

Industry Analysis:

Malting



Photo: Mature Barley - Dupuyer, MT - Photo credit: Chuck Hamler

Conducted by:



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Governor Steve Bullock

Commerce Director Meg O'Leary

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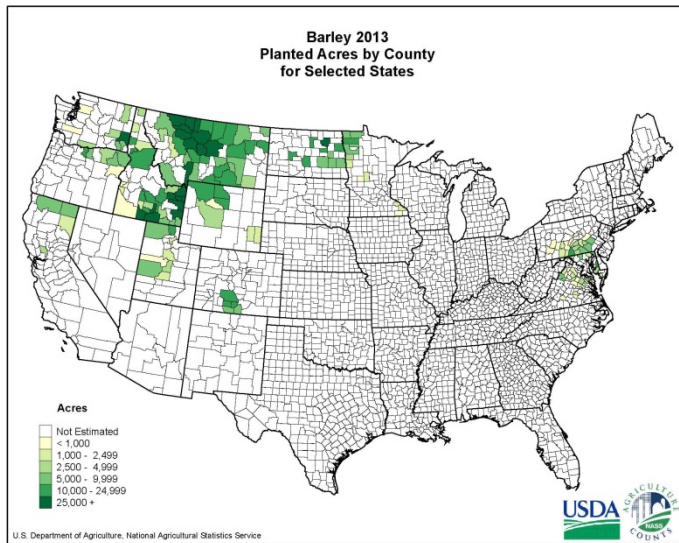
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Introduction

Montana’s Golden Triangle production of grains is the agricultural envy of the world. This region produces the nation’s finest wheat and barley. Montana wheat is of such quality that it is blended with wheat produced throughout the country in order to increase the quality of those grains. Montana barley is equally exceptional. The finest barley on the continent is produced right here in Montana; and the best of those grains is sold as malting barley.

US malting barley production is predominantly consumed by American brewers accounting for 87% of non-feed barley consumption. Large American breweries like Anheuser-Busch InBev (AB InBev), MillerCoors, and Pabst consume the bulk of production; however, in recent years, the rise of craft brewing throughout the nation increased its share of demand for the available supply of malt barley.



Craft breweries now consume nearly 20% of total malting barley production. In 2012, craft beer surpassed 6% of the total U.S. beer production (approximate current share is 8%) with volume and dollar sales reaching record levels. Craft brewers reach consumers by providing unique brews that are packed with flavor and malt.

Montana is second in the nation for craft breweries per capita with over 50 breweries now operating in the state and more under development. This increase in local demand for malt has convinced the state’s only

maltster, Malteurop in Great Falls, to provide its malted barley in smaller volumes so that craft brewers can make appropriate sized orders. Craft brewers use approximately 80-90% pale malts, or base malts, in their brews; Malteurop provides the majority of this malt used by Montana’s breweries. The remaining malt needed by craft brewers is classified as specialty malts and is acquired domestically or from international markets.

Given the increased popularity of the craft brewing industry, the Montana Department of Commerce’s Industrial Development Program (IDP) and the Montana Department of Agriculture believe there is an opportunity to add value to Montana’s world renowned barley production through further development of malts within the state. This industry analysis report investigates conduciveness of the current market conditions to develop malting facilities in the state.

Understanding the Malt Industry

Malting is one of the oldest agricultural processes of human history. Malted grains were used in traditional meal made entirely from germinated wheat dating back to ancient times. Perhaps discovered accidentally, products made from germinated grains provide additional flavors agreeable to the palate and fermented grains deliver intoxication when consumed. Malting practices more similar to the processes used today can be traced back to around 500 C.E. when malt houses were first constructed. These malt houses used floor malting and natural draft kilning techniques to produce large quantities of malt for brewing and distilling. These practices are still used today, however, the industry has evolved with the development of mechanical equipment which decreases labor inputs and produces a more consistent product.

Today, malting can be defined as a process whereby grains are made to germinate by soaking in water and are then halted from germinating further by drying with hot air. Malting develops the grain's enzymes which are required to modify the starches into sugars. Malting also develops other enzymes which break down the proteins in the grain into forms that can be used by yeast. The term "malt" refers to several products of the process: the grains to which this process has been applied (for example malted barley), the sugar, heavy in maltose, derived from such grains (such as the baker's malt used in various cereals), and a product based on malted milk, similar to a malted milkshake. ([Wikipedia](#)¹)

Barley is the primary source grain used in malting for various applications. Brewing is the primary consumer of malted grains throughout the globe followed by distilling. The primary driving factors that determine industry profit and management decisions are therefore the price of coarse grains, demand from beverage manufacturing, the trade weighted index, and per capita alcohol consumption. Demand for malts has remained relatively even, however the source of that demand has shifted as domestic lager consumption has decreased and craft beer consumption has increased.

The manufacturing or processing of malt requires various inputs that can determine the location of a malting facility. The primary input is the grain. Maltsters prefer to ship the grain as little as possible due to the transportation costs associated with the high weight of the grain. Access to water is also important. Malthouses are large water users. A significant volume from a quality water source is imperative in malting and wastewater treatment is required. Energy is the final primary input in a malthouse's operations. Large amounts of energy are needed to complete the three stages of malting; the largest of these is the kilning stage when grains can be exposed to temperatures topping 200 degrees Fahrenheit.

¹ <http://en.wikipedia.org/wiki/Malt>

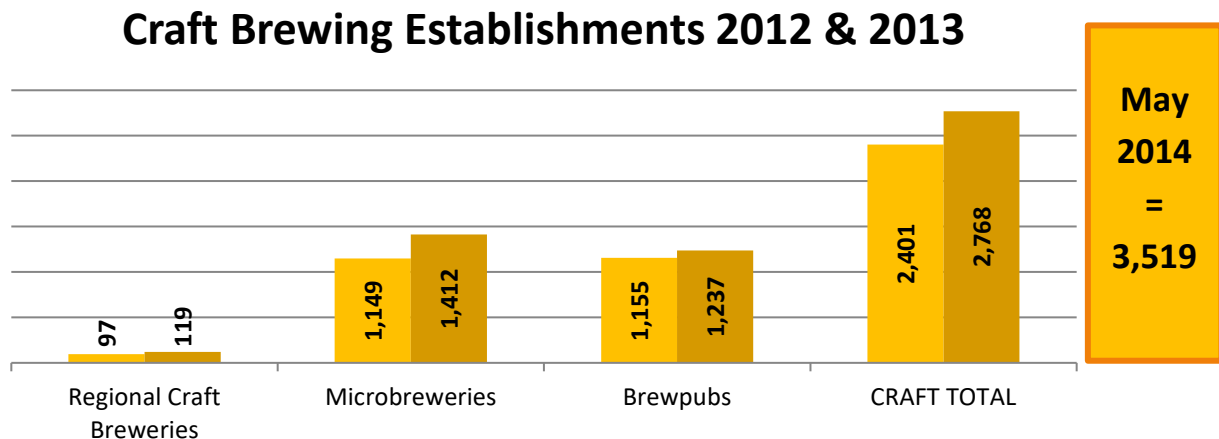
Market Analysis

This report focuses on the prospect of successfully developing a sustainable mid-sized malting facility in Montana. The majority of malted barley in North America is consumed by the brewing industry. Approximately 80% of this market is made up of commercial brewers who have largely made the malting industry vertically integrated from the seed in the field to the beer in the bottle. Given that the industry is dominated by approximately a dozen facilities and only a handful of companies, this report summarizes IDP's research of the current status of the marketplace and the potential for development and addition of a new Montana-based malthouse to the market.

Demand

Growth in Brewing and Distilling

The craft brewing and distilling industry has realized significant growth in Montana and across the nation in recent years. In 2013 alone, 413 new breweries opened in the US. In total, 2,822 breweries operated for part or all of 2013 representing the highest number of operating breweries in America since the 1870's. This upward trend is projected to continue. While this growth has not contributed to an overall increase in demand for malt, it has increased demand for specialty malts which are used in higher volumes by craft brewers.



Increasing Craft Beer Consumption

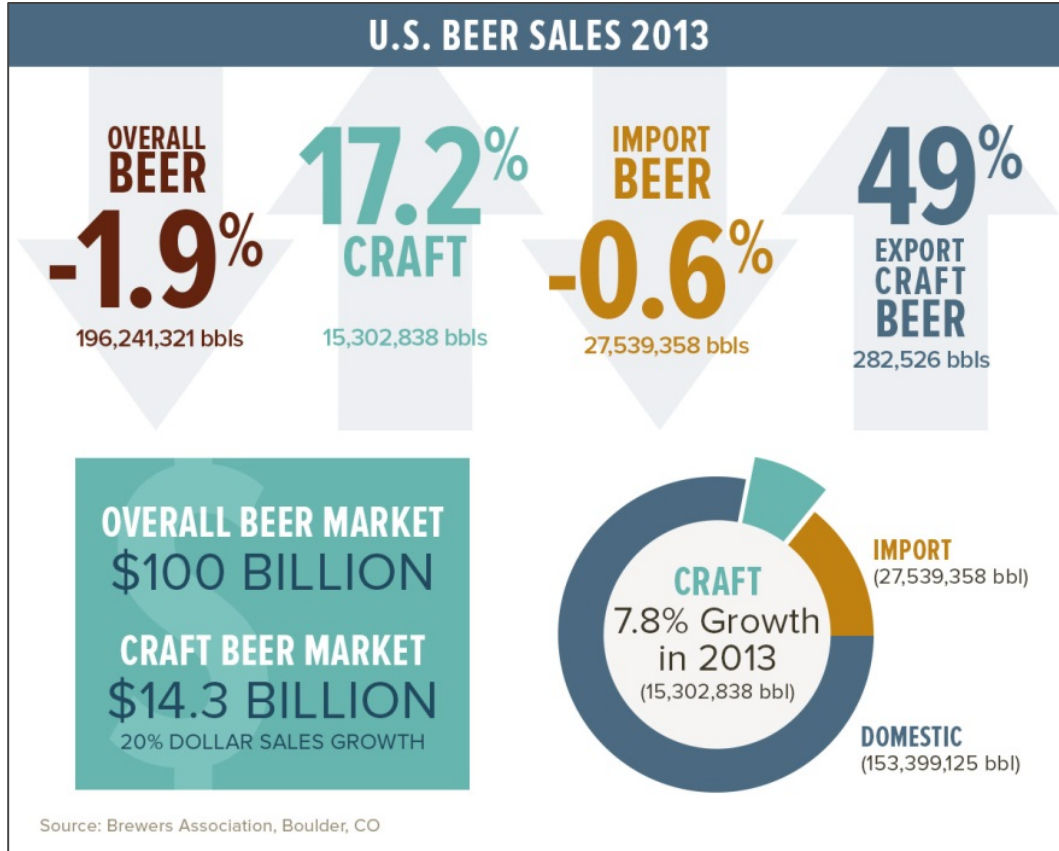
It seems that craft breweries have sprung up everywhere catering to customers who are seeking distinctive and flavorful beers. Statistics from the Brewers Association (a trade association representing craft breweries nationwide) show 3,519 craft breweries listed as of the end of May 2014; and 123 new breweries added in the month of April 2014 alone. The growth in breweries is having a significant impact on the market place.

The impact is highlighted in a 2012 IBISWorld industry report entitled *Malt Production in the US*:

The Malt Production industry experienced volatile but positive growth over the past five years. Although barley costs were unstable and high, operators raised prices enough to partially counteract cost increases without significantly hurting demand; thus boosting revenue. Consumers had less disposable income during the recession and purchased less beer, which caused beer production volumes to decline slightly. However, the rise of craft beer maintained brewers' demand for malt. Craft brewers make up a small proportion of beer production, but account for about 18.0% of malt demand. Furthermore, increasing global beer production is driving foreign breweries to source malt from the industry, lifting exports an annualized 10.4% to \$262.2 million over the five years (2008 to 2012) and mitigating import competition.

A key statistic is that craft beer production in the US consumes a disproportionately large quantity of malted grain. Constituting just 5.7% of total beer production in 2012, US craft breweries consumed 17.9% of the malt sold. This shows that craft breweries are a significant and growing component of the malt market.

The infographic below shows that while the American beer market has dropped nearly 2% in sales, the craft beer sector has increased over 17% and exports have increased nearly 50%. Domestic brewers easily retain their dominant portion of the market with over 75% of sales. Large brewers of domestic



lagers like AB InBev and MillerCoors have taken note of the growth in the craft sector and have added craft brews to their product lines or acquired small craft breweries into their portfolios.

Growth of the Specialty Malt Market

IDP research indicates that craft brewers like variety and they are willing to try new and different types of pale and specialty malts in order to create distinctive beers. Willingness to try new malt varieties sends a positive signal to potential investors in a specialty malting plant that market acceptance of a new product should be high.

The purpose of this analysis is to consider the feasibility of developing a competitive malting facility in Montana. The Montana Department of Commerce, Industry Development Program (IDP) has researched the demand for malt by US craft brewers as part of this industry analysis. Our estimates are based on extrapolating Montana craft beer production / malt consumption numbers provided by the Montana Brewers Association (MBA). The MBA reports 51 craft breweries operate in Montana producing 118,500 barrels of beer in 2013 and consuming 7 million pounds of malted grain. IDB calculated the volume of base or pale malt consumed versus specialty malts consumed by craft brewers by assuming that 15% of the malt used to make a batch of craft beer is of the specialty variety while about 85% of each batch is comprised of base or pale malt.

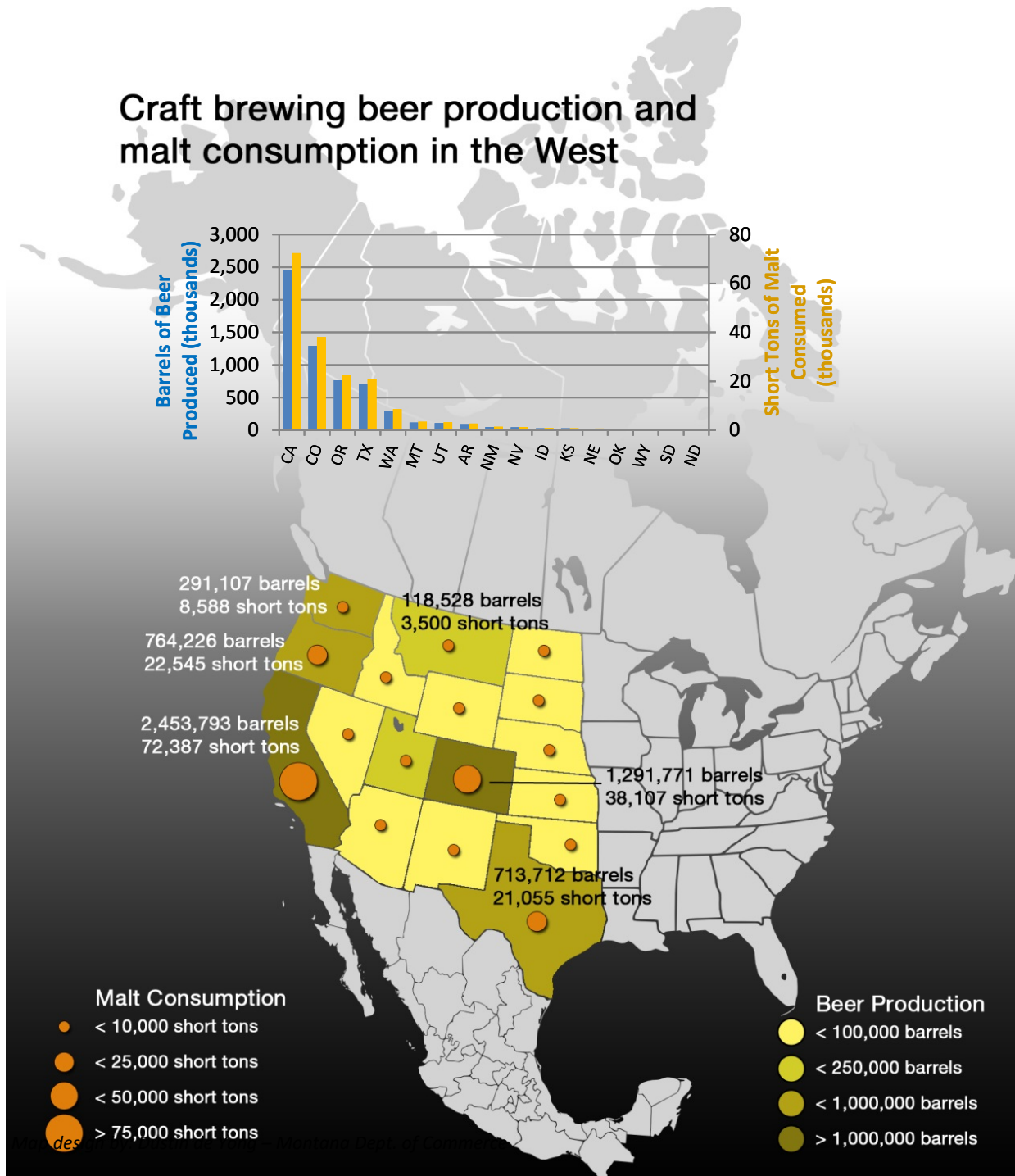
Montana craft breweries produce nearly 120,000 barrels of beer and consume approximately 7,000,000 pounds of malt per year.

IDP obtained the 2012 beer production numbers from the National Craft Brewers Association for all 50 states. Using the ratio of 59 lbs. of malt per barrel of craft beer (based on MBA numbers), the following spread sheet estimates craft beer production / malt consumption.

The numbers indicate that US craft brewers produced about 13.75 million barrels of beer in 2012 and consumed about 405,000 tons of malt worth about \$340 million. Of that total malt consumption, it is estimated that about 61,000 tons were comprised of specialty malts, valued at approximately \$100 million.

US Craft Beer Production and Malt Use		
13.75 million barrels produced in 2012		
	Consumption	Value
Pale Malt	344,000 tons	\$240 million
Specialty Malt	61,000 tons	\$100 million
Total	405,000 tons	\$340 million

Craft brewing beer production and malt consumption in the West



Recent demand for malt has been static; however, moderate growth for all malt is expected in the short term. The specialty malt market is the most likely to expand; however, this market lacks production volume compared to the pale or base malt market.

Some of the growth anticipated for the craft brewing and malt industries is due, in part, to increases in malt exports. Currently, many domestic craft brewers import malt from Europe which certainly has an increased transportation cost to reach US markets leaving them vulnerable to domestic competition.

Framing a business decision to build a malting plant in Montana will involve many factors, not the least of which is estimating the portion of the current and future craft brewing malt market that could be captured. The malting industry operates on small margins and high production volume. A developer will need to consider a balance of specialty and base malt production and volumes in order to maximize profit and return on investment.

Supply

In 2012, over 57% of US barley production was used for malt, about 31% was used as feed, and about 5% was exported. According to the American Malting Barley Association (AMBA), US malt production since 1986 had remained fairly static until a few years ago. The 2012 IBISWorld Report states:

The Malt Production industry has grown over the past five years despite challenges from volatile input prices, changing consumer trends, and import competition. Although the price of barley and other coarse grain inputs rose significantly, producers were able to increase prices enough to increase revenues. Additionally, an increase in global beer production caused many breweries around the world to demand more malt from US producers, lifting exports and mitigating import competition. Revenue rose at an annualized rate of 5.2% to \$1.1 billion between 2008 and 2012, including an 11.0% jump in 2012 as a result of rapid export growth.

According to the National Agricultural Statistics Service (NASS), Montana growers planted 990,000 acres of barley in 2013, up 90,000 acres from 2012. Of the total, approximately 66%, or 660,000 acres, were planted as malting barley varieties. For 2014, Montana acreage planted in barley was reported to be 940,000 acres, ranking the state first in the nation. For 2014, the next leading barley acreage states are Idaho and North Dakota which were projected to plant 660,000 and 650,000 acres, respectively.

Key Malt Industry Statistics			
Nation		Montana	
Revenue (2012)	\$1.1 billion	Malt Barley Planted	660,000 acres
Exports (2012)	\$262.2 million	Percent of Malt Barley Planted to make Malt Grade	~ 90%
Annual Growth (2007-2012)	5.20%	Malt Barley Produced	27.6 million bushel
Projected Annual Growth (2012-2017)	2.40%	Malt Barley Exported	15.6 million bushel

Maltsters and brewers purchased 27.6 million bushels of Montana’s barley crop between July 1, 2012 and June 30, 2013 to make malt. Malteurop’s malting facility in Great Falls has a capacity to process 12 million bushels annually, meaning that facility processes about 43% of Montana’s barley crop. Much of the remaining 57% is contracted and exported to large breweries like MillerCoors and AB InBev.

Market Trends

Craft Malting

Increasing development of microbreweries and craft beer production increased demand for specialty malts. Craft malting has made a surge in the marketplace as microbreweries search for unique, consumer-capturing brews that no other brewery can offer. This surge has caught the attention of industry manufacturers and more small-batch malt systems are becoming available for micro and craft malting applications.

Water Conservation

The world’s largest retailer, Walmart, has placed pressure on brewers who stock their shelves to decrease the amount of water used to make their brews. In response, MillerCoors and AB InBev have sent a message to their maltsters and contracted growers to make investments in water conservation. These water conservation initiatives provide a competitive advantage to Montana’s malt barley production as Montana boasts more acres of malt barley planted in dry-land farming than any other state.

Source Locating

More malting companies are locating near the source of their primary input - barley. As demand for malts has become decentralized from the brewing centers of yesterday, malting companies are keeping transportation costs down by locating near contracted acreage.



AB InBev has launched a water conservation campaign in recent years calling for men to put down their razor and grow a beard in the name of water conservation. Anheuser-Busch claims to have reduced water use by 40% since 2007.

Factors of Development

Logistics

Locating a mid-sized specialty malting plant in Montana has several competitive advantages including proximity to one of the continent's prime malt barley growing regions. Montana's low protein malting barley is of the highest quality for making beer as a result of ideal growing conditions. These conditions include the region's hot days and cool nights during the height of the growing season and dry weather during the harvesting season. Montana barley is already in high demand, increasing the potential that a prospective in-state, specialty malting facility could create a branded malt product that would enjoy a similar branded high demand. The steadily rising prices brought by Montana malting barley has been good for producers and the state's agricultural economy, but has also resulted in higher downstream costs for brewers and consumers alike. Locating a specialty malting facility near the source barley would provide competitive pricing for its finished product.

It would appear that Malteurop located its facility in Great Falls, in part, to be near its barley supply. IDP estimates that making malt reduces the final product weight by about 30%. This reduction in bulk may result in lower shipping costs and logistical efficiencies for some business scenarios.

*Malting reduces
barley weight by
approximately 30%.*

Rail transportation has been affected by booming energy development on the Montana / North Dakota border and in Northern Alberta. This massive, recent scale up of rail shipping Bakken crude and oil sands bitumen has created freight congestion that further underscores a potential strategic advantage to locating near the barley source.

Expenditures

Malting facilities can be incredibly simple and labor intensive, or mechanically complex with little labor input. These factors result in varying capital costs to develop and operate a malthouse.

Capital Expenditures

Traditional malthouses in Europe were very simple, yet effective. Techniques, such as floor malting and hand raking, keep capital expenditures down but increase labor inputs over time. Many micro malthouses emerging today are using some of these traditional techniques to keep upfront costs as low as possible.

Other mechanical and automated equipment provides greater malt consistency and fewer labor inputs. The nation's commercial and industrial malthouses are highly automated and engineered in order to secure a consistent quality in product over very large volumes. Some smaller and mid-sized malthouses use a combination of mechanical and traditional malting techniques. Recently, some of the finest manufacturers of brewing and malting equipment have developed scalable, small batch malting systems

in order to meet the growing trend of craft and micro malting occurring around the globe. As the market for these systems increases and manufacturing output meets this growing demand, the capital expenditures for these systems will decrease.

Operating Expenditures

Grains

These commodities fluctuate in price on the open market due to acres planted, crop yields, weather, etc.

Water

Water is also a very important input used in the malting process and can vary greatly depending on location.

Transportation

Logistics play a very big role for companies who do not have a local supply of malt grains and/or are targeting markets outside of their area.

Power

Power prices may also affect a malthouse's bottom line depending on the type of energy used in fueling the malting process.

Wastewater

Wastewater treatment can also be a significant operating expenditure for large malting facilities; smaller facilities may still be able to use municipal facilities.

Labor Compensation

Malthouses are not large employers as most of the processes have been mechanically automated.

Taxes

Multimillion dollar malting facilities can suffer from tax burdens. However, Montana malting facilities are exempt from business equipment tax, can locate in favorable tax increment districts across the state, and enjoy no sales tax statewide.

Revenues

Revenue streams for malting companies are primarily derived from the sale of malted grains. Some malthouses have made use of malting byproducts. Power generation from otherwise wasted biomass can reduce an operators power bill and increase revenue. This same byproduct can be used in livestock feed applications.

Case Studies

Previous Developments

Montana's supreme barley production has attracted investment in malting in recent history. In 1997, investors financed a \$200,000 study to examine the development of a commercial malthouse to be located in Choteau. It is IDP's understanding that development of the project dissolved as the location did not have a sufficient water supply.

Malteurop Great Falls

The Malteurop facility in Great Falls was initially developed by International Malting Company (IMC) in 2003-2004 and then bought by Archer Daniels Midland (ADM) Malting, a subsidiary of the agriculture conglomerate ADM. Malteurop then acquired ADM Malting in 2008 and continues to operate the facility as well as two other malthouses previously owned by ADM in the Midwest.



Malteurop Great Falls – 200,000 ton / year malting facility.

Malteurop is Montana's only operating malting company, has an international footprint, and holds one quarter of the US malting market, followed closely by Cargill at 19%. Malteurop sells approximately 80% of its product to commercial breweries like AB InBev, MillerCoors, and Pabst. The Great Falls malting facility is the second largest of the company's three US malt houses producing 200,000 tons per year; the other malt houses are in the Midwest and produce 220,000 ton and 115,000 ton per year. Malteurop does not currently produce specialty malts commercially however, IDP has learned that the company is developing a specialty malt program. At which of the three Malteurop facilities this development will occur has not been made public.

Current Developments

Tom Blake, Montana's former barley breeder at Montana State University, has developed a malting system for craft breweries to operate in-house. The current prototype produces roughly 800 pounds of malt per week and was scaled to meet the malt demands of an average-sized Montana craft brewery. This system would allow brewers to experiment with different malts which they might not otherwise find or be able to acquire on the market. The technology is scalable to meet the needs of breweries both large and small. An investment by a brewing company in this technology would also require additional labor

Tom Blake has also partnered with Andy Stohlmann of Montana Maltings who is currently developing a micro-malthouse in Montana using a system developed by Kaspar-Schulz of Germany. Mr. Stohlman is currently testing batches of malts utilizing Tom Blake's technology and will be providing over 20

different specialty and custom malts to local breweries, distilleries, and homebrew customers. Mr. Stohlmann has acquired barley production agreements and attracted approximately half of the \$3 million investment he is seeking. The company is also growing test plots of hops in the Gallatin Valley and is actively recruiting new hop growers to increase their production.

Hypothetical Development

As IDP has prepared this malt industry analysis, a number of plausible development scenarios emerged under which specialty malting facilities could be built in Montana:

In-House Specialty Malting

Less than 50 tons per year

Individual breweries can purchase off the shelf micro-malting systems designed to produce enough malt in small batches to meet the specialty malt needs of a single brewery. The Bayern Brewery in Missoula has considered this approach, looking into a micro malting system that would produce about 220 lbs. per day of specialty malt. The owner is looking to expand his current brewery site to add this micro malting system – the cost of the malting system is about \$550,000.

Micro Specialty Malting

Approximately 1,000 tons per year

Another scenario is for an entrepreneur to build a micro scale malting system producing around 1,000 tons annually. Montana Maltings of Bozeman has developed a business plan and is in the early development stages of a facility this size - likely to be located in Gallatin County. The estimated cost to develop this plant is \$3 million. Malting equipment from Kaspar-Schulz cost is \$1.9 million and the remainder is building and land development expenses. The company indicates it has investors willing to pay for 50% of the development cost. IDP, along with the Montana Manufacturing Extension Center (MMEC), is actively assisting Montana Maltings on the development of a financing plan including potential participation from the Montana Board of Investments. Montana Malting's business plan is to capture as much of the 500 ton annual specialty malt demand of Montana craft brewers; as well as sell malt to out-of-state customers.

Commercial Specialty Malting

Approximately 10,000 tons per year

A third scenario for a group of investors, including existing Montana companies, is to pursue a larger specialty malting plant. This strategy, in addition to capturing as much of the relatively small 500 ton annual Montana specialty malt market as possible, would seek to market products outside of Montana including attempting to land contracts with some of the larger craft brewers in the region like New Belgium, Sierra Nevada and others. IDP estimates that two to four of the larger regional craft breweries, producing around of two to three million barrels of beers annually, create a demand for about 9,000 to 13,500 tons of specialty malts annually.

Industrial Malting

Greater than 50,000 tons per year (pale and specialty malt)

A fourth scenario would be for specialty malting companies to expand their operations in or into Montana. While it has produced primarily base malts in the past, Malteurop is developing a line of specialty malts aimed at meeting the expanding demand from craft breweries. The City of Great Falls' development strategy is to market its attributes to existing specialty malting companies, like Briess or Great Western, in an effort to attract them to build a facility. Industrial development of this size tends to take advantage of economies of scale. Therefore, a profitable malting facility would likely top the 100,000 ton or even 200,000 ton capacity and produce pale malts as well as specialty.

Development Target: Commercial Specialty Malthouse

Justifying Production Level

After careful market analysis, IDP has found sound evidence justifying development of a specialty malting facility on the commercial scale, approximately 10,000 ton per year, in Montana. This includes:

Demand

Capturing two of the four largest craft brewers in the region would consume 10,000 tons of specialty malt annually. The rapidly growing craft beer industry also carries increasing demand for these malts spread over a large geographical area and number of establishments.

Production

In order to achieve a return on investment (ROI) rate attractive to investors, the malting facility must achieve some level of economies of scale. Specialty malt, while primarily sold in 50 pound bags, is a bulk product and carries small margins. Therefore, to be profitable, a company must sell large quantities. A 10,000 ton commercial facility would provide the production necessary to be successful on these small margins and provide the larger quantities needed by the craft industry's largest breweries.

Quality Control

Production consistency and quality are vital to the success of larger craft breweries that depend on delivering a reliable product in a can or bottle to their consumers. Commercial facilities can better manage quality of larger batches of malt compared to smaller facilities.

Logistic Advantage

Transportation costs may decrease by locating near the raw barley source. This saving can be passed on to the consumer or retained as profit.

Available Upstream Barley Supply

The malthouse must consider its supply of raw barley. Current acreage and associated contracts for barley planted for malt are somewhat constrained. While a demand from a new malthouse for 1 million bushels or less of malt barley may be attainable; producers would likely not be able to meet the five or ten million bushel demand of an industrial malthouse, five in the short term.

The IDP is collaborating with the MMEC and CTA Architects and Engineers (CTA) to provide a cost analysis for possible malting facilities in Montana. These facilities would likely be located in close proximity to the state’s largest barley growing region from the Great Falls area and to the northwest.

Running the Numbers

IDP has calculated the capital expenditures and possible ROI of the commercial development of a 10,000 ton per year specialty malt facility. IDP assumes that the plant area requirement for a 10,000 ton plant would be directly proportional to the Malteurop 200,000 facility (200,000 vs 10,000 = 5%). The facility would handle 5% of the grain compared to the Malteurop facility, thus the space required is 5%. Space for lab and administrative areas would add an anticipated 2,500 square feet for a 10,000 ton facility.

	Malteurop	Specialty Malthouse
Annual Tonnage	200,000 tons	10,000 tons
Germination	140,000 sq. ft.	7,000 sq. ft.
Kiln	45,000 sq. ft.	2,250 sq. ft.
Silos	42,000 sq. ft.	2,100 sq. ft.
Lab / Admin	50,000 sq. ft.	2,500 sq. ft.
Total sq. ft.	277,000 sq. ft.	13,850 sq. ft.

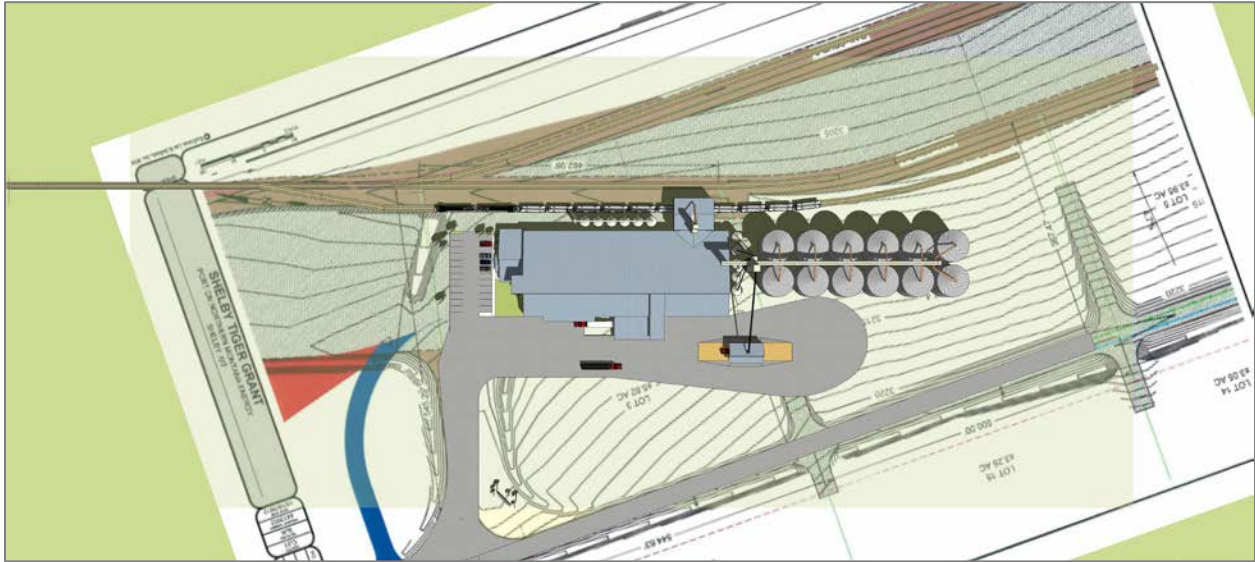
* Note: Information from the Schulz company website indicates that a 25 ton per week micro-malting system measures 11.4 feet by 59.3 feet constituting a total area of 676 square feet. IDP estimates installing 10 of these systems in a modular fashion would require approximately 7,000 square feet.

Land and Building Cost

According to Department of Commerce records, capital expenditures in 2003 dollars for the Malteurop facility in Great Falls was \$75 – 80 million excluding processing equipment.

Calculating 5% of the high side of the 2003 Malteurop plant cost of \$80 million and adding a 30% inflation factor, IDP estimates land and building costs in 2014 dollars of \$5.2 million for a commercial specialty malthouse capable of housing equipment and personnel to produce 10,000 tons per

year. MMEC and CTA have been requested to review this estimate.



Equipment Cost

IDP estimated equipment costs based on the 1,000 ton per year compact Schultz malting machine that costs \$1.9 million. IDP, working with MMEC, roughly calculates that scaling that equipment up in a modular fashion to produce 10,000 tons per year would cost about \$14 million.

Total Cost

The total cost estimate for a specialty malt plant producing 10,000 tons annually is:

Land and Building	\$5.2 million
Equipment	\$14 million
Total	\$19.2 million

A 30% contingency factor in this estimate would create an investment range of \$16 to \$23 million for land, building and equipment.

Return on Investment

A 10,000 ton plant would produce 20 million pounds of malt per year, valued at \$13 million using an average specialty malt price of 65 cents per pound. IDP is uncertain how much investors would want to net out of this plant. Assuming an ROI of 5%, a malt house would need to have \$1 million in net profits annually from a 10,000 ton plant producing \$13 million in gross revenue. A 10,000 ton malt plant would process about 600,000 bushels of malt barley with an average cost of \$6.50 per bushel resulting in annual input costs of approximately \$3.9 million. The plant would require around 10- 15 employees with payroll estimated at \$1.1 million annually, which leaves about \$7 million to pay debt, operate the plant (pay utility costs, insurance, repair and replace equipment, etc.) and market the product leaving approximately a \$1 million dollar profit.



The image above, as well as the image on page 15, is a conceptualization created by CTA for the placement of a mid-sized malting facility within the Shelby, Montana Industrial Park. Shelby Mayor Larry Bonderud indicates the town has considered a facility of this nature and that all utilities and services are currently available for a shovel ready development site.

Supportive Ventures

The rise of craft brewing has caught the attention of many of Montana's entrepreneurs from farmers to brewers to seed scientist. Multiple supportive ventures are under development in Montana that can provide quality information and assistance in development of a specialty malt facility.

The facilities listed below can easily integrate research associated with malting. These research assets set Montana apart in the private malting industry by providing quality scientific research and development of malts from the seed in the field to the last drop of the pint glass.

Malting Lab

Former Montana State University barley breeder Tom Blake has received a grant through the Montana Department of Agriculture's Growth-Through-Ag program to build a malting laboratory. This lab will examine the response of various barley strains and varietal grains to malting processes in order to achieve desired malts.

Flavor Profile Lab

The 406 Brewing Company of Bozeman has been awarded a grant through the Growth-Through-Ag program to construct a flavor profiling lab. This laboratory will be able to determine finished malts flavor profiles and further analyze their effect once brewed.

Mini Malting System

Tom Blake also has developed a mini malting system that can produce up to 800 pounds of malt per week at full capacity. This system can be acquired with very little expense and serves as an ideal volume for maltsters to run test batches.

Northern Seed Lab

Butte-based Northern Seed is expanding into the Bozeman area with one of Montana's first private seed research facilities. The lab will screen seed varieties developed in crop breeding programs around the world which Northern Seed will market through Westfeeds and Montana Seed and Grain. In addition to screening, Northern Seed will take on contract research at the facility. Ron Ueland, President of Northern Seed stated, "I'm very confident that out of this will come a value-added variety or seed variety that isn't in existence today."

Montana State University College of Agriculture

The University has long been recognized as a leader in barley breeding and the facilities housed in the Department of Plant Sciences and Plant Pathology continue to contribute the highest level of research, development, and commercialization in many small grain industries.

SWOT Analysis

Sourcing the input material - barley - from your backyard is very cost efficient for malt producers. The nation's largest malthouses have either located near a barley source or near a large customer base - breweries. The nation's largest malthouses supply or are owned by large domestic brewers which consume large volumes of base malts. These large domestic brewers often pay two-way transportation costs both getting the barley from field to the malthouse as well as from the malthouse to the brewery. Breweries in Colorado and California incur the largest transportation expenses.

As craft breweries volume of production is a small fraction of large domestic brewers, a malthouse must serve a larger customer base over a much larger area in order to produce enough volume to achieve a return on their investment. Consequently, a specialty malthouse will obtain the highest logistic efficiency by locating near its source malt. A facility located in Montana would hold an advantage over the larger specialty malt producers currently operating outside of ideal barley growing regions.

Malthouses also require a fair amount of land and water. Obtaining a large amount of land near utility services helps to keep construction costs down as the facility can build horizontal rather than vertical which also avoids costly extensions of needed utilities. Montana communities continue to develop industrial parks and tax increment finance districts creating an ideal location for development. Water may seem abundant in a headwater state like Montana; however, much of that water is already accounted for in historical water rights. This does not equate to inaccessibility since some rights may have water available for distribution under current rights or a user may find that a malthouse application more profitable and apply for a change of use in the water right. Montana's water is available and of excellent quality for malting.

Montana's long history as an agricultural producer means a number of key assets to the malting industry are already in place, most importantly growers and ag workers. Montana growers are known for producing the highest quality grains in the world. This quality comes from a deep understanding of how varieties respond to different environments which is precisely what maltsters spend their lives perfecting. Value-added applications across the state have created a workforce of capable individuals fed by the state's outstanding ag curriculum offered by the Montana University System campuses. The state could greatly benefit from a food lab and food scientist approved by the FDA in order to expedite development of value added applications in the ag industry. The Montana Department of Agriculture has invested in a malting lab and a flavor profile lab to aid the malting and craft brewing industry.

Infrastructure	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Water	Sufficient water supply and infrastructure in barley growing regions	Wastewater treatment facilities may not have needed capacity for a large malthouse	Wastewater facilities could serve malthouse and future tenants	Possible increases in capital investment may deter investment
Ag Infrastructure Network	Montana's strong ag economy has established a strong network to move ag products	Lack of rail competition and rail congestion leads to increased costs.	Develop stronger in-state markets for malted barley and increase robustness of in-state infrastructure	Increased price of transportation due to lack of rail capacity and ability to reach a diversity of markets
Power	Competitive power prices and renewable power available	None	On-site power production through CHP, biomass, or wind	Lower power costs in other states (WY)
Land	Abundant and affordable industrial parks; world's best barley region	None	Multiple options allow developer to solicit offers to locate from different communities	None

Workforce	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Current Workforce	Trained workforce at Malteurop in Great Falls; Montanans are well versed in manufacturing / ag processing; entry level requires little to no training	Lack of knowledgeable and experienced Maltster	Increase worker training; tailored MUS curriculum; leverage MT lifestyle to attract workforce	None
College Graduates	Montana has 19 agricultural degrees and certificates spread across the state and 10 food related degrees and certificates	Lack of a food scientist	Obtain an accredited food scientist at MSU; develop malting and brewing curriculum	Outside markets provide more employment opportunities and higher wages for graduates

Quality of Life	Strengths	Weaknesses	Opportunities	Threats
Recreation	Abundant outdoor opportunities; 2 nd in breweries per capita; outstanding rural living	Cold northern climate doesn't appeal to all audiences; no coastline	Leverage Montana's lifestyle in marketing efforts	Competing states with similar amenities
Community	Excellent school systems; family-centric atmosphere; short commutes; no traffic; low crime	Limited proximity to cultural amenities	Easily become a member of and shape the community in which you live	Larger population centers with greater cultural diversity and amenities

Tax Environment	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Real Property Tax	Low cost of land	Tax rate is perceived as high	Education about tax policies and incentives; quantify operating costs in Montana versus other states	Termination of tax incentives; politics of tax policies that pick and choose subsidization
Corporate Income Tax	Montana ranks 7 th best in the Tax Foundation's State Business Tax Climate Index	Limited number of corporations that can promote Montana as a place to do businesses	Education about taxes	MT ranks 23rd lowest among states levying a corporate income tax
Business Equipment Tax (Personal Property Tax)	Full exemption for malting facility equipment	None	Education about taxes	None
Sales Tax	There is no sales tax	Drives up property and income taxes	Leverage savings from lack of sales tax against other perceived high tax	Competing states with no sales tax

Financial Incentives	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Tax breaks	No sales tax; full exemption from business equipment tax for malting facility equipment, New and Expanded Industry Abatements; one for state portion of property tax and the other for corporate income tax	Need for a more comprehensive tax incentive comparison with other states	Show benefits of operating in MT through bottom-line analysis	Expiration or termination of tax incentives
Low interest loans	Available funding from CDBG and Montana Board of Investments	Loan criteria may limit applicability	Lock in low-interest rates	Increasing interest rates; lack of funding from state legislature
State grants	Work force training grants; Big Sky Trust Fund monies	Grant criteria may limit applicability	Possibility of funds made available for public infrastructure, business equipment and more	Removal of funding by the federal government or state legislature

Environment	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Meteorology	Ideal barley growing conditions	The prime barley growing regions of the state are limited	Montana's meteorological situation makes this a prime barley growing region that will persist into the future because barley production here is less likely to experience competition from crops like corn and soy beans such as has happened in other barley growing states	Extreme weather events like drought or poorly timed rain
Geology/soils	Ideal barley soils in a headwaters state	The prime barley growing soils of the state are limited	More barley acreage can be brought into production	Poor conservation practices

Transportation	<i>Strength</i>	<i>Weakness</i>	<i>Opportunities</i>	<i>Threats</i>
Highway	Well maintained network of highways	Rural interconnection highways	Safe delivery of goods and workforce	Weather and flooding in remote areas
Interstate	I-90, I-94, and I-15 provide east-west, north-south interstate access with I-90 and I-15 intersecting in Butte	No interstate access in the northern third of the State; however, strong highway infrastructure is present	Access to all regional markets	Weather and flooding in remote areas
Rail	Extensive rail network	Much of rail capacity has gone to oil, coal, and wheat	Possible decreased rates in empty return loads	Increased shipment of Montana's natural resources decreases rail capacity
Air	Eight large commercial airports; five Essential Air Service commercial airports; 120 general aviation airports	Limited number of direct flights	Increased market activity from malting activity would increase demand for air service	Other locations provide more direct air service to multiple markets

Economic Impact

Since signing and filling contracts in 2008, Malteurop has helped Montana’s malt growers increase their profit margin. This value adding facility has economic impacts both upstream and downstream within the malt industry. Upstream, growers have increased their presence in the market and decreased their input in transportation costs. Downstream from the malthouse, brewers have benefited from the decreased costs associated upstream while realizing their own savings in purchasing their base malt within the state’s boundaries.

A specialty malthouse would provide similar economic benefits to the industry. Furthermore, a facility of this nature would provide growers and brewers more alternatives and flexibility in their operations. Specialty malts would allow growers to make use of many different varieties of barley which can be very beneficial to an agricultural systems health and immunity; and, brewers would have the opportunity to use a much wider variety of malts with greater accessibility at a lower price point.

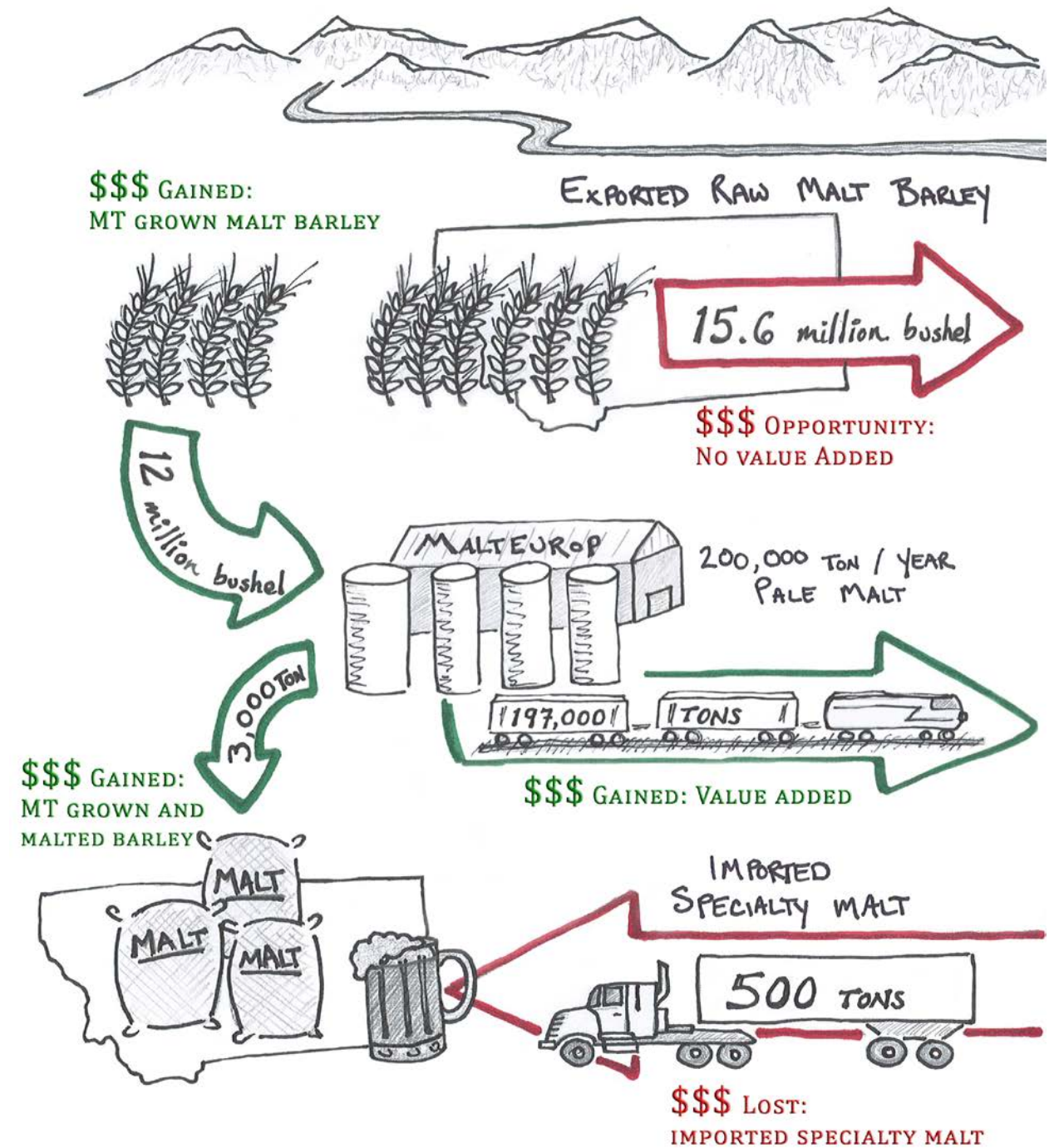
Bolstering the economics of these sections of the malt industry would increase the strength and longevity of an industry that is already carrying substantial economic momentum.



Jim Koch, founder of one of the earliest and largest craft breweries, the Boston Beer Company, pours one of his signature brews, Samuel Adams Boston Lager. Photo Credit: Associated Press

Current Economic Impact

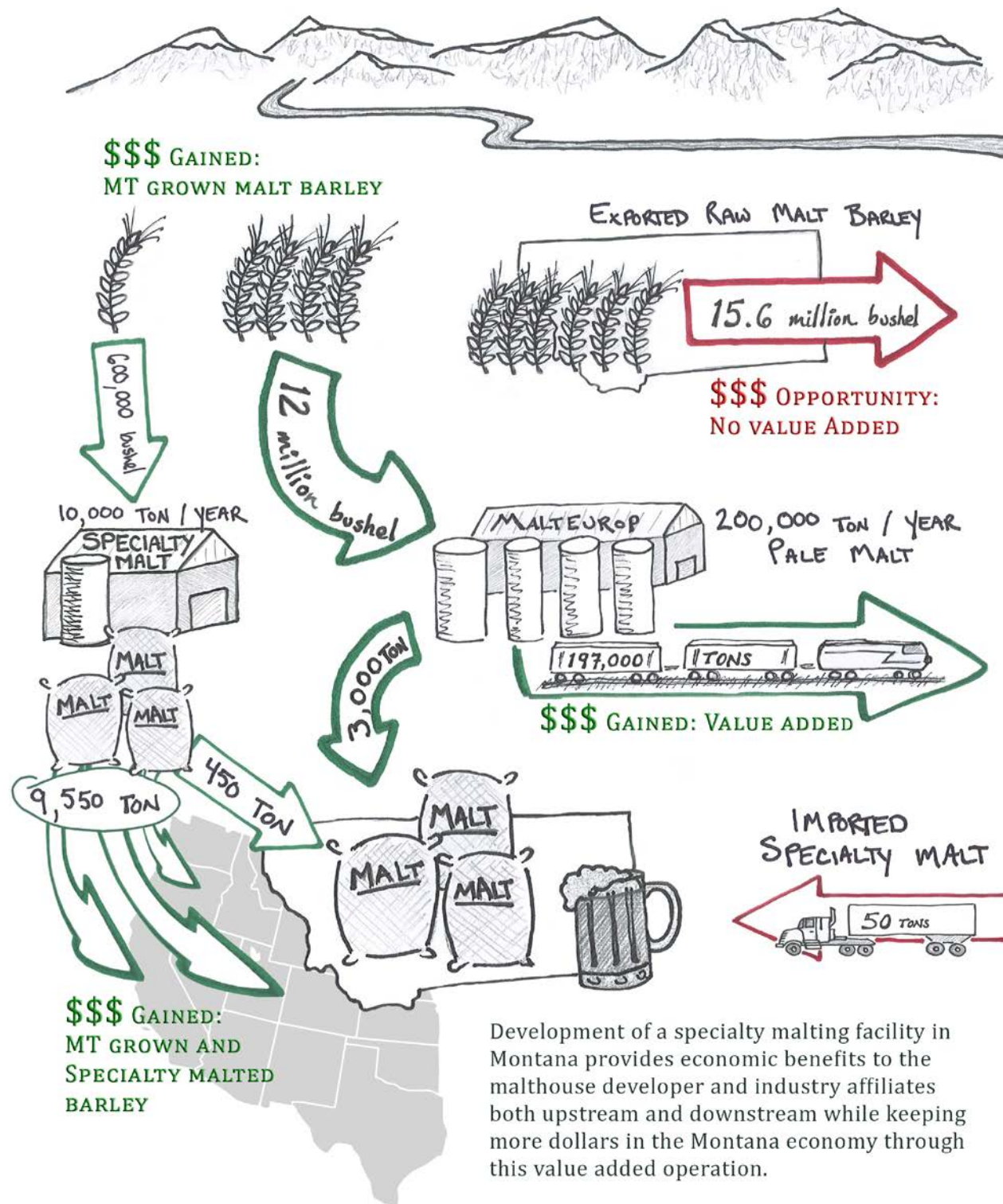
MONTANA TOTAL MALTING BARLEY: 27.6 MILLION BUSHELS



Infographic design by: Dustin de Yong – Montana Dept. of Commerce

Potential Economic Impact

MONTANA TOTAL MALTING BARLEY: 27.6 MILLION BUSHELS



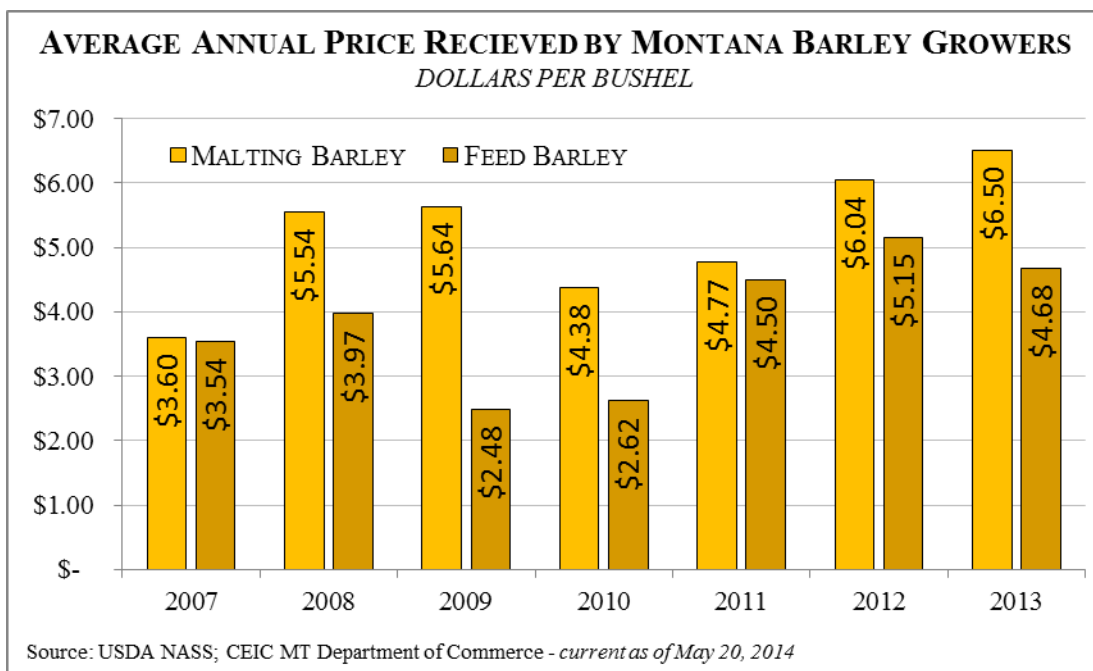
Infographic design by: Dustin de Yong – Montana Dept. of Commerce

Upstream – Agricultural Impact

In 2013, Montana growers planted 990,000 acres with barley – more than any other state in the US. Since 2010, the annual average production of malt variety barley in Montana has increased both in value and volume (see figures below).

From 2010 to 2013, production value of malting barley increased by 30% from 22.8 to 29.7 million bushels, respectively. During the same time, non-malting barley – used for feed, forage, or other uses – has remained fairly constant in both production value and volume. Malting barley is considered a high risk crop as there are many chances for failure in achieving malt grade; making grade is the difference between a good return and low or no return. Risks include fusarium head blight (scab), other diseases, drought / heat stress and not meeting quality requirements. Montana possesses the right growing conditions and growers with the skills necessary to consistently produce high grade malting barley. This again indicates that Montana has competitive advantages in this industry.

While overall production volume of malting barley in Montana has continued to increase, so too has the average price received by barley growers in the state (see below figure). The value of Montana's malting barley has more than doubled (102% increase) from \$93.9 million in 2010 to \$189.5 million worth of production in 2013.



Economic theory suggests that prices are determined by demand for a good or service. If more of a good – such as malting barley – is demanded by the consumers, such as breweries, then the price paid for that good will rise, generally speaking. In the case where both supply – malt barley production volume – and price is rising, it suggests that the current demand for malt barley is not being met. Looking forward, it would appear that, at least in the near term, more malt barley varieties are going to be demanded from producers in Montana and across the country.

The increasing demand for malting barley from breweries in Montana and across the nation will have to be met by malting facilities. Montana producers led the country in acres planted with barley in 2013 (990,000 acres) including an increasing amount of malting varieties. A malting facility that could meet the increasing demand for varietal malts from the growing brewery industry and which used Montana barley as the primary input makes strategic and logistical sense.

The USDA indicates that maltsters and brewers purchased 27.6 million bushels of Montana’s barley crop between July 1, 2012 and June 30, 2013 to make malt. This is up 15.8% from the previous year, according to a recent survey conducted by the USDA NASS Montana Field Office. At an average price of \$6.75 per bushel, this increase produced an estimated total of \$186.3 million for producers.

Downstream –Craft Brewing Impact

In October of 2012, the Bureau of Business and Economic Research at the University of Montana reviewed the economic impact of the state’s craft brewing market. Based on data collected from Montana breweries, the industry grew rapidly from 2010 to 2011.

Montana Brewery Survey Data Summary <small>(BBER)</small>			
Category	2010	2011	% Change
Production	87,442 barrels	102,925 barrels	18%
Beer Sales	\$21.8 million	\$26.1 million	20%
Employment	231 jobs	320 jobs	39%
Compensation	\$5.2 million	\$6.4 million	23%
Expenditures	\$15.6 million	\$18.8 million	21%

Production rose 18%, sales were up 20%, employment (both full- and part-time) was up 39%, compensation increased 23%, and expenditures were up 21%. Operations of craft breweries provided a significant impact outside of the industry to the state economy. More than 430 jobs, nearly \$50 million in private sector sales, \$9.8 million in private non-farm compensation, \$1.8 million in government compensation, and \$1.5 million in state government revenues exist in the economy as a result of craft brewing operations in Montana. Jobs are spread across a wide spectrum of the economy and impacts reoccur every year the brewing industry operates. The Bureau of Business and Economic Research is currently collecting data from the state’s craft beer industry and will be providing updated numbers sometime in 2014.

Nationally, craft beer production rose 18% in 2013. Regional craft breweries like Sierra Nevada and New Belgium made up 77% of the production volume, while microbreweries made up 15.5%. The industry directly contributed 108,440 jobs in 2012 and \$33.9 billion to the national economy through the three tier system of breweries, wholesalers, and retailers. ([Brewers Association](#))

Montana Competitors

Malteurop has put Montana on the map as a prime location for malting facilities. However, other states have far more production of malts than Montana. Reasons for locating revolve around logistic proximity to upstream or downstream markets.



Map design by: Dustin de Yong – Montana Dept. of Commerce

Industrial / Commercial Malting Companies

Alberta

Canada Malting – Calgary, AB

Located in the heart of the Canadian prairies, a prime malting barley growing region, the Calgary facility has convenient access to an excellent source of malting barley. Outbound freight allows the loading of trucks and railcars, and is a few days transit from container and bulk-loading facilities. The Calgary plant is positioned to deliver malt to Western North America and throughout the world via the Pacific Ocean.

Rahr Malting Canada, Ltd. – Alix, AB.

This facility was constructed in the middle of Alberta's prime barley-growing region in 1993. The central location ensures both dependable supplies of premium quality malting barley and proximity to key markets. This modern and efficient tower malthouse has an annual capacity of 140,000 metric tons (9 million bushels). The facility is serviced by truck and by the Canadian Pacific and Canadian National Railroads.

British Columbia

Gambrinus Malting Corporation – Armstrong, BC

The malthouse originally belonged to the Schlossquell Brewery of Heidelberg, Germany. In 1992, the malthouse was dismantled and shipped to Armstrong where it still resides today producing Canadian 2-Row malts.

Saskatchewan

Prairie Malt Limited (Cargill Malt) – Biggar, SK

Prairie Malt Limited is located in the heart of Canada's vast prairie region. Some of the best barley in the world is grown within a one hundred kilometer radius of this malthouse which has an annual capacity of 105,000 metric tons. Prairie Malt utilizes the Fleximalt system which combines germination and kilning in one malt compartment.

Ontario

Canadian Malting – Thunder Bay, ON

Located at the west end of Lake Superior in a major Canadian grain port, the Thunder Bay plant is well situated to pull malting barley from the Eastern Canadian prairies. It ships malt via rail and truck to Eastern North America and can load malt directly onto vessels from its malt storage elevator.

Quebec

Canadian Malting – Montreal, QC

The Montreal plant is located very close to a significant number of breweries in Eastern North America. A competitive rail rate allows barley from the Canadian prairies to be brought in to Montreal. This rate, coupled with the close proximity to its customers, allows the Montreal plant to offer competitive

delivery pricing. The plant can also load containers and bulk malt onto oceangoing vessels to service customers through the Atlantic region.

Colorado

MillerCoors – Golden, CO

MillerCoors operates the nation's 4th largest malthouse at their Colorado brewing operations in Golden. The facility malts barley produced in Montana and other states supplying 530 million pounds per year to the brewhouse.

Idaho

AB InBev – Idaho Falls, ID

AB InBev malting operations in Idaho Falls produce 350,000 ton per year. Anheuser-Busch contracts more than 20 million bushels of Idaho barley each year.

Great Western – Pocatello, ID

Great Western also operates a malt and brewing supplies warehouse and distribution system known as The Country Malt Group. Great Western operates malting facilities in Pocatello, ID and Vancouver, WA producing a variety of pale and specialty malts.

Located in the barley fields of southern Idaho, the Pocatello malt plant has easy access to some of the best quality barley and most reliable crops grown anywhere in the world.

InteGrow Malt LLC – Idaho Falls, ID

InteGrow Malt, LLC (IGM) is a Joint Venture between Grupo Modelo, S.A.B. de C.V., the leader in the production and marketing of beer in Mexico, and Cargill, Inc. IGM's principal market is supplying part of the malt needs of Grupo Modelo's seven breweries located in Mexico. Grupo Modelo brews and distributes ten brands including Corona Extra, the number one Mexican beer sold in the world, Modelo Especial, Victoria, Pacifico, Negra Modelo, and other regional brands.

North Dakota

Cargill Malt – Spiritwood, ND

Cargill is the nation's second largest malting company providing approximately 19% of malt consumed. Cargill, unlike Malteurop, dabbles in providing specialty malts to brewers. Cargill's malting plant is located in Spiritwood, ND.

Minnesota

Anheuser-Busch InBev – Moorhead, MN

This 250,000 ton per year malthouse provides malt to four AB InBev breweries.

Malteurop – Winona, MN

This 115,000 ton per year facility produces Pilsen and special kilned malt. This location allows for bulk shipping by barge along with truck and rail.

Rahr Corporation – Shakopee, MN

The Shakopee production facility annually produces 380,000 metric tons (24.6 million bushels) of malt, making it one of the largest single site malt production facilities in the world. The campus consists of five individual malthouses. Two major North American rail carriers, the Union Pacific and Canadian Pacific, service this site. The Shakopee site serves as the headquarters for the Rahr Malting Companies.

Washington

Great Western Malting – Vancouver, WA

This malt plant is located on the Columbia River, within easy reach of the prime malt barley growing areas of Idaho, Montana, Oregon and Washington. Located within the Port of Vancouver, this is one of only two malt plants in North America with direct access to the ocean, the other being the Canada Malting plant in Montreal, Quebec.

Wisconsin

Briess Malt and Ingredients Co. – Chilton, WI

The Briess Malthouse in Chilton, Wisconsin is one of the most unique and specialized malthouses in North America handcrafting more styles of malt than any malting operation in the world (Briess). From it comes such unique specialties as Carapils® Malt, Victory® Malt and Dark Chocolate Malt.

Briess Malt and Ingredients Co. – Waterloo, WI

In 1997 new roasting operations with multiple drum roasters were built directly next to the Waterloo malthouse making the Waterloo malting operation capable of producing the entire line of Briess specialty malts. In 2005 supply was outpacing demand for malt and the Waterloo malthouse was closed. In 2008, after setting idle for three years, Briess re-commissioned the malthouse after an extensive remodeling project in response to increased demand for malt. Today, the Briess malthouse in Waterloo is operating at full capacity. Other features at the plant include railroad service for cost effective transportation of raw materials and finished goods and an environmentally-friendly wastewater treatment system.

Malteurop – Milwaukee, WI

The largest of Malteurop's American malthouses, the Milwaukee facility produces 220,000 tons per year of Pilsen malt. Malt is shipped in bulk by truck and rail.

Micro / Craft Malting Companies

Colorado

Colorado Malting Company – Alamosa, CO

This company has been providing a wide variety of malts since 2008. Like many malthouses this size, CMC focuses on serving local markets. The company also has a gluten-free product line of 6 different malts, some of which are made from millet or other seeds.

Massachusetts

Valley Malt – Hadley, MA

Valley Malt started in 2010 with the support of local farmers and brewers. For the first time in many decades, barley is being grown in organic fields helping to build healthy soil. Valley Malt now offers base malts for local brewers and is bringing an innovative twist to many traditional malts. Being a micro-malthouse has its advantages offering unique malts that are made from heirloom or gluten-free grains, smoked with native woods, and roasted fresh to order.

Michigan

Michigan Malt Co. – Shepard, MI

This micro-malthouse provides high quality locally produced malts for both craft brewers and home brewers interested in making a more authentic and environmentally sustainable product. All the barley and wheat is locally grown in partnership with other Michigan growers that make up a "family of farms".

Nevada

Rebel Malting Co. – Reno, NV

Rebel Malting Company is small and produces malted products with local and niche markets for the brewing and distilling industries. Micro malting operations are located in Reno, Nevada. Grain is primarily sourced from two locations - Fallon and Yerington, Nevada. The Rebel focus is to sow and grow grains within 100 miles of the malthouse and hand deliver this product to local brewers and distillers near Reno, Nevada. The company promotes its malting process which claims to use 30% less water, an important commodity in the arid region.

New York

Farmhouse Malt – Newark Valley, NY

This malthouse uses a combination of new technology and centuries old methods to craft its malts sourced from growers across the state of New York.

North Carolina

Farm Boys Malt – Pittsboro, NC

Farm Boy Farms was created to provide locally grown American Malting Barley Association recommended barley, wheat, and hops to microbrewers and expert homebrewers of North Carolina. The company grows AMBA 2-row, wheat, rye, milo, and five varieties of hops.

Riverbend Malt – Ashville, NC

Riverbend Malt House pledges to provide the area's craft brewers with locally-farmed, artisan malts that bring depth and character to their passion while greatly lessening the local industry's impact on the planet. Riverbend retains the tradition of the original three-step process implying that the artisan characteristics of traditional malting techniques provide an artisan quality malt.

Oregon

Christensen Farms Malting Co. – McMinnville, OR

Christensen Farms capitalized on Oregon’s large craft beer market by creating local malt for the local breweries. Controlling the process from the seed at planting, the sustainable production practice employed through harvest, and through the malting process delivers an all Oregon beer for the first time in years.

Texas

Blacklands Malt – Leander, TX

This Texas malthouse grows and malts its barley all within the Lone Star State to capture the unique flavor of Texas.

Addendum: 2018 Update

The Department of Commerce is providing an update to this industry analysis due to ongoing developments and market status in the state, nation, and beyond. It is the purview of the department to make all industry analysis reports living documents which can continue to provide meaningful information and analysis to industrial development entities within Montana.

Malt production is directly correlated to beer production. The vast majority of malted barley in the United States is used as the primary input to the brewing process. Digging further into the data, craft beer consumes nearly 40% of the malt used by the US beer industry. This figure is most significant as craft beer only accounts for 12.7% of the volume of the US beer market. Both of these figures are up significantly over the past five years as craft beers have exploded in the marketplace. Recent headlines however are questioning whether the craft beer movement is slowing and possibly reaching its plateau as production appears to have tapered off. The National Brewers Association is the entity most relied upon for craft beer production data. Since the department's publishing of the 2014 report the association has established parameters around what counts as craft beer. These parameters have disqualified many brewers that were previously included. Many of these brewers account for large production numbers and have undergone recent expansions.

Even by the association's most recent figures, craft brewing continues to increase production. This is placing a large demand on the malt barley industry. Additionally, brewers are looking to malt to differentiate their product line from the competition; just as hops played this role in recent history. Brewers are experimenting with malts, developing new recipes, and using the characteristics of the malt in marketing their beer. All of this increased demand is leading to an increase in malt production capacity across the United States.

Developments and expansions of various sizes are coming into the market and the malt industry is in the early stages of a major supply chain shift.

This addendum investigates the current market landscape as compared to 2014, spotlights some developments in the state of Montana, and looks at the prognosis of the marketplace moving forward.

\$600 - \$650M

*Market Value of the
Malt Industry serving
the US Brewing
Industry*



*Addendum
Figure 1.*

Market Demand

As noted in the 2014 report, the brewing industry represents the largest market sector for malted barley. This addendum discusses market demand of the brewing industry, particularly the craft brewing industry, which consumes a disproportionately large volume of the available supply.

Previous data compiled by the department in creation of the 2014 report was sourced from the National Brewers Association (NBA). Comparing the 2013 data to the NBA's most recent 2016 data provides a general overview of market changes. There are some subtleties to the quantification of data and the qualification of a craft brewery that slightly skew some comparisons. However, with these considerations, an apples to apples comparison is easily achieved and will be addressed as they arise in the addendum.

National

Markets for traditional and craft beer have largely followed national trends as reported in 2014. As noted in the NBA figures below, overall beer production was stagnant in 2016. However, the craft segment of the market produced 6.2% more beer than in 2015. This market trend shows that in the calendar year of 2016 craft beer continued to increase market share over traditional beers but with less vigor than in 2013. This number is slightly skewed as previously qualified craft breweries by NBA standards no longer meet the association's definition of a craft brewery. NBA qualifies a craft brewery as: (1) having production of less than 6 million barrels annually, (2) less than 25% of the ownership or control by a beverage alcohol industry member which is not itself a craft brewer, and (3) has a majority of its total beverage alcohol volume in beers whose flavors derive from traditional or innovative brewing ingredients and their fermentation. This definition has disqualified some of the nation's largest craft beers, and all craft breweries that have been acquired by AB InBev, Miller/Coors, and the like from the total volume of craft beer production reported by the NBA. Notably, these disqualified breweries have increased production in recent years placing further demand on industry suppliers.

Addendum Figures 2, 3, & 4.



14.3% → 21.8%

3-year increase of market value of craft beer in the overall beer market

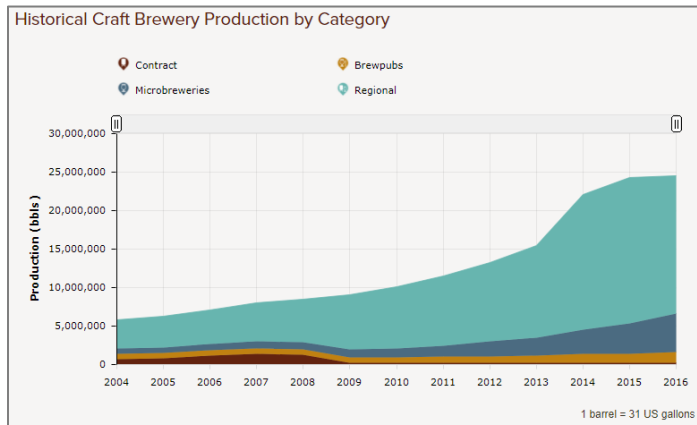


Source National Brewers Association and Montana Dept. of Commerce

*Note: charts' percentage figures represent Year over Year data

Notably, craft beer has increased its market share (sales) to 21.8% of the overall beer market representing a 66% increase in just 3 years. Production volumes follow these growth rates as overall beer has remained stagnant while the craft segment has increased 57.5% over the same three-year time period. Regional craft breweries account for the majority of production, 73.0%, while microbreweries account for 20.4%, followed by brewpubs, and finally contract brewing companies.

Addendum Figure 5.



Source: National Brewers Association

Montana

The 2014 report states that Montana was second in the nation for breweries per capita with over 50 breweries in operation and more in development. As of February 2018, the Montana Brewers Association (MBA) reported 73 breweries in operation and a known 12 in various stages of development. The most current production data for Montana craft breweries comes from the NBA which reports 179,632 barrels produced in 2016 versus approximately 130,000 barrels in 2013.

In August 2016, the University of Montana’s Bureau of Business and Economic Research revisited their 2012 impact study of craft brewing in Montana. The study notes (see Figure 5) an 87% increase in beer production from 2010 – 2015, or roughly 13% per year. Nationally, production volume increases remain strong but have slowed in the past three years. Montana, seems to be bucking that trend as the BBER study reports a 15% increase in 2015 versus a 6% increase nationally in 2016.

Addendum Figure 6. – Montana Craft Beer Production

Category	2010	2011	2012	2013	2014	2015	2010-15 % Change
Production (bbl)	87,442	102,925	114,340	130,121	142,516	163,217	87%
Sales (\$ Mil.)	21.8	26.1	29.4	33.9	38.8	45.9	111%
Employment	231	320	388	486	569	702	204%
Compensation (\$ Mil.)	5.2	6.4	7.9	9.5	11.2	13.2	154%
Expenditures (\$ Mil.)	15.6	18.8	19.8	22.5	20.3	37.5	140%

Source: MT Bureau of Business & Economic Research

Export Market

Foreign markets for American craft beers are maturing. According to NBA exports grew 4.4% from 2015 to 2016 totaling 465,617 barrels valued at \$121 million. Compared to 2013’s 282,526 barrels exports. Increasing demand for craft beers abroad is not only increasing US production but is spurring a craft movement across the globe. These developing markets are providing real opportunities to producers of equipment and input materials.

Asian countries are following American beer consumption trends. China, the world's largest consumer of beer, is moving away from the traditional lagers and pilsners and turning to the distinct flavors of craft beer. Craft beer in China only represents 1% of the total beer market but GB Times reported in 2017 that the country was on course to become the world's largest consumer of craft beer that year. Industry

Overall output of the beer industry in China in 2015 fell by 5.06%.

However, the output of craft beer saw an increase of 54.55% and has maintained a growth rate of more than 50% over the past four years.

- National Bureau of Statistics (China)

giants are taking notice; AB InBev is buying into local craft breweries and moving their craft products into the market. Vietnam, Korea, Japan, Thailand and other Asian Pacific nations are following this cultural and market trend.

Closer to home, Mexico has quietly been building a significant craft brewing industry. Americans have been introducing craft beer to tourist regions by opening up small breweries in resort towns over the

past decade. A 2017 article by Food & Wine sites a census conducted by Beerectorio, a Mexican craft beer association, which states that just one decade ago there were 20 or fewer craft breweries in Mexico and at the time of the census in 2016-2017 there were nearly 650. The association also reports 62% and 59% growth in hectoliters of craft beer produced for 2016 and 2017, respectively.

Canada once represented the largest US export market for craft beer although that may have changed in recent years as European and Asian Pacific markets are embracing the products. Regardless, American brewers have entered into a receptive market to the north and the number of Canadian craft breweries are on the rise as well. An increase from 310 craft breweries in 2010 to 775 in 2016 shows a rapidly maturing marketplace that is only slightly behind US beer market trends.

The US has lead the beer revolution which has resulted in a global movement. Markets along our borders and across oceans are developing a strong consumer base and building a craft industry of their own. We can expect the export market for US craft beer to increase in the near future, but we can also expect that the true nature of craft will develop domestic production in locales across the globe.

Market Supply

An increase in demand for malted barley has been observed by growers, malting companies, and the brewing industry. While overall beer sales have remained stagnant, the growth in the craft beer sector is driving malt consumption. As of January 2018, the NBA reports that US craft brewers have consumed nearly 40% of total malt consumed by all US brewers, and that proportion continues to grow. Craft beers can also be referred to as all malt beers, and the artisans behind these brews are requiring malts with very specific traits and characteristics. These demands are reshaping the malt barley industry.

Addendum Figure 7.

Desired Malt Characteristics

- ✓ *Distinctive flavors and aromas*
- ✓ *Lower free amino nitrogen ("FAN")*
- ✓ *Lower Total Protein*
- ✓ *Lower Diastatic Power ("DP")*
- ✓ *Lower Kolbach Index (ratio of Soluble Protein to Total Protein, or "S/T")*

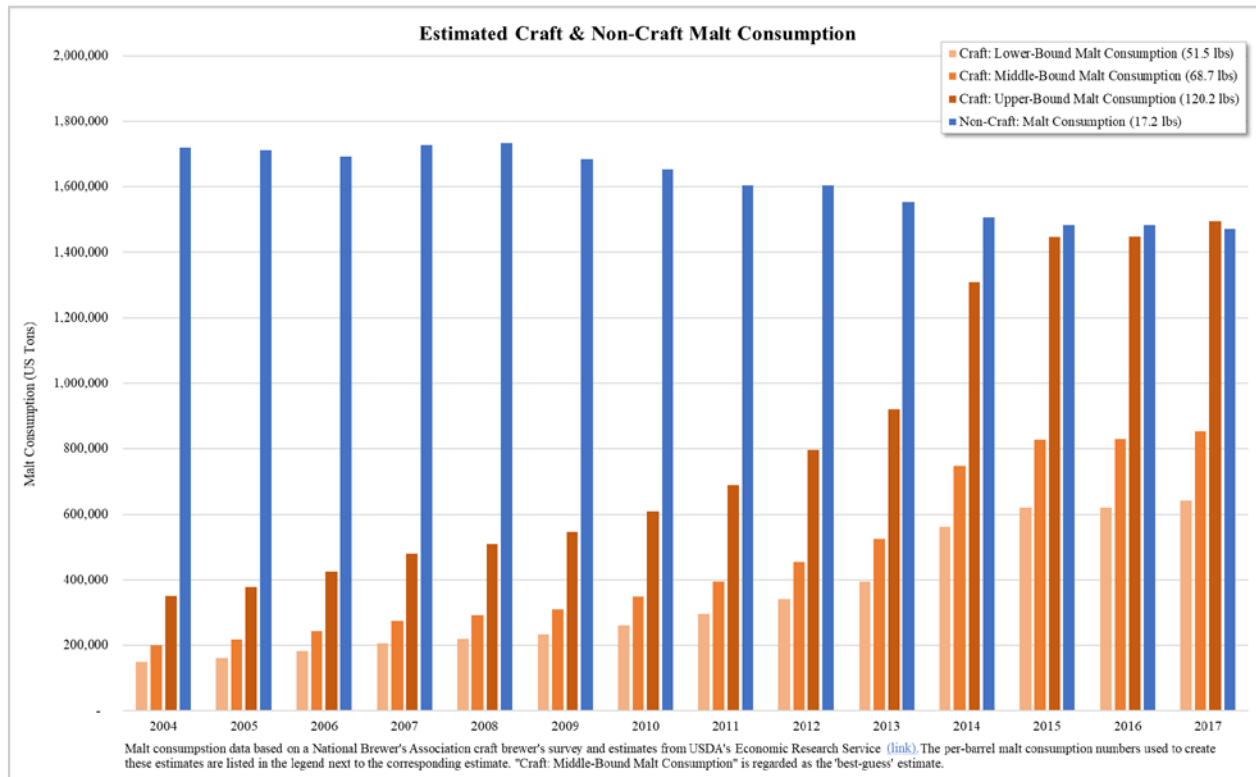
Production Levels

A March 2016 article posted by *Total Ales* reports in 2014 the US craft beer industry used over 500,000 tonnes (metric) of barley. That report calculates that approximately 46,125 tonnes of barley are needed to produce the 36,900 tonnes of malt which will supply 1% of the craft beer market. They predicted that craft beer would reach 20% of total market share by volume of the US beer industry by 2020, and require over 1,000,000 tonnes of US barley. Craft beer reached 12.3% total market share by volume in 2016. While the department does not foresee 20% market share by 2020, it does foresee the craft segment reaching this level of market share in the future.

A 2015 United States Department of Agriculture (USDA) article titled *Expanding Craft Beer Production Boosts Industrial Use of Barley* reported the craft beer renaissance has substantively effected malt consumption. It states, “Due to craft beer’s more intensive use of malt and malt products, a 1-percent expansion in craft beer production more than offsets the decline in malt usage associated with a comparable decrease in non-craft production.”

As illustrated in *Figure 8* below, malt consumption by craft brewers varies dependent on the style of beer. Dependent on what is being brewed, malt usage may vary from 50 lbs. to 120 lbs. per barrel for a craft beer compared to approximately 17 lbs. of malt per barrel for non-craft. Non-craft brewing companies have cut back on malted barley use in exchange for cheaper “filler grains” like corn and rice. When this is paired with the decrease in non-craft beer consumption and production, malt barley demand from non-craft industry segment has decreased substantially.

Addendum Figure 8.



Montana barley production has increased year over year since 2012. Montana produced 1,123,200 tons of barley in 2016 which accounted for 23.4% of the nation's supply. This USDA figure lumps feed barley and malt barley together, but it is historically estimated that 85-90% of Montana barley production makes malt on average. That percentage has likely dropped in recent years as traditional brewers, AB InBev and Miller/Coors, have substantially cut growing contracts in Montana. Given these circumstances, upstream supply of, and contracts for, raw malt barley are readily available to craft maltsters under the Big Sky.

The 2016 article posted by *Total Ales* states the US malting industry is working very close to full capacity, and that malt houses are working 24/7/365 simply to keep up with orders. Production of craft malt is responding as industry operators are expanding production capacity, and development of new craft malt facilities are occurring throughout the nation. The Craft Maltsters Guild reports that it currently has 70 members and another 100 are in development. Craft malt majors Briess, Rahr, and Great Western have all undergone expansions in the last few years in order to keep up with rising demand. These maltsters, along with foreign maltsters, offer the standard craft malts on which the industry was built. New malt houses of various sizes are also entering the market. Most of these new malt houses target the desires of craft brewers to attain unique craft beers sourced from local, quality products.

The craft brewing industry expects to reach 20% of market share by 2020, which will nearly double current malt consumption.

"Every brewer is looking for that field-to-glass story, if a brewer has a ready answer, that gets the hook deeper," said Christopher Seitz, Eastern Division Sales Manager for County Malt Group a malt distributor.

Many micro malt houses popping up around the country produce much smaller volumes of malt, classified in the department's 2014 report as 50 – 1,000 ton/year. Their focus is on creating a locally sourced, high quality, unique product that adds to the story of what's in your glass. Some facilities may even employ artisan malting techniques from centuries ago, like floor malting, in order to create a story of their own and differentiate themselves in the marketplace. These facilities are fulfilling some of the demand from craft brewing and distilling, however their relatively small impact to the industry as a whole will not curb the demand increase we are likely to see in the coming years.

The commercial segment of the malting industry, as defined by the 2014 report as ~10,000 tons / year, is undergoing expansion as well but with far fewer facilities under development or expansion. This segment of the industry requires substantial capital investment in order to get off the ground but also offers economies of scale, quality control, and production efficiencies while allowing the maltsters a batch size small enough to create unique malts with the characteristics that brewers are demanding.

Not to be forgotten are the malts which help to develop many of Americans favorite craft beers. Europe has been in the craft beer industry longer than any place on the globe. In an August 2016 article in the Chicago Tribune titled, *How European Barley became a Staple of American Craft Beer*, the author states,

“In the past five years, malt exports to the US from European Union nations more than tripled, according to Eurostat data.” This astounding figure highlights the space yet to be filled by domestic production of the American craft malt industry.

In summary, an increase in malted barley is being realized through expansions and new developments. Forecasted demand does not seem to be slowing and more developments are likely to occur. Craft brewers will consume more than half of the malt used by the US brewing industry within the next five years and will drive demand over one million tonnes. The malting industry will shift to meet product demands set by craft beer giving rise to micro and commercial scale malthouses. Industrial malting companies will continue to provide the foundational malts still used as a base malt in many craft beers and some may venture into smaller batch craft malting through development of new malting facilities or through acquisition of established craft malt companies.

Market Trends

The craft beer movement has been called a revolution by some. With any revolution comes a bit of chaos, and plenty of experimentation. While the artisans behind craft brews continue to find innovative ways to bring new flavor profiles to the pint glass, the US craft beer market is showing signs of maturity and refinement. From the farmer putting seed into the ground to the couple sipping on suds at the local brewery, the knowledge of what has gone into that pint of beer is exponentially greater than it was ten years ago. With over ten years in the marketplace, the craft beer consumer market has also established their voice and are making their desires known through the dollar. Capitalizing on the current and future market requires careful examination of market trends within the overall beer industry.

Local Sourcing

Perhaps the strongest market trend is a focus on utilizing local resources as much as possible. The fastest growing segment of the craft beer industry is microbreweries, which grew by 20.6% from 2015 to 2016 according to the NBA. This category represents your local tap room. Many of these establishments focus their sales within a small radius from where they brew, only distributing by keg. The community feel is critical to these establishments. Where once the coffeehouse stood as the meeting place of the community, the local brewery has stepped in and is seen not as a place of intoxication but as a place for positive interaction.

Essential to the success of the local brewery is the story behind its creation and its products. Of course, it helps if the brewer that started just blocks away in his garage makes a good beer, but the sourcing of local products sets the hook in consumers and keeps them coming back to support their community’s local economy. Many microbreweries offer customer participation by brewing beer with customer grown hops or other ingredients.

“Every brewer is looking for that field-to-glass story, if a brewer has a ready answer, that gets the hook deeper,”

– Christopher Seitz, County Malt Group

BBER's 2016 report on Montana craft brewing dove into to the data of this market trend and found that Montana breweries are spending more of their total expenditures in state. Total in state expenditures have increased from 34% in 2010 to 53% in 2015. BBER included a new question to their survey of MT brewers for their 2016 report which focused on the source of agricultural input products used by MT brewers.

Addendum Figure 9.

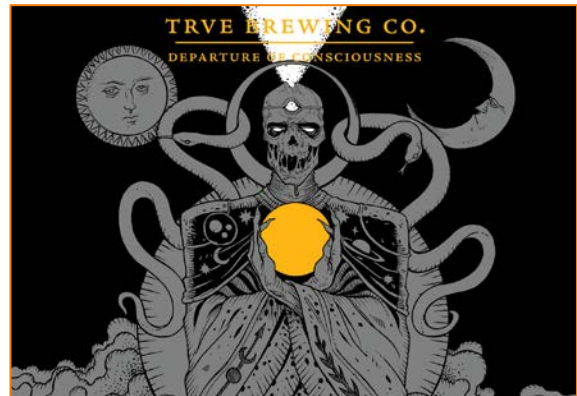
All MT Brewery Expenditures (millions)						
	2010	2011	2012	2013	2014	2015
Out of State	9.6	11.3	10.6	11.4	9.6	17.7
In State	5	7.5	9.2	11	10.7	19.8
Total	14.6	18.8	19.8	22.4	20.3	37.5
Percent in State	34%	40%	46%	49%	53%	53%

This data shows an increase in dollars spent in Montana for 2015 and 2016, \$1.4 and \$1.6 million respectively, accounting for 36% of total agricultural expenditures in each year.

Of course, not all brewers are able to source their input products locally. These brewers are focused on bringing unique products into their breweries that will help their beer tell a story to their customer. The products may be purchased for their historic quality, growing region, sustainable practices, or even charitable cause in order for the brewery to market to their customer.

Differentiation

As more craft beer claims shelf space in our grocery stores, takes over taps of local establishments, and craft breweries adorn the streets of our communities, it has become imperative for brewers to differentiate themselves from the competition. Even the nation's largest breweries are experiencing a bit of an identity crisis in the midst of the microbrewery explosion; it's just harder to stand out. A successful branding strategy is important in any industry these days and developing packaging that stands out in the crowded craft beer aisle is a feat in graphic design. But branding goes far beyond a catchy beer name and a flashy logo. Craft brewers are seeking to build a lasting relationship with their customer, and breweries are accomplishing this in a variety of ways. One marketing strategy that is being picked up by more brewing establishments is to get behind a cause their customer base identifies with and contribute a portion of sales to that cause. Another is to find a niche and stick to it. TRVE Brewing Co. in Denver has identified itself as the city's heavy metal themed brewery. Owner Nick Nunns states, "I've been a metalhead my whole life and the brand is simply an extension of my personality and the things I enjoy in life." He says the strategy works, as long as it isn't phony.



Source: TRVE Brewing Company's Aged Amber Ale label, *Departure of Consciousness*

Another Denver brewery, Black Shirt Brewing, is setting itself apart by specializing in red ales. This strategy allows owner Chad Miller to focus on creating some of the best ales in a single category of craft beer. "We asked ourselves, 'Are we going to be known as a Walmart, with something for everyone? Or as a brewery that spends every waking moment chasing perfection?'" This also touts the industry's ability to bring new levels of innovation into the product lines of craft beer.

Perhaps most importantly, brewers are distinguishing themselves from others in the marketplace by bringing quality products to your taste buds. Craft brewers see themselves as part scientist, part artist. They love to hypothesize and prove out new recipes and flavor combinations. Like artists in a studio, or scientist in a laboratory, they enjoy sharing their work with one another, and are even collaborating with



Credit: Vintage Grocers

one another on a more frequent basis. Developing new flavor profiles and successful variations on classic recipes requires knowledge of the input products and how they will contribute to the final product.

Information

When the department conducted its initial research for the 2014 study, the authors found that there was a large disconnect of information in the production line, especially with regard to malted barley. The local brewer in Helena could rattle off a number of the malt varieties that he frequently used but could not tell you the origin of the barley or the seed variety used to create the malt profile. This is somewhat true for other key inputs like yeast, and lesser true for hops which have garnered much of the spotlight from other ingredients due to the popularity of IPAs. The story is entirely different today. Brewers are diving into the origins of all the ingredients in their brews and the science behind how different malts, malting processes, yeasts, and hops interact in the fermentation process to bring new flavor profiles, colors, and aromas to the pint glass.

This information serves as the backstory behind the beer, which has become a critical component in successful marketing strategies. This new paradigm is demanding that input products to craft beer up their marketing game as well. Hops, malts, and the like are striving to set themselves apart from the competition. Origin, production practices, and what the product brings to your glass of beer are all avenues being pursued by suppliers. This upstream market is slowly building these aspects into their marketing strategies and figuring out exactly what craft brewers want to be a part of their story.

One aspect that any brewer can appreciate, is more scientific information. The craftsmen and women making some of the nation's most successful craft brews have dialed in the formula. Whether that



Credit: Tapped Life

came to be through trial and error or recipe by design, maintaining that formula's integrity as production increases is vital to customer retention. Scientific information is the key to this achievement. More information also provides the brewer with greater intelligence throughout the creation of a new brew. Developing and refining flavor profiles, beer characteristics, and other aspects can be achieved any number of ways but understanding exactly how different inputs effect final outcomes increases the brewers' knowledge, efficiency, and ability to market their product.

Montana Developments

Since publishing its 2014 report, the Montana Department of Commerce has witnessed a number of developments in the malting industry. As previously noted, Montana along with the nation has increased the number of craft breweries in operation, thusly increasing the volume of craft beer being produced. This has accounted for a large increase in the amount of malt consumed in the US. This new demand has served as a catalyst for an increase in domestic malt production from historic operations and new developments coming online, as well as an increase in the amount of malt imported into the United States.

There is not a corner of the nation that has not noticed craft beer's expanding presence in the market. This has garnered the attention of entrepreneurs and investors alike, and many are attempting to capture their share of this economic expansion.

Western Feedstock Technologies

The department's 2014 study noted the work of former state barley breeder Dr. Thomas Blake and his development of micromalting equipment to be used by the advanced home brewer and microbrewery. Today, Dr. Thomas Blake and Dr. Victoria Carollo Blake have expanded the original business into Western Feedstock Technologies (WFT) and have focused the company into four divisions. *Montana Malters* offers malting equipment in three different batch sizes. *Big Sky Malts* specializes in small-batch, hand-crafted premium malt to market locally from their malthouse in Bozeman, Montana. *Montana MaltLab* offers contract malt and grain analysis. Finally, *Gallatin Grains* is a purveyor of premium small grains from Montana and produces heirloom varieties of malting barley, along with hullless oat, and spring rye.

This company is meeting a few of the industry's needs on a small level. Local breweries near Bozeman are likely already taking advantage of Big Sky Malts' craft malts in their seasonal brews. Montana Malters has tapped into the international market for selling its brewing equipment. The company has accessed the Montana Department of Commerce's Office of Trade and International Relations and attended a trade mission to Japan which the department believes has resulted in sales of equipment. This equipment may prove very popular in US breweries as well; craft brewers would benefit from marketing that they malt their own barley inhouse for some of their brews. The Gallatin Grains arm of the business may also prove lucrative as many maltsters large and small are looking to diversify seed varieties used in malts. Finally, the Montana MaltLab is likely to see some small demand for its services as brewers fine tune recipes or increase production volume.

WFT's weakness, as perceived by the authors of this report, lies within their branding and marketing. The products and services that they are bringing to market have solid potential, but it seems that awareness is lacking. The authors have not reviewed a business plan, marketing plan, or branding strategy for WFT which would provide insights into the scale and consumer market desired.

<http://www.westernfeedstocks.com/>

Montana Malting Company (Manhattan Malting Company)

This company is referenced in the 2014 report under *Current Developments*. Andy Stohlmann was partnering with Tom Blake, referenced above, to build a 1,000-ton craft malting facility in the Bozeman area. During the development process the partnership dissolved as the partners focused on different aspects of the endeavor. The department worked closely with Andy Stohlmann during early stages of development, including awarding the company a Big Sky Trust Fund grant for a feasibility study.

Two things hindered this development as do many startups, time and capital. Mr. Stohlmann was / is a fulltime pilot for the National Guard, is a husband and father, and an entrepreneur. The development progressed with some assistance from the department, but it never found solid footing. However, one aspect of the development succeeded. Mr. Stohlmann always planned to have a brewery within his malthouse to test and share products of his creation. He acquired brewing equipment as it became available in the market, eventually assembling all that he needed to make craft beer. When a space opened up near the Montana State University campus in Bozeman, Mr. Stohlmann seized the opportunity. He now operates Bunkhouse Brewing in Bozeman, MT.

Stone Path Malt

In October of 2014, a call from Massachusetts came to the Montana Department of Commerce. The individual, Michael Schroth, sought to speak with the author of the Malting Industry Analysis report. In their discussion Michael told the author that he and his semi-retired friend had previously discussed developing a malt house for the craft beer industry on the eastern seaboard. He had found the 2014 Montana report shortly after publishing, shared it with his friend, and they decided to move into development of the project.

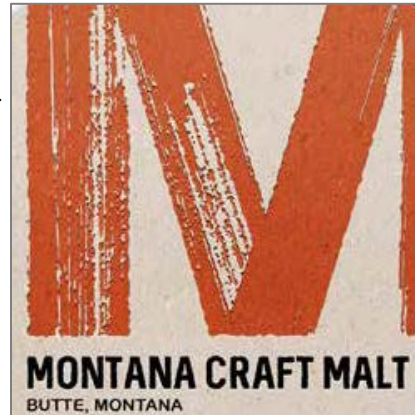
Over the next year or so, Michael and his partners developed Stone Path Malt. They developed a business partnership with a maltster and developer of the Kasper Schultz malting system in Germany. Soon thereafter they began taking orders from east coast brewers, sending contract malting orders to Germany, and importing craft malts. Phase two of their business plan is currently underway. Stone Path is developing a 1,500 metric ton per year malting facility in Massachusetts. Not losing sight of the modest Montana beginnings, Stone Path has been in contact with the Montana Wheat and Barley Commission and planning to source Montana grains for a portion of their malt production. Phase three of their business plan is to develop a malting facility near the continent's best barley growing region, Montana.

<http://www.stonepathmalt.com/>

Montana Craft Malt

In February of 2017, a team of investors announced that they had organized to build a 10,000 ton malting facility in Butte, Montana called Montana Craft Malt (MCM). This facility just qualifies as a craft malt house under the Craft Maltsters' Guild 5 to 10,000 tons per year standard, however the intent of the business is clearly stated in the company name. The Department of Commerce was contacted by the development team of MCM in 2016 and notified of their intentions. The department at that time believed that the *Development Target* of 10,000 tons annually as identified in the report was still valid in the marketplace.

MCM completed early development stages of the project in the latter half of 2016 including feasibility and market studies, establishing primary partners, capital acquisition, initial plant design, and initial customer agreements. This due diligence provided the primary developers and investors a level of certainty necessary to move forward with the \$15+ million project. All market analysis and feasibility work done by a third party reaffirmed and strengthened what the department had published in its 2014 report.



Northern Seed Lab was noted as a private company and a *Supportive Venture* to a craft malting facility development in the department's 2014 report. President of Northern Seed, Ron Ueland, was supportive of the state's efforts to bring this development to light, as it would positively affect the state's barley growers and possibly his seed program. As developments of a malting facility faltered in the state in 2014-2015, Mr. Ueland began to take notice of what was happening in the malt industry and decided, someone must do this. MCM broke ground in the Montana Connections Business Park in Butte, Montana in late fall of 2017. Under a Non-Disclosure Agreement, the department received and reviewed MCM's business plan. MCM notes that the malting industry supply chain has not yet evolved to the needs of the craft beer industry. The industry remains largely consolidated with a relatively small number of industrial sized malting operations forcing craft brewers to purchase commodity malts with little differentiation from the competition. MCM's business plan speaks specifically to the demands of the craft brewing industry as identified in 2014 by the department and in the 2018 Addendum.

Credit: Montana Craft Malt

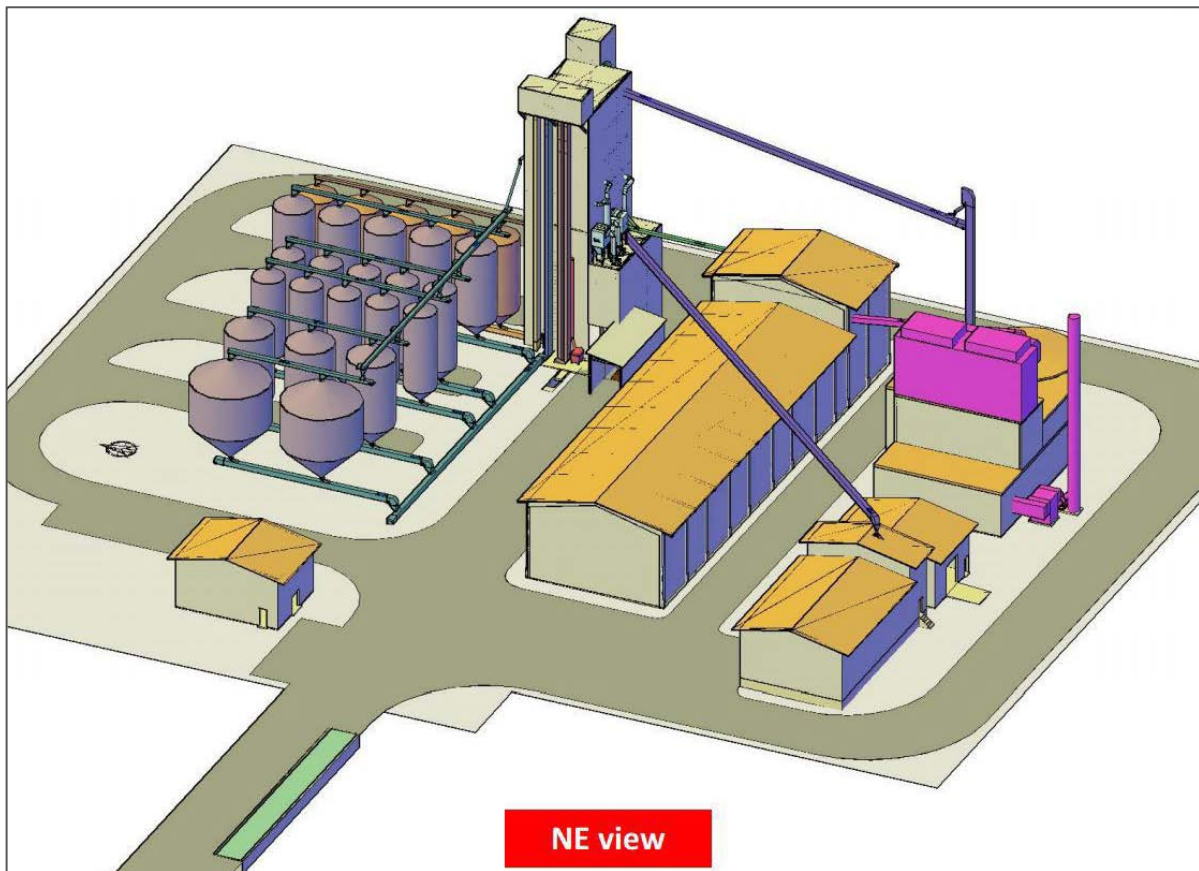
The Montana Craft Malt Company brand will honor the distinct craft culture and its unique values – emphasizing a sense of origin, diverse malt varieties, and cache around the craft.

By offering a product that is high in demand, at competitive market prices, MCM should easily secure and retain a customer base and meet projected revenues. Operating in an agricultural economy such as Montana has benefits beyond the obvious supply of some of the continent's highest quality barley. MCM has a readily available market for the biproducts of the malting process; screenings from cleaning the sprouted grains will be sold to the livestock industry in the surrounding area. The company is also looking to add value to other agricultural industries and to decrease plant downtime. The grain conditioning assets of the plant will be contracted out to the grain and food industries during the

germination stage of malting. These considerations amongst others show a diligence by MCM to minimize losses and utilize the full potential of the plant and the product.

The 2014 report published by the Department of Commerce identified this size of facility as the *Development Target* for a craft malting facility in Montana. The report however describes the facility as a commercial specialty malt house; the Montana Craft Malt facility will produce both specialty and base malts for the craft beer industry. Montana’s craft beer industry in 2013 consumed approximately 500 tons of specialty malt and IDP research estimated that two of the four large regional craft breweries like New Belgium or Sierra Nevada produced 2-3 million barrels of beer annually creating a demand for 9,000 to 13,500 tons of specialty malts alone. Considering the growth in local and regional craft brewing and the fact that MCM will be providing base and specialty malts, more than sufficient demands exists for a 10,000 ton facility.

Credit: Montana Craft Malt - facility rendering



Today, Montana has increased the number of brewing establishments as well as increased the output of barrels brewed from the state’s established breweries. This increase in volume is outpacing the nation on a percentage basis year over year. Nationally, the same story can be told. More establishments and more barrels of craft beer. If anything, the 2014 report published by the department undershot the *Target Development* for a craft malting facility in Montana.

<http://www.montanacraftmalt.com/>

Montana State University

Since the 2014 report a new breeder, Jamie Sherman, has been hired to head the MSU barley program. She is building on the strong history of the MSU program, breeding for all end-uses of barley. A continued focus is to improve barley for the craft malting and brewing industry. A group of lines soon to be released were inherited from the previous breeder, Tom Blake, that carry a low protein gene with the potential to keep malt barley within quality specs while being managed at higher nitrogen allowing farmers high yields. To support grower success, high yielding lines even under dryland conditions and with malt quality stability are being selected. A new focus, funded by several groups, is investigating the contribution of barley variety to flavor. Molecular markers are being identified to improve efficiency and accuracy of selection.

Another major development of the program is the establishment of a Malt Quality Testing Lab which assists the breeding program with more data points, earlier in the 10-12 year process, which helps prevent the loss of important malt traits. This lab can provide as many as 10,000 points a year, a large increase compared to what has traditionally been available. Another key contribution of the MSU Malt Quality Testing Lab is the full testing service it provides to third party maltsters. This state of the art lab, one of only two of its kind in the country, supports the establishment of new craft maltsters. The lab provides quality data helping maltsters perfect their processes. The lab further contributes to the community through education and outreach offering tours to those hoping to gain a better understanding of the breeding program, malt quality, and testing.

Addendum Figure 10.

American Malting Barley Association 2018 Report to Congress	
Crop value:	\$211.8 million
Total business activity:	\$1.351 million
Tax revenue:	\$158 million
Employment:	10,152 individuals
MT Breweries:	68
MT Distilleries:	15
MT Malt plants:	6

The MSU breeding program will be hosting the Craft Malt Conference in January/February of 2019, an event organized by the national Craft Maltsters Guild. Montana is already well known across the country as a premier producer of high quality malt barley and this event will highlight the craft malt now being produced in the region, as well as, the potential for the industries growth. In conjunction with the conference, the University will also host a week of world class education through the “Advanced Course in Craft Malt Technology” taught by leading experts the week prior to the conference.

www.montana.edu/barleybreeding

Conclusion: Industry Snapshot

Bart Watson, Chief Economist for the Brewers Association, published his analysis of craft brewery growth in 2017 on March 28, 2018, while this addendum was being drafted. His insights confirm, that nationally growth in craft beer has decelerated. Even when losses from acquisitions are included, the 5% growth rate experience in 2017 is far less vigorous than years passed but remains a healthy growth rate by any industry standard. His analysis also points to a market focused on local microbreweries and brewpubs. This segment of the craft industry accounted for 60% of total craft growth in 2017, and if you include breweries that were microbreweries in 2016 but crossed into the regional brewery sector in 2017, they account for 80% of the industry's growth.

The landscape for brewers has definitely changed. The market is showing signs of maturity. The majority of breweries, 73%, saw flat or upward growth in 2017. This is a sign of a healthy, stable marketplace. Competition overall is stronger than if you were first opening the doors to your tap room just two or three years ago. As Mr. Watson states, "Plenty of breweries are differentiating themselves and finding ways to grow in this marketplace, but it's certainly no longer universal." Consumer spending shows a move toward smaller, local brewing operations. Craft beer sales at the brewery grew by 400,000 barrels in 2017 accounting for ~33% of total craft growth.

"Craft demand is fundamentally strong and here to stay."

– Bart Watson, Chief Economist for the Brewers Association

For the malting industry, all signs are pointing toward a shift in the supply chain. The fastest growing segment of the craft beer industry, microbreweries, are demanding quality products sourced locally or traceable to their point of origin. The craft industry now has the collective buying power to shape the production of malt suppliers. Malt houses nimble enough to contract to the individual orders of breweries will build a portfolio of loyal customers. Brewer alliances and collaborations in brewing will foster development of larger batch sizes of craft malt to be used by multiple craft brewers.

Growth in craft malt houses across the country seems to be strongest in the smaller end of production capacity. These micro malt houses may produce anywhere from 5 to 1,500 tons per year. Their market is primarily local microbreweries and some regional breweries in need of contract malting services. Malting industry majors have undergone large expansions to meet market demand and stave off increasing imports of malt. These expansions generally have not focused on delivering a craft product to brewers and will do little to help brewers differentiate themselves in the market.

Montana Craft Malt currently under development in Butte Montana, is entering into the market unlike any other current development discovered in the department's research. It is likely that once operational, Montana Craft Malt will be the largest craft malt house in the US. Operating with the batch flexibility of a micro malting facility but at industrial volumes that can meet the needs of some of the largest craft breweries. One would imagine that this is the ideal space to be in for a craft maltster, so why aren't more developments of this nature in the works?

First, this has never been done. Not at this scale, with this level of flexibility, and not in the current craft beer marketplace. Montana Craft Malt (MCM) is pioneering a new way of meeting the needs of a growing industry. Second, a development of this scale is very capital intensive. Therefore it undergoes serious scrutiny by investors and financial institutions who are relying on a certainty of return for their substantial investment. MCM has an impressive leadership team with an extensive history of successful entrepreneurship, business management, and growth. Should their model prove successful, it is likely that they will expand operations should the market provide the need. It is also likely that others may follow MCM's lead.

Abundantly clear is the forecast for domestic malt production. Craft beer's demand for malt is stronger than ever. Three factors are contributing to meet that demand, (1) current operators are expanding and operating at full capacity, (2) new malt houses are coming on line and, (3) imports have more than tripled in recent years. Two of those three factors are not even providing the product that the craft brewers want: corporate malts and foreign tariffed malt. The industry will shift to meet the demands of its customers, displacing imports and domestic malt products that do not meet the desires of brewers. This represents an enormous opportunity.

To capture a large portion of this market a maltster cannot operate as has historically been done. They must progress, adapt, and evolve in the same manner that the craft beer industry has in its revolution within the US brewing industry. Careful attention to the desires of the customer are paramount, delivering consistency and accountability. We will witness an evolution of the malt industry at a much slower pace than craft brewing. Major changes within any commodity market will take place over longer period of time. But slowly, upstream barley growers will build relationships and loyalty to craft malt houses. Malt houses will add value to the farmers grains and tell the story of how the malt came to be, and craft brewers will have the ability to source malts of their choosing.

