

MONTANA BUSINESS QUARTERLY

VOLUME 50, NUMBER 4, WINTER 2012



THE ECONOMIC IMPACT OF
*Craft
Brewing*
IN MONTANA

Inside:

- Local Brewery Profiles
- Mountain Pine Beetle Impacts
- Vocational Rehabilitation ROI
- American Community Survey Stats
- Energy Update
- MBQ Index

**BUREAU OF
BUSINESS
AND ECONOMIC
RESEARCH**

**ABOUT THE BUREAU OF BUSINESS
AND ECONOMIC RESEARCH**

The Bureau of Business and Economic Research has been providing information about Montana's state and local economies for more than 50 years. Housed on the campus of The University of Montana-Missoula, the Bureau is the research and public service branch of the School of Business Administration. On an ongoing basis, the Bureau analyzes local, state, and national economies; provides annual income, employment, and population forecasts; conducts extensive research on forest products, manufacturing, health care, and Montana Kids Count; designs and conducts comprehensive survey research at its on-site call center; presents annual economic outlook seminars in cities throughout Montana; and publishes the award-winning Montana Business Quarterly.

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**MESSAGE FROM BBER
DIRECTOR PATRICK BARKEY**

The Bureau of Business and Economic Research is many things, but as our name suggests, we are primarily a research organization. More specifically, we are focused on policy research, which brings the tools and concepts of business and economic research to bear on issues of importance to Montanans.



In policy research, it is the findings themselves, instead of the research techniques, that are the primary interest. How many Montanans lack health insurance? What would be the impact on Montana if the federal government were to indeed fall off the "fiscal cliff?" What is the economic footprint of the military in Montana? We research questions like these because policy debates can be informed by findings we discover and present.

That's perfectly exemplified by our recent study on the economic impact of the craft brewing industry in Montana described in this quarter's issue of the MBQ. BBER researchers gathered data and utilized state-of-the-art research tools to assess the contributions to the economy made by an innovative and rapidly growing industry segment with a presence across the state.

Of course, this research is almost always sponsored – paid for – by organizations or government agencies that often have a stake in the outcome. To say that quality research costs money would not surprise anyone in the business of providing a product of value. Just like countless other research organizations based in colleges and universities across the country, the BBER charges project sponsors – be they private companies or federal government agencies – to compensate for the University resources used to produce the final product.

Does that financial result influence research findings? All research is funded somehow, and can always be subject to this question. Our approach has always been to utilize methods, models, and procedures in our projects that are accepted as state-of-the-art by our research peers and to document the process through which our findings are reached as transparently as possible.

This is what we have always done and will continue to do at the BBER. The readers of our reports can then judge whether the information we provide is of value.

Sincerely,

A handwritten signature in black ink that reads "Patrick M. Barkey". The signature is written in a cursive style.

Patrick M. Barkey
Director, Bureau of Business and Economic Research

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MONTANA BUSINESS QUARTERLY

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The Economic Impact of Craft Brewing in Montana

by Colin B. Sorenson, Todd A. Morgan, and Shannon Furniss

Craft brewing has been around in Montana since 1859 – 17 years before Custer’s Last Stand, according to Steve Losar, who knows a lot of good stories about the history of beer in Montana.

Having a brewery meant you had a stable town, Losar says. It was part of the economic fabric and was tied to industries like mining and logging that produced “thirsty kinfolk.”

Losar has spent more than 40 years sorting through old newspapers and publications and gathering memorabilia for his beer museum in Polson.

It appears that Montanans are still pretty thirsty today. Montana’s 33 craft breweries (as of 2011) represent one of the fastest growing manufacturing sectors in the state. From 2010 to 2011, production increased by 18 percent, employment was up by 39 percent, and sales rose by 20 percent.

According to the Montana Brewers Association, Montana is second in the nation in the number of breweries per capita. With 30,919 people per brewery, Montana is only slightly behind Vermont. With the opening of a handful of new breweries in recent months, Montana is well on the way to being No. 1, with a total of 38 breweries.

To determine the economic contribution of craft brewing, BBER surveyed Montana brewers, collecting data on production, sales, employment, compensation, expenditures, and benefits. The response rate was 97 percent. Using a well-respected economic model, Regional Economic Models, Inc. (REMI), BBER was able to compare two scenarios – a Montana economy where the brewing industry never existed versus an economy with brewing – to find the economic impact.

Having a brewery meant you had a stable town, Losar says. It was part of the economic fabric and was tied to industries like mining and logging that produced “thirsty kinfolk.”

Survey Findings

From 2010 to 2011, production at Montana breweries increased from just over 87,000 barrels to nearly 103,000 barrels. Beer sales increased from just under \$22 million to more than \$26 million. Employment, including both full- and part-time jobs, increased from 231 to 320 from 2010 to 2011 – a 39 percent increase. Compensation (wages and salaries plus the value of benefits packages) increased from \$5.2 million to \$6.4 million from 2010 to 2011 – a 23 percent increase. Expenditures (excluding labor) increased from \$15.6 million to \$18.8 million from 2010 to 2011 – a 21 percent overall increase (Table 1).

As shown in Figure 1, brewers were asked what portion of their expenditures, other than employee compensation, occurred in Montana. Overall, expenditures rose by 21 percent, from \$15.6 million to \$18.8 million. The Montana portion of expenditures rose from \$6 million (38 percent of total expenditures) in 2010 to \$7.5 million (40 percent of total expenditures) in 2011. The percentage of expenditures made within the state varied widely among brewers, and brewers reported that anywhere from 2 percent to 90 percent of their expenditures were in Montana. Some brewers noted that they would prefer to buy more supplies from within Montana, but they were unable to obtain some of their products locally.

Providing health insurance and other benefits is clearly a high priority for many breweries in the state. Figure 2 shows the number of breweries that offer various benefits to their employees including health insurance, dental insurance, life insurance, retirement and disability, and paid vacation.

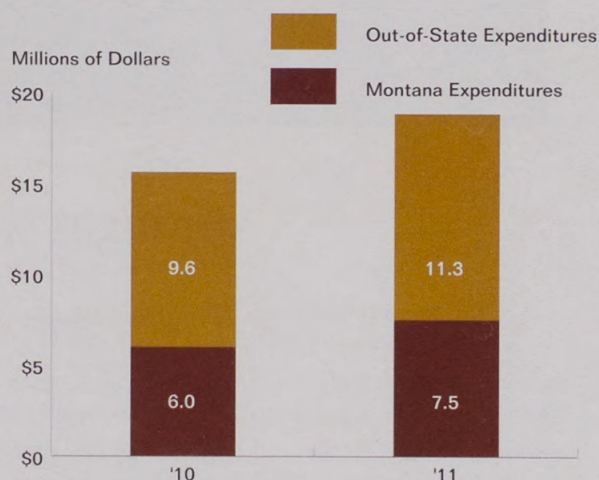
**Table 1
Montana Brewery Survey Data Summary**

Category	2010	2011	Percent 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%

* Excluding employee compensation.

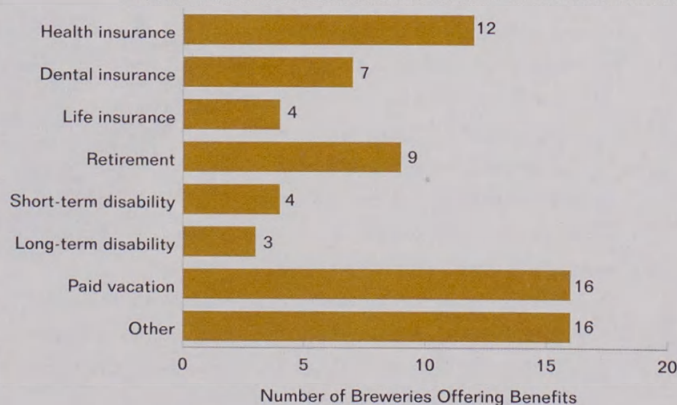
Source: Bureau of Business and Economic Research, The University of Montana.

**Figure 1
Montana Brewery Expenditures**



Source: Bureau of Business and Economic Research, The University of Montana.

**Figure 2
Montana Brewery Employee Benefits**



Source: Bureau of Business and Economic Research, The University of Montana.



Draught Works, Missoula, MT

Draught Works, Missoula

Want to buy your friend a beer? Pull out your wallet – or your iPhone. Through a new mobile app, beerfarmer.com, you can buy a pint of Scepter Head IPA or Quill Pig (classic style Pilsner) or whatever Draught Works is brewing up and send it to your friend via text message. Your friend can then claim and redeem his beer.

Connecting with customers is important to the management at Draught Works, and they've learned that their customers respond well to technology and social media. The brewery keeps their customers informed of new brews, live music, and other events via Facebook and Twitter. Reminders of "Growler Monday" where customers get a free pint for filling up their growler or "Chug for Charity," where 50 cents of each beer goes to a local nonprofit come in a steady stream through postings and tweets. Special promotions posted regularly – like ski to Draught Works (or show your skis/gear) and get a free pint – cater to Missoula's recreationally minded beer drinkers, keeping them tuned in and engaged.

Paul Marshall and Jeff Grant opened the brewery on Toole Avenue a little over a year ago. Located in Missoula's Westside neighborhood, the brewery is a

remodeled 5,000-square-foot warehouse that dates back to the 1930s. Red brick walls and a wooden bar made from a salvaged "boom" log from the bottom of Flathead Lake give the brewery a neighborhood kind of feel. And many of the customers who stop by for a brew live in the neighborhood.

Last year, Draught Works – Missoula's newest brewery – produced 700 barrels, but they expect that number to increase as the business continues to grow. The brewery keeps five beers on tap at all times, though they have 15 to 20 different recipes that they create for special occasions – like the Last Rites Mexican Chocolate Porter they brewed for Missoula's Festival of the Dead parade in the fall. Draught Works has 10 part-time employees who keep busy milling, mashing, lautering, brewing, whirlpooling, cooling, fermenting, and serving up their specialties in the taproom.

The business model of tasting and selling beer in the taproom works for now, Marshall says, but they may eventually get into distribution. It seems Missoulians are quite fond of Draught Works' product.

"I'd put Missoula up against any town in the nation for savvy and culture and palette," Marshall says.



Economic Impact Results

Results from the REMI economic impact simulation are summarized in Table 2. This study finds that because the craft brewing industry exists in Montana, the state economy is larger and more prosperous. Government revenues are also higher as a result of the industry. Because of the operations of the craft brewing industry:

- There is an employment impact of 434 jobs across various sectors of the state economy;
- In addition to the jobs in the manufacturing sector, there are significant impacts in the construction, health care, and retail trade sectors;
- There are employment and output (private sector sales) impacts throughout the five regions of the state, though they are concentrated in the northwest region;
- Because of the brewing industry, output (private sector sales) is \$48.4 million higher than would otherwise be the case;
- Private nonfarm compensation and government compensation are \$9.8 million and \$1.8 million

Table 2

Economic Impacts of Beer Brewing in Montana

Category	Impact
Total Employment	434 Jobs
Output (Private Sector Sales)	\$48.4 Million
Compensation (Private Nonfarm)	\$9.8 Million
Compensation (Government)	\$1.8 Million
State Government Revenues	\$1.5 Million

Source: Bureau of Business and Economic Research, The University of Montana.

higher, respectively, than they would be without the existence of craft brewing in Montana;

- State government revenues are \$1.5 million higher than they would be without the Montana craft brewing industry.

Beaver Creek Brewery, Wibaux

Out in far eastern Montana – on I-94 not too far from the North Dakota border – is Wibaux, population about 400. With not too much around but vast plains and open road, two billboard signs pull people into what has become known as a microbrew oasis, Beaver Creek Brewery.

Named after a creek that runs through Wibaux, Beaver Creek Brewery opened in the summer of 2008 with six beers on tap, plus root beer. The Paddlefish Stout won a “people’s award,” but beer connoisseurs also are fond of the Redheaded IPA and Rusty Beaver Wheat.

Why open a brewery in Wibaux? “We had too many pints and decided it was a good idea,” says Jim Devine, one of the partners at Beaver Creek Brewery. He and his partners, Sandy Stinnett and Russell Houk, took 18 months to remodel a historic downtown building that has been many things in its lifetime – a grocery store, a shoe store, a butcher shop. In 2008, the partners brewed about 68 barrels of beer. As the brewery grew in

popularity, so did its production. Last year, production was about 650 barrels.

A country western musician who spent 12 years recording in Nashville, Devine still has connections and brings in live music for his customers. Blind Pilot, an indie folk band from Portland, was one of the groups. Playing at the brewery, which holds only 100 people, is a unique experience for some of the bigger groups. Devine is not adverse to picking up his guitar and holding Sunday afternoon jam sessions.

One of the frustrations Devine shares with fellow microbrewers is the fact that taproom laws are restrictive, with limited hours, only a certain number of pints allowed, and other production limits. He recently opened a restaurant next door, the Gem, that will serve Beaver Creek’s beer through a beer and wine license held by a family member. Several other Montana brewers are looking into implementing this type of business model.





BIG SKY BREWING CO

MISSOULA, MONTANA

Big Sky Brewing, Missoula

Who could resist trying a beer called Moose Drool? Or Scapegoat, or Powder Hound, or Trout Slayer? With catchy names and tasty beers, Big Sky Brewing is the biggest brewery in the state with production of about 46,000 barrels of beer in the past year. That works out to around 630,000 cases or nearly 2.5 million six packs of beer that the brewery sold throughout Montana and in 24 states west of the Mississippi (except Arkansas and Louisiana) plus Wisconsin, Illinois, and Michigan.

Owners Neal Leathers, Bjorn Nabozney, and Brad Robinson brewed their first batch of beer, Whistle Pig Red Ale, in the summer of 1995, and it hit the market in time for the 4th of July weekend. When they first started thinking about names of beers, they decided they wanted to use big Montana animals as their theme. The most famous of the company's brands, Moose Drool, has a label with a moose lifting his head from a pond with water streaming off his muzzle.

Big Sky Brewing was a draft-only brewery for the first few years. They soon realized that they were growing rapidly and becoming a

regional player. The owners decided to start bottling and distributing their beer. In 2002, they moved into a larger site (24,000-square-foot) near the Missoula airport to accommodate their growing operation. The brewery has a gift shop and hosts concerts at its outdoor venue. Some of the concerts have included Bob Dylan, Brandi Carlile, the Decemberists, and Modest Mouse, with the proceeds of beer sales going to local area nonprofits. Missoula's Glacier Ice Rink was one of the beneficiaries, receiving more than \$30,000 to construct new locker rooms.

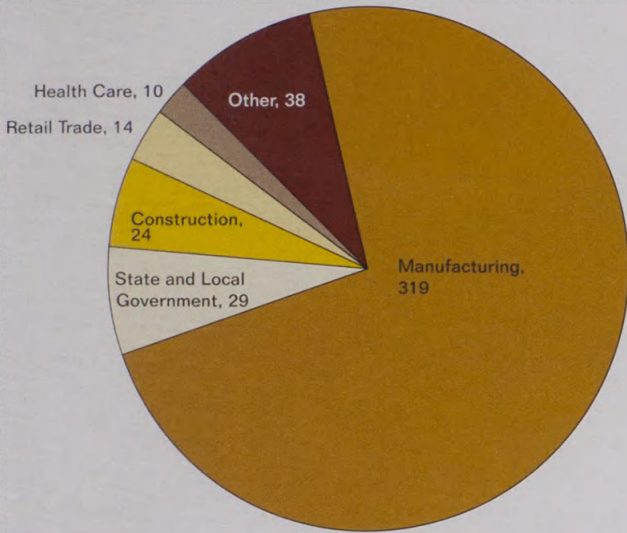
The brewery started out as a four-person operation. Now it has 45 employees with a payroll of about \$2.35 million. Big Sky Brewing offers employees health insurance, 401K plans, and paid vacation.

According to Big Sky Brewing President Neal Leathers, the owners' future plans include continuing to expand their territory and getting their beers into more stores, restaurants, and taverns.



Big Sky Brewing is the biggest brewery in the state with production of about 46,000 barrels of beer in the past year.

Figure 3
Employment Impacts by Industry
(Number of Workers)



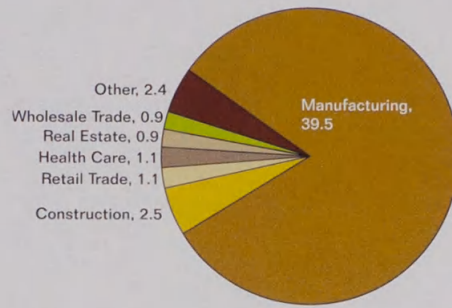
Source: Bureau of Business and Economic Research, The University of Montana.

Impacts by Industry Sector and Montana Region

Economic impacts of the brewing industry are spread across several industry sectors and also dispersed across the state. Clearly, the manufacturing sector, which includes the brewing industry, holds the largest share of the employment impacts, as shown in Figure 3.

However, the employment impacts of the brewing industry are revealed in several other sectors as well. This includes 29

Figure 4
Output (Gross Sales) Impacts by Industry
(Private Sector, Millions of Dollars)

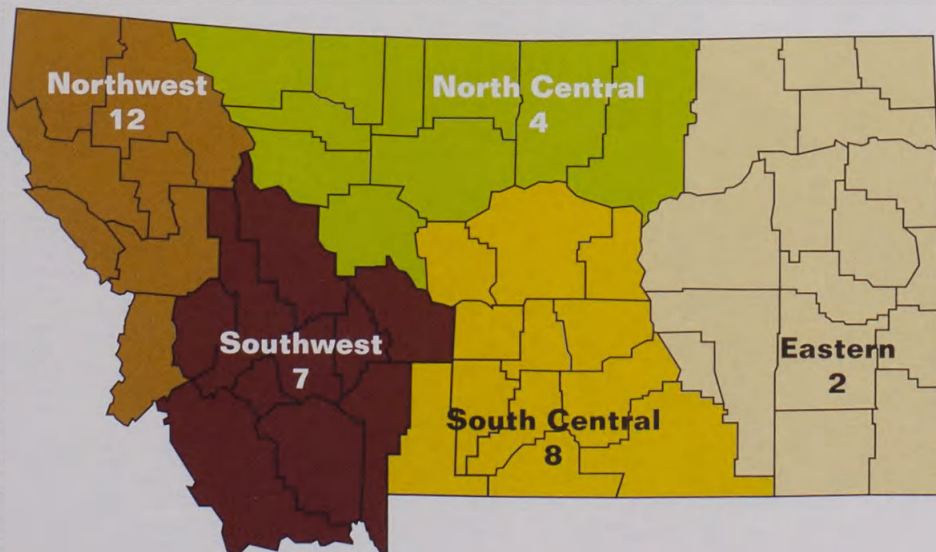


Source: Bureau of Business and Economic Research, The University of Montana.

jobs in state and local government, 24 jobs in construction, 14 jobs in retail trade, 10 jobs in health care, and 38 additional jobs in other sectors. Output impacts (Figure 4), measured by private sector gross sales total, are \$48.4 million, \$39.5 million of which can be attributed to manufacturing.

While concentrated in the more populous regions of the state, economic impacts due to craft brewing extend into each region of the state. For the purpose of the analysis, impacts were split into five Montana regions (Figure 5). At the end of 2011, there were 12 breweries in northwest Montana, seven in southwest Montana, four in north central Montana, eight in south central Montana, and two in eastern Montana.

Figure 5
Economic Regions and Number of Active Breweries, 2011



Source: Bureau of Business and Economic Research, The University of Montana.

Bozeman Brewing Company, Bozeman

Montana breweries should work together to promote quality local hand-crafted beer that is brewed in the state, according to Todd Scott, president of Bozeman Brewing Company and board member of the Montana Brewers Association.

“It’s likely we’re working toward the same goals, and there is strength in numbers,” Scott says. “We are one voice during the legislative session.”

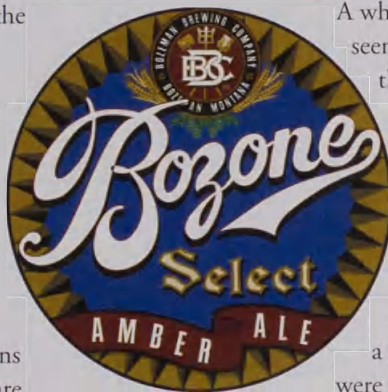
From the time of Prohibition when alcohol was banned, the craft brewing industry has faced challenges. Whether it’s fighting increasing taxes or competition from international corporations that dominate markets, brewers should share information with each other, he says.

Scott, who calls himself and his wife, Lisa, check signers/ chief keg and bottle washers/maintenance specialists aka owners, opened the brewery in 2001 after having worked as head brewer for 10 years at Spanish Peaks, a trendy Bozeman brewery that moved production to California. To

get their start, they bought the brewing equipment from Spanish Peaks. It wasn’t long before they developed Bozeman Brewing’s flagship beer, Bozone Select Amber Ale.

A whimsical name for the Bozeman area, Bozone seems to be well-liked by most customers in the tasting room, who range from cowboys to patchouli-wearing hippies to university professors, Scott says. Last year, the brewery, with a handful of employees (water enhancement specialist aka head brewer, sellerman aka manager, lab rat aka brewer, to name a few), produced 3,400 barrels. They also started to can Bozone beer and sell it in a few markets outside of Bozeman. The cans were designed for Bozeman’s recreationally oriented community – bikers, hikers, and skiers – who could carry them easily in backpacks.

Future plans include continuing to expand and offering IPA, Porter, and Hefeweizen in cans. “We may not ever be the biggest, but we’ll have smart, controlled growth and try to fill everyone’s need for beer.”



Figures 6 and 7 show output and the employment impacts by region, respectively.

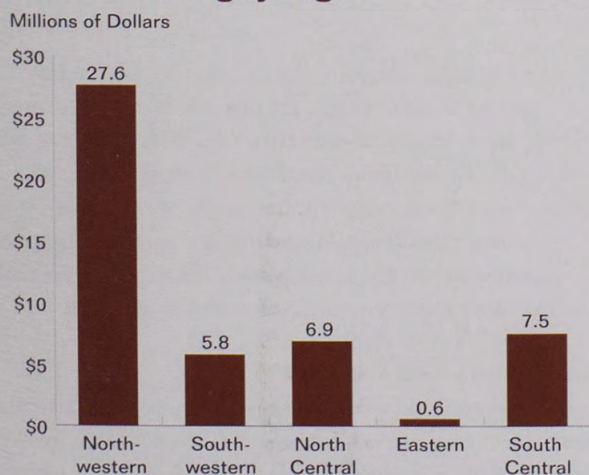
Conclusion

Based on the data collected from Montana breweries, the industry grew rapidly from 2010 to 2011. This analysis has developed a baseline economic impact of the brewing industry on Montana’s economy and established that it is a healthy and growing sector. In the future, additional research could

be conducted to monitor changes in the economic impact of the industry over time. Furthermore, the effects of legislative changes could be modeled to inform policymakers on the impact of changing legislation on the Montana economy. □

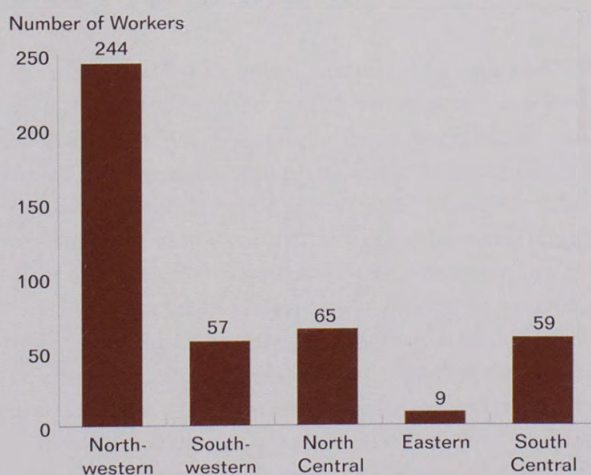
Colin B. Sorenson is a research economist at the Bureau of Business and Economic Research, Todd A. Morgan is the director of forest industry and manufacturing research. Shannon Furniss is BBER’s communications director.

Figure 6
Output (Gross Sales) Impacts of Montana Brewing by Region



Source: Bureau of Business and Economic Research, The University of Montana.

Figure 7
Employment Impacts of Montana Brewing by Region



Source: Bureau of Business and Economic Research, The University of Montana.



Photo by Diana Six

The Mountain Pine Beetle in a Changing Climate

What Does it Mean for Montana's Forests?

by Diana L. Six

Few days go by without seeing an article addressing some issue related to bark beetles. Even fewer go by without seeing a dead pine. Ideas on what is causing the current outbreak of mountain pine beetle seem to flourish as well as the beetle. Some say the outbreak is within bounds of natural historical variability. In other words, the degree and extent of tree mortality occurring now is similar to that which has occurred in past outbreaks. Others say that this outbreak is different – it is more extensive and severe, and this difference is due either to past logging and management practices, to climate change, or to both. Some say none of this would have happened if we had only managed our forests.

So what is the truth? To answer this question we need to know some basic information about the insect. While there

are many species of bark beetles in our forests, including many species of pine beetles, the one that is currently causing widespread mortality of pines across the west is the mountain pine beetle, *Dendroctonus ponderosae*. Unfortunately, this insect is often incorrectly reported as the pine bark beetle, the pine beetle, or the Rocky Mountain pine beetle. Google these names and you run the risk of getting the wrong insect and incorrect information on behavior and management.

Conditions and Triggers

The mountain pine beetle is a native insect whose natural geographic range extends from just north of Mexico to northern British Columbia. It can develop in all but one native pine species as well as most exotic ornamental pines.

However, outbreaks are usually restricted to lodgepole pine, and to a lesser extent, ponderosa pine. Most of the time, it is present in our forests in very low numbers. Only occasionally does it erupt into outbreaks such as we are seeing now.

Outbreaks are not cyclic as is often claimed. Cyclic outbreaks are predictable and occur at regular intervals over time. Mountain pine beetle outbreaks are instead highly irregular in occurrence. There is a good reason for this. They only occur if and when two things come together at the same time: appropriate stand conditions and a trigger. Appropriate stand conditions include a predominance of pines greater than 9 inches in diameter. However, forest conditions alone cannot lead to an outbreak. If that was the case, old growth wouldn't exist. A trigger is

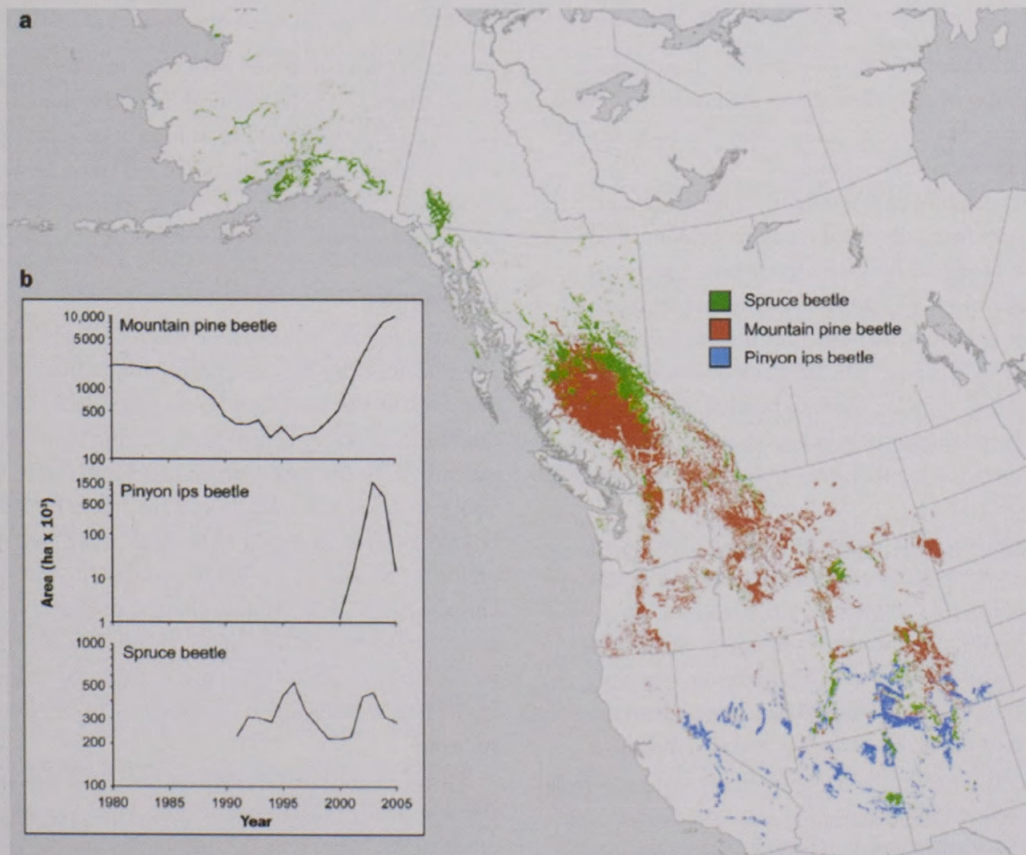


Photo by Diana Six

also needed, and for the mountain pine beetle, the main trigger is warm temperatures, although drought can also play a role.

How do outbreaks get triggered? Mountain pine beetles are small – about the size of a grain of rice. This makes them seemingly unlikely culprits in the demise of large trees. Trees are not sitting ducks waiting to be killed by beetles. They are heavily defended and fight back. A pine's main line of defense is resin. As a beetle bores into the tree it severs canals releasing the resin which can then flush the beetle from the tree, often drowning it in the process. Beetles overcome this defense by mass attacking trees. Mass attacks are initiated when the first beetles to land release pheromones that attract other beetles to the tree. If enough beetles respond, the numerous attacks drain the tree of resin and the beetles win – the tree is killed. If too few show

Figure 1
Regions of Major Eruptions by Three Species



Source: BioScience, June 2008 / Vol. 58 No. 6, www.biosciencemag.org



up, the beetles are killed and the tree survives. In successful attacks the cessation of resin flow allows the beetles to burrow into the phloem, a thin layer of tissue under the bark, where they lay eggs and produce their young.

Healthy pines produce copious resin, while stressed or weakened trees produce only small amounts or none. The amount of resin produced by a tree determines how many beetles it will take to kill it. To kill a healthy tree with lots of resin, thousands of beetles are needed. A tree with little resin can be overcome by far fewer. Drought stress reduces resin production in pines, allowing them to be more easily killed by beetles. Beetle populations can build up in these “easy” trees until their numbers reach a threshold over which they can kill even healthy trees.

While drought can help beetles get into trees, it is not required to initiate an outbreak. What is needed is warm conditions. Few factors can increase the size of an insect population faster than an increase in temperature. Warmer temperatures support faster beetle development, greater productivity, and greater survival. Milder winters reduce mortality due to freezing, and warmer overall conditions reduce spring and fall kill-offs that otherwise would occur due to early or late freeze events.

And of course, warmer temperatures and drought usually come together. When this occurs, it really is the perfect storm

– more beetles combined with trees that require fewer beetles to kill them. Once an outbreak initiates, there is little that can be done to stop it. And as long as supporting conditions exist, the beetles will continue to kill trees. Drought and abnormally warm periods occur at regional scales, explaining why outbreaks also tend to be regional in their extent.

Outcomes

Two outcomes are possible when an outbreak initiates. The outbreak can run to “completion” where most pines of a suitable size are killed across a vast area. The outbreak can also halt before completion, leaving many mature trees unscathed. In the past, outbreaks seldom ran to completion. This is because past outbreaks were driven by abnormally hot dry periods. A return to normal cooler wetter conditions typically reduced suitability for beetles and outbreaks ended. Unfortunately, with climate change, predictions are that a return to normal cooler, wetter conditions is unlikely. Instead, we are likely to see increasingly warmer and drier situations. In the future, running to completion may become more common.

Several characteristics indicate this outbreak is quite unlike any that have occurred historically. First, it is more than 10 times larger. More than 32 million hectares of pines have been killed, and the outbreak is still expanding. British Columbia

has been hardest hit; estimates are that 75 percent to 80 percent of the extensive lodgepole pine forests in the province have been killed. The size and severity of the outbreak in Canada has been driven by a combination of past logging and forest management practices that produced vast areas of suitable forest and by climate change, which has supported larger beetle populations (Carroll et al., 2004). This is also true for many areas affected by the outbreak in the U.S.

Second, the beetle has expanded into new territory. Warming temperatures have allowed the beetle to move several hundred kilometers farther north where they are infesting “naïve” lodgepole pine – those that have not experienced beetles in the past and have consequently not evolved strong defensive systems. The beetles have also breached the historic geological barrier of the Northern Rockies and have moved halfway across Alberta where they now are infesting jack pine forests (de la Giroday et al., 2011). Here the beetle is an exotic – it is in a new place in a new species of pine. And we know that the combination of exotic insects and native trees seldom turns out well. Jack pine is a major component of the transcontinental boreal forest. The prediction is that as warming continues, the beetle will move across the continent in jack pine and then potentially into eastern pine forests. The impacts the beetle will have in these forests are unknown.

The beetle has also expanded into western high elevation subalpine whitebark pine forests. Warming has reduced the time it takes the beetle to complete development, allowing it to synchronize its life cycle to enter winter in stages that allow survival at subfreezing temperatures. Warmer winters have also supported greater overwintering survival in high elevations. This has resulted in rapidly spreading outbreaks so devastating that whitebark pine was recently recommended for listing as an endangered species (Federal Register, 2011). In the Greater Yellowstone area alone, more than a million acres of whitebark pine have been killed over just the past few years (Logan and MacFarlane, 2010).

Unlike lodgepole pine forests, whitebark pine forests are not expected to recover in most areas after the outbreak ends. This has major implications for the plant and animal communities dependent on the tree. The loss of whitebark pine is also expected to severely impact snow pack retention, leading to earlier snowmelt with serious consequences on fisheries and domestic and agricultural water supplies.

Sounds bad, and it is. In the past, mountain pine beetle, like fire, acted as a natural disturbance agent that maintained forest structure, function, and resilience. However, when beetle outbreaks increase in size, severity, or frequency from historical norms, they become damaging instead of renewing. As warming continues, the predictions are we will have more devastating outbreaks, not only of mountain pine beetle, but of many species of bark beetles.

Changing forests will affect Montana’s economy through impacts on the wood products industry, tourism, and our water supply and alter the ecosystem goods and services upon which we all depend.

Will what happened in British Columbia with the mountain pine beetle happen in Montana? No. We have much more diverse forests that are less prone to wide-scale mortality. However, it is important to recognize that conditions are changing and that the forests we know are adapted to conditions different than those they will experience in the future. That means our forests will change, and part of that change will involve bark beetles as they respond to warmer temperatures and tree stress. Changing forests will affect Montana’s economy through impacts on the wood products industry, tourism, and our water supply and alter the ecosystem goods and services upon which we all depend. Awareness of these changes and their drivers will be necessary to develop effective adaptation and conservation strategies. □

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Vocational Rehabilitation

Investing in Disabled Population Provides Returns

by Gregg Davis and James T. Sylvester

Federal and state spending for the working-age populations with disabilities is increasing faster than gross domestic product, consuming an ever-increasing share of the nation's output.

With continued increases in the cost of health care and an increase in the number of working-age Montanans with disabilities as a result of the aging baby-boom generation, spending to support this population represents a large and faster growing share of all federal and state expenditures.

Almost all spending for the disabled nationally is for health care and income maintenance. Only a fraction of the remainder is targeted for improving employment and economic independence for people with disabilities.

Vocational rehabilitation programs provide services to assist, find, or maintain employment to the disabled. Improving employment opportunities could reduce reliance

on income support programs and provide health insurance coverage through their employers.

BBER studied Montana's working-age populations with disabilities to estimate the return on investment resulting from participating in Montana's Vocational Rehabilitation Program. More than 1,400 closures occurring in 2007 for two status categories – those who were successfully rehabilitated and those who received some services but did not have employment – were examined. The study findings indicate that the return on tax dollars spent on the program for individuals who are successfully rehabilitated is significant.

Background

There are more than 36 million people with disabilities in the United States, accounting for almost 12 percent of the total civilian non-institutionalized population. In Montana, the proportion with disabilities is greater. Thirteen percent (125,302) of the civilian non-institutionalized population in Montana have disabilities. Working-age adults with disabilities, those 18-64 years of age, comprise more than half of the disabled population in Montana and nearly 11 percent of all working adults in this age group.

An estimated \$357 billion in federal spending spread over 63 federal agencies went to assist working-age people with disabilities nationally in 2008. This represents 12 percent of all federal spending. In addition, states spent \$71 billion on joint federal-state programs, with more than 90 percent of these funds going to Medicaid. Of the combined federal and state spending for the disabled, 95 percent covered health care and income maintenance. Contributing to this spending growth was the increase in the number of disabled served, primarily attributable to the aging baby-boom population, disabled veterans returning from the Middle East, and the recession of 2007. Many of these unemployed workers applied for Social Security Disability Insurance (SSDI).

Expenditures per beneficiary also increased, due in part to medical inflation continually outpacing inflation in general. SSDI benefits increased at a faster pace, primarily due to benefits for new awardees increasing with a wage index that typically grows more rapidly than consumer prices.

The aging of the baby-boom generation is expected to contribute to growth in SSDI awards for at least another decade. In Montana, federal government payments for Social Security Disability Insurance and Supplemental Security



Findings at a Glance

- More than 64,000 working-age Montanans have disabilities, accounting for half of Montana's total population with disabilities.
- Thirteen percent of Montana's civilian non-institutionalized population have disabilities, above the proportion nationally (12 percent).
- From 2002 to 2008, combined state and federal spending nationally on working-age people with disabilities increased faster than growth in the nation's gross domestic product, all federal outlays, and all federal revenues.
- Almost all state and federal spending for the disabled nationally is for health care and income maintenance. Only a fraction of the remainder is targeted for improving employment and economic independence for people with disabilities.
- Factors driving the growth in state and federal spending are disabled veterans returning from the Middle East, an aging demographic, and the recession of 2007. Montana's population is disproportionately represented by both veteran and baby-boom populations. Veterans represent nearly 13 percent of the population 18 years and older, compared to only 9 percent of the population nationally. Baby boomers account for 15 percent of the population in Montana and 13 percent nationally.
- In Montana, the population with disabilities compared to the population without disabilities is:
 - less likely to be employed (28 percent versus 66 percent),
 - more likely to not participate in the labor force (69 percent versus 29 percent),
 - more likely to have less than a high school education (18 percent versus 6 percent),
 - less likely to have a four-year college degree or more (16 percent versus 32 percent), and
 - more likely to live in poverty (37 percent versus 21 percent).
- Even by conservative estimates, the calculated return on investment for tax dollars spent on the Montana Vocational Rehabilitation Program for individuals who are successfully rehabilitated is positive. In the year analyzed, 2007, return on investment figures for rehabilitated individuals combined with those who had some services before their cases were closed, show that the benefit is at least three times the taxpayer investment by the third year out.
- Return on investment is the ratio of administrative and servicing costs for closed cases to post-closure wages for 12 consecutive quarters, federal and state taxes paid due to post-VR employment, reduced Supplemental Security Income (SSI) and Social Security Disability Insurance (SSDI) based on post-VR substantial wage-earning, and Social Security reimbursement made to the Montana Vocational Rehabilitation Program for closed cases occurring in 2007.
- Return on investment varies by closure status and disability type.
- Return on investment for individuals whose cases are closed as successfully rehabilitated is \$1.69 for the first year, \$3.18 for the second year, and \$4.21 for the third year after closure.

To read the full report, go to www.bber.umt.edu

Table 1

Socio-Economic Characteristics of Montana and U.S. Populations with Disabilities, 2010

	Percent Total Civilian Non-Institutionalized Population			
	- With Disability -		- Without Disability -	
	U.S.	MT	U.S.	MT
Total Civilian Non-Institutionalized Population	11.9	12.8	88.1	87.2
Population 16 years of age and older	14.1	15.1	85.8	84.9
Employed	21.8	27.6	64.2	65.7
Not in Labor Force	73.0	68.6	28.4	29.2
Employed in Retail Trade	13.1	12.8	11.6	11.7
Employed in Education/Health Care/Social Assistance	23.0	26.4	23.3	23.4
Education Attainment (25+ Population)				
Less than High School	26.6	17.8	11.8	6.1
High School or Equivalent	34.5	36.8	27.2	28.4
Some College or Associate Degree	25.4	29.4	29.6	33.8
Bachelor's Degree or Higher	13.5	16.0	31.4	31.8
Earnings in Past 12 Months (16+ Population)				
\$1 - \$4,999 or less	19.1	20.5	11.2	13.8
\$5,000 - \$14,999	23.2	29.7	16.7	19.2
\$15,000 - \$24,999	16.5	16.0	15.5	17.7
\$25,000 - \$34,999	12.1	12.1	13.5	14.7
\$35,000+	29.1	21.6	43.0	34.5
Median Earnings (2010 dollars)	\$19,500	\$14,871	\$29,997	\$24,491
Poverty Status (16+ Population)				
< 100% Federal Poverty Level	21.0	21.2	12.3	11.8
100% - 149% Federal Poverty Level	14.4	15.4	8.1	9.0
> = 150% Federal Poverty Level	64.6	63.3	79.6	79.2

Source: U.S. Census Bureau, 2010 American Community Survey 1-Year Estimates.

Table 2
Vocational Rehabilitation Population Characteristics, Montana

	Number	Percent
Total Closures 2007	3,301	100
Successful Rehabilitated Closures	840	25.4
Median Age at Application	38	-
Female	1,575	47.7
Disability Sensory/Communicative	233	7.1
Disability Physical	1,334	40.4
Disability Mental	1,734	52.5
Significant Disability	2,436	73.8
Mean Weekly Hours Worked, Successful Closure		
At Application	6.9	-
At Closure	29.4	-
Mean Weekly Earnings, Successful Closure		
At Application	\$59	-
At Closure	\$302	-
No Medical Insurance at Application	1980	60.0

Source: Montana Vocational Rehabilitation Program, Montana Department of Labor and Industry, Bureau of Business and Economic Research, The University of Montana.

Income alone totaled more than \$469 million in 2010, up 5 percent from 2009 and almost 10 percent from 2008.

Characteristics of the Population with Disabilities

In Montana, there are about 64,000 working-age adults with disabilities, accounting for half of Montana's total disabled population. Most have ambulatory impairment (48 percent), followed by cognitive difficulties (39 percent), and difficulty living independently (29 percent).

Most of Montana's disabled population (39 percent) is employed in retail trade and education/health care/social assistance, compared to 35 percent for the non-disabled (Table 1). Montana's disabled population also tends to have less formal education than their non-disabled counterparts. Over half of the population 25 years of age and older with disabilities has a high school diploma or less, compared to 35 percent of those without disabilities. As a result, people with disabilities are more likely to be low-income earners and live in poverty. Median incomes for disabled people are only 60 percent of the earnings of Montana's non-disabled for those with earnings. Nearly twice as many disabled people are likely to fall below 150 percent of the federal poverty level than their non-disabled counterparts.

For successfully rehabilitated people with closed cases, the average weekly hours worked at initial application for entry into the program is seven hours, increasing substantially to 29 hours per week at closure. The average weekly earnings at application are \$59, compared to \$302 at closure. Six in ten applicants lacked health insurance of any kind (Medicaid, Medicare, employer sponsored) (Table 2).

In 2007, 840 people with significant disabilities were successfully rehabilitated and their cases closed. They represent 25 percent of total cases. Those whose cases were closed after some services were delivered represent nearly 22 percent of cases, 528 individuals.

Vocational Rehabilitation Return on Investment

Table 3 summarizes the three-year return on investment for the two types of closed cases occurring in 2007. For the two types of closures combined, a positive return on investment occurs for all three years following closure in 2007. For the first year, for every tax dollar invested for vocational rehabilitation services (VR), \$1.35 is returned to society due to post-VR wage earnings, tax revenues for both the state and federal government, and reduced SSI and SSDI benefit payments. The return on investment increases in the second year to \$2.53 for every tax dollar invested in vocational rehabilitation and to \$3.31 for every tax dollar by the third year. For both types of closures, VR services are delivered, so the higher returns on investment are attributable to successful wage earners.

Another approach to valuing the contribution of vocational rehabilitation services to Montana's population with disabilities is to assess the average wages earned post-closure relative to some benchmark. As shown in Table 4, rehabilitated-status wages (\$27,683) are over twice the average wages for closures in the second category (\$11,399). In this sense then, it appears VR services are successful in increasing the earnings of disabled people who successfully complete the VR program.

Conclusion

Even with a conservative estimate of return on investment, the return for the investment in clients in the two categories – those who were successfully rehabilitated and those who got some services before they left the program – is at least three times the taxpayer investment in vocational rehabilitation by the third year. For those successfully rehabilitated, the return on investment increases to a fourfold return by the third year. □

Gregg Davis is director of health care industry research at The University of Montana Bureau of Business and Economic Research. James T. Sylvester is an economist at BBER.

Table 3
Return on Investment for Vocational Rehabilitation Population with Closures in 2007, by Closure Status

Closure Status	Return on Investment by Year, Post Closure in 2007		
	1st Year	2nd Year	3rd Year
Successful Closure, Rehabilitated	\$1.69	\$3.18	\$4.21
Unsuccessful Closure, After Services	\$0.80	\$1.49	\$1.85
Closures Combined	\$1.35	\$2.53	\$3.31

Source: Montana Vocational Rehabilitation Program, Montana Department of Labor and Industry, Bureau of Business and Economic Research, The University of Montana.

Table 4
Average Wages by Closure Status

Closure Status in 2007	Mean Wage After Closure	Number in Group
Successful Closure, Rehabilitated	\$27,683	770
Unsuccessful Closure, After Services	\$11,399	519
All Closures in 2007	\$17,488	2,783

Source: Montana Vocational Rehabilitation Program, Montana Department of Labor and Industry, Bureau of Business and Economic Research, The University of Montana.

About the Study

The Bureau of Business and Economic Research used unemployment insurance data available from the Montana Department of Labor and Industry, along with data from the Montana Vocational Rehabilitation Program, to estimate the return on investment for all services delivered to those cases closed as successful and rehabilitated and those clients whose cases were closed after they received some services but did not have employment. Administrative and operational cost data were supplied by the Montana Vocational Rehabilitation Program, with wage data supplied by the Montana Department of Labor and Industry for 12 consecutive quarters after closure.

Since this study is constrained by wage earnings reported under unemployment insurance, other wage income may be missing. Unemployment insurance data only covers workers with unemployment insurance; the self-employed are not captured by this data set. The self-employed in Montana are a significant proportion of the Montana job market. In 2010, the self-employed (proprietors) accounted for 28 percent of total employment in Montana.

Other data provided by the Montana Vocational Rehabilitation Program include disability codes, age and gender of applicant, and information on whether Medicare, Medicaid, Supplemental Security Income, Social Security Disability Insurance, or Temporary Assistance to Needy Families payments were received at time of application and closure.



The American Community Survey

A Bevy of Information

by James T. Sylvester

How rich or poor are Americans? Where do they work and what training do they have for their jobs? What languages do they speak? Do they have health insurance? How many vehicles do they own? Do they have laptops and/or smart phones? Do they use wood or gas to heat their homes?

The American Community Survey (ACS) is an ongoing survey administered by the U.S. Census Bureau that provides data every year – giving communities the current information they need to plan investments and services.

The Census Bureau polls a random sample of about 3 million American households about demographics, habits, languages spoken, occupation, housing, and various other categories. The results offer current demographic portraits of counties and communities throughout the the U.S. The federal government uses the survey to divvy up more

than \$400 billion in annual funding to states and localities for roads, education, health care, and other programs. In addition, private companies, particularly retailers, use it to decide where to locate stores and what to put on their shelves.

The American Community Survey replaced the long-form questions asked in the census prior to 2010. Analysts now have data available annually instead of every 10 years. This frequency allows for investigations into how society is changing demographically. However, the ACS is currently under attack from members of Congress who find the questions asked intrusive. They think responding to the ACS should be voluntary. The mandatory nature of the survey keeps participation rates high enough where the Census Bureau can get what it lacks by canvassing a small portion of the households that didn't reply. Follow-up activity to keep the same statistical validity will increase the cost of the ACS.

Since the ACS is a survey, there is a margin of error associated with the data. In other words, an estimate is described as a number plus or minus another number. The margin of error will be much larger for smaller areas than large areas such as states or urban areas. Also the margin of error will be large for relatively rare events. When an analyst uses ACS data he or she should state the estimate as between a

lower bound and upper bound, not as a single number.

Figures 1 and 2 about Montana residents' home heating sources are an example of some of the information gleaned from the survey. □

James T. Sylvester is an economist with The University of Montana Bureau of Business and Economic Research.

Figure 1
Percentage of Housing Units Using Wood as a Primary Heating Fuel, Montana and Counties, 2011

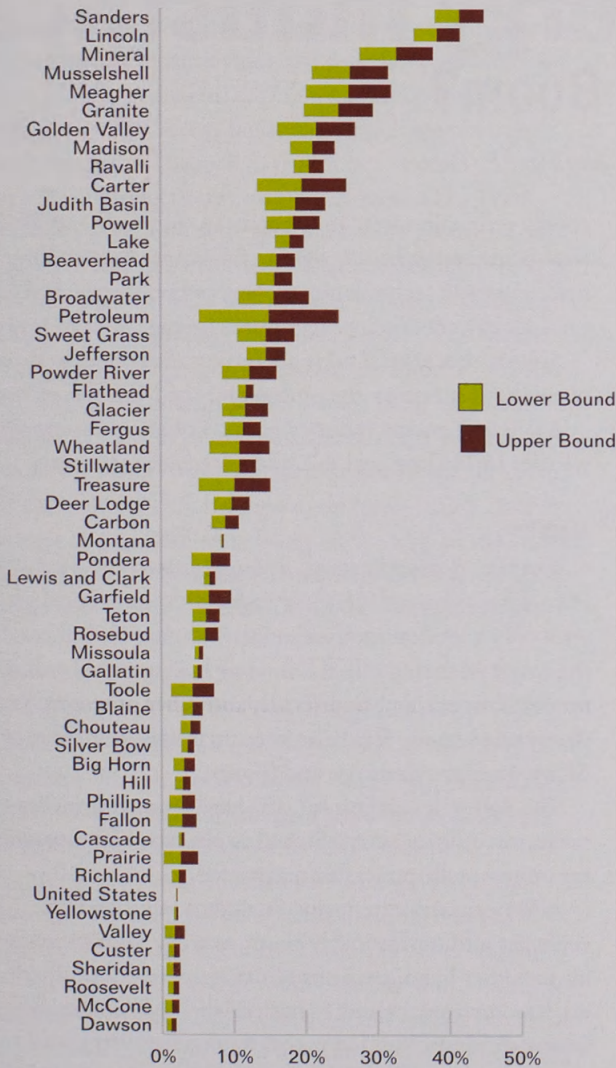
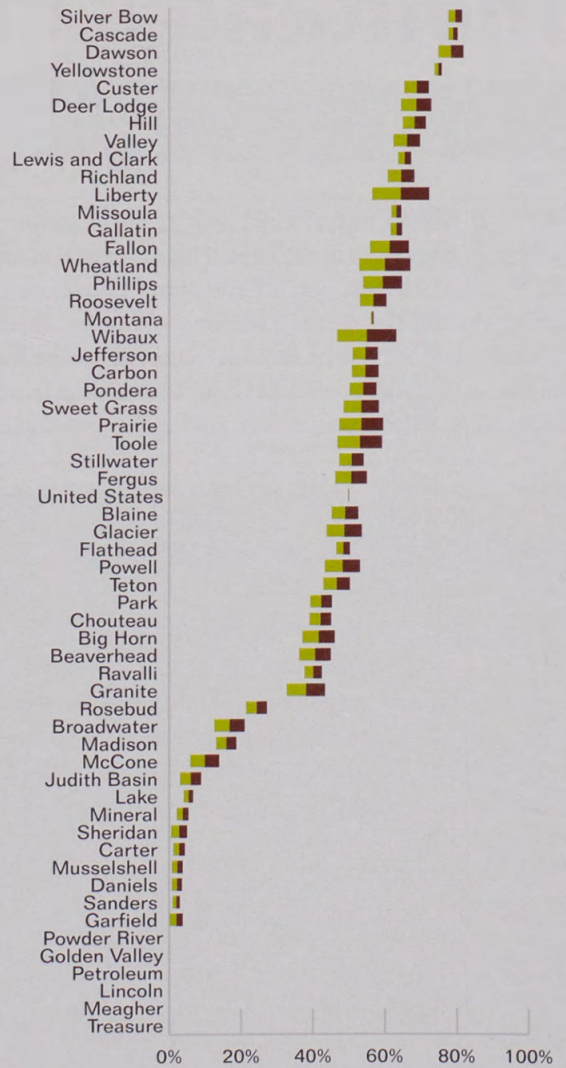


Figure 2
Percentage of Housing Units using Utility Gas as a Primary Heating Fuel, Montana and Counties, 2011



Source: American Community Survey, U.S. Census Bureau.



Montana's Energy Industries

A Real Boom?

by Terry Johnson and Paul E. Polzin

Montana entered 2012 with its energy sector constantly in the news. Huge increases in oil production next door in North Dakota were impacting the labor market and supplier companies. There were expectations for similar increases on the Montana side of the border. Significant new coal capacity was deep into the planning stage. Electric power lines, grid updates, and wind-

energy generation were moving ahead. Bio-fuels and biomass were being researched in western Montana. And exciting new investments in technologies such as carbon storage and large capacity battery development were coming closer to reality.

So, where are we? And more importantly, how do these possibilities influence the outlook for the Montana economy?

Montana's energy industry consists of many components – we start by looking coal, oil, and state energy taxation.

BBER'S New Energy Program

Energy and mining represent nearly 20 percent of what drives Montana's economy. Natural resource development, if responsibly managed, has the potential to reshape the trajectory of the state's economic growth. That is why the Bureau of Business and Economic Research is establishing a new Natural Resources and Energy Program that examines the trends, issues, and factors affecting the outlook for one of the most dynamic and highest paying sectors in the Montana economy. Through the energy program, BBER will conduct: impact analysis; feasibility studies; regional forecasting; industry studies; market research; labor supply analysis; sentiment surveys; community assessments; press interviews; and tax and public policy analysis.

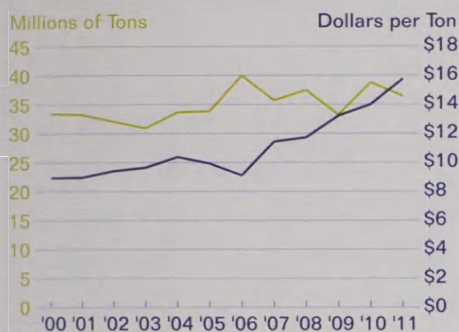
Coal

Despite all the talk about new coal mines, the production of coal has remained relatively stable over the past decade, with only a modest increase in 2010 (Figure 1). But one of the major Montana mines has recently announced reduced production and likely layoffs. This apparent contradiction is explained by the fact that there are really two markets for Montana coal – domestic and foreign.

The domestic markets for coal have recently been depressed as electric utilities have switched to abundant, cheap, and environmentally preferable natural gas.

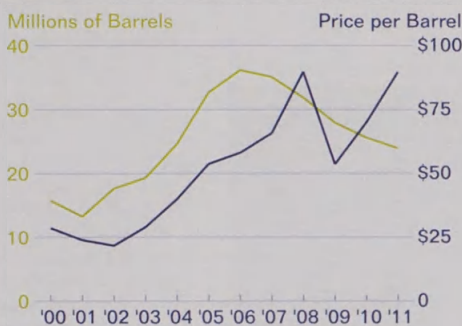
Additional negative factors include a stagnant U.S. economy and unseasonably warm weather. Foreign markets, on the other hand, are just beginning to develop and are expected to grow rapidly as industrializing countries such as China and India build new coal-fired generating plants to meet the demands of their citizens. We are going to have to wait and see how trends in these divergent markets balance out and impact total coal production in Montana in coming years.

**Figure 1
Montana Coal Production**



Source: Montana Department of Revenue.

**Figure 2
Montana Oil Production
and Price**



Source: Montana Department of Revenue.

**Figure 3
Montana Oil Rig Counts
By Month**



Source: Montana Department of Revenue.

Oil

As with coal, the frenzy and hype associated with the Bakken field is not necessarily mirrored in the data. Oil production in Montana actually peaked in 2007 and has declined each year since (Figure 2). But, recent production trends are not a good predictor of what will happen in the future.

Current oil production is strongly influenced by prior drilling and exploration activity. An oil well's production is greatest when it is first drilled and declines steadily thereafter. This means that new wells will constantly have to be brought on line just to keep production stable. Figure 3 reports that the number of drilling rigs in Montana declined from 2006 to 2009 but turned sharply upward since then. This easily explains the decline in production and strongly suggests a reversal in the future. Since the time profile of the rig counts closely parallels the U.S. business cycle (peak in late 2007 and trough in mid-2009), the most likely cause of the decline in Montana was the decreased demand, price weakness, and economic uncertainty associated with the Great Recession.

Government Revenue

The energy industries are directly and indirectly responsible for sizable amounts of revenue to state and local governments. The energy industries contribute three direct payments to state government: coal production taxes, oil production taxes, and royalty/rent/bonus payments.

All three energy-related sources of state government revenue have experienced an upward trend during the past decade despite the declines in coal and oil production during certain years. These revenues are based on the value of production – not just the volume – and energy prices have increased. The significant one-time increase in royalties/rents/bonus in FY 2010 was due to the \$85 million bonus payment for the state coal in the Otter Creek area.

These three sources of revenue increased at an average annual rate of 8.5 percent per year between FY 2000 and FY

**Table 1
Summary of Governmental Revenue
(Figures in Millions)**

Fiscal Year	Coal Production Taxes	Oil & Gas Production Taxes	Federal / State Royalty, Rent, Bonus	Total Revenue
2000	\$46.341	\$43.773	\$72.029	\$162.143
2001	43.836	92.396	90.948	227.180
2002	42.249	50.304	65.475	158.028
2003	39.867	73.389	77.144	190.400
2004	42.113	92.676	78.386	213.175
2005	48.133	137.754	100.304	286.191
2006	48.042	203.681	123.443	375.166
2007	52.450	209.946	115.283	377.679
2008	58.191	324.311	146.112	528.614
2009	64.023	218.425	134.357	416.805
2010	59.791	206.286	212.320	478.397
2011	70.757	215.130	137.139	423.026
2012	72.567	210.644	148.000	431.211

Source: State Accounting System, Mineral Management Service.

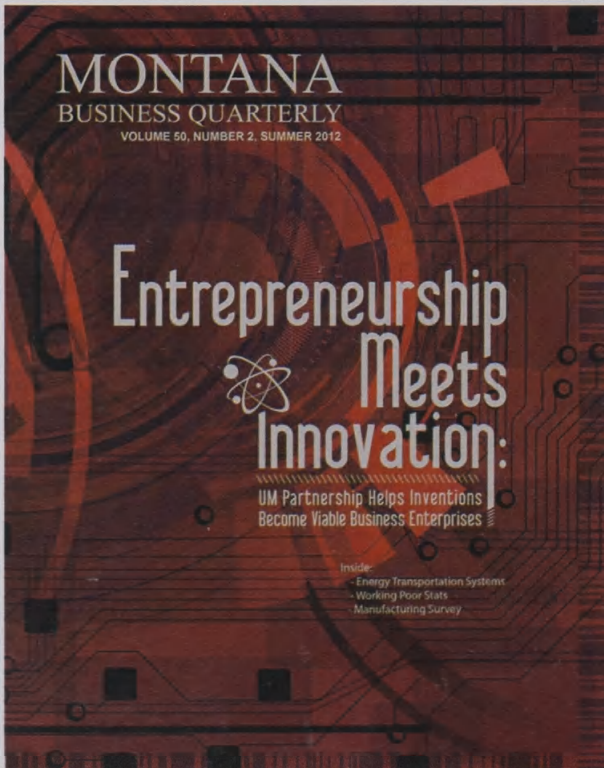
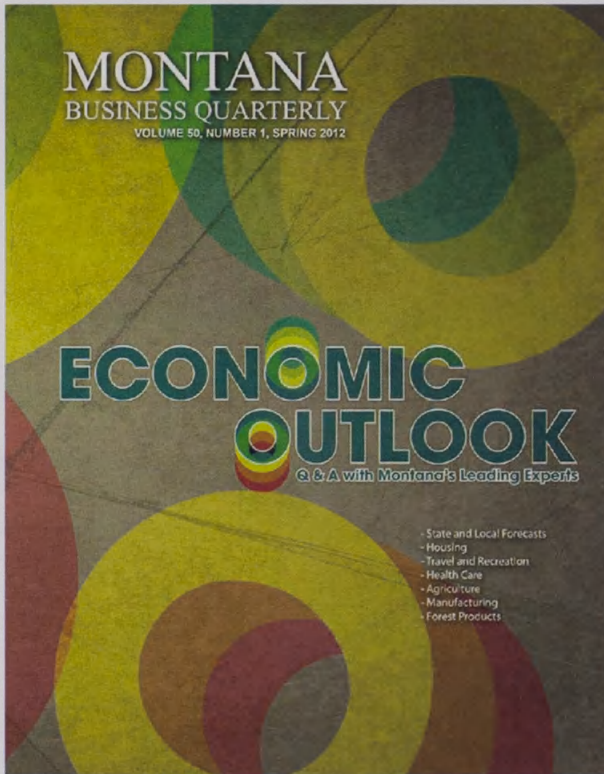
2012. To put this in perspective, total state government tax revenues increased an average of 4.2 percent per year during the same period.

Summary

Both coal and oil production have experienced ups and downs during the past decade. Even so, generally rising prices have meant that the contributions from the energy industries have been a growing contributor to state government revenues. □

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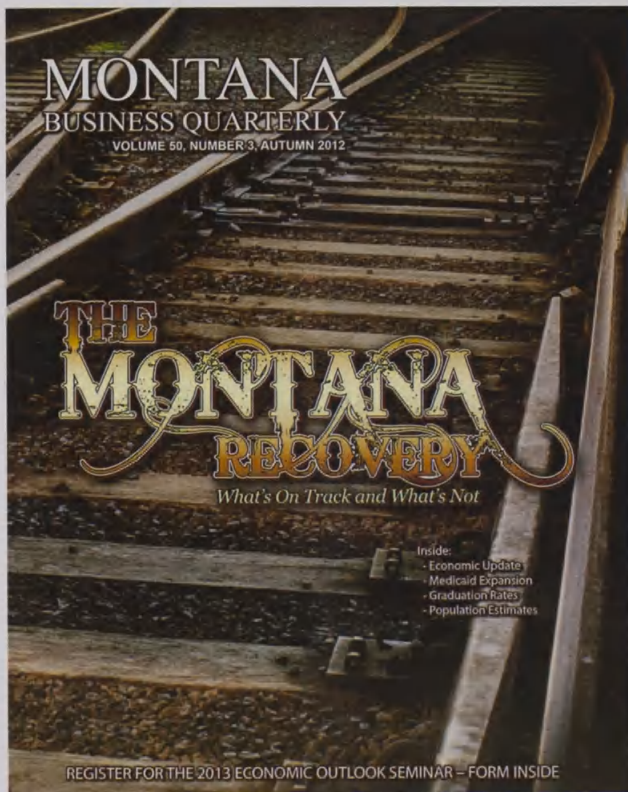
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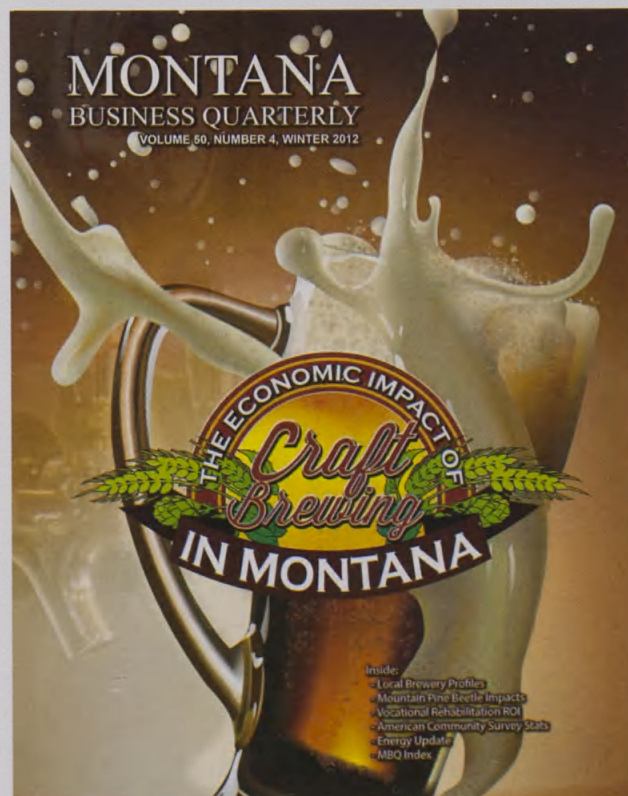
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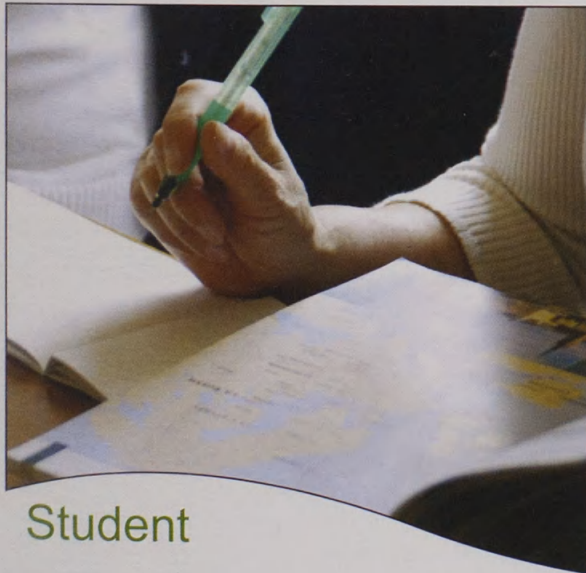
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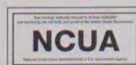
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