purpose of this study is to guide value-added grain business cluster development at Blue Mountain Station that potentially includes grain enterprises such as malting, distilling, milling, baking, and noodle or pasta making. Adding value to grain can be a capital-intensive endeavor, and identifying and establishing common resources needed across many of these grain enterprises may improve the business case for any individual enterprise.

Discrete components of the study were led by different consultants. Arrowleaf Consulting collected primary data through interviews, led research related to non-malthouse-specific enterprises, provided project coordination and management, developed the funding plan, and integrated results from all team members into this final report. Steven Peterson, Peterson & Associates, developed the regional economic overview (Appendix A) and the economic impact and investment assessment (Appendix D). Dennis Mitchell led the craft malthouse feasibility study in collaboration with Rob Liedl (Appendix B). John McLean, Blue Room Architecture & Design, provided malthouse development cost estimates and concept drawings (Appendix C). Paul Bowen facilitated a malt industry report generated by the Washington Small Business Development Center, which is available as a separate document. Bowen also provided information for the craft malthouse feasibility report and provided valuable input throughout the feasibility study process, including information for the funding plan. Appendix E is a list of federal and state grant programs relevant to the cluster development and to the malthouse.

FIGURE 1 | Map of craft mills and malt houses in the Northwest



Craft Mills and Malt Houses in Washington, Oregon, Idaho, and Montana

● = Mill □ = Malt house

- 🌾 Business only processes its own grain
- 👤 Business is currently for sale
- ❓ Operating status of business unknown

- 1 1000 Springs Mill
Buhl, ID
- 2 Bluebird Grain Farms 🌾
Winthrop, WA
- 3 Camas Country Mill
Eugene, OR
- 4 Cairnspring Mills
Burlington, WA
- 5 Chimacum Valley Grainery
Chimacum, WA
- 6 Ethos Stone Mill
Richland, WA

- 7 Fairhaven Mill
Burlington, WA
- 8 Farm to Market Grains 🌾
Bonners Ferry, ID
- 9 Gee Creek Farm 🌾
Ridgefield, WA
- 10 Hillside Grain 🌾
Bellevue, ID
- 11 Joseph's Grainery 🌾
Colfax, WA
- 12 Maskal Teff
Boise, ID

- 13 Montana Milling
Great Falls, MT
- 14 Wheatberry Mills 🌾
Deary, ID

- 1 Cascadia Malts
Nine Mile Falls, WA
- 2 Farm Power Malt 🌾
Power, MT
- 3 Gallatin Valley Malt Co. 🌾
Manhattan, MT
- 4 Gold Rush Malt 👤
Baker City, OR
- 5 Liberty Malt
Idaho Falls, ID
- 6 LINC Malt
Spokane Valley, WA

- 7 Mashbill Malts 🌾
Nampa, ID
- 8 Mecca Grade Estate Malt 🌾 👤
Madras, OR
- 9 Montana Craft Malt
Butte, MT
- 10 Mountain Malt
Idaho Falls, ID
- 11 Skagit Valley Malting ❓
Burlington, WA

Executive Summary

STUDY PURPOSE



To guide

value-added grain business cluster development at Blue Mountain Station that potentially includes grain enterprises such as malting, brewing, distilling, milling, baking, and noodle or pasta making.



To identify

common resources needed across artisan grain enterprises that may improve the business case for individual enterprises.



To estimate

the economic impacts of artisan grain business cluster development.



To assess

feasibility, including investment and funding strategies, with a focus on a craft malthouse as an anchor tenant.

CONTEXT

Blue Mountain Station



21-acre food park



1 mile from downtown Dayton, Columbia County



Blends sustainable local agriculture with artisan food processing and food tourism.

Blue Mountain Station currently has an Artisan Food Center with



3

craft beverage businesses



3

value-added food businesses



1

commercial kitchen



1

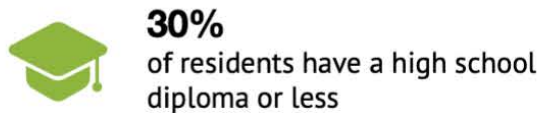
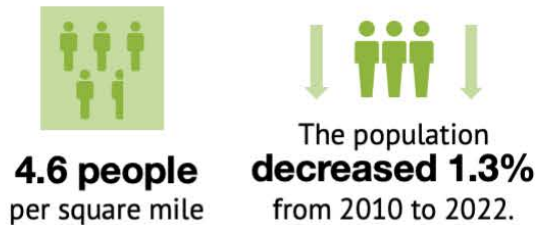
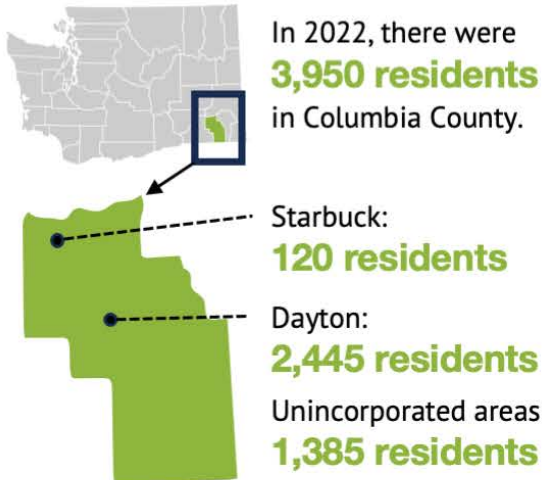
cooperatively owned food market



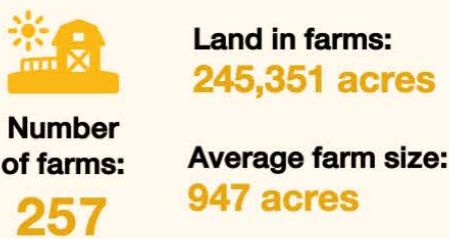
13

undeveloped acres where the infrastructure for an artisan grain business cluster could be built

DEMOGRAPHIC OVERVIEW

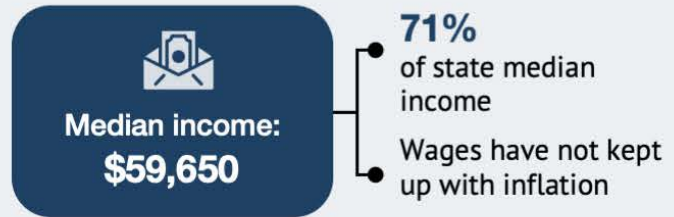


AGRICULTURE



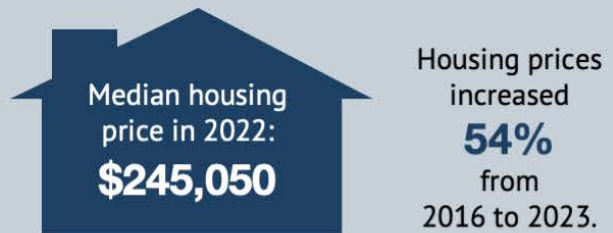
- WHEAT: 68,922 acres**
- CHICKPEAS: 1,923 acres**
- DRY PEAS: 12,684 acres**
- BARLEY: 1,855 acres**

ECONOMIC OVERVIEW



Cost of living

Highest of the seven southeast Washington counties and 21.9% higher than the national average.



Poverty rates in Columbia County are lower than for the state overall (US Census 5-Year ACS, 2022):

Washington State:

Total population: **9.9%**
 Population under 18 years old: **11.9%**

Columbia County:

Total population: **9.3%**
 Population under 18 years old: **6.8%**

FOOD AND AGRICULTURE-RELATED JOBS IN 2022



 **Trucking and distribution services**


 **Truck scale**

 **Storage bins**

 **Cleaning and dehulling**

 **Augers/conveyor belts**

 **Mill**
(sized to the value-added businesses at Blue Mountain Station)

 **Co-packing**
Pallets, forklift, scales, containers

 **Warehousing for shelf-stable products**

 **Cold storage**

 **Office space**

 **Branding, marketing, business services**

 **Retail space**

 **Gluten-free storage and processing**

10,000 BUSHEL (300 TON) BINS

COST APPROXIMATELY \$30K to 48K

for concrete, construction, and material costs, depending on options.

Therefore, a grain terminal with six 10,000-bushel bins would cost from **\$180,000 to \$288,000.**

Relatively small mills can produce a substantial amount of flour

EXAMPLE SMALL-SCALE COMMERCIAL MILL OPTION:

A 30-inch stone burr mill with a base price of \$7,467 can produce 1,250 pounds of bread flour an hour. In less than two hours, it can produce enough flour for 5,000 slices of toast.

2,035 LBS OF FLOUR are needed to produce **1,628 LOAVES OF BREAD**

which would be enough to give **5,000 PEOPLE** a 1 oz (i.e., 1 slice) serving of bread

Artisan Grain Business Cluster Economic Impacts

An artisan grain cluster at Blue Mountain Station with malting, pasta, bakery, distillery, and commercial kitchen operations could have

considerable economic impacts.



Annual sales
\$15.4 million

Annual gross regional product
\$6.4 million



Annual revenues
\$9.9 million



Payroll
\$1.3 million



Average total compensation
\$2.8 million

Average total compensation per job

\$61,658

Including multiplier effects

46.3

TOTAL NEW JOBS



22 Jobs at Blue Mountain Station

Total annual tax revenue to local and state coffers

\$1.8 million








\$1,181,218
Sales and excise taxes



\$589,669
Property taxes



\$28,004
Other taxes

	 MALTING	 PASTA	 BAKERY	 DISTILLERY	 COMMERCIAL KITCHEN
Employees	7 	2.3 	4 	7 	2 
Payroll	\$435,847	\$226,397	\$208,365	\$331,724	\$125,000
Revenues	\$2,000,000	\$1,000,000	\$549,349	\$5,881,391	\$500,000
Annual sales	\$4.2 million	\$1.6 million	\$0.9 million	\$8.1 million	\$0.7 million
Annual gross regional product	\$1.8 million	\$0.5 million	\$0.5 million	\$3.4 million	\$0.3 million
Total new jobs	 15.4	 4.9	 5.7	 16.9	 3.4
Average total compensation	\$1.1 million	\$0.3 million	\$0.3 million	\$0.9 million	\$0.2 million
Average total compensation per job	 \$71,167	 \$63,624	 \$54,303	 \$54,683	 \$58,670
Total local and state tax revenue	\$134,568	\$31,058	\$43,476	\$1.6 million	\$37,737
Sales and excise tax	\$93,219	\$18,115	\$26,198	\$1 million	\$23,288
Property taxes	\$35,371	\$9,229	\$13,347	\$519,858	\$11,864
Other taxes	\$5,978	\$3,714	\$3,931	\$11,796	\$2,585



Annual sales
\$4.2 million



Annual revenues
\$2 million



Employees
7



Gross payroll
\$435,000

INVESTMENT ASSESSMENT
of \$8.4M North American System



Suboptimal benefit-cost ratio
0.95



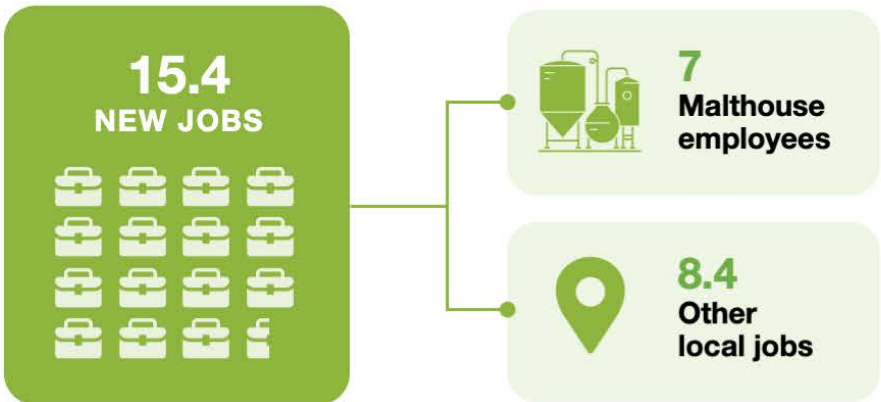
Suboptimal internal rate of return
8%




Payback period
11.4 years


RIPPLE EFFECTS


ANNUAL GROSS REGIONAL PRODUCT
\$1.8 million





Annual total compensation
\$1.1 million



Average total compensation per job
\$71,167

↓
Including multiplier effects

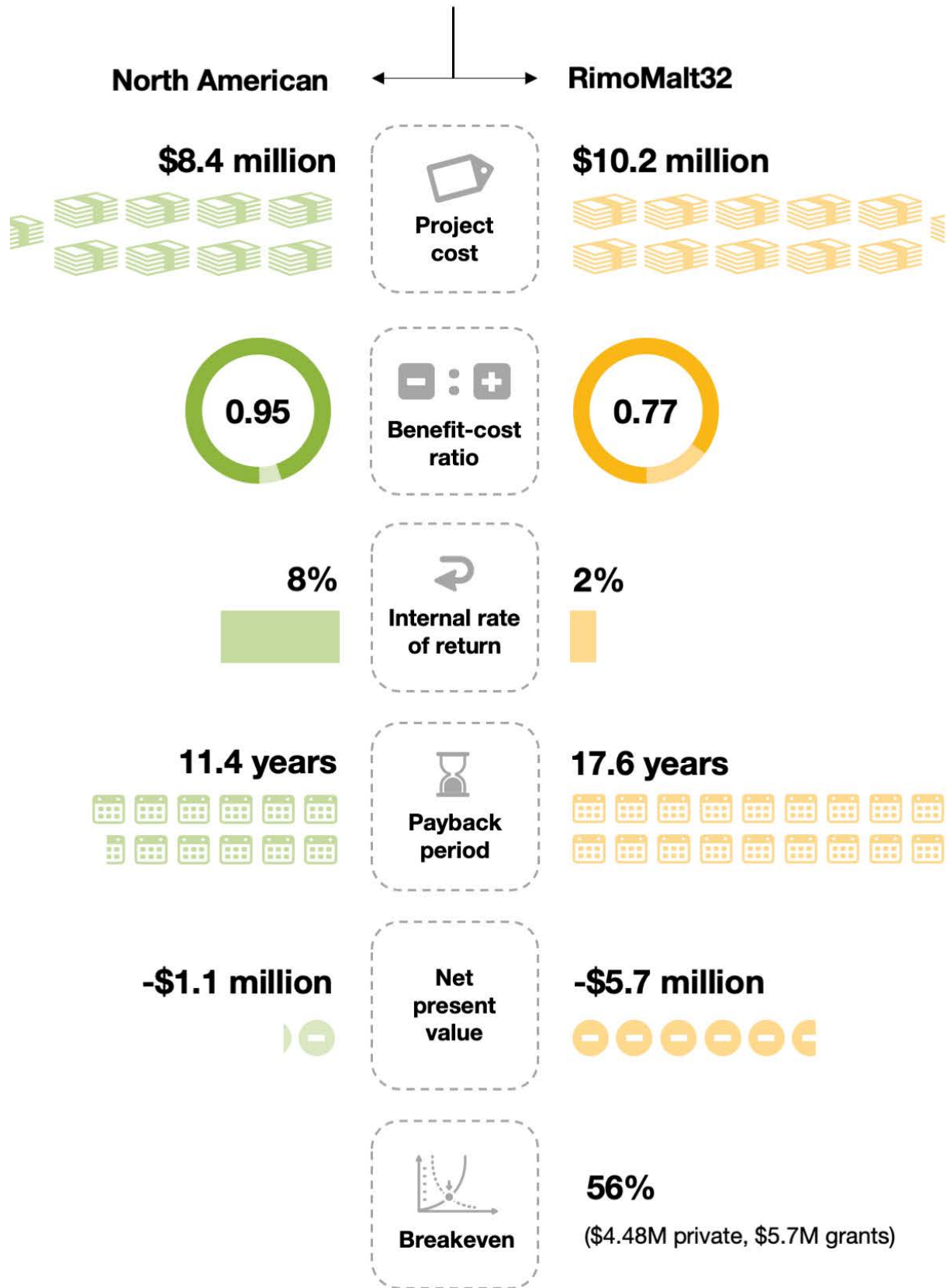
The malthouse would generate **considerable tax revenues:**



\$134,568
to local and state coffers



2 MALTING SYSTEM SCENARIOS



We identified interest in regionally sourced dry (shelf-stable) and fresh pasta products.



FACILITY COSTS

~\$1.5 million
for a facility that processes 5,134 pounds (86 bushels) of grain/year

INFRASTRUCTURAL NEEDS INCLUDE

Mill (optional)
\$3,000 - \$30,000

Pasta equipment processing lines
range from \$26,000 - \$36,000

↓
Including mixer, feeding machine, extruders, cutters, cooling, drying, and packing

ECONOMIC IMPACT & INVESTMENT HIGHLIGHTS


Annual sales \$1.6 million	Employees 2.3	Benefit-cost ratio 0.95
Annual revenues \$1 million	Gross payroll \$226,397	Payback period 13.7 years
Internal rate of return 2%		

RIPPLE EFFECTS

Annual gross regional product \$0.5 million		Tax Revenues \$31,058 to local and state coffers
Annual total compensation \$0.9 million	 4.9 New jobs	
Average total compensation per job \$63,624	<i>Including multiplier effects</i>	
		\$18,115 Sales and excise taxes
		\$9,229 Property taxes
		\$3,714 Other taxes

3 Mill Scenarios

1



A mid-to-large-scale commercial mill
with its own flour products.

We do **not** recommend this option for three reasons:



Competition with a large-scale mill underway in the Pendleton area.



Products like pasta, bread, and other value-added products are more profitable and competitive at smaller scales than flour. Higher-value products, such as spirits or pasta, are likely more suitable for the cluster.



Two mills have explored the site recently and decided against locating there.

2



A small-scale commercial mill
included as part of the shared infrastructure at Blue Mountain Station.



Businesses (e.g., bakery, pasta, noodle, tortilla, small-scale flour, and others) could rent the mill by the hour like (or as part of) the Blue Mountain Station commercial kitchen.



Such a mill could be scaled up with demand.



These mills range from \$3,000 - \$30,000, depending on capacity and features.

3

Each business in the artisan grain cluster that requires flour could have **their own mill in-house.**



Businesses that have their own mill could offer toll milling services for extra revenue when they are not using it for their own production.

Recommendations

An artisan grain cluster at Blue Mountain Station would provide many opportunities for business development. The site is well located for common and specialty grains, legumes, and other crops with many options. Markets for local and regionally produced foods, especially products for consumers wanting healthy, environmental, and social attributes, are growing. While the local county population is small, Dayton is within two hours of large markets, including Spokane and the Tri-Cities, in addition to several other larger population centers. Port of Columbia has a history of successfully supporting small food businesses, is ready to develop the property, and can provide technical assistance. Furthermore, the development would be meaningful economically, providing new opportunities for starting businesses and creating jobs, local and state tax revenue, new markets for producers, and synergies for additional food business growth and agricultural development.

Mainstem Malt

Mainstem Malt is an important committed partner, which will provide the synergies needed to help the grain cluster succeed. The business case for Mainstem Malt when it builds and owns the building is not strong and needs to be shored up through additional supports. The breakeven point for the RimoMalt 32 system requires that 56% of the \$10.2 million cost is paid for through other means than by the business. This provides a rough target for the cost savings required. There are several strategies to strengthen the business case for Mainstem Malt:

STRATEGY 1: REDUCE THE COST OF THE MALTHOUSE.

- Approximately \$1.75 million may be saved by choosing the domestically produced malting equipment (i.e., the “North American” system).
- Reduce the size of the building to 3,000 square feet of indoor space, for example, at a cost savings of \$3 million.
- Increase the shared infrastructure owned by the Port of Columbia to reduce the startup capitalization of Mainstem Malt. The shared infrastructure will also be an important draw for additional value-added businesses, including pasta, noodles, baked goods, distilleries, and others.
- Use grants for some equipment, especially as it supports toll malting or otherwise benefits more producers and businesses. Expect \$.5-\$1M in grants, including ones for market development (operational funding) if it benefits more entities than just Mainstem Malt.

Mainstem Malt needs to develop a finance package that includes equity, loans, and grants sufficient to cover the capitalization budget. The smaller the startup cost for Mainstem Malt, the more likely grants can improve its financial situation. Bootstrapping and cost-saving options not considered as part of this study may need to be integrated to bring the capitalization and startup costs to a level that results in a sustainable and profitable business. Increasing revenues may be an option but was not explored in the study.

STRATEGY 2: PORT OF COLUMBIA BUILDS AND OWNS THE BUILDING, MAINSTEM MALT LEASES IT.

The Port of Columbia owning the malthouse building would transfer \$2 million to \$5 million in capitalization costs from Mainstem Malt to the Port of Columbia. For this strategy to work,

1. The Port of Columbia Commissioners would need to agree to the plan. This would be a different project on a much larger scale than previously envisioned and agreed to by the commissioners.
2. The Port of Columbia would need to be in a financial position to take on additional debt of this magnitude. It is in the process of paying off previous investments, so this scenario has potential but is currently uncertain.
3. The Port of Columbia would need to take on management of a much larger project than originally envisioned.

The artisan grain business cluster

There are several strategies the Port of Columbia could pursue to enable development of an artisan grain business cluster. CERB and other funding is available for the campus infrastructure development. Port of Columbia expects to be responsible through grants and loans for this part of the development. In addition to site development, several strategies for shared infrastructure will give the site a competitive advantage for these types of businesses and provide critically needed services in the area.

STRATEGY 3: BUILD GRAIN STORAGE.

Shared grain storage will not only help Mainstem Malt but be a draw for other businesses such as pasta manufacturing and a bakery because it will enable farm-separated storage, which is critical to accessing high-margin markets. This could be built to meet immediate need with room to grow as the cluster develops and needs more storage.

STRATEGY 4: ADD EQUIPMENT SUCH AS GRAIN CLEANERS, SEPARATORS, AND DEHULLERS.

This equipment can not only support Mainstem Malt and other businesses in the cluster but provide a valuable toll service to producers in the area. It will enable businesses in the cluster to produce products with less readily available grains and seeds, while providing a much-needed resource for producers. These types of equipment can be included in Economic Development Administration (EDA), state and federal funding requests, and other opportunities in the funding list in Appendix E.

STRATEGY 5: ADD SPECIALIZED EQUIPMENT FOR GRAIN AND LEGUME VALUE-ADDED BUSINESSES TO EXISTING BMS FACILITIES.

The Port of Columbia could buy additional equipment for its existing commercial kitchen, such as a mill, noodle and pasta equipment, mixers, tortilla press, dryers, and others for development of grain-based value-added businesses. There are multiple options to fund equipment or renovate space in the funding list for changes at this scale. There is interest among consumers in gluten-free products, and BMS is well suited to expand or promote space for those types of products.

STRATEGY 6: ADD A NEW BMS BUILDING WITH RETAIL SPACE FOR GRAIN BUSINESSES.

The Port of Columbia could build and own a new building for grain businesses similar to other BMS buildings that includes space for both value-added processing and retail. This building could include much of the shared equipment for the cluster. It could be sized to be large enough for one or more larger scale businesses such as pasta manufacturing or a bakery, which could occupy half of the building, for example, with the remaining space for smaller footprint value-added businesses, shared equipment, and so on. This would enable small businesses to be a part of the cluster and the opportunity to scale up operations to the point where they need their own building.

Funding plan and next steps

The recommended scenario is the following:

1. Size the Mainstem Malt capitalization so that the business can be profitable over a reasonable amount of time, which will help it secure investment and have a strong possibility of success. Use that to indicate the amount of the project Port of Columbia needs to assume in addition to basic site infrastructure. Use the strategies above to get the capitalization budget into the range needed so Mainstem Malt can be successful.
2. Port of Columbia moves forward with multiple large requests, including to the EDA, and state and federal spending requests. Target EDA and the federal congressionally directed spending requests to \$4 million and the state carve out funding request to \$2 million. These sources will pay for most or half of a project and are the best options for large amounts of funding. One of these awards would significantly improve the financial model for the cluster, Mainstem Malt, and other potential businesses.
3. Port of Columbia finances the remainder through CERB or other available debt financing.
4. Port of Columbia funds strategies 2-6 through grants to federal and state programs. EDA, state, and federal funding requests, and WSDA and USDA grants described in the funding list are strong options.
5. How Strategy 6 (i.e., add a new BMS building with retail space for grain businesses) fits is determined in part by the success of efforts to reduce the cost of the malthouse. Including \$2 million for the malthouse and \$2 million for a new building could be a winning strategy for a federal congressionally directed spending funding request and provide the foundation for expanding the cluster and business development in the artisan grain space. An additional \$2 million in debt financing would allow for \$3 million for each, which would provide more options.

FEBRUARY 2024 ADDENDUM: FUNDING PLAN UPDATE

Since this feasibility study was completed, Mainstem Malt was able to purchase equipment for much less than expected, making the project clearly financially feasible. The plan is for Port of Columbia to apply for CERB funding for site development and the malt house building shell. Port of Columbia will submit a request for federally directed funding and a request to the Washington legislature to pay for any remaining needed match. Port of Columbia also will apply to the Washington Resilient Food System Infrastructure program and other similar grant programs for equipment for the cluster. Numerous funding opportunities are listed in the Funding Plan in this feasibility study. The CERB and federally directed funding request will be submitted in Spring 2024. Port of Columbia will apply to equipment and other grants as they open in 2024. If the full funding is not yet secured, Port of Columbia will pursue a funding request with the Washington Legislature in January-February 2025. Mainstem Malt has secured the funding for its portion of the project.

Blue Mountain Station and the development context

With the mechanization and consolidation of agribusiness, beginning in the 1970s, Columbia County and Dayton, the largest town in the predominantly rural and agricultural region, have experienced population decline, lost jobs, and empty storefronts. In response, the Port of Columbia began developing Blue Mountain Station, a 21-acre food park about a mile from downtown Dayton, in 2013 as part of the County's long-term economic development and diversification plan. Blue Mountain Station blends sustainable, locally produced agriculture with artisan food processing and food tourism.

Columbia County: Economic and demographic overview

Appendix A provides a detailed regional demographic and economic overview by Peterson & Associates that provides context for the economic development and rural revitalization impact potential of artisan grain business development at Blue Mountain Station. The infographic in this section summarizes the highlights from Appendix A to frame the economic development potential of an artisan grain cluster at Blue Mountain Station for Columbia County specifically.

In summary, Columbia County has vast agricultural lands and one of the smallest population densities in the state. Overall, wages are substantially lower than the state median and have not kept up with inflation, and the cost of living is the highest among all southeast Washington counties. The median income in Columbia County in 2022 was \$59,650; the average salary among the County's 144 crop production and agricultural workers was \$50,322, and the average salary among the 52 food manufacturing workers was \$70,751. An artisan grain business cluster has potential to bring additional family-wage and entry-level jobs to Columbia County and to generate tax revenue.

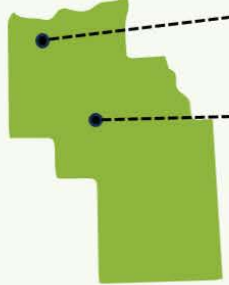
Specific economic impacts for job, wage, and tax generation associated with malthouse, pasta, distillery, and commercial kitchen manufacturing in the cluster are presented in depth in the appendices and below in the enterprise-specific sections of this report.

Columbia County

DEMOGRAPHIC OVERVIEW



In 2022, there were **3,950 residents** in Columbia County



Starbuck: **120 residents**
 Dayton: **2,445 residents**
 Unincorporated areas: **1,385 residents**



4.6 people per square mile



The population **decreased 1.3%** from 2010 to 2022.



30% of residents have a high school diploma or less.

AGRICULTURE

NUMBER OF FARMS:
257

LAND IN FARMS:
245,351 acres

AVERAGE FARM SIZE:
947 acres



WHEAT: 68,922 acres



CHICKPEAS: 1,923 acres



DRY PEAS: 12,684 acres



BARLEY: 1,855 acres

ECONOMIC OVERVIEW



UNEMPLOYMENT RATE: 4.1%



MEDIAN INCOME:
\$59,650

71% of state median income

Wages have not kept up with inflation

COST OF LIVING

Highest of the seven southeast Washington counties and 21.9% higher than the national average.

Median housing price in 2022:
\$245,050

Housing prices increased **54%** from 2016 to 2023.

Poverty rates in Columbia County are lower than for the state overall (US Census 5-Year ACS, 2022):

WASHINGTON STATE:

Total population: **9.9%**

Population under 18 years old: **11.9%**

COLUMBIA COUNTY:

Total population: **9.3%**

Population under 18 years old: **6.8%**

FOOD AND AGRICULTURE-RELATED JOBS IN 2022

144

Crop production and agricultural workers

Average salary: **\$50,322**

52

Food manufacturing workers

Average salary: **\$70,751**

Regional market overview

Appendix A includes a regional market assessment. There were 15.7 million people and 6.3 million households in the Pacific Northwest in 2021 (Table 1). Personal consumption spending (i.e., purchasing power) in the Pacific Northwest totaled \$719 billion in 2021, including \$57 billion in food and beverage purchases for home consumption (Appendix A). To further illustrate the general regional market potential, Figure 2 maps population centers in Washington, Oregon, Idaho, Montana, and part of Wyoming and Figure 3 shows the population centers in Alaska. Figure 4 maps population centers within 60 air miles and 120 air miles of Dayton.

TABLE 1 | Population and number of households by state, 2021

	Population	Households
Alaska	732,673	274,574
Idaho	1,900,923	717,151
Montana	1,104,271	464,072
Oregon	4,246,155	1,726,340
Washington	7,738,692	3,079,953
Total	15,722,714	6,262,090

US Census ACS 1-Year Estimates

FIGURE 2 | Map of Northwest cities and towns by population, 2020

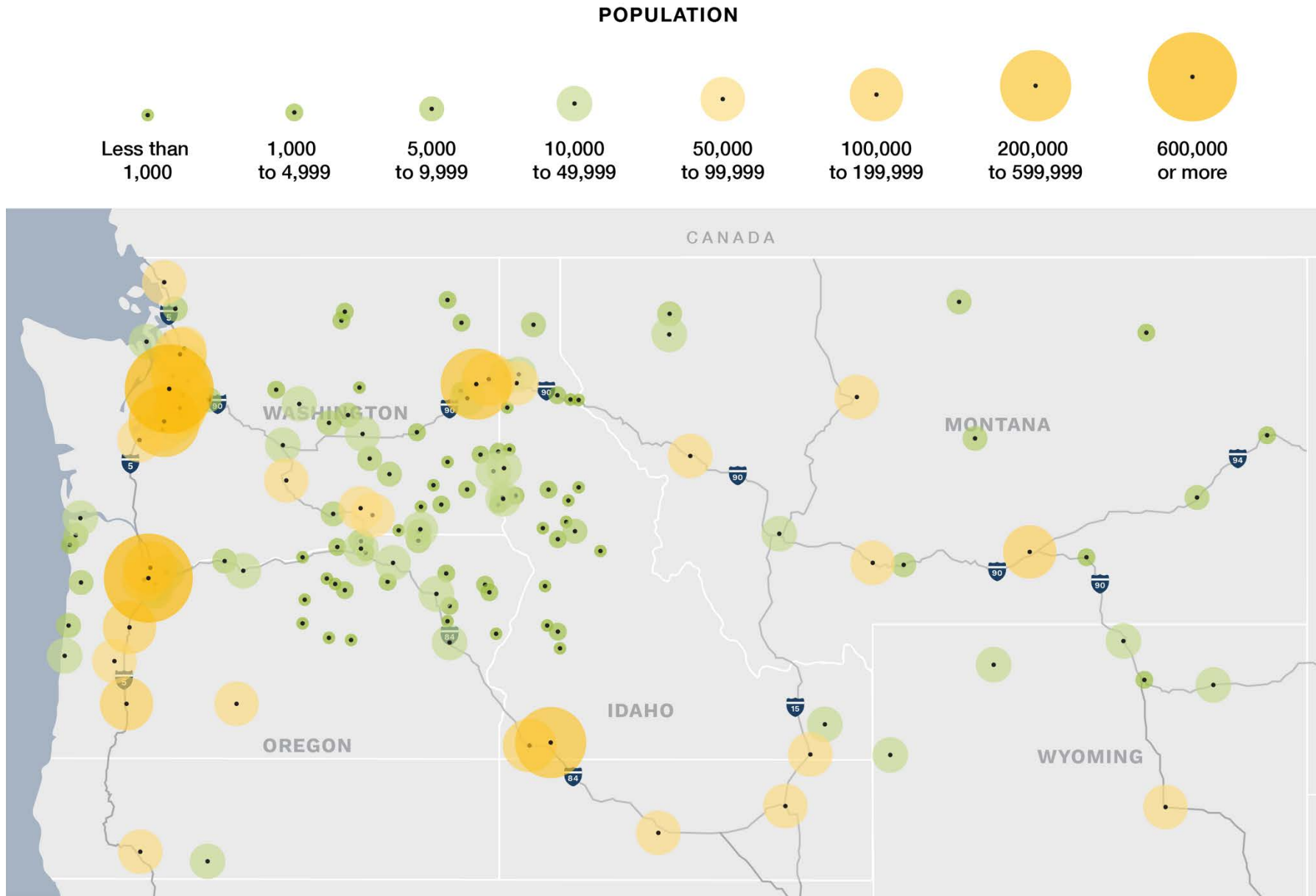


FIGURE 3 | Map of Alaskan cities and towns by population, 2020

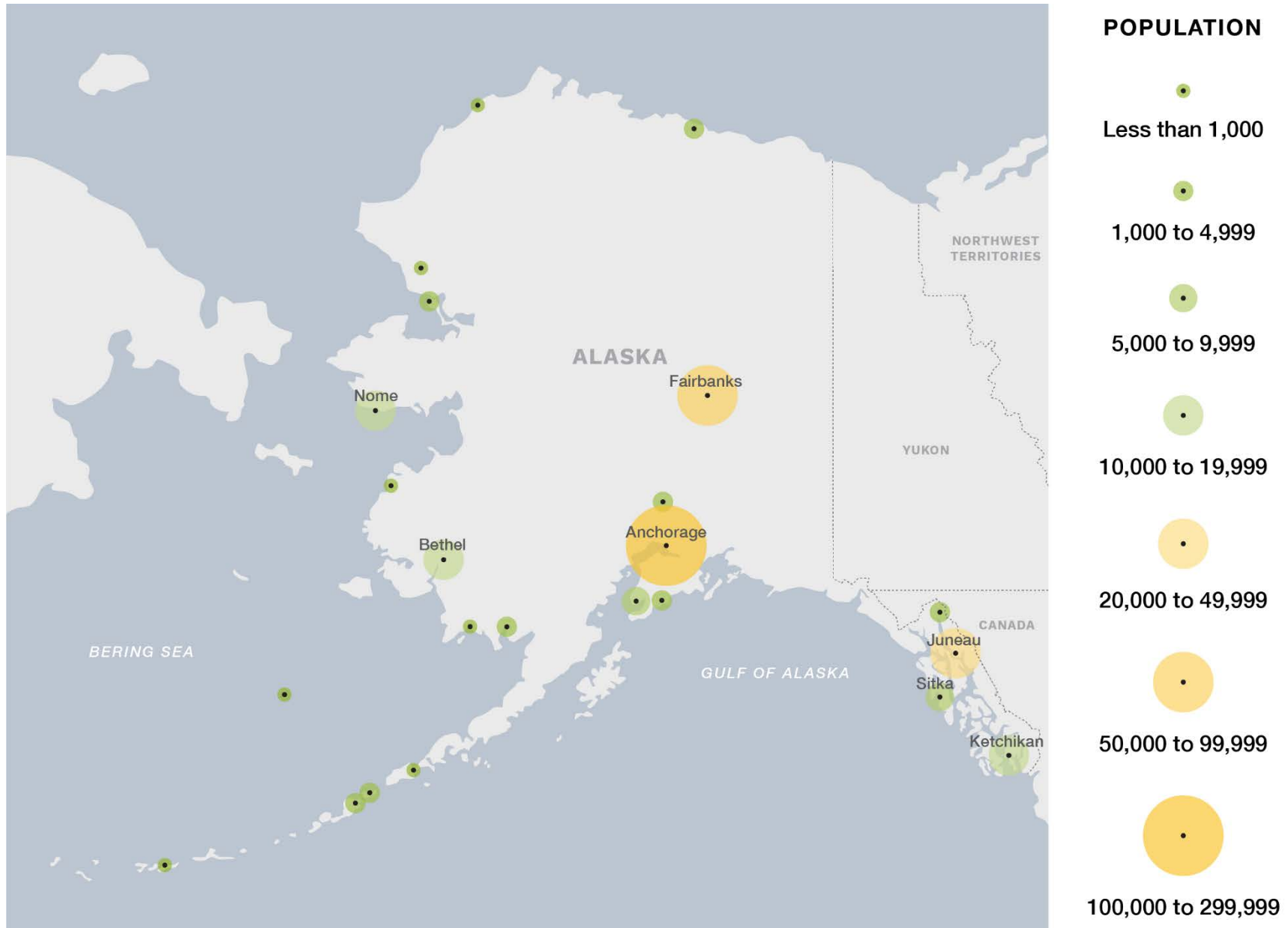
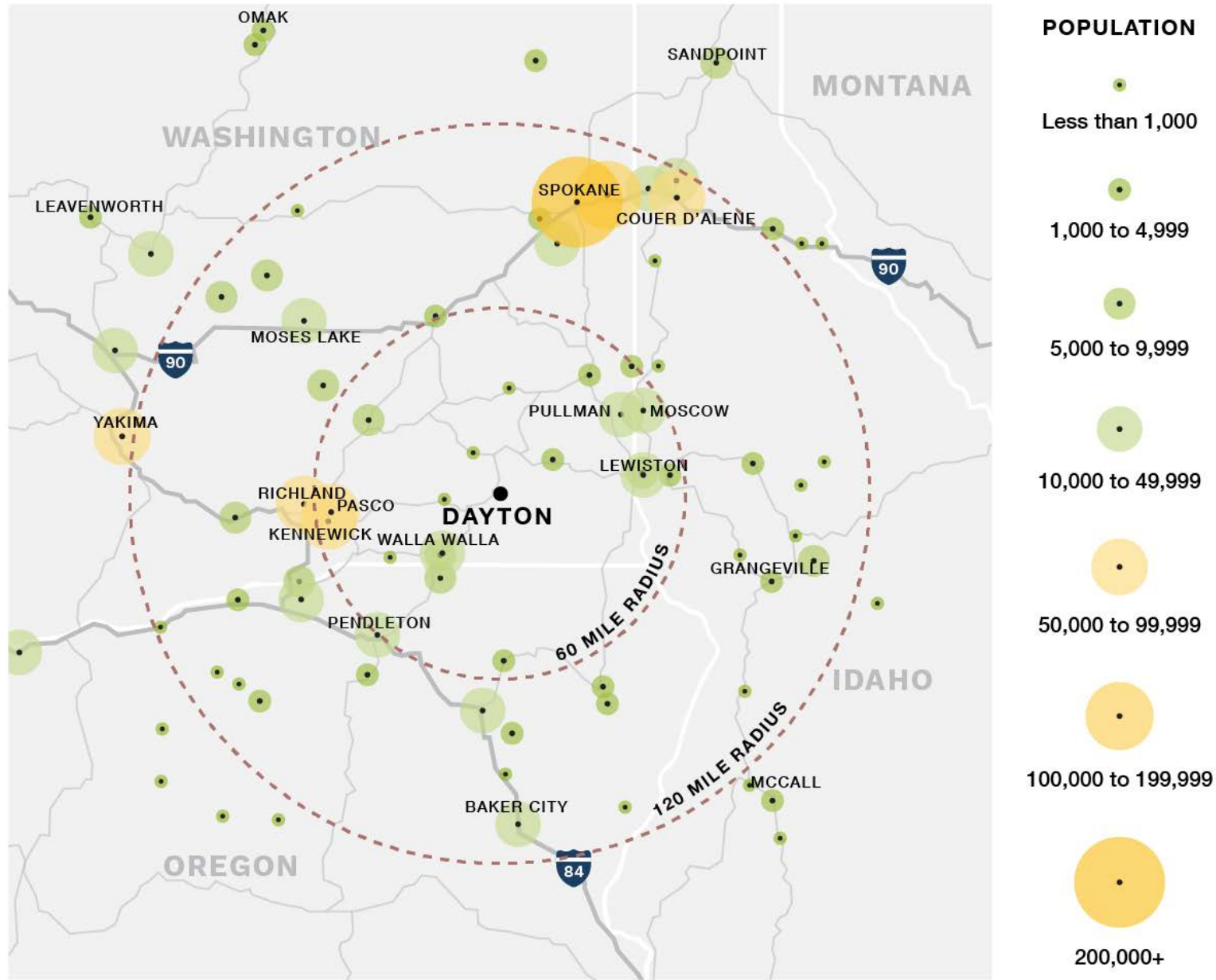


FIGURE 4 | Map of cities and towns within 60 miles and 120 miles of Blue Mountain Station in Dayton, 2020



Site appropriateness for an artisan grain business cluster

BLUE MOUNTAIN STATION EXISTING ARTISAN FOOD CENTER AND MASTER PLAN

An Artisan Food Center was constructed at the Blue Mountain Station site in 2013 to recruit, market, and support the success of artisan food producers. The Artisan Food Center has been successful: it currently houses three craft beverage businesses, three value-added food businesses, a commercial kitchen, and a cooperatively owned food market that sells local and regional products (Figure 5). The Blue Mountain Station site also features a garden and plant nursery.

FIGURE 5 | Photos of Blue Mountain Station. Left: Artisan Food Center building front with entrances to the cooperative food market, commercial kitchen, winery, and other businesses. Middle: an industrial-sized mixer inside the commercial kitchen. Right: The entryway to the cooperative food market.



An artisan grain business cluster at Blue Mountain Station would be well-aligned with current economic and agricultural activity and the Port of Columbia and Columbia County’s long-term economic diversification strategies, goals, and development plan. The 21-acre Blue Mountain Station site is adequate to support the anticipated artisan grain cluster development with space available for gradual scaling and the addition of new businesses over time.

The vision for an artisan grain business cluster is to build on Blue Mountain Station’s momentum by adding a unique but compatible artisan food cluster suited to the Northwest grain economy. The goal is for the cluster to contribute to the development of domestic markets for grain products that enable grain growers to diversify their markets, providing producers and other entrepreneurs with potentially higher-value, higher-profit local and regional markets than volatile international markets. The cluster would support a greater diversity of value-added market opportunities for grain producers in the region, including non-wheat cereals, gluten-free grains, and other crops with rotational benefits. The development would enable and provide appropriately scaled infrastructure, supply chain, and market opportunities for small and mid-size farm and food businesses. The development would include small-to-mid-scale grain storage, cleaning, and handling capacities that allow for the identity preservation of unique grains through the supply chain from agricultural producer to consumer.

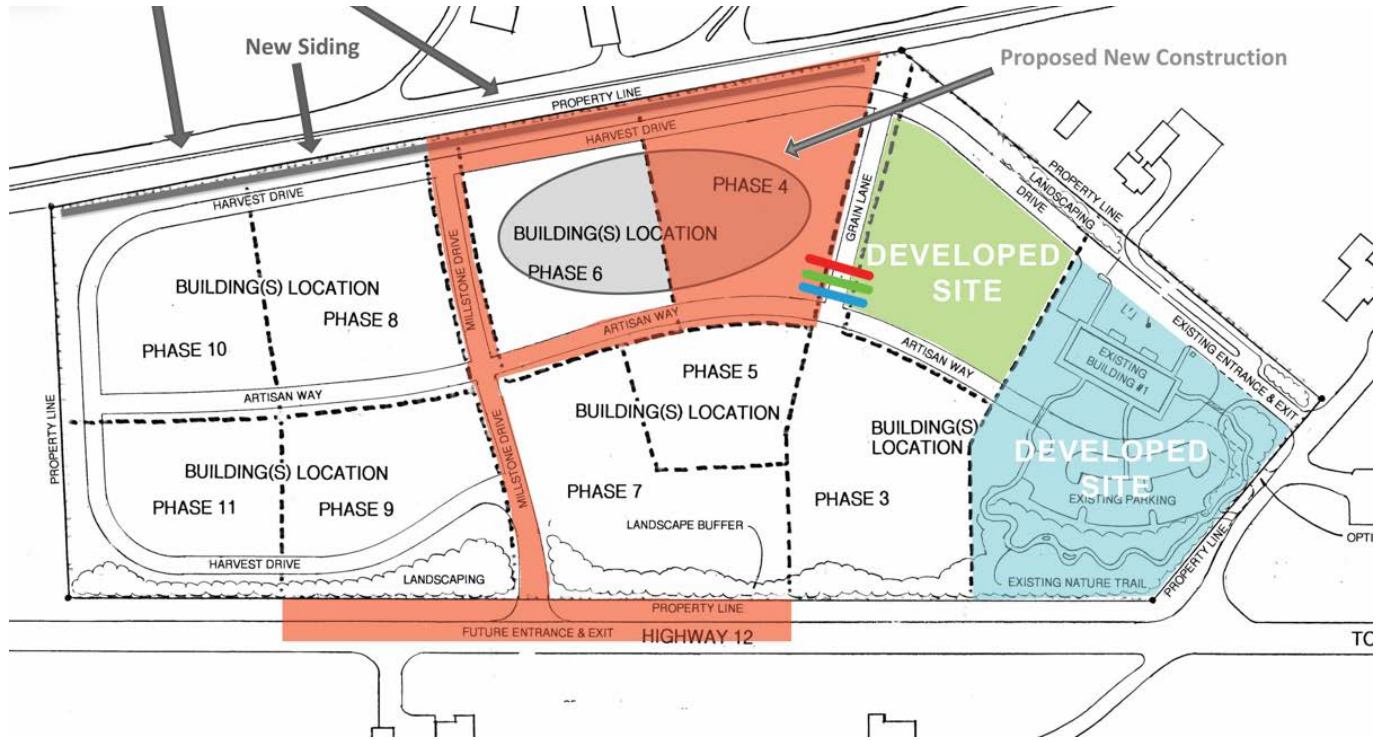
The development activities at the Port of Columbia will help reduce the risk associated with starting and expanding local businesses that depend on a reliable source of grains and processing equipment.

The grain cluster would create more opportunities for restaurants, grocers, bakeries, institutions, and other markets to use and stock products made with regional grains. Building on the existing Artisan Food Center activities at Blue Mountain Station, an artisan grain cluster would also complement and elevate hospitality industries and agritourism across a wide range of food and beverage consumers and professionals, leading more of the Northwest and out-of-state spenders to invest their dollars into the southeast Washington economy.

Overall, the vision under consideration is to develop part or all the available areas of the Blue Mountain Station campus into an artisan grain business cluster, including infrastructure, supply, and potentially marketing and distribution synergies. The first step towards the artisan grain business cluster, as evaluated in this study, would be to site a craft malthouse with Mainstem Malt as the anchor tenant (Appendix B). The long-term vision is to have multiple, complementary artisan grain businesses. The cluster could include an artisan mill, which could be a “toll mill” that provides custom flour milling and mixing services to other businesses for a fee, or one of multiple vertically integrated enterprises operated by a single value-added food business (e.g., a bakery or pasta maker) (explored below in the milling and pasta enterprises sections). Ideally, a bakery, pasta or noodle maker, and other artisan grain businesses will also co-locate in the cluster to take advantage of the available infrastructure and access to the abundant supply of local grain, seed, legume, and other crops with unique attributes, textures, and flavors associated with the production area.

Figure 6 shows the Blue Mountain Station master plan development phases and Figure 6 is an ariel view of the current development. The Phase 1 portion of the site map is where the existing Artisan Food Center is located, including the craft food and beverage businesses, commercial kitchen, and cooperative food market as well as a parking lot, entrance and exit, and loading area (behind the Artisan Food Center building) with truck access and parking. There is a second building constructed in the Phase 2 area (the building with red siding and white roof pictured in Figure 9). The artisan grain business cluster development would begin in the Phase 4 area with the craft malthouse with potential to expand as needed through the Phase 11 area.

FIGURE 6 | Planned phases from the 21-acre Blue Mountain Station site master plan. The craft malthouse explored by this study would be in the Phase 4 area. Phases 4-7 on the map are the artisan grain cluster development focus area. There are still 13 acres that can be developed.



Source: John McLean, Blue Room Architecture & Design

FIGURE 7 | Ariel view of the Blue Mountain Station site showing the proposed artisan grain cluster development area relative to the existing infrastructure. Master plan development phases 4-11 are contained within the field encompassed by the rectangle with the white dashed line. The railway is pictured along the northwest edge and Highway 12 along the southeast edge of the site. The Artisan Food Center building is the where the Blue Mountain Station Google Map identifier is pointing.



Source: Google Maps

FIGURE 8 | Ariel view of the concept imagery for the proposed artisan grain cluster development at the Blue Mountain Station site (source: John McLean, Blue Room Architecture & Design)



FIGURE 9 | Left: Photo of the proposed project area (i.e., the field area encompassed by the rectangle with the white dashed line in the ariel map above) taken facing southwestward; the railroad is visible on the right side of the photo. Right: Photo of the existing Blue Mountain Station infrastructure taken from the edge of the proposed new development facing northeastward; the distillery and main Blue Mountain Station buildings are pictured.



COMMERCIAL KITCHEN

Blue Mountain Station's commercial kitchen, which is rented by the hour, is an example of an existing resource that could be leveraged by new artisan grain and flour-related businesses. The existing commercial kitchen is often booked, yet still has capacity to accommodate additional renters. While the space has limitations, it could be adapted (for example, by expanding the type of equipment available) for new and specific products.

In addition, a vacant 550 square foot space with a Class 1 hood is next door to the existing commercial kitchen that an artisan grain cluster tenant could rent while scaling up into their own facility. This space could alternatively be used for co-packing, bottling, storage, or gluten-free processing among other artisan grain cluster-relevant functions.

UTILITIES

Water availability and treatment

Blue Mountain Station is connected to the City of Dayton's water and sewer systems. Dayton has an ample water supply. The water is treated with chlorine, which does not adversely impact the existing beverage companies at the site. The water supply and quality are attributes that have attracted beverage companies.

Electricity

Blue Mountain Station has underground three-phase electricity supplied by Pacific Power. Propane is available. Natural gas is unavailable at the site.

Mainstem Malt researched energy programs available through Pacific Power that would make energy costs more affordable for businesses in the cluster. As Kether Scharff-Gray of Mainstem Malt summarized:

- **Demand response:** Pacific Power partners with Enel to offer a program to its customers called Demand Response. Demand Response provides advanced warning of any power grid instability and provides cash incentives for large energy users to be on standby and temporarily reduce their electrical draw or switch to alternative generation if there is a potential threat to the grid, such as a black-out. The incentive payout to each company would be between \$30,000 to \$80,000 a year.
- **Time of Use:** Pacific Power offers a Time of Use program through which customers are billed based on when they use electricity. Electric customers can save money by shifting energy use to lower-cost off-peak hours (i.e., 10 pm to 2 am when electricity demand is lower). Mainstem Malt found that shifting the time of day when it has the highest energy requirements to "off-peak" hours could dramatically reduce its energy costs. Specifically, shifting production timing to take advantage of off-peak hours drops the average cost per kilowatt hour from between \$0.75 and \$0.20 (1 batch of malt per week and 5 batches per week, respectively) to between \$0.20 and \$0.09 per kilowatt hour (1 batch per week and 5 batches per week, respectively).

In addition to these two programs, Kether Scharff-Gray found benefits in economies of scale. As she explained, "Regardless of the program (or source of energy), the cost of energy decreases dramatically as we scale production from 1 day of kilning to 2, 3, 4, and ultimately 5 days of kilning because the demand charges are spread across more kilowatt hours."

Others

Blue Mountain Station has high-speed broadband internet. Basin Disposal Inc. provides waste disposal services.

ROADS, TRAFFIC FLOW, AND PARKING

The Blue Mountain Station site has highway access and a road network (Harvest Drive, Artisan Way, and Grain Lane) that allows safe and efficient traffic flow around the campus (Figures 6-8). It also has a parking lot for patrons and backdoor parking for Artisan Food Center tenants. Currently, the Blue Mountain Station site is accessed by turning off Highway 12 onto Wagon Road. Vehicles travel Wagon Road briefly (~100 ft.) before coming to Harvest Drive, which runs along the north side of the developed areas (i.e., the back side of the Artisan Food Center, the Phase 1 and Phase 2 areas of the Master Plan map) and connects to Artisan Way via Grain Lane on the westside of the Phase 2 area. Together, Harvest Drive, Grain Lane, and Artisan Way circle the current development. Truck traffic flows through the site on Harvest Drive (along the backside of the Artisan Food Center), has room to unload and load, and moves counterclockwise, exiting via Artisan Way. Patron traffic turns promptly onto Artisan Way to access the parking lot on the front side of the Artisan Food Center building, avoiding the truck and tenant traffic on the backside of the buildings.

The Blue Mountain Station Master Plan includes extending Harvest Drive and Artisan Way to provide a road network through the rest of the site as it is developed (Figure 6). Site expansion into the Phase 6 and Phase 7 areas includes a plan to build a new road (Millstone Drive) that would connect and run perpendicularly to Harvest Drive and Artisan Way and provide an additional Highway 12 entrance and exit, which is labeled on the Master Plan map. The general site development plan is to have storage and processing infrastructure and activity concentrated in the Phase 4, 6, 8, and 10 areas farthest from the highway and the storefronts and areas with patron activity concentrated in the Phase 5, 7, 9, and 11 areas most visible to highway traffic. Parking lots to safely accommodate delivery, business, processing, and patron visitors would be part of the development.

AVAILABILITY OF NEEDED DISTRIBUTION SYSTEMS

Highway 12 connects Dayton most immediately to Walla Walla, WA, Milton-Freewater, OR, and the Tri-Cities (Kennewick, Pasco, Richland, and West Richland), WA, as well as to Lewiston and Moscow, ID, in the other direction. Columbia County's road system was developed for the transportation of wheat and other agricultural products and trucks routinely haul grain and other crops throughout the County, including to Northwest Grain Growers warehouses and elevators in Dayton, Waitsburg, and other sites.

In addition to the road, highway, and interstate transportation network, the Blue Mountain Station site also has access to rail. A short line connects Blue Mountain Station to the Union Pacific and Burlington Northern Santa Fe lines in the Wallula and Tri-Cities area. The site has a 1,000 ft rail siding.

Several food distribution companies serve Dayton, and a growing network of food hubs in the Northwest is seeking to distribute artisan grain-based value-added products like beverages, bread, tortillas, noodles, and pasta to retail, restaurant, entertainment and sport venue, and institutional (e.g., hospitals, universities, colleges) markets. It is possible for Blue Mountain Station to become a node in the broader regional food hub network. Some examples of the local and regional systems emerging to distribute artisan products include the following:

- **Walla Walla Food Hub** distributes locally and regionally grown and made fresh produce, specialty mushrooms, value-added products, including grains and flours, jams, dairy products, and more.
- **Northwest Food Hub Network** is a “network of farmer-owned cooperative food hubs and partner organizations that share supply, services, and infrastructure to serve markets across Montana and Washington.”¹ They also reach northern Idaho. The member food hubs include Puget Sound Food Hub in northwest Washington, LINC Foods/LINC Malt in Spokane, and Western Montana Growers Cooperative in Missoula. Working together, the network aggregates and distributes products from small and mid-scale food and farm businesses to reach markets throughout the region, including larger markets, such as institutional markets, that small-scale producers do not have adequate volume or consistency to serve individually. When interviewed about the possibility of a grain cluster in Dayton, WA, an informant with Northwest Food Hub Network expressed strong support and excitement for a regional artisan grain food hub. The informant said that a “hub for grain growers that had pasta, bread, and then a whole line of oats, millet, quinoa” could potentially become a fourth hub in the established Northwest Food Hub Network. The interviewee expanded on the potential partnership, expressing how “significant investment” in the grain cluster resulting in on-site processing infrastructure, trucking, and storage would expand the Northwest Food Hub Network’s reach and close gaps between producers and customers in the Northwest.
- **Kitchen Sync Strategies** is an example of an organization seeking to develop market opportunities for local and regional foods by leveraging institutions’ purchasing power and market potential. From the interviews, Kitchen Sync Strategies self-defined their organization as “a brokerage company that provides consulting to food enterprises and support actors... We’re brokering the sale of the food hubs’ farmers products.” A growing number of schools, hospitals, universities, business campuses, entertainment venues, and others are developing values-based purchasing goals, presenting opportunities for small and mid-scale farm and food businesses. Key informant interviewees pointed out that shelf-stable, value-added products—such as pasta and noodles—are well suited for these markets and that the market demand for these types of regionally sourced products is largely unmet. In the interview, Kitchen Sync Strategies expressed excitement about supporting the grain cluster in Dayton and noted the need for an artisan grains hub in the development of the artisan grains food system. Potential collaboration with the grain cluster fosters opportunity to share information, infrastructure, and distribution networks with an organization like Kitchen Sync Strategies, particularly the demonstration of how a little investment can yield profit for artisan grains producers. They also expressed willingness to share strategies and recipes with value-added artisan grains producers.

SECURITY

There are no identified security risks at the site.

ENVIRONMENTAL IMPACTS

The Port of Columbia completed Phase 1 environmental and cultural resources reviews in 2009 prior to purchasing the property. No negative environmental impacts are known to be associated with the food park development. In 2023, because there was once an apple orchard at the site, the soil at Blue Mountain Station was tested and found negative for arsenic.

¹ <https://www.nwfoodhubnetwork.com/who-we-are>

REGULATIONS

A development agreement between Columbia County and the Port of Columbia governs Blue Mountain Station, which is available on its website. The agreement includes building standards and water and sewer extension plans. Blue Mountain Station has a food processing conditional use permit in place that covers all individual food processing businesses that operate there.

OTHER VACANT INDUSTRIAL LAND

Mainstem Malt has investigated numerous properties in the Walla Walla Valley, including all suitable existing buildings, concluding that a new facility is needed. Mainstem Malt approached the Port of Walla Walla, which was not interested in working with them due to limited water treatment capacity in Walla Walla. The Port of Walla Walla staff indicated, as did several others interviewed, that the Walla Walla water treatment system is overburdened, in part resulting from the winery boom. Currently, the Port of Walla Walla and the City of Walla Walla are looking to limit rather than encourage agricultural businesses that produce water that needs treatment. This is a problem in College Place as well. Mainstem Malt considered building on other undeveloped land in Walla Walla County or Columbia County but found it would be more difficult than locating at the Port of Columbia because it would need to develop both a standalone water source and treatment infrastructure as well as raise additional capital to purchase a property. The Port of Columbia owns other properties in Dayton, but none as suitable as Blue Mountain Station where the artisan grain cluster will build upon the existing infrastructure and artisan foods focus.

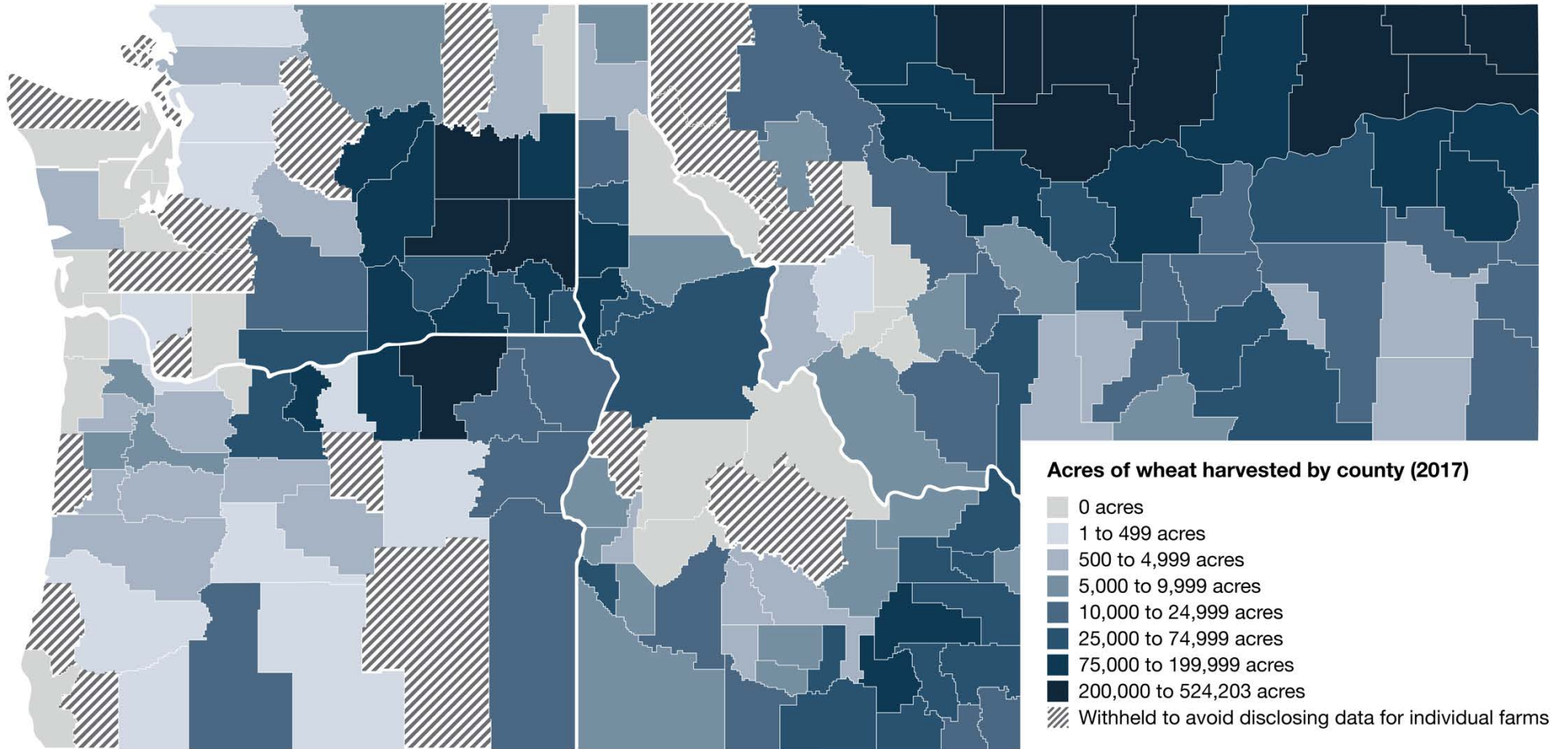
Supply: grains, legumes, and other crops

Dayton is in the heart of one of the most productive grain and legume regions in the world. The supply needs of any artisan grain value-added business considered by this study would be minimal within the volume of wheat, barley, chickpeas (garbanzo beans), and other crops grown within a two-hour radius. For example, in 2021, the seven southeastern counties of Washington State alone produced 1.24 million acres of wheat, 152 thousand acres of chickpeas, 18 thousand acres of canola, 48 thousand acres of dry peas, 48 thousand acres of barley for grain, 27 thousand acres of corn for grain, and 28 thousand acres of lentils, among many other crops (Appendix A).

Figures 10-20 provide further context and production scale by mapping the number of acres in select crops harvested in 2017 by county for Washington, Oregon, Idaho, and Montana (US Agricultural Census). The key takeaway from this section is that many grains, legumes, seeds, and other crops grow very well in the region within a viable drive radius of Blue Mountain Station. The need to develop crop- and attribute-specific supply relationships could be a conditioning factor or constraint; however, the ability to grow artisan grains and other relevant crops is not a constraint in general.

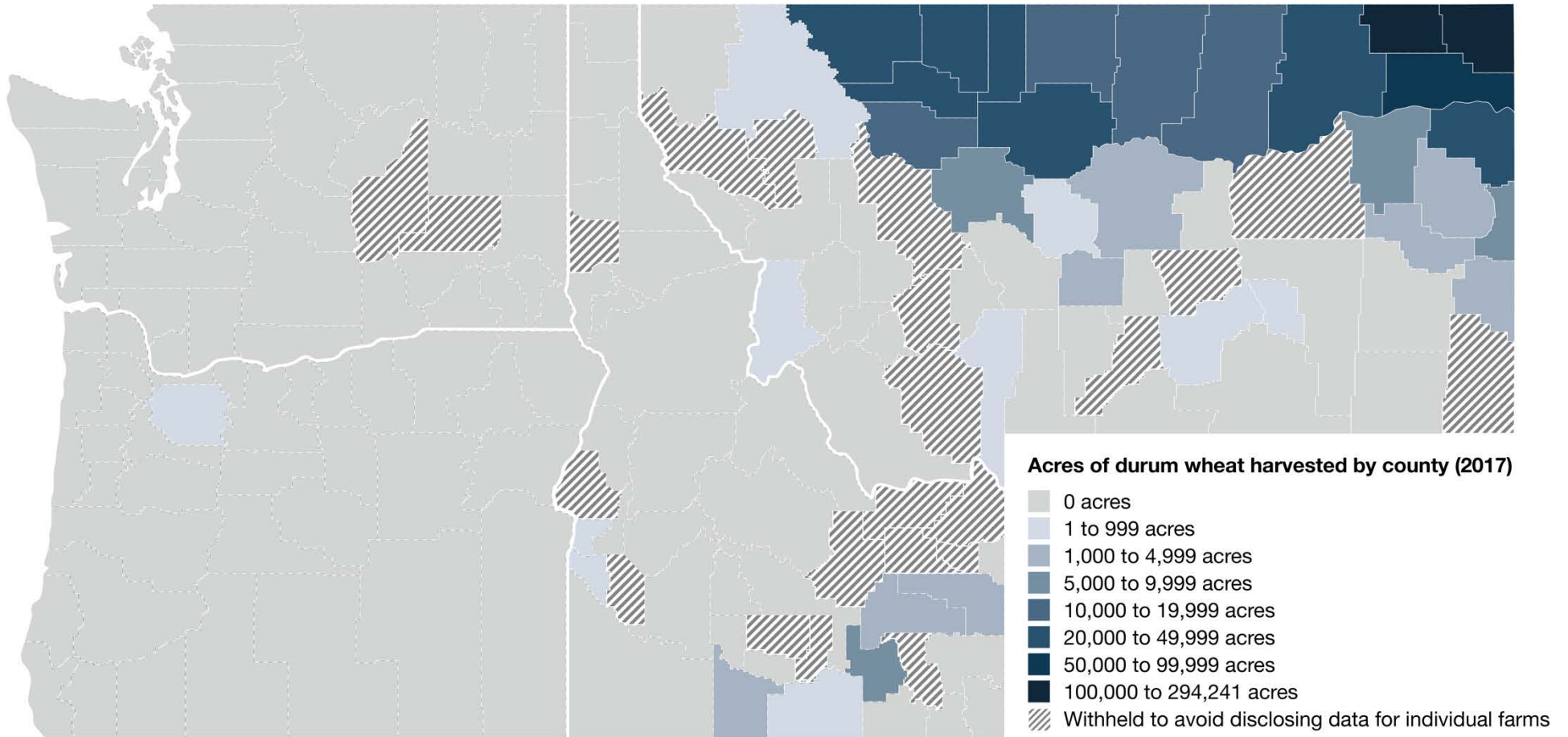
Wheat is abundant in Columbia and adjoining counties as well as the broader Northwest (Figure 10).

FIGURE 10 | Acres of wheat harvested in 2017 by county



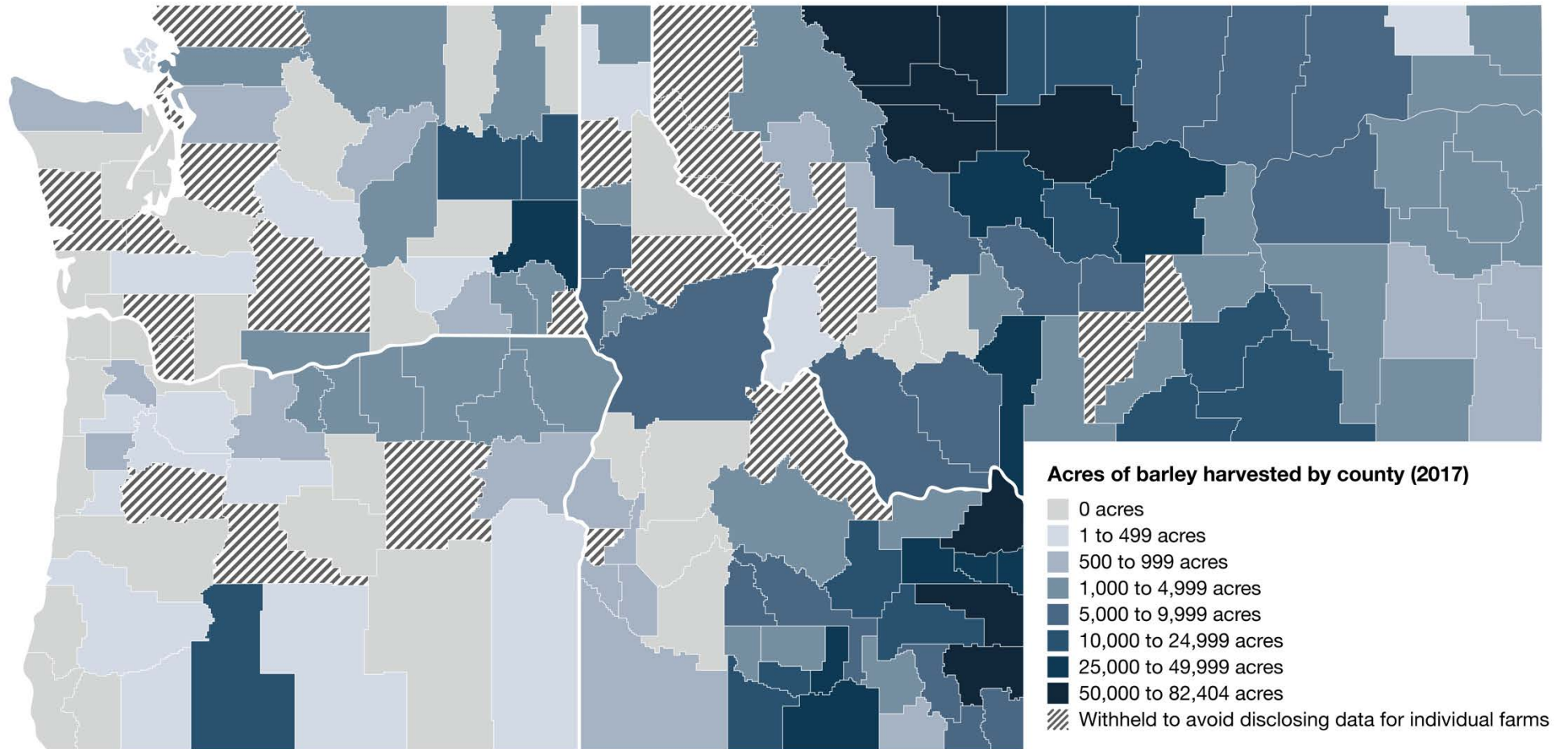
Durum wheat, commonly ground into semolina flour to make pasta, is primarily grown across northern Montana (Figure 11). A small number of producers in Grant and Adams counties, WA, and Latah County, ID, grew durum wheat in 2017.

FIGURE 11 | Acres of durum wheat harvested in 2017 by county



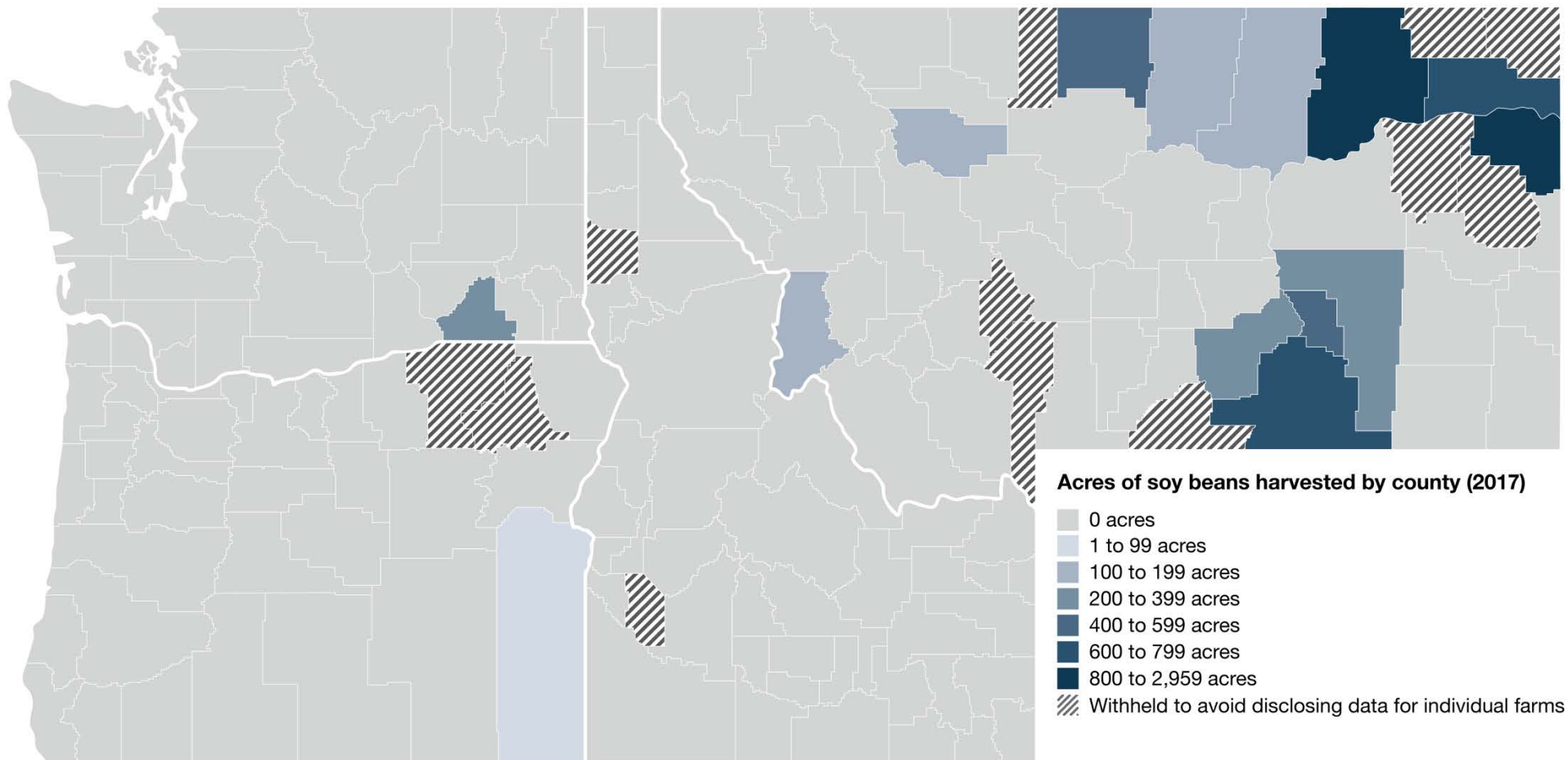
Barley is also widely distributed throughout the US Northwest (Figure 12). The most productive areas were northcentral Montana and southeastern Idaho. Whitman County was the most productive county in Washington, with over 50,000 acres of barley harvested in 2017.

FIGURE 12 | Acres of barley harvested in 2017 by county



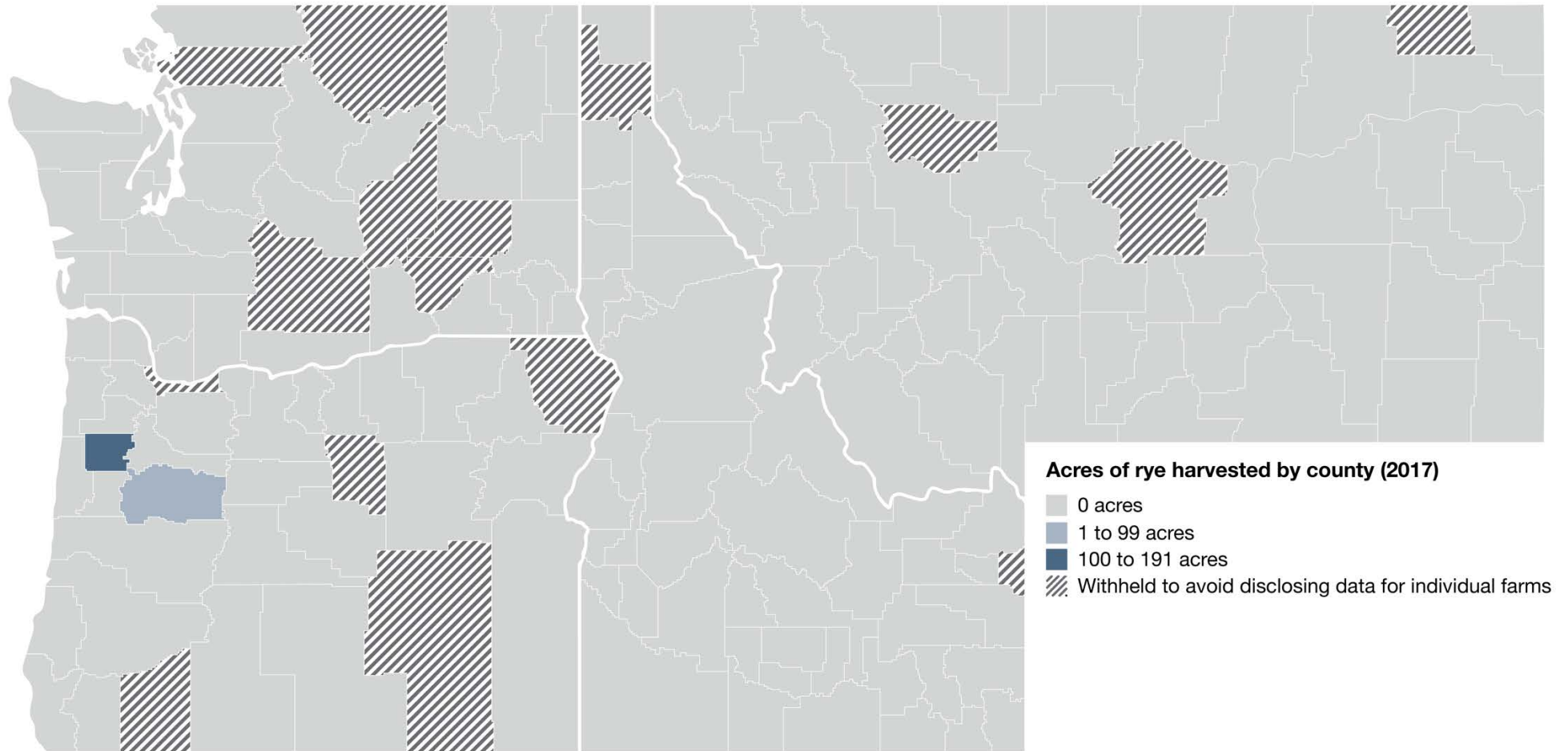
Soybean production is concentrated in eastern Montana, though producers did grow some soybeans in Walla Walla (WA), Umatilla and Union (OR), and Latah (ID) counties in 2017 (Figure 13).

FIGURE 13 | Acres of soybeans harvested in 2017 by county



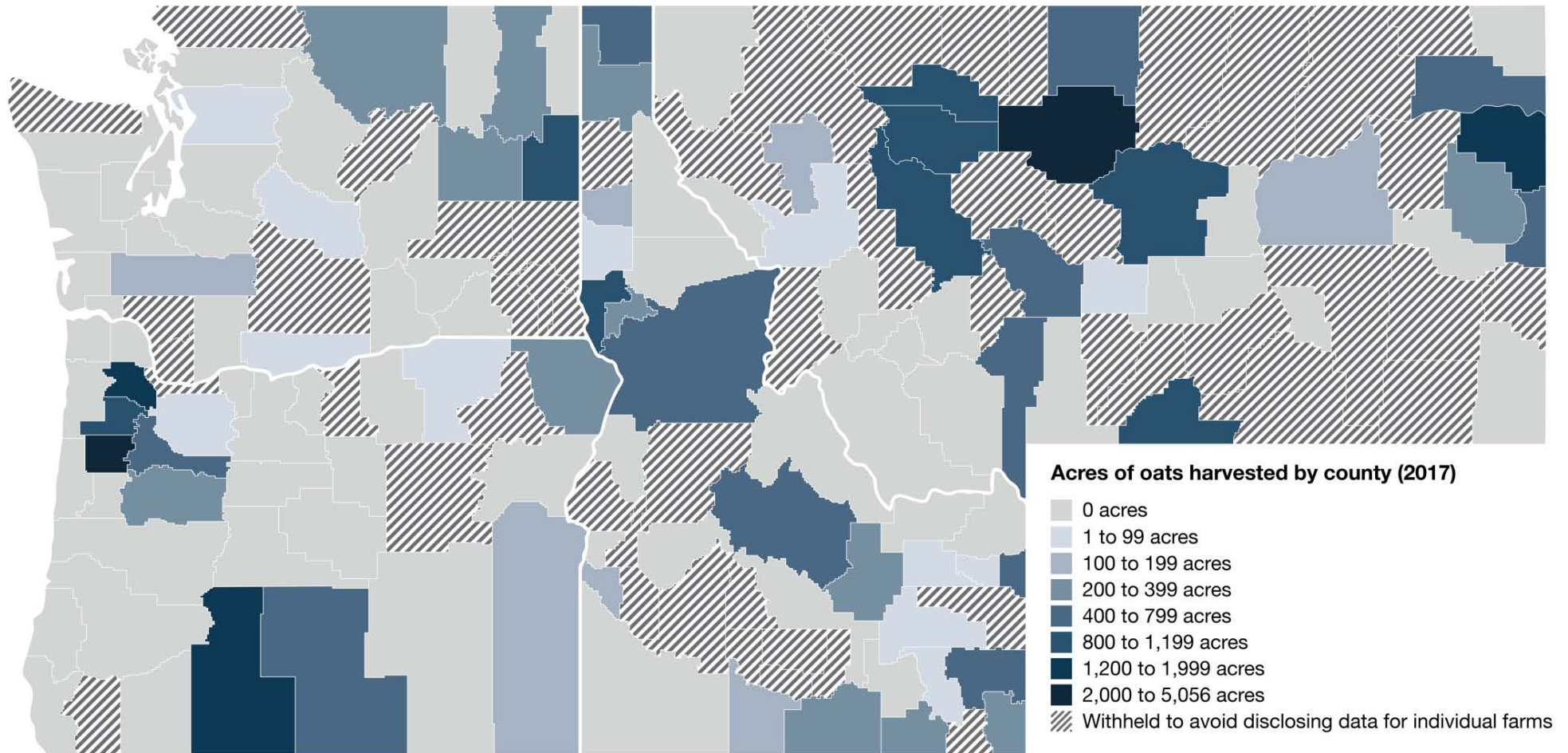
While the number of producers (and associated acres) growing rye in 2017 was minimal, the number of counties with data withheld to avoid disclosing data for individual farms shows some rye production in all four states, including Wallowa (OR) and Grant, Adams, Franklin, and Yakama (WA) counties (Figure 14).

FIGURE 14 | Acres of rye harvested in 2017 by county



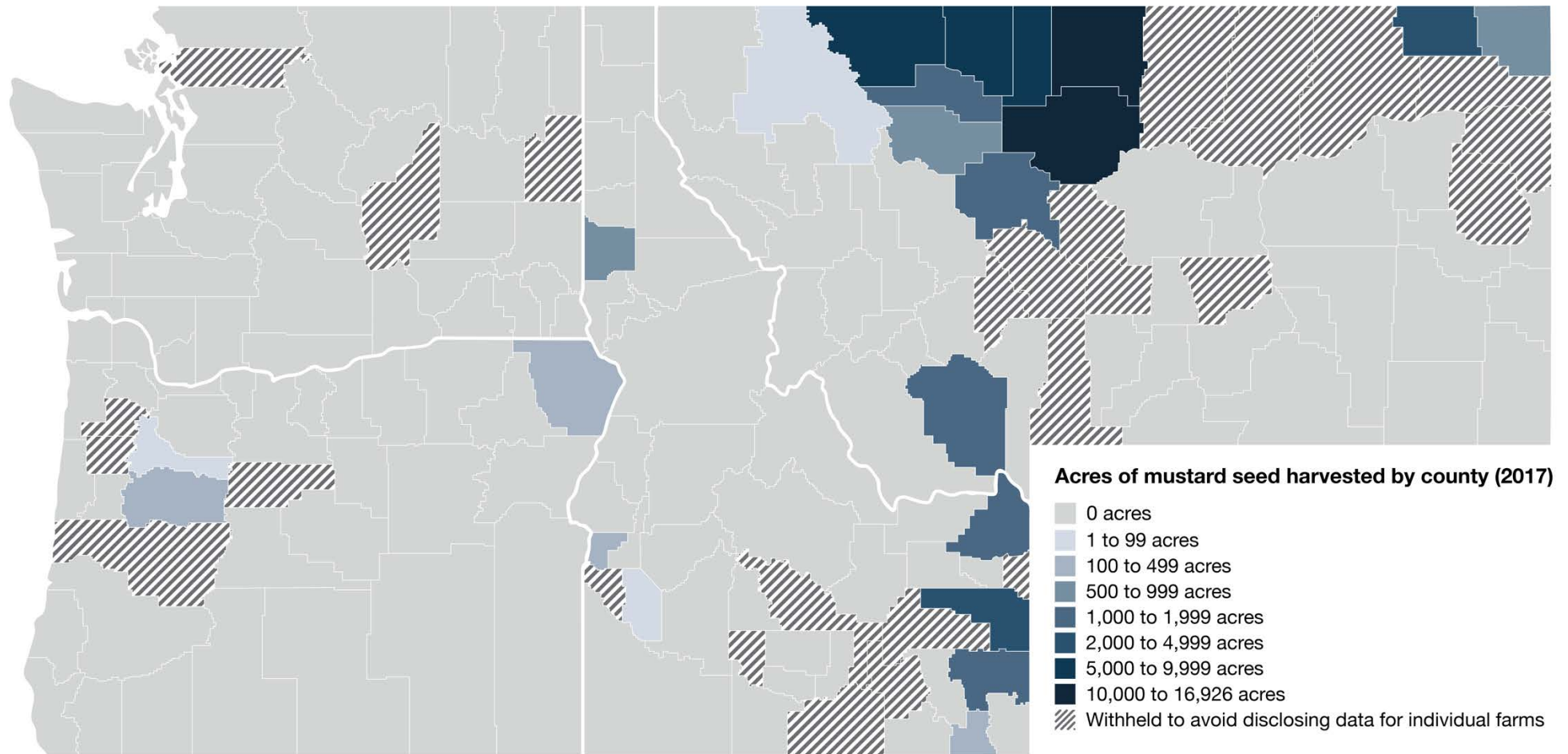
While not as prominent as wheat or barley, oats are also widely distributed throughout the region, including in northcentral Idaho (Figure 15). The withholding of data for several counties in southeastern Washington indicates some producers in those counties grow oats.

FIGURE 15 | Acres of oats harvested in 2017 by county



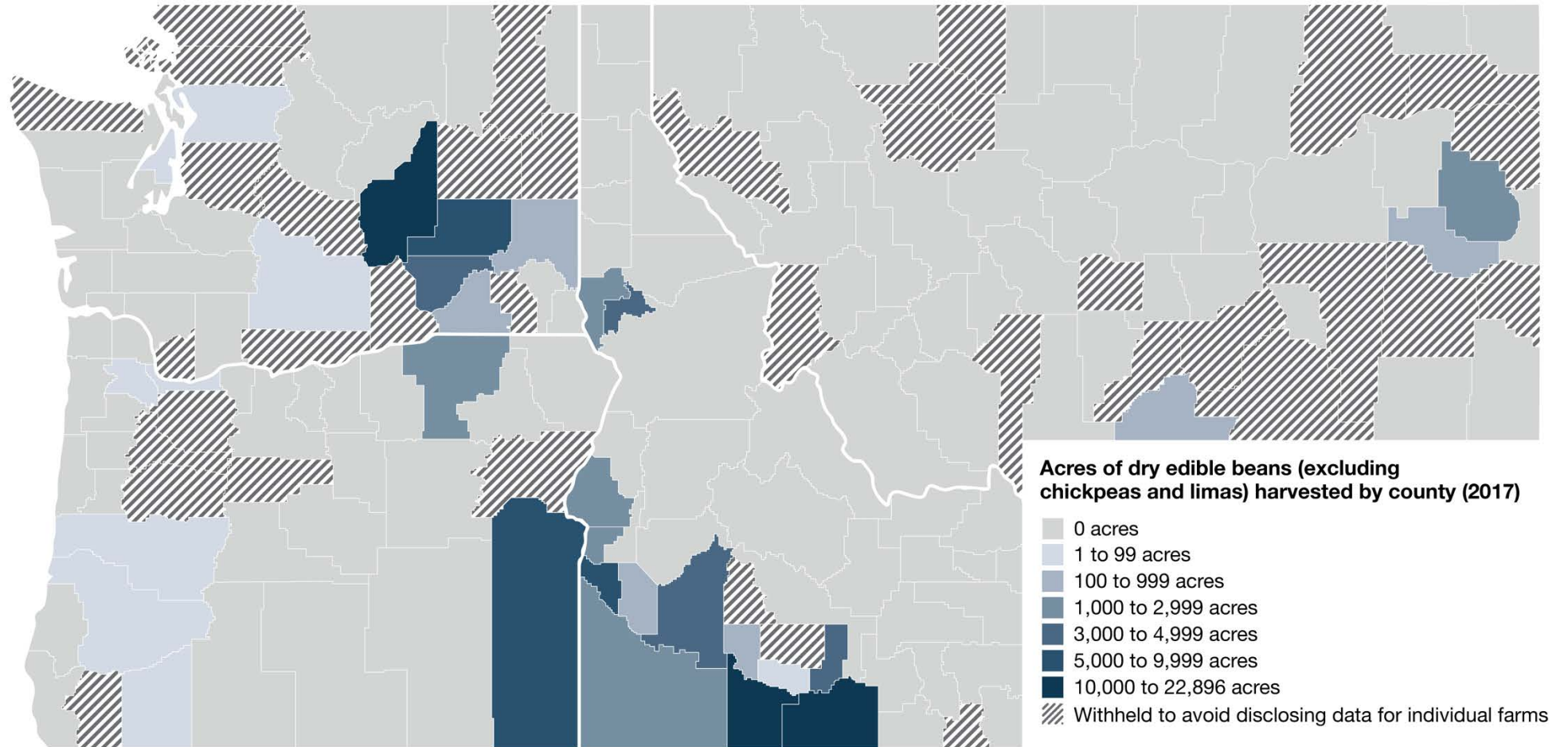
Northcentral Montana produces the majority of the mustard seed in the region (Figure 16).

FIGURE 16 | Acres of mustard seed harvested in 2017 by county



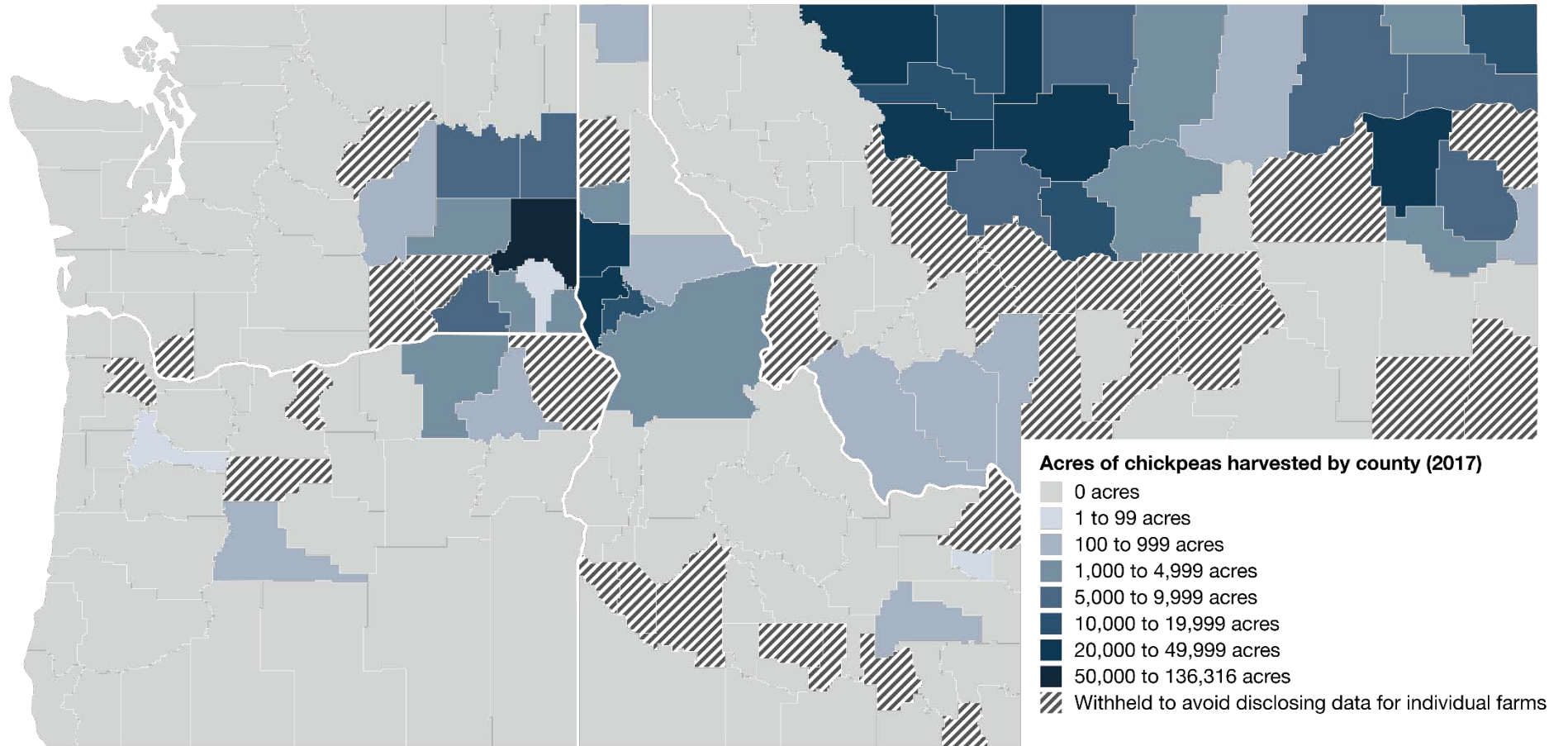
Dry edible beans are grown in many counties in southeastern Washington and southwestern Idaho (Figure 17).

FIGURE 17 | Acres of dry edible beans (excluding chickpeas and lima beans) harvested in 2017 by county



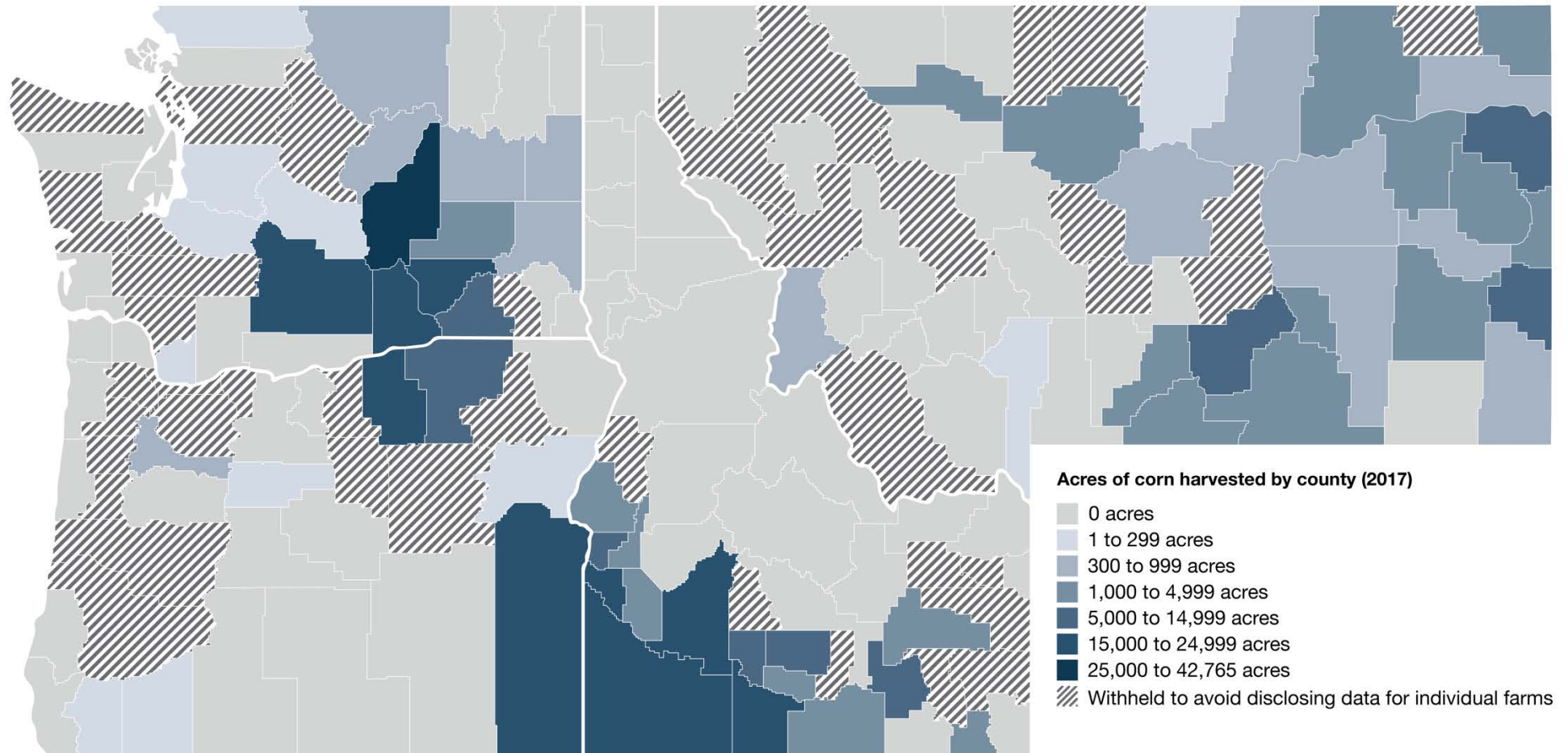
Chickpeas (garbanzo beans) are abundant within a feasible drive radius of Blue Mountain Station (Figure 18).

FIGURE 18 | Acres of chickpeas harvested in 2017 by county



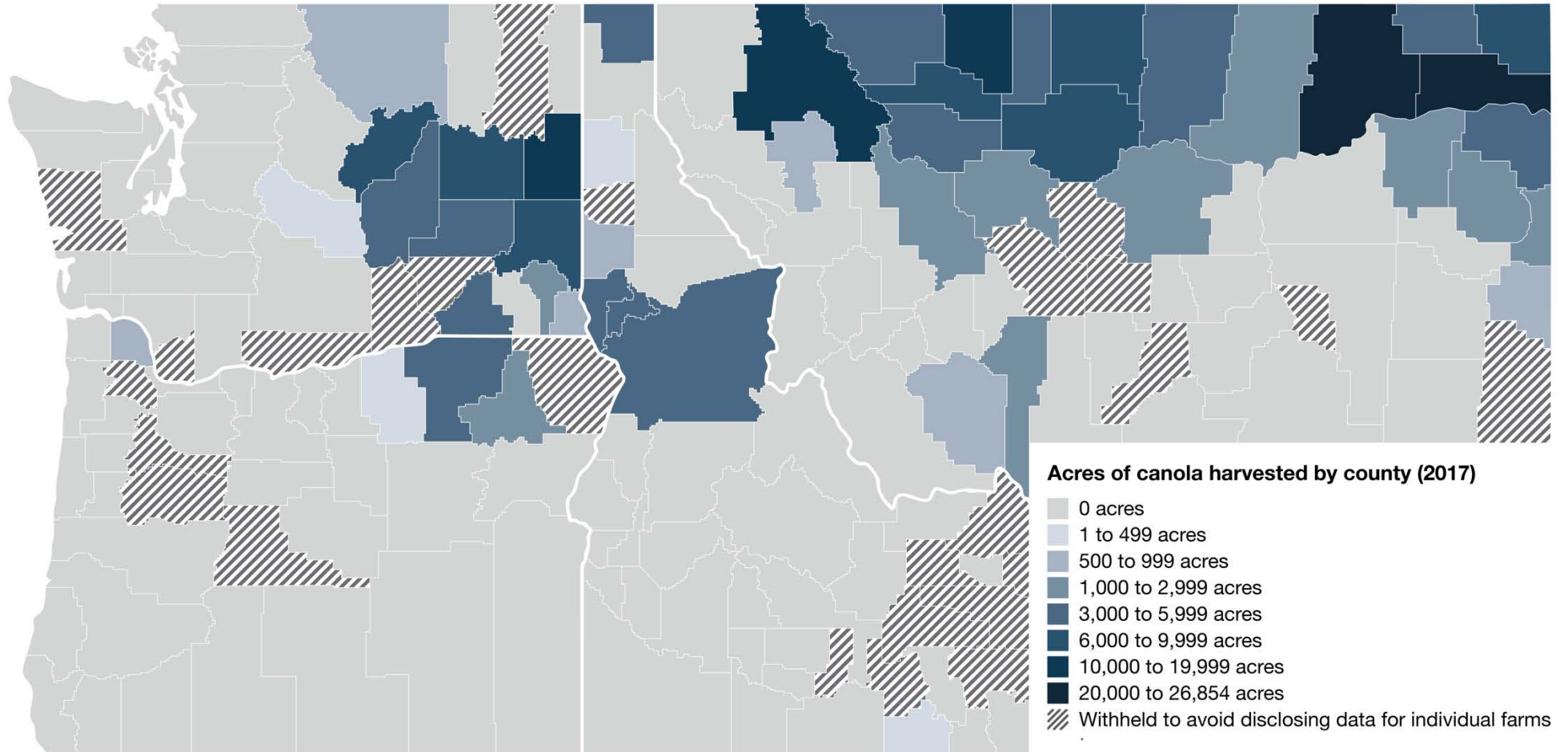
Corn follows a similar distribution pattern to dry edible beans, though is more common (Figure 19). Southeastern Washington, northeastern Oregon, and southwestern Idaho are the top producing areas in the region.

FIGURE 19 | Acres of corn harvested in 2017 by county



Canola is grown in much of the northern reaches of the region, including northern Montana and east-central Washington (Figure 20).

FIGURE 20 | Acres of canola harvested in 2017 by county



Product differentiation: Growing practices and farm identity preservation

The University of Idaho Northern District Community Food Systems Program offers the following definition of artisan grains:

Artisan grains are varieties of cereal crops that are differentiated from conventional grains because of a specific attribute that they possess (i.e., high nutritional value, regenerative cultivation practices, etc.). These grains are generally not grown for commodity markets and include grain subsets such as landraces and ancient grains.²

While the US Agricultural Census data help illustrate the volume and extent of available crops that could be sourced from the region, the potential supply of grains and other crops for an artisan, regional food system-focused business cluster requires more context. A primary theme from the key informant interviews is that the opportunity for regional artisan grain economy development lies in differentiating products from those available through conventional production and supply chains to access a premiumized market niche. Specifically, unique (i.e., environmentally superior in some way) production practices and farm identity preservation (i.e., traceability and transparency) to final value-added product enable value-added businesses and end consumers to assess the extent the product aligns with their values and allows the “story” embedded in the product to be marketed.

A fundamental way to differentiate products is through on-farm production practices. Commonly mentioned examples from interviews included specific certifications (e.g., USDA organic, Salmon-Safe, Trout-Safe, Food Alliance) and descriptors including glyphosate free, “climate smart,” “regenerative,” and “ecological.” Overall, there are examples of producers in the region who are experimenting with and implementing a range of innovative practices; however, not everyone agrees what set of practices or certifications are most desirable or most sustainable environmentally, which creates many pathways and opportunities for growers and value-added businesses to differentiate their products and find market niches. Furthermore, the practices most suitable or leading to the best environmental outcomes (e.g., erosion or nonpoint source pollution prevention) can vary from site to site. These differences in perspective and production practices are already conditioning regional artisan grain supply chain partnerships and defining niches. As one key informant said,

“It’s the attributes from the grain itself that are going to have meaning to the businesses that are going to utilize it, then ultimately their customer. And it is—as with so many things in local and regional food systems—really relationship based. There are some different perspectives on, as in all things about what is sustainable, what is regenerative, what is Climate Smart or what is ecological within this whole grain community. So, I think there’s a lot of collaboration, but there’s also a lot of differentiation at the level of the grain production in that very beginning of the supply chain. So, there’s the opportunity to develop unique values-based supply chains based on that differentiation. And I think it’s very much collaboration still, but there’s also lanes of within that, which provides a lot of market opportunity overall.”

Farm identification alone or in combination with production practices were the most important attributes for marketing artisan grain products from the perspective of many key informants.

² <https://www.idahofoodworks.org/what-are-artisan-grains>

ORGANIC CERTIFICATION

While USDA Organic is not the only third-party certification producers adopt to differentiate their practices and products, it is among the most well-established and recognized programs. Figures 21 and 22 show the number of USDA Organic-certified farms by county in 2017 and amount (in acres and bushels) of USDA Organic-certified wheat harvested in the region by state in 2019, respectively. While there is a considerable number of USDA Organic-certified farms and acres of certified-organic wheat grown in the Northwest—presenting potential supply for value-added businesses that want to have the USDA Organic label—they are not concentrated in Columbia nor immediately adjoining counties where instead other certification programs (namely, Salmon-Safe and Food Alliance) tend to be more common among grain growers.

FIGURE 21 | Number of USDA Organic-certified farms in the region by county, 2017 (note, this data is all farms not only grain farms)

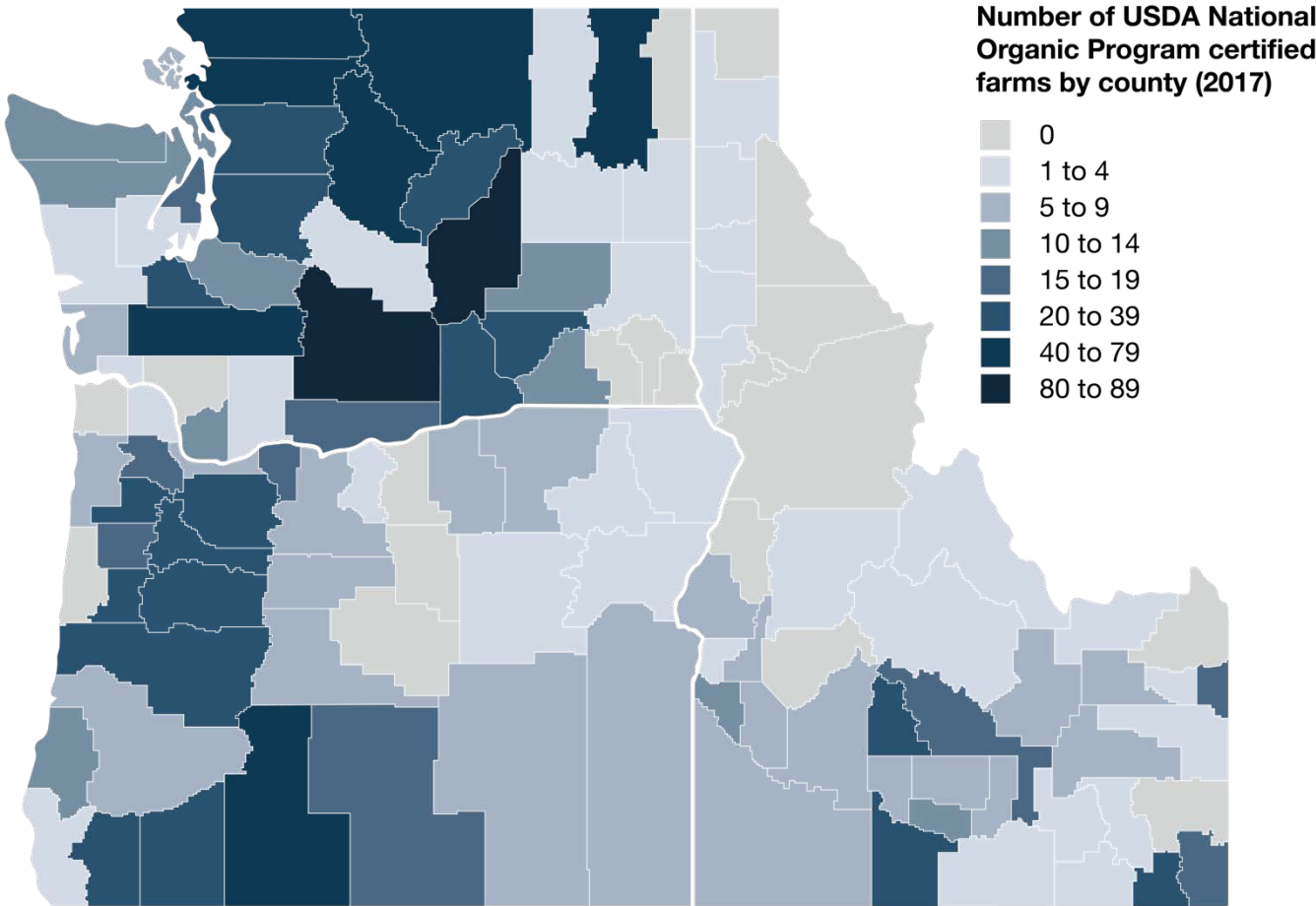
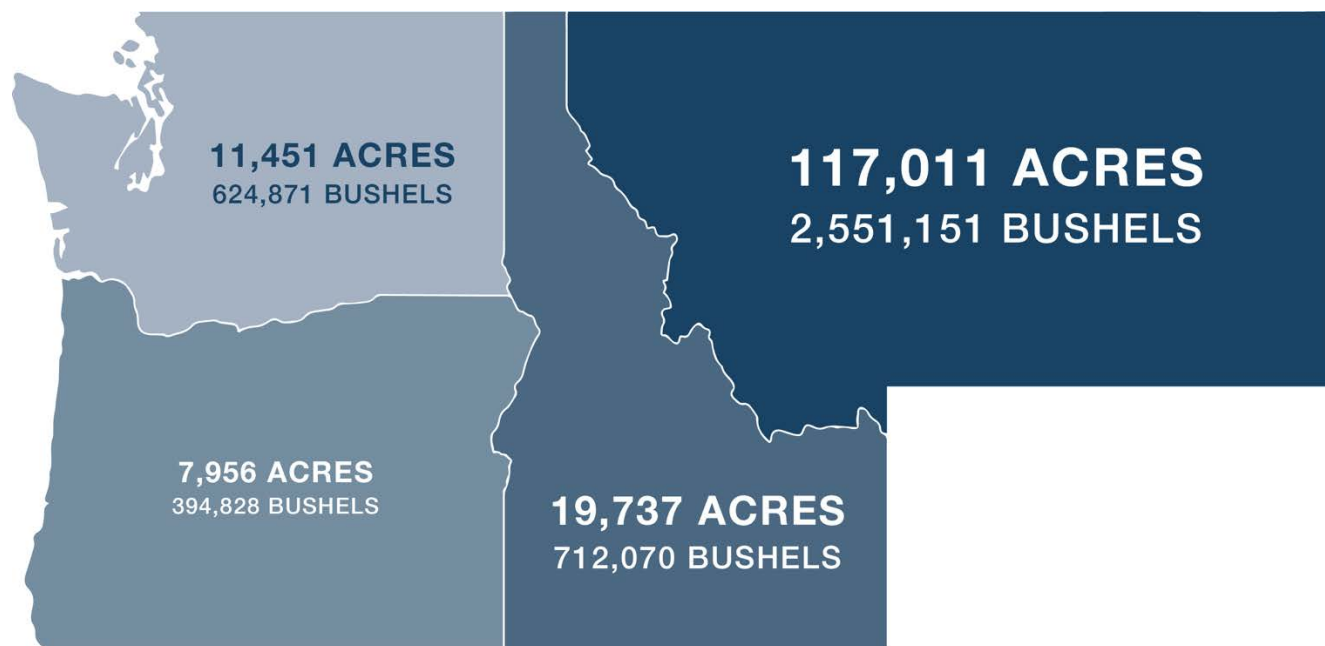


FIGURE 22 | Acres and bushels of USDA Organic-certified wheat harvested in the region by state, 2019



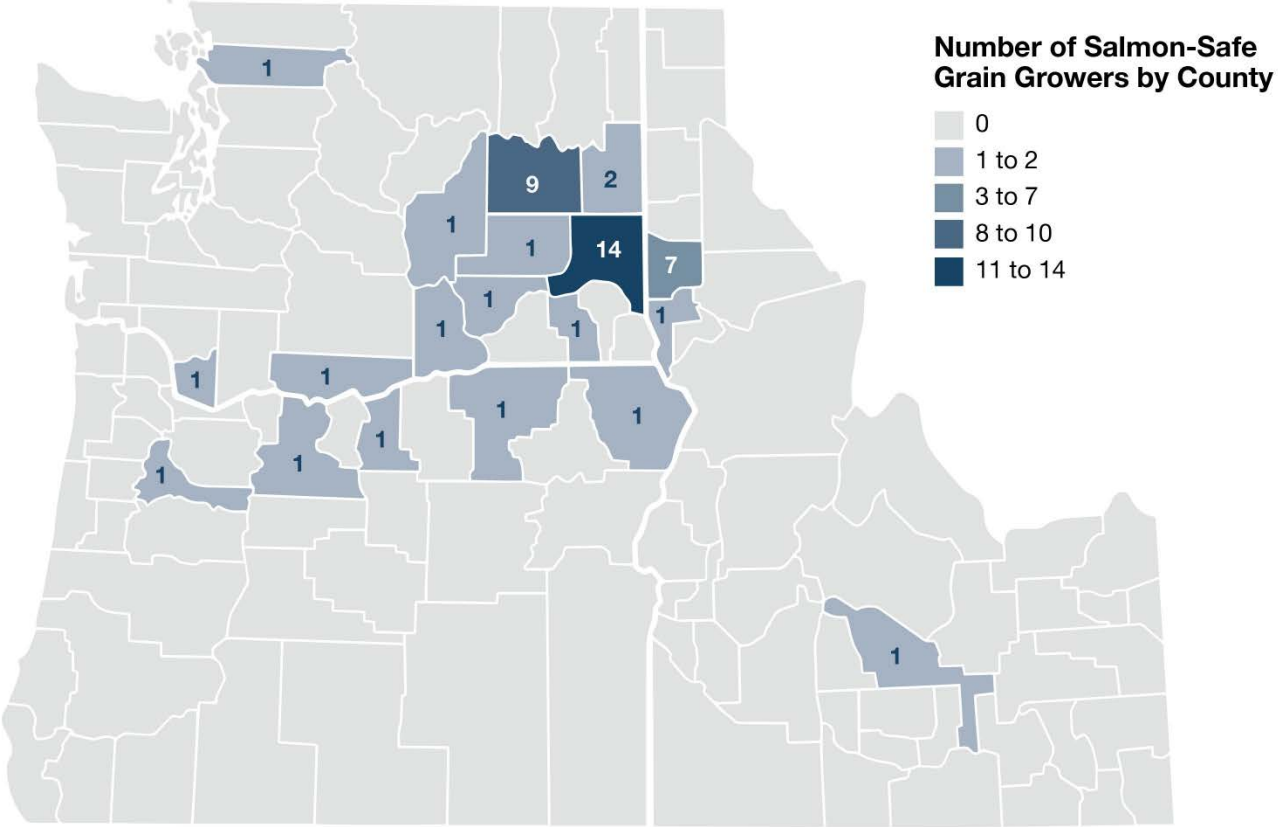
SALMON-SAFE CERTIFICATION

Salmon-Safe is another example of a third-party certification and accreditation program artisan grain businesses in the Blue Mountain Station cluster might choose to differentiate their products. Salmon-Safe emerged in this feasibility assessment as a useful case study in part because Mainstem Malt, the prospective anchor tenant for the artisan grain cluster, sources all Salmon-Safe barley for its malt and because the certification came up frequently in key informant interviews. Furthermore, there are more grain growers participating in the Salmon-Safe program within Dayton’s immediate production area than in USDA Organic certification.

Salmon-Safe incentivizes producers to adopt agricultural practices that protect watersheds. Certification is based on a farm’s performance in seven categories: in-stream habitat protection and restoration, riparian and wetland vegetation protection and restoration, water use management, erosion prevention and sediment control, integrated pest management and water quality protection, animal management, and landscape-level biodiversity.

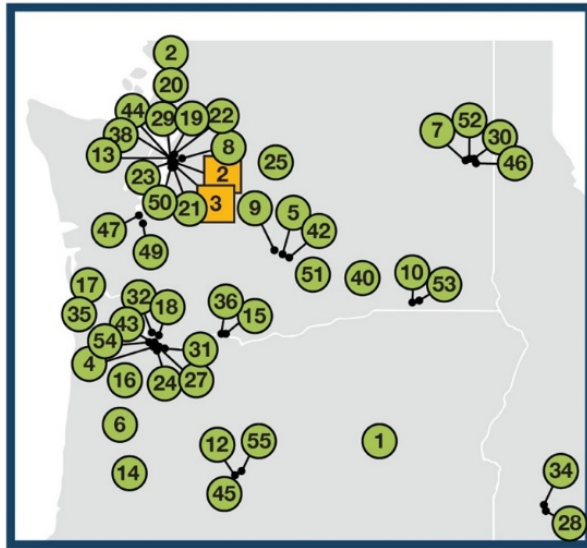
Salmon-Safe has more than 95,000 certified acres concentrated in Oregon, Washington, and California and is expanding inland with its new Trout-Safe certification program. The region has a growing number of certified Salmon-Safe grain growers, many concentrated in southeast Washington (Figure 23). As of May 2023, there were 47 Salmon-Safe grain growers in the region: five in Oregon, 33 in Washington, and nine in Idaho.

FIGURE 23 | Number of certified Salmon-Safe grain growers in the region by county, May 2023

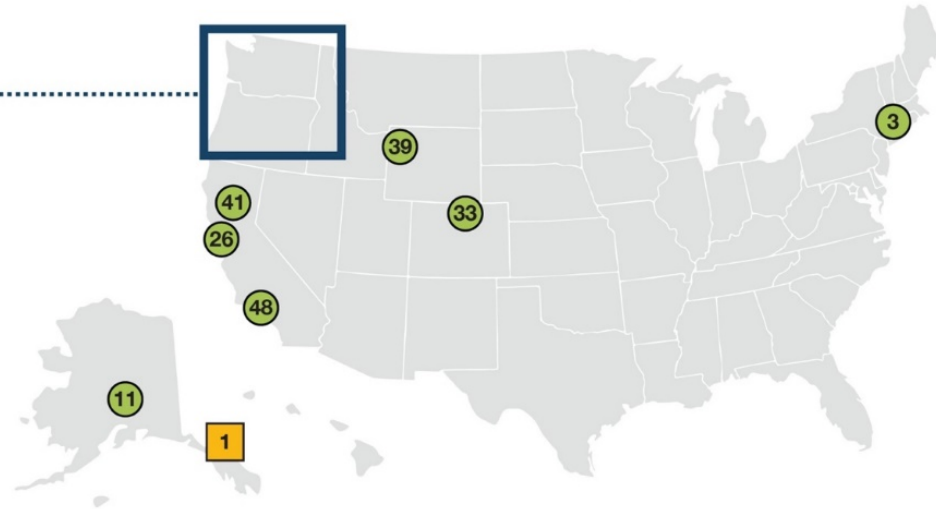


Salmon-Safe also helps illustrate the supply and market potential for these types of unique artisan grain products as there is a growing number of businesses throughout the Northwest and beyond selling Salmon-Safe-certified products, including wineries, breweries, and distilleries. Figure 24 is a map of 58 breweries and distilleries that feature Salmon-Safe products as of May 2023. The Walla Walla Basin, including the Touchet River, is a stronghold for salmon and steelhead habitat restoration, providing cultural and marketing resonance for Salmon-Safe labelling. In addition to Mainstem Malt, other businesses that join the artisan grain cluster at Blue Mountain Station will have the opportunity for sourcing and processing according to Salmon-Safe standards. This is a location-specific asset in marketing for businesses that has proven to resonate broadly across the Northwest and beyond. However, there are many other options for differentiating and building supply chain relationships to move artisan grain products as well.

FIGURE 24 | Map of breweries and distilleries that purchase Salmon-Safe hops or malt, May



Salmon-Safe Brewery and Distillery Partners



- | | | | | |
|---|---|--|---|--|
| 1 1188 Brewing
John Day, OR | 13 Fair Isle Brewing
Seattle, WA | 25 Icicle Brewing Co.
Leavenworth, WA | 37 Quirk Brewing
Walla Walla, WA | 49 Triceratops Brewing Co.
Tumwater, WA |
| 2 Aslan Brewing
Bellingham, WA | 14 Falling Sky Brewing
Eugene, OR | 26 Laughing Monk Brewing
San Francisco, CA | 38 Reuben's Brews
Seattle, WA | 50 Two Beers Brewing
Seattle, WA |
| 3 Athletic Brewing Co.
Milford, CT | 15 Ferment Brewing
Hood River, OR | 27 Little Beast Brewing
Portland, OR | 39 Roadhouse Brewing
Jackson, WY | 51 Varietal Brewing Co.
Sunnyside, WA |
| 4 Baerlic Brewing Co.
Portland, OR | 16 Foreland Brewing Co.
McMinnville, OR | 28 Lost Grove Brewing
Boise, ID | 40 Sage Brewing Co.
Pasco, WA | 52 Whistle Punk Brewing
Spokane, WA |
| 5 Bale Breaker Brewing
Yakima, WA | 17 Fort George Brewing
Astoria, OR | 29 Lucky Envelope Brewing
Seattle, WA | 41 Sierra Nevada Brewing Co.
Chico, CA | 53 Quirk Brewing
Walla Walla, WA |
| 6 Block 15 Brewing Co.
Corvallis, OR | 18 Fortside Brewing Co.
Vancouver, WA | 30 LumberBeard Brewing
Spokane, WA | 42 Single Hill Brewing
Yakima, WA | 54 Widmer Brothers Brewing Co.
Portland, OR |
| 7 Brick West Brewing
Spokane, WA | 19 Fremont Brewing
Seattle, WA | 31 Migration Brewing Co.
Portland, OR | 43 Steeplejack Brewing
Portland, OR | 55 Worthy Brewing Co.
Bend, OR |
| 8 Chainline Brewing
Kirkland, WA | 20 Garden Path Fermentation
Burlington, WA | 32 Mt. Tabor Brewing Co.
Vancouver, WA | 44 Stoup Brewing
Seattle, WA | |
| 9 Cowiche Canyon Brewing
Cowiche, WA | 21 Georgetown Brewing
Seattle, WA | 33 New Belgium Brewing Co.
Fort Collins, CO | 45 Sunriver Brewing Co.
Sunriver, OR | |
| 10 Crossbuck Brewing
Walla Walla, WA | 22 Halcyon Brewing
Seattle, WA | 34 Payette Brewing
Boise, ID | 46 The Grain Shed
Spokane, WA | |
| 11 Denali Brewing
Talkeeta, AK | 23 Holy Mountain Brewing
Seattle, WA | 35 Pelican Brewing Co.
Cannon Beach, OR | 47 Three Magnets Brewing
Spokane, WA | |
| 12 Deschutes Brewery
Bend, OR | 24 Hopworks Urban Brewery
Portland, OR | 36 Pfriem Brewing
Hood River, OR | 48 Topa Topa Brewing Co.
Ventura, CA | |
-
- | | | |
|-----------------------------------|---|--------------------------------------|
| 1 Amalga Distillery
Juneau, AK | 2 Copperworks Distillery
Seattle, WA | 3 Westland Distillery
Seattle, WA |
|-----------------------------------|---|--------------------------------------|
-
- = Brewery ■ = Distillery

Grower opportunities

An impetus for the current study is the potential for expanded mid-scale grain infrastructure and processing opportunities to enable more growers to build on and take advantage of the burgeoning consumer and supply chain interest in artisan products for potentially higher-profit local and regional markets. Key informant interviewees agreed there is plenty of current and potential crop supply to support an artisan grain cluster at Blue Mountain Station, including from many existing large-scale producers who are seeking to explore or expand regenerative practices, such as cover cropping and rotational crop diversification, or who are simply interested in diversifying their markets to increase profitability. As one key informant explained,

“[Because] they utilize herbicides as a tool pretty significantly in their systems, they’re afraid of herbicide resistance. So being able to mix up what they’re growing and having **more options than what the commodity market offers**. Especially because...the commodity market price is below the cost of production for what I can grow this grain for.... If somebody has thousands of acres, it doesn’t necessarily mean that they’re going to expect to sell it all into some niche artisan grain market. But **if they can diversify some of their operation, I think it does allow them more flexibility.**”

In addition to market diversification and options, for some grain growers, the possibility of developing vertically integrated enterprises presents opportunities to integrate additional family members into a family farm and food business venture where the farming business may not be adequate to support all who wish to be involved. Some examples of vertically integrated enterprises other farms have successfully developed in the region include flour mill and bakery models (e.g., Bluebird Grain Farms, Wheatberry Mills, Hillside Grain) and malthouse and brewery businesses (e.g., Farm Power Malt, Mashbill Malts) (Figure 1). However, key informants also highlighted that many farmers prefer to just focus on farming and are therefore uninterested in value-added ventures.

CROP-SPECIFIC CONSIDERATIONS

There are many opportunities to develop products, businesses, and markets around specific artisan crops. For example, Table 2 summarizes value-added products typically made from select crops. At the same time, different crops—and varieties within them—have unique attributes, tradeoffs, and agronomic needs and implications, which we highlight in Table 3. While there is a lot of potential to develop supply and market relationships, some specialty grains and seeds are only currently grown in small quantities and could be difficult to source, at least initially. The landrace grains being grown out by Palouse Heritage came up in key informant interviews as one such example of a narrow niche a business and its partners are carving out in the regional artisan grains space.³ Not unlike most businesses, an enterprise using currently rare grains or seeds would likely have to scale up over time while building the supply and market relationships and other resources needed to reduce risk throughout the chain from the value-added business to the growers.

³ <https://www.palouseheritage.com/heritage-grains>

TABLE 2 | Grain and replacement crops and common value-added products

Crops	Primary value-added products
Hard red winter wheat	Flour, breads, bakery goods
Hard red spring wheat	Flour, breads
Durum wheat	Flour, pasta
Soft red winter wheat	Flour, cakes, cookies, crackers
Soft white wheat	Flour, noodles, crackers, cereal, malt, beer, spirits
Hard white winter wheat	Flour, breads, malt, beer, spirits
Hard white spring wheat	Flour, breads, malt, beer, spirits
Barley	Malt/beer, flour, breads, crackers, spirits
Oats	Breads, biscuits, cookies, probiotic drinks, cereal, granola, baby food, malt/beer, alternative dairy products, spirits
Corn	Cornmeal, flour, cereal, malt, beer, snack foods, baby food, English muffins, bakery goods, coatings, batters, spirits
Farro/emmer	Flour, breads, cookies, pasta, pilaf, flatbreads, malt, beer, spirits
Einkorn	Flour, breads, crackers, malt, beer, pasta, spirits
Rye	Flour, breads, malt, beer, spirits, cereal, cookies
Spelt	Flour, breads, crackers, pasta, malt, beer, spirits
Buckwheat	Granola, cookies, noodles, cereal, gluten-free flour replacement, malt, beer, spirits
Flax	Oil, supplement, cereal, breads
Teff	Gluten-free flour replacement, chocolate products, snack foods, crackers, East African cuisine
Khorasan/Kamut	Flour, high-protein flour replacement, breads, bakery goods, cereal
Millet	Malt, beer, flatbreads, tabbouleh, crackers, cookies, breads, spirits
Sorghum	Snack foods, gluten-free flour replacement, noodles, pasta, flatbreads, malt, beer, spirits
Chickpeas/garbanzo beans	Snack foods, pasta, tortillas, gluten-free flour replacement, malt, beer, spirits
Lentils	Gluten-free flour replacement, high-protein flour replacement, alternative meats, snack foods, malt, beer, spirits
Triticale	Flour, bakery foods, cereal, spirits, breads, malt, beer
Soybeans	Alternative dairy products, tofu, yuba, sprouts, gluten-free flour replacement, tempeh, soy sauce, alternative meats, snack foods, miso, high-protein flour replacement, oil
Amaranth	Gluten-free flour replacement, snack foods, breads, crackers, malt, beer, spirits
Quinoa	Gluten-free flour replacement, pizza crust, cereal, granola, thickening agent, malt, beer, spirits
Peas	Gluten-free flour replacement, high-protein flour replacement, alternative meats, snack foods, malt, beer, spirits
Black beans	Gluten-free flour replacement, high-protein flour replacement, crackers, alternative meats, snack foods
White rice*	Gluten-free flour replacement, bakery goods, snack foods, breads, crackers, noodles, rice paper, baby food, cereal, malt, beer, spirits
Brown rice*	Gluten-free flour replacement, bakery goods, snack foods, breads, crackers, noodles, rice paper, baby food, cereal, malt, beer, spirits

*Not grown in the region

TABLE 3 | Example agronomic considerations of artisan grains and other milled crops

Crops	Environmental considerations
Hard red winter wheat	Rotational crop, requires cold acclimation, suitable environmental conditions may vary by variety
Hard red spring wheat	
Durum wheat	
Soft red winter wheat	
Soft white wheat	
Hard white winter wheat	
Hard white spring wheat	
Barley	Drought resistant, tolerates alkaline soils, does not grow well in acidic soils, cover crop, rotational crop, high saline tolerance
Oats	Cold weather tolerant, cover crop, rotational crop
Corn	Requires irrigation, vulnerable to cold, high nitrogen needs
Farro/emmer	Hulls may clog seeding equipment, low nutrient needs, drought tolerant
Einkorn	Frost tolerant, self-pollinating, drought tolerant
Rye	Cover crop, rotational crop, drought tolerant, cold weather tolerant, tolerates acidic
Spelt	Hulls may clog seeding equipment
Buckwheat	Cover crop, rotational crop, tolerant of low-fertility soil, vulnerable to frost, if exported to Asia cannot be grown in rotation with or near wheat
Flax	Harvest leaves residue that must be chopped or burned, prefers cool climates, self-pollinating, rotational crop
Teff	Vulnerable to frost, may need irrigation
Khorasan/Kamut	Like spring wheat, rotational crop, currently trademarked and only grown on organic farms
Millet	Drought resistant, rotational crop, cover crop, suppresses weeds
Sorghum	Drought tolerant, heat tolerant
Chickpeas/garbanzo beans	Rotational crop, drought tolerant, does not grow well in saline soils, nitrogen-fixing
Lentils	Vulnerable to wind, self-pollinating, drought tolerant, cold tolerant, cover crop, rotational crop, nitrogen-fixing
Triticale	Cover crop, rotational crop, tolerant of alkaline soil, more susceptible than typical wheats to winter injury
Soybeans	Rotational crop, sensitive to saline, prefers high potassium soils, nitrogen-fixing
Amaranth	Vulnerable to frost, drought tolerant, heat tolerant, related to pigweed so may have negative connotations for producers, cross-pollinates with quinoa
Quinoa	Grows best at high elevations (7000-10000 ft), drought tolerant, saline tolerant, vulnerable to heat, cross-pollinates with amaranth
Peas	Nitrogen-fixing, vulnerable to heat, rotational crop, frost tolerant, does not grow well in saline soil
Black beans	Nitrogen-fixing, rotational crop, may require irrigation, vulnerable to weeds
White rice	High water needs, needs uniform land to flood, high daily temperatures; not grown in region
Brown rice	High water needs, needs uniform land to flood, high daily temperatures; not grown in region

⁴ <https://www.sare.org/publications/managing-cover-crops-profitably/nonlegume-cover-crops/cereal-rye/>

Heritage grains and other currently uncommon crops

There is a great deal of interest and exploration of heritage grains in the regional grain system development discussion. Palouse Heritage, a Palouse-based company focusing on development and promotion of heritage grains, provides the following definitions (text quoted from website):

Heritage/heirloom grains: generic terms that include all grain varieties raised before the mid-20th century when the modern breeding techniques of industrialized, chemically focused farming came into common use. Heritage grains include landrace and ancient grains.

Landrace grains: ancient pre-hybridized varieties ("races") of wheat, barley, oats, rye, and other grains that flourished since time immemorial in areas ("lands") throughout the world where they adapted to local environmental conditions. Most of our Palouse Heritage grains are landraces.

Ancient grains: landraces as well as primitive "pre-wheat" cereals like einkorn and emmer which have a thin but indigestible shroud ("hull") which must be removed for consumption.⁵

While heritage grains may be suitable opportunities for some growers and value-added products, they are not the only crops relevant to a regional artisan grain supply chain and economy. Also, there are several heritage and "ancient" crops and varieties, each with unique opportunities and tradeoffs. For example, quinoa is often marketed as an "ancient" grain.

In an interview, Doug Finkelburg, University of Idaho Northern Extension District Dryland Cropping Systems Area Extension Educator, provided several examples of risk and other considerations for crops that are not yet widely grown. For example, uncommon crops can entail unique challenges related to disease susceptibility, low yields, and lack of research and professional support. Here is a quote that summarizes considerations Finkelburg raised related to heritage grains:

If you're going to grow an ancient grain, you're going to have a tall crop that's probably going to fall over very easily because that's what they did. We're going to be looking at something that's going to require extra handling. It will not have the same yield potential as the varieties that we're growing commercially right now. So...expectations will need to be managed and, to successfully harvest and handle that crop, there will likely be some extra steps involved compared to what we see now where...the combine effectively cleans the grain enough for point of sale for the initial transport. Maybe it's got to be cleaned again at the elevator if it's really weedy or something. There's also a limitation of products where weed control that are going to be labeled in some of these ancient grains or landraces. There may not have been the research and the effort put behind labeling weed control products for spelt, for instance, where you could legally apply the product in barley crop. You may not be able to legally apply it in the spelt crop if there's not a special thing on the label. I don't know what that universe looks like. I don't work in that area, but those are also considerations that will need to be thought through to successfully produce any of those grains. But as far as is there a limitation in our environment? No.

Susceptibility to disease

As Finkelburg explained in the context of heritage grains, disease can be a concern as many of the vectors are unknown or under researched. He stated, "I don't think we understand how susceptible any of these

⁵ <https://www.palouseheritage.com/heritage-grains>

older grains, ancient grains, landraces, pick your terminology, are to our current crop diseases.” There are some eastern Washington-relevant resources from Washington State University and the University of Idaho; however, some of the current research about diseases in grains and seeds currently uncommon to the US Northwest comes from western Washington, which is a different climate than the agronomic conditions of eastern Washington. Special considerations for disease in uncommon grains will take more research and information sharing.

Yields and protein

Artisan and heritage grains not widely grown commercially may not have the same yield potential as commodity grains. In addition, low yields and extra steps in the harvest and cleaning process are exacerbated by competition with the commercial market for the crop with highest protein content. Other regions, like eastern Montana, are better suited to growing high-protein grains than the area most immediately to be served by a facility in Dayton.

Few accessible resources to support artisan grain production

Producers also need to consider the limited agronomic resources for commercially uncommon grains. Regarding tools available for grain growers, Finkelburg observed that “it needs to be very clear that the more obscure and specialized the crop is that you’re considering producing, the fewer production support resources exist.” These production support resources include access to herbicides, crop insurance, research, best practices, and market demand. One example of lack of support resources is the expectation that interseeding rye can contaminate and complicate future crops (i.e., interseeding rye in Year 1 crops can result in “volunteer rye” in Year 2 crops, potentially creating problems for cleaning, blending, and milling certain grains, especially for a gluten-free grain crop).

Crop insurance and lease terms

Crop insurance and lease agreement terms arose in key informant interviews as factors that can constrain the types and amounts of crops producers grow, with implications for the supply of cereals not widely produced commercially. As one interviewee said about crop insurance,

“Another thing that I see as a barrier [to regional artisan grain economy development] is crop insurance. I was talking to a grower the other day and they’re intercropping, so they’re growing multiple crops at one time on the same piece of ground. And they were doing enough innovative stuff that they got kicked off crop insurance. So, whatever is grown has to either be a small enough parcel that the grower is willing to take the risk.... Either it has to be already covered under crop insurance or there has to be enough momentum around it that maybe it can gain traction with some sort of regional exception.”

GLUTEN-FREE CROPS

Many interviewees expressed interest in or indicated market demand for artisan gluten-free malt and flour-based value-added products. As Table 4 shows, many crops relevant to an artisan grain business cluster at Blue Mountain Station are gluten free and grown regionally. To access this market niche, gluten-free grains, seeds, legumes, and other crops must always be stored and processed separately from wheat, barley, and other glutenous inputs, requiring separate infrastructure. Gluten-free product lines for local and regional markets can present high-profit market niches.

TABLE 4 | Artisan grains and other milled crops by states grown and gluten content

Crops	States Grown				Gluten Content (Dry) (mg/g)
	ID	MT	OR	WA	
Khorasan/Kamut	☯	☯			90
Durum Wheat	☯	☯			80
Einkorn	☯	☯	☯	☯	80
Spelt	☯	☯	☯	☯	80
Farro/Emmer	☯	☯	☯	☯	75
Barley	☯	☯	☯	☯	70
Spring Wheat	☯	☯		☯	60
Winter Wheat	☯	☯	☯	☯	60
Triticale	☯	☯	☯	☯	40
Rye	☯	☯	☯	☯	30
Amaranth	☯	☯	☯	☯	Gluten-free
Buckwheat	☯	☯	☯	☯	Gluten-free
Chickpeas	☯	☯	☯	☯	Gluten-free
Corn	☯	☯	☯	☯	Gluten-free
Flax	☯	☯	☯	☯	Gluten-free
Lentils	☯	☯	☯	☯	Gluten-free
Millet	☯	☯	☯	☯	Gluten-free
Oats	☯	☯	☯	☯	Gluten-free
Peas	☯	☯	☯	☯	Gluten-free
Quinoa	☯	☯	☯	☯	Gluten-free
Sorghum	☯	☯	☯	☯	Gluten-free
Soybeans	☯	☯	☯	☯	Gluten-free
Black Beans	☯		☯	☯	Gluten-free
Teff	☯		☯	☯	Gluten-free
White Rice					Gluten-free
Brown Rice					Gluten-free

ON-FARM STORAGE

Unlike the international commodity grain system, the importance of farm identity preservation and traceability through to the final product underlies the need to store grain from different farms separately. The artisan grain cluster at Blue Mountain Station could include a grain terminal with grain silos and bins along with cleaning to address the common infrastructural bottleneck for domestic grain chains. Blue Mountain Station may not have enough space to store all the volume processed at the site per year, in which case addressing the storage bottleneck might also require increasing on-farm storage capacity. On-farm storage would allow growers and the value-added businesses in the artisan grain cluster flexibility to call in the grain on a staggered schedule as the Blue Mountain Station bins and specific value-added businesses (i.e., the grain growers’ customers) are ready to accommodate it.

Another reason for on-farm storage is that the grain must be stored somewhere until it is purchased. For example, one key informant noted that the grain feeding into value-added grain businesses will have to go through third-party quality analysis to be cleared for receiving or determine that it needs to be diverted to a

different market more suitable to its quality (e.g., animal feed). In this case, the producer needs to store the grain until it is analyzed, and the value-added business is ready to receive it.

On-farm storage is relatively expensive. In addition to the cost of the bin, developing the infrastructure includes site preparation (e.g., concrete, electrical, fans, and augers) and maintenance costs. In a personal correspondence, Robert Schuyler, owner of Spokane-based T&S Sales Grain Handling & Storage, said that “while there are many options and [price] ranges” for a **10,000-bushel bin**, he “would estimate an all-in budget (concrete, construction, and material cost) to range from **\$30,000 to \$48,000**, depending on options.”

Loan programs, such as the USDA Farm Storage Facility Loan Program, which provides low-interest financing for building or upgrading grain bins, drying and handling equipment, and storage and handling, exist to help make increasing on-farm storage capacity more affordable.⁶ Grants, such as the Resilient Food System Infrastructure Program, which will range from \$100,000 to \$3,000,000 and be open in Washington in March 2024, can also help.⁷

Shared artisan grain cluster infrastructure

This section provides an overview of infrastructure that could support multiple grain businesses operating at Blue Mountain Station. Shared infrastructure within the cluster will help attract businesses by reducing startup and ongoing operating costs. Table 5 provides a summary of infrastructural considerations for the cluster.

⁶ <https://www.fsa.usda.gov/programs-and-services/price-support/facility-loans/farm-storage/index>

⁷ <https://agr.wa.gov/services/grant-opportunities/resilient-food-system-infrastructure>

TABLE 5 | Shared infrastructure needs from interviews

Infrastructure	Description	Potential User
Trucking	Trucks and drivers to transport grain to the cluster, distribute malt* and value-added product (*potentially pneumatic trucks)	Growers, malthouse, flour producers, value-added business
Warehouse and storage	Handling and storage (e.g., bins) for grains and small batch grains to preserve farm identity; also, storage for malt, flour, and other finished value-added products	Growers, malthouse, flour producers, value-added business
Grain cleaning, dehulling, separation	Cleaning grain, dehulling millet and other artisan grains locally; sorting grains	Local growers, malthouse, mill, flour producers, value-added business
Mill	Mill scaled to needs of value-added businesses on site	Grain-based value-added enterprises, such as pasta, bakery, and tortilla businesses
Co-packing	Pallets, bags or totes, forklift, scales, etc.	Malthouse, value-added business
Cold storage	Refrigerator space to accommodate fresh pastas and other relevant value-added products and to enable the site to be an aggregation node in the regional food hub network	Fresh pasta and noodle value-added businesses, any fresh value-added product, regional food hub
Frozen storage	Freezer space for noodles, breads, and value-added products to access frozen food markets	Pasta, noodle, bakery and other value-added businesses, regional food hub
Office	Space with access to internet, printers, meetings, to support operations	Growers, malthouse, flour producers, value-added business, researchers
Commercial kitchen	Access to existing shared commercial kitchen, potential additional kitchen for gluten-free processing	Value-added businesses & producers
Retail space/tasting room	On-site space for products to be sold and engage customers	Malthouse, value-added business, customers

Trucking and shared distribution

Interviewees saw distribution and transportation as potential bottlenecks for the grain cluster, especially given Dayton’s relative remoteness from population centers. Some key informants considered local trucking contracts as a solution while others identified the potential for the grain cluster to have its own truck that would support local growers in getting grain to the business cluster while addressing concerns about access to market. One distributor suggested that a co-owned truck would also close some gaps in product distribution. For example, the truck would be able to bring products from the grain cluster to food distribution hubs like the Northwest Food Hub Network. As described above, several conventional and food

hub distribution networks in the region would be interested in working with businesses in the artisan grain cluster. Blue Mountain Station could be a node in the food hub network according to representatives of Northwest Food Hub Network and Kitchen Sync Strategies.

Grain and seed cleaning

Grain cleaning, the step before milling, is one of the most common infrastructural bottlenecks mentioned by key informants, especially affordable grain cleaning services near growers. Grain cleaning involves screening to remove larger debris, air separation for dust and other small contaminants, magnetic separation, and other processes.

Cleaning grain at a smaller scale is much needed in the area, according to interviewees, as the only other grain cleaners are industrial and typically will not accept smaller batches from artisan growers. Other times, the need for grain cleaning in small batches is so competitive that growers often cannot schedule in time to get their grains ready for milling. One key informant said that much existing grain cleaning capacity is at facilities that process grains that have been treated with insecticides, fungicides, and other treatments incompatible with food end uses. Two specific grain cleaning needs discussed in interviews included millet dehulling and seed separators. Table 6 lists existing companies that advertise grain and seed cleaning services in the Northwest.

TABLE 6 | Companies advertising crop cleaning services in the Northwest

Name	Location	Current crops cleaned/processed
Basin Seed LLC	Stanford, MT	Safflower/canola, legumes, alfalfa/grass, small grains*
Berger International	Carlton, OR	
Big Flat Seed Cleaning LLC	Turner, MT	Safflower/canola, legumes, small grains*
Big Sky Wholesale Seeds Inc	Shelby, MT	Small grains, legumes, alfalfa/grass
Big Wheel Seed Cleaning LLC	Missoula, MT	Legumes
Blue Mountain Seed Inc	Walla Walla, WA	Legumes
Boyer Seed	McMinnville, OR	
Bruce Maurer Inc	Power, MT	Small grains, legumes
Bruce Seed Farm Inc	Townsend, MT	Small grains, alfalfa/grass
Cahill Seeds	Flaxville, MT	Small grains, legumes, safflower/canola*
Cascade International Seed Co	Aumsville, OR	
Central Bean Co	Quincy, WA	Legumes
Central Oregon Seeds Inc	Madras, OR	Grass, vegetable seeds
CHS Farmers Elevator	Miles City, MT	Wheat, barley, grasses, alfalfa
CHS Inc	Miles City, MT	Small grains, safflower/canola, alfalfa/grass
Circle S Seeds of MT Inc	Three Forks, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Clark Seed	Idaho Falls, ID	Wheat, barley, oats
ClearView Seed	Denton, MT	Small grains, safflower/canola, legumes, alfalfa/grass*

Columbia Grain-Tiber Plant	Chester, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Columbia River Seed	Plymouth, WA	Kentucky bluegrass, ryegrass, fine fescues, radishes, mustards, peas*
Corvallis Feed & Seed	Albany, OR	Oats, wheat, barley, triticale, peas
Crites Seed Co	Quincy, WA	Peas, corn
DDS Seed Company	Pullman, WA	Chickpeas
Diversified Screening	Great Falls, MT	Grasses, legumes, corn, wheat, barley
Farmer Bean Co	Quincy, WA	
Ferren Seed LLC	Miles City, MT	Small grains
Ferry Boat Seeds	San Juan Island, WA	
First Creek Seeds	Saco, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
George F. Brocke & Sons Inc	Kendrick, ID	Legumes, canola, rapeseed*
Global Harvest Foods	Mead, WA	Millet, safflower/canola, milo, sunflower*
Golden Harvest Seed Inc	Big Sandy, MT	Small grains, safflower/canola, legumes*
Golden Triangle Seeds	Rudyard, MT	Small grains, legumes
Great Plains Seed Service	Geraldine, MT	Small grains
Heartland Seed Inc	Moccasin, MT	Small grains, legumes
Hinrichs Trading Co/Ardent Mills	Pullman, WA	Chickpeas
Hodgskiss Seed	Choteau, MT	Small grains, legumes
Idaho Grimm Growers Warehouse Corp	Blackfoot, ID	Alfalfa, cereals, grasses, flowers
Inland Empire Milling Co	St. John, WA	Wheat, barley, peas, millet, legumes, canola, rapeseed, flax*
Ioka Farms	Silverton, OR	Grasses, clovers, fescue, chicory, small grains, peas
King Seed Cleaning	Missoula, MT	Small grains
Lake Seed Inc	Ronan, MT	Small grains, safflower/canola, legumes*
Lehner AG LLC	Miles City, MT	Small grains, safflower/canola, legumes*
M&R Custom Seed Cleaning	MT	Wheat, barley, oats, peas, lentils
Marion Ag Service Inc	Aurora, OR	Fescue, clover, ryegrass, "others upon request"
Marsh Seed Cleaning LLC	Miles City, MT	Small grains, legumes
McNally Agricultural Service	Sidney, MT	Small grains, safflower/canola, legumes*
Mobile Ag Seed Cleaning LLC	Scobey, MT	Small grains, safflower/canola, legumes*
Montana Flour & Grains	Fort Benton, MT	Small grains
Montana Gluten Free Processors LLC	Belgrade, MT	Small grains
Mountain View Co-op	Dutton, MT	Small grains
Nelson's Seed Co	American Falls, ID	
Nortana Grain Company	Lambert, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Northwest Seed Enterprises Inc	Billings, MT	Small grains, alfalfa/grass

Nutrien Ag Solutions	Billings, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Nutrien Ag Solutions	Conrad, MT	Small grains, safflower/canola, legumes*
Nutrien Ag Solutions	Fort Benton, MT	Small grains, safflower/canola, legumes*
Nutrien Ag Solutions	Shelby, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Oregon Seed Cleaning LLC	Salem, OR	
Pacific Northwest Farmers Cooperative	Genessee, ID	Cereal grains, chickpeas, peas, lentils
Palouse Brand	Pullman, WA	Chickpeas, peas, lentils
Palouse Pulse	Farmington, WA	Lentils
Pardue Grain	Cut Bank, MT	Legumes, hemp
Pratum Co-op	Madras, OR	
Pratum Co-op	Salem, OR	
Pride Grain Cleaning	Belt, MT	Small grains
Rocky Mountain Supply-Townsend Seed	Townsend, MT	Small grains
Saco Dehy Inc	Saco, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Safflower Technologies	Laurel, MT	Small grains, safflower/canola, legumes*
Safflower Technologies	Fairview, MT	Small grains, safflower/canola, legumes*
Skagit Seed Services	Mount Vernon, WA	
Smith Seed Services	Halsey, OR	
Spokane Seed Co	Spokane, WA	Lentils, peas, chickpeas
Stahl Seed Cleaning	Glasgow, MT	Small grains, safflower/canola, legumes*
Stricks Agriculture LLC	Chester, MT	Legumes
Thomas Ag Services	Grace, ID	
Treasure State Seed Inc	Fairfield, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Triangle Farms Inc	Silverton, OR	Grasses, clovers, flowers, specialty grains
Universal Seed LLC	Independence, OR	
Valley Agronomics	Arco and Preston, ID	
Valley Seed LLC	Glasgow, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Wagner Seed Co	Warden, WA	Wheat
Walker Seeds	Lindsay, MT	Small grains, safflower/canola*
Weaver Seed of Oregon	Scio, OR	
Westland Seed Inc	Ronan, MT	Small grains, legumes, alfalfa/grass
Wild Horse Seeds	Havre, MT	Small grains, safflower/canola, legumes, alfalfa/grass*
Zellmer Seed & Grain	Hogeland, MT	Small grains, legumes

*Cleans millet or similarly sized cereals

SEED SEPARATORS

One interviewee brought up the need for seed separators to enable farmers in the region to adopt interseeding cover cropping practices, which is of growing interest and being promoted and explored by researchers and several southeastern Washington conservation districts. Here is what the key informant said:

“I know one of the things that was tried last year...was intercropping, so growing peola, field peas, and canola. But wow, I know **one of the growers that participated in that research experience still has an experiment, still has a big bag full of several hundred pounds of this peola because there was no separator**. And it shouldn't be that hard to separate those two things, right? I mean, that's just based on seed size; it should be pretty straightforward. But there just wasn't a separator. And then there's grinders and millet, dehullers, and that sort of thing.”

DEHULLING

Several crops must be dehulled for human consumption, including millet, and ancient grains like einkorn and emmer. The need for millet dehulling in the region specifically was a primary interview theme. As of 2023, very few millet dehullers operate in the region (Table 6), which means millet producers are primarily selling their crop for lower-value bird seed rather than human consumption or shipping it out of the region to be processed and shipped back. Here are quotes from two interviewees describing this bottleneck:

“There's no company or small business that focuses on dehulling and dehulling, right now, you just about have to send it to Montana where the only commercial dehulling place is. And **by not being able to have local dehulling**, that's the cost-effective with no long-term transportation and without getting into the whole carbon footprint and just environmental stewardship, **that eliminates local growers who would like to grow ancient grains** vis-a-vis Einkorn, Spelts, Emmers and the like, which is a growing commercial area.”

“We've successfully grown millets, but we have no dehulling. The closest dehulling is in South Dakota or Bay State in Colorado, which they won't mill and **it's prohibitive for transportation**.”

The opportunity and potential for millet dehulling infrastructure at the grain cluster would reduce the costs of millet production. It also could provide a foundation to develop a vertically integrated gluten-free processing plant.

Storage

GRAIN STORAGE (TERMINAL SCALE)

As mentioned above, the artisan grain cluster at Blue Mountain Station could include a grain terminal with grain silos and bins, which is an infrastructural bottleneck identified by many key informants. Per Spokane-based T&S Sales Grain Handling & Storage, a 10,000-bushel (300 ton) bin costs approximately \$30,000 to \$48,000 for concrete, construction, and material costs, depending on options. Therefore, a grain terminal with six 10,000-bushel bins—roughly the storage needed to supply about four to six value-added grain businesses at Blue Mountain Station—could cost \$180,000 to \$288,000.

According to key informant interviewees, on-farm storage is a huge bottleneck for artisan grain system development, as described in this quote from a farmer:

“I think as for what's still needed, **storage is a big part of it. It's a challenge.** I think the forces in the commodity market have tended to push farmers away from on-farm grain storage, and that's **exactly what we need for, I guess, the revolution that we're all hoping for in direct grain sales.** So, storage would definitely be a big piece.”

Grain storage at Blue Mountain Station would need to be able to keep grain from individual farms or farm clusters separate to preserve traceability and farm identity. Maintaining farm identity through value-added processing is important to distinguish artisan grain products from commodity products and therefore achieve a price premium.

COLD STORAGE

While refrigerated or cold storage may not be necessary for malting and milling, it would provide opportunities for other value-added businesses to keep and produce perishables on site. Fresh noodles, which are considered later in this report, require refrigeration and a quality cold supply chain. Being able to access shared cold storage space would help many businesses, especially during startup, to reduce initial capital costs. Additionally, an opportunity to become a node in a larger distribution system that includes food hubs and local and regional distributors will benefit from cold storage that can serve as an aggregation point for multiple businesses for both incoming and outgoing products.

FROZEN STORAGE

Frozen storage will benefit bakery and pasta manufacturers and other value-added businesses by enabling access to additional markets. Frozen dough and noodles are products that have a much longer life and are attractive to wholesale buyers and restaurants. This also will enable Blue Mountain Station to serve as an aggregation and delivery node in the growing food hub network in the Northwest, a much-needed capacity which would serve farmers in the Walla Walla Valley and potentially a swath of Northeast Oregon since the main food hubs in the Inland Northwest are all north of Dayton.

Mill

A mill could be shared across multiple businesses that need flour. We discuss milling in more depth below.

Co-packing

Co-packing can include equipment for moving products, like pallets and a forklift, scales to weigh product, and material for binding shipments. For example, co-locators could share infrastructure to pack malt into bags, bundle grain into totes or containers, label printing, and other ways to prepare products for sale.

Gluten-free services and infrastructure

Interviewees said there is demand and opportunity for gluten-free processing infrastructure at the grain cluster. If that were to exist at the cluster, the infrastructure and supply chain would need to be separate to avoid allergens during the gluten-free cleaning and milling process. One interviewee commented on the potential infrastructure:

“There might be a way with the facilities at **Blue Mountain Station to create that certified gluten-free space**, which then allows for creating those **certified gluten-free bakery verticals** and things, which I think is a place where things can really start to expand.”

Notably, the existing spaces at Blue Mountain Station have their own HVAC systems, which has enabled the site to house gluten-free operators. For example, Blue Mountain Station has had gluten-free granola, candy, and baked goods businesses.

Office, branding, and business support

Interviewees responded that a common office space could be a valued asset for the grain cluster. A common office could also be used as a meeting place for clients and as a market center for artisan grains supply chains. For example, many interviewees expressed a need for “soft infrastructure” or technical assistance for growers and small businesses. One interviewee stated:

“Here's the deal, if you're an artisan food maker and you don't come from a giant bowl of money, like a trust fund or something, **you're going to need to get really scrappy and efficient in your startup costs**. If they were looking to help facilitate the growth and success of any food startups of any kind, **having a service cooperative would be really, really helpful to where you could join the cooperative as an independent brand**. Then access shared legal, accounting, marketing, social media management, et cetera. Then also having a space for production. Those are the things that kill small brands trying to get started.”

A common office would be an ideal place for collaborative farmer groups and others to develop marketing strategies, facilitate training, communicate research, and general networking to address technical assistance needs.

Commercial kitchen

If a new artisan value-added grain operation starts out small, Blue Mountain Station has a well-outfitted commercial kitchen and other shared equipment and resources available, including a cooler. This provides opportunities to share the existing kitchen space for processing, cooking events, and production.

There is potential for an additional kitchen to be developed that could include equipment important to the startup of multiple value-added businesses. This kitchen could be a gluten-free facility to complement other gluten-free shared infrastructure at the cluster.

Retail space: Store fronts, tasting rooms

Finally, key informants indicated a demand for potential retail space or store fronts and a potential “customer experience space,” or tasting room. The retail space and tasting room will benefit value-added entrepreneurship through sales and customer interaction. An additional benefit to new retail space is the potential for education and outreach about artisan grain food systems. A pasta maker using artisan grains reflected on how to use such a space:

“I think education and media, **just teaching people where things come from**. I do the best I can. I bring people in and do tours and stuff... I bring kids in through the summer, show them where the pasta is being made, how it's made, because **I think that's really important, to get the youth involved in food production**.”

Combining the production infrastructure with store fronts and customer experience will improve access to artisan grain value-added products, while increasing awareness about artisan grains as a food. A storefront

can teach people about the regenerative, nutritional value of these grains, create more demand, and improve the market potential for value-added products.

Some key informants saw storefronts at Blue Mountain Station as important but secondary to selling larger quantities of fresh and shelf-stable products through regional distribution networks to wholesale markets:

“If you’re at Blue Mountain Station and, say you’re going to have a bakery, maybe that bakery’s going to have a little storefront, but **it’s going to be most successful if it’s a wholesale bakery** because it’s just not going to have the sales force. However, if it’s a real artisan bakery that’s super high quality, there’s a lot of places that they would be able to sell to. But I think that **wholesale market is one that is in our area largely untapped** when we’re looking at identity-preserved grains.”

Craft malthouse

Craft malthouse feasibility and economic impacts study highlights

A full report assessing the feasibility of a craft malthouse at Blue Mountain Station produced by Dennis R. Mitchell (2023) is available as Appendix B. The detailed economic impact and investment assessment produced by Peterson & Associates (2023) is available as Appendix D. Here we summarize the highlights from the full reports and budget estimates updated based on Blue Room Architecture & Design’s subsequent construction and equipment cost estimates for each scenario, which are more accurate than Mitchell’s original estimates because they include Washington State sales tax and other details.

The full malthouse feasibility study (Appendix B) considers two scenarios: one in which the malthouse purchases Buhler’s fully engineered RimoMalt 32 system and another in which the malthouse designs its own system sourcing American-made components (“North American system”). Mitchell (2023) recommended the fully engineered RimoMalt 32 system largely because the costs and supply chain factors were more certain at the time of the study (Appendix B). John McLean, Blue Room Architecture & Design, estimated the capital budgets for construction and equipment costs for each scenario, which are based on a 10,000 square foot facility and do not include the cost of developing the Port of Columbia infrastructure, such as roads at the Blue Mountain Station site and the additional Highway 12 entrance and exit.

Table 7 presents the estimate of probable costs for the RimoMalt 32 system compared to the North American system. Assuming Spring 2024 bidding/buyout, Blue Room Architecture & Design estimates the construction and equipment costs for the RimoMalt 32 system would total roughly \$10.2 million compared to roughly \$8.4 million for the North American system. As Table 7 shows, the only difference between the two budget estimates is the “Specialty/Process Equipment” costs, which are based on Mitchell et al. (2023)’s estimates (Appendix B). That is, the Mitchell et al. (2023) equipment cost estimate plus Washington State sales tax associated with the RimoMalt 32 system would cost \$1,745,087.27 more than the North American system equipment. McClean notes that construction and equipment costs between the two systems are not substantially different and therefore the lifecycle and energy costs are the factors that will likely determine the final decision between the two. Peterson & Associates found that, at an \$8.4 million project cost, the North American system would have an 11.4-year payback period and a suboptimal internal rate of return and benefit-cost ratio (Appendix D). In comparison, the RimoMalt 32 system, at a \$10.2 million project cost, would have a 17.6-year payback period and a suboptimal internal rate of return and benefit-cost ratio (Appendix D).

TABLE 7 | Probable cost estimate for malthouse facility construction and equipment, RimoMalt 32 system compared to North American system (assumes Spring 2024 bidding/buyout, produced October 5, 2023, Blue Room Architecture & Design)

Costs	Qty	Unit	RimoMalt 32	North American
Est. Cost of Construction				
PEMB Facility-partial finish/conditioned/NREC-Co	300	10,000	\$3,000,000.00	\$3,000,000.00
Additional Site / Utility Improvements (Allowance)	1	EST	\$100,000.00	\$100,000.00
Port Infrastructure Development / Road Improvements	Excluded			
SUBTOTAL			\$3,100,000.00	\$3,100,000.00
Construction Contingency (Material / Labor / PEMB Vendor Risk)		10%	\$310,000.00	\$310,000.00
WA State Sales Tax: Dayton, WA		0.080	\$272,800.00	\$272,800.00
Est. Construction Cost Subtotal:			\$3,682,800.00	\$3,682,800.00
Prevailing Wage / Public Funds Multiplier (TBD)	0.25	EST	\$920,700.00	\$920,700.00
Soft Costs Associated with Construction (REQUIRED):				
Grant / Funding-Related Project Requirements		TBD		
Equipment Consultant / Vendor Coordination		TBD		
Geo-Technical/Site Survey (N/A)		TBD		
LEED SILVER Registrations / Expenses		TBD		
Architectural / Engineering / Project Management		EST	\$250,000.00	\$250,000.00
Est. Reimbursable Expense (Travel/Printing, Etc.)		EST	\$15,000.00	\$15,000.00
Detailed Third Party Cost Estimates		TBD		
Temporary Measures / Business Interruption/Moving		TBD		
Temporary Utilities / Rental Equipment		TBD		
Environmental Survey / Abatement (New Construction)		N/A		
Special Inspections		0.50%	\$15,500.00	\$15,500.00
Permit and Review Fees				
City of Dayton (Est.)		0.50%	\$15,500.00	\$15,500.00
Other		TBD		
SUBTOTAL			\$296,000.00	\$296,000.00
Soft Costs Associated with Owner's Construction (OWNER DISCRETION):				
Furniture by Owner (Typically 5-10%)	EST	0.00%	\$12,000.00	\$12,000.00
Shelving, Racks, Storage, Equipment	EST		\$25,000.00	\$25,000.00

Equipment-Specific Install/Calibrations/Utilities	EST	0.00%	\$50,000.00	\$50,000.00
Specialty/Process Equipment (Mitchell w/ WA State Sales Tax)	EST	LS	\$4,840,000.00	\$3,094,912.73
Process Wastewater Treatment System (Pre-Discharge)	EST	LS	\$100,000.00	\$100,000.00
Office/Admin Equipment	EST	0.00%	\$25,000.00	\$25,000.00
Phone/Data/Cable/Fiber/Audio-Visual (Typically 2-5%)	EST	2.00%	\$73,656.00	\$73,656.00
Owner-Provided Low Voltage (Controls/Security) Systems	TBD	0.00%		
Interior/Exterior Signage	EST	0.00%	\$10,000.00	\$10,000.00
Marketing/Promotional	TBD			
Insurance Costs	TBD			
Legal, Insurances, Titles, Lender Fees	TBD			
SUBTOTAL			\$5,135,656.00	\$3,390,568.73
Project Contingency		5.00%	\$155,000.00	\$155,000.00
TOTAL EST. PROJECT COST			\$10,190,156.00	\$8,445,068.73

In Appendix D, Peterson & Associates explain, “For the business to be indifferent to investment they would need to offset the \$10.2 million initial investment [RimoMalt 32 system cost] by approximately 56% so that the private sector portion of the initial investment amounted to approximately \$4.48 million, and the capital grants amounted to \$5.7 million. This is based off baseline assumptions with a 10% discount rate.”

Craft Malthouse Feasibility Study Highlights

MALT MARKETS | Breweries

85%
of malt market

The craft beer segment of the beer market has steadily grown over the past 15 years:



~290 breweries
IN 2011



1,021 breweries
IN 2022



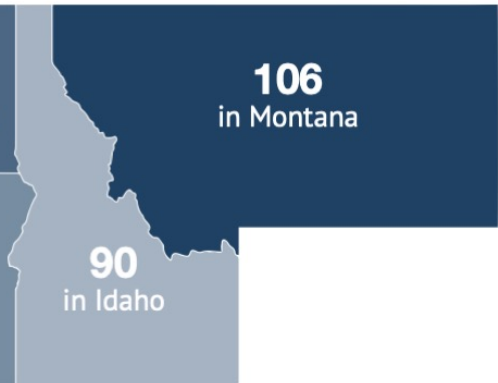
1,021 craft breweries
in the Pacific Northwest in 2022



Produce
≥1.9 million barrels
of beer a year



Need
≥70,000 tons
of malt per year



Craft breweries are generally small, locally owned, and amenable to buying malt from small craft malthouses.

Niche Malt Markets

Specialty
(e.g., Crystal, Camel, and Roasted)

Organic and eco-certified
(e.g., Salmon-Safe)

Non-barley
(e.g., wheat, rye, oats, sorghum, millet, and legumes)

Locally grown, locally malted, farm-identified

MALT MARKETS | Distilleries

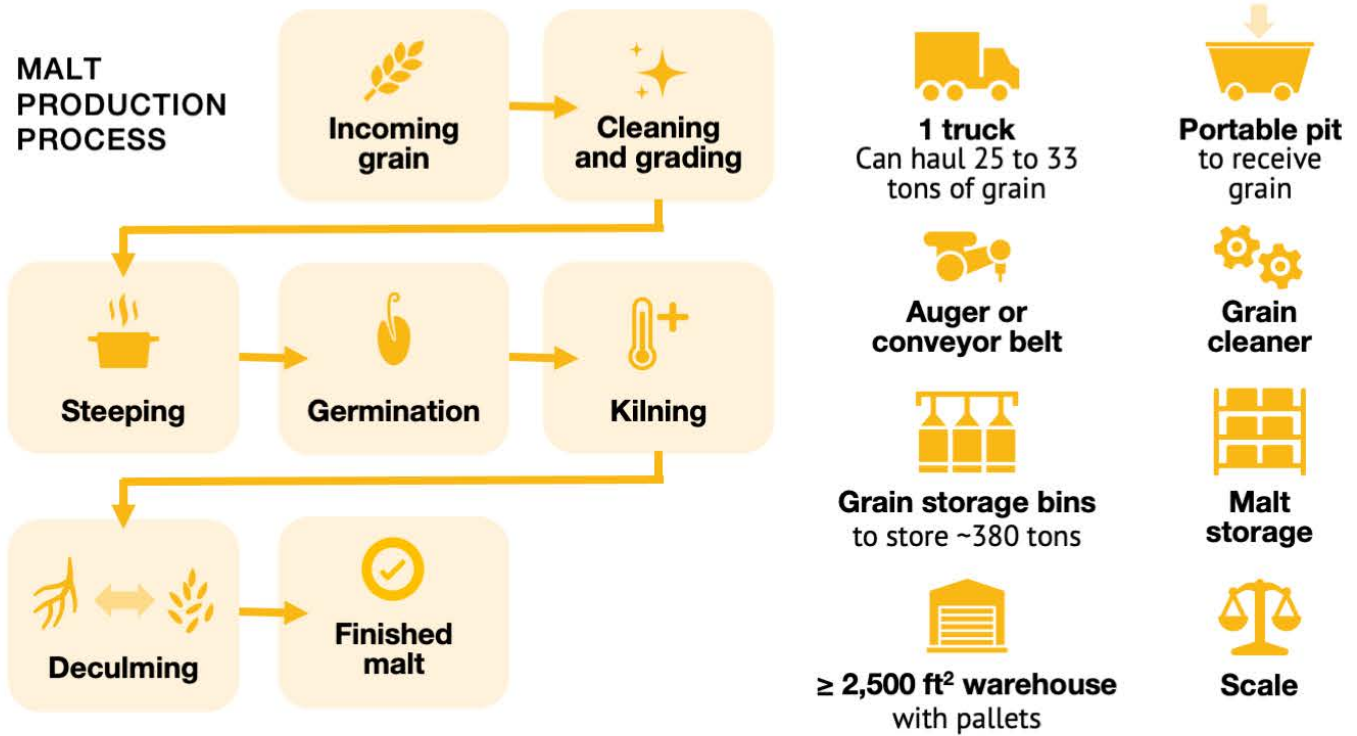
15%

of malt market

...but those who use malt need **10 times or more malt** to produce a gallon than brewers.

Increasing demand for locally grown and malted whiskey and other malt-based **spirits with "a story."**

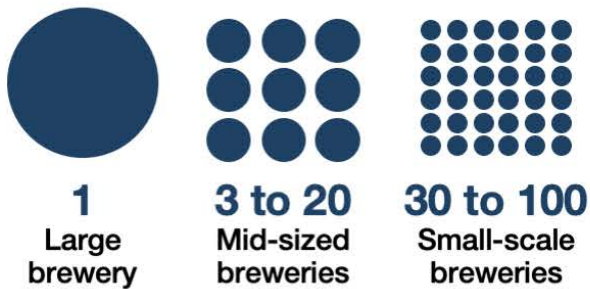
INFRASTRUCTURAL NEEDS



MID-SIZED SCENARIO

Mid-sized operation to start

1,000 to 4,000 tons of malt
(17,000 to 66,000 barrels of beer)
per year could supply 1% to 2% of the current Northwest craft beer market or the equivalent of...



MARKET FOCUS

Most of volume: Base malts sold at “defensible” premium

Smaller proportion: Specialty malts sold at higher margin

Product attributes

Locally grown

Grain farm-identity preserved

Craft breweries and distilleries

Homebrewers smallest volume but largest margin

Buhler fully engineered RimoMalt 32 system:

32 metric ton (35.2 US ton) batch size with 1,760 ton/year production capacity.

FACILITY COSTS
\$8.4 to \$10.2 million

POTENTIAL SIDE REVENUE STREAMS



Grain cleaning



Grain bagging



Animal feed



Trucking

Figure 25 is a preliminary floor plan for an initial 10,000 square foot facility and Figure 26 is a floor plan showing the same facility expanded to 15,000 square feet (Blue Room Architecture & Design). These figures along with the 15,000 square foot facility depicted on the Blue Mountain Station Master Plan map are available in Appendix C.

FIGURE 25 | Preliminary craft malthouse concept floor plan for a 10,000 square foot facility. Created August 30, 2023, by Blue Room Architecture & Design. Original documents are in Appendix C.

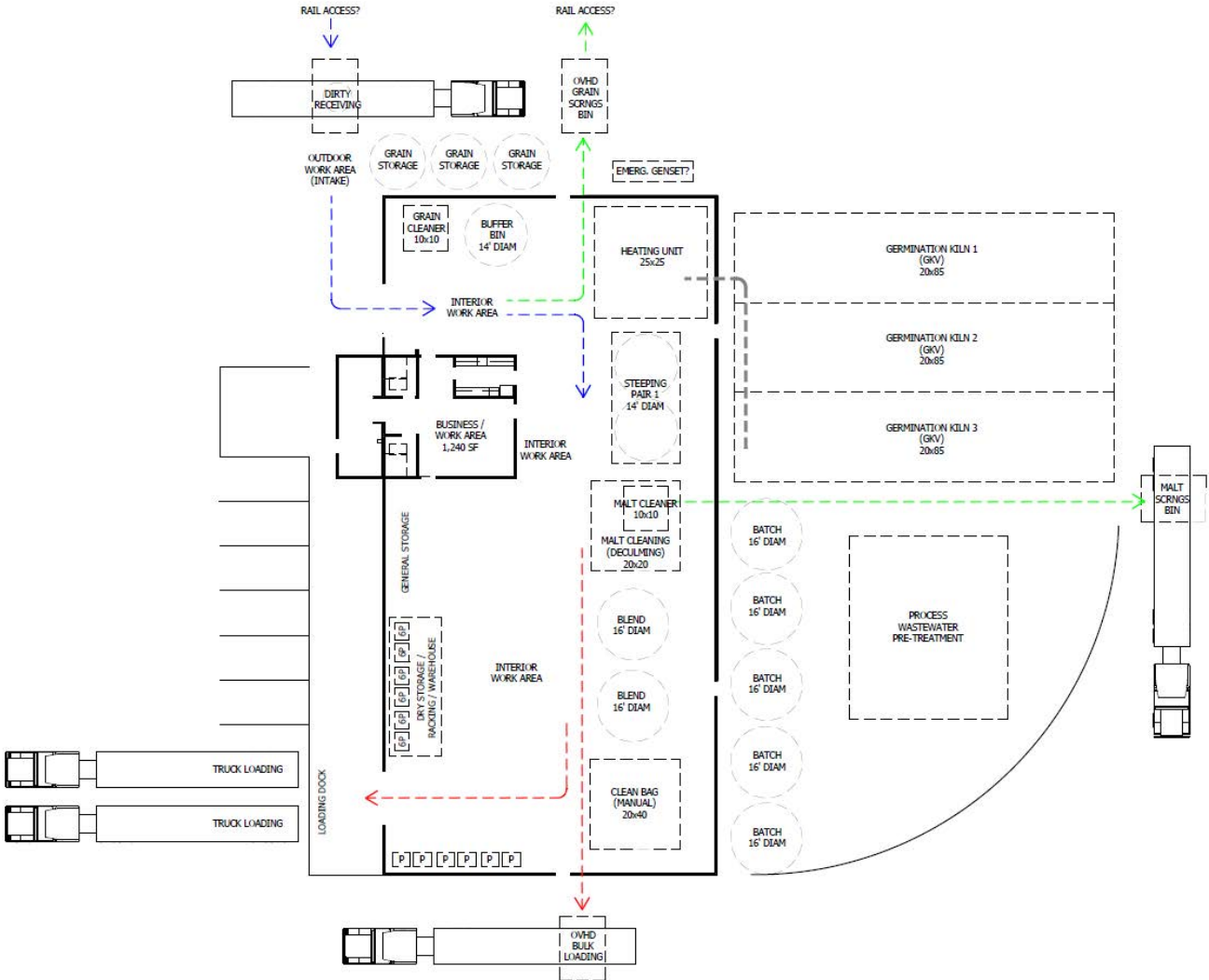
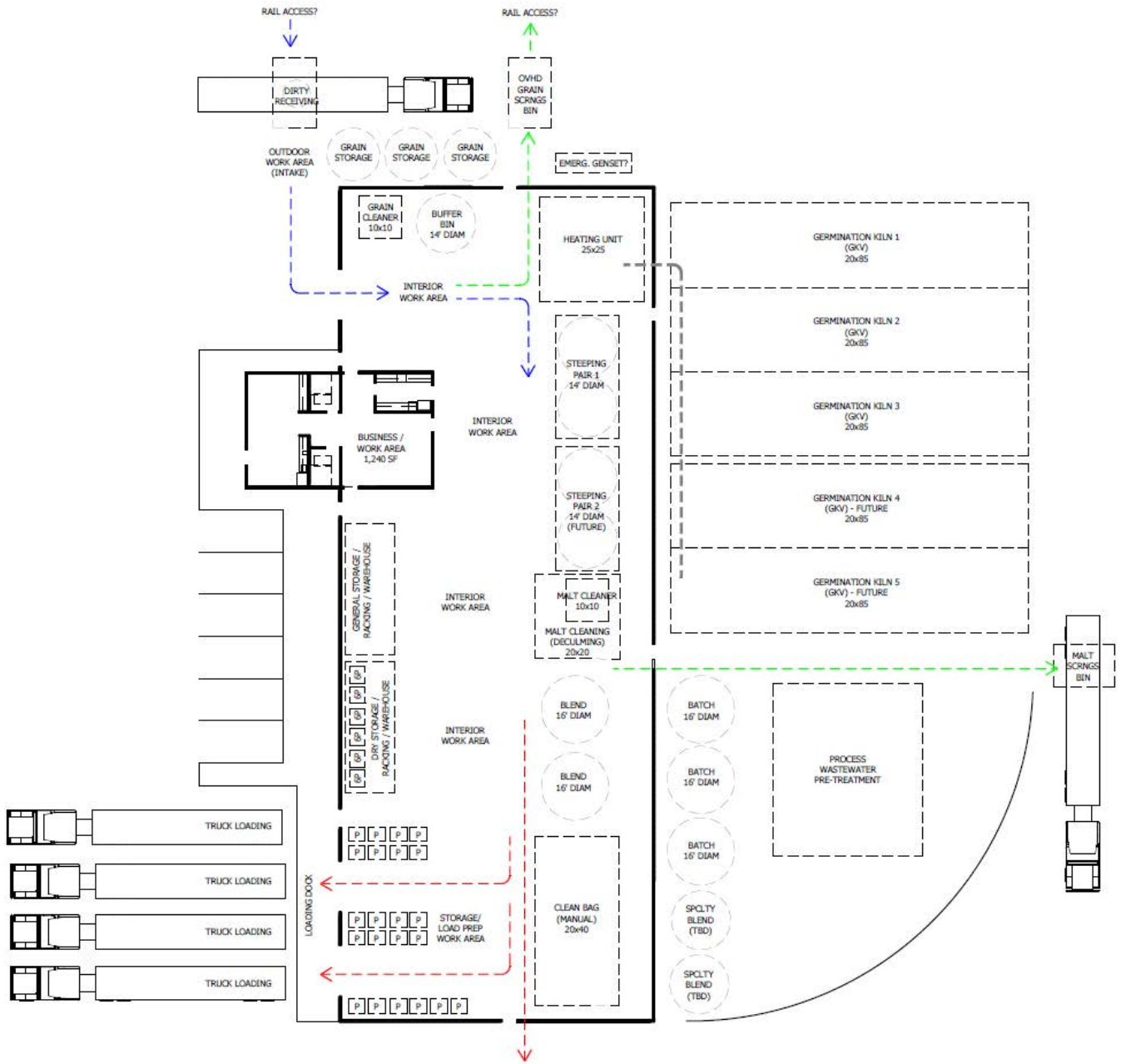


FIGURE 26 | Preliminary craft malthouse concept floor plan for an expanded, 15,000 square foot facility.
 Created August 30, 2023, by Blue Room Architecture & Design. Appendix C also includes an architectural site plan concept map that shows this floor plan on the Blue Mountain Station Master Plan map.



Craft Malthouse Economic Impact and Investment Highlights*



Annual sales
\$4.2 million



Annual revenues
\$2 million



Employees
7



Gross payroll
\$435,000

INVESTMENT ASSESSMENT
of \$8.4M North American System



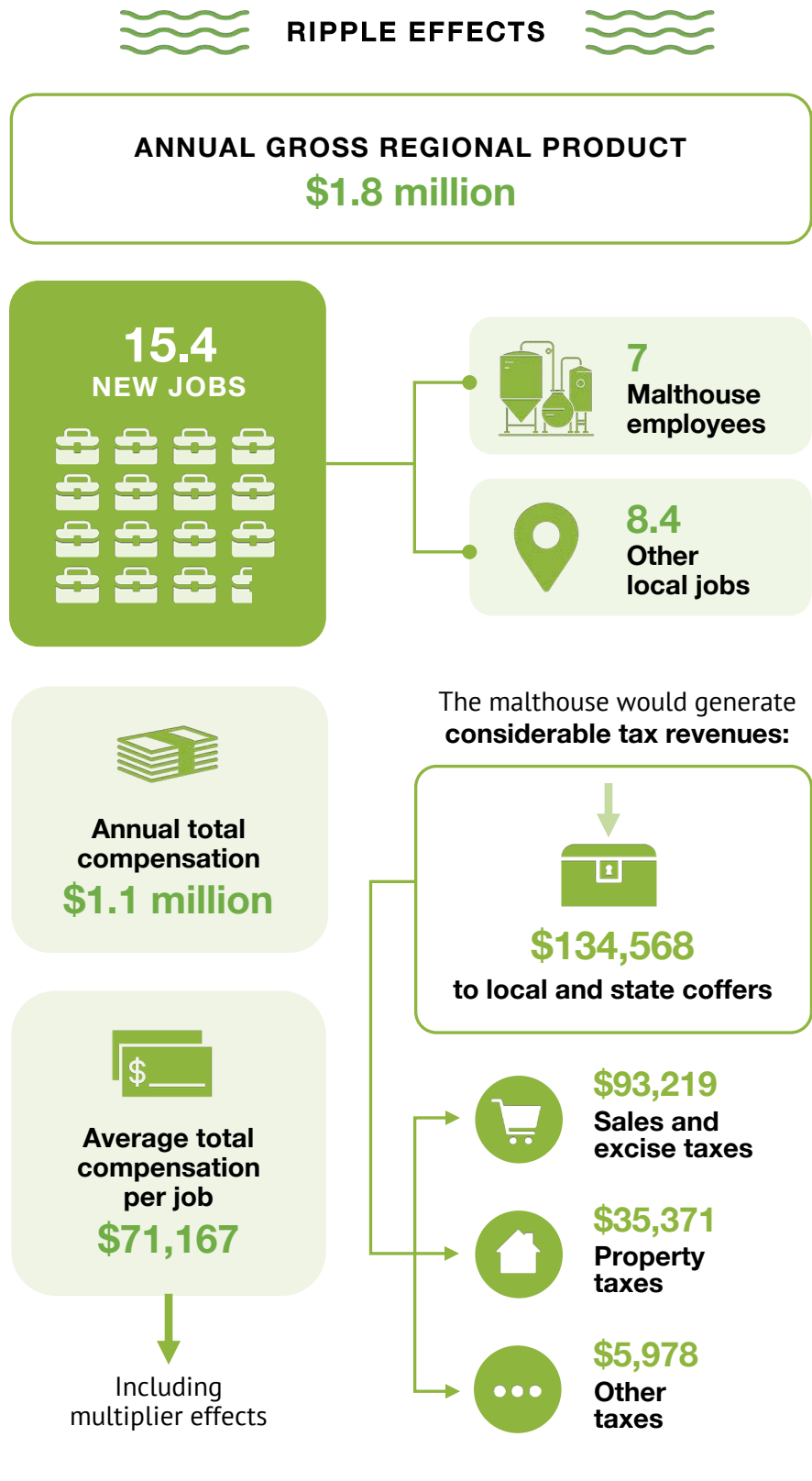
Suboptimal benefit-cost ratio
0.95



Suboptimal internal rate of return
8%



Payback period
11.4 years



*A full report estimating the economic impacts of the craft malt house produced by Steven Peterson (2023) is available as Appendix D. Here we summarize the highlights from the full report.

Maltsters closing: case studies

We were writing this feasibility study, three craft maltsters in the Northwest closed or were listed for sale: Skagit Valley Malt in Burlington, WA; Gold Rush Malt in Baker City, OR; and Mecca Grade Estate Malt in Madras, OR. A 2023 *Sightline* article “At What Cost—Abrupt Skagit Valley Malt Closure Highlights Risks of Craft Malt Expansion” summarizes the primary challenges behind these changes saying,

“Together, this news might seem to indicate trouble for the craft malt industry, but the truth is more nuanced: **Craft maltsters, Skagit Valley included, say they’re not struggling to attract customers, but at the same time are facing a need for critical levels of cash flow and funding** to create **economies of scale in a capital-intensive, low-margin craft malt industry**. Friction comes from the **high cost of equipment and raw materials necessary to take local craft malting facilities to the next level** of output, which would create efficiencies and make them more profitable.”

In this section, we briefly describe why they closed or are for sale.

SKAGIT VALLEY MALT

When Skagit Valley Malt in Burlington about 66 miles north of Seattle launched in 2011, its contracts enabled Skagit Valley farmers to grow barley, mostly as a cover crop.⁸ In spring 2023, Skagit Valley Malt was a leading producer of craft base and custom malts in Washington with 18 employees, 272 distiller and brewer customers, and about \$500,000 of barley contracts with local growers.^{9,10} However, in June 2023, Skagit Valley Malt announced it was closing and declaring bankruptcy. The announcement came as a surprise because the company was consistently gaining about 10 new customers monthly and, earlier in the year, the company added two new malting machines, which cost \$11 million and would have expanded its production capacity sixfold in 2024.^{11,12} At the same time, a key informant in Fall 2023 noted that this “story is still actively unfolding and rumor has it that [Skagit Valley Malt] may reopen,” so we do not know the status of Skagit Valley Malt as of this writing.

In a June 2023 interview with *Sightlines*, Eric Buist, the former marketing manager, explained Skagit Valley Malt had expected to secure investors for the expansion based on experience; however, with current interest rates and inflation, the expected funds did not materialize. The company ultimately filed for bankruptcy because it could not secure the financing it needed to pay its suppliers and for the expansion.¹³

GOLD RUSH MALT

Gold Rush Malt in Baker City—127 miles south of Walla Walla, WA, and 128 miles northwest of Boise, ID—was a one-person base-malting operation started by Tom Hutchinson in 2016.¹⁴ Gold Rush Malt sourced all its grain from family farms in northeast Oregon and sold the two base malts it specialized in (Pilsen and Pale malts) primarily to craft breweries within 100 miles of Baker City but also to distillers and home brewers. In a 2021 *Craft Maltsters Guild* “Member Highlight” interview, Hutchinson explained that he had explored expanding his 5,000-pound (2.5 ton) batch operation to meet more demand, but decided

⁸ <http://washingtonbeerblog.com/skagit-valley-malting-is-closed-and-filing-for-bankruptcy/>

⁹ <http://washingtonbeerblog.com/skagit-valley-malting-is-closed-and-filing-for-bankruptcy/>

¹⁰ <https://www.goodbeerhunting.com/sightlines/2023/6/22/skagit-valley-malt-closure-highlights-risks-of-craft-malt-expansion>

¹¹ <http://washingtonbeerblog.com/skagit-valley-malting-is-closed-and-filing-for-bankruptcy/>

¹² <https://www.goodbeerhunting.com/sightlines/2023/6/22/skagit-valley-malt-closure-highlights-risks-of-craft-malt-expansion>

¹³ <http://washingtonbeerblog.com/skagit-valley-malting-is-closed-and-filing-for-bankruptcy/>

¹⁴ <https://craftmalting.com/member-highlight-meet-gold-rush-malt/>

expanding would be too labor intensive and opted instead to stay at a scale he could produce by himself.¹⁵ By 2021 accounts, Gold Rush Malt was winning awards and flourishing, in June 2023 Hutchinson told *Sightline* he too had encountered capital and economy of scale challenges that motivated him to sell rather than expand.¹⁶

I'm selling everything I make as fast as I can make it. There's a market there and there's potential," says Tom Hutchinson, owner of Gold Rush Malt. He estimates he would have to spend between \$500,000 and \$1 million for Gold Rush to double its output; instead, Hutchinson is trying to sell the business. "To expand production would require investing a lot more capital, and I'm not going to invest any more of my personal money. ... The economies of scale have always been a big issue for people in craft malt.

MECCA GRADE ESTATE MALT

Mecca Grade Estate Malt, one of Oregon's best known craft maltsters, announced it was for sale for \$5.5 million in March 2023.¹⁷ Mecca Grade Estate Malt is in Madras about 45 minutes north of Bend and 2.5 hours southeast of Portland. It was a vertically integrated operation that sourced grain from their family farm and had a malting business, small craft brewery, and an onsite tasting room. As Johnson-Greenough (2023) of *The New School* reports, their malt customers included specialty "farmhouse breweries" such as The Ale Apothecary and Wolves & People Farmhouse Brewery as well as brewers and distillers around the country.¹⁸ The sale includes 240 acres of farmland, a four-bedroom farmhouse, and the 23,000 sq. ft. malthouse, which includes a 10 ton malter, 92,000 bushels of grain storage, and 146 acres of water rights.¹⁹ As founder Seth Klann said in a written statement posted by *The New School*,

"In 2019, Mecca Grade Estate Malt was at full capacity and production, and we were looking at adding a second 12-ton machine to keep up with demand. We employed 1.5 full-time maltsters and sales were solid. I was doing the books, designing and guiding the brand, running our social media, on the road making collaboration beers, and presenting our malting research at conferences. Then **Covid happened and rocked everyone's world."**

Klann identified several reasons behind their decision to sell and move out of the area, which all appear related to COVID-19 impacts.²⁰ During COVID-19 the malting operation became understaffed for unspecified reasons, leading Klann to burnout as he ran the operation alone. Previously Klann had led marketing and relationship building and, with him redirected to malt production, marketing was largely left unfulfilled, and sales dropped. Furthermore, Klann and his father were the only investors in the malt company, which led to financial and relationship strain. Klann and another partner—a brewer—opened the brewery and tasting room in 2021. They soon had greater demand for their beer than they were able to supply, requiring them to explore scaling up to a 5-barrel brewery. In the meantime, the brewer unexpectedly moved, leaving the brewery without a brewer, and Klann trying to run the malt and brewing operations on his own simultaneously while seeking to hire a new brewer.

¹⁵ <https://craftmalting.com/member-highlight-meet-gold-rush-malt/>

¹⁶ <https://www.goodbeerhunting.com/sightlines/2023/6/22/skagit-valley-malt-closure-highlights-risks-of-craft-malt-expansion>

¹⁷ <https://newschoolbeer.com/home/2023/3/mecca-grade-estate-malt-brewery-for-sale>

¹⁸ <https://newschoolbeer.com/home/2023/3/mecca-grade-estate-malt-brewery-for-sale>

¹⁹ https://www.zillow.com/homedetails/9619-NW-Columbia-Dr-Madras-OR-97741/2058728405_zpid/

²⁰ <https://newschoolbeer.com/home/2023/3/mecca-grade-estate-malt-brewery-for-sale>

An additional detail included in *The New School* article was that Klann expressed opposition to COVID-19 mask and vaccination mandates in a Mecca Grade Estate Malt social media post during the height of the pandemic in response to Portland-based breweries asking him to join a “Portland VAXX Coalition.” Klann’s political statement evidently led to a boycott of his business.

CASE STUDY SUMMARY: THE CLOSURE TAKEAWAYS

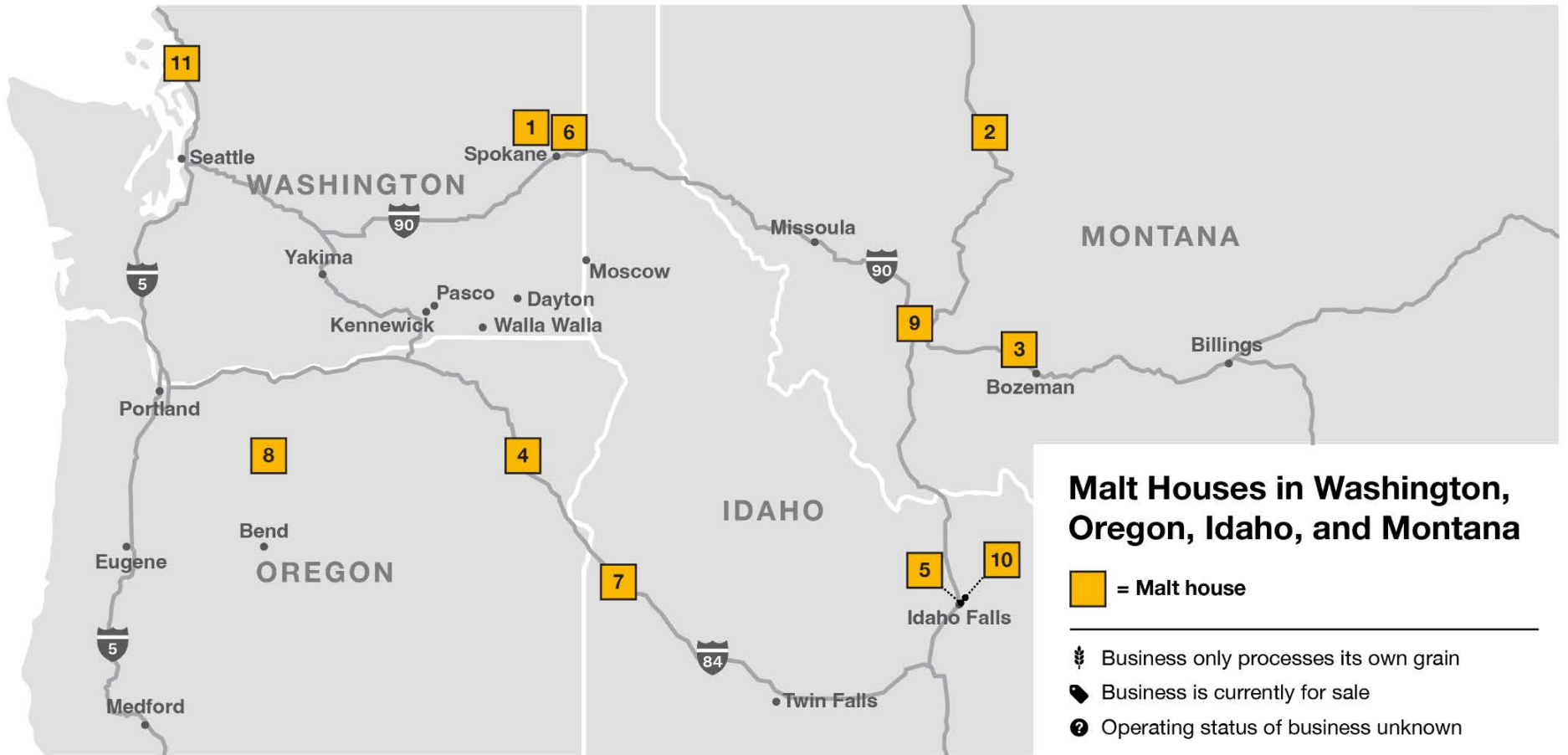
In all three closure case studies, the craft maltsters had solid and growing customer bases apart from the boycott Mecca Grade Estate Malt experienced during the politically charged months of COVID-19. Yet even Mecca Grade Estate Malt had bounced back by 2021 when it opened its brewery and tasting room and had more demand than it could supply. They all also had an abundant grain supply.

The largest challenge according to the information we were able to gather from secondary sources is the capital investment required to reach an economically sustainable economy of scale.

Northwest craft malt houses: Competition and characteristics

Figure 27 shows the names and locations of the existing eleven craft malt houses in the Northwest region. Table 8 summarizes their characteristics, including the types of grains they source and suppliers, products they make, attributes they market, and their market approach.

FIGURE 27 | Craft malt houses in Oregon, Washington, Idaho, and Montana



Malt Houses in Washington, Oregon, Idaho, and Montana

1 = Malt house

- 🌾 Business only processes its own grain
- 👉 Business is currently for sale
- ❓ Operating status of business unknown

- | | | | | | |
|--|--|--|--|--|---|
| <p>1 Cascadia Malts
Nine Mile Falls, WA</p> | <p>3 Gallatin Valley Malt Co. 🌾
Manhattan, MT</p> | <p>5 Liberty Malt
Idaho Falls, ID</p> | <p>7 Mashbill Malts 🌾
Nampa, ID</p> | <p>9 Montana Craft Malt
Butte, MT</p> | <p>11 Skagit Valley Malting ❓
Burlington, WA</p> |
| <p>2 Farm Power Malt 🌾
Power, MT</p> | <p>4 Gold Rush Malt 👉
Baker City, OR</p> | <p>6 LINC Malt
Spokane Valley, WA</p> | <p>8 Mecca Grade Estate Malt 🌾 👉
Madras, OR</p> | <p>10 Mountain Malt
Idaho Falls, ID</p> | |

TABLE 8 | Craft maltsters in Washington, Oregon, Idaho, and Montana and select attributes of the grain they source and products they make

Company	Types of Grain	Grain suppliers	Products	Other attributes	Markets
Farm Power Malt in Power, MT	Durum wheat, Buzz barley, Unitan barley	Grows its own	Malt	None	Unknown
Gold Rush Malt in Baker City, OR	Barley	"Local family farms in East OR"	Malt	None	Breweries
LINC (Local Inland NW Cooperative) Malt in Spokane Valley, WA	Red Russian wheat, Sonora white wheat, Purple Egyptian barley, Scots bere barley, H130910, Rye, Oats, Spelt	<ul style="list-style-type: none"> • Palouse Heritage/Scheuerman (Endicott, WA) • Joseph's Granary/Bill Myers (Colfax, WA) • MJW Grain/James Wahl (Lind, WA) • Clearwater Farms (Nez Perce, ID) • Diamond S Farms (Colfax, WA) • Newhouse Farm (Sunnyside, WA) • Horlacher Farms (Latah, WA) 	Malt	Heritage grains (Sonoran white and Russian red wheats, Purple Egyptian and Scots Bere barley, spelt)	Markets, Breweries, Restaurants
Mashbill Malts in Nampa, ID	Soft white wheat, Two row spring barley, Rye	Grows its own	Malt	None	Online retail, Malthouse
Mecca Grade Estate Malt in Madras, OR	Soft white winter wheat, hard red spring wheat, Two row spring barley, Rye	Grows its own	Malt, Unmalted grain, Beer	None	Online retail, In-store pickup
Montana Craft Malt in Butte, MT	Soft white winter wheat, Barley, Dextrin	Bo's Hay and Grain, Other MT growers	Malt	None	Unknown
Skagit Valley Malting in Burlington, WA (not in business as of June 2023)	White wheat, Pilot barley, Opera barley, Talisman barley, Rye, Francin, Triticale, Millet, Buckwheat	<ul style="list-style-type: none"> • Hedlin Family Farms (LaConner, WA) • Knutzin Farms (Burlington, WA) • Washinton Bulb Company (Mount Vernon, WA) 	Malt	Some certified gluten-free, Some certified organic, Some Salmon-Safe	Online retail, Breweries, Restaurants

Craft mill

Overview

There are multiple options for developing a mill. The options we explored included the following scenarios:

- A mid- or large-scale mill with its own flour brands. We do not recommend pursuing this scenario primarily because Cairnspring Mills is in the process of opening a mill in the Pendleton area. Also, products like pasta, bread, and other products that add value to flour or do not use flour (e.g., distilled spirits) are more likely to be more profitable and competitive even at smaller economies of scale.
- A small-scale commercial mill included as part of the shared infrastructure at Blue Mountain Station that value-added businesses (bakery, pasta, noodle, tortilla, small-scale flour, and others) can rent by the hour like (or as part of) the commercial kitchen, with room to grow as justified by demand.
- Each business in the artisan grain cluster that requires flour could have their own mills in-house sized to their unique operation. For example, a pasta business could have a mill sized to its own needs. Businesses with their own mill could increase their revenue by offering toll milling.

Small-scale commercial mill options

Milling infrastructure continues to develop, but stone milling remains a widely used technique for small-scale, artisan mills. Roller mills and ball mills are also commonly employed in dry milling.²¹ Wet milling is much less common, especially when flour is the desired end-product.²² Relatively small and affordable commercial mills can produce a substantial amount of flour. Table 9 shows the capacity and price for several small-scale commercial mills readily available from Pleasant Hill Grain.²³ This information is only intended to illustrate the scale and price range of this type of milling equipment rather than as an endorsement of any specific product, brand, or retailer. Additional research would be needed to select a specific mill and to identify the best retailer. Figures 28 and 29 are pictures of two example mills from Table 9 to further illustrate size.

²¹ Dziki, Dariusz. The latest innovations in wheat flour milling: a review. *Agricultural Engineering*. 27, no. 1 (May 2023): 147-162. <https://doi.org/10.2478/agriceng-2023-0011>

²² Sayaslan, Abdulvahit. Wet-milling of wheat flour: industrial processes and small-scale test methods. *LWT – Food Science and Technology*. 37, no. 5 (August 2004): 499-515. <https://doi.org/10.1016/j.lwt.2004.01.009>

²³ www.pleasanthillgrain.com

TABLE 9 | Example mills by type, size, price, and production capacity

Type (Brand)	Width (inches)	Price range	Pounds of wheat flour/hour (fine – coarse)
Stone burr (Meadows)	8	\$2,700 - \$4,605	40-60
Stone burr (Meadows)	12	\$7,467 - \$14,622	220-440
Stone burr (Meadows)	20	\$7,467 - \$14,622	600-800
Stone bur (ABC Hansen)	24	\$12,607 - \$12,990	330-600
Stone burr (Meadows)	30	\$7,467 - \$14,622	1250-2250
Hammer (Hippo No. 1)	94	\$8,683 - \$10,847	440-2480
Hammer (Hippo No. 47)	129	\$5,700 - \$18,100	1146-5291
Hammer (Hippo No. 69)	160	\$7,850 - \$31,300	1984-7716
Hammer (Hippo No. L63)	87	N/A	2750-2400
Automatic Roller Mill	28	\$12,995	14,000-25,200

(Source: Pleasant Hill Grain website)

FIGURE 28 | The 12-inch Meadows Stone Burr Mill starting at \$7,467 can grind 220 to 440 pounds of flour per hour, as an example of a small-scale commercial mill. The 30-inch model (\$7,467-\$14,622) can grind 1250 to 2250 pounds per hour.



(Source: Pleasant Hill Grain website)

FIGURE 29 | The Hippo No. 69 Hammer Mill with Air Conveyor starting at \$7,850 can grind 1,984 to 7,716 pounds of flour per hour, as an example of a small-scale commercial mill. Its width is 160 inches (~13 feet).



(Source: Pleasant Hill Grain website)

How much flour is in a loaf of bread?

To give a sense of scale, a serving of bread is 1 ounce (1 slice). To provide 5,000 people (population of Columbia County = 3,950) with a serving of bread a day would take 32,565 ounces of flour a day (Table 10). The 30-inch stone burr mill in Table 9 can produce 1,250 pounds of bread flour an hour. In less than two hours, it can produce enough flour for 5,000 slices of toast (i.e., 1,628 bread loaves).

TABLE 10 | Amount of flour, bread loaves, and acres of grain needed to meet demand for 5,000 vs 20,000 people

Population	Flour oz per day	Flour pounds per day	Flour tons per day	Flour tons per year	20 oz loaves per day	Acres to grow amount of grain
5,000	32,565	2,035	1.02	372	1,628	148.60
20,000	130,260	8,141	4.07	1,485	6,513	593.19

1 slice bread = 1 serving = 1 oz

Infrastructural needs

Table 11 summarizes the infrastructural needs and constraints of select crops.

TABLE 11 | Infrastructural needs and constraints of artisan grains and other milled crops

Crops	Needed infrastructure/infrastructural constraints
Hard red winter wheat	
Hard red spring wheat	
Durum wheat	
Soft red winter wheat	Single-stream or multiple-stream processing based on final product, refining needed if making white flour, short shelf-life, dry or wet milling
Soft white wheat	
Hard white winter wheat	
Hard white spring wheat	
Barley	Processing includes dehulling, dry or wet milling, requires low amount of skinned and broken kernels, must be dried if moisture >13.5% at harvest
Oats	Processing includes cleaning, dehulling, and roasting, must be dried if moisture >13% for storage, dry or wet milling
Corn	Processing includes degerming, dry milling or wet milling, high moisture content can result in harvest losses, must be dried if moisture >15% at harvest
Farro/emmer	Processing includes dehulling, may require swathing before harvest
Einkorn	
Rye	Processing includes tempering, dry or wet milling, must be dried if moisture >13% at harvest
Spelt	Processing includes dehulling, dry or wet milling, must be dried if moisture >14% at harvest

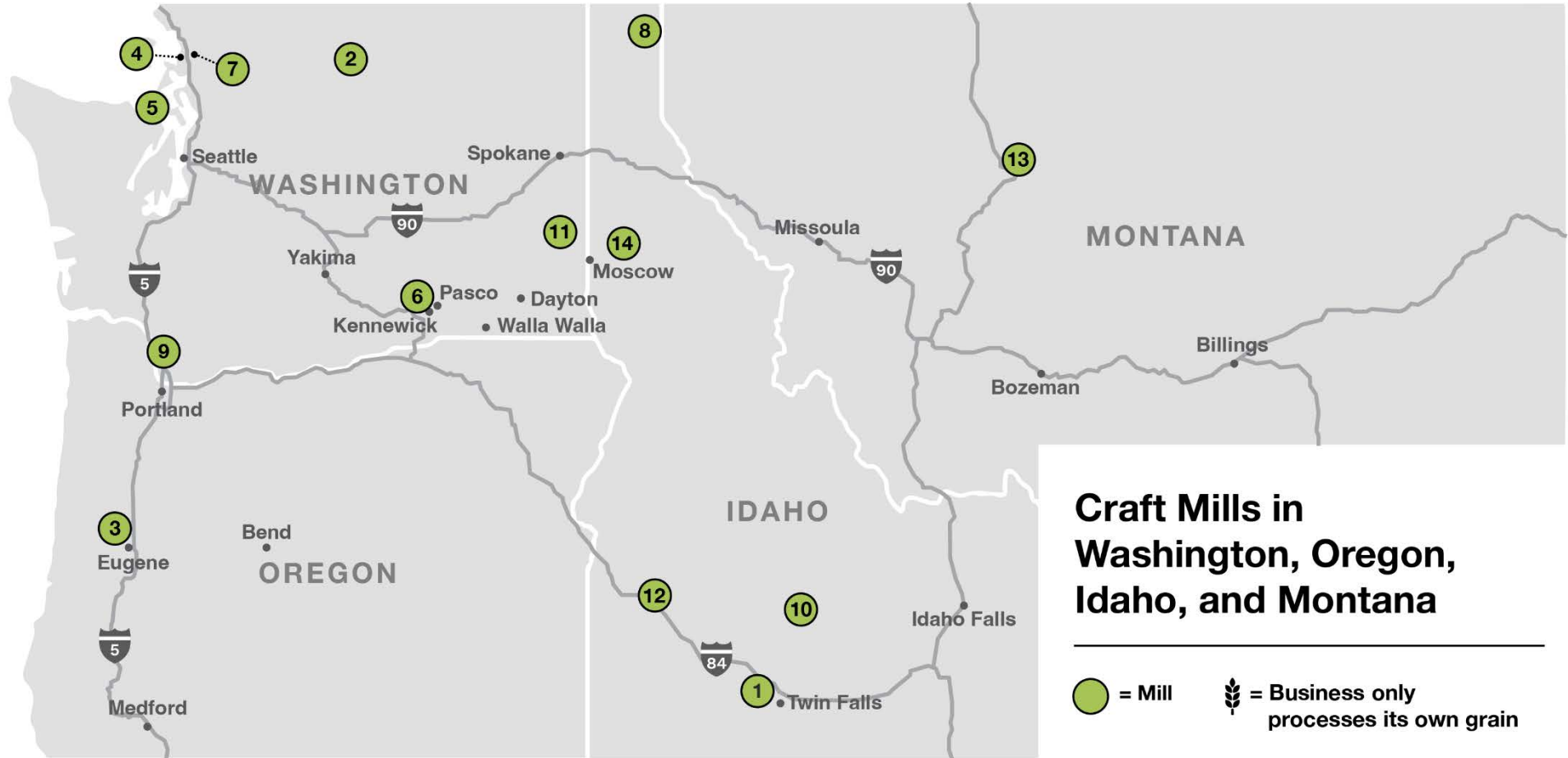
Buckwheat	Processing includes dehulling, cross contamination concerns, must be dried if moisture >13% at harvest, dry or wet milling
Flax	Processing includes dehulling, cold pressing to retrieve oil, must be dried if moisture >10% at harvest
Teff	Separating endosperm is difficult so usually whole-grain, dry or wet milling
Khorasan/Kamut	Similar to wheat
Millet	Processing includes dehulling, grain size of small millets necessitates different machinery, must be dried if moisture >12.5% at harvest
Sorghum	Processing includes degerming, must be dried if moisture >12% at harvest, dry milling or wet milling
Chickpeas/garbanzo beans	Milling includes removal of seed coat and splitting of cotyledons, often attrition, hammer, or roller mills, must be dried if moisture >10% at harvest
Lentils	Processing includes dehulling and splitting of cotyledons, dry or wet milling, often stone, roller, or pin milling, raw flour develops undesirable flavor and is often roasted, must be dried if moisture >14% at harvest
Triticale	Similar to wheat, often blended with wheat during milling process
Soybeans	Thin seed coat often shatters during harvest, typically processed using heat treatment and crushing, must be dried if moisture >11% at harvest
Amaranth	Milling technologies are still relatively new, small structure makes milling difficult, often processed by dry roasting and steam jet-cooking
Quinoa	Processing includes polishing to remove saponin coat, dry or wet milling
Peas	Processing includes dehulling and splitting of cotyledons, dry or wet milling, often stone, roller, or pin milling, raw flour develops undesirable flavor and is often roasted, must be dried if moisture >16% at harvest
Black beans	Processing includes dehulling
White rice	Processing includes cleaning, hulling, pearling, and polishing
Brown rice	

Northwest artisan mills: Competition and examples

Figure 30 shows the names and location of artisan mills in the Northwest; Table 12 lists the mills with information about types and sources of grain, legumes, and seeds processed, the products they produce and product attributes, and sales venues. These provide examples of successful models. Of the 14 existing artisan mills, six use a vertical integration business model and only mill grain from their own farms. The other eight mills represent direct potential competition for a new mill as well as evidence that these types of operations are feasible.

Of note, Cairnspring Mills is exploring developing a network of mills to address the need in the Inland Northwest, including one in Pendleton.

FIGURE 30 | Artisan mills in Oregon, Washington, Idaho, and Montana



Craft Mills in Washington, Oregon, Idaho, and Montana

● = Mill 🌾 = Business only processes its own grain

- | | | | |
|---|---|---|--|
| <p>1 1000 Springs Mill
Buhl, ID</p> <p>2 Bluebird Grain Farms 🌾
Winthrop, WA</p> <p>3 Camas Country Mill
Eugene, OR</p> <p>4 Cairnspring Mills
Burlington, WA</p> | <p>5 Chimacum Valley Grainery
Chimacum, WA</p> <p>6 Ethos Stone Mill
Richland, WA</p> <p>7 Fairhaven Mill
Burlington, WA</p> <p>8 Farm to Market Grains 🌾
Bonners Ferry, ID</p> | <p>9 Gee Creek Farm 🌾
Ridgefield, WA</p> <p>10 Hillside Grain 🌾
Bellevue, ID</p> <p>11 Joseph's Grainery 🌾
Colfax, WA</p> <p>12 Maskal Teff
Boise, ID</p> | <p>13 Montana Milling
Great Falls, MT</p> <p>14 Wheatberry Mills 🌾
Deary, ID</p> |
|---|---|---|--|

TABLE 12 | Artisan mills in Idaho, Washington, Oregon, and Montana by grains milled, value-added products, market outlet, and suppliers





Company	Types of Grain	Products	Other attributes	Sales type	Grain suppliers
1000 Springs Mill in Buhl, ID	Hard red spring wheat, Hard white winter wheat, Hard red winter wheat, Purple barley, BarleyMAX	Flour, flakes/cereal, other unprocessed grains/legumes	All organic, All non-GMO, Heritage grains (purple barley)	Online retail, Wholesale to grocers	Unspecified
Bluebird Grain Farms in Winthrop, WA	Hard white wheat (Pasayten), Hard red wheat (Methow), Soft white wheat (Sonora), Farro, Einkorn, Rye, Spelt	Flour, cereals, whole grains, sourdough starter	Certified organic, Heritage grains (Sonora wheat, einkorn, spelt)	Online retail, Wholesale (to grocers and restaurants), Retail shop	Grows its own
Camas Country Mill in Eugene, OR	Hard white wheat (Edison), Hard red spring wheat (Type 65, Vecorra Rojo Type 85, Rouge de Bordeaux), Soft white wheat (Sonora), Hard red winter wheat, Durum wheat, Amarillo white wheat, White barley, Purple karma barley, Rye, Spelt, Buckwheat, Einkorn, Oats, Corn, Flax, Emmer, Red fife, Brown teff, Kamut, Khorasan	Flours, whole grains, flaked grains, cracked grain cereals, pasta, wild rice, finished baked goods	Some certified organic, Heritage grains (Sonora wheat, purple barley, einkorn, emmer, spelt, teff, Kamut, Khorasan)	Online retail, Storefront	Hunton's Farm (Junction City, OR) Agency Lake Farms (Chiloquin, OR) Strome-Fisher Farms (Junction City) Stanley Farver Farms (Junction City)
Cairnspring Mills	Hard red spring wheat (Espresso, Yecora Rojo), Durum wheat, Hard red winter wheat (Sequoia, Skagit 1109), Rye	Flours	Glyphosate-free, Neonicotinoid-free, Partner with WSU bread lab, Some organic	Online retail, Wholesale (to grocers)	Anderson Organics, Moon Family Farm (Horse Heaven Hills, WA), Hudson Bay Farm (Milton-Freewater, OR), Carbondale Farms (Milton-Freewater, OR), and other local farms in/near the Skagit Valley
Chimacum Valley Grainery	Hard red winter wheat, Soft white wheat, Purple wheat, Salish blue perennial wheat, Hard white wheat, Buckwheat, Quinoa, Oats, Spelt, Rye, Barley	Flours, breads, pastries, pastas, whole grains	Certified organic, Partner with WSU bread lab	Online retail, Wholesale (to grocers and restaurants)	Grows its own and sources from farms in the Skagit Valley and Columbia Basin

Ethos Stone Mill in Richland, WA	Soft white wheat (Sonoran Gold), Hard red winter wheat (Sequoia), Hard red spring wheat (Hollis), Yellow Breton wheat, Rye	Flour, pancake mix, baked goods	Heritage grains (Sonoran Gold)	Online retail, In-store at bakery, Wholesale	Local farms (Moon Farms and Palouse Heritage farms)
Fairhaven Mill in Burlington, WA	Soft white wheat, Hard red wheat, Barley, Spelt, Rye, Oats, Millet, Buckwheat, Corn	Flour, whole grains	All certified organic, some certified gluten-free, Heritage grains (spelt)	Online retail, Storefront	Local farms cooperative
Farm to Market Grains in Bonners Ferry, ID	Hard white spring wheat, Soft white winter wheat (Brundage 95), Transit hullless barley	Flour, pancake mix	None	Local grocery stores	Grows its own
Gee Creek Farm in Ridgefield, WA	Hard red wheat, Hard white wheat, Soft white wheat, Durum wheat, Spelt, Rice, Millet, Sorghum, Corn, Buckwheat	Cereals, flours, pancake mix	All certified organic, Heritage grains (spelt)	Farmers markets	Grows its own
Hillside Grain in Bellevue, ID	Hard red spring wheat (Ruth - from WSU bread lab), Soft white spring wheat (Sawtooth)	Flour	Organic (unclear if certified), Partner with WSU bread lab, Bromate-free	Online retail	Grows its own
Joseph's Grainery in Colfax, WA	Hard red wheat, Soft white wheat, Baronesse barley, Chickpeas, Lentils	Flours, cereals, pancake mix, whole grains	Kosher certified	Farmers markets, Local grocery stores and retail locations	Grows its own
Maskal Teff / "The Teff Company" in Boise, ID	Teff	Flour	Heritage grain	Online retail	Unspecified
Montana Milling in Great Falls, MT	Hard red spring wheat, Hard red winter wheat, Hard white wheat, Soft white wheat, Durum wheat, Buckwheat, Millet, Corn, Flax, Triticale, Spelt, Soybeans	Flours, cereals/flaked grains, whole grains	Certified organic, Kosher certified, Heritage grain (spelt)	Wholesale/bulk orders	Several local MT growers
Wheatberry Mills in Deary, ID	Wheat	Finished baked goods, wholesale flour	None	Online retail	Grows its own

Milled products






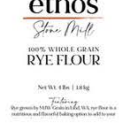
As Table 2 above illustrates, there is no shortage of grain, legume, and seed crops that can be milled for flour and further processing. The table of existing mills also illustrates the range of products artisan mills are making. Milled products include coarse meals (e.g., corn meal), cereals, spices, teas, and even crickets and other edible insects. Brownie, cake, cookie, pancake, and other dry ingredient mix products are also possibilities that could be developed if a mill were available. For example, Alaska Flour Company’s barley flour 15-ounce Black Gold Brownie Mix retails at \$6.99. Other examples from Alaska Flour Company are presented in Figure 31. Figure 32 shows example products Ethos Stone Mill in Richland, WA, sells and at what price.

FIGURE 31 | Examples of dry mix products made by Alaska Flour Company

 <p>15.0 oz</p> <p>Chocolate Chip Cookie Mix</p> <p>\$6.99</p> <p>Add to cart</p>	 <p>20.0 oz</p> <p>Raspberry Pancake Mix</p> <p>\$8.59</p> <p>Add to cart</p>	 <p>5.2 oz</p> <p>Jalapeño Cheddar Barley Risotto</p> <p>\$4.55</p> <p>Add to cart</p>	 <p>20.0 oz</p> <p>Apple Cinnamon Pancake Mix</p> <p>\$8.59</p> <p>Add to cart</p>
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Source: Alaska Flour Company website

FIGURE 32 | Examples of dry mix products made by Ethos Stone Mill

<p>Pancake Mix</p> <p>(2 lbs) Our pancake mix is made with 100% freshly milled heritage grains. Grown by Palouse Heritage,...</p> <p>\$10.00</p> 	<p>Sonoran Gold™ (Pastry Flour)</p> <p>(2 lbs flour) "Culinary historians believe Sonoran Gold™ wheat to be the first cereal grain introduce...</p> <p>\$6.00</p> 
<p>Moon Family Sequoia (All Purpose)</p> <p>(2.2 lbs flour) 100% whole grain Sequoia wheat grown by Moon Family Farm. "Our most versatile a...</p> <p>\$4.00</p> 	<p>Palouse Heritage Crimson Turkey™ (Bread Flour)</p> <p>(2 lbs flour) "Palouse Heritage Crimson Turkey™ Wheat is the famed hard red winter wheat native t...</p> <p>\$6.00</p> 
<p>Moon Family Hollis (Bread Flour)</p> <p>(2.2 lbs) 100% whole grain bread flour featuring Hollis wheat from Moon Family Farm.</p> <p>\$4.00</p> 	<p>Rye Flour</p> <p>(2 lbs) Rye grown by MW Grain in Lind, WA. Rye flour is a nutritious and flavorful baking option to add to...</p> <p>\$6.00</p> 

Source: Ethos Stone Mill website

Branding

Branding may be based on individual producers, local/regional producer groups, sustainable practices, organic, non-GMO, artisan grains, stone-ground flours, and so on. Branding should distinguish products from those of commodity supply chains by product attributes and story. For more information relevant to branding, see the “Product differentiation” section above.

Market feasibility

Table 12 shows fourteen artisan mills across the Northwest of varying scales—although most are relatively small—operating successful businesses and using multiple market strategies. Their markets include **direct-to-consumer** sales through their own storefronts, website (online sales), and farmers market stands as well as wholesale or **intermediated market** sales to local and regional grocers, restaurants, and bakeries. They sell flour in bulk and in smaller packaged products, including dry mixes.

EXAMPLE MARKETS

Bakeries and other wholesale

There are many bakeries that source artisan flour in the Northwest, as reflected in Table 13. Some artisan mills sell flour and mixes to food service companies.

TABLE 13 | Examples of bakeries that source local grains in the Northwest, including the products they make, product attributes they seek (as reflected by labels used), and their current suppliers

Name	Location	Products	Labels used	Current suppliers, if known
Baker and Spice	Portland, OR	Breads, cakes, scones, croissants, buns, cookies, frozen pastries		
Bakery Nouveau	Seattle, WA	Breads, cookies, croissants, Danishes, cakes		
Barn Owl Bakery	Lopez Island, WA	Cookies, crackers, breads, bagels, pastries	Organic, heritage grains	Lopez Island producers
Bernice’s Bakery	Missoula, MT	Breads, scones, rolls, croissants, Danishes, pastries, muffins, cakes		
Bluebird Bakery	Sandpoint, ID	Cookies, croissants, breads		
Breadfarm	Bow, WA	Breads, muffins, Danishes, croissants, cookies	Organic, local	Cairnspring Mills, Fairhaven Mill
Brown Bear Baking	Eastsound, WA	Breads, pastries		“Heriloom wheat grown in Skagit Valley and Eastern Washington”
Camber	Bellingham, WA	Breads, biscuits, buns	Some gluten-free breads	
Ceres Bakery	Kalispell, MT	Breads, cakes, cookies, croissants, muffins, buns, scones		
Creswell Bakery	Creswell, OR	Breads, pastries	Non-GMO, local	

Ethos Bakery and Café	Richland, WA	Breads, croissants, cookies, muffins, scones, cakes	Organic, local, non-GMO	Mills own grain (Ethos Stone Mill)
Farmstead Bread	Myrtle Point, OR	Breads, muffins, Danishes, crackers, croissants, muffins, scones	Organic, local	
Gaston's Bakery	Boise, ID	Breads, pastries, Danishes, croissants, scones, buns, flour, frozen croissants	Organic, local	Started milling own flour a few years ago
Grand Central Bakery	Hillsboro, OR	Breads, croissants, Danishes, muffins, cookies, frozen Doughs	Local	Camas Country Mill, Cairnspring Mills, Shepherd's Grain, Smalls Family Farm
Grand Central Bakery	Portland, OR	Breads, croissants, Danishes, muffins, cookies, frozen doughs	Local	Camas Country Mill, Cairnspring Mills, Shepherd's Grain, Smalls Family Farm
Grand Central Bakery	Burien, WA	Breads, croissants, Danishes, muffins, cookies, frozen doughs	Local	Camas Country Mill, Cairnspring Mills, Shepherd's Grain, Smalls Family Farm
Grand Central Bakery	Seattle, WA	Breads, croissants, Danishes, muffins, cookies, frozen doughs	Local	Camas Country Mill, Cairnspring Mills, Shepherd's Grain, Smalls Family Farm
Hideaway Bakery	Eugene, OR	Breads, Italian pastas, muffins, cakes, cookies, pastries, croissants, wood-fired pizza	Some gluten-free, organic	
Hillside Bread	Bellevue, ID	Breads, scones	Organic, local	Mills own grain (Hillside Grain)
Honest Biscuits	Seattle, WA	Biscuits, baking mix	Sustainably-grown, local, some gluten-free	Shepherd's Grain
La Petit Bakehouse	Missoula, MT	Breads, pastries		
Larsen's Bakery	Seattle, WA	Breads, pastries		
little t american baker	Portland, OR	Breads, cookies, croissants, Danishes, brownies, muffins	Local	
Macrina Bakery	Kent, WA	Breads, bagels, cookies, pastries		
Macrina Bakery	Seattle, WA	Breads, bagels, cookies, pastries	Organic, local	
On the Rise Bread Company	Bozeman, MT	Breads, croissants, pizza dough	Local	
Pane d'Amore	Bainbridge, Port Townsend, and Sequim, WA	Breads, scones, cookies, croissants, Danishes, cakes, brownies	Some gluten-free pastries	
Park Avenue Bakery	Helena, MT	Breads, cakes, brownies, cookies, croissants, Danishes, scones, pastries		

Rise Up! Artisan Bread	Jacksonville, OR	Breads, rolls	Organic, local, non-GMO, pesticide free	Lehi Mills, Dunbar Farms
Rising Tides Baking Company	Manzanita, OR	Breads, cakes, pastries, scones	Local	
Rubinstein Bagels	Seattle, WA	Bagels	Organic	"From farms in Eastern Washington"
Sea Wolf Bakery	Seattle, WA	Breads, cookies, croissants, cakes, rolls, biscuits, scones, muffins, pies	"Does not use tree nuts or peanuts in products"	Shepherd's Grain, Cairnspring Mills, Fairhaven Mills
Snacktivist Foods	Coeur d'Alene, ID	Baking mixes, falafel mix, flour	Top 9 allergen free, vegan, "climate smart"	Unspecified but supports small producers
Tandem Bakery and Café	Missoula, MT	Breads, cakes, doughnuts, pastries	Vegan, gluten-free, local	
The Flora Bakehouse	Seattle, WA	Breads, croissants, pastries	Some gluten-free, some vegan	
The Grain Shed	Spokane, WA	Breads, croissants, cookies, cakes, buns	Organic, local	
The Mazama Store	Mazama, WA	Breads, bagels, pastries	Local	Bluebird Grain Farms, Shepherd's Grain
Wild Yeast Community Supported Bakery	Corvallis, OR	Breads, pastries, rolls, scones, cookies, brownies, crackers	Organic, local	Camas Country Mill, Harcombe Farm
Zeppole Baking Company	Boise, ID	Breads, pastries, scones, Danishes, muffins, croissants	Natural	

Retail

Artisan and specialty flours and dry mixes (e.g., brownies, corn bread, pancakes) produced at Blue Mountain Station could be sold in retail settings such as cooperative, natural, and all other grocer types.

Direct-to-consumer, including grain CSAs

Internet sales and artisan grain community supported agriculture (CSA) shares are an emerging marketing channel for flour and other grain-based value-added products. Blue Bird Grain Farm in Winthrop, WA, is an example of a mill with a CSA. The CSA offers several options, one is to receive five items per month—including 1 lb. to 2 lb. bags of rye flour, einkorn flour, hard red flour, hard white flour, emmer flour, farro, pancake mix, lentils, cereal blend, or baking mix—for \$219 to \$325.55 a year.²⁴

HEALTH MARKET

A sizeable portion of the population is motivated to buy gluten-free foods due to health concerns. Gluten-free diets are becoming increasingly common in the United States. This increase is likely due to a greater awareness and diagnosis of medical conditions that prevent effective gluten absorption in the intestinal track as well as an increased interest in the health foods and diet markets. Figures 33 and 34 show the number of people with celiac disease, wheat allergy, and diabetes.

²⁴ <https://bluebirdgrainfarms.com/product-category/community-supported-agriculture-csa-program/>

FIGURE 33 | Total number of people in Idaho, Montana, Oregon, and Washington with celiac disease, wheat allergy, and diabetes, 2021

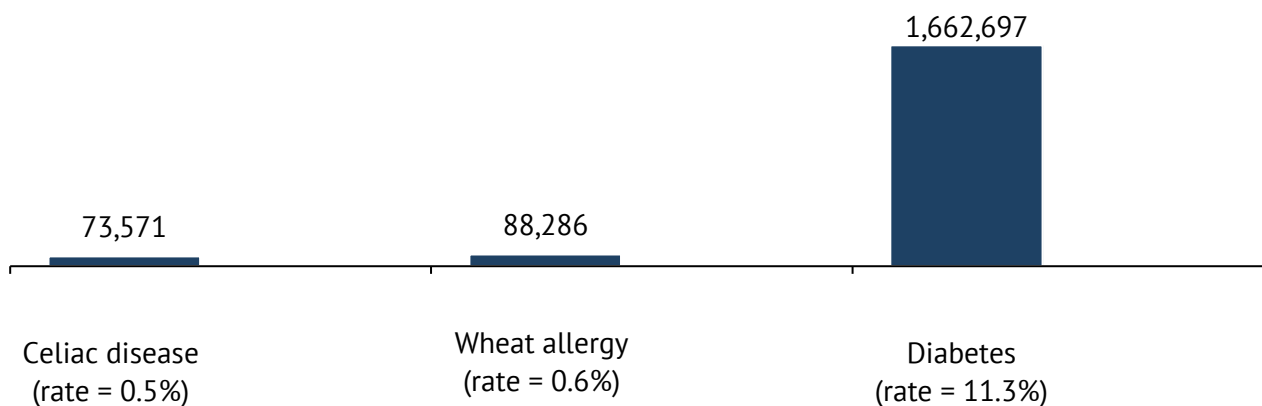
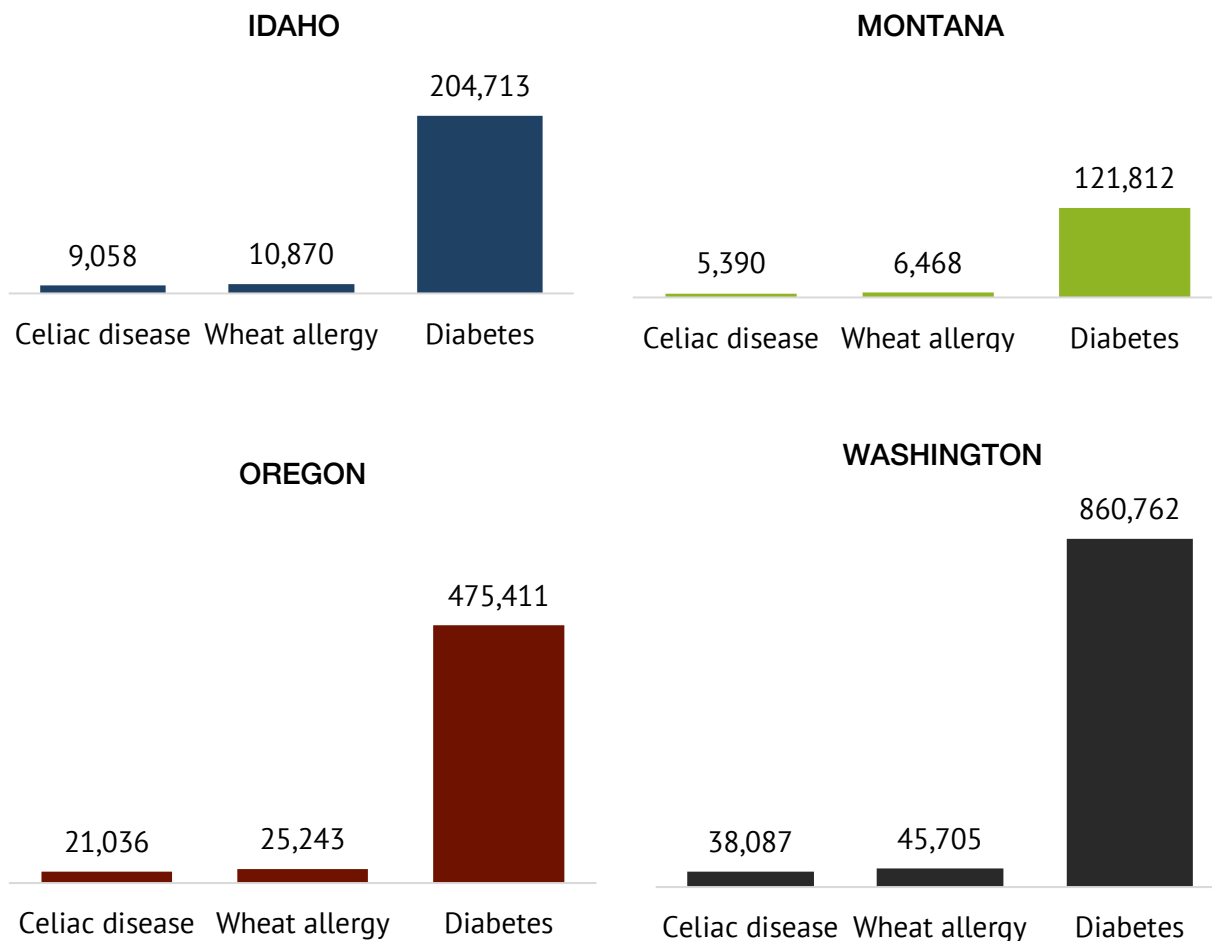


FIGURE 34 | Number of people with celiac disease, wheat allergy, and diabetes by state, 2021²⁵



²⁵ Centers for Disease Control and Prevention. “National and State Diabetes Trends.” Accessed September 18, 2023. <https://www.cdc.gov/diabetes/library/reports/reportcard/national-state-diabetes-trends.html>

Celiac disease

Celiac disease is a relatively common autoimmune disease, thought to occur in 0.5-1% of the worldwide population.²⁶ Celiac disease generates an immune reaction to gluten, leading to a range of gastrointestinal symptoms including bloating, nausea, and abdominal pain. Even in minor cases, prolonged consumption of gluten can damage the intestinal track and inhibit nutritional intake, leading to further complications.²⁷ A fully gluten-free diet is therefore often suggested for any patient diagnosed with celiac disease to prevent adverse health effects.

Singh et. al found a prevalence of celiac disease in about 0.5% of the United States population.²⁸ Based on this estimate, about 773,570 individuals have celiac disease in Idaho, Montana, Oregon, and Washington. However, rates may be higher as individuals experiencing minor symptoms are less likely to seek medical intervention. Others may self-diagnose and adopt a gluten-free diet without consulting a medical practitioner. While global rates of celiac disease suggest little correlation with race and ethnicity, several studies have found a higher prevalence in women and children.²⁹

Wheat allergy

A wheat allergy occurs when the body produces antibodies to proteins found in wheat. It is not specific to the protein gluten and generates a different immune system reaction than celiac disease. However, maintaining a gluten-free diet can help people with wheat allergies avoid wheat. Symptoms of wheat allergy can range from relatively mild skin rashes and headaches to life-threatening anaphylaxis.³⁰ About 0.2-1% of the population is thought to have a wheat allergy, with a greater prevalence in children.³¹ Based on this estimate, between 29,400 and 147,200 people in Idaho, Montana, Oregon, and Washington likely have a wheat allergy.

Non-celiac gluten sensitivity

Non-celiac gluten sensitivity refers to other disorders that cause symptoms related to the ingestion of gluten. One such condition is gluten ataxia, which generates an immune response to gluten and may be related or unrelated to celiac disease. Unlike celiac disease, the immune response in gluten ataxia affects

²⁶ Caio, Giacomo, Umberto Volta, Anna Sapone, Daniel A. Leffler, Roberto De Giorgio, Carlo Catassi, and Alessio Fasano. "Celiac disease: a comprehensive current review." *BMC Medicine* 17, no. 142 (January 2017). <https://doi.org/10.1186/s12916-019-1380-z>.

²⁷ Mayo Clinic. "Celiac disease." Accessed August 23, 2023. <https://www.mayoclinic.org/diseases-conditions/celiac-disease/symptoms-causes/syc-20352220#:~:text=Celiac%20disease%2C%20sometimes%20called%20celiac,response%20in%20your%20small%20intestine>.

²⁸ Singh, Prashant, Ananya Arora, Tor A. Strand, Daniel A. Leffler, Carlo Catassi, Peter H. Green, Ciaran P. Kelly, Vineet Ahuja, and Govind K. Makharia. "Global prevalence of celiac disease: systematic review and meta-analysis." *Clinical Gastroenterology and Hepatology* 16, no. 6 (June 2018): 823-836. <https://doi.org/10.1016/j.cgh.2017.06.037>

²⁹ U.S. Census Bureau; American Community Survey, 2021 American Community Survey 5-Year Estimates, Table DP05; generated by Hailey Smalley; using data.census.gov; <https://data.census.gov> (23 August 2023).

³⁰ Mayo Clinic. "Wheat allergy." Accessed August 23, 2023. <https://www.mayoclinic.org/diseases-conditions/wheat-allergy/symptoms-causes/syc-20378897>

³¹ Cianferoni, Antonella. "Wheat allergy: diagnosis and management." *Journal of Asthma and Allergy*, no. 9 (January 2016): 13-25. <https://doi.org/10.2147/JAA.S81550>

neurological function and can damage the cerebellum. Symptoms include trouble speaking and moving and issues with gait and balance. Gluten ataxia and other non-celiac gluten sensitivities are relatively unstudied, and prevalence is still unknown.³²

Other medical issues

Some studies suggest that gluten-free diets can improve some negative symptoms in people with atopy, fibromyalgia, endometriosis, irritable bowel syndrome, diabetes, systemic lupus erythematosus, thyroiditis, and psoriasis. However, more research is necessary to establish these connections.³³ Some research also suggests correlations between gluten sensitivities and some neurological disorders, including autism spectrum disorder and schizophrenia.^{34,35} A gluten-free diet is sometimes prescribed to these patients to alleviate gastrointestinal distress and improve behavioral symptoms, though these connections remain controversial in scientific literature.

Weight loss and health food marketing

Gluten-free diets have also become increasingly prevalent in populations not affected by these diseases. Between 2011 and 2016, retail sales of gluten-free foods doubled, likely as a result of health food marketing.³⁶ While less than 1% of the US population is estimated to have celiac disease, gluten ataxia, or a wheat allergy, about 30% of American adults reported an interest in reducing or eliminating gluten from their diet.³⁷ Many advocates of gluten-free diets reported adopting the diet for health or weight-loss benefits, though peer-reviewed evidence of these benefits is extremely limited.

Toll milling

A toll mill provides custom flour milling and mixing services to other businesses for a fee. However, there is not a toll miller currently available in the region, at least not at the scale needed for many value-added producers, like pasta makers. At the same time, Cairnspring Mills is in the process of opening a mill in Pendleton that might fulfill this need. The cost of transportation for toll milling is often prohibitive, and a

³² Catassi, Carlo, Julio C. Bai, Bruno Bonaz, Gerd Bouma, Antonio Calabro, Antonio Carroccio, Gemma Castillejo et al. "Non-celiac gluten sensitivity: the new frontier of gluten related disorders." *Nutrients* 5, no. 10 (2013): 3839-3853. <https://doi.org/10.3390/nu5103839>

³³ El-Chammas, Khalili and Elaine Danner. "Gluten-free diet in nonceliac disease." *Nutrition in Clinical Practice* 26, no. 3 (May 2011): 294-299. <https://doi.org/10.1177/0884533611405538>

³⁴ Marcason, W. "What is the current status of research concerning use of a gluten-free, casein-free diet for children diagnosed with autism?" *Journal of American Dietetic Association* 109, no. 3 (Mar 2009): 572. <https://10.1016/j.jada.2009.01.013>

³⁵ Dickerson, Faith, Cassie Stallings, Andrea Origoni, Crystal Vaughan, Sunil Khushalani, Flora Leister, Shuoja Yang, Bogdana Krivogorsky, Armin Alaedini, and Robert Yolken. "Markers of gluten sensitivity and celiac disease in recent-onset psychosis and multi-episode schizophrenia." *Biological Psychiatry* 68, no. 1 (July 2010): 100-104. <https://doi.org/10.1016/j.biopsych.2010.03.021>

³⁶ Niland, Benjamin and Brooks D. Cash. "Health benefits and adverse effects of a gluten-free diet in non-celiac disease patients." *Gastroenterology and Hepatology* 14, No. 2 (February 2018): 82-91.

³⁷ Gaesser, Glenn A., and Siddhartha S. Angadi. "Navigating the gluten-free boom." *Journal of the American Academy of Physician Associates* 28, no. 8 (August 2015): 1-7. <https://doi.org/10.1097/01.JAA.0000469434.67572.a4>

major bottleneck, according to the key informant interviews. One flour blend producer commented on the need for regional toll milling:

“We’ve got [a miller] in Spokane, **but he doesn’t toll mill for people. There’s just not a lot.** Bluebird, you’ve got Thousand Springs down in Buhl. But if you’re shipping, which **I do ship from Central Washington all the way to Buhl. Hell, you may as well have just shipped it to Northern California.** That’s a long ways. He’s one of the only places that is willing to do that work and toll milling for people.”

A different interviewee reflected on the infrastructure gap left after the Pendelton Flour Mill fire in 2022, and how Shepards Grain is moving their milling operations to southeastern Idaho. Again, transportation to this mill is challenging, as “there’s no cost feasible way you can ship from western Whitman County to Blackfoot County.” Additional mills would reduce the distance grains and flours need to be trucked for processing.

There are also limits to types of mills in the region. For example, there is no local mill for semolina in Washington state. Semolina is a popular flour for making pizza and pasta. One interviewee reported that they must get their semolina milled in Alberta, Canada, which limits their ability to market their noodle product as “Washington local.” If there were a semolina mill in Washington, it could benefit pizza and pasta makers who are working towards a value-added local artisan grain product.

A mill at the artisan grain cluster in Dayton could provide different opportunities for milling. The mill could focus on milling for several value-added products, like noodle manufacturing or a bakery, or the mill could follow Shepards Grains model, developing a flour mill, bagging the flour, and selling it from Dayton. Both options have the potential for vertical integration of processes and value-added co-locators.

Pasta and noodles

Overview and summary of economic Impacts

There are multiple potential entry points into making pasta and noodles, from bootstrapping up. The resources available, people involved, and the pace at which they can build their customer base will determine what is possible.

We assessed two scenarios for pasta manufacturing, which are also relevant to noodles:

- 1) A small-scale scenario requiring a \$1.5 million facilities and equipment investment and using 5,134 pounds (86 bushels) of grain a year (Appendix D).
- 2) Pasta manufacturing at a mid-scale similar to the scale of operation proposed by Mainstem Malt. The detailed economic impact and investment assessments completed by Peterson & Associates for this scenario are presented in Appendix D. The following infographic summarizes the highlights from the detailed report.

This exercise is hypothetical since Port of Columbia does not yet have an interested manufacturer. Pasta manufacturing is successful across the West, and opportunity exists. Fresh noodle markets, the fastest growing segment of the market, are accessible locally and abundantly in a few-hour drive radius and newly developed distribution systems—notably the food hubs—provide access to higher premium markets. Not only are markets available, dried pasta in particular is a priority of food security programs locally.

Another benefit of this type of value-added business is that it is scalable from multiple startup options. The existing commercial kitchen and Blue Mountain Station, with some additional equipment specific to noodle making and more shared refrigeration space, could help bootstrap a business into place by supporting product development and initial production.

These scenarios involve sizing shared milling equipment to the value-added processing needs of the businesses at Blue Mountain Station or the individual business buying its own mill.

Pasta Manufacturing Facility Highlights*

We identified interest in regionally sourced dry (shelf-stable) and fresh pasta products.



FACILITY COSTS
~\$1.5 million
 for a facility that processes 5,134 pounds (86 bushels) of grain/year

ECONOMIC IMPACT HIGHLIGHTS		
<p>Annual sales \$1.6 million</p>	<p>Employees 2.3</p>	<p>Benefit-cost ratio 0.95</p>
<p>Annual revenues \$1 million</p>	<p>Gross payroll \$226,397</p>	<p>Payback period 13.7 years</p>
<p>Internal rate of return 2%</p>		

INFRASTRUCTURAL NEEDS INCLUDE

- Mill (optional)**
\$3,000 - \$30,000
- Pasta equipment processing lines**
range from \$26,000 - \$36,000

↓

Including mixer, feeding machine, extruders, cutters, cooling, drying, and packing

RIPPLE EFFECTS		Tax Revenues
<p>Annual gross regional product \$0.5 million</p>		<p>\$31,058 to local and state coffers</p>
<p>Annual total compensation \$0.9 million</p>	<p>4.9 New jobs</p>	<p> \$18,115 Sales and excise taxes</p>
<p>Average total compensation per job \$63,624</p>	<p><i>Including multiplier effects</i></p>	<p> \$9,229 Property taxes</p>
		<p> \$3,714 Other taxes</p>

*A full report estimating the economic impacts of pasta manufacturing produced by Steven Peterson (2023) is available as Appendix D. Here we summarize the highlights from the full report.

Equipment and costs

Pasta making involves mixing the ingredients, extruding, cutting, drying, cooling, and packaging. For fresh pasta, pasteurizers are needed to eliminate pathogens. Proper storage is important to maintain freshness. It is possible to purchase all the equipment needed in a pasta processing line as a single package. Table 14 presents six options to give a sense of available lines, prices, features, and production capacity. As the table shows, options we found range from \$26,000 to \$36,000. However, there are many options at many scales, including custom equipment, and used equipment is also readily available. Pasta processing equipment is available for multiple energy types including electricity, which is optimal for the Dayton site.

TABLE 14 | Examples of commercial pasta equipment lines by price, features, and capacity

Model	Price	Included Features	Production Capacity
HK-80/100/150	\$36,000	Mixer, feeding machine, single screw extruder, cutter, dryer, cooling and conveying	200-260 kg/hr
TSE	\$35,000	Mixer, screw conveyor, single screw extruder, cutter, cooling machine, hot air dryer, automatic fryer, flavoring line	100 kg/hr
HM-100	\$35,000	Mixer, screw conveyor, macaroni extruder, cooling conveyor, hoister, dryer	100-150 kg/hr
TF300B	\$34,000	Mixer, vacuum mixer, vacuum extruder, die, cutting machine, electronic control system, water cooling device, oil cooling device	300 kg/hr
DLG150	\$26,000	Mixer, screw conveyor, single screw extruder, cutter, drying system, cooling conveyor, packaging system	280-300 kg/hr
NT-100	\$36,000	Mixer, extruder, cutter, drying system, flavoring system, packing system	100 kg/hr

Supply

Quality pastas are made from durum wheat, which is currently grown primarily in northern Montana, southeast Idaho, and North Dakota (Figure 11). Gluten-free pasta is generally made with rice flour and chickpea flour, sometimes with smaller amounts of lentil flour. Pastas can include a variety of flours beyond durum wheat, lentil, pea protein, chickpea, barley, and spelt for example. Aside from rice, these ingredients are grown, generally in abundance, near Dayton and across the Inland Northwest.

Market feasibility

Although some artisan pasta and noodle businesses exist in the Northwest, there is still unmet demand. Key informants we interviewed indicated the prospect of increasing access to pasta and noodles that can be distributed through short food supply chains and values-based supply chains is very appealing, including the potential to develop gluten-free pasta, which interviewees agreed would be very marketable. Interviewees and our broader research identified demand for local and regionally produced dry artisan pasta and noodle products for intermediated market and other buyers that need shelf-stable products and also a niche for fresh products (e.g., sold to restaurants and through grocers), which can be sold for more. Overcoming common constraints to developing local and regional supply chains for fruits and vegetables,

artisanal pasta (and other grain products) can more easily be scaled up to meet demand from institutional and other large-scale markets and are not constrained by seasonality. One interviewee commented:

“When I think about something like pasta, that’s a great fit for these large state procurement contracts where they are really looking for something that has local identity, meets certain nutritional requirements, that they can just get a big shipment of it all at once, hold it in a dry storage warehouse, and then do what they will to get it out to the end users.”

Distributors and food hubs expressed interest in working with the grain cluster as a hub that produces specialty, artisan pasta:

“We’re really excited about pasta. I think that would be huge, especially because one of our most popular products is this Montana Marinara, this locally sourced pasta sauce. And to have pasta to compliment that would be such an easy plug and play opportunity.”

MARKET TRENDS

The global pasta and noodles market was approximately \$70 billion in 2021 and is expected to grow to \$95.91 billion by 2030.³⁸ The fresh noodle market in the United States is projected to grow 4.57% from 2020 to 2027, when it will reach \$1.15 billion.³⁹

Increased interest in ethnic foods, healthy eating, and the convenience of ready-to-cook fresh noodles are driving factors in market growth in the United States. Health concerns are driving growth in demand for gluten-free fresh noodles and fresh noodle kits in the fresh noodle market. The largest market is food service, mostly small and multi-cuisine restaurants closely followed by the residential market.

Overall, the market is highly competitive with both large and small artisanal manufacturers.⁴⁰ Although both industries are competitive with well established brands, continuous changes in consumer preferences, steady growth, and new retail and restaurant development are creating opportunities. Manufacturers should expect to constantly be adapting.⁴¹ Demand is highest on the West Coast, Northeast, and major metropolitan areas of the United States.⁴²

While the domestic market for noodles is steadily increasing, fewer people eat noodles compared to bread, and the market area will likely need to be much larger than that of a bakery, including at least the Tri-

³⁸ Verified Market Research. Global Pasta and Noodles Market Size by Product [Dried Pasta& Noodles, Ambient Pasta& Noodles, and Chilled Pasta & Noodles], by Geographic Scope and Forecast. Accessed on 9-12-2023 at <https://www.verifiedmarketresearch.com/product/pasta-and-noodles-market/>

³⁹ Verified Market Research. United States Fresh Noodles Market Size and Forecast. Accessed on 9-12-2023 at <https://www.verifiedmarketresearch.com/product/united-states-fresh-noodles-market/>

⁴⁰ Market Wide Research. United States Fresh Noodles Market Analysis--Industry Size, Share, Research Report, Insights, Covid-19 Impact, Statistics, Trends, Growth and Forecast 2023-2030. Accessed on 9-12-2023 at <https://markwideresearch.com/united-states-fresh-noodles-market/>

⁴¹ Market Wide Research. United States Fresh Noodles Market Analysis--Industry Size, Share, Research Report, Insights, Covid-19 Impact, Statistics, Trends, Growth and Forecast 2023-2030. Accessed on 9-12-2023 at <https://markwideresearch.com/united-states-fresh-noodles-market/>

⁴² Market Wide Research. United States Fresh Noodles Market Analysis--Industry Size, Share, Research Report, Insights, Covid-19 Impact, Statistics, Trends, Growth and Forecast 2023-2030. Accessed on 9-12-2023 at <https://markwideresearch.com/united-states-fresh-noodles-market/>

Cities and Spokane, and potentially Seattle, Portland, and Boise and everything in between.

The Walla Walla Valley and the Tri-Cities are home to many hundreds of wineries and the area is internationally known for its wines. Walla Walla is a tourist destination with many fine restaurants that serve pasta and noodles. The Tri-Cities are rapidly growing and include diverse market opportunities. The Walla Walla Valley is often compared to Tuscany in types and quality of food products and landscape beauty. Dayton is a good location in terms of local and regional market access and the story it can tell, including being in a well-recognized, high-quality terroir for many crops.

The key is to differentiate the product and marketing to develop a customer base. The US fresh noodle market is expected to grow steadily. The biggest trends in noodles are towards plant-based and gluten-free, free from additives, preservatives, and artificial flavors, and organic.⁴³ Also, addition of protein-rich pulses.⁴⁴ The trend is also towards healthy fresh noodles, which have a higher profit margin but have perishability challenges.

Washington is the largest exporter of buckwheat to Japan.⁴⁵ Optimally, the flour is used within 30 days of milling. Japanese companies and consumers will not use it if it is older than a year.⁴⁶

Northwest artisan pasta and noodle companies: competition and examples

Table 15 provides a list of existing artisan pasta and noodle companies in the Northwest region, including the products they make, product attributes they use for marketing, and their current suppliers. This list includes the artisan pasta and noodle companies we could find and may not be exhaustive. Table 16 provides examples of restaurants making in-house artisan pasta and noodles in the Northwest, including the products they make, and the product attributes they market. The examples in these tables illustrate that many businesses at different scales are successfully producing and selling these types of products.

⁴³ Market Wide Research. United States Fresh Noodles Market Analysis--Industry Size, Share, Research Report, Insights, Covid-19 Impact, Statistics, Trends, Growth and Forecast 2023-2030. Accessed on 9-12-2023 at <https://markwideresearch.com/united-states-fresh-noodles-market/>

⁴⁴ IFT. Making Over Pasta and Noodles. Accessed on 9-12-2023 at <https://www.ift.org/news-and-publications/food-technology-magazine/issues/2017/december/columns/ingredients-to-formulate-pasta-and-noodles>

⁴⁵ Suderman, Hannelore. What about buckwheat? Washington State Magazine. Accessed on 9-12-2023 at <https://magazine.wsu.edu/2014/01/30/what-about-buckwheat/>

⁴⁶ Ibid.

TABLE 15 | Examples of artisan pasta and noodle companies in the Northwest, including the products they make, product attributes they seek (as reflected by labels used), and their current suppliers

Name	Location	Products	Labels used	Current suppliers, if known
Bellingham Pasta Co.	Bellingham, WA	Italian pastas	Some vegan, local, regional	"Focusing on regional trade and locally produced products"
Carso's Pasta Company	Lynnwood, WA	Italian pastas, pastries	Natural	
Classic Foods	Portland, OR	Italian pastas	Local	
Country Pasta	Polson, MT	Italian pastas		
Cucina Fresca Gourmet Foods	Seattle, WA	Italian pastas	Local, sustainable	
Dolina Pasta Co.	Bozeman, MT	Italian pastas	Local, organic	"Grown and milled in Montana"
Esotico	Portland, OR	Italian pastas	Local, pesticide-free, herbicide-free	
Foglia	Beaverton, OR	Italian pastas	Local	
Lagana Foods	Seattle, WA	Italian pastas	Sustainably grown	Shepherd's Grain
Local Fixe	Roseburg, OR	Italian pastas	Local	Shepherd's Grain
Local-Goods	Deer Harbor, WA	Italian Pastas, granola/muesli	Local, non-GMO, some gluten-free	
Pasta Montana	Great Falls, MT	Italian pastas	Local	"100% Montana grown"
Providore/Pastaworks	Portland, OR	Italian pastas	Local	
Rallenti Pasta	Portland, OR	Italian pastas	Allergen-free, gluten-free, legume pastas	Shepherd's Grain
Seconde Fresh Pasta Co.	Billings, MT	Italian pastas, pastries	Local	
Sherry's Pasta	Medford, OR	Italian pastas	Local, organic, some gluten-free	
Shin Shin Foods	Portland, OR	Asian noodles, cookies		
Sky Pasta	Great Falls, MT	Italian pastas	Local	Montana's "Durum Triangle"
Tsue Chong	Seattle, WA	Asian noodles, fortune cookies		
Umi Organic	Portland, OR	Asian noodles	Organic	Camas Country Mill
Wan Hua Foods	Seattle, WA	Asian noodles		
Yellowstone Pasta Co.	Billings, MT	Italian pastas	Local	"Local Montana Durum Wheat Semolina"
Eatwell Organic Noodle	Florence, OR	Asian noodles	Natural, organic	

TABLE 16 | Examples of restaurants making inhouse artisan pasta and noodles in the Northwest, including the products they make, and product attributes (as reflected by labels used)

Name	Location	Products	Labels used
Alavita	Boise, ID	Italian pastas	Local, some gluten-free
Eatwell Organic Noodle	Florence, OR	Asian noodles	Natural, organic
Ferranti Fresh Pasta	Boise, ID	Italian pastas	Local, organic
Placido's Pasta Shop	Eugene, OR	Italian pastas	Local, organic
Wildflour	Leavenworth, WA	Italian pastas, cakes, pastries	Local

Sun Noodle and other larger-scale examples

Sun Noodle is an artisan noodle producer that supplies ramen restaurants and has recently begun selling directly to consumers online. It consults with chefs to develop the noodles, producing over 120 different types of noodles at this point. Starting with San Francisco Whole Foods, the company now sells more than \$5 million in revenue with a focus on fresh, natural Asian foods. Noodles are aged under refrigeration and then shipped fresh or frozen. Sun Noodle uses electricity to power its production process. Producers of instant noodles sometimes use natural gas to cook the noodles in oil.

Other large-scale noodle makers:

- Maruchan is a global leader in producing instant ramen kits. Production of noodles is presumably similar to the process used by Sun Noodle, though Maruchan noodles are then fried in oil and dried before packaging.
- Nona Lim (revenue: \$5 million) emphasizes fresh, natural Asian foods. The company produces three types of fresh ramen noodles, gluten-free rice noodles, and a variety of noodle broths and soups. Fresh rice noodles are made in Singapore by a family business. No information on ramen noodle production is available.

Funding plan

This section provides an overview of grant and loan opportunities to finance both Port of Columbia and Mainstem Malt. A more detailed list of funding opportunities is included in Appendix E.

Congressionally directed spending and state “carve out” funding requests

Asking the federal or Washington State legislature to fund the project is a possibility; alignment and support of local representatives will be important. A several million-dollar request that could serve as leverage for other loans and grants for Port of Columbia is worth exploring.

Port of Columbia: Blend grants and loans to fund site development and facilities

Strong grant opportunities exist to fund a significant portion of the grain business cluster site development, facilities, and equipment. At the top of the list is the **Washington Department of Commerce**

CERB program, with which Port of Columbia has a successful history. The CERB program could fund shared infrastructure at the cluster, most notably site development. Up to 25% of the award total can be issued as a grant, with the remaining funds available as a low-interest loan.

CERB Committed Private Partner Program (Washington Department of Commerce)

Due Date	Ongoing. The Board meets every two months to make funding decisions. Next review date is 1/15/2024.
Amount	Maximum loan amount: \$5 million per project. Interest rates are 1%-3%. Up to 20-year term. Maximum grant amount: 25% of total award, determined by underwriting process and debt service coverage ratio.
Description	Loans and grants for construction of public infrastructure necessary for private business expansion. The Committed Private Partner (CPP) Program requires a private business commitment as part of the application. Requires 20% cash match.

USDA Rural Development and **EDA** also fund shared infrastructure and buildings, with EDA having recently funded a grain infrastructure project in Yakima for \$3.1 million.

Community Facilities Loans and Grants (USDA Rural Development)

Due Date	Ongoing
Amount	Maximum loan amount: varies. Interest rates are set by Rural Development. Up to 40-year term. Maximum grant amount: 15%-17% of total award, determined by community size and median household income.
Description	Provides affordable funding to develop essential community facilities in rural areas. Can be used for food hubs, community kitchens, etc.

Rural Innovation Stronger Economy Grants (USDA Rural Development)

Due Date	April 2024 (estimated)
Amount	\$500,000 to \$2 million
Description	Funds support industry clusters and maximize the use of local productive assets. Can be used to build or support a business incubator and/or provider worker training.

Economic Development Assistance Programs (US Department of Commerce)

Due Date	Ongoing
-----------------	---------

Amount	Up to \$3 million
Description	Funding to advance economic prosperity in distressed communities. Supports construction, non-construction, technical assistance, and revolving loan fund projects.

Several other USDA grant programs, such as the **Urban, Indoor, and Emerging Agriculture Program, Local Food Promotion Program, Farmers Market Promotion Program**, and periodic Washington State Department of Agriculture opportunities can pay for shared equipment and facilities improvements, such as adding to the commercial kitchen or adding coolers or freezers.

Urban, Indoor, and Emerging Agricultural Production Initiative (USDA NIFA)

Due Date	TBD 2024
Amount	\$50,000 to \$1 million
Description	Funds to develop urban, indoor, and emerging agricultural production systems. The program includes food value chain stages: production, harvesting, transportation, aggregation, packaging, distribution, and markets.

Local Food Promotion Program (USDA Agricultural Marketing Service)

Due Date	May 2024 (estimated)
Amount	Planning grants: \$25,000 to \$100,000 Implementation grants: \$100,000 to \$500,000
Description	Funds directed toward planning and implementation of local and regional food intermediary supply chains. Requires a 25% match.

Farmers Market Promotion Program (USDA Agricultural Marketing Service)

Due Date	May 2024 (estimated)
Amount	Capacity building grants: \$50,000 to \$250,000 Community development training and technical assistance grants: \$100,000 to \$500,000
Description	Funds outreach, training, and technical assistance to farmers markets, roadside stands, CSA programs, agritourism activities, online sales, or other direct producer-to-consumer market opportunities.

The one-time USDA **Resilient Food System Infrastructure Program**, which will be administered in Washington by the State Department of Agriculture is also worth considering.

Resilient Food System Infrastructure Program (USDA via WSDOA)

Due Date	Open March 2024 (due date not released yet but it will be a short window)
Amount	\$100,000 to \$3,000,000
Description	Projects that build resilience across Washington state’s middle-of-the-food-supply-chain – aggregation, processing, manufacturing, storing, transporting, wholesaling, and distribution – for locally and regionally produced foods including specialty crops and grains for human consumption.

Mainstem Malt: Blend equity investments and debt finance to fund the equipment and facility

Milling and malting are low-margin, high-volume businesses that are capital intensive when built at a regional scale. Grants can give a boost to a specific function, such as sales or the one-time purchase of equipment, but rarely provide substantial capital for private businesses. Grants are most successful for private businesses as an accelerator rather than as foundational to the business model. Cooperatives may have a few additional funding options, but generally, the larger the required capital investment, the less impact grants are likely to have.

The funding strategy for the malthouse in the cluster is to raise as much private capital as possible and debt finance the rest. Mainstem Malt is familiar with **Steward**, for example, which packages equity, loans, and grants to finance projects. It will be easier to fund shared equipment and resources rather than business specific ones.

Important potential grant programs include the **Local Food Promotion Program** (see above), **Resilient Food System Infrastructure Program** (see above), and the **Farm and Food Business Builder Grants** (\$100,000 max) expected to be announced this winter that will be distributed through the new **Northwest and Rocky Mountain Regional Food Business Center**.⁴⁷

Paul Bowen at SBDC identified two loan programs as being the most likely to finance Mainstem Malt. The **7(a) International Trade loan program** provides guaranteed term loans to improve the competitive position of small businesses that are existing exporters or are developing new export markets. Funds can be used to acquire, construct, renovate, modernize, improve, or expand facilities and equipment to be used in the United States to produce goods or services involved in international trade and to develop and penetrate foreign markets, and for working capital for export transactions. The **Standard 7(a) Loan Program** provides loans greater than \$500,000, and excludes 7(a) Small, SBA Express, Export Express, CAPLines, Export Working Capital Program (EWCP), International Trade loans, and Pilot Program loans. Revolving lines of credit are permitted only under SBA Express, Export Express or CAPLines. These loans may be processed under Preferred Lender Program (PLP) delegated authority or non-delegated through the Loan Guaranty Processing Center (LGPC).

International Trade Loan (SBDC)

⁴⁷ <https://nwrockymountainregionalfoodbusiness.com/>

Due Date	Ongoing
Amount	Up to \$5 million Up to 90% SBA guarantee. Interest rate is negotiable.
Description	Funding to acquire, construct, renovate, modernize, improve, or expand facilities and equipment involved in international trade. SBA turnaround time is 5 to 10 business days. SBA or qualified lenders may be granted delegated authority to process, close, service, and liquidate the 7(a) loan without SBA review.

Standard 7(a) (SBDC)

Due Date	Ongoing
Amount	\$500,001 to \$5 million Up to 75% SBA guarantee. Interest rate is negotiable.
Description	Funding to acquire or improve real estate and buildings, purchase or install machinery and equipment, purchase fixtures and supplies, provide working capital, or a combination thereof. SBA turnaround time is 5 to 10 business days. SBA Form 1919 required. SBA or qualified lenders may be granted delegated authority to process, close, service, and liquidate the 7(a) loan without SBA review.

Other loan programs exist that could be options for Mainstem Malt, including **USDA** and **Washington Department of Commerce** programs.

Food Supply Chain Guaranteed Loan Program (USDA Rural Development)

Due Date	Ongoing
Amount	Up to \$40 million
Description	Eligible borrowers must be directly engaged in the middle of the food supply chain, specifically the aggregation, processing, manufacturing, storing, transporting, wholesaling, or distribution of food. Examples of qualifying entities include meat processors and food hubs.

Craft3 Fund (Washington Department of Commerce)

Due Date	Ongoing
Amount	\$250,000 to \$5 million
Description	Small business loan program. Non-profit community development financial institution partnered with SBCI. Interest rate ranges from 7 to 10.99%. Loan term of 3 to 7 years.

Artisan grain business cluster marketing plan

Overview

This marketing plan is for Port of Columbia, whose focus will be providing services and market access to artisan grain cluster tenants, leading to business and economic development in Columbia County. Mainstem Malt has already developed a producer base, customer base, and identified suitable target markets by product, which is summarized in Appendix B. Mainstem Malt has the experience and capability to expand its business-specific clientele.

The next step for Port of Columbia is to identify and recruit tenants committed to co-locating in the artisan grain cluster and producers seeking specific grain infrastructure services. With a marketing budget and dedicated staff with experience and success building and marketing Blue Mountain Station, Port of Columbia is responsible for and ready to implement the actions outlined in this marketing plan. Staff dedicated to implementing the artisan grain business cluster marketing plan include the Port of Columbia executive director and economic development coordinator as well as a marketing consultant.

The niche for Port of Columbia is to target value-added businesses focused on local (including Tri-Cities) and regional markets. Grain elevators in the Spokane area recently began planning to provide some of the services Port of Columbia is considering, including seed cleaning and separating. However, the Spokane-area elevators are planning to provide cleaning and separating services to large-scale growers who will continue primarily selling in large quantities to international commodity markets. These other elevators are planning to scale and market their new infrastructure and services to producers and groups of producers that can fill an entire large-capacity elevator bin. It is likely that more elevators in the region will provide these services but will not serve small-batch or accommodate farm-identified strategies. It does not make sense for the artisan grain development at Port of Columbia to directly compete with the large elevators for the large-scale producers. That is, Port of Columbia is unlikely to capture the large-scale commodity farmers who want to unload their crops into the same storage and marketing system they currently use. Therefore, **Port of Columbia's market niche for grain storage, seed cleaning, seed separation, and related services will be producers who want to retain farm identify, develop vertically integrated enterprises, and reach smaller-scale, higher-value markets than possible through the commodity system.**

Recent key informant conversations suggest that a mobile seed separator/cleaner currently costs ~\$150,000. However, mobile equipment is not a preferred solution as durability and efficiency problems

are expected from the start. A stationary set of equipment currently costs ~\$220,000 to install at a grain elevator, connected to an existing system. While these prices are specific to expected operations in the Palouse region, they give an indication of current costs and that multiple scales of equipment are available. Connecting the equipment to storage at Blue Mountain Station would be an ideal set up. The scale of the stationary equipment will likely be smaller than the mobile unit, if it is sized to onsite and on-farm storage capacity in the area. A survey of producers to get a better sense of producer demand and the volume needed for the equipment is the next step.

In the Palouse, the conservation districts and the National Association of Conservation Districts are expecting to cost share the equipment on a current project. Port of Columbia should connect with Columbia, Walla Walla, and Garfield conservation districts to see if they are interested in providing similar help. With a conservation district or other partner willing to cost share the equipment, the odds of receiving grant funding for the remaining balance are high. The conservation districts also will know the interests of many producers in the Walla Walla Valley and who are good prospects to use these services.

Marketing goals

Goal 1: Identify a minimum of 2-3 committed co-locators to develop the cluster beyond malting, including potentially bakeries, Asian-style noodles, pasta, gluten-free baked goods or noodles/pasta, and distilleries.

Goal 2: Identify producers or others who want to use shared equipment and services at the Blue Mountain Station grain cluster and their specific needs.

Marketing strategies, action elements, and timeline

The Port of Columbia economic development coordinator and marketing consultant will collaborate to implement the marketing plan with support from the executive director. Arrowleaf Consulting will support questionnaire, contact, and strategy development as requested on an ongoing basis.

Strategies and actions	2024 timeline (by quarter)			
	Q1	Q2	Q3	Q4
Develop an intake and interest questionnaire, which will be embedded into all digital marketing and outreach, to efficiently gather information, such as type and scale of business/products; infrastructure and equipment needs; volume and type of crop supply needed; services and timing/willingness to pay for services needed; any special conditions; distance willing to transport crops; target markets; interest in a cooperative; availability and interest in on-farm storage; interest in marketing services. In this early phase, consider if there should be a separate questionnaire for value-added business vs. grower audiences or a skip pattern directing participants to the appropriate version of the form as these audiences have some overlap.				

Develop website-based outreach for value-added business and grower audiences, including communicating how they can make their interest known.				
Develop social media-based outreach targeting value-added business and grower audiences. Start with native, free social media outreach and include paid advertising as needed.				
Launch social media and website-based outreach (ongoing until co-locators and service customers identified).				
Develop the existing contact list of artisan grain value-added businesses and growers and outreach directly via email and phone to alert them to the opportunity, recruit as appropriate, and activate outreach through their networks (ongoing until co-locators and service customers identified).				
Partner with conservation districts, farm cooperatives and other producer groups, Washington State University Extension, Cascadia Grains, Inland Northwest Artisan Grains, Local Inland Northwest Cooperative (LINC) Foods and LINC Malt, Pasco Specialty Kitchen, Walla Walla Valley Food System Coalition, BMAC and other food security organizations, and other organizations likely to know current and aspiring artisan grain entrepreneurs to reach prospective value-added businesses and producers through direct referrals of promising candidates as well as each organization’s newsletters, email lists, and social media.				
Follow up via in-person, phone, or video meetings with identified potential co-locators to further evaluate/vet fit, infrastructure and service needs, and determine next steps towards implementation.				

The messaging should be detailed and engaging to convey the opportunity to the prospective producer or business and get them to complete the questionnaire or contact the Port of Columbia staff. The messaging might also convey that the Port is uninterested in competing with existing local efforts but is intending to address a specific, complementary need and niche.

Outcomes timeline

Specific measures for outcomes are identified in the executive summary and in the economic analyses in Appendix D.

The timeline for achieving project outcomes is the following:

2024

- The marketing plan implementation will identify a minimum of 2-3 additional committed partners for the artisan grain cluster. They will be integrated into facilities planning and funding recruitment for the cluster as they are identified, their feasibility is assessed, and their facilities needs determined.

- The marketing plan implementation will identify a sufficient number of producers who will use services at Blue Mountain Station, such as storage and seed cleaning, to size the equipment and better define the feasibility of providing specific shared services.
- Port of Columbia and Mainstem Malt will implement their respective components of the funding plan.

2025

- Port of Columbia will
 - a. Build the basic infrastructure on the site to support development of the grain cluster.
 - b. Build the building shell for the malt house.
 - c. Plan and begin pre-/construction, as applicable, with co-locators identified through the 2024 marketing plan implementation.
- Mainstem Malt will install its equipment and prepare operations.
- Construction-related jobs and economic benefits will occur.

2026

- Mainstem Malt will begin operations.
- Jobs and economic benefits associated with Mainstem Malt will start.
- Producers will start using shared services, which will support their business development.
- Port of Columbia will continue planning, supporting, and site development tasks with identified co-locators.

2027

- Mainstem Malt will operate at full capacity.
- Producer services will operate at full capacity.
- Construction will begin to further develop the cluster for additional businesses and services.
- Jobs and benefits associated with Mainstem Malt and producer use of services will be fully realized.

APPENDIX A

Regional and Economic Profile and Analyses

PREPARED BY

Steve Peterson | Peterson & Associates

EXECUTIVE SUMMARY

Regional economy and supply chain

The regional economy consists of the seven counties in southeast Washington: Adams, Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman. Broadly speaking, it is an economy in transition with great diversity. The region is largely rural, punctuated with modest-size urban centers. The region has a strong agricultural base with agricultural processing. The City of Pasco in Richland County is part of the Tri-Cities (which includes Richland and Kennewick) and the historic Handford nuclear site. The City of Pullman in Whitman County is the home of Washington State University and Schweitzer Engineering Laboratories. Walla Walla County has a vibrant vineyards and wine producing region and tourism with an international reputation. It is also the home of Whitman College and Washington State Penitentiary. Walla Walla County an economy transitioning from historic production agriculture and agricultural processing to viticulture and related tourism and a service-based economy. Columbia County, one of the most rural in Washington State, has recently acquired substantial wind energy resources. It is struggling to diversify its very rural and small economy.

Population

The region is mostly rural, with most counties consisting of very small populations. Franklin County is the most populous, the home of the City of Pasco (i.e., Tri-Cities). Garfield County is the most rural. Franklin County grew 26.2% from 2010 to 2022 cumulatively, while Columbia County lost -1.3%. From 2010 to 2022, the regional population grew 13% while the U.S. population grew 7.7% cumulatively, Washington State (15.5%), and Idaho (23.4%). Approximately 76% of the population live in incorporated cities while 24% live in rural regions.

Garfield County had only 3.2 persons per square mile, ranking only 246/3,221 counties in terms of the least population density in the U.S. by county. Columbia County had 4.7 persons per square mile and ranked 365/3,221 counties. These two counties have very small populations, labor forces, and are very rural. Economic diversification from value-added agriculture products would help diversity the economies.

Median household income

The region's 2021 median household income is substantially below the U.S. median and the median for Washington State. The lowest medium income is Whitman County at 63% of Washington State's level, but it is an outlier because of the student population from Washington State University. Only Franklin County's median income is above the U.S. median income. The region lags substantially behind median income in Washington State.

Cost of living

The regional (supply chain) economy has above average cost of living. Every single county in the regional economy is above the national average (100). For example, the highest cost of living is Columbia County which is 21.9% higher than the national average.

Labor force and unemployment

In December 2023, Columbia County's labor force totaled 1,764. Of the total labor force, 91 people were unemployed, which is a 5.2% unemployment rate (Washington State Employment Security Department, 2023).

Poverty

The regional economy has greater overall poverty rates than Washington State or the U.S. For children under the age of 18, the region is also higher (on average) than Washington State and U.S. average. The highest was Asotin (21.2%), Adams (21.1%), and Columbia (20.2%).

Regional housing prices

Housing prices have followed national and state trends with rapidly increasing housing costs in the last 7 years. Overall, the region's housing prices have doubled in the last 7+ years, increasing by 97%, from a region average of \$163,702 to \$322,301. The average total compensation per job in the regional economy was \$47,423 in 2015 and had increased to \$64,682 by 2022, an increase of 36.4%. Wages have not kept up with inflation.

Agriculture

The broader region has a substantial production agricultural sector with both dryland agriculture (mostly wheat) and some irrigated agriculture in Walla Walla and Franklin counties. Rural production agricultural employment is declining over time (10,304 jobs in 2012 to 8,128 jobs in 2022), stressing some of the region's most rural economies (including Columbia County), mostly from productivity increases and farm consolidation. Animal (meat) production employment increased from 1,130 jobs (2012) to 1,600 jobs in 2022. Agricultural processing (manufacturing) increased from 5,059 jobs in 2012 to 6,031 jobs in 2022. There has been consolidation in agricultural processing with some plants closing and other operations expanding, creating winners and losers. The most rural regions have been the hardest hit and most affected. Overall, agricultural, forestry, and agricultural processing jobs increased from 19,874 jobs in 2012 to 20,590 jobs in 2022. Total cash receipts from marketing for production agriculture average about 2 billion dollars annually regionwide.

Market regional assessment

The market region is the states of Alaska, Idaho, Oregon, and Washington. Total population in the market region is 14.7 million in 2022 and an estimated 5.7 million households in 2021. The region has a diverse and substantial population base to support sustainable agricultural production and value-added products. The region has vast purchasing power totaling approximately \$719 billion in personal consumption spending in 2021. Food and beverage purchases for home consumption (i.e., off premises) was \$57 billion.

REGIONAL ECONOMY AND SUPPLY CHAIN

Overview

The regional economy includes the counties of Adams, Asotin, Columbia, Franklin, Garfield, Walla Walla, and Whitman situated in southeast Washington State (Figure 1 and Figure 2). The focus of the analysis will be on Columbia County, but the entire region will be explored.

FIGURE 1 | Regional Production and Supply Chain

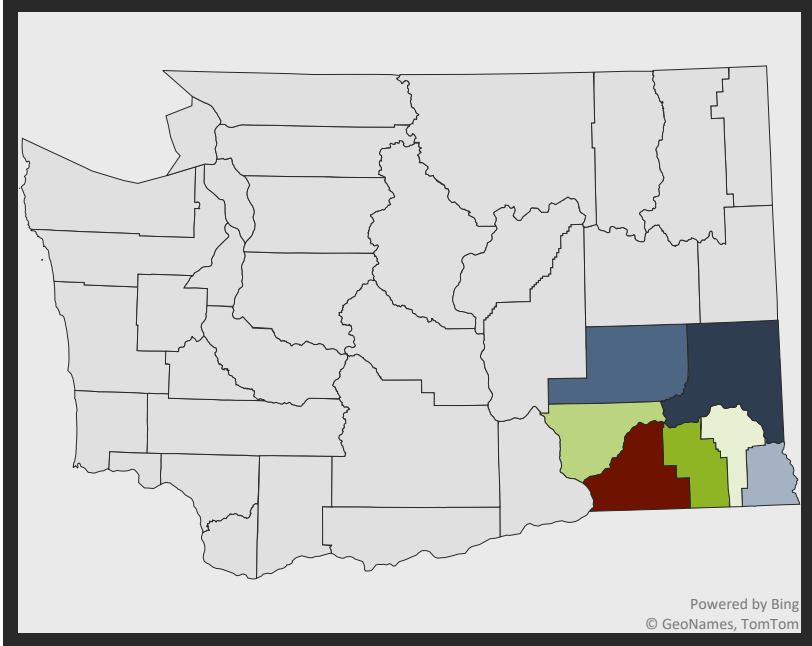
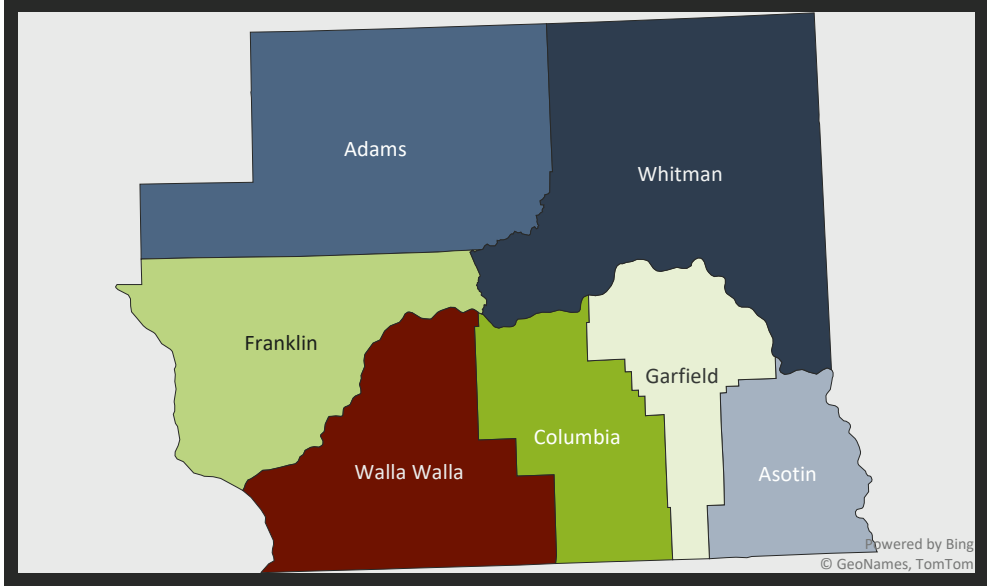


FIGURE 2 | County Population –Regional Economy



Population and rural/urban

The region is mostly rural, with most counties consisting of very small populations. Franklin County is the most populous, the home of the City of Pasco (i.e., Tri-Cities). Garfield County is the most rural. Franklin County grew 26.2% from 2010 to 2022 cumulatively, while Columbia County lost -1.3% (Table 1). From 2010 to 2022, the U.S. population grew 7.7% cumulatively, Washington State (15.5%), and Idaho (23.4%).

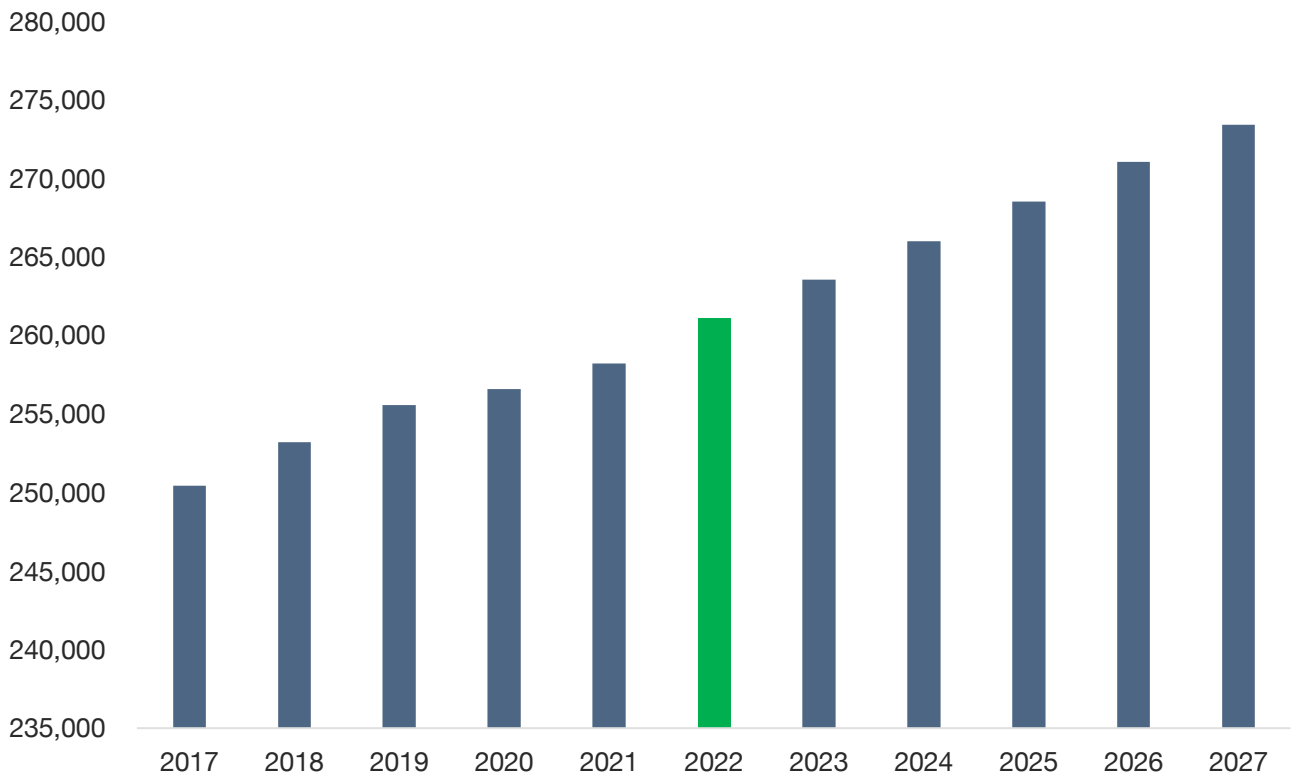
TABLE 1 | Population Change by County

County	2010	2022	% Change
Adams County	18,728	20,961	11.9%
Asotin County	21,623	22,508	4.1%
Columbia County	4,078	4,026	-1.3%
Franklin County	78,163	98,678	26.2%
Garfield County	2,266	2,363	4.3%
Walla Walla County	58,781	61,890	5.3%
Whitman County	44,776	47,619	6.3%
Region Total	228,415	258,045	13.0%

Source: U.S. Census

Figure 3 presents the 7-county population from 2017 to 2022, and a project to 2027 at 273,395, up 4.7% cumulatively from 2022. The chart indicates actual population trends from 2017 to 2022 with a population projection from 2023 to 2027.

FIGURE 3 | Regional Population Change and Projection 2017 to 2027



Source: Lightcast

The 2020-2022 population by city is presented in Table 2. Pasco, Franklin County is the largest regional city with a population of 80,180 followed by Pullman, Whitman County (32,790). The smallest cities are Hatton, Adams County with 80 people and Lamont, Whitman County also with 80 people.

TABLE 2 | 2020-2022 Population of Regional Cities

Region	2020	2021	2022
Adams	20,613	20,900	21,100
Unincorporated	9,472	9,575	9,575
Incorporated	11,141	11,325	11,525
Hatton	79	80	80
Lind	535	535	535
Othello	8,549	8,725	8,920
Ritzville	1,767	1,775	1,780
Washtucna	211	210	210
Asotin	22,285	22,500	22,600
Unincorporated	13,920	14,070	14,165
Incorporated	8,365	8,430	8,435
Asotin	1,204	1,215	1,220
Clarkston	7,161	7,215	7,215
Columbia	3,952	3,950	3,950
Unincorporated	1,385	1,380	1,385
Incorporated	2,567	2,570	2,565
Dayton	2,448	2,450	2,445
Starbuck	119	120	120
Franklin	96,749	98,350	99,750
Unincorporated	13,668	13,990	14,195
Incorporated	83,081	84,360	85,555
Connell	5,441	5,125	4,840
Kahlotus	147	145	145
Mesa	385	390	390
Pasco	77,108	78,700	80,180
Garfield	2,286	2,300	2,300
Unincorporated	897	905	905
Incorporated	1,389	1,395	1,395
Pomeroy	1,389	1,395	1,395

Region	2020	2021	2022
Walla Walla	62,584	62,100	62,625
Unincorporated	17,084	17,110	17,200
Incorporated	45,500	44,990	45,425
College Place	9,902	9,775	9,855
Prescott	372	370	370
Waitsburg	1,166	1,165	1,180
Walla Walla	34,060	33,680	34,020
Whitman	47,973	44,600	47,800
Unincorporated	5,929	5,880	5,920
Incorporated	42,044	38,720	41,880
Albion	550	545	545
Colfax	2,782	2,765	2,785
Colton	401	400	405
Endicott	312	310	310
Farmington	131	135	140
Garfield	562	565	565
LaCrosse	297	300	300
Lamont	79	80	80
Malden	216	110	135
Oakesdale	395	400	400
Palouse	1,015	1,020	1,035
Pullman	32,901	29,690	32,790
Rosalia	598	600	590
St. John	599	600	600
Tekoa	817	810	810
Uniontown	389	390	390

Source: [April 1 Population of Cities, Towns, and Counties \(wa.gov\)](http://April 1 Population of Cities, Towns, and Counties (wa.gov))

Approximately 76% of the regional population live in incorporated cities while 24% live in unincorporated rural regions. Interestingly, the region is mostly rural and situated in a rural setting while the majority of the population live in incorporated towns and cities.

TABLE 3 | Urban Versus Rural

Density	%
Incorporated	76%
Unincorporated	24%
Total	100%

Source: April 1 Population of Cities, Towns, and Counties (wa.gov)

Median household income

The region’s 2021 medium household income is substantially below the U.S. median and the median for Washington State. The lowest medium income is Whitman County at 63% of Washington State’s level, but it is an outlier because of the student population from Washington State University. Only Franklin County’s median income is above the U.S. median.

TABLE 4 | Median Household Income 2021 for Selected Regions

Region	Median Household Income (2021)	% of State Median Household Income
Washington	\$84,155	100%
U.S.	\$70,784	84%
Adams County	\$57,405	68%
Asotin County	\$56,438	67%
Columbia County	\$59,650	71%
Franklin County	\$79,532	95%
Garfield County	\$61,268	73%
Walla Walla County	\$63,631	76%
Whitman County	\$53,140	63%
Yakima County	\$60,058	71%

Source: Median HH Income and Unemployment (usda.gov)

Poverty rates

The regional economy has greater overall poverty rates than Washington State or the U.S. For children under the age of 18, the region is also higher (on average) than Washington State and U.S. average. The highest was Asotin (21.2%), Adams (21.1%), and Columbia (20.2%).

TABLE 5 | 2021 Poverty Rates by Region

Region	Overall	Under 18 Years
Washington	9.9	12
U.S.	11.6	15.3
Adams	16	21.1
Asotin	13.9	21.2
Columbia	13.2	20.4
Franklin	11.8	14.7
Garfield	13.2	18.1
Walla Walla	12.1	14.8
Whitman	18.1	12.6

Sources: Poverty (usda.gov), Poverty in the United States: 2021 (census.gov)

Educational attainment

The regional economy lags Washington State and the U.S. in terms of educational attainment. The regional economy has a high percentage of people who have less than a 9th grade education (8.8%). Approximately 15.4% of the population has a bachelor's degree which lags Washington State (23.2%) and the U.S. (20.8%) (Table 6).

TABLE 6 | Educational Attainment for Selected Regions

Education Attainment	Regional Economy	Columbia County	Washington State	United States
Less Than 9th Grade	8.8%	3.9%	3.5%	4.7%
9th Grade to 12th Grade	7.6%	6.8%	4.6%	6.2%
High School Diploma	23.1%	19.1%	21.7%	26.3%
Some College	23.3%	32.4%	22.3%	19.8%
Associate's Degree	10.8%	11.6%	10.2%	8.8%
Bachelor's Degree	15.4%	14.9%	23.2%	20.8%
Graduate Degree and Higher	11.1%	11.3%	14.4%	13.3%

Source: Lightcast

Unemployment

Table 7 presents the distribution of unemployment by age *as a percentage of the total unemployment*. (Note: This is not the overall unemployment rate. For example, in the regional economy, the percentage of unemployed below the age of 22 is 2.62% versus 2.10% for Washington State. Overall, the age distribution of the unemployed is about the same as Washington State. The age group with the largest percentage of unemployed workers is ages 35-44 which was 23.35% for the U.S. as compared to 25.43% for Columbia County.

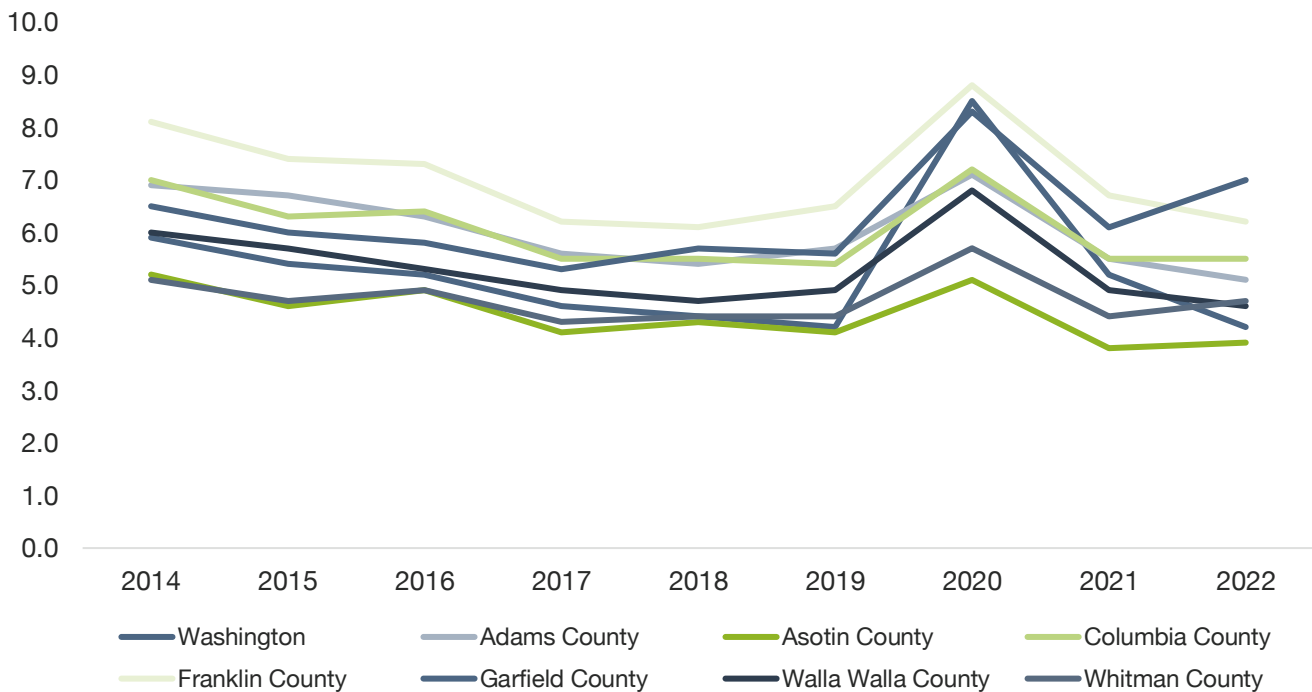
TABLE 7 | Unemployment by Age as a Share of Total Unemployment

Age	Regional Economy	Columbia County	Washington State	United States
18- 21	2.62%	1.31%	2.10%	2.21%
22-24	4.65%	4.28%	4.17%	4.59%
25-34	22.09%	18.13%	22.93%	24.03%
35-44	23.49%	25.43%	24.58%	23.35%
45-54	20.95%	20.11%	21.63%	20.40%
55-59	10.62%	12.15%	10.51%	10.10%
60-64	8.86%	10.14%	8.77%	8.51%
65+	6.71%	8.44%	5.32%	6.80%
Total	100.00%	100.00%	100.00%	100.00%

Source: Lightcast

The average regional unemployment rate (equally weighted) ranged from about 6.4% in 2014 to 7.0% in 2020 to 5.3% in 2021. There was the COVID-19 spike in 2020.

FIGURE 4 | Unemployment Rate for Selected Regions 2014 to 2022



Source: Unemployment (usda.gov)

In April 2023 the unemployment rate by county and region is presented in Table 8. Unemployment rates nationally have fallen to relatively low levels over the last year despite the Federal Reserve System’s raising the interest rates to fight inflation ([Federal Funds Rate History 1990 to 2023 – Forbes Advisor](#)). Historically, the regional unemployment has averaged above the U.S. and Washington State levels.

TABLE 8 | Unemployment Rate for Selected Regions April 2023

Region	U Rate
U.S.	3.4
Washington	4.3
Adams County	4.1
Asotin County	3.0
Columbia County	4.1
Franklin County	5.3
Garfield County	4.7
Walla Walla County	3.5
Whitman County	3.6

Local Area Unemployment Statistics : U.S. Bureau of Labor Statistics (bls.gov)

Cost of living

The regional (supply chain) economy has above average cost of living as seen in Table 9. Every single county in the regional economy is above the national average (100). The highest cost of living is Columbia County, which is 21.9% higher than the national average and 4.4 percentage points higher than the seven-county southeast Washington region as a whole.

TABLE 9 | Cost of Living Index for Selected Regions 2022

Production-Supply Chain Region	Index
Columbia County, WA	121.9
Garfield County, WA	118.4
SE WA Counties	117.5
Asotin County, WA	117.0
Adams County, WA	115.3
Walla Walla County, WA	115.3
Whitman County, WA	112.5
Franklin County, WA	109.7
Market Region	Index
Alaska	131.8
Idaho	99.6
Oregon	119.1
Washington	114.9

Source: Lightcast

We believe the high cost of living in the defined service area is primarily a result of high transportation costs, the small number of vendors for most products, and supply chain constraints. These include gas expenses that are higher in rural areas, and Misc. Good and Services, which include everything from restaurant and retail expenses to veterinary services. Again, these prices tend to reflect high transportation

costs embedded in the retail price, and veterinary services for livestock are more expensive in rural areas than pet care in more urban areas.

The primary source reporting prices and inflation in the U.S. comes from the Bureau of Labor Statistics (BLS), which produces the Consumer Price Index (CPI) ([Consumer Price Index \(CPI\) Databases : U.S. Bureau of Labor Statistics \(bls.gov\)](#)). This index focuses on the broader urban regions and does not address the unique issues confronting rural residents. These include high transportation costs, small number of vendors for most products, lack of many available services, and supply chain constraints. This data gap is filled by several private firms. The cost-of-living data in this analysis was provided by Lightcast and the data originates from the *Council for Community and Economic Research (C2ER)*, which has produced localized cost of living indexes (COLI) since 1968 ([Home - C2ER: The Council for Community and Economic Research](#)). Their index is based on a market basket of goods and services, see the “Weights of the C2ER index” table below. The local and regional data is provided by volunteers. The C2ER COLI remains one of the most robust localized price indexes available.

Weights of the C2ER index:

Groceries	13%
Housing	28%
Utilities	10%
Transportation	11%
Health Care	4%
Misc. Goods & Services	33%
<hr/> Total	<hr/> 100%

Cost of living estimates are complicated. Columbia County has low housing costs (subject to availability) and low congestion costs. Other products and services have higher costs, however, that are reflected in the C2ER index. Washington State cost of living indexes (in general) also tend to be above the national average.

Housing prices

Regional housing prices have followed national and state trends with rapidly increasing housing costs in the last 7 years. However, the initial base price was less than most urban regions such as King County. Table 10 presents the median housing prices (Realtors) and the typical housing price (Zillow) along with the percentage change in Zillow prices from 2/15 to 5/23. Overall, the region’s housing prices have doubled in the last 7+ years, increasing by 97%, from a region average of \$163,702 to \$322,301. The average total compensation per job in the regional economy was \$47,423 in 2015 and had increased to \$64,682 by 2022, an increase of 36.4%. Wages have not kept up with inflation.=

TABLE 10 | Housing Prices for Selected Regions

County Name	Realtors 2022 Q3	Zillow 2/15	Zillow 5/23	Zillow % Change
Adams County	\$207,300	\$143,833	\$295,067	105%
Asotin County	\$278,660	\$159,009	\$291,047	83%
Columbia County*	\$245,050	\$177,581	\$272,854	54%
Franklin County	\$376,330	\$182,925	\$402,577	120%
Garfield County	\$193,810	\$109,345	\$213,277	95%
Walla Walla County	\$328,110	\$195,287	\$403,077	106%
Whitman County	\$290,010	\$177,931	\$378,211	113%
King County	\$851,460	\$408,496	\$812,044	99%
Region Average	\$274,181	\$163,702	\$322,301	97%

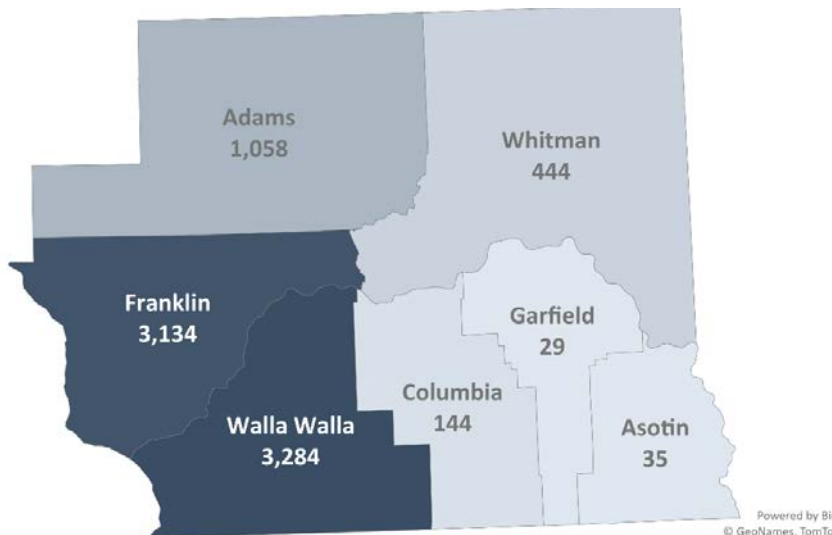
Sources: <https://www.zillow.com/>
 County Median Home Prices and Monthly Mortgage Payment (nar.realtor)
 Beginning Zillow 2/1/16

Agriculture-related employment

Crop production (plant)

There were 10,304 workers in plant production agriculture in 2017 and 8,128 workers in 2022, a decline of 21% (Figure 5 and Table 11). Walla Walla County had the most plant production workers at 3,284 workers and Asotin County had the fewest at 35 workers. There were about 824 pay-rolled locations (mostly farms) and the average total compensation (salary and benefits) was \$49,065.

FIGURE 5 | Crop Production Agricultural Workers



Source: Lightcast

FIGURE 11 | 2022 Crop Production Agriculture Workers

County Name	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	2022 Payrolled Business Locations	Avg. Earnings Per Job
Franklin	4,919	3,134	(1,785)	(36%)	219	\$50,550
Walla Walla	3,752	3,284	(468)	(12%)	157	\$45,815
Adams	905	1,058	153	17%	155	\$56,921
Whitman	469	444	(25)	(5%)	207	\$44,963
Columbia	145	144	(1)	(1%)	38	\$50,322
Garfield	58	29	(30)	(51%)	23	\$41,837
Asotin	55	35	(20)	(37%)	25	\$36,260
Total	10,304	8,128	(2,176)	(21%)	824	\$49,065

Source: Lightcast

Livestock production (animal)

There were 1,124 workers in livestock production agriculture in 2017 and 1,600 workers in 2022, an increase of 42% (Table 12). Adams County had the most workers at 484 workers and Columbia County had the fewest at 13 workers. There were about 93 pay-rolled locations (mostly ranches) and the average total compensation (salary and benefits) was \$55,094. Only Whitman County and Asotin County lost jobs from 2017 to 2022, at -18% and -24% respectively.

TABLE 12 | 2022 Animal Production Agriculture Workers

County Name	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	2022 Payrolled Business Locations	Avg. Earnings Per Job
Franklin	702	881	179	26%	33	\$49,678
Adams	244	484	240	98%	21	\$58,185
Walla Walla	100	139	40	40%	11	\$55,324
Whitman	60	49	(11)	(18%)	14	\$43,800
Asotin	19	14	(4)	(24%)	7	\$36,203
Columbia	<10	13	NA	NA	4	\$45,368
Garfield	<10	20	NA	NA	2	NA
Total	1,124	1,600	476	42%	93	\$55,094

Source: Lightcast

Food processing manufacturing

There were 5,059 workers in food processing manufacturing in 2017 and 6,031 workers in 2022, an increase of 19% (Table 13). Franklin County had the most workers at 3,032 workers and Garfield County had the fewest at no workers. There were about 514 pay-rolled locations and the average total compensation (salary and benefits) \$69,685.

TABLE 13 | 2022 Food Manufacturing Jobs

County Name	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	2022 Payrolled Business Locations	Avg. Earnings Per Job
Franklin	2,546	3,032	486	19%	23	\$67,997
Walla Walla	1,485	1,721	236	16%	9	\$71,206
Adams	980	1,093	113	12%	11	\$73,337
Columbia	35	52	17	47%	1	\$70,751
Whitman	12	92	80	652%	3	\$73,684
Asotin	<10	40	NA	NA	4	\$22,030
Garfield	0	0	0	0%	0	\$0
Total	5,059	6,031	972	19%	51	\$69,685

Source: Lightcast

Total regional employment for food production and food processing is 19,874 workers in 2017 and 20,590 workers in 2022, an increase of 270 workers or 1.4%. The contribution to gross regional product is \$2.27 billion in 2022.

TABLE 14 | Regional Economy Agriculture Production and Food Processing Employment and Wage Data

Industry	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	Avg. Earnings Per Job	Firms	2022 GRP
Crop Production	10,304	8,128	(2,176)	(21%)	\$49,065	824	\$971,084,196
Animal Production	1,130	1,600	470	42%	\$55,094	93	\$166,560,527
Forest Nurseries / Forest Prod.	17	0	(17)	(100%)	\$0	0	\$176,678
Logging	34	5	NA	NA	NA	4	\$3,139,766
Soil Preparation, Planting	81	150	69	85%	\$66,694	35	\$15,332,060
Crop Harvesting	28	154	127	459%	\$83,694	11	\$13,517,839
Postharvest Crop Activities	905	709	(196)	(22%)	\$56,563	20	\$42,674,829
Farm Labor Contractors	1,879	2,732	853	45%	\$38,241	41	\$107,318,216
Farm Management Services	<10	180	NA	NA	\$50,087	3	\$9,382,501
Support Activities for Forestry	23	45	21	91%	\$64,084	4	\$3,146,598
Other Animal Food Manu.	88	217	129	148%	\$84,246	5	\$47,744,050
Flour Milling	0	27	27	NA	\$24,397	1	\$2,339,136
Confectionery Manu./Chocolate	19	118	99	528%	\$47,437	1	\$11,441,546
Frozen Fruit, Juice, Veg. Manu.	2,582	3,392	811	31%	\$66,971	8	\$428,208,780
Frozen Specialty Food Manu.	671	314	(357)	(53%)	\$109,179	2	\$65,056,938
Fruit and Vegetable Canning	216	345	129	60%	\$72,135	4	\$45,588,997
Dried Food Manufacturing	39	282	243	615%	\$69,041	1	\$35,139,868
Animal (except Poultry) Slaug.	1,327	647	(680)	(51%)	\$72,700	6	\$87,431,960
Retail Bakeries	21	135	114	540%	\$27,862	16	\$4,806,184
Roasted Nuts/P. Butter Manu.	0	241	241	NA	\$68,886	1	\$53,368,952
Coffee and Tea Manufacturing	5	301	NA	NA	\$72,995	2	\$61,244,811
Breweries	18	41	23	127%	\$32,888	10	\$9,708,886
Wineries	488	828	339	69%	\$55,088	85	\$88,462,969
Total	19,874	20,590	270	1.4%	NA	1,176	\$2,272,876,286

Source: Lightcast

TABLE 15 | Regional Economy Employment, Wage, and GRP

Industry	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	2022 GRP
Agriculture, Forestry	14,413	13,704	(709)	(5%)	\$1,340,236,543
Mining,	48	135	86	179%	\$23,108,093
Utilities	301	452	151	50%	\$363,446,774
Construction	3,958	6,432	2,475	63%	\$557,391,526
Manufacturing	10,476	13,039	2,563	24%	\$1,887,990,718
Wholesale Trade	3,639	4,061	422	12%	\$1,460,395,369
Retail Trade	8,615	9,820	1,205	14%	\$942,940,681
Transportation/Ware.	2,451	3,305	854	35%	\$410,095,198
Information	687	540	(147)	(21%)	\$168,535,198
Finance and Insurance	1,538	1,496	(42)	(3%)	\$401,724,935
Real Estate a	752	1,004	252	33%	\$374,187,816
Professional, Scientific Serv.	1,540	2,090	550	36%	\$268,106,007
Management of Companies	38	103	65	172%	\$16,915,930
Waste Management	1,746	1,999	253	14%	\$134,275,724
Educational Services	3,411	2,885	(526)	(15%)	\$140,618,758
Health Care and Social Assis.	9,844	12,242	2,398	24%	\$955,835,944
Arts, Entertainment, and Rec.	890	1,123	234	26%	\$88,744,415
Accommodation/Food Services	5,988	7,613	1,625	27%	\$410,774,935
Other Services	4,971	2,912	(2,059)	(41%)	\$167,364,268
Government	25,229	26,097	868	3%	\$2,451,219,798
Total	100,536	111,052	10,517	10%	\$12,563,908,631

Source: Lightcast

TABLE 16 | Regional Economy Employment, Wage, and GRP

Industry	2022 Jobs	Avg Salary/Benefits Per Job	Percent Jobs
Agriculture, Forestry	13,704	\$48,650	12.3%
Mining,	135	\$47,617	0.1%
Utilities	452	\$174,614	0.4%
Construction	6,432	\$66,836	5.8%
Manufacturing	13,039	\$82,393	11.7%
Wholesale Trade	4,061	\$81,875	3.7%
Retail Trade	9,820	\$47,311	8.8%
Transportation and Warehousing	3,305	\$69,653	3.0%
Information	540	\$74,256	0.5%
Finance and Insurance	1,496	\$87,621	1.3%
Real Estate a	1,004	\$48,675	0.9%
Professional, Scientific Services	2,090	\$73,628	1.9%
Management of Companies	103	\$112,860	0.1%
Waste Management	1,999	\$47,065	1.8%
Educational Services	2,885	\$38,297	2.6%
Health Care and Social Assistance	12,242	\$63,707	11.0%
Arts, Entertainment, and Rec.	1,123	\$37,362	1.0%
Accommodation/Food Services	7,613	\$28,133	6.9%
Other Services	2,912	\$31,656	2.6%
Government	26,097	\$83,578	23.5%
Total	111,052	\$64,682	100.0%

Source: Lightcast

OVERVIEW OF COLUMBIA COUNTY

Columbia County has approximately 868.63 square miles of land which has a 2020 population density of 4.6 persons per square mile. In terms of size, Columbia County is one of the smallest counties, ranking 31/39th in the state. In terms of total population, Columbia County is ranked 38/39th counties, with an estimated 2022 population of 4,026. Only Garfield County to the east has fewer people in Washington State. The county is in southeastern Washington and borders the Oregon state to the south, Whitman County is north, Walla Walla County west. and Garfield County east. It is also situated near the Idaho State border. The county borders on the Snake River in the north. The largest city and county seat is Dayton, with a 2022 estimated population of 2,445. The second largest city is Starbuck with 120 people. The unincorporated regions had 1,385 in 2022 (Source: The 2021 Port of Columbia Economic Influence on the Regional Economy. [Home Page | Port of Columbia County, Oregon](#))

TABLE 17 | Columbia County Employment, and Wages

Industry	2012 Jobs	2022 Jobs	2012 - 2022 Change	2012 - 2022 % Change	Avg Salary/Benefits Per Job
Agriculture, Forestry	171	163	(7)	(4%)	\$49,885
Mining,	5	0	NA	NA	NA
Utilities	27	159	132	491%	\$208,317
Construction	49	142	93	191%	\$92,160
Manufacturing	71	93	22	31%	\$72,517
Wholesale Trade	26	32	5	20%	\$77,488
Retail Trade	94	99	5	5%	\$34,173
Transportation and Warehousing	17	25	9	53%	\$80,984
Information	5	5	NA	NA	NA
Finance and Insurance	29	24	(5)	(17%)	\$95,633
Real Estate	5	5	NA	NA	NA
Professional, Scientific Services	20	33	13	65%	\$29,400
Management of Companies	15	5	NA	NA	NA
Waste Management	5	5	NA	NA	NA
Educational Services	5	5	NA	NA	NA
Health Care and Social Assis.	42	82	40	96%	\$37,807
Arts, Entertainment, and Rec.	35	94	59	170%	\$14,770
Accommodation/Food Services	87	109	22	25%	\$22,704
Other Services	178	70	(107)	(60%)	\$22,127
Government	474	580	106	22%	\$78,990
Total	1,359	1,732	373	27%	\$73,713

Source: Lightcast

Agriculture overview and production

There are 3,988 farms in the regional economy, according to the 2017 Census of Agriculture. Whitman County has the largest number of farms at 1,039 and Asotin County has the smallest number of farms 205. The total number of farm acres is 4.36 million. Whitman County has the largest number of acres in the region at 1.29 million. Most of the agriculture sales are crops ranging from 93% in Whitman County to 58% in Asotin County (Table 18). The farming is a mix of dry land agriculture (such as Whitman County) and substantial irrigated agriculture (such as Walla Walla and Franklin Counties).

TABLE 18 | Farm Characteristics Regional Economy

Metric	Adams	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman	Total
Number of Farms	586	205	257	772	226	903	1,039	3,988
Land in Farm Acres	972,095	250,865	243,351	615,274	289,848	702,537	1,287,978	4,361,948
Average Size Farm	1,659	1,224	947	797	1,283	778	1,240	NA
Share of Sales (%)								
Crops	71	58	86	74	86	NA	93	NA
Livestock etc.	29	42	14	29	14	NA	7	NA

Source: USDA/NASS Census of Agriculture Chapter 2, Table 1

There is a total of 1.240 million acres in wheat harvested, 152,056 acres in chickpeas, and 99,694 acres in vegetables for the largest crop production totals. There is also 48,180 acres in barley for grain (Table 19). Table 19 presents the harvested acres for the major crops in the regional economy.

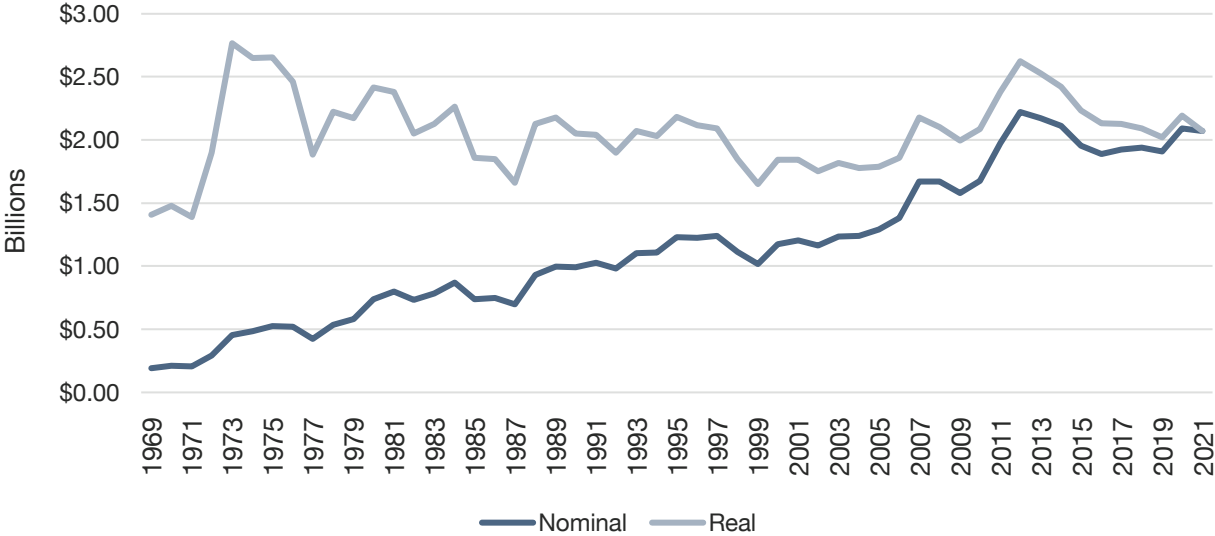
TABLE 19 | Crop Acres Harvested by County

Crop	Adams	Asotin	Columbia	Franklin	Garfield	Walla Walla	Whitman	Total
Wheat for grain, all	273,973	26,054	68,922	62,999	95,921	188,653	524,203	1,240,725
Vegetables	28,478	6	NA	50,754	NA	20,456	NA	99,694
Potatoes	21,780	NA	NA	29,983	NA	NA	NA	51,763
Forage hay/haylage)	21,676	4,764	3,345	80,988	1,960	16,563	20,214	149,510
Field/grass seed	9,803	NA	NA	NA	NA	NA	NA	9,803
Chickpeas	8	1000	1,923	NA	3,053	9,756	136,316	152,056
Canola	4,484	540	NA	NA	2,473	3,500	7,099	18,096
Dry edible peas	3,400	NA	12,684	3,033	NA	13,016	15,501	47,634
Barley for grain	NA	NA	1,855	421	3,578	683	41,643	48,180
Corn for grain	4,724	NA	NA	15,422	NA	6,064	695	26,905
Apples	NA	NA	NA	NA	NA	11,658	NA	11,658
Lentils	NA	NA	NA	NA	NA	NA	28,385	28,385
Total	368,326	32,364	88,729	243,600	106,985	270,349	774,056	1,884,409

Source: USDA/NASS Census of Agriculture Chapter 2, Table 25

Figure 6 presents the cash receipts from marketings both in nominal terms and in real terms in constant 2021 dollars (adjusted for inflation). The total receipts average about 2 billion dollars annually. Crop receipts and related revenues are quite volatile year-to-year but in real terms have remained relatively constant and stable. This suggests that production agriculture is not a growth industry relative to the overall economy. Value-added products are likely the only way agricultural products can expand into new markets.

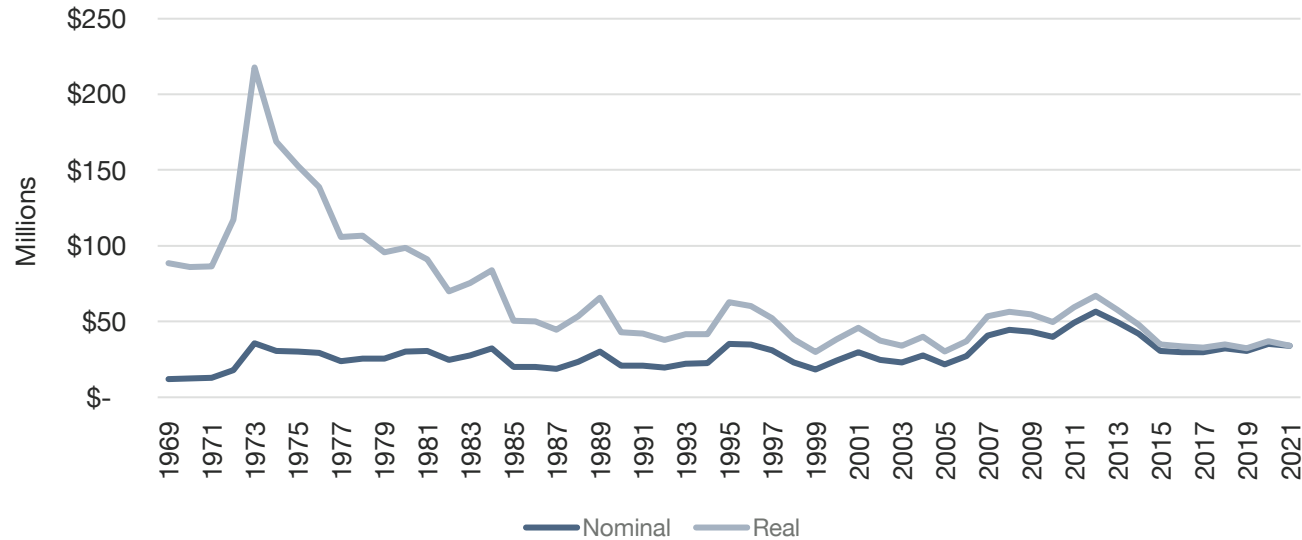
FIGURE 6 | Cash Receipts from Marketings 1969-2021 in Nominal and Real 2021 Dollars Regional Economy



Source: BEA Interactive Data Application

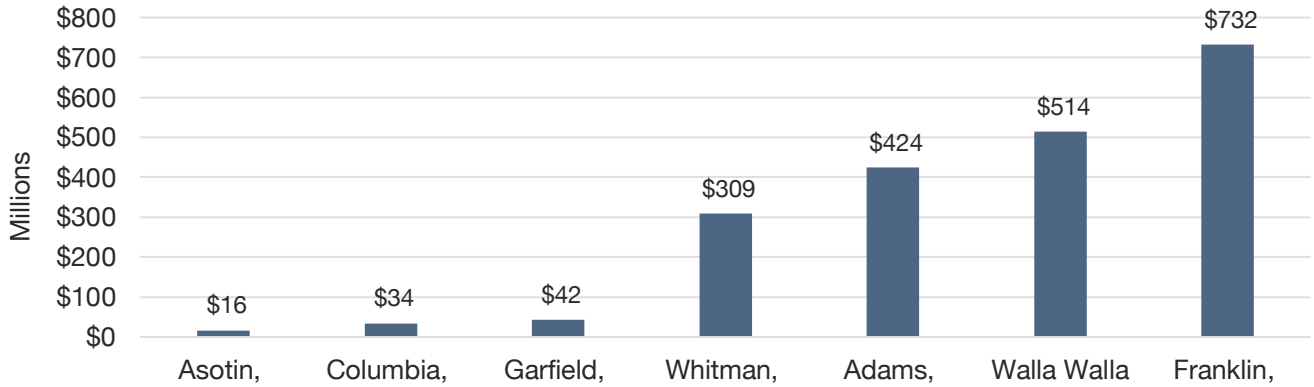
Columbia County averages about \$50 million in agricultural receipts per year, adjusted for inflation. Revenues peaked in the mid-1970s due to high overall wheat and crop prices (Figure 7).

FIGURE 7 | Cash Receipts from Marketings 1969-2021 in Nominal and Real 2021 Dollars Columbia County



Franklin County has the highest level of receipts in 2021 at \$732 million, followed by Walla Walla County (\$514 million), Adams County (\$424 million), and Whitman County (\$309 million).

FIGURE 8 | Cash Receipts from Marketings 2021 by County

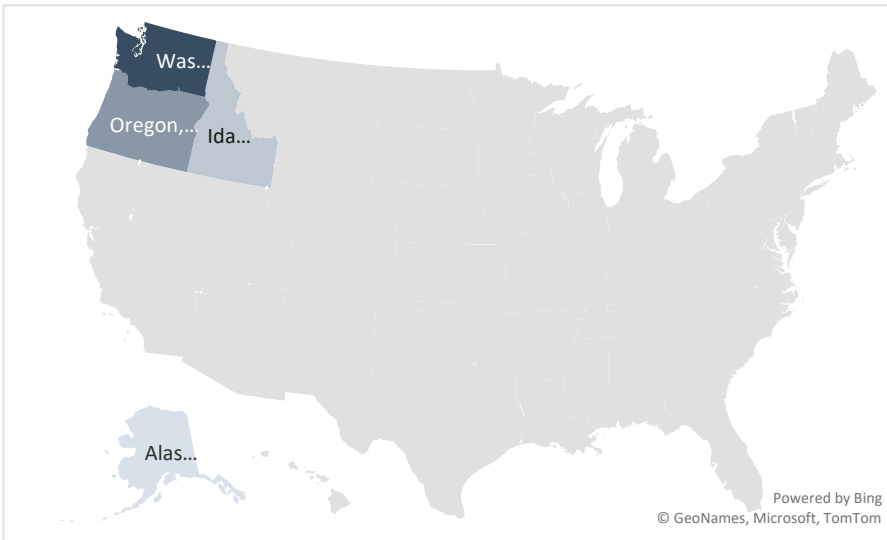


Source: BEA Interactive Data Application

MARKET REGIONAL ASSESSMENT

The market region is the states of Alaska, Idaho, Oregon, and Washington (Figure 9).

FIGURE 9 | Market Region



Total population in the market region is 14.7 million in 2022 and an estimated 5.7 million households in 2021 (Table 20). The region has a diverse and substantial population base to support sustainable agricultural production and value-added products.

TABLE 20 | 2022 Population and households (2021) by state

State	Population	Households
Alaska	733,583	271,310
Idaho	1,939,033	693,880
Oregon	4,240,137	1,702,600
Washington	7,785,786	3,022,260
Total	14,698,539	5,690,050

Source: U.S. Census and Statista (Number of U.S. households, by state 2021 | Statista)

The region has vast purchasing power totaling approximately \$719 billion in personal consumption spending in 2021. Food and beverage purchases for home consumption (i.e., off premises) was \$57 billion (Table 21).

TABLE 21 | 2021 Personal Consumption Expenditures by State 2021 (\$ Millions)

Consumer Purchase Category	Alaska	Idaho	Oregon	Washington	Total
Personal consumption expenditures	\$39,807	\$75,541	\$202,877	\$400,487	\$718,712
Goods	\$12,154	\$28,749	\$72,075	\$129,780	\$242,758
Durable goods	\$5,399	\$12,380	\$29,774	\$54,275	\$101,828
Motor vehicles and parts	\$1,677	\$4,029	\$8,916	\$14,846	\$29,469
Furnishings	\$1,168	\$2,562	\$7,208	\$11,663	\$22,601
Recreational goods and vehicles	\$2,016	\$4,543	\$10,437	\$22,106	\$39,102
Other durable goods	\$538	\$1,246	\$3,212	\$5,660	\$10,656
Nondurable goods	\$6,755	\$16,369	\$42,301	\$75,505	\$140,930
Food and beverages off-premises	\$3,018	\$6,266	\$17,427	\$30,287	\$56,999
Clothing and footwear	\$728	\$1,896	\$6,318	\$9,772	\$18,715
Gasoline and other energy goods	\$645	\$2,648	\$4,372	\$7,285	\$14,949
Other nondurable goods	\$2,364	\$5,559	\$14,184	\$28,160	\$50,267
Services	\$27,653	\$46,792	\$130,802	\$270,707	\$475,954
Household consumption services	\$25,690	\$45,829	\$122,694	\$257,860	\$452,072
Housing and utilities	\$6,372	\$13,513	\$37,894	\$76,846	\$134,625
Health care	\$8,406	\$12,764	\$33,783	\$62,882	\$117,836
Transportation services	\$1,349	\$2,032	\$5,608	\$14,399	\$23,388
Recreation services	\$1,662	\$1,930	\$6,115	\$16,572	\$26,279
Food services and accommodations	\$2,670	\$5,181	\$13,029	\$23,543	\$44,423
Financial services and insurance	\$2,600	\$5,837	\$13,227	\$29,690	\$51,354
Other services	\$2,631	\$4,572	\$13,037	\$33,928	\$54,168
Final consumption nonprofits	\$1,963	\$963	\$8,108	\$12,847	\$23,882
Gross output of nonprofits	\$5,346	\$6,903	\$24,685	\$44,543	\$81,477
Less: Receipts from nonprofits	\$3,383	\$5,940	\$16,577	\$31,695	\$57,595

Source: BEA Interactive Data Application

APPENDIX B

Feasibility Study for a Malting Facility in Dayton, Washington

FINAL REPORT • JULY 16, 2023

PREPARED BY

Dennis R. Mitchell, Ph.D.

Rob Liedl

EXECUTIVE SUMMARY

The Port of Columbia seeks the development of a micro malt facility in Dayton, Washington. A recent feasibility study indicated a strong and growing demand for craft malts to compliment the Northwest's world famous craft beer and distilled spirits. The facility when in operation would provide: a market for locally grown barley and other grains, local jobs, and utilize locally produced energy.

Malting is the controlled germination of grain seeds to produce enzymes that can break down starches into sugars. Once the enzymes have been produced, the germination process is stopped by drying the grain at relatively low temperatures (around 120°F) in order to avoid degradation of the enzymes. The major purpose of malt used in breweries and distilleries is to convert starch into fermentable sugars. Brewers also use specialty malts that are dried at higher temperatures to add flavor and color to their beer.

There are three major markets for malt: the brewing industry, the distilled spirits industry and the food/baking industry. The beer industry constitutes approximately 85% of the malt market and distilleries consume about 15% of the malt. The amount of malt consumed by the food/baking industry is undefined and assumed to be small.

The markets we propose to focus on is the craft beer segment of the beer industry and craft distilled spirits of the distilled spirits industry. In Washington, Oregon, Montana, Idaho and Alaska (as of 2022) there were 1,021 breweries with an estimated craft beer annual production of at least 1.9 million barrels. It is estimated that this equates to at least a 70,000 ton/year market for malt. The craft beer breweries are generally small and locally owned and therefore amenable to buying their malt from small craft malt houses. The craft beer segment of the beer market has steadily grown over the past 15 years. A craft malt house can fill this growing market niche.

The various niche markets for malt include:

- Specialty Malts
- Organic and Eco-Certified Malts
- Non-Barley Malts
- Locally Grown – Locally Malted

The craft distillery market is also growing. The Alcohol and Tobacco and Trade Bureau (TTB) has proposed to give American Single Malt Whiskey its own legal standard of identity. One of the criteria for this label is that it is "Sourced from a fermented mash of 100% malted barley". If this proposal is adopted it will increase demand by craft distilleries for malt with a story (the Locally Grown – Locally Malted niche market).

Several sizes of malt houses were examined, and we have concluded that a medium sized malt house with a production of 1,000 – 4,000 tons of malt per year would be an optimum size to start with⁴⁸. This size malt house could supply a single large brewery (over 15,000 barrels/year production) or about 10 medium sized breweries or over 100 small breweries.

The focus of the malt house should be on producing Base Malts sold at a defensible premium (are likely to make up most of the volume), with premium specialty malts representing a higher margin opportunity that

⁴⁸ With the ability to expand up to 5x initial capacity.

should be pursued. In particular the emphasis should be on Malts with a “story” and emphasis on locally grown (identity preserved, traceable back to the farm that grew the grain) locally malted niche market.

We decided that Buhler’s fully engineered RimoMalt 32 system with a 32 metric ton (35.2 US ton) batch size would be ideal with an annual production capacity of 1760 tons. For a cost comparison, we designed a similar system with the same batch size. Both systems utilize the same grain cleaning and handling prior to the malting process and the same malt cleaning and handling post process.

The costs of the entire 1760 ton per year facility based on the RimoMalt 32 are estimated to be \$6.3 million and the similar facility of our own design is estimated to be \$4.6 million. Operating at 90% capacity the malt house can generate an EBITDA of 38% on sales of \$2.1 million per year.

The Port of Columbia already has a partner, Mainstem Malt, ready to accept the responsibility for operating the malt house. Mainstem Malt already has a customer base in both the Craft Beer and Craft Distilled Spirits market sectors with annual sales of 500 tons per year and this is about one third of the production capacity of the proposed facility.

THE MARKET FOR MALT

Of all the malt produced in the United States (in 2012) 85% of it was sold to brewers and about 15% was sold to distillers. A small portion must be sold to the baked goods industry as malt appears on many ingredient lists. About 5% of the malt is used to make malt extract products (dry, crystal, liquid). However, most of the malt extracts are used in beer production.

Beer

The brewing industry is evolving rapidly and so is the demand for different kinds of malts. Consequently, the malting industry is also evolving to meet that demand. Historically, the United States beer industry from Prohibition until the 1980’s has been characterized by increased product homogeneity and the dominance of adjunct lager styles. (Adjunct style is where the malt is used to supply the enzymes that convert the starch to sugar, and other grains such as rice and corn are used to supply the starch. This processing method lowers production costs.) This resulted in fewer and larger breweries producing the beer, which in turn resulted in fewer and larger malting facilities. The total production of beer in the United States is 192 million barrels consuming about 2 million tons of malt per year.⁴⁹

Today, all-malt beers (craft beers, a subset of the total beer market) are once again gaining in popularity, and this is reflected in the rapid growth in the number of small breweries. For the small craft breweries to gain market share, their product must be distinctly different from that of the large adjunct breweries. Thus, they are demanding different malts than those used by the adjunct brewers and a greater variety of malts (to distinguish their product from that of other craft brewers). By the beginning of 2022, there were over 9,700 breweries operating in the United States (compared to 2,670 in 2012 and about 360 breweries in 1992) producing over 10,000 brands of beer. This change in the brewing industry is largely responsible for the reemergence of micro-malting houses.

There are several segments to the brewing industry from the very small microbrewery to the very large national breweries. These are the general market segments:

- **Brewpub:** is a restaurant-brewery that sells 25% or more of its beer on-site.
- **Microbrewery:** produces less than 15,000 barrels per year with 75% or more being sold off-site.

⁴⁹ Department of The Treasury, Alcohol and Tobacco Tax and Trade Bureau Statistical Report: Beer.

- **Regional Brewery:** annual beer production between 15,000 and 6,000,000 barrels.
- **Large Brewery:** annual beer production over 6,000,000 barrels.

A Large Brewery such as Anheuser-Bush produces beer on such a scale that they generally have their own regional malt houses (Anheuser-Bush has malt houses in Idaho and Minnesota). Consequently, a large brewery is not likely to buy malt from a micro-malthouse; therefore, large breweries will not be discussed further in this paper. In general, this is also true for Regional Breweries. However, many Regional Breweries are starting to dabble in Craft beer and hence may buy special malts from a micro-malthouse for a limited-edition craft beer.

The target market for a micro-malthouse will be predominately the Microbreweries and the Brewpubs. These types of Craft-breweries are looking to differentiate themselves from the rest of the breweries, and one way to do this is to use malt that is different from their competitors.

LOCAL CRAFT BEER MARKET

In 2022, Washington had the largest number of craft breweries (448), followed by Oregon (318), Montana (106), Idaho (90), and Alaska (59). While Washington had the most breweries, Oregon produced the most barrels of beer.⁵⁰ Additionally, to the south is the California craft beer market that has almost as many breweries (957) as the combined number of breweries in the Pacific Northwest, and they produce almost twice the number of barrels of beer (3,551,344).

TABLE 1 | 2022 Craft Beer Statistics for the Pacific Northwest

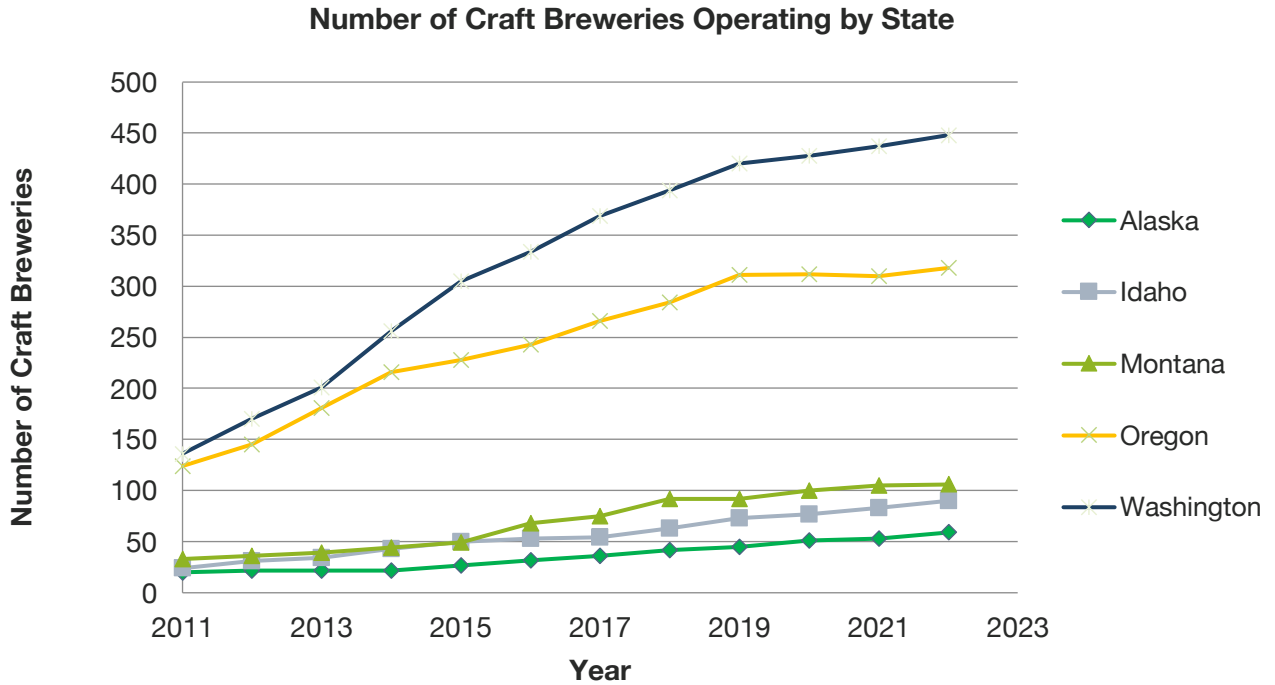
State	Number of Breweries	Barrels of Beer Produced
Washington	448	577,730
Oregon	318	867,236
Montana	106	196,141
Idaho	90	100,069
Alaska	59	162,102
Total	1,021	1,903,278

Overall, there are over 1,000 breweries in these five states, and they produce almost 2 million barrels of beer. To produce this much beer, they would need a minimum of 59,000 tons of malt⁵¹ just for the craft beer market sector.

⁵⁰ [State Craft Beer Sales & Production Statistics, 2022 - Brewers Association](#)

⁵¹ Assuming 2 pounds of malt per gallon of beer and 31 gallons per barrel. This value is low since most craft beer uses much more than 2 lbs/gallon, often double or triple this amount.

FIGURE 1 | Number of craft breweries operating by state



Over the last decade, the number of breweries in every state in the Pacific Northwest has been growing, as may be seen in the graph in Figure 1. This growth in the number of craft breweries also results in the growth in the number of barrels of beer produced each year. To illustrate this growth in production, the number of taxable barrels of craft beer sold in Oregon by year is plotted in Figure 2.⁵²

FIGURE 2 | Barrels of craft beer production in Oregon by year



⁵² Oregon Liquor Control Commission: Taxable Barrels of Malt Beverages Reported as Sold in Oregon.

It is interesting to note that, as of 2020, the top 15 of the larger craft breweries in Oregon no longer qualify as Microbreweries under the definition of producing less than 15,000 barrels per year. They are now in the Regional Brewery market segment alongside Anheuser Busch and MillerCoors.

NICHE MARKETS

As craft brewers are constantly creating new brews and new styles of beer, there are a few obvious niche markets to investigate. They are:

- Specialty Malts
- Organic and Eco-Certified Malts
- Non-Barley Malts
- Locally Grown – Locally Malted –Base Malts

Likewise, craft distillers can promote their products based on ingredients.

The **Specialty Malts** niche market includes Crystal and Carmel malts and Roasted malts. Almost all craft beer uses a significant quantity of specialty malts. There are a large variety of specialty malts available, and it is the judicious selection of these malts that allows the brewer to differentiate their craft beer from all the others on the market. The interesting thing about this niche market is that there are only two commercial roasters in North America: Briess Malt in Wisconsin and Great Western in Vancouver.⁵³ Most of the roasted malt is coming from Europe.

The **Organic and Eco-Certified Malt** niche market will most likely be in the food or baking segment of the malt market. Various craft beer and spirits brands utilize organic and other certified malts as a way to premiumize their products. Examples include Aslan Brewing, Peak Organic Brewing, Hopworks Brewery, Otter Creek, and Magic Hat. Budweiser did produce an organic beer for a short time but discontinued it for lack of a market.

The **Non-Barley Malt** niche market includes malts made from other grains such as wheat, rye, oats, sorghum, and other grains and legumes. A subset of this niche market would be **gluten-free malts** used to produce gluten-free beer and baked goods. Budweiser does produce a gluten-free beer made from malted sorghum and has found market demand for this product. Eckert Malting and Brewing is a micro-malter in Chico, California that produces malted rice for the gluten-free niche market. Grouse Malting and Roasting Company in Colorado is another micro-malting company that specializes in producing gluten-free malt.

Wheat and rye malts are finding increased use in the formulation of craft beers. Wheat malt is added to many craft beer formulas to increase head retention and mouth feel in addition to flavor. It is estimated that 5 to 10 percent of craft beers contain wheat malt. If this is true, then about one million barrels of craft beer produced in the United States per year contain wheat malt, and this would account for about 25,000 tons of wheat malt per year. While the amount of wheat malt may be insignificant in terms of the total market for wheat, it is a growing market.

Up to now, no US malting company has specialized in producing wheat malt. Most wheat malt has been produced as a minor product of regional malting facilities (representing no more than 5-10% of their annual production).

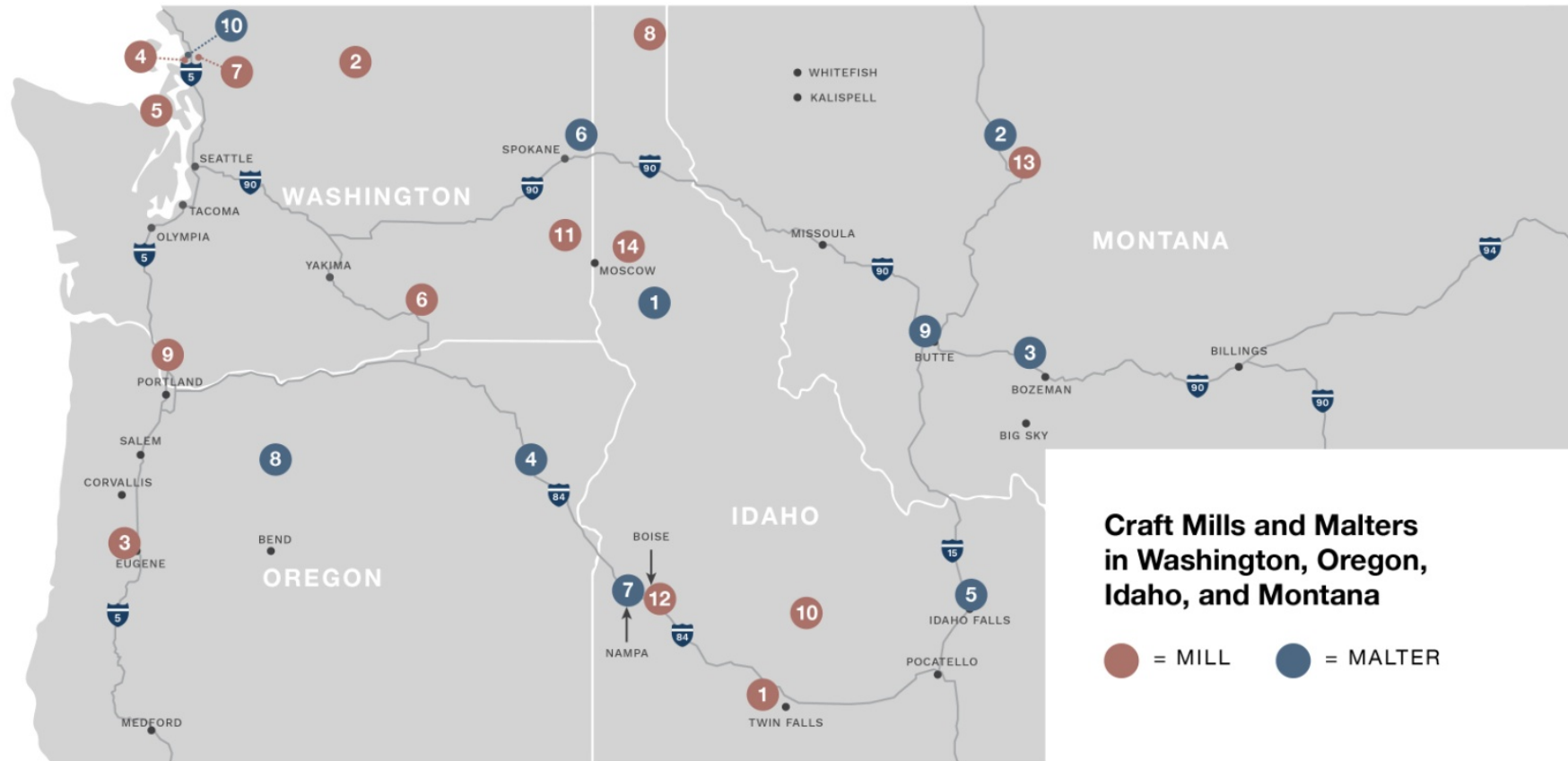
⁵³ Source: Personal communication with Alan Slater, Anheuser-Busch.

The **Locally Grown – Locally Malted Base Malt** niche market is the selling of an attribute of the malt that is popular with the “Buy Local” movement that has become popular as socially conscious people want to support (and protect) their local businesses and farmers. This niche market for malt is also the niche market that most craft brewers fill in the beer market (so it is a good fit). The “Buy Local” movement is also promoted by those concerned with global warming as they become aware of the CO₂ released into the atmosphere as a result of transporting food products over long distances. Mainstem Malt anticipates filling this niche market.

Part of the value of products in this niche market is that our products generally come with a “story.” The story will include the virtues, hard work, and care of the farmer that grew the product. The story will then be added to each product and be forwarded along the production chain that ultimately produces the final product delivered to the customer. The story will demonstrate the social value of the product to the customer.

SERVICE AREA AND COMPETITION

FIGURE 3 | Malt houses in Oregon, Washington, Idaho, and Montana (source: Arrowleaf Consulting)



Craft Mills and Malteries in Washington, Oregon, Idaho, and Montana

● = MILL ● = MALTER

- 1 **1000 Springs Mill**
Buhl, ID
- 2 **Bluebird Grain Farms**
Winthrop, WA
- 3 **Camas Country Mill**
Eugene, OR
- 4 **Cairspring Mills**
Burlington, WA
- 5 **Chimacum Valley Grainery**
Chimacum, WA

- 6 **Ethos Stone Mill**
Richland, WA
- 7 **Fairhaven Mill**
Burlington, WA
- 8 **Farm to Market Grains**
Bonners Ferry, ID
- 9 **Gee Creek Farm**
Ridgefield, WA
- 10 **Hillside Grain**
Bellevue, ID

- 11 **Joseph's Grainery**
Colfax, WA
- 12 **Maskal Teff**
Boise, ID
- 13 **Montana Milling**
Great Falls, MT
- 14 **Wheatberry Mills**
Deary, ID

- 1 **Coldstream Malt and Grain Co.**
Nezperce, ID
- 2 **Farm Power Malt**
Power, MT
- 3 **Gallatin Valley Malt Co.**
Manhattan, MT
- 4 **Gold Rush Malt**
Baker City, OR
- 5 **Liberty Malt**
Idaho Falls, ID

- 6 **LINC Malt**
Spokane Valley, WA
- 7 **Mashbill Malts**
Nampa, ID
- 8 **Mecca Grade Estate Malt**
Madras, OR
- 9 **Montana Craft Malt**
Butte, MT
- 10 **Skagit Valley Malting**
Burlington, WA

Not included in the above map of Craft Maltsters are the major non-craft malting plants of:

- Greatwestern, which has malting facilities in Vancouver, Washington and Pocatello, Idaho annually producing 300,000 metric tons and 200,000 metric tons of malt respectively.
- Anheuser Busch has a major malting facility in Idaho Falls, Idaho producing 300,000 metric tons of malt annually.⁵⁴
- Grupo Medelo Barley Malting Facility is a smaller plant located next to the Anheuser Busch facility in Idaho Falls, and it produces 100,000 tons of malt per year that is exported to Mexico.

PRODUCTION CYCLE

In order to design a malting facility, one must understand and appreciate all the activities that will take place in that facility. A general overview of the Malting Process is shown in the Flow Chart in Figure 4 on the next page.

Incoming grain

Intake is the point for sampling and analysis to ensure quality of raw material. The grain should be run through a magnetic separator (to remove any metal that could damage processing equipment), pre-cleaner (to remove straw, stray seeds, stones, and undersized seeds), and dust removal prior to weighing. If the moisture content is greater than 10-12%, the grain needs to be dried (to preserve the viability and reduce dormancy period of newly harvested grain) prior to storage. Storage is necessary to match intake over a short harvest period with long-term demand. In storage, the grain moisture content and temperature should be monitored. Other issues of concern in grain storage include pest and mold control.

Cleaning and grading

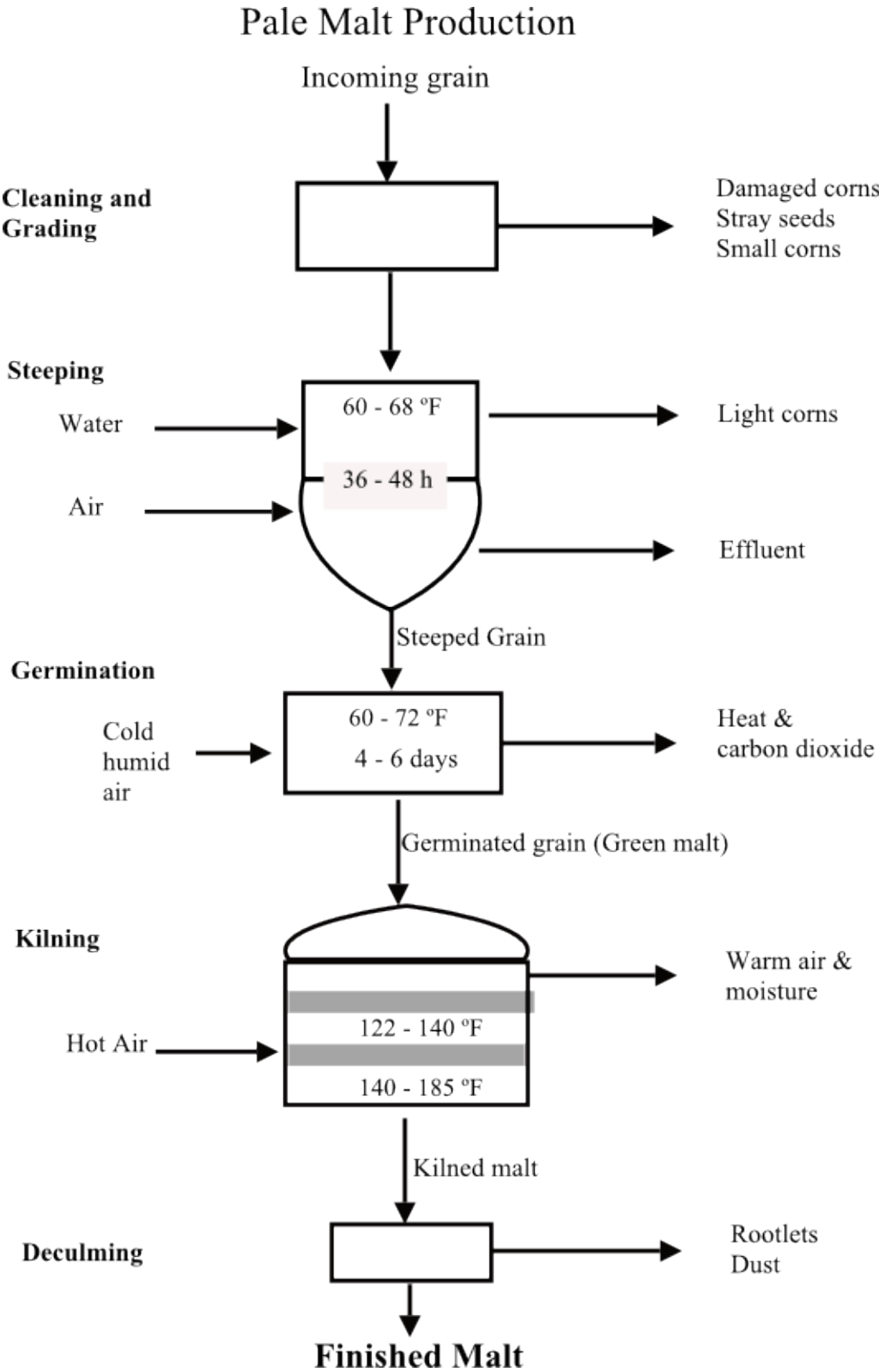
The quality of the grain malted will determine the quality of the final product. Therefore, it is desirable to separate the 'good' grain from the 'unmaltable' material such as undersized or broken grain and foreign seeds. The process includes running the grain through a cleaner (of greater efficiency than the intake pre-cleaner) and dust removal prior to grading. Grading is done by screening (to remove small grains) and a sorter to remove broken grains.

Having a uniform grain size is important for the next step (steeping) as larger grains will absorb water more slowly than smaller grains. Non-uniform grain size will result in variation in grain moisture content which, in turn, will result in variation in germination rate. This will, in turn, result in variations in the extent of germination of the malted grain when it is dried. The end result will be a lower quality malt product due to greater variation in the properties of the malted grain.

The grain should be tested for moisture, pre-germination, germination capacity, germination energy, and damaged kernels to determine the suitability of the grain for malting. This testing will also indicate if any modifications to the steeping procedure are necessary.

⁵⁴ idahobusinessreview.com/2018/07/18/anheuser-busch-barley-program-aims-for-higher-yields-from-idaho-growers/

FIGURE 4 | Malt Production Flow-chart



Steeping

The steeping process enables the grain to absorb sufficient water under aerobic conditions to initiate and then maintain the germination of the grain. The steeping stage consists of alternating periods when the grain is immersed in water, referred to as the 'under water period,' and periods with water drained from the grain, referred to as the 'air rest period.' For barley, moisture levels between 42 and 46% are required for pale malts and between 45 and 47% for dark malts. For wheat, the moisture level is around 40% when it is transferred to germination.

The steeping process is started by transferring a weighed quantity of grain into a vessel where the grain is initially washed to remove any remaining dust from the grain. (Some malters spray-wash the grain in the auger while it is being transferred to the steeping vessel.) The grain is then submerged for 2 to 10 hours with periodic aeration (to replace oxygen in the water and strip carbon dioxide). The water is then drained for an air rest period of 10 to 18 hours with periodic aeration (with moist air) to remove excess CO₂ and also cool any heating that may occur. Generally, the grain is submerged two or three times over a 2-day period with air rest periods in between.

One important consideration is the control of temperature during the steeping process. While higher temperatures will result in faster sprouting (chitting), steeping the grain at lower temperatures will result in a more uniform stage of growth when the chitted grain is transferred to germination. Barley is generally steeped at 55-66 °F (12-18°C).⁵⁵

After 2 days the grain should be 'chitted' (showing signs of growth) and is ready to be transferred to the germination area. The moisture content and percentage of corn chitted on discharge are key indicators of the success of steeping.

Germination

Germination is the growth of the embryo under controlled conditions of humidity and temperature which causes enzymes to break down the cell walls of the endosperm. This period is often referred to as modification. For barley the germination generally takes 4 to 6 days (wheat is faster and usually takes 3 to 5 days). During germination the grain will develop an acrospire and rootlets. Normally, the rootlets can be expected to grow to a length of between 1.5 and 2 times the length of the grain. The acrospire length is a good indication of the extent that the grain has been modified. The acrospire should be limited to between 2/3 and 3/4 of the length of the grain for pale malts and between 3/4 and the full length of the grain for dark malts.

For barley the germination temperature is generally maintained between 57° and 68°F (14–20 °C) and for wheat the temperature is maintained between 55° and 61°F (13-16 °C).

The product of this step is called green malt. The green malt can be kiln-dried to produce pale malts or go directly to the roaster to produce crystal or caramel malts. Darker malts are generally produced by roasting the pale malts.

⁵⁵ If the water is chlorinated the chlorination needs to be removed by passing all water thru a bed of activated carbon.

Kilning

The purpose of the kilning step in the malting process is to dry the malt for storage. The regulated removal of water from the green malt is necessary to achieve the following (often contradicting) objectives:

- Prevent further growth and modification.
- Produce a stable product that can be stored and transported.
- Preserve enzymes.
- Develop and stabilize such properties as color and flavor.
- Remove undesirable flavors.
- Inhibit the formation of unacceptable chemical compounds.
- Minimize energy consumption.
- Dry the rootlets to permit their removal.

To preserve the enzyme content of the malt, the grain is first dried at a relatively low temperature of 120°F (50°C) until the grain moisture is reduced to below 12%. This generally takes between 10 and 18 hours depending on air flow. In the next phase of the drying process the malt is dried from 10% moisture to 4% moisture by gradually increasing the temperature to about 175°F (80°C) over a period of 4 hours. At the end of the drying process, the kiln temperature may be raised for 1 to 2 hours in the “curing” stage. This is followed by a cooling period to achieve a temperature suitable for discharge and storage. The final “curing” temperature is where the flavor and color of the malt is developed (and some of the undesirable flavors are removed).

Deculming

The process of removing the rootlets is referred to as “deculming”. Once the malt is dry, the rootlets can be broken off by mechanical agitation and then removed by screening. The removal of the rootlets is important because they impart undesirable flavor when the malt is used for brewing. The removed rootlets make a good cattle feed as they have a significant protein content.

Roasting

The roasting process is used to produce a variety of Specialty Malts.

- Roasted pale malt products are produced by raising the temperature of the malt from about 195°F (90°C) to about 390°F (200°C) over a period 80-90 minutes and then cooled over a period of about 10 minutes.
- For Black malt products the temperature is raised from 140°F (60°C) to about 425°F (220°C) over the period of an hour and then held at that temperature until the desired color is developed and then the product is rapidly cooled.
- Crystal malt products are produced by placing green malt (un-dried malt) in the roaster with the air being recycled (100% RH) at 140°F (60°C) where the malt is stewed for 1-1.5 hours. The stewing process allows the enzymes in the malt to convert the starch inside the kernel to sugar. After stewing the air is vented and the temperature is gradually raised to 285 °F (140°C) over a period of 45 minutes. This dries the malt and then develops the Carmel color. Once the desired color is achieved the malt is rapidly cooled.

The roasting process requires a skilled operator to monitor the process; ‘like a chef baking a soufflé’.

QUALITY CONTROL

“Quality malt comes from quality grain!!!”

In order to produce quality malt, malters need grain that is alive with the right protein content, good kernel size, grain that is free of insects or fungi infestation and the right variety.

The purpose in analyzing the incoming grain is to determine that the malting process is started with high quality grain. The periodic analysis of the grain throughout the malting process is both for quality control purposes as well as feedback to the operator that the malting process is proceeding as expected. And finally, the analysis of the malt product is used to classify the malt and assure that the malt meets the buyer’s specifications.

Grain analysis

The purpose of analyzing the raw grain is to verify the quality of the grain received as well as determining what modifications to the malting process are needed to produce the best quality malt. The raw grain is analyzed visually, physically, chemically and for functionality.

TABLE 2 | Grain Analysis Parameters

Visual	Physical	Chemical	Functional
<ul style="list-style-type: none">• General appearance• Foreign material• Odor	<ul style="list-style-type: none">• Plumpness (size, distribution)• Thin Kernel (size)• Pealed and Broken kernels• Test weight	<ul style="list-style-type: none">• Moisture• Protein• Variety purity (DNA)• DON (Vomitoxin)	<ul style="list-style-type: none">• Pre-Germination• Germination capacity.• Germination Energy• Damaged kernels

Malt analysis

The objectives when malt is analyzed are:

- To be able to compare malts.
- To understand the major components of malt.
- A Certificate of Analysis (for the buyer of the malt).

The malt analysis results are used to evaluate quality and to compare it to different malts. The malt analysis also allows the buyer to evaluate whether or not the malt meets their commercial specifications, and it is a good indicator for predicting brewing performance.

The production facility will need a certain amount of laboratory equipment for production testing. Particularly, the production facility will need a NIR spectrometer to determine moisture and protein, a constant temperature and humidity chamber for germination testing and a reflectance spectrometer for malt

color testing. Note that even with the in-house testing capabilities it would be wise to send samples of the final malt products to an Agricultural Products Lab for independent verification of the in-house analysis.⁵⁶

One of the major selling points that the large commercial malting companies use to sell their product to brewers is the quality, availability, and consistency of their product. This is one of the major arguments they use against buying malt from a micro malt house, that a micro malt house can't deliver either quality or consistency. To overcome this perception a successful micro malt house will have to develop the reputation for having a very good testing lab whose results are verified by independent testing. While a micro malt house may have a difficult time competing with the large commercial malt houses on price, they can certainly compete on quality.

TYPES OF MALTING FACILITIES

A typical malting facility has to accommodate the three basic steps for malting: steeping, germination and drying. Usually, each step is generally accomplished using different equipment, each of which is optimized to perform its specified function. However, some systems do combine two or more of the steps into a single piece of equipment. The result of these multifunctional systems is generally a compromise design, and the result is less control over the performance of each function. It must be noted that there are several multifunctional systems on the market (in the 1-to-20-ton batch size) that perform well.

While there are many different designs for malting facilities, they tend to fall into three distinct categories based on the design of the germination equipment.

- Traditional Floor Malting
- Rotating Drum Malting
- Pneumatic (or Box with False Floor) Malting

The equipment used for the steeping process for all three of these systems is generally the same: a vessel in which the grain can be immersed under water with aeration. The vessel is generally round with a conical bottom around which air inlets are symmetrically spaced. The size of a steeping vessel is limited by a maximum depth of 15-20 feet (submerging the grain to greater depth can result in pressure damage to the kernel). So, for very large (pneumatic) malting systems, multiple steeping tanks are used to feed a single germination tank.

Traditional floor malting

In traditional floor malting, the malt is germinated by spreading it out on the floor in a layer 3-4 inches deep. The grain is then periodically manually raked to turn the malt and separate the grain rootlets (to prevent the grain from matting). The room in which the grain is germinated needs to have good climate control and air circulation. The equipment for steeping and kilning is much the same as that used in pneumatic malting.

Advantages:



⁵⁶ Commonly utilized labs for craft malsters are located at Montana State University (Bozeman, MT) and Hartwick College (Oneonta, NY).

- Low Capital cost.
- “Traditional Hand Crafted” market.

Disadvantages:

- Labor intensive
- Lower productivity per unit of floor space (germination requires 200-400 ft²/ton).
- Limited batch size.

Traditional floor malting is most suited to farm malting where the farmer wants to add value to his grain crop by utilizing his labor during the winter months. The limit to such production is estimated to be between 50 and 100 tons per year.

Rotating drum malting

In this type of system, the germination of the grain takes place in a vessel that can be rotated on its horizontal axis. The stirring of the grain is accomplished by rotating the drum. In this type of system all grain spends as much time on the bottom of the grain bed as it spends on the top of the grain bed. The aeration of the grain in this type of system is accomplished by the grain falling through the air (as opposed to the air passing through the grain bed in a pneumatic system). This means that all the grain experiences the same conditions, and the result is a very even germination of the entire batch.

In rotating drum malting systems, the drying is often done in the same vessel. Rotating drum drying systems (kiln) are mostly used for roasting and not as a kiln. A rotating kiln has the advantage of all the grain in the batch dries at the same rate and experiences the same conditions for the same duration. As opposed to the pneumatic kiln system in which the air passes up through the grain bed drying the grain at the bottom of the bed several hours before drying the grain at the top of the bed. The disadvantage of a rotating kiln is that it is less energy efficient when drying grain at low temperatures due to the fact that the air in contact with the grain never becomes totally saturated with water and hence a greater number of air exchanges is necessary to dry the grain (more heated air is needed to dry the grain).

Advantages:

- Very uniform product.
- Most suitable arrangement for germination and kilning in the same vessel.
- Automation.
- Higher productivity per unit of floor space.
- Less labor than floor malting.

Disadvantages:

- High Capital cost
- Limited batch size (about 10 tons).
- Less energy efficient.

Figure 6 | Drum Malting Facility

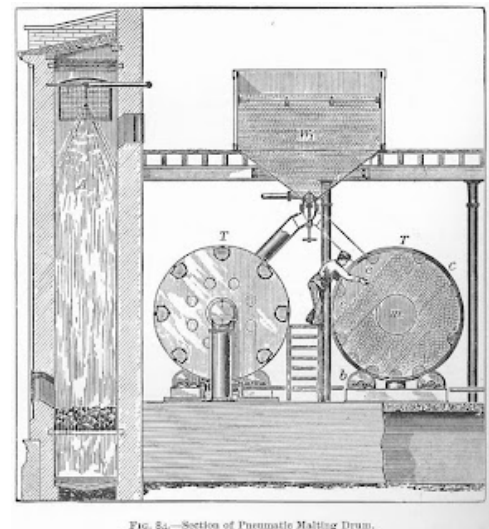


FIG. 84.—Section of Pneumatic Malting Drum.

The batch size limit of about 10 tons is mainly due to the limit of the size of a drum that can be constructed off site and transported to the malting facility. Building larger drums on site, while feasible, becomes cost prohibitive. This limits the production of such a system to about 500 tons of malt annually.

Pneumatic malting (box malting, ‘Saladin’ or ‘Wanderhaufen’ style)

The original “Saladin Boxes” were rectangular open-topped germination compartments with large helical screws mounted on a carriage that slowly traversed the germination bed to turn the grain (such as the system depicted in Figure 7). Today most of the pneumatic malting systems are much the same; however, the configuration is round with large helical screws mounted on a boom that spans from a tower in the center of the bin to the edge (such as the system in Figure 8). Generally, the boom also houses an auger that is used to load and unload the bin. The germination bin containing the grain has a perforated false bottom that cool air is forced up through. Most bins are constructed of stainless steel and likewise the walls and ceiling of the room over the bin is also covered with stainless steel (this is for washing down in order to preserve a high degree of sanitation).

Figure 7 | Photo of Pneumatic Germination Box.



The grain is loaded into the bin from the steep tank(s) to a depth of 3-4 feet and as the grain sprouts that depth can almost double. While there is a limit to the depth of the grain bed there is no limit to the diameter of the bin. One pneumatic malting system in England is sized for a 500 metric ton batch size (most large commercial systems are 10-20% of that size).

Figure 8 | Photo of large commercial round pneumatic germination tank.



Pneumatic kilns are much the same as the pneumatic germination tank except the boom doesn't have the helical screws for turning the grain. The auger on the boom is used for loading and leveling the green malt (for a uniform grain bed depth) and used for unloading (“skimming”) the dried grain. Often a single pneumatic kiln will service several germination tanks.

Advantages:

- Large batch size.
- Can be highly automated.
- Higher productivity per unit of floor space.
- Energy efficient.

Disadvantages:

- Moderate Capital cost
- Slight variation in product.
- Cleaning under the false floor is necessary and can be difficult to access.

This type of malting system has the advantage that it can be designed for almost any size malting system. For very large systems this type of system is the most cost-effective system. The design, engineering, and control of the air handling component of this type of system will ultimately determine its performance.

Combination systems

A combination system is where two or more steps of the malting process are performed in the same vessel. Typical combinations are steeping/germination, germination/kiln or all-in-one where all three steps (steeping, germination and drying) are performed in a single vessel.

There are two primary reasons that combination systems are of interest for malting:

1. Lower capital cost: By combining two (or more) functions into a single vessel it eliminates the need (cost) for the other vessel(s) and the associated equipment needed to transfer the grain from one vessel to another.
2. Reduced handling of the grain: By combining two (or more) functions into a single vessel it eliminates the need to transfer the grain from one vessel to another. This reduces the damage to the grain that can occur during transport.

The drawback to combination systems is that the combination piece of equipment is occupied for the duration of time required for the combined functions. The facilities' productivity can't be increased by staggering production.

Most combination systems have fairly small batch sizes. There are several prefabricated systems on the market, most are small (less than 1 ton batch size) and are made for a small microbrewery that wants to produce its own malt. Two of the larger commercially available combination systems are described below. The Schultz malting system is a rotating drum type system that combines the germination and kiln functions into the rotating drum. The second system is a combination Saladin box pneumatic type system produced by Buhler called the RimoMalt system.

Schultz (rotating drum) malting system

Kaspar-Schulz is in Bamberg, Germany and has been building brewing and malting equipment since 1880. Their system is available in 2, 5 and 10 metric ton batch sizes. With staggered production the steep tank and

Figure 9 | The Schultz malting system



air handling system can service up to three rotating drums. The 10 ton per batch system costs about \$2,000,000 and each additional 10 ton per batch drum costs about \$700,000.

Buhler – RimoMalt system

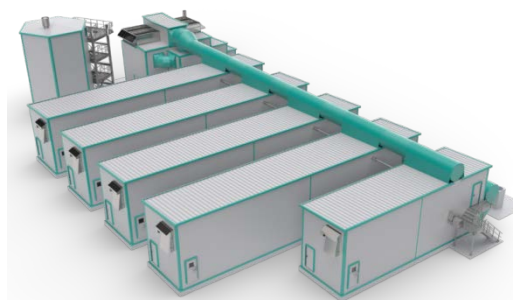
Buhler is a Swiss family business specializing in processing technology for transforming raw materials into higher-grade end products.

Buhler’s RimoMalt system is a modular malting plant that is based on a Saladin type system. The Saladin box is used for both germination and as a kiln. One advantage of the RimoMalt system is that it doesn’t require an additional building for the malting system. The RimoMalt system is designed in such a way that it is easily expandable.

Their system is available in 16, 32 and 56 metric ton batch sizes. This allows for annual production of 960, 1,930 and 3,390 metric tons of malt respectively. The RimoMalt 16 cost about \$2.8 million dollars and the RimoMalt 32 cost about \$3.2 million dollars. Additional Germination/Kiln Units can be added for \$1.1 million each.⁵⁷

With this system you can start with a single Germination/Kiln Unit (GKU) and then adding up to 4 additional GKUs’ for a total production capacity that is 5 times the initial capacity.

Figure 10 | RimoMalt system



MICRO MALTING FACILITIES

As a result of the market analysis, several potential sizes of micro malting facilities that would be appropriate to placement in Dayton have emerged. We have ruled out the smallest size malt house that utilizes floor malting techniques. The very small facility does not lend itself to scale without a lot of hand labor. We believe that we must deal in truck load scale quantities to be a successful malt house. We also rule out the very largest malt facility as it would lead to head-to-head competition with the largest established malt factories that already dominate the marketplace. We believe the best place to start in this marketplace with a mid-size malt house capable of producing 1,000 -4,000 tons per year with the ability to expand production as needed (up to 5x the initial production capacity).

Mainstem Malt

Mainstem Malt’s mission statement is:

Community + Conservation + Craft Malted Grain

We’re on a mission to build innovative malt supply chains in support of family farms, rural communities, and landscape-scale conservation. We start with water and strive for comprehensive sustainability.

We help brewers, distillers, and bakers bring the farm to their fans through premium malt.

⁵⁷ Plus an additional \$230,000 for shipping and installation.

Each of our partnering farms employs meaningful conservation practices that help restore our region’s landscapes and waterways. Salmon-Safe certification, habitat enhancement, dryland farming practices, irrigation efficiency, and low water crop rotations are some of the practices we encourage.

Our goal is always to meet family farmers where they are, uncover opportunities for more sustainable practices, and provide premium crop contracts to incentivize change. Looking forward, we’re excited to extend our offerings to include certified organic and perennial grains. We’ll also be doubling down on our commitments to the rural communities where we do business.

Products #MadeWithMainstem help protect the places we love, one field & stream at a time.

Mainstem Malt has been partnering with other craft malting houses to “transform our growers’ grain into malt.” Their malting partners are:

TABLE 3 | Mainstem Malt partners

Montana Craft Malt Butte, Montana Est. 2019	Our largest capacity maltster, located on the Clark Fork River headwaters of the Columbia Basin, in the heart of the Rockies. Montana Craft Malt resembles a downscaled version of a modern 3-vessel system, at 37 tons of grain per batch.
LINC Malt Spokane, Wash. Est. 2016	A cooperative craft malt house, operated by LINC Foods. LINC Malt utilizes 2 precision pneumatic drum malting systems, each split between a steep tank and germination-kiln vessel, to yield roughly 8 tons of finished malt every 5 days.
Skagit Valley Malting Burlington, Wash. Est. 2015	The Pacific Northwest’s largest and most technologically ambitious craft malt house. Skagit Valley Malting utilizes a growing array of single-vessel pneumatic malting modules, each producing 8.5 tons of malt every 7 days.

Mainstem has a track record of selling 500 tons per year to brewers, distillers, and bakers. This track record sets the lowest production capacity for a malt-house that we should consider. In fact, with their own production facility, they should be able to sell several times (2-4) this amount of malt with ease. So, for this Malt Plant Design Study we should consider a facility with 1000 – 2000 ton production capacity.

MEDIUM MICRO MALTING HOUSE

Annual production of 1,000- 2,000 tons of malt.

This level of production equates to 17,000 to 66,000 barrels of beer. This level of production would be enough to supply 30 to 200 small breweries or 3 to 20 medium-sized breweries or a single large brewery. This size of facility could supply between 1% and 2% of the current craft beer market for malt in Oregon, Washington, Idaho, Montana, and Alaska. This level of production would be enough to supply 1 of the top 10 producing breweries in either state or about 10% of the smaller breweries in all states. However, with the

projected growth of craft beer market demand for malt these necessary market shares will drop dramatically. There is also a growing demand for craft malt in the craft single malt whiskey market sector.

This medium-size micro-malting facility would be a business unto itself. Such a facility would need a weekly production of 20 to 40 tons of malt. Initially we considered designing a system with 1000 tons of annual production, but it readily became apparent that we would quickly reach production capacity and need to add additional capacity. Also, adding the additional capacity to the initial build did not add all that much to the overhead. So, it was decided that we should design a malt-house with a production capacity closer to 2,000 tons per year.

For various reasons it was decided that the Saladin box type of system would be preferable to the drum type system. For this analysis we will focus on the RimoMalt 32 which has a 32 metric ton of malt batch size. This equates to about a 35 US ton batch size. However, in keeping with Mainstems' philosophy of keeping it local, we decided to also cost out building a Saladin box system of our own design using mostly North American made components and we will call this the North American System, for comparison.

In order to cost out a facility based on each of the above systems we need to layout a facility capable of handling the barley when it is delivered on a truck thru to when the sold malt is loaded on another truck (or train) ready for delivery to the customer. This layout only needs to be conceptual, not a final engineered design.

The RimoMalt 32 system includes only those components involved in the actual malting of the grain. That is, from after the barley is delivered to the soak tank (often referred to as a steep tank) until the malt is unloaded from the kiln. It does not include any of the components necessary for handling, cleaning, and storage the barley between the truck delivering the grain, and the delivery of the barley to the soak tank. Likewise, it does not include any of the components necessary for handling, cleaning, and storage of the malt after it leaves the kiln. Since the grain handling systems will be common to both system designs, they will be discussed first before discussing the layout of each system.

RAW GRAIN RECEIVING, CLEANING, AND STORAGE

Truck delivery of raw barley

A truck can generally carry 25 tons of barley; with a trailer (often referred to as a "pup" and the trailer/pup combination referred to as a "train") this increases the total to 32-33 tons (about 1,400 bushels) of barley. Ideally, the truck driver (farmer) would like to unload the truck in 15-30 minutes. If the unload time is over an hour you will begin to test the patience of the driver.⁵⁸ This can be done with either a drive-over pit (in the ground covered with a metal grate) or with a portable-pit that slides under the truck. Both types have an auger or conveyer belt that moves the grain into the facility. For this layout we will use the portable pit simply because it is less likely to collect foreign material to contaminate the grain.

Next, we would like to clean the grain before placing it in storage bins. This can be done by either:

- Placing the grain in a temporary receiving (2000 bushel) bin to hold the grain. Then cleaning the grain with a small, 300 to 400 bushel/hour grain cleaner, over a period of 3-5 hours as the grain is transferred to the storage bins.

⁵⁸ Personal communication with barley farmer Brice Mitchell.

- Or cleaning the grain on the fly as it is unloaded from the truck using a larger grain cleaner capable of processing 1200 to 2000 bushels/hour as the grain is transferred directly to the storage bins.

The tradeoff here is the cost of the temporary bin versus doubling the cost of the grain cleaner. The ‘cleaning the grain on the fly’ method will cost about \$10-15,000 more but is probably worth it⁵⁹. We will choose this method.⁶⁰

Sizing the grain storage bins

To produce a 32 MTon (35.3 USTon) batch of malt we will need to start with about 47 tons of raw barley. At 50 batches/year, this equates to 2350 tons of barley annually or about 190 tons/month (see Table 4). The question is: how much grain are we going to store on site at the malting facility? We decided that we would rely on on-farm storage for the bulk of the annual grain needs. The decision is to keep a two month of production supply of barley at the facility. This would also allow the farmers to clean out their bins prior to harvest. So we will need storage for 380 tons (about 16000 bushels) of barley on site.

TABLE 4 | Batch and Annual Barley needs in various units of mass and volume.

	Tons	bushels	ft3	MTons
Raw Barley/Batch	47.1	1961	2440	43
Cleaned Barley/Batch	44.7	1863	2318	41
Cleaning waste/batch	2.4	98	122	2
Annual requirements at 50 batches/year.				
Raw Barley/Year	2353	98056	121981	2139
Cleaned Barley/Year	2236	93153	115882	2032
Cleaning waste/Year	118	4903	6099	107

The next two questions we had to answer in order to decide on how many bins and what size are:

1. How is the grain to be segregated? Based on Variety, moisture, protein...etc.?
2. How high of a storage cost (\$/bu) is acceptable? The larger bin size correlates with lower cost per bushel.

We will leave the answer to question 1 up to the facility operator. The answer to question 2 is that the cost/bu of bins in the 5000 bu to 8000 bu size are at the midpoint between the cost/bu going up exponentially as the bin size gets smaller and the bin size going up exponentially to get a unit of reduction in the cost/bu. As a compromise it we decided that we would have 3 x 5000-bushel bins for barley storage.

MALT CLEANING, STORAGE, AND BAGGING

Malt cleaning

It is desirable to be able to unload and clean the germination/kiln box in one day so that a new batch (that is in the soak tank) can be loaded the next day. The 35 tons of malt in the kiln should be unloaded in 3-4

⁵⁹ There will also be a 1 to 4 hour labor savings per truckload with the larger grain cleaner so the labor savings should pay for the cost differential over a couple of years.

⁶⁰ The temporary bin will probably still be needed to accommodate after hours deliveries when no one is available to run the cleaner.

hours. As the malt is unloaded it can be deculmed and cleaned. Therefore, the cleaner needs to be able to clean at least 10 tons/hour (420 bu/hr).

Malt storage and bagging

It was decided that each batch of cleaned malt will be transferred to a separate 2000bu bin. There will be 3 x 2000 bu bins and 1x 5000 bu bin for mixing batches to produce malt to a customers' specification (example: protein content). This gives us a malt storage capacity for over a month worth of production.

Hopefully most of the malt will leave in bulk truckload quantities. For smaller quantities, the malt will need to be bagged in either ton bags (on a pallet) or in 50 lb bags stacked 40 bags (1 ton) on a pallet. This is done by transferring the malt from the storage bins to a bagging station with a scale. After bagging, the pallets of malt are transferred to the warehouse for storage or staging for loading on a truck.

The warehouse area needed should be at least enough to stage 1 batch of malt (35 pallets) for shipment and store an additional batch of malt (another 35 pallets). Additional isle space is also needed to maneuver the pallets. This adds up to at least 2500 ft² of warehouse space as a minimum.

The Buhler-RimoMalt 32 system

The RimoMalt 32 system is a fully engineered facility that ships prefabricated components to the building site in 25 shipping containers for assembly. The estimated assembly/construction time is about 9 months.

The basic RimoMalt 32 Metric Ton system includes:

- 1 x Steep Tank
- 1 x Germination/Kiln Unit (GKU)
- 1 x Heating Unit

All connections between the 3 blocks are to be supplied by Buhler.

The customer is to supply:

- Inlet to the steep tank (Bucket elevator and/or conveyor)
- Movement of finished malt from outlet on GKU
- Wastewater connection underneath unit (GKU box)
- Stairs to the steep tank.

The footprint will occupy an area 50 x 90 feet and the height will range from 27.5 feet for the GKU to 34.6 feet for the steeping unit.

FIGURE 11 | RimoMalt system

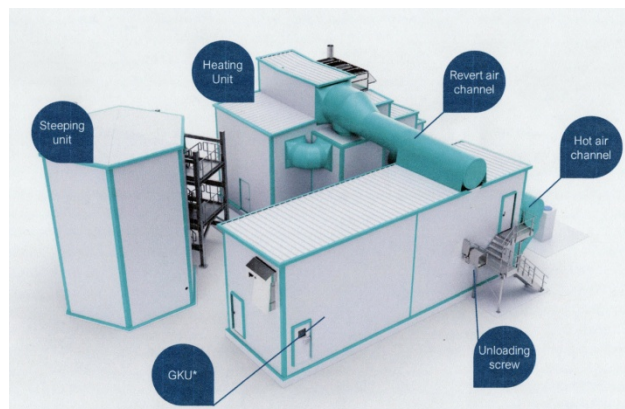
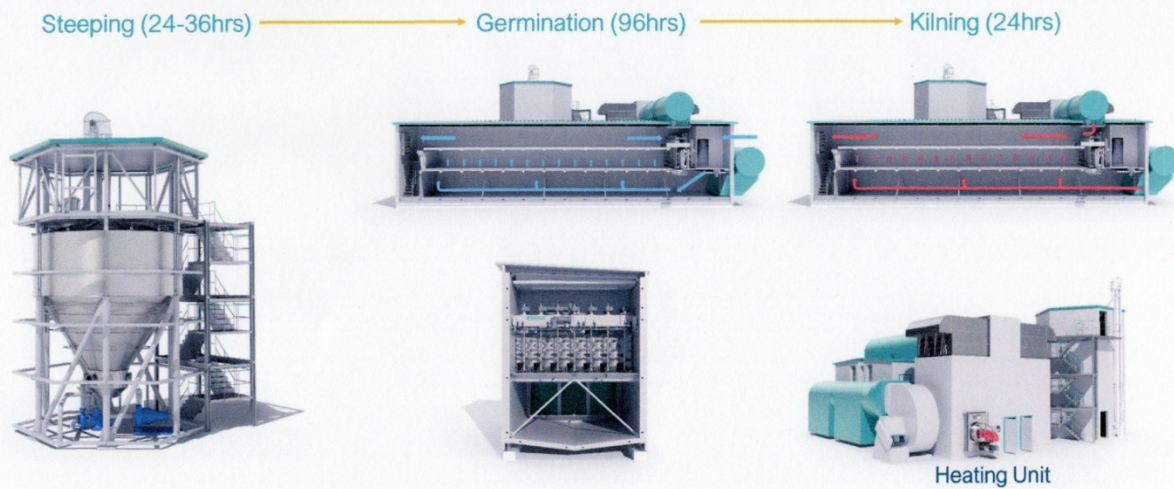


Figure 12 | Cutaway Views of RimoMalt Malting System

RimoMalt Malting System



The above figure shows a cut-away of the Germination/Kiln Unit with the fresh air flow through the unit during the germination cycle (depicted with blue arrows) and the hot air flow through the unit during the kiln cycle (depicted with red arrows).

THE AMERICAN-MADE 35-TON SYSTEM

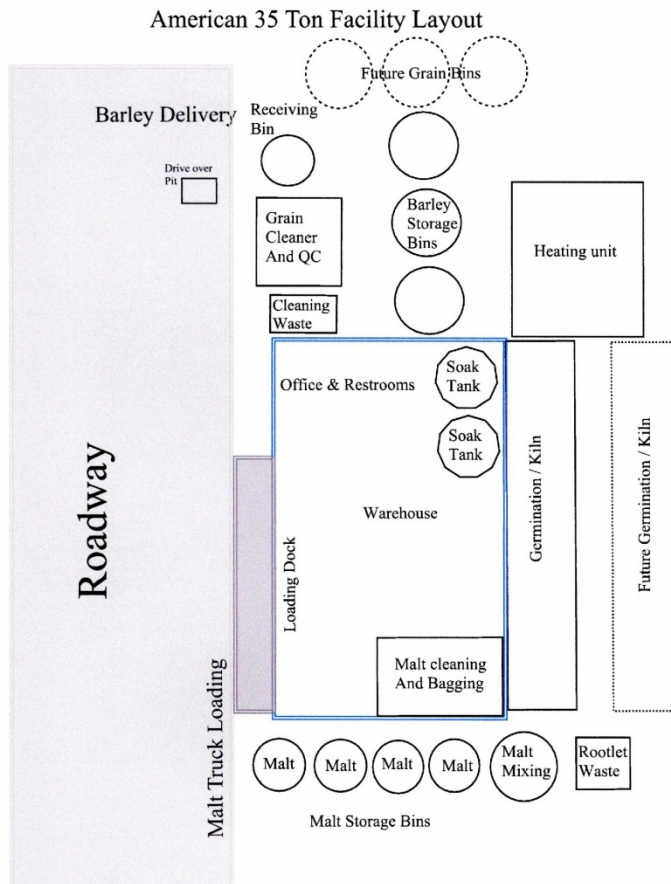
The idea behind the American Made System is to see if we can design a malting facility by sourcing only American made components. The design is to be a Saladin box type of system (similar to the RimoMalt system above). The system is to be designed to produce 35 tons of malt per batch.

For the purpose of this feasibility study, we need only to estimate the size/capacity of each component of the system in order to estimate the cost. A detailed engineering design of the facility will still be necessary

before the system can be built. What follows is a general discussion of the specifications for the system and how they were determined.

A diagram of a potential layout for the facility is depicted in the Figure to the right. The flow of the grain through the facility is as follows: The raw barley is delivered to the facility, and then cleaned. We expect about a 5% loss in the cleaning process.⁶¹ The cleaned barley is then placed in one of 3 storage bins to await further processing (malting). The cleaned barley is then transferred from the storage bin(s) to the Soak Tank where the moisture content of the barley is raised from about 10% to 40-45%. The high moisture barley is then transferred to the Germination/Kiln box where it is spread out and stirred as it goes through the process of becoming malt. After the malt has been dried to about 4% moisture, the malt is then transferred through a cleaner to its own individual bin for each batch. After each batch of malt has been analyzed, the malt from multiple batches can be mixed in a predetermined ratio, to meet customer specifications, and placed in the larger malt mixing bin.

Figure 13 | Malting facility layout



Delivery, cleaning, and storage of barley

The delivery, cleaning and storage of barley was discussed previously above, so we will only list the general specifications here.

- To be able to unload from truck and clean 33 tons of barley per hour.
- 2000 bushel temporary storage bin.
- 3 x 5000 bushel cleaned barley storage bins.

Soak tank

To soak the grain a tank with a conical bottom (with a slope of at least 45°) is needed. A single 26,000-gallon tank will be sufficient to accommodate the batch volume of grain. This tank will be about 20 feet in diameter and have a height of about 16 feet.⁶² The tank will need to be plumbed for aeration and fitted with a screen so that the water can be drained and refilled without the loss of grain. This tank will most likely be fabricated out of stainless steel.

⁶¹ This value can vary from 2% for high quality grain to 8% for fair to poor quality grain. 5% is a mid-value.

⁶² In sizing the tank, 2 feet of headspace was added above the grain bed to allow for expansion and to avoid spillage over the top.

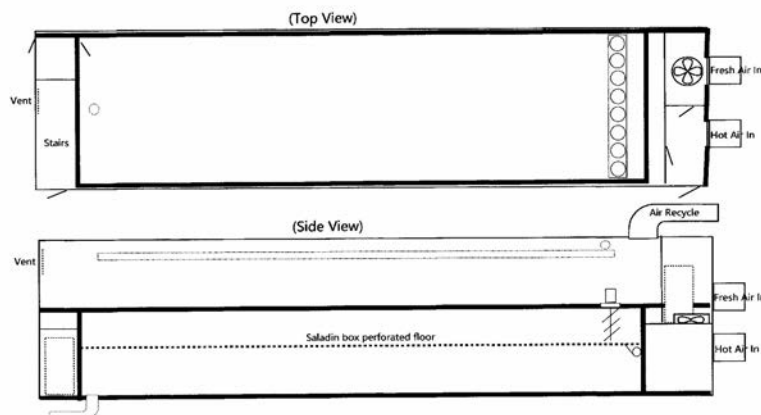
As an alternative two 13,000-gallon tanks (14 feet diameter x 15 feet tall) could be used. While these smaller tanks should also be fabricated out of stainless steel, less costly conical bottom tanks of this size made of polypropylene are commercially available and could be considered.

Once the barley has soaked for about 24-36 hours the grain can be transferred to the germination/kiln salad box as a wet slurry.

Germination/kiln Salad box

The Salad box is essentially a box with a perforated floor in which the grain is spread while it germinates. During the germination phase, moist fresh air is blown up through the perforated floor and through the grain bed. Also, any liquid water in the grain bed is allowed to drain down through the floor to the clean-out-chamber/air-duct below. The grain is stirred several times per day by a set of ribbon bladed augers that can traverse the length of the box (to keep the sprouting grain from matting). Then during the kiln cycle the moist fresh air is replaced with hot dry air being blown up through the grain bed to dry the grain.

Figure 14 | Germination/kiln Salad Box



The size of the Salad box is largely dictated by the desired depth of the grain in the box. The volume of the barley can be expected to swell from about 2300 ft³ to 2900 ft³. It is desirable to keep the depth of the grain bed to about 2.5 feet or less. So, the box will need a floor area of about 1150 square feet. To maintain a uniform air flow through the grain bed it is best not to have the length to width ratio exceed a 4:1 ratio. Hence the box dimensions will be 17 x 68 feet (inside dimensions). The box height will be 5 feet so that the grain does not spill out over the sides when the grain is stirred. The chamber under the perforated floor needs to be about 6 feet high to allow workers head space to clean out and wash down the chamber between batches.

The Salad box can be constructed from stainless steel or concrete. In Figure 14 above, the dark heavy lines represent a 1-foot-thick reinforced concrete wall that is 11 feet high that forms the box and duct under the perforated floor. While the inside of the box is 17 x 68 feet, the overall structure will measure about 20 x 90 feet. The 20-foot width is 17' box (id) + 2 x 1' cement walls + 2 x 0.5' insulation and metal siding. It is estimated that the cement walls and floor of the structure will require about 156 cubic yards of concrete. The walls above the concrete box and the ceiling will be covered with stainless steel sheeting, behind which will be insulation. The outside of the structure will be covered with metal siding. On top of the cement wall, running the length of the box will be a track along which the malt stirring apparatus will traverse the length of the box.

For each 35-ton batch of malt we will need to evaporate about 33,000 lbs of water. This will require about 33 MBTU (9,670 kWhr) of energy, most of it over an 8–12-hour period. But we will also need to heat roughly 35.2 million cubic feet of air to transfer the energy and carry away the water. This will require an additional 70.4 MBTU (20,640 kWhr)⁶³ of energy. Hence, we will need a heater capable of delivering about 8 MBTU/hr

⁶³ Part of this energy will be recoverable by heat exchanging the outgoing moist hot air with the incoming cool air.

(2.3 MW). Also, we will need a blower that can move 70,000 cfm to accomplish this. The blower for the fresh air during the germination phase can be about one fifth this size, or 14,000 cfm.

Revisiting the idea for an all-electric facility

The problem using electricity for heating is the electric utilities application of demand price structuring. This is based on the peak demand. For example, in the above heater sizing we have a peak demand of 2.3 MW (for a period of 8-12 hours each week). With demand pricing the electric utility will bill for that level of demand all month. So it doesn't matter if you produced 1 batch or 10 batches during the month the bill will be the same (It doesn't even matter if you turned off the heater all week). The reason electric utilities do this is to force those with high peak power demands to level out their load.

An all-electric facility will require an entirely different design to minimize the Electric Peak load. This can be done by spreading out the kiln process all week. So instead of producing one 35-ton batch each week we will break it up into 5 x 7-ton batches or better yet 7 x 5 ton batches. The smaller batch sizes would also dictate the need for smaller heaters and therefore lower peak power demand. A 0.5 MW heater would be required for a 7-ton batch size and a 0.33MW for a 5-ton batch size. This minimizes the demand charge for electricity but at the expense of much higher capital cost (probably double): you now need 5 to 7 Saladin boxes with the associated infrastructure.⁶⁴ Also labor cost will be higher as batches will be loaded and unloaded every day of the week, at least doubling the work force will be required to operate the facility.

In terms of the operation of the facility. You will quickly find that you should never start up an operation after the middle of the billing cycle (and preferably only at the beginning of the billing cycle). Also, always end an operation before the end of the billing cycle.

Malt cleaning, storage, and bagging

Malt cleaning, storage and bagging were discussed previously above, so we will only list the general specifications here.

- The malt should be unloaded from the kiln and the kiln cleaned in 3-4 hours.
- Will need a malt-cleaner capable of processing at least 10 tons/hour (420 bu/hr).
- Each batch of cleaned malt will be transferred to a separate 2000bu bin.
- There will be at least 3 x 2000 bu bins and 1x 5000 bu bin for mixing batches to produce malt to a customers' specification.
- Warehouse space for at least 70 pallets of malt.

⁶⁴ Also you will need 5 to 7 times as many smaller bins for malt at an exponentially higher unit cost. Probably would go to storing all the malt in ton bags in the warehouse and this would necessitate at least doubling of the size of the warehouse.

FACILITY COST, OPERATING EXPENDITURES, AND ANTICIPATED REVENUES

Since we have ruled out building the largest and smallest type of malt house, our focus for the development of this business will be a mid-size 1,760 ton per year facility. Below are the capital costs and anticipated operational cost. The operating costs are developed on a per-ton of malt production basis. Expected revenues from the malt products are derived from a generalized market analysis and conversation with brewers as to likely product mixes. All cost and revenue information are brought together in the form of expected cash flow for a medium sized malting facility, balance sheets, and summary EBITA projections for three years of operation.

Capital

In order to estimate the capital cost for a malting facility of a given size the costs for the following elements are needed:

- Grain receiving and handling
 - storage
 - cleaning
 - grading
- Production
 - Steeping
 - Germination
 - Kiln
- Product handling
 - Laboratory
 - Bagging
- Building/Office

The capital cost of a malting facility using the 35 tons per batch Saladin Malting System was calculated for a facility with 1,760-ton annual production capacity. The costing for the RimoMalt 32 system production facility is listed in Appendix 1 and the costing for the North American system is listed in Appendix 2. The capital cost of the RimoMalt 32 is a little over \$6.2 million dollars and the North American System facility is about \$4.5million dollars. This facility can be upgraded for a higher annual production capacity facility by adding an additional 35 ton (32 Mton) per batch Germination/Kiln Unit for an additional \$1.1 million plus an additional \$230,000 for shipping and installation.

Operating Expenses

Grain

The primary grain of interest for this analysis is barley. Barley is the most commonly malted grain. Wheat is also commonly malted and while there are many similarities between these two grains they do differ in both cost and physical density. Since wheat is a denser grain and hence a much greater weight can be malted in the same volume, we will focus on barley in all our production estimates.

There are two types of barley grown; feed barley and malt barley (and these two categories are further subdivided into spring and winter). While the market price of feed barley varies greatly the price of malt

barley has been fairly stable at around \$6.84/bushel⁶⁵ due to it being mostly grown on contract (FarmandRanchguide.com). The density of barley is 48 lbs/bushel (or 41.6 bushels/ton). So, this would mean that malt barley costs about \$0.1425/lb or \$285.02/ton.

While there are many more types of wheat (Red/White, Hard/Soft, and Winter/Spring) there are no specific varieties of wheat that have been bred for malting. Like feed barley, the price of wheat varies widely. For the purpose of this analysis, we will use an average price of \$10.50/bushel. The density of wheat is 60 lbs/bushel (or 33.3 bushels/ton). The average wheat costs \$0.175/lb or \$349.97/ton.

In order to calculate the yield of malt from either grain one must consider the malting weight losses. The key factors that will determine the final weight of the malt are:⁶⁶

- **Moisture Content:** The initial moisture content of most grains is around 10-12%.
- **Foreign Material and Broken Grains:** We will assume about a 5% weight loss due to cleaning up the grain.
- **Respiration as the Grain Germinates:** Assume about 6% weight loss.
- **Rootlets:** The rootlets that have to be removed from the dried malt account for about 4% weight loss.
- **Final moisture content:** Assume it will be about 4%.

Using these factors, we can calculate the malt yield from 100 lbs of barley to be:

$$\text{Weight as Malt} = 100 \text{ lbs} \times (0.88 \times 0.95 \times 0.94 \times 0.96) / 0.96 = 78.6 \text{ lbs Malt}$$

Thus an 80% yield is a maximum theoretical yield, in practice the yield will probably be somewhere between 70-80%. For calculation purposes let us assume a malt yield of 75%.

Therefore, to produce 1 ton of malt one needs to purchase 1.333 tons of grain (1 ton/0.75 yield = 1.333 tons). Resulting in a grain cost per ton for malt barley of \$379.93 (\$285.02/ton x 1.333) and for malted wheat the grain cost per ton would be \$465.46 (\$349.97/ton x 1.333).

Water

The malting process will use a considerable volume of water. The total volume depends on the number of water exchanges employed during the steeping process. The data in Table 5 may serve as a guide for water usage is from Malting Technology, Manual of Good Practice⁶⁷.

⁶⁵ This number is an estimate based on Mainstem purchase. The USDA National Statistics Service Agricultural Prices (June 2022) does not list a price for April or May 2022 but does list a price of \$5.78/bu malt barley for May of 2021. Overall in the US the price of malt barley went from \$5.00/bu in May of 2021 to \$6.07/bu in May of 2022. So a \$1 increase in price from May of 2021 is not unreasonable.

⁶⁶ "Malt, A Practical Guide from Field to Brewhouse" by John Mallett, Brewers Publications (2014). p. 65.

⁶⁷ Malting Technology, European Brewery Convention Manual of Good Practice. (2000) Fachverlag Hans Carl Publisher..

Table 5 | Malting Water Use Per Mass of Malt

Water	m ³ /Mton malt	Gallons/US-ton malt	gal/lb malt
Cleaning	0.3 - 0.7	87 - 203	0.04 - 0.10
Steeping	2.4 - 5.6	697 - 1627	0.35 - 0.81
Handling	0.3 - 0.7	87 - 203	0.04 - 0.10
Total	3 - 7	872 - 2034	0.44 - 1.02
Effluent	2.5 - 6	726 - 1744	0.36 - 0.87
Conversion	264.172	Gal/m ³	
	1.1	Mton/US-ton	

In Dayton, the base rate for water is \$48.40/month city or \$66.77/month for the first 800 ft³ (5,984 gallons) and then charged by the cubic foot at the rate shown in Table 5. Assuming the malting facility is producing 147 tons of malt per month (assuming 5 m³/mton), This equates to 23,661 ft³/month. The water consumption cost would be between \$1.90 and \$2.25 per ton of malt produced (depending on water use and if City or County rates are applied).

Table 6 | Dayton Water Rates

Ft ³ of water	City		County	
	\$/ft ³	\$/1000gal	\$/ft ³	\$/1000gal
801-50,000	0.01009	\$ 1.35	0.01153	\$ 1.54
50,001-100,000	0.01009	\$ 1.35	0.01258	\$ 1.68
over 100,000	0.01111	\$ 1.49	0.01295	\$ 1.73

However, the major cost of the water is in the energy needed to evaporate the water absorbed by the grain in the germination process.

If we start with 100 lbs of grain at 10% moisture, then the dry weight of the grain is 90 lbs. If we hydrate the grain to 46% moisture the grain will weigh 166.67 lbs. If we then dry it to 4% moisture the grain will weigh 93.75 lbs. That means that 73 lbs of water had to be evaporated to dry the grain. So, we will need to evaporate 0.78 lbs of water per pound of malt produced which equates to 1,560 lbs of water per ton of malt produced.

It takes approximately 1000 BTU to evaporate 1 pound of water.⁶⁸ Assuming the 147 ton/month production (will need to evaporate 229,320 lbs of water per month requiring about 229 MBTU of power per month) and the cost of propane in Dayton is about \$1.65/gallon or \$18.15/MBTU. The cost of power to evaporate the water would be \$28.31 per ton of malt. So, in comparison to the cost of the water itself, the cost of evaporating the water absorbed by the grain is the more significant cost.

⁶⁸ The actual number is 970.4 BTU/lb, but rounding to 1000 BTU/lb can be justified to account for inefficiencies (and it is an easier number to remember).

Wastewater

In the discussion of water usage, it was estimated that a malting facility producing 147 tons of malt per month would consume about 177,000⁶⁹ gallons of water per month of which 229,320 lbs of that water (about 27,500 gallons) would be evaporated. That leaves a little less than 149,500 gallons of water per month to account for. Some of this water will be used to increase the humidity in the air that is circulated through the germinating grain and therefore leave the malting facility in the exhaust gas stream. The rinse water from the initial steeping process will account for at least 141,000⁷⁰ gallons of the water usage will contain a fair amount of organic matter (including tannins) but instead of sending this water to the wastewater treatment plant it could be filtered to remove any particulates (that could be composted) and likewise used for irrigation.

Dayton charges \$0.00099 /gallon to treat Gray water. This means the monthly bill for the 149,500 gallons of wastewater will cost approximately \$148 per month or about \$1.01 per ton of malt.

Power

Since different sources of energy are priced using different energy units it is useful to convert them all to the same cost per unit of energy. This is done by converting to dollars per million BTU (\$/MBTU) in the following table:

Table 7 | Cost comparison for different sources of energy.⁷¹

	Cost	1 MBTU=	\$/MBTU
Electricity ⁷²	\$0.08 /KWh \$1.34	293 KWh	\$ 23.44
Natural Gas	/Therm \$1.65	10 Therm	\$ 13.40
Propane	/Gallon	11 Gallons	\$ 18.15

While Natural Gas is the least costly form of energy, unfortunately this form of energy is not available in Dayton. The Cost figures in Table 7 are for 2021. While Propane seems like a better choice in terms of energy cost now, it must be noted that the price of propane can fluctuate wildly (in the winter the price can go to over \$5/gallon, or \$55.00/MBTU), whereas the price of electricity is fairly stable year-round. Electricity is the power source of choice for lighting and conveyance motors. The choice between electricity and propane for heating generally comes down to the difference in the initial capital cost (electrical heating systems are generally more costly to install than propane systems). Although if the Electric provider applies a Demand Structure in their billing, then the cost of electricity is prohibitive for use in drying and/or roasting of malt. This is because the electricity cost is based on peak demand at a rate of \$ 8.73 per kWhr . This effectively increases the \$/MBTU in Table 6 above from \$23.44/MBTU to \$2,558/MBTU. A 100-fold increase.

⁶⁹ The range is 128,000 to 300,000 gallons, we will assume an average value of 5 m³/mton.

⁷⁰ Assuming 4 m³/mton or 960 gallons/ton.

⁷¹ The cost (\$/MBTU) for gasoline and diesel is even higher and therefore not included in the table.

⁷² This value is for a constant level of power usage throughout the billing cycle. It is misleading because with utility demand pricing structure the price/kWhr can be as much as 100x this value.

One big advantage the site in Dayton has for Propane is that the site is along a railroad. This means that the facility can buy propane by the train-car load at a price less than that listed in Table 6. Purchasing propane by the train-car load should be investigated. As of 6/8/23 the Mont Belview distribution hub in Texas price was \$0.60/gallon propane. Adding about \$0.15/gallon for transportation cost, the delivered price would be \$0.75/gallon propane (that is still less than half the price of propane listed in Table 6).

There are a great many factors to consider in estimating the total energy usage for a malting facility. The following table (Table 8) is from Malting Technology, Manual of Good Practice⁷³ with units converted from metric to more common US units.

Table 8 | Use of utilities for production of pale malt.

	kWh/ton	MBTU/ton
Electricity	78 - 110	
Primary Fuel (Kiln Heat)	530 - 691	1.8 - 2.4

Many of the energy requirements of a malting facility are used to heat air to moderate temperatures between 150 and 200°F hence the use of solar energy to preheat the air could be investigated (as part of the facility design process). Likewise, the windy dry climate of Dayton would suggest the possibility of using evaporative cooling to augment the cooling requirements of the germination process.

Since we are comparing the RimoMalt32 system to one of our own design, it will be useful to compare the RimoMalt32 specifications to those we calculated for our system (Table 9):

Table 9 | RimoMalt32 specifications

	RimoMalt 32 Per mton		Per 32 mTon Batch		US Units		Our Calculated Values Per Batch	
Heat Demand	600- 650	kWh	19200- 20800	kWh			27632	kWh
Electrical Demand	130	kWh	4160	kWh			4560	kWh
Fresh Water Consumption	3-4	m ³	96-128	m ³	33814	gallons	32245	gallons
Waste water	2.5	m ³	80	m ³	21134	gallons	28288	gallons
Germination Airflow	600	m ³ /h	19200	m ³ /h	11300	cfm	8000- 14000	cfm
Kiln Airflow	3000	m ³ /h	96000	m ³ /h	56502	cfm	55437- 70000	cfm
Maximum heating capacity	1600	kW			5.46	MBTU/h	2303	kW

The biggest differences between our calculated values and the RimoMalt32 specifications is that we did not account for recaptured heat from the exhaust gases in the heat-exchanger in our Heat Demand and Maximum heating capacity calculations. Our Electrical demand is slightly higher because we included grain

⁷³ Malting Technology, European Brewery Convention Manual of Good Practice. (2000) Fachverlag Hans Carl Publisher..

cleaning and movement in our calculation. The other big difference is in the wastewater calculation as we did not include respiration and evaporative cooling water loss during the germination phase.

Labor

The malting process generally takes 7 days and once started cannot be stopped until the malt is dried (without reduction in quality or loss of the batch). Therefore, the operation of a malting facility is 24 hours a day and 7 days a week and someone should be present (or on call) at all times to monitor the process and to take corrective action if necessary. Modern technology allows plant operators to monitor important functions of the facility via phone apps. The proposed facility can be operated with a staff of seven (7) people: an owner/manager, production supervisor, receiving manager, sales and packaging manager, quality control specialist, and two production/ packing assistants.

Revenues

A micro malt house, by definition, has limited production and therefore its product should command a premium (due to limited supply). The higher capital cost per unit of production dictates that the micro malter must pursue those market segments with the highest margins.

While no market segment can be ignored, the primary target market will be the small to medium sized craft brewer. Craft distilleries must also be considered a significant target market. These two market sectors will account for the greatest product volume. A retail market sector that cannot be ignored is the homebrewer. This market segment can be marketed directly via the internet as well as thru brewing supply stores. While this market segment represents the smallest product volume it does represent the highest product margins.

In order to estimate potential revenues for a micro malt house we should first review the current market price for malt. A survey of the market for the price of pale malt produced by the large US malt houses such as Briess and Great Western is shown in the table below. Malt from European malt houses generally sell for 30% - 60% more here in the United States. As one would expect the price per pound is dependent on the sales volume.

Table 10 | Market price for pale malt

Unit	\$/pound
Bulk	\$0.35 - \$0.55
Bulk 50 lb bags	\$0.70 - \$0.75
Single 50 lb bag	\$0.75 - \$0.90
Single 10 lb bag	\$1.00 - \$2.00
By the pound	\$1.00 - \$3.00

In Table 10 above “Bulk” generally refers to truck loads (of 20-30 tons) although in the case of “Bulk 50 lb bags” could refer to as little a single pallet load (1-2 tons) or even malt packed in ton bags.

In one study⁷⁴ it was stated that in 2012 the average price of pale malt was \$0.35/lb and specialty malt price was \$0.85/lb. The reason for this apparent difference in price is that the specialty malt is generally sold in

⁷⁴ Industry Analysis: Malting, Montana Department of Commerce, September 2014.

50 lb bags (or smaller) units and most pale malts are sold in bulk. It should be noted that specialty malts do command a price premium over that of pale malt for the same sales unit.

Consider that a small brewer will purchase (on average) about 10 tons of malt per year and of that about 1.5 tons will be various specialty malts. This means that all sales to small brewers will be in 50 lb bags. A medium sized brewer will on average consume 90-100 tons of malt per year of which about 15 tons will be various specialty malts. This means that while the medium sized brewer may buy pale (base) malt in bulk, the specialty malt will be purchased in 50 lb bags (on a pallet).

It is reasonable for a micro malt house to sell its malt for an average price of \$0.75 per pound. If a significant portion of the sales are retail, then the average sale price of \$1.00 per pound may be achieved.

Capital costs

The capital costs are listed in Appendix 1 and 2:

The separate subtotal for equipment is for the option of renting a building. This would transfer the building capital cost to a monthly rental expense.

Operating costs

Raw Material

Barley cost: \$6.84/bushel, \$0.1425/lb or \$285.02/ton

Wheat cost: \$10.50/bushel, \$0.175/lb or \$349.97/ton

Assume: 75% Yield,

Barley 48 lbs/bushel or 41.6 bushels/ton,

Wheat 60 lbs/bushel or 33.3 bushels/ton

Raw barley cost/ton of malt: **\$379.93/ton**

Raw wheat cost/ton of malt: \$465.46/ton

Utilities

Water: **1018** gallons/ton of malt⁷⁵

Water cost: \$1.90 and **\$2.25** per ton of malt

Effluent: **726** gallons/ton of malt⁷⁶

Wastewater cost: (\$0.00099/gallon): **\$1.01** per ton of malt

Power: Both Electricity and Propane are necessary for facility operation.

Electricity: **130** kWh/ton⁷⁷

@\$0.08/kWh = \$10.40/ton of malt

Demand pricing @ \$0.15/kWh⁷⁸ = **\$19.50/ton** of malt.

And

Primary Fuel (Propane):⁷⁹ **688** kWh/ton, **2.35** MBTU/ton

Propane: **26** gallons/ton, @\$1.65/gallon = **\$42.62/ton** of malt

Products

The sales forecasting was predicated on 4 products:

- Bulk Base 25-ton sales at \$1,100/ton (\$0.55/lb), (48% of sales)
- Bulk Specialty 25-ton sales at \$1,500/ton (\$0.75/lb), (12% of sales)
- Bagged Base 50 lb bag sales at \$1,500/ton (\$0.75/lb), (32% of sales)

⁷⁵ In Table 4 the range is from 872 to 2034 gallons/ton. We will use the RemoMalt32 value of 1018 gallons/US ton.

⁷⁶ In Table 4 the range is from 726 to 1744 gallons/ton. The RemoMalt32 value is 726 gallons/ton (our value is 804).

⁷⁷ The range in Table 7 is from 78 to 110 kWh/ton. We will use the RimoMalt32 value of 130 kWh/ton (Table 8).

⁷⁸ Assuming peak demand between 100-150 kW, and \$8.73/peak kW the cost averages out to be about \$0.15/kWh.

⁷⁹ The range in Table 7 is 530-**691** kWh/ton, 1.81-**2.36** MBTU/ton. We will use the average RemoMalt32 value of 688 kWh/US ton.

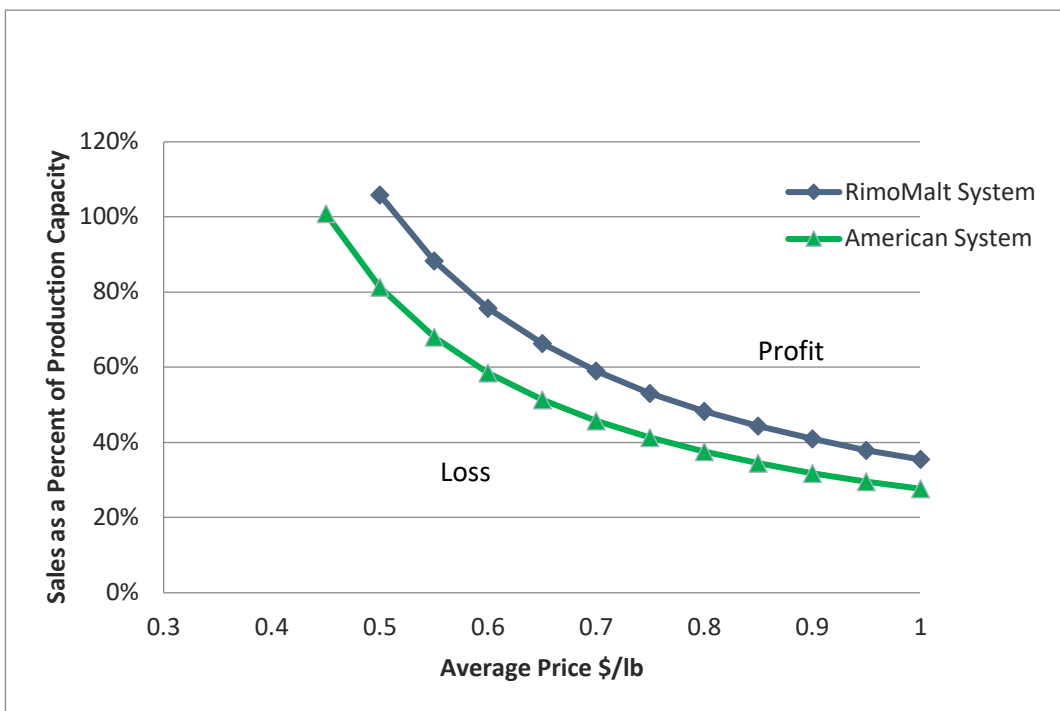
- Bagged Specialty 50 lb bag sales at \$1,900/ton (\$0.95/lb), (8% of sales)

The product distribution we used is 80% Base malt and 20% Specialty Malt, with 60% bulk and 40% bagged. This product distribution yields an average malt price of \$0.67 per pound.

The purpose in selecting these four products is to determine the cash flow sensitivity to product price/unit. These three products should not be confused with the eventual products such as pale wheat malt or crystal barley malt that will be sold by the malt house at hopefully a higher price point.

A breakeven analysis was performed for both the RimoMalt32 and the North American Systems. Breakeven being defined as the point where sales is covering all costs (including salaries) but the business does not make any profit. In Figure 15 (below) the level of sales is described as a percentage of the facility annual production capacity (of 1760 tons/year) is plotted as a function of the average price (\$/lb) of the malt sold.

Figure 15 | Breakeven analysis



At the end of the year, if the sales as a percent of production capacity and the average price that the malt was sold at, are above the line then a profit is made. If it is below the line, then there is a loss. If it is on the line, then we broke even. For example: if we sell 1,400 tons (80% of production capacity) for an average price of \$0.70/lb, then we make a profit. However, if we only sell 530 tons (30% of capacity) at \$0.80/lb we will be operating at a loss. This doesn't mean that we can't sell malt for say, \$0.40 or \$0.50/lb as long as we have enough sales at a higher price to offset the malt sold at a lower price so that the average price is on or above the line. Note that the closer you get to selling 100% of capacity, the lower your average price can be and still make a profit.

SUMMARY AND BUSINESS CASE

Beer is the primary market for malt; distilled spirits is a second market. The baked goods market offers an opportunity for the development of new products.

The craft beer industry is growing at a rapid rate and currently holds 13.2% share of the US beer market. The growth of the craft beer market share of the beer industry over the last decade has grown steadily and is projected to continue to grow. Evidence that the craft beer market share will continue to grow can be seen in Oregon's craft beer statistics where craft beer currently accounts for 20% of the beer sold in Oregon and 60% of the draft beer sold in Oregon.⁸⁰

Craft beer is a growing market which will increase the demand for malt and specialty malts. As craft beer increases its market share of the total, the market for malt will also increase.

Currently the 1,021 craft breweries in Alaska, Idaho, Montana, Oregon, and Washington produce more than 1.9 million barrels of craft beer per year. This represents an estimated demand for 70,000 tons of malt per year (and growing). In terms of breweries per capita (per 100,000 adults age 21+) these states are some of the highest in the nation; with Alaska at 11.2 (ranked 4th), Idaho at 6.5 (ranked 11th), Montana at 12.5 (ranked 3rd), Oregon at 9.8 (ranked 7th) and Washington at 7.7 (ranked 9th).⁸¹

Most of the malt used to brew beer is made from barley and currently 2-row malt barley is favored over 6-row malt barley varieties. To date no variety of wheat has been bred specifically for malt.

The craft distillery business is a relatively new phenomenon and most likely will increase in popularity as has the craft brewery industry. This is a growing market segment. The ingredients used to produce distilled spirits are much more varied and include fruit and other sources of sugar (that don't require the malt enzymes to break down carbohydrates). Consequently, the use of malt is more varied. The good news is that the distillers who do use malt use ten times (or more) as much to produce a gallon of their product as do brewers. Therefore, a distillery can use a great deal of malt.

A piece of very encouraging news is that the Alcohol and Tobacco Tax and Trade Bureau (TTB) has proposed to give American single malt whiskey its own legal standard of identity. The proposal suggests that spirits labeled 'American single malt whiskey' must be:⁸²

- Sourced from a fermented mash of 100% malted barley.
- Mashed, distilled, and aged in the U.S.
- Distilled entirely at one distillery.
- Distilled to no more than 160 proof or less.
- Stored in oak barrels not exceeding 700 liters.

Most relevant to the discussion of malt markets, is the first item in the listed criteria above. Distillers of a craft American single malt whiskey will be looking for malt with a story. Craft malt from a micro-malt-house can fill this requirement by not only being able to trace the barley to a specific region but to a specific farmer in that region.

While there seems to be very little malt presently being used in baking in the US, use of malted wheat in healthier and premium breads in the UK is a growing trend.⁸³ What little use of malt there is in the baking industry is confusing because it is often not referred to as malt but rather as "sprouted wheat". Hummingbird

⁸⁰ [Oregoncraftbeer.org/Oregon-beer/economic-impact](https://oregoncraftbeer.org/Oregon-beer/economic-impact)

⁸¹ 2022 Brewers Association Statistics.

⁸² [Distilling.com/distillermagazine/crafting-the-american-single-malt-movement/](https://distilling.com/distillermagazine/crafting-the-american-single-malt-movement/)

⁸³ www.bakersjournal.com/ingredients/malted-wheat-710

Wholesale, a specialty grain distributor, stated that while they did not currently have a malt customer base, they could sell the entire malt production if the product was made from “personal grown grain”.

Finding markets for malt in the food industry will probably take some creativity. Malt is not commonly viewed as being a food ingredient in most modern cooking. Consequently, it will require some consumer education on the use and value of including malt as a food ingredient. As an example of creative thinking, one might consider using malt to convert starch to sugar as a replacement for high fructose corn syrup in the beverage industry.

The target markets for a micro-malt house are:

- Small to medium sized craft brewers.
- Home brewers.
- Craft distillers.
- Artisan millers & bakers.

By being small, a micro-malt house has a competitive advantage over the large commercial malt houses like Briess, Great Western, and Rahr in that it can tell a much more compelling and personal story about where their product comes from. A micro-malt house can only source its grain from a handful of farmers, whereas the large malt houses buy grain combined from farmers in multiple states. Malt from a micro-malt house allows the brewer to tell a much more compelling “ground-to-glass” story about their product. Of course, it is the responsibility of the micro-maltsters to communicate that message about the source of the grain in the malt to their customers.

Micro-malting facility

Based on this market and business proforma analysis a medium sized micro-malt house with an annual production of 1,760 tons of malt per year would produce enough malt to supply between 1% and 2% of the craft beer demand for malt in Washington, Oregon, Idaho, Montana, and Alaska. This size malt house would be large enough to be competitive in price with the larger maltsters at scale and central to the large and growing craft brewing market.

A 1,760-ton micro-malt house is the optimum sized facility for the Pacific North-West craft malt market. The scale of such a facility is high enough to be competitive on price (with the large commercial malthouses) within the target market. Yet the smaller batch size means a higher quality product can be produced. The smaller batch size also means that the micro-malt house can be much nimbler in response to changes in market demand.

While the statistics show that the market for malt is going to grow, the market plan of “build it and they will come” may be a bit risky. It would be wise to make every attempt to garner some form of commitment from several breweries and/or distilleries to buy a portion of the malt production. It must be noted that Mainstem Malt already has customers in both the brewer and distiller markets with sales of 500 tons of malt per year⁸⁴ and this is equal to almost a third of the annual production capacity of the proposed facility.

While much of our analysis focused on craft brewers as the prime target market, other market segments cannot be ignored. Homebrewers can be marketed thru the internet and so a good internet site will need to be developed and social media will need to be actively managed. While homebrewers may not represent a

⁸⁴ In 2022, biggest sales year to date.

high-volume market, they certainly represent a high margin market. Craft distillers are another market that needs to be actively courted. In fact, Mainstem Malt has already made major inroads into this market sector.

Other potential side revenue streams for the micro-malt facility include:

- Use of grain cleaning equipment to clean grain for local farmers and other businesses.
- Use of the bagging equipment to bag other grains for retail sale.
- The rootlets and raw barley rejected during the cleaning and sizing process could be pelletized and sold as animal feed.⁸⁵
- Trucking, if the facility acquires a truck in the future.

Finally, by locating a micro malting facility in Dayton that will add value to a locally produced product (grain/barley) thus it will keep more dollars in the community.

In this study we costed out 2 systems: 1) based on the Buhler RimoMalt 32 MT system and 2) a system of our own design, that we are calling the North American System. Both systems have the same malt production capacity and the same grain handling up to and after the malting process. The major difference is that the RimoMalt 32 system has been fully engineered and our North American System still needs to be mechanically and electrically engineered.

The cost of the entire facility based on the RimoMalt 32 System is estimated to be \$6.2 million. The 1,750 ton per year facility will break even at a production capacity of 1122 tons per year and generate an EBITDA of 38% on Sales of \$2.1 million per year when run at 90% capacity.

The cost of the entire facility based on the North American System is estimated to be \$4.6 million. The 1,750 ton per year facility will break even at a production capacity of 858 tons per year and generate an EBITDA of 38% on Sales of \$2.1 million per year when run at 90% capacity.

⁸⁵ The barley rejected while cleaning and sizing should contain 14-15% protein and the rootlets will have about 30% protein.

MALT FEASIBILITY APPENDIX 1:

Note: these numbers were subsequently updated. See main feasibility study report and Appendix C in main report for more accurate cost estimates from the architect.

Facility Costing

Costing for 1,760 ton annual production facilities.

North American Malting System 35 ton batch, 1,760 tons/year

Cost

-Grain receiving and handling		
4x5,000 bushel bins		\$84,000
4x2,000 bushel bin malt		\$44,000
2,000 bushel bin Declum		\$11,000
6 x Augars		\$40,000
Magnet		\$12,000
Fork lift		\$15,000
Scale		\$10,000
Seed cleaners		\$20,000
Drive over hopper		\$21,000
-Production		
2 Steeping unit		\$250,000
35 ton Germination-kilning combo salad in box		\$405,000
Turning Machine, tracks, End walls, floor trays, malt unload		\$330,000
70,000 cfm fan, 7-10 in H2O, with VFD		\$100,000
14,000 cfm germination fan, 3 in H2O, with VFD		\$20,000
aprox 10 mmbtu/hr indirect heater, electric with heat recovery		\$400,000
Ducting and louvers		\$150,000
Automatic system		\$100,000
Malt cleaner with conveying		\$50,000
Engineering		\$180,000
Cold water tank		\$27,104
Cold water pump		\$3,905
Piping material		
Installation, Electric installation		\$400,000
Commissioning Packing and loading, Transport		
Misc		\$100,000
-Product handling		
NIR protein/moisture		\$10,000
Misc Lab Equipment		\$10,000
Tote filler		\$20,000
Bagging machine		\$50,000
Total Equipment cost		\$2,863,009
-Building/Office	sq ft	
Grain Handling	400	
Production	600	
Office	300	
Warehouse	3,000	
Total	4,300	\$967,500
Sub total		\$3,830,509
Contingency	20%	\$766,102
Total for 1760 ton per year malt facility		\$4,596,611

Washington Micro-Malt House

Year End Summary	Year 1	%	Year 2	%	Year 3	%
Income						
Variable cost Product 1 - Bulk Base Barley Malt 25	462,000		646,800		860,244	
Variable cost product 2 - Bulk Speciality Malt 25 t	149,400		209,160		276,091	
Variable Cost Product 3 - Bagged Base Malt in 50l	414,000		580,180		771,639	
Variable Cost Product 4 - Bagged Speciality Malt i	114,000		159,760		212,480	
Total Income	1,139,400	100%	1,595,899	100%	2,120,454	100%
Cost of Sales						
Variable cost Product 1 - Bulk Base Barley Malt 25	187,074		261,904		348,332	
Variable cost product 2 - Bulk Speciality Malt 25 t	44,363		62,109		81,983	
Variable Cost Product 3 - Bagged Base Malt in 50l	150,534		210,959		280,575	
Variable Cost Product 4 - Bagged Speciality Malt i	32,725		45,861		60,995	
Total Cost of Sales	414,697	36%	580,832	36%	771,886	36%
Gross Margin	724,703	36%	1,015,067	36%	1,348,569	36%
Salaries and Wages						
Owners Compensation	75,000		77,250		81,113	
Salaries	110,000		113,300		118,965	
Full-time	153,600		158,208		166,118	
Part-time	-		-		-	
Independent Contractors	-		-		-	
Payroll Taxes and Benefits	62,341		64,212		67,422	
Total Salaries and Wages	400,941	35%	412,970	26%	433,618	20%
Fixed Business Expense						
Advertising	6,000		6,720		7,123	
Truck Expense	-		-		-	
Bank and merchant Fees	2,400		2,688		2,849	
Contract Labor	-		-		-	
Conferences and Seminars	12,000		13,440		14,246	
Customer Discounts and Refunds	1,200		1,344		1,425	
Dues and Subscriptions	1,200		1,344		1,425	
Miscellaneous	1,200		1,344		1,425	
Insurance (Liability and Property)	6,000		6,720		7,123	
Licenses / Fees/ Permits	300		336		356	
Legal and Professional Fees	12,000		13,440		14,246	
Office Expenses and Supplies	1,200		1,344		1,425	
Postage and Delivery	2,400		2,688		2,849	
Rent (on Business Property)	12,000		13,440		14,246	
Rent of Vehicles and Equipment	-		-		-	
Sales and Marketing	6,000		6,720		7,123	
Taxes-Other	6,000		6,720		7,123	
Telephone and Communications	1,800		2,016		2,137	
Internet Carrier Fee	600		672		712	
Utilities	12,000		13,440		14,246	
Total Fixed Business Expenses	84,300	7%	94,416	6%	100,081	5%
Operating Income Before Other Expenses [EBITDA]	239,462	21%	507,681	32%	814,870	38%
Other Expenses						
Amortized Start-up Cost						
Depreciation	216,267		216,267		216,267	
Interest						
Commercial Loan	80,791		78,347		75,782	
Commercial Loan 2	32,500		29,697		26,804	
Taxes						
Total Other Expenses	329,558		324,312		318,853	
Net Income	(90,096)	-8%	183,370	11%	496,017	23%

MALT FEASIBILITY APPENDIX 2:

Facility Costing

Costing for 1,760 ton annual production facilities.

RimoMalt 32 MT MaltingSystem 35 ton batch, 1,760 tons/year		Cost
-Grain receiving and handling		
4x5,000 bushel bins		\$90,000
4x2,000 bushel bin malt		\$44,000
2,000 bushel bin Declum		\$15,000
6 x Augars		\$40,000
Magnet		\$12,000
Fork lift		\$15,000
Scale		\$10,000
Seed cleaners		\$20,000
Drive over hopper		\$21,000
<hr/>		
-Production		
RimoMalt 32 System		\$ 3,200,000
	1 Steeping unit	
	35 ton Germination-kilning combo salad in box	
	Turning Machine, tracks, End walls, floor trays, malt	
	Air handling, heater, ducting and louvers, Automatic	
Installation, Electric installation		\$400,000
	Commissioning	
Shipping	25 containers	\$300,000
	Packing and loading, Transport	
Stairs for Steep Tank		\$45,000
Foundation/Concrete Slab		\$20,000
Malt cleaner with conveying		\$50,000
Engineering		\$25,000
Wastewater pump		\$10,000
Cement Pad		\$20,000
Misc		\$50,000
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-Product handling		
NIR protein/moisture		\$10,000
Misc Lab Equipment		\$10,000
Tote filler		\$20,000
Bagging machine		\$50,000
<hr/>		
Total Equipment cost		\$4,477,000
-Building/Office		
	sq ft	
Grain Handling and Lab	400	
Production	600	
Office	300	
Warehouse	3,000	
Total	4,300	\$967,500
<hr/>		
Sub total		\$5,444,500
Contingency	15%	\$816,675
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Total for 1760 ton per year malt		\$6,261,175

RimoMalt 32 MT Micro-Malt House

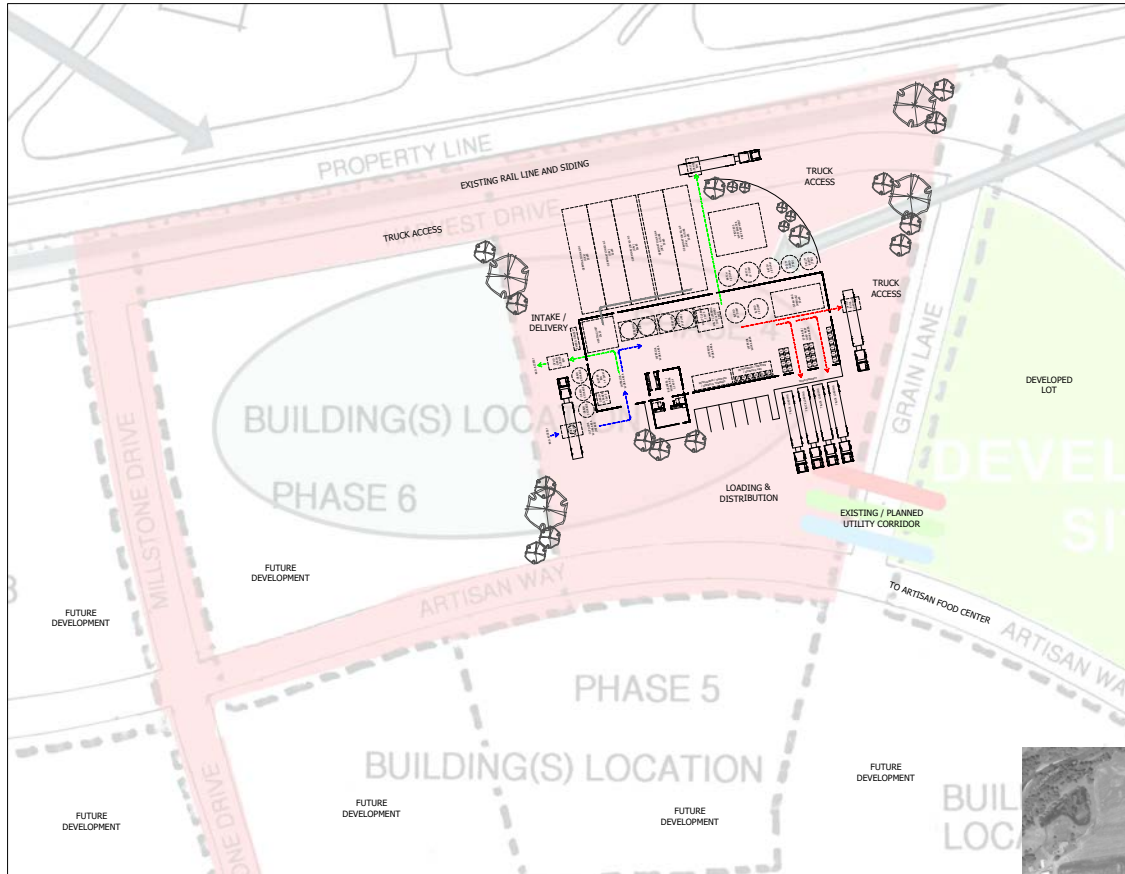
Year End Summary	Year 1	%	Year 2	%	Year 3	%
Income						
Variable cost Product 1 -Bulk Base Barley Malt 25 ton	462,000		646,800		860,244	
Variable cost product 2 - Bulk Speciality Malt 25 ton	149,400		209,160		276,091	
Variable Cost Product 3 - Bagged Base Malt in 50lb bag	414,000		580,180		771,639	
Variable Cost Product 4 - Bagged Speciality Malt in 50lb bag	114,000		159,760		212,480	
Total Income	1,139,400	100%	1,595,899	100%	2,120,454	100%
Cost of Sales						
Variable cost Product 1 -Bulk Base Barley Malt 25 ton	197,574		276,604		367,883	
Variable cost product 2 - Bulk Speciality Malt 25 ton	44,363		62,109		81,983	
Variable Cost Product 3 - Bagged Base Malt in 50lb bag	150,534		210,959		280,575	
Variable Cost Product 4 - Bagged Speciality Malt in 50lb bag	32,725		45,861		60,995	
Total Cost of Sales	425,197	37%	595,532	37%	791,437	37%
Gross Margin	714,203	37%	1,000,367	37%	1,329,018	37%
Salaries and Wages						
Owners Compensation	75,000		77,250		81,113	
Salaries	110,000		113,300		118,965	
Full-time	153,600		158,208		166,118	
Part-time	-		-		-	
Independent Contractors	-		-		-	
Payroll Taxes and Benefits	62,341		64,212		67,422	
Total Salaries and Wages	400,941	35%	412,970	26%	433,618	20%
Fixed Business Expense						
Advertising	6,000		6,720		7,123	
Truck Expense	-		-		-	
Bank and merchant Fees	2,400		2,688		2,849	
Contract Labor	-		-		-	
Conferences and Seminars	12,000		13,440		14,246	
Customer Discounts and Refunds	1,200		1,344		1,425	
Dues and Subscriptions	1,200		1,344		1,425	
Miscellaneous	1,200		1,344		1,425	
Insurance (Liability and Property)	6,000		6,720		7,123	
Licenses / Fees/ Permits	300		336		356	
Legal and Professional Fees	12,000		13,440		14,246	
Office Expenses and Supplies	1,200		1,344		1,425	
Postage and Delivery	2,400		2,688		2,849	
Rent (on Business Property)	12,000		13,440		14,246	
Rent of Vehicles and Equipment	-		-		-	
Sales and Marketing	6,000		6,720		7,123	
Taxes-Other	6,000		6,720		7,123	
Telephone and Communications	1,800		2,016		2,137	
Internet Carrier Fee	600		672		712	
Utilities	12,000		13,440		14,246	
Total Fixed Business Expenses	84,300	7%	94,416	6%	100,081	5%
Operating Income Before Other Expenses [EBITDA]	228,962	20%	492,981	31%	795,319	38%
Other Expenses						
Amortized Start-up Cost						
Depreciation	323,867		323,867		323,867	
Interest						
Commercial Loan	173,595		168,345		162,833	
Commercial Loan 2	32,500		29,697		26,804	
Taxes						
Total Other Expenses	529,962		521,909		513,503	
Net Income	(301,000)	-26%	(28,928)	-2%	281,816	13%

APPENDIX C

Malting Facility Architectural Concept Floor Plans, Map, and Cost Estimate

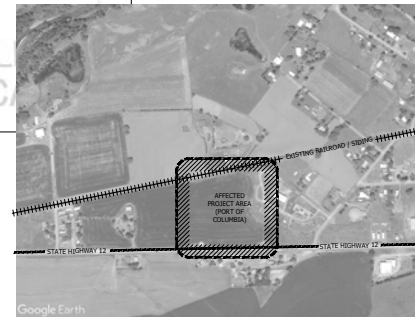
PREPARED BY

John McClean | Blue Room Architecture & Design




PRIMARY PROJECT AREA


- ANTICIPATED SCOPE INCLUDES:
- GENERAL SITE PREP FOR PROPOSED AREA - SITE IS ESTIMATED AT 80K SF
 - CONNECTION/CONNECTION OF EXISTING UNDERGROUND UTILITIES INCLUDING WATER, SEWER, POWER
 - THERE IS NO NATURAL GAS AT THIS SITE / PROPANE ALTERNATE
 - SELECT EXCAVATION/GRADING FOR RECEIVED LOADING DOCK AREA
 - COMPACTOR AND TESTING FOR SLAB ON GRADE FACILITY
 - EXCEPT WHERE NOTED OTHERWISE, ALL ON-SITE TRUCK ACCESS AREAS
 - ANTICIPATED CURBING: GRAVEL / ASPHALT MILLING SURFACE
 - ADA PARKING AND SERVICE AREAS TO RECEIVE FINISHED CONCRETE SURFACE
 - SELECT / LIMITED LANDSCAPE AREAS PER BLUE MOUNTAIN STATION DESIGN STANDARDS AND COORDINATED WITH ANTICIPATED TRUCK ACCESS ROUTES AND OUTDOOR EQUIPMENT SERVICE ACCESS REQUIREMENTS.
 - ALL OFF-SITE ROADWAY, DRAINAGE AND UTILITY IMPROVEMENTS TO BE COORDINATED BY THE PORT OF COLUMBIA.



A ARCHITECTURAL SITE PLAN - CONCEPT
 A1.1 SCALE: 1" = 40'-0"



BLUE ROOM ARCHITECTURE & DESIGN, P.S.
 HISTORIC SALTERS SCHOOLHOUSE
 701 BELL CTR
 VERANDA, WASHINGTON 99037
 (509) 760-7500
www.brstudio.com



DRAFT

NEW BUILDING FOR:
PORT OF COLUMBIA
 MAINSTEM MALT
 700 ARTISAN WAY, DAVENPORT, WA 99328

PROJECT NUMBER: 23007A
 DATE: 01/30/2023
 DRAWN:
 REVISIONS:

PRELIMINARY CONCEPT

ARCHITECTURAL SITE PLAN

A1.1
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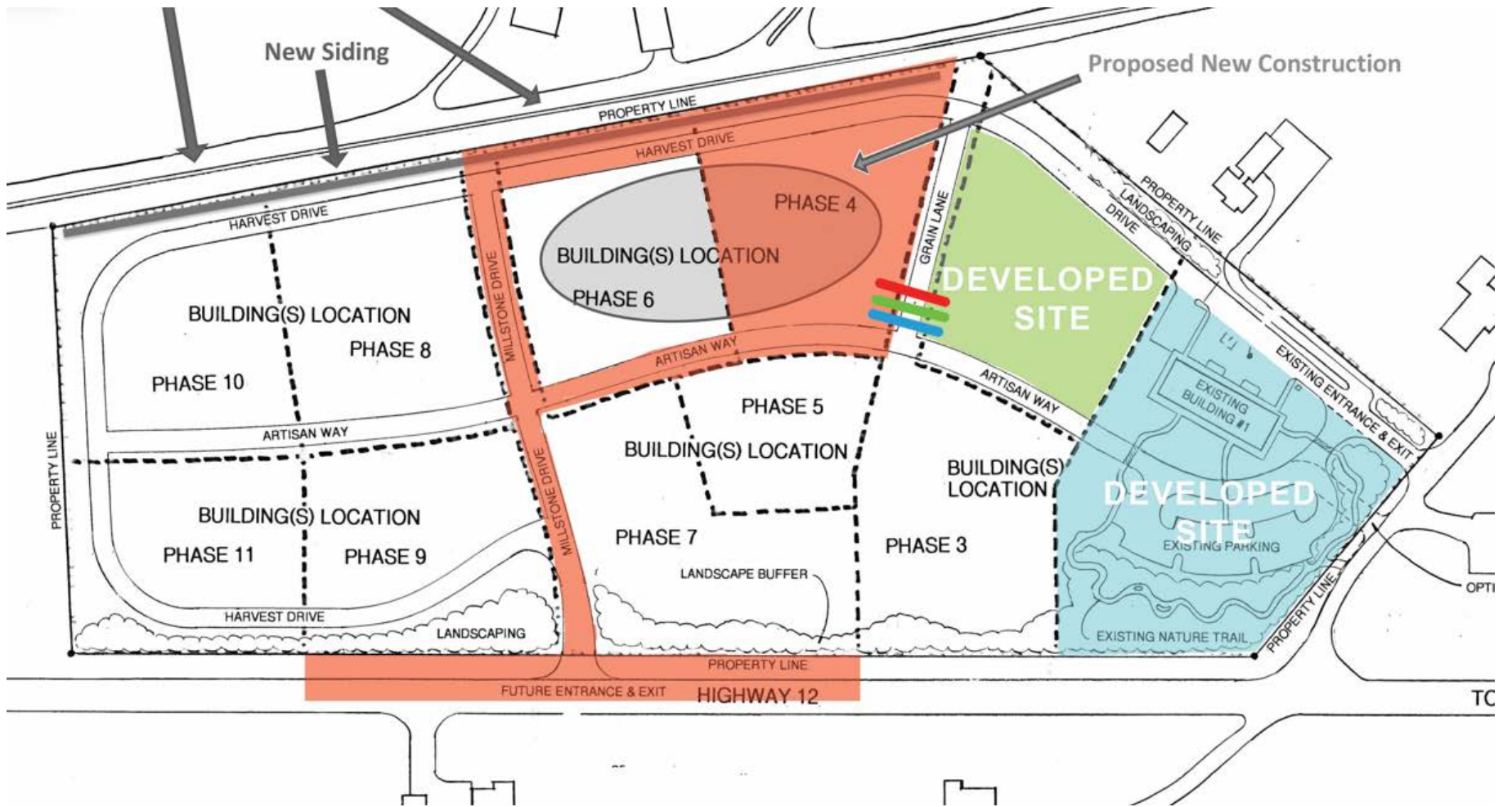
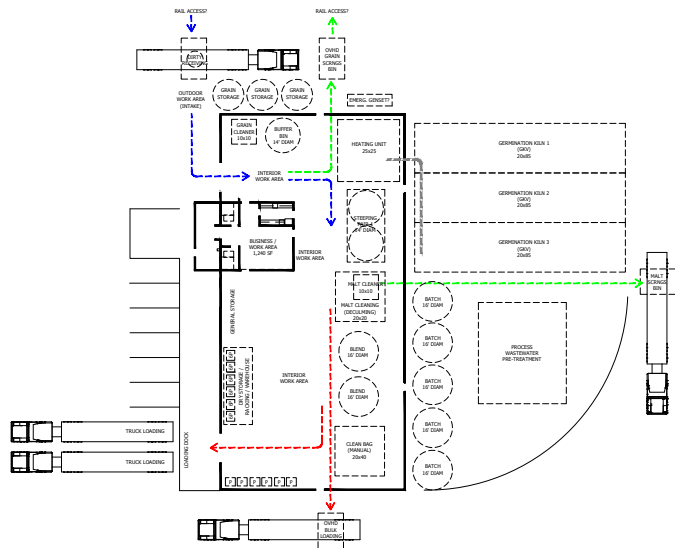




TABLE 1 | Probable cost estimate for malthouse facility construction and equipment, RimoMalt 32 system compared to North American system (assumes Spring 2024 bidding/buyout, produced October 5, 2023, Blue Room Architecture & Design)

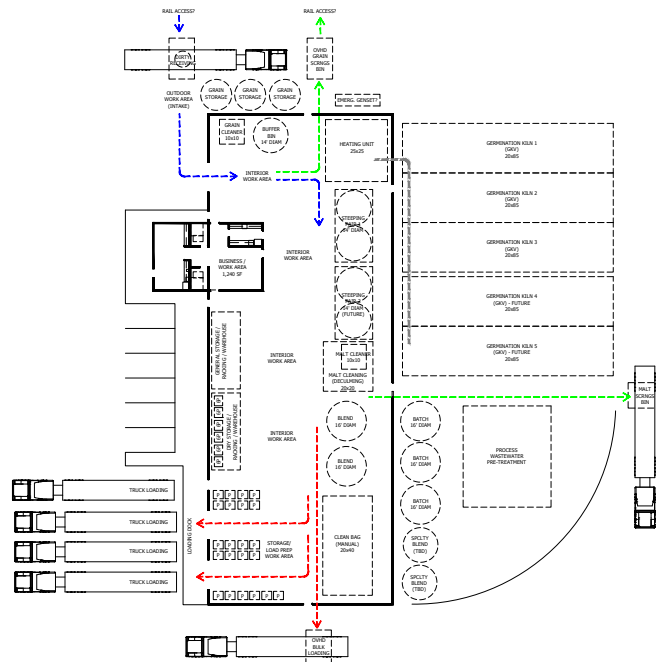
Costs	Qty	Unit	RimoMalt 32	North American
Est. Cost of Construction				
PEMB Facility-partial finish/conditioned/NREC-Co	300	10,000	\$3,000,000.00	\$3,000,000.00
Additional Site / Utility Improvements (Allowance)	1	EST	\$100,000.00	\$100,000.00
Port Infrastructure Development / Road Improvements	Excluded			
SUBTOTAL			\$3,100,000.00	\$3,100,000.00
Construction Contingency (Material / Labor / PEMB Vendor Risk)		10%	\$310,000.00	\$310,000.00
WA State Sales Tax: Dayton, WA		0.080	\$272,800.00	\$272,800.00
Est. Construction Cost Subtotal:			\$3,682,800.00	\$3,682,800.00
Prevailing Wage / Public Funds Multiplier (TBD)	0.25	EST	\$920,700.00	\$920,700.00
Soft Costs Associated with Construction (REQUIRED):				
Grant / Funding-Related Project Requirements		TBD		
Equipment Consultant / Vendor Coordination		TBD		
Geo-Technical/Site Survey (N/A)		TBD		
LEED SILVER Registrations / Expenses		TBD		
Architectural / Engineering / Project Management		EST	\$250,000.00	\$250,000.00
Est. Reimbursable Expense (Travel/Printing, Etc.)		EST	\$15,000.00	\$15,000.00
Detailed Third Party Cost Estimates		TBD		
Temporary Measures / Business Interruption/Moving		TBD		
Temporary Utilities / Rental Equipment		TBD		
Environmental Survey / Abatement (New Construction)		N/A		
Special Inspections		0.50%	\$15,500.00	\$15,500.00
Permit and Review Fees				
City of Dayton (Est.)		0.50%	\$15,500.00	\$15,500.00
Other		TBD		
SUBTOTAL			\$296,000.00	\$296,000.00
Soft Costs Associated with Owner's Construction (OWNER DISCRETION):				
Furniture by Owner (Typically 5-10%)	EST	0.00%	\$12,000.00	\$12,000.00
Shelving, Racks, Storage, Equipment	EST		\$25,000.00	\$25,000.00

Equipment-Specific Install/Calibrations/Utilities	EST	0.00%	\$50,000.00	\$50,000.00
Specialty/Process Equipment (Mitchell w/ WA State Sales Tax)	EST	LS	\$4,840,000.00	\$3,094,912.73
Process Wastewater Treatment System (Pre-Discharge)	EST	LS	\$100,000.00	\$100,000.00
Office/Admin Equipment	EST	0.00%	\$25,000.00	\$25,000.00
Phone/Data/Cable/Fiber/Audio-Visual (Typically 2-5%)	EST	2.00%	\$73,656.00	\$73,656.00
Owner-Provided Low Voltage (Controls/Security) Systems	TBD	0.00%		
Interior/Exterior Signage	EST	0.00%	\$10,000.00	\$10,000.00
Marketing/Promotional	TBD			
Insurance Costs	TBD			
Legal, Insurances, Titles, Lender Fees	TBD			
SUBTOTAL			\$5,135,656.00	\$3,390,568.73
Project Contingency		5.00%	\$155,000.00	\$155,000.00
TOTAL EST. PROJECT COST			\$10,190,156.00	\$8,445,068.73



A CONCEPT FLOOR PLAN - 10,000 SF FACILITY

A2.21A SCALE: 1" = 20'-0"



B CONCEPT FLOOR PLAN - (EXPANDED) 15,000 SF FACILITY

A2.21A SCALE: 1" = 20'-0"



CONSTRUCTION SUMMARY

- PRE-ENGINEERED METAL BUILDING OR SIMILAR
- GENERALLY FLAT SITE CONDITIONS / NO ENVIRONMENTAL OR ZONING CONCERNS
- FULL UTILITY SERVICES AT SITE (NATURAL GAS NOT AVAILABLE)
- MINIMAL LANDSCAPE / PARKING STANDARDS
- REINFORCED CONCRETE SLAB ON GRADE / INSULATED PERIMETER / NON-RADIANT
- INSULATED EXTERIOR WALLS BY FACTORY-FINISHED METAL SIDING
- INSULATED METAL ROOF ASSEMBLY (CLEAR SPAN FOR EQUIPMENT FLEXIBILITY)
- SPACERS FOR NATURAL DAYLIGHTING
- INSULATED OVERHEAD SEGMENTAL DOORS AT LARGE OPENINGS
- INSULATED EXTERIOR-GRADE STEEL SPRING DOORS THROUGHOUT
- PROCESS WASTEWATER TO BE TREATED ONSITE PRIOR TO DISCHARGE TO SEWER
- GENERAL THERMAL CONDITIONING IN PROCESS AREAS, SPECIALTY SYSTEMS BY OTHERS
- FULL CONDITIONING IN WORK / OFFICE AREAS
- RECESSED EXTERIOR LOADING DOCK TO ALIGN WITH FINISH FLOOR (TRG)

EXPANSION STRATEGY

- IF/WHEN NEEDED, FACILITY EXPANSION ANTICIPATES A CONTINUATION OF MATCHING FLOORS AND STRUCTURAL BAYS ALIGNED WITH THE CURRENT FOOTPRINT
- NO CHANGES ANTICIPATED FOR HEAD-END, INTAKE OR BUSINESS OFFICE FUNCTIONS
- INCREASED CAPACITY / PRODUCTION GROWTH IS ACCOMMODATED ALONG THE BUILDING EXTERIOR WITH ADDED PROCESS EQUIPMENT AND INTERIOR WORK / LOADING / DISTRIBUTION AREAS



BLUE ROOM ARCHITECTURE & DESIGN, P.C.
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 VERONAE, WASHINGTON 99037
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 www.brdsstudio.com

SCALE: 1" = 20'-0"
 STRUCTURE: TRG
 PROCESS: TRG
 ELECTRICAL: TRG



DRAFT

NEW BUILDING FOR:
PORT OF COLUMBIA
 MAINSTEM MALT
 700 ARTISAN WAY, DAYTON, WA 99238

PROJECT NUMBER: 23007A
 DATE: 02/20/2023
 DRAWN: ALM
 REVISIONS:

PRELIMINARY CONCEPT

CONCEPT 062823

A2.21A

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APPENDIX D

Malting, Pasta, and Cluster Facilities Economic Impact and Investment Assessment

PREPARED BY

Steve Peterson | Peterson & Associates

EXECUTIVE SUMMARY

There are three sets of analyses conducted for this study: 1) Detailed analysis for the proposed malting operation and facility, 2) Preliminary analysis for the noodle and pasta operation and facility, and 3) Preliminary analyses for the cluster firm operations and facility. The cluster firm analysis includes the pasta and noodle operation, a specialty bakery, a distillery, and a commercial kitchen with storage. The economic impacts of the malting operations were conducted using a state model (Washington State). The pasta and noodles operations and cluster firms' operations were conducted using a regional model that included the counties of Asotin, Whitman, Garfield, Columbia, Franklin, Walla Walla, and Benton. The direct revenues, payroll, and jobs are illustrated in Table 1. In total, fully developed the total cluster firms' direct employment (including pasta and noodles) could reach 15 jobs, \$0.8 million in payroll, and \$7.9 million in sales. These are estimates with a high degree of variability. Factoring in the malting, the total direct annual operations reaches \$9.9 million in revenues, \$1.25 million in payroll, and 22 jobs (Table 1).

Table 1: Direct Estimated Revenues, Payroll, and Jobs

Firm/Operation	Direct Jobs	Payroll	Revenues
Pasta and Noodles	2	\$153,333	\$1,000,000
Specialty Bakery	4	\$208,365	\$549,349
Distillery	7	\$331,724	\$5,881,391
Commercial Kitchen	2	\$125,000	\$500,000
Sub-Total Cluster	15	\$818,422	\$7,930,740
Malting	7	\$435,847	\$2,000,000
Grand Total	22	\$1,254,269	\$9,930,740

Economic impacts of the malting facility

The total economic impacts are \$4.2 million in output (sales), \$1.8 million in gross regional product, \$1.1 million in total compensation, and about 15.4 jobs. The average total compensation per job is \$71,167, including the multiplier effects.

The malting facility will generate considerable tax revenues of approximately \$35,371 property taxes, \$93,219 sales and excise taxes, and \$5,978 other taxes. Total tax revenues are \$134,568 to local and State coffers.

Two additional scenarios were conducted. The high scenario (250%) created \$10.4 million in output and about 39 jobs. The mid-scenario (150%) created \$6.2 million in output and about 23 jobs, including the multiplier effects.

Economic impacts of the pasta and noodles facility

The total economic impacts are \$1.6 million in output (sales), \$0.5 million in gross regional product, \$0.3 million in total compensation, and about 4.9 jobs. The average total compensation per job is \$63,624 including the multiplier effects.

The pasta and noodles facility will generate considerable tax revenues of approximately \$9,229 property taxes, \$18,115 sales and excise taxes, and \$3,714 other taxes. Total tax revenues are \$31,058 to local and State coffers.

Two additional scenarios were conducted. The high scenario (250%) created \$3.9 million in output and about 12 jobs. The mid-scenario (150%) created \$2.3 million in output and about 7 jobs, including the multiplier effects.

Summary results (cluster firms)

Specialty bakery

The total economic impacts are \$0.9 million in output (sales), \$0.5 million in gross regional product, \$0.3 million in total compensation, and about 5.7 jobs. The average total compensation per job is \$54,303, including the multiplier effects.

The specialty bakery will generate tax revenues of approximately \$13,347 property taxes, \$26,198 sales and excise taxes, and \$3,931 other taxes. Total tax revenues are \$43,476 to local and State coffers.

Distillery

The total economic impacts are \$8.1 million in output (sales), \$3.4 million in gross regional product, \$0.9 million in total compensation, and about 5.7 jobs. The average total compensation per job is \$54,683, including the multiplier effects.

The distillery will generate tax revenues of approximately \$519,858 property taxes, \$1,020,398 sales and excise taxes, and \$11,796 other taxes. Total tax revenues are \$1,552,052 to local and State coffers.

Commercial kitchen and locker space

The total economic impacts are \$0.7 million in output (sales), \$0.3 million in gross regional product, \$0.2 million in total compensation, and about 3.4 jobs. The average total compensation per job is \$58,670, including multiplier effects.

The commercial kitchen will generate tax revenues of approximately \$11,864 property taxes, \$23,288 sales and excise taxes, and \$2,585 other taxes. Total tax revenues are \$37,737 to local and State coffers.

Total summary results malting, pasta and noodles, and cluster firms

Total economic impacts of the cluster firms (including pasta and noodles) are \$11.3 million in output (sales), \$4.7 million in gross regional product, \$1.8 million in total compensation, and about 30.9 jobs. The average total compensation per job is \$58,076, including the multiplier effects.

The cluster firms will generate tax revenues of approximately \$554,298 property taxes, \$1,087,999 sales and excise taxes, and \$22,026 other taxes. Total tax revenues are \$1,664,323 to local and State coffers.

Grand total malting, pasta and noodles, and cluster firms

Total economic impacts are \$15.4 million in output (sales), \$6.4 million in gross regional product, \$2.8 million in total compensation, and about 46.3 jobs. The average total compensation per job is \$61,658, including the multiplier effects.

The total tax revenues are approximately \$589,669 in property taxes, \$1,181,218 sales and excise taxes, and \$28,004 other taxes. Grand total tax revenues are \$1,798,891 to local and State coffers.

In December 2023, Columbia County's labor force totaled 1,764. The creation of 46.3 jobs by the cluster amounts to 2.6% of the county's labor force. Of the total labor force in December 2023, 91 people were unemployed (5.2% unemployment rate), so the creation of 46.3 jobs would represent 50.5% of the county's unemployed workers.

DETAILED REPORT

Economic base assessment

This analysis is founded on economic base theory. A local or regional economy has two types of industries: base industries and non-base industries. Any economic activity that brings money into the local economy from the outside is considered a base industry. A base industry is sometimes identified as an export industry, which is defined as any economic activity that brings new monies into the community from outside. For example, base industries can include high-technology companies, medical services, retail trade services, federal government operations, as well as other manufacturing, agriculture, and service firms. Firms providing services to individuals living outside the region's trade center, such as medical and legal services, are included in the region's base. Payments from state and federal governments (including Social Security, Medicare, university funding, and welfare payments) are sources of outside income to businesses and residents. These are counted as part of the economic base. Import substitution can also be basic under certain circumstances.

Non-base industries are defined as economic activity within a region that supports local consumers and businesses. They re-circulate incomes within the region. Such activities include shopping malls that serve the local population, business and personal services consumed locally, medical services consumed locally, and local construction contracts.

Base industries are sometimes confused with non-base industries. For example, some county economies have large retail trade sectors that produce a paradox: they employ a substantial percentage of the workforce but contribute little economic impact because most of the retail sales are local. They bring little new money into the community. Thus, it appears from the size effect that the retail trade sector contributes a large amount of employment and earnings to the economy. In reality, most of this employment and earning activity is allocated or attributed to other local "export" industries that bring revenues into the community from outside. From a "size" perspective, the retail trade sector appears large. However, from an economic base perspective which determines the economic "drivers" of the economy, the retail trade sector is actually much smaller. Only the retail trade activities serving visitors from outside the area can be counted as economic base activity and employment.

Economic base analysis is important for identifying the vital export industries of a region. Non-base industries, on the other hand, are important for keeping money within a region and stimulating local economic activity for residents. In this respect, non-base industries can function in the same manner as an export industry. For example, suppose an Idaho patient elects surgery at a local hospital instead of traveling to a medical center in Salt Lake City, Utah. The substitution of local services for an imported service represents an increase in the demand for local business services. Keeping income in the community enhances the multiplier effects of the export industries. The overall effect of import substitution can be viewed as an analogous increase in demand for an export industry. Our economic models are founded on economic base theory. Thus, medical patients from outside the respective

counties or core economic area are counted as base as well as local patients who would have traveled outside the regional economy for health care services in the absence of the local hospital.

Defining and explaining economic impacts

Economic impacts measure the magnitude or importance of the expenditures of basic (export) industries. Our economic model estimates multipliers for each industrial and service sector. Suppose you have a (hypothetical) multiplier of 1.45. Every dollar of direct expenditure creates \$1.45 dollars of total new spending in the community economy.

Impacts are apportioned into two levels. The first level is the direct impact of the malt processing expenditures on each respective county economy – the jobs, payroll and earnings, value-added, and sales that are directly created by the processing facility as export businesses. The second is comprised of two parts: a) the impacts on other regional businesses that provide goods or services to the malting processing - the indirect impacts - and b) the effect of employee and related consumer spending on the economy - the induced impacts. The indirect and induced impacts are the so-called “ripple” or multiplier effects of the hospitals in each respective economy. The multiplier or ripple effects are driven by the exports of an economy. Exports, the new money coming into an economy, set off a web of transactions as each business seeks to fulfill the demands of their customers. A manufacturing or processing’s impact upon the economy is thus comprised of the magnitude of the multiplier(s) and the magnitude of the exports. The sum of the direct, indirect, and induced effects measures the total impact of an industry on an economy.

Multipliers

The IMPLAN modeling framework is robust and capable of modeling changes in the expenditures affecting any specific industry or any multiple industries at the same time. The IMPLAN model will create an effective average output (sales) multiplier for each expenditure pattern under analysis.

Results

An IMPLAN model was created to estimate the forecasted impacts of the proposed malting facility. The malting operations were reported using a Washington State model as the supply chain encompasses a regional footprint in the state. The market region for sales of all of the products in this analysis is potentially multi-state. The products are niche and specialized, and thus the expenditures were considered basic. Most of the impacts will be in Columbia County where the facilities are located. For malting, it was assumed that the barley was imported (i.e., netted out of the impacts) because it can be sold and exported in the absence of the malting facility.

A south-east Washington State model that included the counties of Asotin, Whitman, Garfield, Columbia, Franklin, Walla Walla, and Benton was utilized to measure the impacts of the cluster firms’ operations, including the pasta and noodles operations.

Descriptions and definitions

The reported economic impacts include the direct impacts of cluster firm operations as well as the backward linkages of that spending as it circulates throughout the economy, i.e., the multiplier effects. It also includes the impacts of consumer spending relating to this economic activity. The following economic model outputs were reported:

Direct (actual) annual employment (not including the multiplier effects)

Sales transactions– reflects the total transactions from all sources in dollars by direct, indirect, and induced economic activity (i.e., including the multiplier effects).

Gross Regional Product – the overall net contribution to the economy (a subset of sales transactions) from the cluster firm related expenditures. Gross regional product includes employee compensation, proprietor income, other property income, and indirect taxes.

Total Compensations (payroll) – (a subset of gross regional product) includes wage, salary, proprietor income payments, and fringe benefits (i.e., supplements) to workers (including the multiplier effects).

Total Employment – represents the total employment resulting from economic activity (including the multiplier effects).

Local and State Taxes – includes local property taxes, sales taxes and excise taxes, and all other state taxes (including the multiplier effects).

Summary results (malting facility)

Table 2 | Economic impact results malting facility

Impact Type	Employment	Total Compensation	Gross Regional Product	Output
Direct Effect	7	\$435,847	\$544,258	\$2,000,000
Indirect Effect	4.8	\$431,005	\$781,226	\$1,461,282
Induced Effect	3.6	\$229,125	\$431,643	\$695,446
Total Effect	15.4	\$1,095,977	\$1,757,127	\$4,156,728

The base case for the malting facility is about \$2 million in annual revenues and subsequent expenditures with a gross payroll of about \$435,000 and 7 direct employees (Table 2).

Factoring in the multiplier effects, the total economic impacts are \$4.2 million in output (sales), \$1.8 million in gross regional product, \$1.1 million in total compensation, and about 15.4 jobs. The average total compensation per job is \$71,167, including the multiplier effects.

The malting facility will generate considerable tax revenues of approximately \$35,371 property taxes, \$93,219 sales and excise taxes, and \$5,978 other taxes. Total tax revenues are \$134,568 to local and State coffers (Table 3).

Table 3 | Tax Impact results malting facility

Tax Type	Taxes \$
Property	\$35,371
Sales/Excise	\$93,219
Other	\$5,978
Total	\$134,568

Table 4 | Forecasted economic impact scenarios of the malting facility

Impact Type	Employment	Total Compensation	Value Added	Output
Base Case	15.4	\$1,095,977	\$1,757,127	\$4,156,728
Scale 150%	23.1	\$1,643,966	\$2,635,691	\$6,235,092
Scale 250%	38.5	\$2,739,943	\$4,392,818	\$10,391,820

Two forecasting scenarios were conducted in addition to the base case. Scenario One increased revenues to \$3 million (150% of the Base Case). Scenario Two increased revenues to \$5 million or 250% of Base Case. The jobs impacts increase to 15,4 jobs in the base case to nearly 39 jobs in the 250% Second Scenario.

Output impacts increase from \$4,2 million in the Base Case to \$10.4 million in Scenario Two. Total Compensation increases from \$1.1 million in the Base Case to \$2.7 million in Scenario Two (Table 4).

The tax impacts also increase significantly, from \$134,568 in the Base Case to \$336,420 in Scenario Two (Table 5).

Table 5 | Tax impact scenarios malting facility

Tax Type	Taxes \$
Base Case	\$134,568
Scale 150%	\$201,852
Scale 250%	\$336,420

Summary results (pasta and noodles facility)

The base case for the pasta and noodles facility is smaller to the malting. It will have about \$1 million in annual revenues with a gross payroll of about \$226,397 and 2.3 direct employees. (Table 6).

Table 6 | Economic impact results pasta and noodles facility

Impact Type	Employment	Total Compensation	Gross Regional Product	Output
Direct Effect	2.3	\$153,333	\$226,397	\$1,000,000
Indirect Effect	1.5	\$109,006	\$167,189	\$395,817
Induced Effect	1.1	\$51,540	\$100,872	\$168,828
Total Effect	4.9	\$313,879	\$494,459	\$1,564,644

The pasta and noodles facility will generate considerable tax revenues of approximately \$9,229 property taxes, \$18,115 sales and excise taxes, and \$3,714 other taxes. Total tax revenues are \$31,058 to local and State coffers (Table 7).

Table 7 | Tax impact results pasta and noodles facility

Tax Type	Taxes \$
Property	\$9,229
Sales/Excise	\$18,115
Other	\$3,714
Total	\$31,058

Forecasting scenarios

Table 8 | Forecasted economic impact scenarios of the pasta and noodles facility

Impact Type	Employment	Total Compensation	Value Added	Output
Base Case	4.9	\$313,879	\$494,459	\$1,564,644
Scale 150%	7.4	\$470,818	\$741,689	\$2,346,967
Scale 250%	12.3	\$784,697	\$1,236,148	\$3,911,611

Two forecasting scenarios were conducted in addition to the base case. The high scenario (250%) created \$3.9 million in output and about 12 jobs. The mid-scenario (150%) created \$2.3 million in output and about 7 jobs, including the multiplier effects.

Output impacts increase from \$1.56 million in the Base Case to \$3.9 million in Scenario Two. Total Compensation increases from \$0.31 million in the Base Case to \$0.78 million in Scenario Two (Table 8).

The tax impacts also increase significantly, from 31,058 in the Base Case to \$77,644 in Scenario Two (Table 9).

Table 9 | Tax impact scenarios pasta and noodles facility

Tax Type	Taxes \$
Base Case	\$31,058
Scale 150%	\$46,587
Scale 250%	\$77,644

Summary results (cluster firms)

There are three sets of analyses conducted for this study: 1) Detailed analysis for the proposed malting operation and facility, 2) Preliminary analysis for the noodle and pasta operation and facility, and 3) Preliminary analyses for the cluster firm operations and facility. The cluster firm analysis includes the pasta and noodle operation, a specialty bakery, a distillery, and a commercial kitchen with storage. The

economic impacts of the malting operations were conducted using a state model (Washington State). The pasta and noodles operations and cluster firms' operations were conducted using a regional model that included the counties of Asotin, Whitman, Garfield, Columbia, Franklin, Walla Walla, and Benton. The direct revenues, payroll, and jobs are illustrated in Table 10. In total, fully developed the total cluster firms' direct employment (including pasta and noodles) could reach 15 jobs, \$0.8 million in payroll, and \$7.9 million in sales. These are estimates with a high degree of variability. Factoring in the malting, the total direct annual operations reaches \$9.9 million in revenues, \$1.25 million in payroll, and 22 jobs (Table 10).

Table 10 | Direct estimated revenues, payroll, and jobs

Firm/Operation	Direct Jobs	Payroll	Revenues
Pasta and Noodles	2	\$153,333	\$1,000,000
Specialty Bakery	4	\$208,365	\$549,349
Distillery	7	\$331,724	\$5,881,391
Commercial Kitchen	2	\$125,000	\$500,000
Sub-Total Cluster	15	\$818,422	\$7,930,740
Malting	7	\$435,847	\$2,000,000
Grand Total	22	\$1,254,269	\$9,930,740

Summary results specialty bakery

The specialty bakery is estimated to have about \$549,349 in annual revenues and subsequent expenditures with a gross payroll of about \$208,365 and 4 direct employees (Table 11).

Table 11 | Economic impact results specialty bakery

Impact Type	Employment	Total Compensation	Value Added	Output
Direct Effect	4	\$ 208,365	\$ 268,874	\$ 549,349
Indirect Effect	0.7	\$ 50,640	\$ 78,624	\$ 182,402
Induced Effect	1	\$ 50,521	\$ 98,932	\$ 165,541
Total Effect	5.7	\$ 309,526	\$ 446,430	\$ 897,292

Factoring in the multiplier effects, the total economic impacts are \$0.9 million in output (sales), \$0.5 million in gross regional product, \$0.3 million in total compensation, and about 5.7 jobs. The average total compensation per job is \$ \$54,303, including the multiplier effects.

The specialty bakery will generate tax revenues of approximately \$13,347 property taxes, \$26,198 sales and excise taxes, and \$3,931 other taxes. Total tax revenues are \$43,476 to local and State coffers (Table 12).

Table 12 | Tax impact results specialty bakery

Tax Type	Taxes \$
Property	\$13,347
Sales/Excise	\$26,198
Other	\$3,931
Total	\$43,476

Summary results distillery

The distillery is estimated to have about \$5.9 million in annual revenues and subsequent expenditures with a gross payroll of about \$331,724 and 7 direct employees (Table 13).

Table 13 | Economic impact results distillery

Impact Type	Employment	Total Compensation	Value Added	Output
Direct Effect	7	\$331,724	\$2,243,935	\$5,881,391
Indirect Effect	6.8	\$441,404	\$873,197	\$1,700,137
Induced Effect	3.1	\$151,021	\$295,705	\$494,820
Total Effect	16.9	\$924,149	\$3,412,837	\$8,076,348

Factoring in the multiplier effects, the total economic impacts are \$8.1 million in output (sales), \$3.4 million in gross regional product, \$0.9 million in total compensation, and about 5.7 jobs. The average total compensation per job is \$54,683, including the multiplier effects.

The distillery will generate tax revenues of approximately \$519,858 property taxes, \$1,020,398 sales and excise taxes, and \$11,796 other taxes. Total tax revenues are \$1,552,052 to local and State coffers (Table 14).

Table 14 | Tax impact results distillery

Tax Type	Taxes \$
Property	\$519,858
Sales/Excise	\$1,020,398
Other	\$11,796
Total	\$1,552,052

Summary results commercial kitchen and locker space

The commercial kitchen is estimated to produce about \$500,000 in annual revenues and subsequent expenditures with a gross payroll of about \$125,000 and 2 direct employees (Table 15).

Table 15 | Economic impact results commercial kitchen

Impact Type	Employment	Total Compensation	Value Added	Output
Direct Effect	2	\$125,000	\$192,530	\$500,000
Indirect Effect	0.7	\$41,956	\$63,596	\$114,461
Induced Effect	0.7	\$32,522	\$63,692	\$106,570
Total Effect	3.4	\$199,478	\$319,818	\$721,031

Factoring in the multiplier effects, the total economic impacts are \$0.7 million in output (sales), \$0.3 million in gross regional product, \$0.2 million in total compensation, and about 3.4 jobs. The average total compensation per job is \$ \$58,670, including the multiplier effects.

The commercial kitchen will generate tax revenues of approximately \$11,864 property taxes, \$23,288 sales and excise taxes, and \$2,585 other taxes. Total tax revenues are \$37,737 to local and State coffers (Table 16).

Table 16 | Tax impact results commercial kitchen

Tax Type	Taxes \$
Property	\$11,864
Sales/Excise	\$23,288
Other	\$2,585
Total	\$37,737

Summary results malting, pasta and noodles, and cluster firms

Total economic impacts of the cluster firms (including pasta and noodles) are \$11.3 million in output (sales), \$4.7 million in gross regional product, \$1.8 million in total compensation, and about 30.9 jobs. The average total compensation per job is \$58,076, including the multiplier effects (Table 17).

Table 17 | Economic impact results cluster firms including pasta and noodles (not including malting)

Impact Type	Employment	Total Compensation	Value Added	Output
Direct Effect	15.3	\$818,422	\$2,931,736	\$7,930,740
Indirect Effect	9.7	\$643,006	\$1,182,606	\$2,392,817
Induced Effect	5.9	\$285,604	\$559,201	\$935,759
Total Effect	30.9	\$1,747,032	\$4,673,544	\$11,259,315

Factoring in the multiplier effects, the total economic impacts are \$14.4 million in output (sales), \$5.7 million in gross regional product, \$2.4 million in total compensation, and about 40.9 jobs. The average total compensation per job is \$54,683, including the multiplier effects.

The cluster firms will generate tax revenues of approximately \$572,756 property taxes, \$1,124,227 sales and excise taxes, and \$29,454 other taxes. Total tax revenues are \$1,726,437 to local and State coffers (Table 18).

Table 18 | Tax impact results cluster firms

Tax Type	Taxes \$
Property	\$572,756
Sales/Excise	\$1,124,227
Other	\$29,454
Total	\$1,726,437

Grand total malting, pasta and noodles, and cluster firms

Total economic impacts are \$15.4 million in output (sales), \$6.4 million in gross regional product, \$2,8 million in total compensation, and about 46.3 jobs. The average total compensation per job is \$61,658, including the multiplier effects (Figure 19).

The total tax revenues are approximately \$589,669 in property taxes, \$1,181,218 sales and excise taxes, and \$28,004 other taxes. Grand total tax revenues are \$1,798,891 to local and State coffers (Figure 20).

Table 19 | Economic Impact Results Total

Impact Type	Employment	Total Compensation	Value Added	Output
Direct Effect	22	\$1,254,269.33	\$3,475,994.00	\$9,930,740.00
Indirect Effect	15	\$1,074,010.67	\$1,963,832.33	\$3,854,099.00
Induced Effect	9	\$514,728.67	\$990,844.33	\$1,631,204.67
Total Effect	46	\$2,843,009	\$6,430,671	\$15,416,043

Table 20 | Tax Impact Results

Tax Type	Taxes \$
Property	\$589,669
Sales/Excise	\$1,181,218
Other	\$28,004
Total	\$1,798,891

INVESTMENT ANALYSIS

Investment analysis is the process of quantifying inflows (revenues) and outflows (expenses) over a defined period. The outcome of such an analysis demonstrates the profitability of a given venture. Standard investment metrics include net present value (NPV), benefit-cost ratios (B-C), internal rates of return (IRR), and payback periods. Any forecast of inflows and outflows requires a set of assumptions as to the growth rates of such variables. Those assumptions are as follows:

- A 20-year time horizon for the investment.
- A 10% discount rate reflecting time value of money, risk premium, and duration or expected term of the investment.
- A growth in market demand of 1.2% (this is captured as a price premium rather than a quantity change though either are technically feasible).
- A price elasticity of demand of -0.3% (a 1% ceteris paribus increase in price leads to only a 0.3% fall in quantity demanded).
- A growth rate in costs of 2% accounting for labor income operating cost increases. A large portion of these costs may be transferred to customers.

These baseline assumptions are varied in a sensitivity analysis to provide a range of potential outcomes. It is clear from the sensitivity analysis that the downside risk of this particular investment appears limited relative to the potential profits. The following table shows the results of the aforementioned assumptions and the initial investment and budget values provided in Appendix B.

Net present value

The malthouse study estimated costs for two scenarios: the “North American” system is estimated to cost \$8.4 million and the RimoMalt 32 system is estimated to cost \$10.2 million. Here, we analyze the investment for both scenarios.

The initial capital investment in Tables 1.1 (“North American” system) and 1.2 (RimoMalt 32 system) constitute the up-front costs that must be incurred before any operations can begin. This is primarily reflective of the equipment costs for the facility and does not include regulatory compliance costs, architectural and engineering costs, or other start-up costs. In exchange, the facility expects to be able to recover these costs within a reasonable time horizon. The question is simple: Will the prospective profits of the firm be economically sufficient to warrant the investment? The net returns annually (revenues minus expenses) must be high enough to not only be positive but serve to payoff the initial investment along with any return that might have been made had the money been employed elsewhere in the economy. That is, we need to be able to generate a return on the investment, and a return of the investment. Revenues and expenses are less valuable because future money is worth less than present money. Investment costs (start-up fees and foregone earnings) are felt immediately because they are incurred today, in the present. Revenues and expenses, on the other hand, occur in the future. They are not yet available. All future revenues and expenses must be discounted by to account for time value of money, risk, and lack of liquidity (referred to as the discount rate) to be able to express them in present value terms.

Let us take a brief example. At 4%, the present value of \$5,000 to be received one year from today is \$4,807. If \$5,000 were to be received in year 10, the present value would be reduced to \$3,377. Put another way, \$4,807 deposited in the bank today earning 4% interest will grow to \$5,000 in one year; and \$3,377 deposited today would grow to \$5,000 in 10 years. An “economically rational” person would, therefore, be equally satisfied receiving \$3,377 today or \$5,000 10 years from today given the going rate of interest of 4%. The process of discounting—finding the present value of future higher earnings—allows the model to express values on an equal basis i.e., present value terms.

Table 1.1:

North American Malting System 35-ton batch, 1,765 tons/year

Year	Income	Investment		Fixed costs	Net Income	Cumulative Net Income
		Costs	Operating costs			
1	-	\$8,213,165	-	-	-\$8,213,165	-\$8,213,165
2	\$1,356,750	\$0	\$860,805	\$400,448	\$95,497	-\$8,117,668
3	\$1,901,349	\$0	\$1,057,424	\$405,506	\$438,419	-\$7,679,249
4	\$2,471,754	\$0	\$1,271,408	\$405,909	\$794,437	-\$6,884,812
5	\$2,536,020	\$0	\$1,296,836	\$414,027	\$825,156	-\$6,059,656
6	\$2,601,956	\$0	\$1,322,773	\$422,308	\$856,876	-\$5,202,780
7	\$2,669,607	\$0	\$1,349,228	\$430,754	\$889,625	-\$4,313,155
8	\$2,739,017	\$0	\$1,376,213	\$439,369	\$923,435	-\$3,389,721
9	\$2,810,231	\$0	\$1,403,737	\$448,156	\$958,338	-\$2,431,383
10	\$2,883,297	\$0	\$1,431,812	\$457,119	\$994,366	-\$1,437,017
11	\$2,958,263	\$0	\$1,460,448	\$466,262	\$1,031,553	-\$405,464
12	\$3,035,178	\$0	\$1,489,657	\$475,587	\$1,069,934	\$664,469
13	\$3,114,092	\$0	\$1,519,450	\$485,099	\$1,109,543	\$1,774,013
14	\$3,195,059	\$0	\$1,549,839	\$494,801	\$1,150,419	\$2,924,431
15	\$3,278,130	\$0	\$1,580,836	\$504,697	\$1,192,597	\$4,117,029
16	\$3,363,362	\$0	\$1,612,453	\$514,791	\$1,236,118	\$5,353,147
17	\$3,450,809	\$0	\$1,644,702	\$525,087	\$1,281,021	\$6,634,168
18	\$3,540,530	\$0	\$1,677,596	\$535,588	\$1,327,346	\$7,961,514
19	\$3,632,584	\$0	\$1,711,148	\$546,300	\$1,375,136	\$9,336,650
20	\$3,727,031	\$0	\$1,745,371	\$557,226	\$1,424,434	\$10,761,084
	\$55,265,019	\$8,213,165	\$27,361,736	\$8,929,034	\$10,761,084	-\$4,607,565
NPV	\$21,960,557.69	\$8,213,165.00	\$11,152,213.02	\$3,730,783.18	(\$1,135,603.51)	
B/C					0.95	
IRR					8%	
Payback					11.38 yrs	

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today. As indicated in Table 1.1 the cumulative present value of all forecasted revenue for the North American system between years 2 and 20 is \$21.96 million, given a 10% discount rate, far lower than the undiscounted \$55.27 million undiscounted total.

The net present value of the North American system investment is -\$1.14 million. This is simply the present value of the revenues minus the present value of all costs, or \$21.96 million - \$23.09 million = -\$1.14 million. The less than zero NPV means that this investment underperforms what we would consider a normal investment at this size and duration. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment is sub-optimal. Were grants available for funding the construction costs the project would likely become financially profitable.

Table 1.2:

RimoMalt 32 System						
Year	Income	Investment Costs	Operating costs	Fixed costs	Net Income	Cumulative Net Income
1	-	\$10,190,156	-	-	-\$10,190,156	-\$10,190,156
2	\$1,139,400	\$0	\$815,637	\$400,448	-\$76,685	-\$10,266,841
3	\$1,595,900	\$0	\$993,803	\$405,506	\$196,591	-\$10,070,250
4	\$2,120,454	\$0	\$1,205,503	\$405,909	\$509,042	-\$9,561,208
5	\$2,175,586	\$0	\$1,229,613	\$414,027	\$531,946	-\$9,029,262
6	\$2,232,151	\$0	\$1,254,205	\$422,308	\$555,638	-\$8,473,624
7	\$2,290,187	\$0	\$1,279,289	\$430,754	\$580,144	-\$7,893,481
8	\$2,349,732	\$0	\$1,304,875	\$439,369	\$605,488	-\$7,287,993
9	\$2,410,825	\$0	\$1,330,973	\$448,156	\$631,696	-\$6,656,297
10	\$2,473,506	\$0	\$1,357,592	\$457,119	\$658,795	-\$5,997,503
11	\$2,537,817	\$0	\$1,384,744	\$466,262	\$686,812	-\$5,310,691
12	\$2,603,801	\$0	\$1,412,439	\$475,587	\$715,775	-\$4,594,916
13	\$2,671,500	\$0	\$1,440,688	\$485,099	\$745,713	-\$3,849,203
14	\$2,740,959	\$0	\$1,469,501	\$494,801	\$776,656	-\$3,072,547
15	\$2,812,223	\$0	\$1,498,891	\$504,697	\$808,635	-\$2,263,912
16	\$2,885,341	\$0	\$1,528,869	\$514,791	\$841,681	-\$1,422,231
17	\$2,960,360	\$0	\$1,559,447	\$525,087	\$875,827	-\$546,404
18	\$3,037,329	\$0	\$1,590,636	\$535,588	\$911,106	\$364,702
19	\$3,116,300	\$0	\$1,622,448	\$546,300	\$947,552	\$1,312,253
20	\$3,197,324	\$0	\$1,654,897	\$557,226	\$985,200	\$2,297,454
	\$47,350,695	\$10,190,156	\$25,934,052	\$8,929,034	\$2,297,454	-
						\$102,512,111
NPV	\$18,787,998.33	\$10,190,156.00	\$10,566,347.50	\$3,730,783.18	(\$5,699,288.36)	
B/C					0.77	
IRR					2%	
Payback					17.6 yrs	

The goal is to express all future higher earnings in present value terms so that they can be compared to investments incurred today. As indicated in Table 1.2 the cumulative present value of all forecasted revenue for the RimoMalt system between years 2 and 20 is \$18.79 million, given a 10% discount rate, far lower than the \$47.35 million undiscounted total.

The net present value of the investment is -\$5.7 million. This is simply the present value of the revenues minus the present value of all costs, or \$18.79 million - \$24.49 million = -\$5.7 million. The less than zero NPV means that this investment underperforms what we would consider a normal investment at this size and duration. Given this result, it can be concluded that, in this case, and given these assumptions, this particular investment is sub-optimal. Were grants available for funding the construction costs the project would likely become financially profitable.

Internal rate of return (IRR)

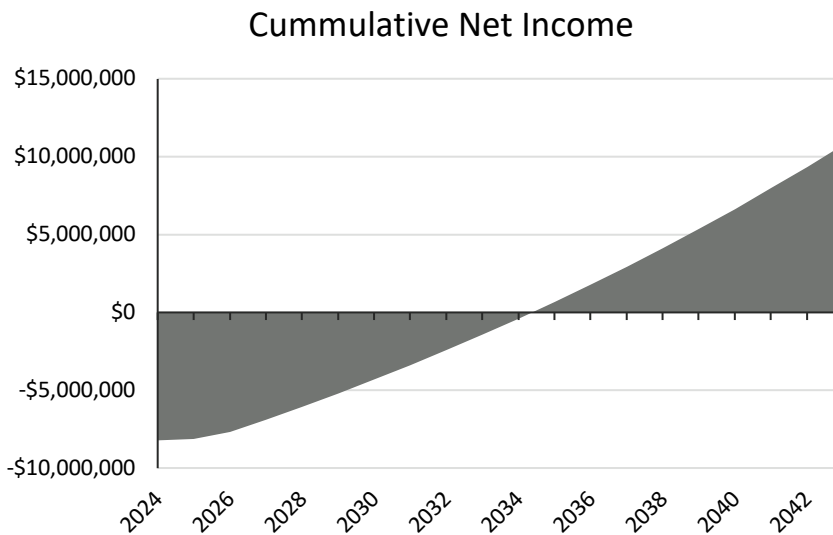
The internal rate of return (IRR) is another way of measuring the worth of an investment using the same cash flows as those used in calculating the NPV. In technical terms, the internal rate of return is a measure of the average earning power of money used over the life of the investment. It is simply the interest rate that makes the net present value equal to zero.

North American system IRR

In the discussion of the net present value above, the model applies the going rate of expected market return, 10%, and computes a negative net present value of -\$1.13 million. The question now is, what would the interest rate have to be in order to increase the net present value to zero, making us indifferent to the investment. Obviously it would have to be lower—8.0% in fact, as indicated in Table 1.1. Or, if a discount rate of 8.0% were applied to the net present value calculations instead of the 10%, then the net present value would increase to zero.

What does this mean? The internal rate of return of 8.0% defines a breakeven solution—the point where the present value of benefits just equals the present value of costs, or where the net present value equals zero. Or, at 8.0%, the next nineteen years will earn back all the initial investments plus pay 8.0% for the use of that money. Is this a good return? If it is compared to the 10% going rate of interest applied to the net present value calculations, 8.0% is slightly lower. It may be concluded, therefore, that the investment in this case is unprofitable. Alternatively, comparing the 8.0% rate of return to the long-term 7% rate, or so, obtained from investments in stocks and bonds also indicates that the investment in the malting facility is slightly better than an indexed fund's performance on stock market returns (on average).

Figure 1.1 North American system

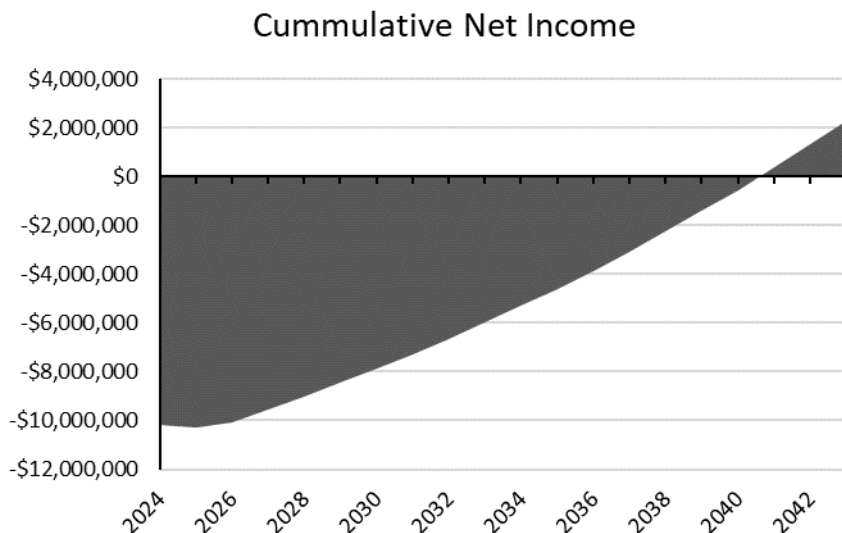


RimoMalt 32 system IRR

In the discussion of the net present value above, the model applies the going rate of expected market return, 10%, and computes a negative net present value of -\$5.7 million. The question now is, what would the interest rate have to be in order to increase the net present value to zero, making us indifferent to the investment. Obviously it would have to be lower—2.0% in fact, as indicated in Table 1.1. Or, if a discount rate of 2.0% were applied to the net present value calculations instead of the 10%, then the net present value would increase to zero.

What does this mean? The internal rate of return of 2.0% defines a breakeven solution—the point where the present value of benefits just equals the present value of costs, or where the net present value

Figure 1.2. RimoMalt 32



equals zero. At 2.0%, the next nineteen years will earn back all the initial investments plus pay 2.0% for the use of that money. Is this a good return? If it is compared to the 10% going rate of interest applied to the net present value calculations, 2.0% is much lower. It may be concluded, therefore, that the investment in this case is unprofitable. Alternatively, comparing the 2.0% rate of return to the long-term 7% rate, or so, obtained from investments in stocks and bonds also indicates that the investment in the malting facility is worse than an indexed fund’s performance on stock market returns (on average).

Benefit-cost ratio

North American system B-C ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or \$21.96 million ÷ \$23.09 million = 0.95 (based on the 10% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 8% internal rate of return discussed above would reduce the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than 8% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 0.95 ratio means that a dollar invested today will return a cumulative \$0.95 over the 20-year time period.

RimoMalt 32 system B-C ratio

The benefit-cost ratio is simply the present value of benefits divided by present value of costs, or \$18.79 million ÷ \$24.49 million = 0.77 (based on the 10% discount rate). Of course, any change in the discount rate would also change the benefit-cost ratio. Applying the 2% internal rate of return discussed above would increase the benefit-cost ratio to 1.0, the breakeven solution where benefits just equal costs. Applying a discount rate higher than 2% would reduce the ratio to lower than 1.0, and the investment would not be feasible. The 0.77 ratio means that a dollar invested today will return a cumulative \$0.77 over the 20-year time period.

Payback period

North American system payback period

Payback period is the length of time from the beginning of the investment until higher future returns give a nominal return on the investment made. In Table 1.1, it will take roughly 11 years and 4 months (see Figure 1). After that point the investment generates money beyond the initial investment and beginning to generate returns (not accounting for opportunity costs and risk). The payback period is a fairly rough, albeit common, means of choosing between investments. The shorter the payback period, the more preferred the investment, because our investment dollars are not being tied up as long.

RimoMalt 32 system payback period

In Table 1.2, it will take roughly 17.6 years (see Figure 1).

Sensitivity analysis

The sensitivity analysis shows how the investment would perform under a different set of assumptions. We vary the growth rates, discount rates, and cost metrics to show a feasible upper and lower bound relative to the baseline discussed above. Admittedly these assumptions are informed by historic market fluctuations but represent in that analyst's expert opinion of a feasible range. While there is minimal downside risk of the investment failing, there are highly profitable upside benefits, suggesting the investment is sound overall.

Table 2: North American system

Assumptions	Lower Bound	Baseline	Upper Bound
Discount Rate	15%	10%	5%
Market Growth Rate	0.60%	1.2%	1.80%
Elasticity	-0.3	-0.3	-0.3
Cost Growth rate	4%	2.0%	2.0%
NPV	(\$3,772,678)	(\$1,135,604)	\$4,266,685
B/C Ratio	0.81	0.95	1.14
IRR	7%	8%	9%
Payback	11.9 yrs	11.38 yrs	10.95 yrs

Table 3: RimoMalt 32 system

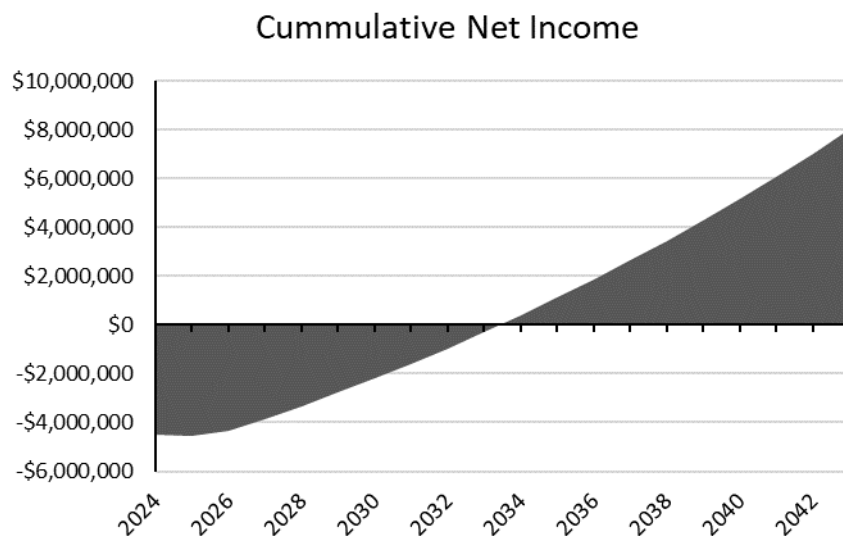
Assumptions	Lower Bound	Baseline	Upper Bound
Discount Rate	15%	10%	5%
Market Growth Rate	0.6%	1.2%	1.8%
Elasticity	-0.3	-0.3	-0.3
Cost Growth rate	4.0%	2.0%	2.0%
NPV	(\$7,835,333)	(\$5,699,288)	(\$2,036,778)
B/C Ratio	0.64	0.77	0.94
IRR	-1%	2%	3%
Payback	#N/A	17.6 yrs	16.4 yrs

Capital grants and investment feasibility

Assuming various economic development grants can be obtained to offset a portion of the \$10.2 million in construction and capital investment costs for the RimoMalt 32 system, what level of support is needed for the private investment to generate a normal return? We run a host of scenarios designed to generate a breakeven analysis where the NPV is near zero, the benefit cost ratio is 1 and the IRR is equal to the 10% discount rate. For the business to be indifferent to the investment they would need to offset the \$10.2 million initial investment by approximately 56% so that the private sector portion of the initial investment amounted to approximately \$4.48 million, and the capital grants amounted to \$5.7 million. This is based off baseline assumptions with a 10% discount rate.

While these numbers sound large for small municipalities this type of public-private partnership is quite normal. The new airport terminal in Pullman, WA, (PUW) received 84% of the capital funds, \$75.1 million, from federal sources. The Climate Pledge Arena remodel cost the city of Seattle \$74.5 million and the Super Sonics \$21 million, a roughly 78% to 22% public private split. Figure 1.3 shows how the cumulative net returns improve under this scenario, reducing the payback period to just under 10.5 years with a 10% rate of return.

Figure 1.3 RimoMalt 32 system



Pasta and dry baked goods manufacturing facility

All of the metrics above, including the assumptions, were also used in conducting an investment analysis for a proposed dry pasta manufacturing facility as well. The operating and fixed costs, as well as profit margins were estimated using data on the industry Cookie, Cracker, & Pasta Manufacturing from the IBIS world databases. Dry pasta generated an expected \$4.8 billion in revenues during 2023 and composed 17.1% of the entire industry. Profit margins industry wide came in at 4.6% and were assumed to be the same for the dry pasta segment. Table 1.3 shows the results of the investment analysis. Because of the age of the industry, revenue and industry volatility are both low, however niche markets have seen mild growth in recent years.

Unfortunately, data on new facility construction and equipment was not readily available. Based on expected employment and current grain prices, we estimate the firm will consume 5,134 lbs. of grain in their production process and will require a facility and equipment totaling \$1.5 million. The single largest cost of production is expected to be the cost of goods consumed in the production process, including cardboard containers, grain, electricity, transportation services and natural gas. Because the industry tends to be capital intensive employment, and the total wage bill, tend to be lower.

Based on the conservative baseline assumptions the facility is expected to just about break even from an benefit/cost perspective (98%). It is still expected to lose roughly \$205 thousand in present value terms, however income is expected to exceed operating and fixed costs as soon as the facility is fully operational. This again, suggests that external grant funding for the initial facility would make the investment viable and profitable, as long as repayment of such startup funds was not required.

The expected growth in operating costs, grain, electricity, etc., is slated to grow faster than overall revenues. If the current prices and market capacity stay the same, profitability will decline. In order to avoid long-run insolvency, a strong marketing program and growing demand, as well as healthy price premiums for specialty pasta will be necessary. Cumulative Annual net income, including the initial \$1.5 million, is not expected to be recovered in nominal terms until approximately 13 years after opening.

Figure 1.3 Pasta manufacturing

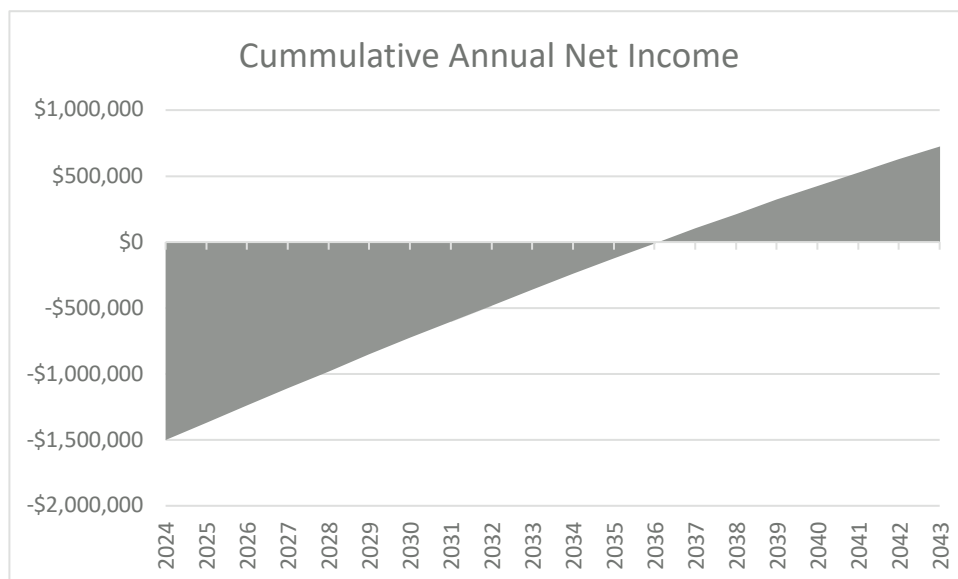


Table 1.3:

Year	Income	Investment Costs	Operating costs	Fixed costs	Net Income
2024		\$1,500,000			-\$1,500,000
2025	\$1,000,000		\$847,384	\$20,616	\$132,000
2026	\$1,015,500		\$863,993	\$20,616	\$130,891
2027	\$1,031,240		\$880,927	\$20,616	\$129,697
2028	\$1,047,224		\$898,193	\$20,616	\$128,415
2029	\$1,063,456		\$915,798	\$20,616	\$127,043
2030	\$1,079,940		\$933,747	\$20,616	\$125,577
2031	\$1,096,679		\$952,049	\$20,616	\$124,014
2032	\$1,113,678		\$970,709	\$20,616	\$122,353
2033	\$1,130,940		\$989,735	\$20,616	\$120,589
2034	\$1,148,469		\$1,009,134	\$20,616	\$118,720
2035	\$1,166,270		\$1,028,913	\$20,616	\$116,742
2036	\$1,184,348		\$1,049,079	\$20,616	\$114,652
2037	\$1,202,705		\$1,069,641	\$20,616	\$112,448
2038	\$1,221,347		\$1,090,606	\$20,616	\$110,125
2039	\$1,240,278		\$1,111,982	\$20,616	\$107,680
2040	\$1,259,502		\$1,133,777	\$20,616	\$105,109
2041	\$1,279,024		\$1,155,999	\$20,616	\$102,409
2042	\$1,298,849		\$1,178,657	\$20,616	\$99,577
2043	\$1,318,981		\$1,201,758	\$20,616	\$96,607
	\$21,898,432	\$1,500,000	\$19,282,080	\$391,705	\$724,647
NPV	\$12,023,573	\$1,500,000	\$10,507,505	\$221,307	(\$205,240)
B/C Ratio					0.98
IRR					5%
Payback					13.08 yrs

The sensitivity analysis is quite similar to that of the malting facility. With lower discount and cost growth rates, the investment can recover and generate a 9% IRR. Results of the sensitivity analysis are provide in Table 1.4.

Table 1.4:

Assumptions	Lower Bound	Baseline	Upper Bound
Discount Rate	15%	7%	5%
Market Growth Rate	0.6%	1.6%	1.8%
Elasticity	-0.3	-0.3	-0.3
Cost Growth rate	4%	2%	2%
NPV	(\$1,793,105)	(\$205,240)	\$182,425
B/C Ratio	0.78	0.98	1.01
IRR	#NUM!	5%	6%
Payback	#N/A	13.08 yrs	11.95 yrs

APPENDIX E

Grant Funding Prospects

PREPARED BY
Arrowleaf Consulting

Grant Funding Prospects

Party	Funder	Grant	Due	Amount	Summary	Link
PoC	US Department of Commerce	Economic Development Assistance Programs	Ongoing	\$3M	Funding to advance economic prosperity in distressed communities. Supports construction, non-construction, technical assistance, and revolving loan fund projects. Check if Columbia County is considered distressed	https://www.eda.gov/funding/funding-opportunities
PoC	USDA Agricultural Marketing Service	Local Food Promotion Program (LFPP)	5/2/23	Planning: \$25K - \$100K Implementation: \$100K - \$500K	2-3-year grant focusing on planning and implementation of local and regional food intermediary supply chain development. Requires a 25% match.	https://www.ams.usda.gov/services/grants/lfpp
PoC	USDA NIFA	Community Food Projects Competitive Grants Program	10/30/23	\$400K	Funding to build local food systems and respond to local food access, farm and nutrition issues, including strategies to reduce food waste and other agricultural needs that mutually benefit agricultural producers and consumers. 2023 date TBA.	https://www.nifa.usda.gov/grants/programs/community-food-projects-competitive-grant-program-cfpcqp
PoC	USDA Rural Development	Community Facilities Direct Loans, Guaranteed Loans, & Grants	5/1/22	Unspecified	Provides affordable funding to develop essential community facilities in rural areas. Can be used for food hubs, etc. 2023 grant date TBA. Loan program is ongoing.	https://www.rd.usda.gov/programs-services/community-facilities/community-facilities-direct-loan-grant-program/wa#overview
PoC	USDA Rural Development	Rural Innovation Stronger Economy (RISE)	4/20/23	\$500K - \$2M	Funds support industry clusters and maximize the use of local productive assets. Can be used to build or support a business incubator and/or provide worker training.	https://www.rd.usda.gov/programs-services/business-programs/rural-innovation-stronger-economy-rise-grants
PoC	WA Department of Commerce	CERB Committed Private Partner Program	1/30/23	\$50K	Loans and grants for construction of public infrastructure necessary for private business expansion. The Committed Private Partner (CPP) Program requires a private business commitment as part of the application. Loans up to \$5M and grants are available up to 25% of the total award with a 20% match.	https://www.commerce.wa.gov/building-infrastructure/community-economic-revitalization-board/cerb-committed-private-partner-program/

Grant Funding Prospects

Party	Funder	Grant	Due	Amount	Summary	Link
PoC and MM	USDA/WA Dept. of Agriculture	Resilient Food Systems Infrastructure Program	4/24 (anticipated)	\$100K - \$3M	Aims to build resilience across Washington state's middle-of-the-food-supply-chain – aggregation, processing, manufacturing, storing, transporting, wholesaling, and distribution – for locally and regionally produced foods including specialty crops and grains.	https://agr.wa.gov/services/grant-opportunities/resilient-food-system-infrastructure
MM	USDA Agricultural Marketing Service	Farmers Market Promotion Program (FMPP)	5/2/23	Capacity building: \$50K-\$250K; Community Development Training & Technical Assistance: \$100K-\$500K	Funds outreach, training, and technical assistance to farmers markets, roadside stands, CSA programs, agritourism activities, online sales or other direct producer-to-consumer market opportunities.	https://www.ams.usda.gov/services/grants/fmpp
MM	USDA Healthy Food Financing Initiative	Technical Assistance Grants	1/31/22	\$20K - \$200K	Technical assistance for organizations planning a food retail or enterprise project.	https://www.investinginfood.com/technical-assistance/
MM	USDA Healthy Food Financing Initiative	Targeted Small Grants Program	1/31/22	\$20K - \$200K	Capital investments into food enterprise projects. 2023 TBA.	https://www.investinginfood.com/tsg-program/
MM	USDA Rural Development	Value Added Producer Grants	5/11/23	Planning: \$75K Working Capital Grants: \$250K	Funding for agricultural producers to enter into value-added activities related to the processing and marketing of new products. The goals of this program are to generate new products, create and expand marketing opportunities and increase producer income. MUST CONTACT STATE REP BEFORE APPLYING.	https://www.rd.usda.gov/programs-services/business-programs/value-added-producer-grants/id

Grant Funding Prospects

Party	Funder	Grant	Due	Amount	Summary	Link
MM	USDA Rural Development	Food Supply Chain Guaranteed Loan Program	Ongoing	Up to a \$40M Loan	Part of USDA's Build Back Better initiative to strengthen critical supply chains and our food system. Eligible borrowers must be directly engaged in the middle of the food supply chain, specifically the aggregation, processing, manufacturing, storing, transporting, wholesaling, or distribution of food. Examples of the types of entities that may qualify for the program include a meat processor or a food hub.	https://www.rd.usda.gov/food-supply-chain-guaranteed-loans
MM	USDA Rural Development	Economic Impact Initiative Grant	Ongoing	Up to 75% of project costs	Funding to assist in the development of essential community facilities in rural communities with extreme unemployment and severe economic depression. Includes funding for food systems.	https://www.rd.usda.gov/programs-services/community-facilities/economic-impact-initiative-grants/wa#overview
MM	WA Department of Commerce	Collateral Support Program	Ongoing	Unspecified	Small business loan program. Apply through a WA Department of Commerce lender partner and qualify for a 2-3% fee. Maximum 18-month loan.	https://www.commerce.wa.gov/growing-the-economy/business-loans/small-business-credit-initiative/collateral-support-program/
MM	WA Department of Commerce	Craft3 Fund	Ongoing	\$250K - \$5M	Small business loan program. Non-profit community development financial institution partnered with SBCI that lends with a fixed rate of 7% -10.99%. 3 to 7 year loan.	https://www.craft3.org/Borrow/business-loans-250k
	USDA Farm Service Agency	Farm Storage Facility Loan Program	Ongoing	\$500K Max	Low-interest financing to producers. 3 to 12 years. Multiple loan programs.	https://www.fsa.usda.gov/programs-and-services/price-support/facility-loans/farm-storage/index
	USDA NIFA	Urban, Indoor, and Emerging Agriculture (UIE)	9/22/22	\$50K - \$1M	Funds to develop of urban, indoor, and emerging agricultural systems. The program includes food value chain stages: production, harvesting, transportation, aggregation, packaging, distribution, and markets. 2023 date TBA.	https://www.nifa.usda.gov/grants/funding-opportunities/urban-indoor-emerging-agriculture

Grant Funding Prospects

Party	Funder	Grant	Due	Amount	Summary	Link
	USDA Rural Development	Rural Business Development Grants	2/28/23	\$500K	Supports targeted technical assistance, training, and other activities leading to the development or expansion of small and emerging private businesses in rural areas which will employ 50 or fewer new employees and have less than \$1 million in gross revenue.	https://www.rd.usda.gov/programs-services/business-programs/rural-business-development-grants
	USDA Rural Development	Rural Community Development Initiative Grant	7/23/23	\$50K - \$500K	Funds to improve housing, community facilities, and community and economic development projects in rural areas.	https://www.rd.usda.gov/programs-services/community-facilities/rural-community-development-initiative-grants/wa
	WA State Dept. of Agriculture	Local Food System Infrastructure Grant	11/15/23	\$10K - \$500K	Rapid and Ready grants and large project grants. Funds planning, equipment, and facilities that support on-farm post-harvest handling, aggregation, processing, manufacturing, storing, distribution, and sale of locally and regionally produced food products.	https://agr.wa.gov/departments/business-and-marketing-support/small-farm/infrastructure-grant/grant-guidelines-english
	Blue Mountain Community Foundation	Discretionary Grants	9/29/23	\$20K	Seed money. Add a food security capacity	https://www.bluemountainfoundation.org/grants/grantinfo/
	Blue Mountain Community Foundation	Dayton/Columbia County WA Fund	3/31/24	\$15K	Supports special program/projects, capital expenditure, and more. Add a food security capacity.	https://www.bluemountainfoundation.org/grants/grantinfo/
	Blue Mountain Community Foundation	Warren Community Action Fund	3/31/24	Unspecified	Funds community actions in the region. Add local food security impact.	https://www.bluemountainfoundation.org/grants/grantinfo/

Grant Funding Prospects

Party	Funder	Grant	Due	Amount	Summary	Link
	Sherwood Trust	Core Grants	3/8/23	\$20k+	Capacity, community, and capital grants are all accepted. These grants are larger and can be multi-year commitments. Add food security capacity, etc.	https://www.sherwoodtrust.org/grant-process-overview
	WA Department of Commerce	Building Communities Fund	Deadline for 2023-2025 cycle was in August 2022, anticipated new RFA Spring 2024	Variable; Up to \$100k is funded 100%, over \$500k is funded 25%	Provides capital facilities grants for community projects to defray 25-100% of costs depending on total cost of the project. Must serve "distressed communities" or a substantial number of disadvantaged people. Reimburses expenses. State appropriations.	https://www.commerce.wa.gov/building-infrastructure/capital-facilities/building-communities-fund/

