ALASKA ECONOMIC TRENDS
MAY 2019

METAL MINING in ALASKA

ALSO INSIDE
How wages grew amid job losses
Management tip: Employee engagement boosts productivity

By Dr. Tamika L. Ledbetter, Commissioner

Engaged employees are productive employees, and workers often cite poor leadership as a major reason for their discontentment and disengagement at work.

Good managers understand employees are their greatest asset, and they know productivity depends on helping workers realize the importance of what they do. Because employees who feel deeply connected to their work tend to perform better, leaders must be able to communicate how each task supports the organization’s mission or bottom line and that each employee’s contribution is vital to the organization’s success.

Creating this culture of engagement in the workplace requires managers to lead by example. Leadership is not what you do, but the embodiment of who you are. The most effective and credible managers are those who inspire their teams by demonstrating their own commitment to professional development and self-improvement.

Private companies and public agencies alike would be wise to evaluate the leadership competency of their managers if they observe less-than-stellar worker performance. Giving managers the skills they need to engage workers and lead more effectively will help them coach their teams to higher levels of performance.

As commissioner of this amazing department, I want to challenge every supervisor to consider how cultivating each employee’s engagement and commitment can vastly improve their unit’s productivity.

I believe improving overall performance starts with building management and supervisory skills. During my tenure, I will focus on executive-level leadership training. I encourage division directors to prioritize ongoing training, professional development, and mentorship and to foster the same commitments in their own leadership teams.

I’m confident that if we embrace this challenge, it will lead to even greater productivity, and the result will be more Alaskans benefitting from our improved services.

Contact Dr. Tamika L. Ledbetter, Commissioner, at (907) 465-2700 or commissioner.labor@alaska.gov.

Follow the Alaska Department of Labor and Workforce Development on Twitter (twitter.com/alaskalabor) and Facebook (facebook.com/alaskalabor).
This exhibit shows the value and production of Treadwell Mines from 1885 to 1904, at a total value of $21,817,296.19, and a visual comparison to Alaska’s total purchase price. The man on the left is Joseph C. MacDonald, Treadwell’s superintendent from 1901 to 1904. Photo courtesy of Alaska State Library Winter and Pond Photo Collection.
Metal Mining in Alaska

Small, high-value industry with a long history here is growing

By SARA TEEL

Mining is a colorful part of Alaska’s past. There are ghost town tours of Kennecott Mine, Skagway exists and thrives because of its gold rush history, and Treadwell Mine tailings created Sandy Beach in Juneau. But mining is also an important part of Alaska’s current economy and will almost certainly play a growing role in its future.

For more than a century, Alaska has produced a variety of minerals, especially metals produced from hard rock. Today, Alaska only produces gold, silver, lead, and zinc in large quantities. In fact, Alaska was the top silver producer in the U.S. in 2017, and zinc and lead were the state’s top two foreign exports. (See the sidebar on page 7 for a list of all metals ever produced in the state and those we’re likely to mine in the future.)

The main metal mines

Alaska has five large-scale metal mines in production: Pogo, Red Dog, Kensington, Greens Creek, and Fort Knox. (See Exhibit 1.) Another 205 mostly small placer operations reported gross operating income in 2017.

Types of metal mines and typical extraction techniques in Alaska

Metallic ores include ferrous (iron-containing) ores such as steel; nonferrous ores such as copper, tin, lead and zinc; and precious metals such as gold, silver, and platinum. This article excludes nonmetallic minerals (sand and gravel) and energy minerals (coal and petroleum).

Many lodes are difficult to access and require ground level or underground mining to reach targeted deposits using drilling or explosives. The mined rock often contains other material, so extracting the desired metal mechanically or chemically often requires crushing or pulverizing the rock.

Large mines in Alaska are mainly open pit or underground. Open pit mines extract rock or minerals relatively close to the surface through an open pit or burrow. This results in a large telescoping hole, the depth of which depends on the amount of recoverable ore and its profitability. Open pits are used to access vertical ore deposits.

Underground mines access ore deposits buried deeper in the earth when the value of the ore exceeds the incurred cost.

Miners use a range of techniques to extract the ore, often employing multiple methods over the life of a mine. The choice depends on the ore’s characteristics (such as mineral type, thickness, dip, grade, and uniformity) as well as the depth, safety, cost, and likely recovery of the mineral.

Common methods used in Alaska are:

- Stoping: The process of extracting the desired ore or other mineral from an underground mine, leaving behind an open space called a stope. The stope may be artificially supported or backfilled.
- Cut-and-fill: Also used in underground mining, usually for steep ore deposits. The ore is mined horizontally from the bottom, and then the gap is backfilled with waste rock, sand, or tailings. This becomes a platform for the layers above.
- Drift-and-fill: This variation of cut-and-fill is used for wider ore deposits.
- Truck-and-shovel/truck-and-loader: In open pit mines, workers unearth material with shovels or loaders, then transport it by truck.

Another notable type of mining is placer, which is usually associated with gold. Placer mines use water to excavate, transport, concentrate, and recover minerals, utilizing differences in density. Placer mining is the oldest form of mining in Alaska and these mines can range from mom-and-pop outfits to large operations, although most are small. Well-known placer mining methods are dredging and panning.
Alaska’s Main Metal Mines and Their Production
2017

(See the sidebar on the previous page for mine types and the extraction techniques used in Alaska.)

- Fort Knox Mine, 20 miles outside of Fairbanks, is Alaska’s largest surface gold mine. It was discovered in 1984 and has been producing continuously since 1996. Fort Knox is an open pit mine that uses a truck-and-shovel operation.

- Pogo Mine is an underground gold mine about 130 miles from Fairbanks. Discovered in 1994, the mine began producing in 2006. Pogo is a cut-and-fill operation.

- Red Dog Mine, 82 miles from Kotzebue, has one of the largest open-pit zinc deposits in the world. Red Dog also produces lead and, to a lesser extent, silver. It was discovered in 1968 and has been producing since 1989. Red Dog is a truck-and-loader operation.

- Greens Creek Mine, on Admiralty Island about 18 miles from Juneau, is in the Tongass National Forest. It’s an underground mine that produces silver, zinc, gold, and lead through cut-and-fill and long hole stoping. Greens Creek was discovered in 1975, produced from 1989 through 1993, then resumed continuous production in 1996.

- Kensington Mine is an underground long hole stop-
Zinc is now more valuable than gold

The thought of valuable metals may conjure the image of heavily laden lines of prospectors climbing Chilkoot Pass during the Klondike Gold Rush in a mad dash for discovery riches. But while gold continues to provide a lucrative revenue stream, Alaska’s zinc production value has surpassed that of gold by 10 percent over the last decade.

Zinc and its concentrates were also Alaska’s top foreign export in 2017, followed by lead ore and its concentrates at a distant second. (See Exhibit 2.)

Production and price have a complex relationship

While gold and silver have been mined continuously in Alaska since the late 1800s, significant production of lead and zinc began just over three decades ago with the commercial success of the Northwest Arctic.
Relationship is complicated. High startup and operation costs, the time it takes from discovery to start of production, and regulatory obligations mean short-term price volatility doesn’t usually affect short-term production. Mines can’t promptly shut down when prices fall, nor can they quickly expand when prices jump. Some mines also produce multiple metals, so changes in an individual metal’s price or production level can have a lesser effect on operational decision-making.

On the other hand, commodity prices have a direct

Borough’s Red Dog Mine.

Since 2000, only gold production has significantly increased in volume. This is the result of Pogo coming online in 2006 and Kensington in 2010. Zinc production remained relatively flat over that period, while silver and lead production bounced around. (See Exhibit 3.)

Price and production don’t always track together, as the relationship is complicated. High startup and operational costs, the time it takes from discovery to start of production, and regulatory obligations mean short-term price volatility doesn’t usually affect short-term production. Mines can’t promptly shut down when prices fall, nor can they quickly expand when prices jump. Some mines also produce multiple metals, so changes in an individual metal’s price or production level can have a lesser effect on operational decision-making.

Sources: Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys; and United States Geological Survey, Mineral Commodity Summaries 2017
relationship with total production value. Since 2000, prices for all four metals have grown steadily, marked by occasional price spikes due to market volatility. (See Exhibit 3.)

Commodity price increases coupled with large production volumes have led to significant growth in production value, even when year-to-year changes in volume were modest. This was the case with zinc and gold. From 2008 to 2017, zinc’s production value grew by 36 percent but production only rose 4 percent. Gold’s trend was similar, with value increasing 34 percent but production up only 7 percent. (See Exhibit 4.)

Silver and lead are worth less and their production value gains were also more modest. Silver recorded 10 percent growth in value and production, and lead’s production and value fell by 8 percent and 12 percent, respectively, over the 2008-2017 period.

Small but growing industry pays high average wages

In 2017, Alaska had an average of 2,688 jobs in metal mining and more than $296 million in total wages. The industry paid among the highest average wages in the state, behind oil and gas, at $110,171. (See Exhibit 5.) This was more than double the state’s average wage that year.

From 2008 to 2017, metal mining employment grew 36 percent and its wages rose 44 percent. This was in stark contrast to Alaska’s total employment, which grew just 2 percent while total wages rose 5 percent.

While metal mining has increased its presence in Alaska, these jobs remain a small fraction of total employment and wages. In 2008, metal mining represented 0.6 percent of Alaska employment, which grew to 0.8 percent in 2017. Wages grew from 1.2 percent of the total to 1.7 percent.

By mineral, the highest average wage in 2017 was $114,296 for silver, lead, or zinc mining, and gold mining wasn’t far behind at $109,229. Metal mining support jobs paid an average of $89,088.

In terms of wage distribution by worker, 53 percent of metal mining workers made less than $90,000 per year, 26 percent averaged between $90,000 and $120,000, and 22 percent made more than $120,000 per year. (See Exhibit 6.)

Most jobs, wages are in gold

Three of Alaska’s five main mines produce only gold, so gold mining makes up almost two-thirds of total metal mining employment and wages.

Gold mining employment grew 45 percent over the last decade and wages grew 51 percent, mostly from 2009 to 2012 when gold production jumped. (See exhibits 3 and 7.) Nongold metal mining employment grew more gradually, rising 24 percent overall from 2008 to 2017.

Gold mining employment was more volatile and had larger swings, as Exhibit 8 shows, until 2016 when prices stabilized. For other metals, growth has been more gradual but sustained. Only 2014 showed a dip in non-gold mining employment.
Most metal miners are young men, Alaska residents

In 2017, Alaska residents made up 62 percent of all metal mining workers and brought home 64 percent of total wages, with some variation depending on the type of metal. (See Exhibit 9.)

The highest resident percentage was in zinc and lead mining, at 71 percent. This is largely because Alaska’s largest zinc mine is Red Dog, which operates under an agreement with NANA Development Corporation, which owns the mine. A substantial portion of Red Dog’s workers are resident NANA shareholders.

Support jobs are the exception, at just 39 percent resident. The need for highly specialized workers unavailable locally is often cited for the disparity. These jobs include drilling and boring machine tool setters, specialized earth drillers and extraction workers, and millwrights.

The majority of residents in metal mining are men (88 percent), who earn 91 percent of total wages. Women, at 12 percent of workers, earn 9 percent.

The median age is 37, with 57 percent of workers 40 or younger. Just 26 percent are 50 or older. (See Exhibit 10.)

These demographics are common in the mining industry overall due to remote job sites, extreme conditions, and atypical work schedules such as one week on, one week off.

Interest in metal mining is growing

Interest in mining appears to be growing. From 2016 to 2017, the number of state prospecting sites increased 174 percent while active site claims grew 10 percent and federal claims increased by 11 percent. Overall, the area of new claims staked grew 232 percent in 2017.

According to the Alaska Department of Natural Resources, a prospecting site grants exclusive prospecting rights for two years and exclusive rights to convert the site to a claim upon discovery. A mining claim is a parcel of land in which the claimant has the right to develop and extract a discovered mineral deposit. These claims can be on state or federal land and are subject to applicable regulations.

A range of new projects and new ores are on the horizon

According to the Fraser Institute’s Annual Survey of Mining Companies, Alaska ranked fifth out of 91 global regions for mineral potential in 2017 and 10th for overall investment attractiveness by mining and exploration companies. The Department of Labor and Workforce Development projects metal mining employment will grow 18.4 percent from 2016 to 2026.

Alaska has multiple opportunities on the horizon, both in the short and long term. Some mines are expanding or pursuing new developments, such as Kensington Mine’s...
Gold Mining More Volatile
EMPLOYMENT CHANGE, 2008 TO 2017

Other metals
Gold

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

Most Miners Are Residents*
RESIDENCY BY METAL MINED, 2017

*As defined by PFD eligibility criteria

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

Jualin vein, Fort Knox’s Gilmore project, and Red Dog’s Anarraaq-Aktigiruq project.

Other potential projects include new mines such as the Pebble Project, a porphyry copper-gold-molybdenum deposit in the Bristol Bay region; Donlin Gold, a proposed, large open pit gold mine in the southwest; and Palmer (copper-zinc-silver-gold-barite). All three are in the advanced exploration stage, although final permitting is uncertain for Pebble in particular due to opposition from groups concerned about possible effects on Alaska’s salmon streams.

Some former metal-producing mines aim to restart production, including Nixon Fork Mine (gold) and Niblack (copper-zinc-gold-silver). Mining of copper, which has been produced in Alaska on and off for more than a century, is expected to resume due to rising global demand for copper in the power industry and electric vehicle production.

Finally, while still an emerging market, exploration of rare earth elements shows promise as demand increases due to their use in defense and other modern technology. One such possibility is the Bokan-Dotson Ridge Project, which is in the advanced exploration phase. The project is located on Prince of Wales Island in an area rich in heavy rare earth elements such as dysprosium, terbium, and yttrium.

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Age and Gender Distribution of Workers
ALASKA METAL MINING, 2017

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section
Wages Resumed Growth Before Employment

Why some indicators turned positive as job losses continued

By NEAL FRIED

Although Alaska continued to lose jobs in 2017, the state’s gross domestic product and personal income began to grow again that year. The two improving economic indicators, which both grew again in 2018, signaled the economy might be on the mend.

A third key economic indicator, total wages, also resumed growth in 2018, even as job losses persisted. (See exhibits 1 and 2.)

Although it might seem strange for GDP, personal income, and total wages to grow during a period of job loss, looking closer at recent years’ data sheds light on how that can happen. The explanation for resumed growth in GDP and income is fairly straightforward, while the pattern for jobs and wages shows a more complicated relationship but makes sense in terms of how the recession progressed over the last three years.

GDP and personal income rose with oil prices, nonwork payments

In the case of state gross domestic product, the price of oil is the tail that often wags the dog. Oil prices went from $43 per barrel in 2016 to $54 per barrel in 2017, boosting GDP.

The reasons for the rise in personal income (the money a person takes in from all sources) were more nuanced. Although the largest share of income comes from working, more than a third comes from other sources, including investments and transfer payments such as Social Security, Medicaid, and in Alaska’s case, the Permanent Fund Dividend.

The stock market performed exceptionally well in 2017, with the Dow Jones up 25 percent. Income from transfer payments also went up that year.

In 2016, total wages fell harder than employment

The pattern for jobs and wages changed each year over the past three.
Employment and Wages by Industry During the Recession 2015 to 2018

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<td>Total Employment</td>
<td>338,574</td>
<td>$18,343,850,415</td>
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<td>-1.9%</td>
<td>332,177</td>
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<td>14,249</td>
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<td>Oil and Gas</td>
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<td>11,303</td>
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<td>16,247</td>
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<td>$6,463</td>
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<td>Manufacturing</td>
<td>14,142</td>
<td>$668,964,247</td>
<td>$3,942</td>
<td>-3.4%</td>
<td>13,655</td>
<td>$563,328,440</td>
<td>$3,987</td>
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<td>Wholesale Trade</td>
<td>6,540</td>
<td>$367,064,525</td>
<td>$4,677</td>
<td>-0.7%</td>
<td>6,469</td>
<td>$361,351,701</td>
<td>$4,655</td>
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<td>Retail Trade</td>
<td>37,431</td>
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<td>$7,286</td>
<td>-0.7%</td>
<td>37,082</td>
<td>$1,138,281,257</td>
<td>$7,099</td>
<td>-0.4%</td>
<td>-0.7%</td>
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<td>Transp and Warehousing</td>
<td>19,694</td>
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<td>Utilities</td>
<td>2,135</td>
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<td>Financial Activities</td>
<td>12,958</td>
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<td>Prof and Business Svs</td>
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<td>28,448</td>
<td>$1,749,125,682</td>
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<td>Education/Health Svcs</td>
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<td>46,008</td>
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<td>$4,677</td>
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<td>43,929</td>
<td>$329,305,526</td>
<td>$4,655</td>
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<td>Leisure and Hospitality</td>
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<td>$809,525,810</td>
<td>$5,373</td>
<td>-0.3%</td>
<td>35,314</td>
<td>$823,536,866</td>
<td>$5,423</td>
<td>-0.4%</td>
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<td>Other Services</td>
<td>11,764</td>
<td>$391,765,810</td>
<td>$4,677</td>
<td>-0.5%</td>
<td>11,154</td>
<td>$392,472,813</td>
<td>$4,628</td>
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<td>Federal Government</td>
<td>14,955</td>
<td>$1,162,962,435</td>
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<td>-0.7%</td>
<td>15,198</td>
<td>$1,178,859,122</td>
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<td>State Government</td>
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<td>-0.7%</td>
<td>24,562</td>
<td>$1,426,132,304</td>
<td>$4,839</td>
<td>-0.8%</td>
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<td>Local Government</td>
<td>39,399</td>
<td>$1,854,695,268</td>
<td>$3,923</td>
<td>0.0%</td>
<td>39,637</td>
<td>$1,870,581,700</td>
<td>$3,933</td>
<td>0.2%</td>
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</table>

Source: Alaska Department of Labor, Research and Analysis Section Quarterly Census of Employment and Wages
Overall, Alaska lost about 6,400 jobs in 2016, another 4,200 in 2017, and 1,200 in 2018. (See Exhibit 2.)

In 2016, total wages fell harder than total employment, as most of the jobs lost were in the high-wage oil and gas, construction, state government, and professional and business services sectors. The biggest loser in 2016 was the oil industry, where the average monthly wage was $11,213 compared to $4,432 for all industries. Construction, with an average monthly wage of $6,463, was the second-largest job loser.

In 2017, percent losses in jobs and wages were about the same

In 2017, the same high-wage industries continued to lose jobs, but the losses slowed. A growing number of lost jobs that year came from manufacturing, retail, and other industries with lower-than-average monthly wages. As a result, the loss in total wages moderated, making the percentages of jobs and wages lost in 2017 nearly identical.

In 2018, wages began to grow but employment continued to fall

The pattern changed in a less predictable way in 2018. Wages began growing again in the first quarter, and growth accelerated over the next three quarters even as the state continued to lose jobs.

Employment losses moderated considerably in 2018, however, and the fourth quarter showed slight growth. Even more than the year before, 2018’s job losses came from lower-wage industries such as retail and manufacturing, and fewer were from high-wage industries. (See Exhibit 2.)

Another big change was in the construction industry. After two years of extensive loss, construction began to grow again. This high-wage industry had been a big contributor to the overall wage losses over the two prior years, so its resumed growth pushed total wages deeply into the black in 2018.

Other possible reasons for increasing wage growth

Although the oil industry continued to lose jobs in 2018, its total wages grew by 4.6 percent. A number of reasons are likely, including larger bonuses or more total hours worked. The job mix could also have changed in favor of more higher-wage jobs.

Raises are another possibility. Although Alaska’s oil industry was still contracting in 2018, which doesn’t usually signal a positive environment for raises, nationally the industry began to recover in 2017 and was having a hard time finding workers. Under those conditions, Alaska’s oil industry had to stay competitive to keep its workforce, which likely pushed wages higher.

It’s also important to remember a number of industries largely escaped the ravages of the recession, including the mining industry, those linked to tourism, and federal government. In the normal course of employment, a large share of the workforce receives raises over the long term, and after three years the cumulative effects would contribute to an overall increase in wages.

Any conversation about the change in wages over time should include inflation. Until 2018, Alaska’s inflation rate was very low — under 1 percent from 2015 to 2017. It jumped to 3 percent in 2018, which muted that year’s real wage gains.

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Gauging Alaska’s Economy

Job Growth
March 2019
Over-the-year percent change

- Post-'80s recession high [Mar 90]: 6.6%
- Recession low, '80s - 7.5% [Sep 86]: -8.0%
- 9.0%
- 0.2%
- 1.7% [U.S.]

Unemployment Rate
March 2019
Seasonally adjusted

- Alaska high during Great Recession [Apr 10]: 8.0%
- Alaska '80s recession low [1987]: -17.0%
- 2.0%
- 12.0%
- 6.5%
- 3.8% [U.S.]
- 5.0% [U.S.]

Wage Growth
4th Quarter 2018
Over-the-year percent change

- Alaska high [1981]: 21%
- Alaska '80s recession [-6.4%] [1987]: 2.2%
- 22.0%
- 11.2%
- 5.3%

- After revisions to 2018 data, the state has registered over-the-year job gains for six consecutive months after losing jobs for the prior 36 months.

- The gains are small but could signal the end of the state’s recession.

- U.S. job growth remains strong and has been positive since 2010, with the strongest growth in 2015.

- Alaska’s rate has been level at 6.5 percent for the last eight months.

- Unemployment rates are complicated economic measures and generally less telling than job or wage growth as indicators of broad economic health.

- Wages increased for the fifth consecutive quarter, with the strongest recent growth in fourth quarter 2018.

- Fourth quarter 2018 wages grew faster in Alaska than the national average, signaling the ongoing recovery from the state’s longest recession.
Gauging Alaska’s Economy

**Initial Claims**
Unemployment, week ending April 6, 2019†

- Four-week moving average ending with the specified week

**GDP Growth**
3rd Quarter 2018
Over-the-year percent change

- For a variety of reasons, initial claims are well below the 10-year average despite job losses.

**Personal Income Growth**
4th Quarter 2018
Over-the-year percent change

- Gross domestic product is the value of the goods and services a state produces. Alaska’s GDP has grown for the last eight quarters after declining for 15 out of the prior 16.

**Change in Home Prices**
Single-family, 4th Qtr 2018
Over-the-year percent change

- Personal income includes wages as well as transfer payments (such as Social Security, Medicaid, and the PFD) and investment income. Growth has resumed and is now well above the 10-year average.

- Home prices include only those for which a commercial loan is used. This indicator tends to be volatile from quarter to quarter.

**Foreclosure Rate**
4th Quarter 2018

- Foreclosure rates remain very low, highlighting how different the current recession is from the ’80s recession when foreclosure rates exceeded 10 percent.

**Population Growth**
2017 to 2018

- The state’s population has remained mostly stable during the state’s recession, although 2018 was the second year of small population declines since 1988.

**Net Migration**
2017 to 2018

- The state had net migration losses for the sixth consecutive year in 2018, although natural increase (births minus deaths) offset those losses until 2017 and 2018.
Employment by Region

Percent change in jobs, March 2018 to March 2019

Unemployment Rates

Seasonally adjusted

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Not seasonally adjusted

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Regional, not seasonally adjusted

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How Alaska Ranks

**Federal, state, and local; includes public schools and universities**

*March seasonally adjusted unemployment rates

*March employment, over-the-year percent change

**Sources: U.S. Bureau of Labor Statistics and Alaska Department of Labor and Workforce Development, Research and Analysis Section**

Other Economic Indicators

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<th>Economic Indicator</th>
<th>Current</th>
<th>Year Ago</th>
<th>Change</th>
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<td>Urban Alaska Consumer Price Index (CPI-U, base yr 1982=100)</td>
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<td>Commodity prices</td>
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<tr>
<td>Crude oil, Alaska North Slope,* per barrel</td>
<td>$67.94</td>
<td>March 2019</td>
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<tr>
<td>Natural gas, residential, per thousand cubic feet</td>
<td>$10.14</td>
<td>Jan 2019</td>
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<td>Gold, per oz. COMEX</td>
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<td>Copper, per lb. COMEX</td>
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<td>Zinc, per MT</td>
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*Department of Revenue estimate

**Sources for pages 14 through 17 include Alaska Department of Labor and Workforce Development, Research and Analysis Section; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; Kitco; U.S. Census Bureau; COMEX; Bloomberg; Infomine; Alaska Department of Revenue; and U.S. Courts, 9th Circuit**
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