

Montana Employment and Labor Force Projections



Job Growth from 2017 to 2027



Montana Department of
LABOR & INDUSTRY

Montana Employment and Labor Force Projections: Job Growth from 2017 to 2027

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Executive Summary

One of the goals of the Montana Department of Labor and Industry is to help develop and maintain a highly skilled workforce. Employment and labor force projections help achieve this goal by providing insight into the occupational and skill needs of Montana’s growing and changing workforce. Employers, educational institutions, and workforce training institutions use projections to anticipate in-demand training programs, while individuals use projections to investigate career paths. The Montana Department of Labor and Industry’s employment projections from 2017 to 2027 include the following highlights:

- Through 2027, Montana is expected to add 3,860 jobs annually. This slow expected growth is expected due to a tight labor market and worker shortages.
- Montana’s labor force is expected to grow by 3,640 workers per year through 2027. Because this growth is less than average employment growth, unemployment rates have the potential to drop to 3.4% by 2027.
- Employment growth is expected in all five regions. The fastest growth is anticipated in the Northwest and Southwest regions of the state. Figure 1 shows a summary of statewide and regional employment growth.

Figure 1: Statewide and Regional Projections Summary, 2017-2027

Region	Annual Change	Annual Growth Rate
Northwest 	1,380	0.9%
Southwest 	1,425	0.9%
North Central 	158	0.2%
South Central 	788	0.7%
Eastern 	108	0.3%
Montana	3,859	0.7%

Source: Montana Department of Labor and Industry Employment Projections, 2017-2027

- Total job openings are projected to be just over 61,700 openings each year, significantly higher than the 17,500 total openings projected in 2016. This difference reflects a change in methodology from the Bureau of Labor Statistics, not a change in the Montana labor market.

About Employment and Labor Force Projections

Every year, the Montana Department of Labor and Industry (MTDLI) produces employment projections in conjunction with the U.S. Department of Labor. Employment projections are produced over a two-year and ten-year time frame, by industry and occupation, and for the state and five sub-state regions. MTDLI also produces labor force projections every year, but only for the state (not for regions). The labor force projections are estimated by age and gender to help provide insight into Montana's changing workforce demographics. Together, the employment and labor force projections are used by a variety of groups and individuals to help plan workforce development.

Employment forecasts are an estimate of the future demand for workers based on historical employment data and the knowledge that is available at the time of the forecast. Because the economy is constantly changing, the forecasts are not going to be exactly right. Instead, projections should be viewed as the most likely employment growth outcome, given the current knowledge and information about the economy. Additionally, projections focus on long-term employment growth and labor force trends, rather than short-term and temporary fluctuations in the business cycle. Therefore, employment forecasts are published as a linear average over the two-year and ten-year period, even though the underlying forecast may include variations from that trend.

The 2017-2027 projections are the first to reflect methodology changes implemented by the U.S. Bureau of Labor Statistics to calculate total job openings that better capture the dynamic workforce. This change in methodology resulted in significantly higher estimated job openings than in the past (61,710 annual projected job openings for 2017-2027 projections compared to 17,500 for the 2016-2026 projections). Because of these changes, projections from the past that use the old methodology should not be compared with projections derived from the new methodology. A more detailed explanation of the methodology change is in the Occupational Demand section.

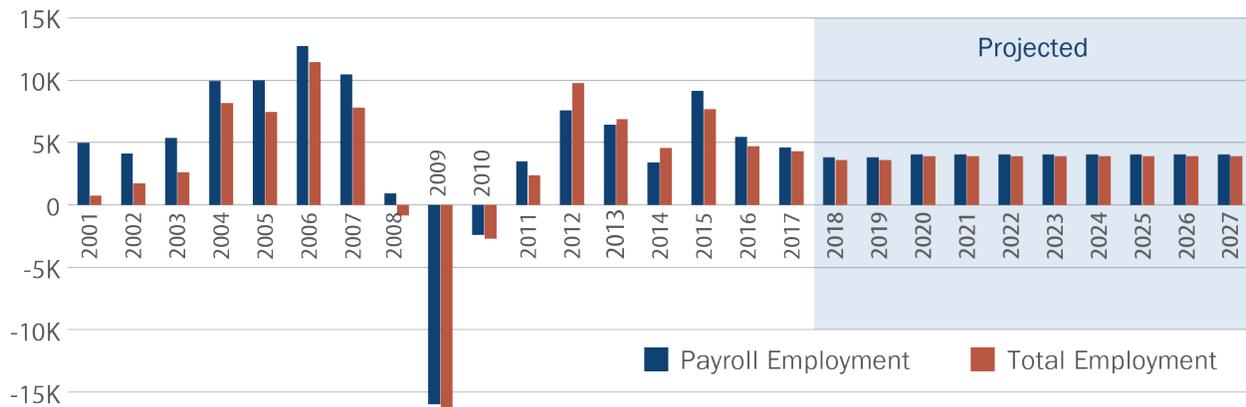
The remainder of this report provides a broad overview of this year's statewide and regional projections along with commonly requested tables of high-opening jobs by specific categories such as jobs requiring a bachelor's degree, jobs that pay higher than \$65,000, and apprenticeable jobs. For detailed information on methodology, see Appendix A. For information of past forecast accuracy, see Appendix B. For a comparison of job postings data to job projections, see Appendix C.

Overview of Montana’s 2017-2027 Projections

Over the next two years, total employment in Montana is expected to grow by 3,570 jobs annually, and then maintain a relatively slow growth of 3,930 jobs per year through 2027.¹ The growth in the short-term follows the recent trend of slowing employment growth – Montana’s average annual growth was 5,620 jobs over the last five years, but slowed to 4,290 in 2017. Long-term growth is expected to be slightly faster than short-term growth at 3,930 jobs per year, or just over 0.7%. This long-term projected growth is consistent with Montana’s historical growth. Montana’s employment grew at an average annual rate of 1.1% since 1990, and 0.7% since 2000.

The relatively slow projected growth is due to the tight labor market, which is characterized by few workers available to fill open jobs. Montana is showing signs of a tight labor market with an unemployment rate around 4% for most of the last three years, and a slowdown of employment growth. Figure 2 shows actual and projected employment growth from 2001 to 2027.

Figure 2: Montana Jobs Added Over Prior Year, Total and Payroll, Historic (2001-2017) and Projected (2018-2027)



Source: Historic total employment data comes from the Local Area Unemployment Statistics. Historic payroll employment data comes from the Quarterly Census of Employment and Wages. Projected data comes from the Montana Department of Labor and Industry 2017-2027 Employment Forecasts.

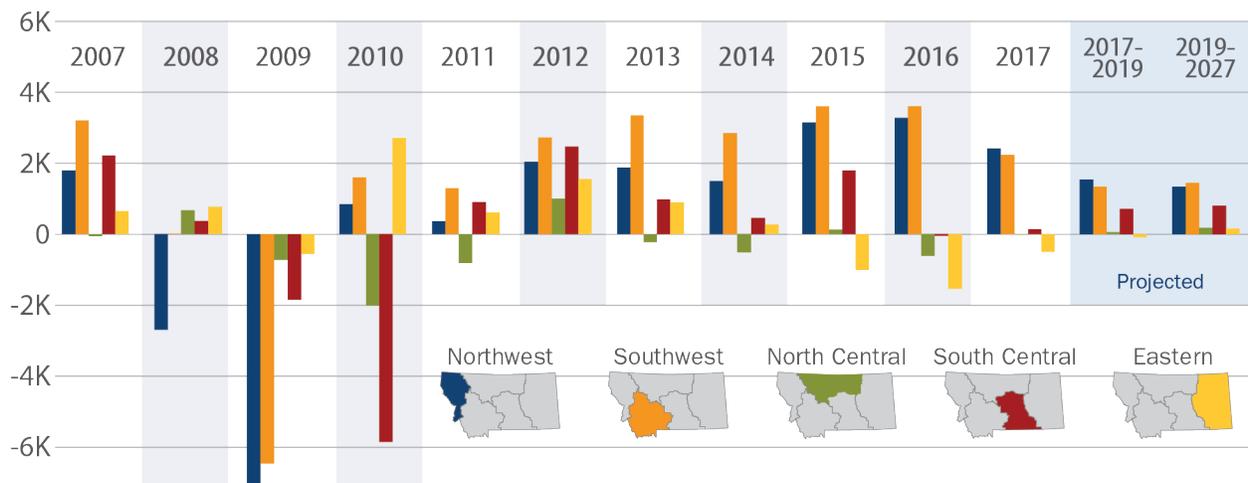
Regionally, the Northwest and Southwest regions are projected to grow fastest over the next ten years, both at 0.9% annually. Both regions had strong growth over the last five years with strong gains in the accommodation and food services, healthcare, and construction industries. The Northwest region, which includes Missoula and Kalispell, had an average annual growth of 1.7% over the last five years, and continued to grow at 1.7% in 2017 (about 2,420 jobs). The Southwest region (including Bozeman, Helena, and Butte) grew at 2.2% over the last five years, but slowed from that average to grow at 1.5%, or 2,240 jobs, over the last year.

The South Central region, including Billings, is projected to grow at 0.7% over the next ten years. This region has grown slower than normal over the last few years, partially due to declines in mining employment. Employment growth in wholesale and retail trade have also been slow, with a noticeable effect on the South Central region. However, because of the strong healthcare industry and the presence of a large urban area, projections are optimistic that this region will rebound and grow at a similar pace to the statewide average.

¹ Total employment includes payroll, self-employed, and agriculture.

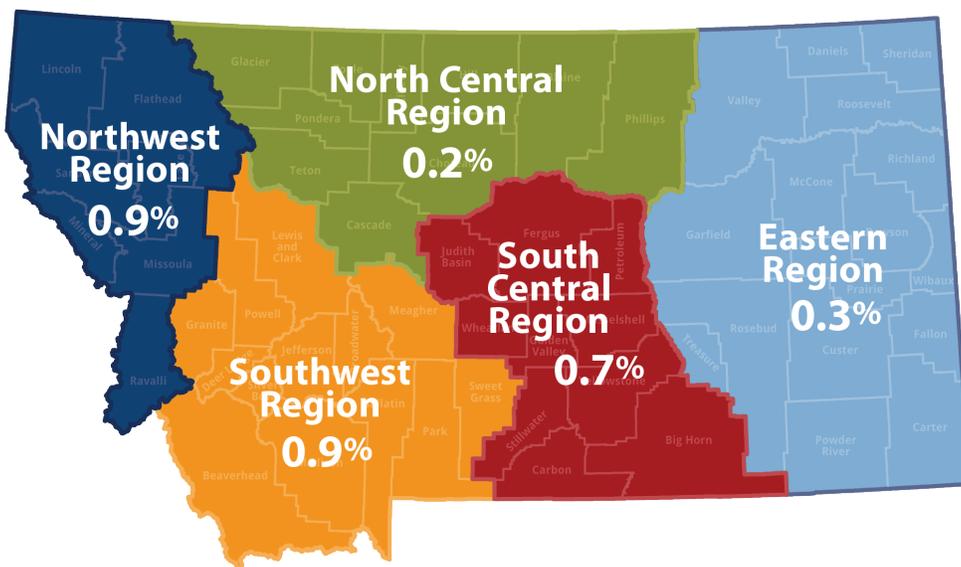
The Eastern and North Central regions have the slowest projected growth at 0.3% and 0.2% respectively. The Eastern region, like the South Central region, has been affected by declining employment in the mining industry (including oil and gas) and lower consumer spending resulting from decreased wage earnings. Projections in the Eastern region are relatively low because this region is in its third year of negative employment growth. Similarly, the North Central region has struggled with job growth over the past several years. Figure 3 shows historical and projected annual employment growth by region. Figure 4 shows the expected job growth rate by region from 2017-2027.

Figure 3: Historical and Projected Annual Employment Growth by Region



Source: Historical data from Local Area Unemployment Statistics. Projected data from the Montana Department of Labor & Industry 2017-2027 Employment Projections.

Figure 4: Projected Employment Growth by Region, 2017-2027



Source: Montana Department of Labor & Industry 2017-2027 Employment Projections

Montana’s labor force is projected to grow annually by 0.67%, or 3,640 workers, over the next ten years. Because labor market growth is slightly lower than the projected employment growth, the unemployment rate has the potential to go from 4.0% in 2017 to 3.4% in 2027. Figure 5 shows the historical and projected labor force, employment, and unemployment rate.

Figure 5 : Projected Labor Force, Employment, and Unemployment Rate



Source: Montana Department of Labor and Industry. Occupational Employment Projections, 2017-2027

Labor force growth is expected to be particularly slow, at 3,200 per year, over the next five years as Montana continues to see retirements of the large baby boomer population without enough young people entering the labor force to replace them. However, after 2022 a large portion of the baby boomers will likely be retired leading to better balance between retirements and new entrants. As a result, the labor force is expected to grow more quickly at 4,000 per year.

Industry Growth

Figure 6 shows Montana's long-term and projected employment growth rates by industry.² The healthcare industry is the largest industry and is also expected to add the most jobs over the next ten years. This industry has posted consistent job growth over the last couple of decades, adding 1,390 jobs annually over the last five years. Job growth is expected to slow slightly to 1,360 jobs per year over the next two years, and then 1,210 annual jobs through 2027. Healthcare employment is expected to grow fastest in the Northwest, Southwest, and South Central regions.

Figure 6: Montana Compounding Annual Employment Growth, Historic and Projected

Industry	Long-term Annual Growth Rate 1990-2017	2012-2017 Annual Growth Rate	2017-2019 Annual Growth Rate	2019-2027 Annual Growth Rate	Average Job Gain Per Year 2017-2019	Average Job Gain Per Year 2019-2027
Healthcare	2.9%	2.1%	1.9%	1.5%	1,358	1,213
Accommodation and Food Services	2.2%	2.5%	0.7%	1.0%	353	537
Construction	3.6%	3.8%	2.1%	1.4%	584	433
Professional	3.8%	2.4%	1.6%	1.7%	343	399
Retail Trade	1.4%	1.3%	0.2%	0.5%	135	291
Other	2.3%	1.8%	1.1%	1.1%	201	211
Manufacturing	0.3%	2.5%	0.8%	0.8%	153	175
Transportation	1.0%	1.5%	0.3%	0.7%	50	116
Local Government	2.6%	1.7%	0.8%	0.5%	176	108
Education	1.2%	0.5%	0.1%	0.2%	31	94
Arts and Entertainment	3.7%	1.8%	0.8%	0.8%	95	93
Admin and Support	3.4%	-2.7%	1.0%	0.5%	165	84
Agriculture	1.6%	3.8%	1.2%	1.4%	69	83
Real Estate	1.7%	2.5%	1.9%	1.1%	113	68
Wholesale Trade	0.9%	1.1%	0.1%	0.4%	21	64
State Government*	2.1%	1.7%	0.2%	0.5%	20	60
Finance and Insurance	1.5%	0.6%	0.3%	0.3%	44	51
Management*	3.0%	0.2%	0.6%	1.0%	13	23
Post Office	-0.5%	-0.6%	-0.4%	-0.1%	-8	-1
Mining	0.0%	-6.3%	0.2%	0.0%	10	-2
Federal Government	-1.1%	-0.9%	-0.1%	-0.1%	-9	-10
Utilities	-1.0%	-2.1%	-1.2%	-0.6%	-34	-15
Information	0.0%	-1.6%	-0.9%	-0.5%	-58	-30
Payroll Employment	1.9%	1.3%	0.8%	0.8%	3,826	4,044
Self-Employed	-3.3%	-0.8%	-0.6%	-0.3%	-247	-114
Total Employment	1.1%	1.2%	0.7%	0.7%	3,579	3,929

*The long-term annual growth rate is the compound annual employment growth rate from 2000 to 2017

Source: Historic data from Quarterly Census of Employment and Wages with an estimate added for railroad employment. Total employment is from the Local Area Unemployment Statistics. Projected data is from the Montana Department of Labor and Industry 2017-2027 Employment Forecasts.

² For projections, the healthcare and social assistance industry and the educational services industry include both private and public employment. All other public employment is included in federal, state, or local government.

Total Job Openings – A Change in Methodology

The U.S. Bureau of Labor Statistics recently changed its job openings methodology to better capture the dynamic workforce. The past methodology, known as the “replacements” methodology, was developed in the early 1990s and relied on movement between age cohorts to estimate people exiting an occupation. This method primarily captured job openings from retirements and deaths under the assumption that workers entered an occupation at a young age and worked in that occupation until retirement.

The new methodology, known as the “separations” methodology, updates this process to account for workers who have multiple occupations throughout their lifetimes. It uses longitudinal data from the Current Population Survey to estimate the probability of a worker leaving their job based on characteristics of that worker. The results are expressed as “Exits” (people who leave the labor force completely, possibly to retire, enroll in school, or take care of family), and “Transfers” (people who leave their job in one field to start a job in a different field).

Total job openings is the sum of change (new jobs), exits, and transfers. The number of openings is significantly higher than in the past (61,710 openings compared with 17,500). This difference reflects that change in methodology rather than conceptual factors. Because of these changes, projections from the past that use the replacements methodology should not be compared with projections derived from the separations methodology. For a more technical explanation, please see <https://www.bls.gov/emp/documentation/separations-methods.htm>.

The accommodation and food services industry is expected to add the second highest number of jobs through 2027. On average, this industry added over 1,200 jobs per year over the last five years but slowed significantly to add about 600 jobs in 2017. Projections estimate a growth of 350 jobs over the next two years because of this recent slowdown. However, longer-term projections estimate nearly 540 new jobs through 2027, which is more consistent with the long-run growth trend. Over the next ten years, the expected growth rate is 0.9%, consistent with national projections.³

Construction is expected to add the third most jobs per year and is expected to grow at a rate of 1.6% (similar to healthcare). Over the last five years, construction added nearly 940 jobs per year on average, but slowed to add 680 jobs in 2017. This trend is projected to continue with 580 jobs added over the next two years, and then 430 through 2027. Construction employment is still below its 2007 peak, and is not expected to hit its 2007 employment level until 2027.

The professional, scientific, and technical services industry is tied with the construction and healthcare industries as the fastest growing over the long-term, at a rate of 1.6% over the next ten years. This industry has grown particularly fast in the past couple years in the Northwest, Southwest, and South Central regions. This line of work typically consists of workers providing accounting, legal advice and representation, consulting services, research services, and other professional services. Workers in these fields typically require a significant amount of training.

³ U.S. Department of Labor, Bureau of Labor Statistics. *In the U.S., annual growth in the accommodation and food services industry was 1.8% from 2006 to 2016. The BLS projects this rate to slow to an average of 0.8% between 2016 and 2026.*

Occupational Demand

Although Montana is expected to add 3,860 new jobs per year through 2027, the number of expected job openings is higher. Job openings are created both when a new job is added and when a worker leaves their job and needs to be replaced. Workers leave their jobs for multiple reasons and these reasons are referred to as “exits” and “transfers.” Exits are people who leave their job and exit the labor force entirely (possibly to retire, enroll in school, or for family reasons). Transfers are workers who leave one occupation for a different occupation (possibly through a promotion or a career change). Including both new jobs, exits, and transfers, Montana is expected to have 61,710 total job openings per year through 2027. Figure 7 shows the ten-year annual expected openings due to new jobs, exits, and transfers by large occupational group.

Exits refer to people who leave their job and exit the labor force, such as to retire or to enroll in school.

Transfers are workers who leave one occupation for a different occupation, like a career change or promotion.

Figure 7: Annual Projected Occupational Demand 2017-2027 by Large Occupation Group

Large Occupational Group	Annual Openings				Annual Average Wage (MT - 2017)
	New Jobs	Exits	Transfers	Total Openings	
1 Food Preparation and Serving Related	451	3,669	4,914	9,033	\$23,160
2 Sales and Related	207	3,634	4,546	8,387	\$34,670
3 Office and Administrative Support	204	3,669	4,098	7,971	\$34,120
4 Construction and Extraction	356	1,258	2,342	3,955	\$48,950
5 Transportation and Material Moving	207	1,530	2,154	3,890	\$38,680
6 Personal Care and Service	298	1,603	1,555	3,456	\$25,370
7 Building and Grounds Cleaning and Maintenance	223	1,534	1,555	3,312	\$28,220
8 Installation, Maintenance, and Repair	186	850	1,488	2,524	\$46,080
9 Education, Training, and Library	108	1,243	1,169	2,520	\$42,200
10 Healthcare Practitioners and Technical	525	907	866	2,299	\$74,780
11 Management	69	1,052	1,085	2,206	\$89,790
12 Production	109	735	1,266	2,109	\$39,660
13 Business and Financial Operations	192	611	1,198	2,001	\$61,230
14 Healthcare Support	233	886	837	1,957	\$29,430
15 Community and Social Service	119	392	660	1,170	\$39,390
16 Protective Service	32	394	419	845	\$44,480
17 Farming, Fishing, and Forestry	25	203	612	840	\$32,590
18 Arts, Design, Entertainment, Sports, and Media	23	334	474	830	\$36,370
19 Life, Physical, and Social Science	56	205	480	741	\$55,210
20 Computer and Mathematical	112	166	451	730	\$63,720
21 Architecture and Engineering	86	187	352	625	\$71,170
22 Legal	39	111	158	308	\$66,960
Total	3,859	25,171	32,678	61,708	\$42,400

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Figure 8 shows the top ten detailed occupations with the most job openings over the next ten years. Most of these jobs fall into the two largest categories – food preparation and serving related occupations and sales occupations. The high number of expected openings in these fields is partially because they are some of the largest employing occupations, and partially due to high turnover. Because these jobs are typically entry-level jobs requiring short-term on-the-job training only, there is little planning needed by a worker to work in one of these occupations. Bookkeeping, accounting, and auditing clerks is the only job that requires some education past high school. None of the jobs in the list pay higher wages than the statewide average of \$42,045.

Figure 8: Top Ten Detailed Occupations with the Most Job Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Cashiers	<HS	ST-OJT	21	1,593	1,555	3,169	\$22,160
2 Retail Salespersons	<HS	ST-OJT	77	1,106	1,386	2,568	\$27,330
3 Combined Food Prep. & Serving <i>Including Fast Food</i>	<HS	ST-OJT	178	1,014	1,060	2,252	\$21,380
4 Waiters and Waitresses	<HS	ST-OJT	74	774	1,186	2,034	\$21,920
5 Office Clerks, General	HS/GED	ST-OJT	1	803	782	1,585	\$31,870
6 Maids and Housekeeping Cleaners	<HS	ST-OJT	94	623	470	1,188	\$24,400
7 Janitors and Cleaners <i>Except Maids and Housekeeping Cleaners</i>	<HS	ST-OJT	61	539	520	1,120	\$28,670
8 Personal Care Aides	HS/GED	ST-OJT	169	520	392	1,081	\$23,290
9 Bookkeeping, Accounting, and Auditing Clerks	SC ND	MT-OJT	3	521	404	928	\$35,640
10 Cooks, Restaurant	<HS	MT-OJT	69	358	489	916	\$24,400

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: <HS = less than high school diploma; HS/GED = High school or equivalent; SC ND = Some college no degree; ST-OJT = short-term on-the-job training; MT-OJT = medium-term on-the-job training

Figure 8 provides an important summary of occupational growth, but there are many other ways to use occupational projections data. For example, a list of high demand occupations requiring a bachelor’s degree may be useful for individuals pursuing a four-year degree who are unsure of their career interests. Educational institutions and businesses may also use that list to respond early to future projected occupational demand. A list of apprenticeable jobs with large job growth may be useful for businesses to decide if setting up an apprenticeship program is appropriate. For individuals making career decisions, a list of specific types of occupations such as those that pay higher than average or jobs that are in a STEM field may be useful tools. The remainder of this report provides tables of occupations with high projected openings by a variety of commonly requested factors.

Occupational Demand – High Wage Jobs

For individuals looking to maximize their earning potential, figures 9 and 10 show jobs with the most openings earning over \$45,000 and \$65,000, respectively. Half of the jobs earning over \$45,000 (figure 9) typically require experience and a high school diploma. For example, training to be an electrician typically requires going through an apprenticeship program, and first-line supervisors usually requires five or more years of experience to work up to that career. Nearly all the top jobs earning \$65,000 or more require at least a bachelor's degree.

Figure 9: Jobs Earning Over \$45,000 with the Most Job Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Registered Nurses	Bach.		182	331	252	764	\$66,280
2 Sales Representatives, Wholesale and Manufacturing <i>Except Technical and Scientific Products</i>	HS/GED	MT-OJT	36	143	290	468	\$54,080
3 General and Operations Managers	Bach.	5+ yrs	46	104	301	451	\$98,230
4 Operating Engineers and Other Construction Equipment Operators	HS/GED	MT-OJT	26	137	252	415	\$51,230
5 First-Line Supervisors of Office and Administrative Support Workers	HS/GED	<5 yrs	12	156	232	399	\$53,280
6 First-Line Supervisors of Construction Trades and Extraction Workers	HS/GED	5+ yrs	38	117	231	387	\$65,370
7 Accountants and Auditors	Bach.		45	111	217	373	\$65,600
8 Business Operations Specialists <i>All Other</i>	Bach.		27	101	186	313	\$65,920
9 Electricians	HS/GED	Appren.	35	87	185	306	\$60,400
10 Elementary School Teachers <i>Except Special Education</i>	Bach.		9	133	149	291	\$52,610

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: HS/GED = High school or equivalent; Bach. = Bachelor's degree; 5+ yrs = five or more years of experience; <5 yrs = less than five years of experience; MT-OJT = medium-term on-the-job training

Figure 10: Jobs Earning Over \$65,000 with the Most Job Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Registered Nurses	Bach.		182	331	252	764	\$66,280
2 General and Operations Managers	Bach.	5+ yrs	46	104	301	451	\$98,230
3 First-Line Supervisors of Construction Trades and Extraction Workers	HS/GED	5+ yrs	38	117	231	387	\$65,370
4 Accountants and Auditors	Bach.		45	111	217	373	\$65,600
5 Business Operations Specialists, All Other	Bach.		27	101	186	313	\$65,920
6 Managers, All Other	Bach.	<5 yrs	6	56	86	149	\$70,890
7 Medical and Health Services Managers	Bach.	<5 yrs	25	40	71	136	\$95,690
8 Civil Engineers	Bach.		20	35	80	135	\$74,930
9 Lawyers	PhD/Prof		19	51	56	126	\$83,150
10 Loan Officers	Bach.	MT-OJT	10	32	73	115	\$65,620

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: HS/GED = High school diploma or equivalent; Bach = Bachelor's degree; PhD/Prof = Doctoral or professional degree; 5+ yrs = five or more years of experience; <5 yrs = less than five years of experience; MT-OJT = medium-term on-the-job training

Occupational Demand – Education Level

Most new job openings in the next ten years are expected at lower education levels. In 2018 and 2019, there are 45,695 projected job openings annually that require a high school diploma or less (approximately 74% of total job openings). Occupations requiring a bachelor's degree make up another 13% of annual openings, which is the most among occupations requiring post-secondary education. Wages generally increase with education levels. Figure 11 shows worker demand by education level.

Figure 11: Worker Demand by Education Level, 2017-2027

Education Level	Annual Openings 2017-2019				Annual Openings 2017-2027				Annual Average Wage MT - 2017
	New Jobs	Exits	Transfers	Total Openings	New Jobs	Exits	Transfers	Total Openings	
Less than High School	778	9,114	11,381	21,273	977	9,384	11,718	22,079	\$26,119
HS Diploma or equivalent	1,263	9,454	12,317	23,034	1,260	9,696	12,660	23,616	\$39,336
Some college, no degree	49	781	717	1,546	48	787	726	1,561	.
Postsecondary award	339	1,450	1,763	3,551	352	1,513	1,837	3,702	\$38,231
Associate degree	139	382	596	1,116	136	400	618	1,153	\$47,227
Bachelor's degree	735	2,739	4,260	7,734	816	2,833	4,421	8,070	\$61,756
Master's degree	129	252	381	762	127	265	403	795	\$62,289
Doctoral/Prof. degree	143	281	283	706	142	295	296	732	\$110,917

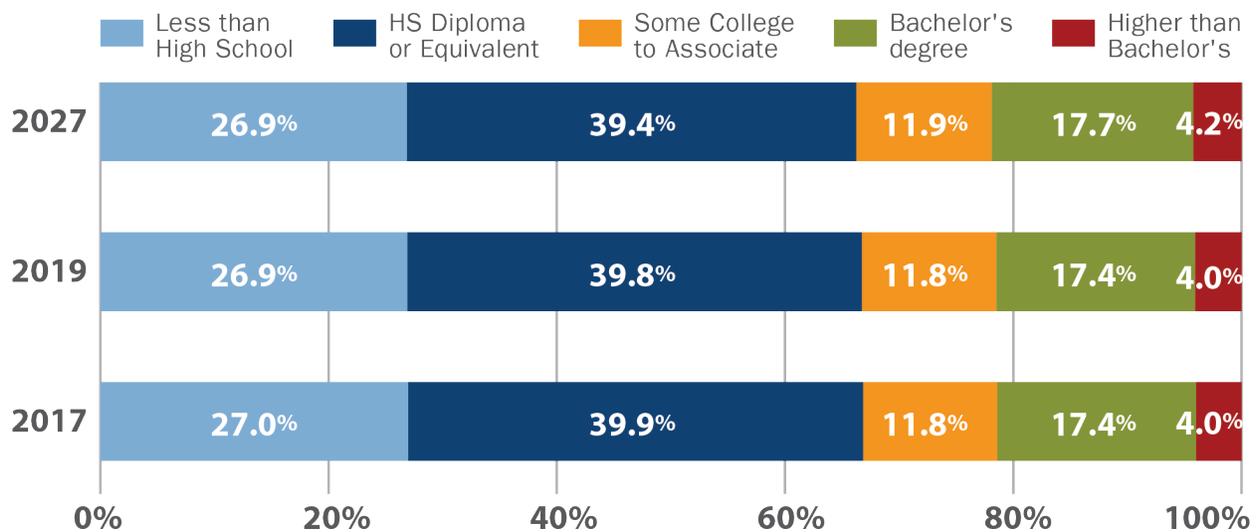
Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

The education and work experience listed in the tables are the minimum required to enter the profession as determined by the U.S. Department of Labor, Bureau of Labor Statistics.

For occupations without a clear path to entry, the BLS determines the typical path based on the current minimum qualifications of workers filling those positions. At these minimums, the worker will likely be earning less than the average wage for the industry.

One reason that Montana expects a high number of job openings in occupations requiring a high school diploma or less is because a significant portion of the workforce is currently employed in these occupations. Figure 12 shows Montana's jobs by minimum education required for 2017, and projected jobs for 2019 and 2027. As the figure shows, this distribution is expected to remain relatively constant over the next ten years. Another reason most job openings are at lower education levels is because these jobs typically pay lower wages and therefore have higher turnover as workers seek to move up the career ladder into higher paying jobs.

Figure 12: Montana Jobs by Minimum Education Required, Current and Projected



Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Although there are fewer projected job openings requiring post-secondary education, these occupations receive significant attention by workforce planners because of the time it takes to train workers for these occupations. Figure 13 shows jobs with the most openings requiring a bachelor's degree or higher. Registered nurses top this list. Education is another in-demand field with three different types of teachers making this list: elementary teachers, secondary teachers, and substitute teachers. Figure 14 shows jobs with the most openings requiring more than a high school diploma, but less than a bachelor's degree. One more education related job is on this list (teacher assistants), along with four different jobs related to healthcare (nursing assistants, licensed practical and licensed vocational nurses, medical assistants, and dental assistants).

Figure 13: Most Job Openings for Jobs that Require a Bachelor's Degree or Higher, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Registered Nurses	Bach.		182	331	252	764	\$66,280
2 Substitute Teachers	Bach.		18	311	238	567	\$22,930
3 General and Operations Managers	Bach.	5+ yrs	46	104	301	451	\$98,230
4 Accountants and Auditors	Bach.		45	111	217	373	\$65,600
5 Business Operations Specialists, <i>All Other</i>	Bach.		27	101	186	313	\$65,920
6 Elementary School Teachers <i>Except Special Education</i>	Bach.		9	133	149	291	\$52,610
7 Secondary School Teachers <i>Except Special and Career/Technical Ed.</i>	Bach.		8	105	128	241	\$51,290
8 Coaches and Scouts	Bach.		12	84	113	209	\$28,050
9 Child, Family, and School Social Workers	Bach.		17	56	99	171	\$35,940
10 Human Resources Specialists	Bach.		9	44	99	151	\$54,310

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: < Bach. = Bachelor's degree; 5+ yrs = five or more years of experience

Figure 14: Jobs Requiring Some Post-Secondary Education, but Less Than a Bachelor's Degree, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Bookkeeping, Accounting, and Auditing Clerks	SC ND	MT-OJT	3	521	404	928	\$35,640
2 Nursing Assistants	PS ND		84	432	360	876	\$27,070
3 Heavy and Tractor-Trailer Truck Drivers	PS ND	ST-OJT	35	280	415	730	\$44,700
4 Teacher Assistants	SC ND		11	201	167	379	\$26,560
5 Automotive Service Technicians and Mechanics	PS ND	ST-OJT	24	119	227	369	\$37,870
6 Computer User Support Specialists	SC ND		34	53	135	222	\$45,670
7 Licensed Practical and Licensed Vocational Nurses	PS ND		25	97	95	218	\$42,690
8 Forest and Conservation Technicians	Associate		3	72	134	209	\$36,460
9 Medical Assistants	PS ND		36	68	96	200	\$33,170
10 Dental Assistants	PS ND		19	76	85	180	\$37,050

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: SC ND = Some college no degree; PS ND = Postsecondary non-degree award; Associate = Associate degree; ST-OJT = short-term on-the-job training; MT-OJT = medium-term on-the-job training

Occupational Demand – by Career Cluster

Career clusters are groups of occupations that share common features, and provide a framework to connect academics to real-world applications. Demand for workers in hospitality and tourism, business management and administration, and marketing are estimated to be the largest of all the career clusters over the next ten years, with about 12,950 annual job openings in hospitality and tourism, 7,650 annual job openings business management and administration, and 6,560 in marketing. Figure 15 illustrates expected worker demand by career cluster and educational level.

Figure 15: Montana Employment Projections by Career Cluster, 2017-2027

Career Clusters	Education Level	Annual Openings, 2017-2027			
		New Jobs	Exits	Transfers	Total
Agriculture, Food & Natural Resources	<HS	29	188	546	762
	HS/GED	-55	765	480	1,189
	Associate	10	89	172	271
	Bach.	17	52	126	195
Total		1	1,094	1,323	2,418
Architecture & Construction	<HS	168	721	1,283	2,172
	HS/GED	253	927	1,709	2,889
	PS ND	.	.	.	.
	Associate	9	26	45	80
	Bach.	.	.	.	.
Total		430	1,674	3,036	5,140
Arts, Audio/Video Technology & Communications	<HS	0	27	22	48
	HS/GED	-1	69	99	167
	SC ND	.	.	.	.
	PS ND	.	.	.	.
	Associate	.	.	.	.
	Bach.	5	141	202	349
Total		4	237	323	564
Business Management & Administration	HS/GED	60	2,407	2,717	5,184
	SC ND	3	521	404	928
	Associate	-1	13	21	33
	Bach.	133	440	935	1,508
Total		195	3,381	4,077	7,654
Education & Training	HS/GED	9	45	34	87
	SC ND	11	201	167	379
	PS ND	3	33	22	58
	Associate	7	50	62	120
	Bach.	43	502	590	1,134
	Master's	15	106	136	257
	PhD/Prof	23	102	106	231
Total		110	1,039	1,117	2,266
Finance	HS/GED	.	.	.	.
	PS ND	.	.	.	.
	Bach.	.	.	.	.
Total		.	.	.	.
Government & Public Administration	HS/GED	.	.	.	.
	Bach.	.	.	.	.
	Master's	2	3	10	15
Total		2	3	10	15
Health Science	HS/GED	161	466	464	1,091
	PS ND	219	803	785	1,806
	Associate	72	117	114	303
	Bach.	219	394	346	959
	Master's	66	58	77	201
	PhD/Prof	91	121	102	314
Total		828	1,958	1,889	4,675

Figure 15: Montana Employment Projections by Career Cluster, 2017-2027 (Continued)

Career Clusters	Education Level	Annual Openings, 2017-2027			
		New Jobs	Exits	Transfers	Total
Hospitality & Tourism	<HS	582	4,804	5,679	11,064
	HS/GED	105	651	1,129	1,885
	PS ND	.	.	.	.
Total		687	5,455	6,808	12,950
Human Services	<HS	.	.	.	.
	HS/GED	239	1,122	1,006	2,368
	PS ND	26	131	97	253
	Associate	1	7	10	19
	Bach.	59	213	353	625
	Master's	40	92	163	295
PhD/Prof	7	16	24	46	
Total		372	1,580	1,653	3,604
Information Technology	SC ND	34	53	135	222
	Associate	.	.	.	.
	Bach.	63	90	257	410
Total		97	143	392	632
Law, Public Safety, Corrections & Security	<HS	2	62	36	101
	HS/GED	29	369	420	818
	PS ND	.	.	.	.
	Associate	18	39	74	131
	Bach.	4	19	28	51
PhD/Prof	20	56	62	138	
Total		73	545	621	1,239
Manufacturing	<HS	2	54	65	122
	HS/GED	186	913	1,583	2,682
	SC ND	.	.	.	.
	PS ND	0	8	17	25
	Associate	9	29	48	86
	Bach.	0	17	32	50
Total		198	1,021	1,746	2,965
Marketing	<HS	108	2,902	3,225	6,236
	HS/GED	.	.	.	.
	Bach.	42	84	202	328
Total		150	2,987	3,427	6,564
Science, Technology, Engineering & Mathematics	Associate	0	5	9	15
	Bach.	57	110	268	435
	Master's	4	6	17	27
	PhD/Prof	1	1	2	3
Total		62	121	296	479
Transportation, Distribution & Logistics	<HS	82	557	797	1,435
	HS/GED	148	840	1,213	2,202
	PS ND	65	431	695	1,190
	Associate	.	.	.	.
	Bach.	2	5	12	18
Total		296	1,833	2,716	4,845

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: <HS = less than high school diploma; HS/GED = High school or equivalent; SC ND = Some college no degree; PS ND = Postsecondary non-degree award; Associate = Associate degree; Bach. = Bachelor's degree; Master's = Master's degree; PhD/Prof = Doctoral or professional degree

Occupational Demand – by Soft Skill

Education and training programs are focused on teaching workers the technical skills they will need to succeed in a career. However, a good worker must also have strong soft skills, such as communication, time management, and the ability to follow directions. Figure 16 categorizes expected job openings by the soft skill most frequently used in the occupation. Montana workers need to have developed coordination, service orientation, and time management to successfully fill jobs in the future. Most jobs will only require low or medium levels of soft skills.

Figure 16: Annual Job Openings by Most Commonly Used Soft Skill, 2017-2027

Soft Skills	Skill Level		
	Low	Medium	High
Coordination - Adjusting to others' actions	14,546	3,702	29
Service Orientation - Actively looking for ways to help people	11,909	3,427	0
Time Management - Managing own time and time of others	3,373	346	0
Complex Problem Solving - Identifying problems, evaluating options, and implementing solutions	2,422	826	63
Social Perceptiveness - Being aware and understanding others' reactions	1,762	4,165	985
Instruction - Teaching others	867	2,027	297
Judgment and Decision Making - Considering the relative costs and benefits of potential action	724	1,623	189
Management of Personnel Resources - Determining how money will be spent and accounting for expenses	345	197	43
Systems Analysis - Determining how a system should work, and how changes will affect outcomes	13	182	0
Negotiation - Bringing people together to reconcile differences	0	784	2
Management of Financial Resources - Determining how money will be spent and accounting for expenses	0	383	63
Systems Evaluation - Identifying measures of indicators of system performance	0	.	.
Persuasion - Persuading others to change their minds of behavior	.	4,054	126

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Occupational Demand – Healthcare Occupations

The healthcare industry is Montana's largest employing industry, with over 72,000 employees. Healthcare employment has increased continuously throughout the last few decades, even adding jobs during the recession. Because of this growth, significant effort has been made to ensure the availability of an adequate workforce. Estimates for the healthcare industry indicate annual growth of 1,240 jobs over the next ten years.

Occupations within the healthcare industry are primarily organized into two general occupational groups, (1) healthcare practitioners and technical occupations and (2) healthcare support occupations. Figure 17 shows the top twenty healthcare jobs with the most annual openings. Most of the largest growing healthcare occupations require at least some post-secondary education. Nursing assistants top the list, with an estimated 876 annual openings every year through 2027.

Figure 17: Top 20 Healthcare Jobs with the Most Annual Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Nursing Assistants	PS ND		84	432	360	876	\$27,070
2 Registered Nurses	Bach.		182	331	252	764	\$66,280
3 Home Health Aides	HS/GED	ST-OJT	47	106	88	242	\$25,050
4 Licensed Practical and Licensed Vocational Nurses	PS ND		25	97	95	218	\$42,690
5 Medical Assistants	PS ND		36	68	96	200	\$33,170
6 Dental Assistants	PS ND		19	76	85	180	\$37,050
7 Medical Records and Health Information Technicians	PS ND		20	40	41	101	\$38,280
8 Pharmacy Technicians	HS/GED	MT-OJT	15	33	45	94	\$34,290
9 Physical Therapists	PhD/Prof		30	24	26	79	\$78,120
10 Veterinary Assistants and Laboratory Animal Caretakers	HS/GED	ST-OJT	11	26	42	79	\$26,570
11 Pharmacists	PhD/Prof		15	27	23	64	\$113,080
12 Radiologic Technologists	Associate		14	24	23	62	\$54,420
13 Physician Assistants	Master's		22	12	25	59	\$101,610
14 Psychiatric Technicians	PS ND	ST-OJT	9	21	28	58	\$25,870
15 Dental Hygienists	Associate		10	29	18	58	\$72,850
16 Emergency Medical Technicians and Paramedics	PS ND		11	14	33	57	\$33,220
17 Nurse Practitioners	Master's		20	13	19	52	\$97,470
18 Phlebotomists	PS ND		8	18	24	50	\$32,730
19 Surgical Technologists	PS ND		9	17	23	49	\$46,980
20 Psychiatric Aides	HS/GED	ST-OJT	.	.	.	.	\$28,760

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: HS/GED = High school or equivalent; PS ND = Postsecondary non-degree award; Associate = Associate degree; Bach. = Bachelor's degree; Master's = Master's degree; ST-OJT = short-term on-the-job training; MT-OJT = medium-term on-the-job training

In addition to the occupations that provide healthcare services, there are other job duties that must be performed in the healthcare industry, such as medical secretaries, housekeeping cleaners, cooks and childcare workers. These non-healthcare jobs have become increasingly important because healthcare providers are evaluated on patient experience as well as health outcomes. Patient experience includes factors such as quality of food, cleanliness of rooms, and staff responsiveness and friendliness.

The top twenty non-healthcare occupations within the healthcare industry with the largest projected job growth are shown in figure 18. The occupations are ranked from most job openings to least job openings within the healthcare industry. The annual total openings listed in figure 18 include all projected job openings for that occupation, not just those within the healthcare industry. The average annual wage listed for each occupation is the average for that occupation across all industries, and is not specific to the healthcare industry.

Figure 18: Top 20 Non-Healthcare Jobs within the Healthcare Industry, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Personal Care Aides	HS/GED	ST-OJT	169	520	392	1,081	\$23,290
2 Medical Secretaries	HS/GED	MT-OJT	61	172	167	401	\$31,860
3 Receptionists and Information Clerks	HS/GED	ST-OJT	22	165	176	362	\$27,910
4 Medical and Health Services Managers	Bach.	<5 yrs	25	40	71	136	\$95,690
5 Mental Health Counselors	Master's	Internship	14	29	51	94	.
6 Maids and Housekeeping Cleaners	<HS	ST-OJT	94	623	470	1,188	\$24,400
7 Social and Human Service Assistants	HS/GED	ST-OJT	20	67	107	193	\$29,570
8 Childcare Workers	HS/GED	ST-OJT	21	347	264	631	\$22,360
9 Billing and Posting Clerks	HS/GED	MT-OJT	21	68	87	175	\$34,980
10 Cooks, Institution and Cafeteria	<HS	ST-OJT	10	134	182	326	\$26,470
11 Recreation Workers	HS/GED	ST-OJT	20	131	200	351	\$27,280
12 Healthcare Social Workers	Master's	Internship	12	24	42	77	\$48,620
13 Food Servers, Non-restaurant	<HS	ST-OJT	12	82	76	170	\$22,550
14 Child, Family, and School Social Workers	Bach.		17	56	99	171	\$35,940
15 Mental Health and Substance Abuse Social Workers	Master's	Internship	8	18	32	59	\$36,720
16 Substance Abuse and Behavioral Disorder Counselors	Bach.		9	18	32	58	.
17 Secretaries and Administrative Assistants <i>Except Legal, Medical, and Executive</i>	HS/GED	ST-OJT	-4	363	353	712	\$32,120
18 Janitors and Cleaners <i>Except Maids and Housekeeping Cleaners</i>	<HS	ST-OJT	61	539	520	1,120	\$28,670
19 Office Clerks, General	HS/GED	ST-OJT	1	803	782	1,585	\$31,870
20 Interviewers <i>Except Eligibility and Loan</i>	HS/GED	ST-OJT	8	52	61	121	\$31,690

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: <HS = less than high school diploma; HS/GED = High school or equivalent; Bach. = Bachelor's degree; Master's = Master's degree; <5 yrs = less than five years of experience; ST-OJT = short-term on-the-job training; MT-OJT = medium-term on-the-job training

Occupational Demand – STEM

Figure 19 contains the demand for occupations that require specialized knowledge of science, technology, engineering, and math (STEM) subjects. These STEM occupations are of interest to many students and educators. Projected openings are organized based on the discipline (field of study), domain, and occupation type. The most projected openings by discipline is biology, by domain is health, and by occupation type is research and development, design, and practitioners. STEM professions typically pay high wages, with all groupings in figure 19 showing wages higher than the statewide average.

Figure 19: Worker Demand for Science, Technology, Engineering, and Math Jobs, 2017-2027

Career Field		Annual Openings 2017-2019				Annual Openings 2017-2027				Annual Average Wage MT - 2017
		New Jobs	Exits	Transfers	Total Openings	New Jobs	Exits	Transfers	Total Openings	
Discipline	Biology	586	1,039	1,290	2,914	574	1,101	1,355	3,030	\$76,772
	Computer Science	251	488	1,036	1,775	277	515	1,090	1,882	\$70,304
	Math	212	461	931	1,604	238	484	975	1,697	\$78,484
	Chemistry	286	512	782	1,579	286	541	822	1,649	\$89,372
	Engineering	203	393	891	1,487	232	415	938	1,584	\$71,514
	Physics	205	378	687	1,270	224	402	722	1,348	\$77,752
	Economics & Accounting	142	277	471	889	147	292	493	932	\$101,975
Domain	Health	584	906	898	2,387	559	965	956	2,481	\$76,378
	Life & Physical Science, Engineering, Math, and IT	222	545	1,252	2,018	258	570	1,307	2,135	\$66,965
	Social Science	.	.	.	.	.	.	.	.	\$61,971
	Architecture	.	.	.	.	.	.	.	.	.
Occupation Type	R&D, Design, or Practitioner	521	777	1,110	2,407	537	827	1,178	2,542	\$85,333
	Technologist and Technician	251	609	932	1,791	243	637	970	1,851	\$47,502
	Managerial	36	59	126	221	38	62	134	235	\$105,223
	Postsecondary Teaching	14	63	67	144	17	66	68	151	\$65,210
	Sales	2	11	22	35	3	11	23	36	\$78,933

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Occupational Demand - Apprenticeships

The on-the-job training method of apprenticeships has grown rapidly in Montana. The number of traditional apprenticeships, such as the programs to train plumbers and electricians, have grown steadily while new apprenticeship programs, in healthcare and information technology, have been created in response to employer demand. Figure 20 shows Montana’s apprenticeable occupations with the most projected job openings through 2027.

Figure 20: MT’s Apprenticeable Occupations with the Most Projected Job Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Bookkeeping, Accounting, and Auditing Clerks	SC ND	MT-OJT	3	521	404	928	\$35,640
2 Nursing Assistants	PS ND		84	432	360	876	\$27,070
3 Construction Laborers	<HS	ST-OJT	70	229	432	730	\$37,430
4 Carpenters	HS/GED	Appren.	47	230	372	649	\$43,900
5 Childcare Workers	HS/GED	ST-OJT	21	347	264	631	\$22,360
6 Maintenance and Repair Workers, General	HS/GED	MT-OJT	51	196	268	515	\$36,810
7 Operating Engineers and Other Construction Equipment Operators	HS/GED	MT-OJT	26	137	252	415	\$51,230
8 Automotive Service Technicians and Mechanics	PS ND	ST-OJT	24	119	227	369	\$37,870
9 Electricians	HS/GED	Appren.	35	87	185	306	\$60,400
10 Plumbers, Pipefitters, and Steamfitters	HS/GED	Appren.	36	82	152	270	\$63,860

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: <HS = less than high school diploma; HS/GED = High school or equivalent; SC ND = Some college no degree; PS ND = Postsecondary non-degree award; ST-OJT = short-term on-the-job training; MT-OJT = medium-term on-the-job training

While the use of the apprenticeship training model has expanded into a variety of occupations, there are still many occupations that are apprenticeable by U.S. standards, but that do not yet exist in Montana. Figure 21 shows U.S. apprenticeable occupations in STEM fields with the most projected job openings. STEM occupations are targeted in this table as the apprenticeship model allows a way to access STEM occupations through on-the-job training, and some apprenticeships offer a way for their apprentices to earn a degree while training.

Figure 21: U.S. Apprenticeable Occupations in a STEM field with the Most Projected Job Openings, 2017-2027

Occupation	Minimum Requirements		Annual Openings				Annual Average Wage MT - 2017
	Edu.	Work Exp.	New Jobs	Exits	Transfers	Total Openings	
1 Computer User Support Specialists	SC ND		34	53	135	222	\$45,670
2 Licensed Practical and Licensed Vocational Nurses	PS ND		25	97	95	218	\$42,690
3 Medical and Health Services Managers	Bach.	<5 yrs	25	40	71	136	\$95,690
4 Medical Records and Health Information Technicians	PS ND		20	40	41	101	\$38,280
5 Pharmacy Technicians	HS/GED	MT-OJT	15	33	45	94	\$34,290
6 Software Developers, Applications	Bach.		27	13	47	87	\$73,960
7 Computer Programmers	Bach.		0	22	57	79	\$92,150
8 Radiologic Technologists	Associate		14	24	23	62	\$54,420
9 Emergency Medical Technicians and Paramedics	PS ND		11	14	33	57	\$33,220
10 Computer and Information Systems Managers	Bach.	5+ yrs	9	11	33	52	\$118,930

Source: Montana Department of Labor and Industry Employment Projections. 2017-2027

Notes: HS/GED = High school or equivalent; SC ND = Some college no degree; PS ND = Postsecondary non-degree award; Associate = Associate degree; Bach. = Bachelor's degree; 5+ yrs = five or more years of experience; <5 yrs = less than five years of experience; MT-OJT = medium-term on-the-job training

Conclusion

Montana's employment outlook is strong, with approximately 3,860 expected jobs added per year. However, with only 3,640 workers expected to be added to the labor force, businesses may find it difficult to recruit and retain the workers they need. This projections publication should serve as a guide to businesses, educational institutions, and workforce training institutions to learn about highly demanded jobs in order to prepare for future workforce needs. In addition, individuals may benefit from employment projections by using the information to justify the cost and length of training of a given career path. No matter the use, employment and labor force projections are an important tool for Montana because they provide information about well-paying and in-demand occupations in an effort to improve job matching between employers and employees.

Appendix A - Methodology

The Research and Analysis Bureau of the Montana Department of Labor & Industry produces projections of employment growth by industry and occupation, and of labor force growth by gender and age group. For both projection types, the Department uses the methodologies recommended by the U.S. Department of Labor, ensuring accurate and consistent methodology across timelines and the most updated practices used among states.

Labor Force Projections

The Montana Department of Labor & Industry only recently began producing labor force projections on an annual basis, and the methodology has been updated and developed each year. The labor force projections start with population projections provided by the U.S. Census Bureau for Montana by age group and gender, available through the Census and Economic Information Center at the Montana Department of Commerce. These population projections include estimates for births, deaths, and net migration. The Montana Department of Labor & Industry analysts adjust these projections to remove the institutionalized and non-civilian populations that are not included in labor force estimates.

Then, historic information on labor force participation rates for each age group and gender is compiled, imputing missing values using national labor force participation rates. Future participation rates are estimated using time-series modeling with adjustments for economic conditions. The participation rates are then applied to the projected population, summing across age and gender groups to arrive at an estimate for the total labor force. This process is similar to the methodology used by the Bureau of Labor Statistics (BLS) when forecasting labor force participation rates, with adjustments for more limited data availability at the state level. More information about the BLS methodology can be found in the Handbook of Methods, available at www.bls.gov/opub/hom/pdf/homch13.pdf.

Employment Projections

The employment projections are produced as a part of a contract with the Employment and Training Administration of the U.S. Department of Labor using the nationally recommended methodology for employment forecasts and the programs provided by the Projections Managing Partnership. The employment projections are published on the state labor market information website at www.lmi.mt.gov, and are also published nationally on the Employment and Training Administration's website at www.projectionscentral.com. More information on the state employment projections program can be found at www.doleta.gov/business/projections/StateEmpProjProgram.cfm.

The projections are based on historic employment data from January 1990 to December 2017. The primary data source for the Montana industry employment projections is the Quarterly Census of Employment and Wages (QCEW), which is published jointly by the Bureau of Labor Statistics and the Montana Department of Labor & Industry. The QCEW covers payroll employment in Montana and is considered the most accurate data source because it is an actual count of employment from the wage records reported to Unemployment Insurance. The QCEW data is aggregated into the North American Industrial Classification System (NAICS) industries. For Montana's statewide industry employment projections, three-digit NAICS industries are used, while regional forecasts are produced at the two-digit NAICS level.

All industries include only private employment except for the healthcare and education industries, which includes both public and private employment. Therefore, the government industry includes all public employment except for workers in the healthcare and education industries. The treatment of public healthcare and education employment is consistent with national recommendations from the Employment and Training Administration of the U.S. Department of Labor.

Industry forecasts are developed by comparing various functional forms of time series models, which use past employment trends to predict employment in the future, with fit and analyst insight determining the appropriate model. Fit is determined using historic data, a holdout period, and by comparing the first six months of forecast to the Current Employment Statistics (CES). The CES is an employer-based survey of employment that is published one month after the employment occurred, creating a six-month lag between the publication of CES employment and the more accurate QCEW data used to forecast employment. These six months of CES estimates are compared to the first six months of forecast to evaluate the fit of the time series forecasting model.

For certain industries, such as oil and gas mining and government, structural models are developed that utilize forecasted explanatory variables or leading indicators, including energy price forecasts, population projections, or job openings. Because of the increased unknown error introduced into the forecast from the use of forecasted explanatory variables, these structural models are primarily used to inform analyst opinion on which time series model is most appropriate. Industry projections are compared against the Montana forecasts developed by IHS Global Insight and against other publicly available employment forecasts.

The total employment level is also estimated using a time series model, and using combined time series and structural models to determine the robustness of the estimate and its sensitivity to differing economic scenarios. Data from the Local Area Unemployment Statistics (LAUS) is used to produce the total employment projection. The LAUS data is a model-based estimate that utilizes the national Current Population Survey to calculate the labor force and employment in Montana. Conceptually, the difference between the LAUS total employment estimate and the QCEW payroll employment number is the level of self-employment in Montana. Therefore, the difference between the two forecasts becomes the forecast for self-employment in Montana. The total employment and payroll employment forecasts are estimated using both a top-down and bottom-up approach with manual adjustment for internal consistency of forecasts.

Once industry forecasts are finalized, the industry employment is disaggregated into occupations using a third data source, the Occupational Employment Statistics (OES). The OES is a survey-based employment estimate that categorizes employment by occupation. The OES provides staffing patterns for each industry, which are used to disaggregate the industry projections into each occupation. For example, if registered nurses are currently 12% of the healthcare industry and 3% of the education industry, the forecast for the occupation of registered nurses would sum 12% of the expected employment in healthcare and 3% of the expected employment in education.

However, this process is complicated by change factors, which adjust the staffing patterns for expected changes in occupational mix in the upcoming ten years. The change factors are calculated at the national level by the Bureau of Labor Statistics with some occupations edited at the state level to adapt to Montana's economic conditions. Change factors adjust the current staffing patterns for predicted changes in future business practices. For example, if registered nurses comprise 12% of the healthcare industry in the current timeframe but are expected to comprise 14% of the healthcare industry in future years, the change factor would slowly change the amount of projected healthcare employment dedicated to registered nurses over the ten-year time frame.

The self-employed staffing pattern is developed following the averages of the state and national occupational data adjusted for the likelihood of the occupation being self-employed. The staffing pattern is automatically generated using national and state level data, but is also manually adjusted using analyst insight. Analysts base those adjustments on self-employed occupation data from the Current Population Survey, data on farmers from the U.S. Department of Agriculture, and the Bureau of Economic Analysis's personal income accounts.

Forecast Error

The Montana Department of Labor & Industry does not produce error ranges for the employment forecasts, although greater consistency is one of the criteria used when selecting the appropriate time series model for each industry. Some industries and occupations have fairly stable growth paths that can be predicted with a great deal of certainty, while other industries are more susceptible to changing economic conditions. Employment growth in healthcare has continued a very steady pace over the last twenty years as Montana's population has aged and consumers have continued to demand more healthcare services. The constant steady growth gives greater confidence in the forecasted employment levels. In contrast, employment in the mining industry varies considerably with changing global prices for oil, energy, and commodities. Price changes at the global level are often difficult to predict, making the employment forecast for this industry fairly uncertain.

Further, forecasting error will be greater in the self-employed estimates compared to other industries because of the use of the LAUS data. The LAUS data series is a model-based estimate (rather than an actual count from the QCEW data used for other industries), which includes estimation error in the historic data. The estimation error is magnified as the employment is projected into the future, resulting in a fairly wide error range in the self-employed forecasts. There is also forecasting error in other industries, but the error range is smaller because the historic data is an actual count and therefore does not include historic estimation error. The occupational projections include the most uncertainty because both the industry projection and the OES estimate include some error. Regardless, uncertain occupational projections provide better expectations of future growth than the alternative of no forecast estimates.

Knowing about forecast uncertainty helps to interpret the employment forecasts more appropriately. As an example, the 2017-2027 employment forecasts suggested there will be about 765 openings annually for registered nurses. In comparison, we expect only 180 openings per year for dental assistants. While neither figure is likely to be exactly correct, it is clear that there is a greater demand for nurses than dental assistants (although both occupations are growing). The greater demand for nurses will persist even if the economy undergoes a structural shift or experiences a large recession. The relative demand of occupations is more stable and of greater certainty than the numerical demand.

Additional caveats are important to understand the projections as well. The employment projections do not account for current unfilled positions, but for the new job openings that are expected in the future. For example, if there were currently 500 unfilled openings for welders in Montana, and roughly 60 openings are expected next year, the worker demand here only presents the 60 openings expected, not the total 460 openings available for workers in the next year. In general, occupations with longer training times and faster expected growth will also be the occupations with current unfilled demand.

Appendix B – Accuracy of Past Forecasts

The Department of Labor and Industry has a good track record for accuracy in the overall total projections. After one year, the 2015 projections were only 300 jobs off (0.1%), and the 2016 projections were only 1,250 jobs off (0.3%). The consistent history suggests that the methodologies used for projections are working well.

On an industry basis, the industries with steady growth trends are more likely to have accurate forecasts, while industries with irregular spurts and business cycles generally have greater forecast error. Figure 22 shows the difference between predicted and actual employment levels by industry for the 2016-2026 projections cycle.

Figure 22: Accuracy of 2016-2026 Projections One Year after Forecast

Large Occupational Group	2016-2026 Projections for 2017	Actual 2017	Difference	% Difference
Agriculture & Forestry	5,595	5,650	-55	-1.0%
Mining	6,525	6,325	200	3.2%
Utilities	2,997	2,873	124	4.3%
Construction	27,983	27,712	271	1.0%
Manufacturing	19,567	19,893	-326	-1.6%
Wholesale Trade	17,456	17,188	268	1.6%
Retail Trade	59,803	59,043	760	1.3%
Transportation	15,759	15,866	-107	-0.7%
Information	6,252	6,394	-142	-2.2%
Finance	15,258	15,113	145	1.0%
Real Estate	5,641	5,822	-181	-3.1%
Professional & Technical	21,892	21,939	-47	-0.2%
Management of Companies	2,106	2,077	29	1.4%
Admin & Waste Services	17,182	16,994	188	1.1%
Educational Services	40,425	40,165	260	0.6%
Healthcare & Social Assistance	71,452	72,089	-637	-0.9%
Arts, Entertainment, & Recreation	11,959	11,693	266	2.3%
Accommodation & Food Services	53,708	53,265	443	0.8%
Other Services	17,741	17,909	-168	-0.9%
Postal Service	2,104	2,124	-20	-1.0%
Federal Government	9,612	9,425	187	2.0%
State Government	12,508	12,702	-194	-1.5%
Local Government	20,951	20,801	150	0.7%
Total Payroll	464,478	463,225	1,253	0.3%

Source: MT DLI. QCEW.

Appendix C – Job Postings Data

The MTDLI's employment projections are the primary tool the Department provides to the public to discuss future demand for workers. However, job postings data, specifically the MontanaWorks.gov online job posting board, is another source the Department has analyzed to understand the demand for current openings. The advantage of this data source is that it is generally available earlier than other data sources, which provide early insight into employer hiring needs. However, this data is not used when projecting employment for multiple reasons. First, projections data and job postings data already show similar employment demand. Figure 23 shows the top ten occupations for job postings and projections. Three of the ten most-posted jobs are also projected to have the most annual openings.

Figure 23: Top Ten Occupations for Job Postings and Projections, 2017

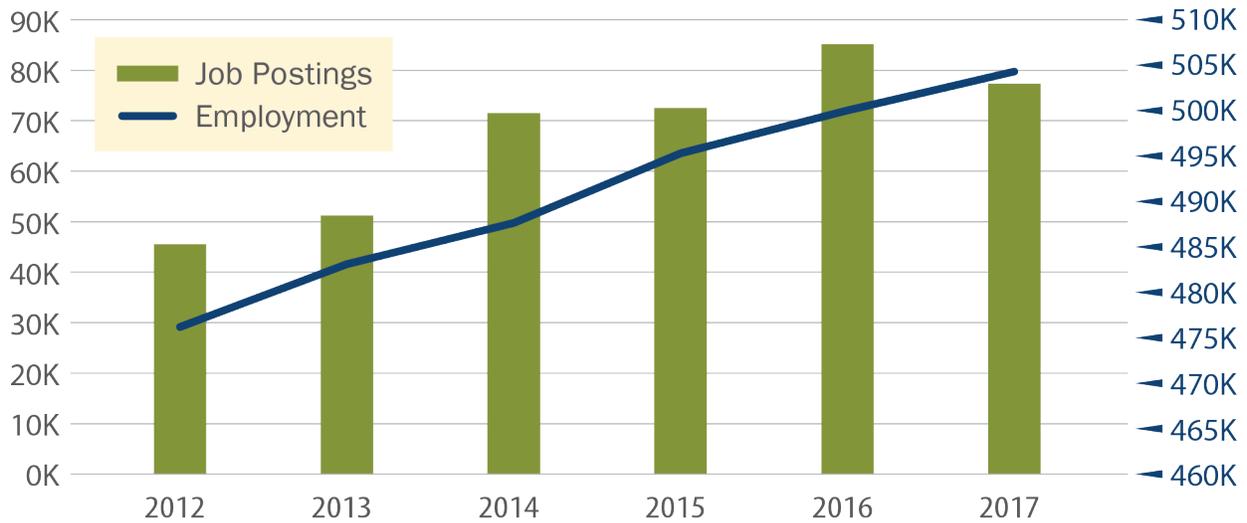
Job Postings Occupations	Rank	Projections Occupations
Retail Salespersons	1	Cashiers
Truck Drivers, Heavy and Tractor-Trailer	2	Retail Salespersons
Cashiers	3	Combined Food Preparation and Serving Workers
Customer Service Representatives	4	Waiters and Waitresses
Registered Nurses	5	Office Clerks, General
First-Line Supervisors/Managers of Retail Sales Workers	6	Maids and Housekeeping Cleaners
Maids and Housekeeping Cleaners	7	Janitors and Cleaners
Licensed Practical and Licensed Vocational Nurses	8	Personal Care Aides
Home Health Aides	9	Bookkeeping, Accounting, and Auditing Clerks
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	10	Cooks, Restaurant

Source: Job postings from MontanaWorks.gov, Projections from the MT DLI.

Another reason that the projections methodology does not consider job postings data is that job postings data is affected by factors other than economic growth. One factor is that employers may post a job opening several times if it takes multiple attempts to find a qualified candidate, which over-represents the number of job openings. Another factor is a change in the way employers hire. Not all job postings are put on the same job postings board, and not all job postings are even on the internet. Employers in towns with universities or other training providers may use those connections to find qualified applicants, and some employers may choose to use headhunters or recruiters. A change in recruiting behavior may impact the number of online job postings.

As an example, Figure 24 shows the number of Montana job postings and total employment. The number of job postings remained relatively flat between 2014 and 2015, even though employment was growing, demonstrating that noneconomic factors affect job postings, making the postings less reliable for projections.⁴

Figure 24: MontanaWorks.gov Job Postings compared with Total Employment, 2012-2017



Source: Job postings from MontanaWorks.gov. Employment from BLS LAUS.

⁴ All information in Appendix C is originally from the Economy as a Glance Article: Bradley, Christopher. 2017. "Online Job Postings as Economic Data" Montana Department of Labor and Industry. Numbers have been updated for 2017.



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