ALASKA ECONOMIC
TRENDS
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Where **robots** do the work

ALSO INSIDE

The resilient Mat-Su economy

Parnership addresses two key Alaska workforce needs

By Catherine Muñoz, Acting Commissioner

Access to quality child care is a critical workforce issue.

In my own family, the pandemic made child care especially difficult, leading my daughter and another family member to temporarily exit the workforce to stay home with the kids. This trend spanned the state as two-earner families opted to get by on one person's wages because of the difficulty of finding child care.

Gov. Dunleavy recently appointed a task force of business leaders, policymakers, and child care providers to do a deep dive into the barriers and challenges in child care. The goal is to bring forward a range of recommendations for regulatory and policy change to incentivize more options for young families.

Part of Gov. Dunleavy's fiscal year 2024 capital budget also includes a proposal from my department's Division of Vocational Rehabilitation to utilize the Business Enterprise Program to test-pilot an employer-sponsored child care development center at the Mat-Su Regional Medical Center.

Alaska's Business Enterprise Program is a unique partnership that enables independent business-people to work in concert with the State of Alaska to provide vending and other food services to customers across our beautiful state. It just so happens these Alaskans are legally blind or have severe disabilities.

President Franklin D. Roosevelt signed the Randolph-Sheppard Act into law in 1936. The enactment gave states the right to create Business Enterprise Programs for the legally blind. For the first time in history, participants in the program were afforded priority to operate vending facilities in federal buildings, giving them unprecedented opportunities.

Since then, most states have passed some type of companion legislation that extends the same priority to other government buildings. The Chance Act was signed into law in 1976, allowing the development of vending sites on state property and including those with a severe disability as participants.

Alaska is leading the nation with this new partnership with the Mat-Su Regional Medical Center and Alaska's Business Enterprise Program to create an employer-sponsored child care development center in the hospital. This center will help hospital staff address the high demand for child care and support new entrepreneurial opportunities for blind and disabled Alaskans. No other BEP throughout the country has created such a partnership!

With the leadership of Gov. Dunleavy and the Alaska Legislature, the capital request for $620,400 will set in motion DVR's efforts to address Alaska's child care challenges while supporting job and entrepreneurial opportunities for blind and disabled Alaskans. Other states are noticing this new partnership and watching how Alaska is expanding opportunities for more of our workforce while meeting other critical needs in our communities. Click here for more information about Alaska's Business Enterprise Program.

Sincerely,

Catherine Muñoz

Contact Acting Commissioner Catherine Muñoz at (907) 465-2700 or commissioner.labor@alaska.gov.

ON THE COVER:

At the top: an extended da Vinci vessel sealer. Alaska now has 11 da Vinci machines for robotic assisted surgery. The newest was installed at Bartlett Regional Hospital in Juneau in May, the first for Southeast. Image © 2019 Intuitive Surgical Operations, Inc. Below, the Susitna River near Denali Highway, with Mount Deborah and Mount Hayes visible in the distance. Photo courtesy of Flickr user Robb Hannawacker: License

ALASKA ECONOMIC
TRENDS

Trends is a nonpartisan, data-driven magazine that covers a variety of economic topics in Alaska.

ON THIS SPREAD: The background image for 2023 is a flipped aerial view of tidal channels on the Copper River, taken by Flickr user Banco de Imágenes Geológicas. License: creativecommons.org/licenses/by-nc-sa/2.0/

Where robots are doing the work

A long-term global trend and the technology used in Alaska

By LIZ BROOKS

Automation is a global trend prompting excitement about technology and potential savings as well as concern about what people will do when machines do more of the work.

The pandemic accelerated this trend as the need grew for contactless and distance delivery of goods and services, focusing on online services such as automated banking and virtual doctors' appointments. Conversations about automation have since expanded to include the potential and pitfalls of artificial intelligence. Researchers recently estimated 80 percent of workers in the U.S. do at least some tasks that artificially intelligent computer programs could do.

Robotics is another type of automation growing with technological advancement and demographic trends, and it's been around for a long time. (See "What's a robot?" on page 7.) In 2021, 3.5 million industrial robots operated worldwide, and the number has increased by 14 percent a year on average since 2016.

Last year, North American companies ordered a record 44,196 robots valued at $2.38 billion. These figures represented 11 percent and 18 percent increases, respectively, over 2021.

Robotics didn't boom nationwide during the pandemic in the same way as online services, but the pandemic did encourage some interesting experimentation. For example, the Juneau City Museum offered remote tours in 2020 via tablets mounted on wheels. Virtual visitors controlled the devices remotely, directing them around the museum to look at displays. The idea didn't stick, however, and the museum returned the devices.

Robotics is growing in Alaska, however. The clearest examples are of robots doing things humans cannot do, or can't do as fast, cleanly, or safely.

Alaska hospitals are home to 11 da Vinci sets used to perform robot-assisted surgery, usually in the torso. Surgeons move robotic "arms" via a console, enabling them to operate through smaller incisions than the surgery would otherwise allow.

Other examples include Ravn Alaska using ultraviolet lights on mobile robotic devices to disinfect plane cabins and Alyeska Pipeline Service Company using sensor-laden tools to inspect the pipeline's interior for wear and tear. A few seafood processors use robots to process fish and even to pack and palletize fillets. Robotic devices aid in research as drones or as underwater remotely operated vehicles.

This article will explore some of these examples and discuss how and why robotics is on the rise.

At left, biologists at the Alaska Department of Fish and Game use this submersible remotely operated vehicle, which they call "Buttercup," to study rockfish near Homer. Above, an Omron UV disinfection robot moves around inside a U.S. hospital. (Photos courtesy of ADF&G and Omron)

Percentages of manufacturing workers exposed to robots by state, 2019

Legend: ■ Estimate ■ Adjusted to reflect states' exposure if their manufacturing mirrored national shares

States listed top to bottom: Michigan, Kentucky, Kansas, Missouri, North Dakota, Maine, Ohio, Iowa, Wisconsin, Tennessee, Alabama, Indiana, Nebraska, Minnesota, Arizona, Mississippi, Illinois, Arkansas, Georgia, Utah, **United States**, Oregon, Pennsylvania, South Carolina, Idaho, Colorado, North Carolina, Massachusetts, Rhode Island, California, South Dakota, New York, Maryland, Texas, Washington, New Hampshire, Connecticut, West Virginia, Virginia, New Jersey, **Alaska**, Louisiana, Florida, Nevada, Delaware

X-axis: 0% to 45%

Notes: Excludes estimates for states with unpublished data and those where margins of error exceeded 40 percent: Montana, Oklahoma, Vermont, Hawaii, New Mexico, and Wyoming. See the sidebar on page 7 for more about these survey estimates and their limitations.

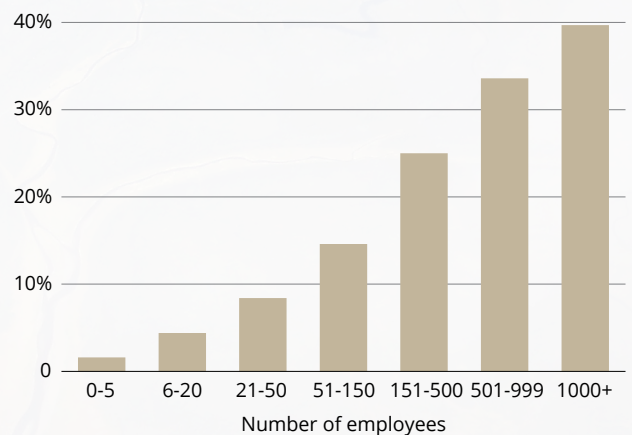**Source:** U.S. Census Bureau, Annual Survey of Manufacturers

Multiple factors driving the trend

Robotics shows more promise for some types of work than others, but multiple technological and demographic trends are driving its integration.

While robots are sometimes used for intricate work such as surgery or jobs humans can't do, it's the dull, dirty, or dangerous work that's often targeted for automation. That's why 44 percent of robots installed globally between 2019 and 2021 were for materials handling: industry jargon for lifting heavy items.

Human labor has also become scarcer in recent years. The number of working-age people nationally is still growing, but growth has slowed. In Alaska, our working-age population has gotten smaller every year since 2013 — in 2022, it was 6 percent below the peak. (See the March 2023 issue of *Trends*.)

Shares of U.S. manufacturing plants using robots, by plant size, 2019

X-axis (Number of employees): 0-5, 6-20, 21-50, 51-150, 151-500, 501-999, 1000+
Y-axis: 0 to 40%

Source: U.S. Census Bureau, Annual Survey of Manufacturers

Much of that change came as the large baby boom generation reached retirement age, and the pandemic added pressure as employers everywhere reported trouble filling open positions, a challenge that continues three years later.

The growth in job openings — which hit a new high in 2022 — presented an additional obstacle in Alaska, where about 20 percent of the yearly workforce comes from outside the state, especially for seasonal work. Seafood processing, one of Alaska's largest seasonal employers, imports nearly three-quarters of its workers from outside Alaska, but attracting them has gotten harder.

While Alaska's average wages remain higher than the U.S. — a draw for out-of-state workers — that gap has been shrinking. (See the December 2022 issue of *Trends*.) Labor is getting more expensive, and as wages grow, so do operating costs.

As costs rise and technology advances, using robots has become increasingly appealing to employers.

Where the robots are globally

That shift is global. In 2021, China led with the

U.S. robotics capital spending, 2021

Industry	Robotics spending
Total	**$11,536,000,000**
Manufacturing	$8,581,000,000
Durable goods manufacturing	$6,259,000,000
Nondurable goods manufacturing	$2,321,000,000
Retail trade	$1,316,000,000
Health care and social assistance	$704,000,000
Wholesale trade	$265,000,000
Professional, scientific, tech svcs	$238,000,000
Transportation and warehousing	$190,000,000
Forestry, fishing, agriculture	$44,000,000
Real estate, rental and leasing	$34,000,000
Information	$30,000,000
Construction	$26,000,000
Accommodation and food svc	$26,000,000
Mining	$15,000,000
Other services (except public)	$14,000,000
Finance and insurance	$13,000,000
Admin, support, waste mgmt	$13,000,000
Educational services	$10,000,000
Arts, entertainment, and rec	$8,000,000
Utilities	$5,000,000
Management of companies	$4,000,000

Source: U.S. Census Bureau, Annual Capital Expenditures Survey, 2021

Robotics grows as a percentage of national capital expenditures
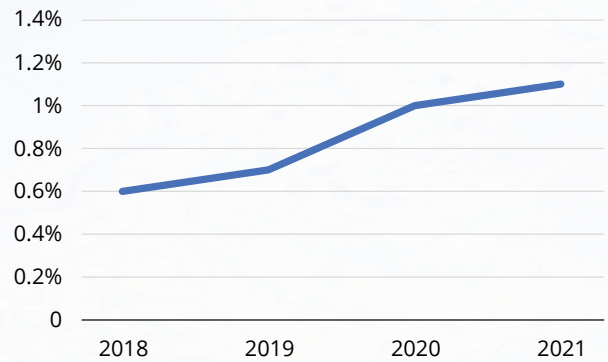
Source: U.S. Census Bureau, Annual Capital Expenditures Surveys, 2018-2021

number of new industrial robots installed at 268,000, followed by Japan (47,000) and the U.S. (35,000). Most customers of industrial robots in China and Japan were electronics manufacturers, whereas U.S. customers were mainly automotive manufacturers.

Auto manufacturers first introduced robots to their assembly lines in the 1960s, primarily to weld and handle heavy parts, and pioneered their use. By 2019, almost half of U.S. auto manufacturing employees worked in plants with robots. The larger the plant, the more likely it is to have robotic equipment, as the bar chart on the previous page shows. Twenty-five percent of facilities with 51 to 150 employees had robotic equipment in 2019, rising to 40 percent of facilities with 1,000 or more workers.

Manufacturers made up almost three-quarters of U.S. robotic equipment purchases in 2021. As the exhibits on this page show, U.S. companies spent $11.5 billion buying robotic equipment in 2021. That represented 1.1 percent of total equipment purchases made that year, up from 0.6 percent in 2018, the earliest year these data were available.

Light use in Alaska manufacturing

In Alaska's manufacturing sector, about 14 percent of workers are exposed to robots on the job, which is well below the 26 percent of manufacturing workers nationally. That makes sense when you consider the prevalence of car manufacturing and massive meat plants in the Lower 48, whereas seafood processing makes up about two-thirds of all manufacturing in Alaska.

When the estimates are adjusted to reflect what

What's a robot, and where do the numbers come from?

The International Federation of Robots tracks annual installations of robots around the world by collecting data directly from robot suppliers. The Association for Advancing Automation tracks data on the U.S. robot market. Both of these sources use a strict definition of "robot."

The International Federation of Robots defines robots specifically as manipulators with at least three axes that are automatically controlled, reprogrammable, and multipurpose. Other similar mechanisms, such as those that are fully teleoperated (meaning they have no autonomy) but otherwise satisfy the definition, are called robotic devices.

The Census Bureau has also collected data on robotics since 2018 through two surveys (see the next subsection), which use the term "robotic equipment," a less restrictive category that includes semi-autonomous devices.

This article uses an expansive definition of robotics that technically describes several uses of robotic devices rather than true robots. Thus, "crawler pigs," which are remote-controlled sensor-laden devices that inspect pipelines' interiors and have cable tethers, are robotic devices. (They're used for inspecting narrow pipelines that can't accommodate larger inline inspection tools.)

Typical tasks that robots perform in industrial settings include assembly, cleaning, delivery, dispensing, inspection, machine tending, material handling, packaging, painting, palletizing, pick-and-place, rescue, security, and welding.

Our definition excludes automatic teller machines, computer numerical control machining equipment, and kiosks. Kiosks are stationary, consumer-oriented machines with a graphic interface and no visible moving parts.

More on the Census Bureau surveys

The Census Bureau's robotic device surveys cover:

1) Data on business expenditures for new and used robotic equipment collected as part of its Annual Capital Expenditures Survey. The survey represents all U.S. nonfarm businesses with and without employees. Data are published by industry, but not by state.

2) Data on the total number of industrial robots in operation at each manufacturing plant, the number of robots purchased during the year, and the capital expenditures for new and used industrial robotic equipment, collected through the bureau's Annual Survey of Manufacturers.

Estimates of robotic use derived from this source have high levels of uncertainty, which is why several states' data are missing from the large bar chart on page 5, and margins of error can be large.

Both Census Bureau surveys were recently discontinued and will be replaced by the new Annual Integrated Economic Survey, which will begin collecting data solely from employers in early 2024.

states' percentages would be if they had the same mix of manufacturing as the nation, Alaska drops to just 9 percent, and Minnesota, Nebraska, and Michigan rank highest. (See the chart on page 5.) Minnesota ranks first in part because it created programs to increase automation in small manufacturing facilities.

Seafood processing might seem ripe for growing robotics use, as the tasks are repetitive and performed in remote and sometimes dangerous conditions — but even nationally, the industry has been slower to adopt robots than some types of manufacturers.

Researchers who studied how seafood processors on the East Coast responded to the pandemic found the high cost of new technology was the primary reason plants didn't adopt robotic equipment. Space constraints and the need to adapt facilities to process different species depending on the season were also mentioned as reasons automation in seafood processing was less productive than it might seem.

Those challenges are amplified in Alaska, where costs are higher and logistics are challenging. Still, robotic solutions are beginning to appear in Alaska.

All large Alaska seafood processing facilities have already mechanized portions of their lines. Mechanization differs from robotics in that these machines can only perform one task, and mechanized plants still require hundreds of people to run. People orient fish before feeding them into the processing machines, keep facilities clean, and maintain the equipment.

Mechanized machines make a big difference, too, in that they are as good as human operators or better and they're definitely faster. Mechanized size-sorting, heading, gutting, washing, filleting, pin-boning, and skin removal are already common in the state. Makers of one machine advertise it can fillet up to 150 Alaska pollock per minute.

Robots can do even more, with fewer people. A machine that uses sensors to automatically adjust knives based on individual fish anatomy can fillet 25 salmon a minute while maximizing fillet size. Robots can also portion, vacuum seal, package, and palletize products. While these upgrades aren't yet widespread in Alaska, a few large plants have made the leap.

Robotic devices aren't common in the remainder of Alaska's manufacturing sector, which makes a range of products from beer to baked goods to custom furniture, usually in small businesses. Some of these other manufacturers told researchers robots aren't viable for the small quantities they produce. Robots are expensive and ultimately perform a small set of repetitive tasks — a poor fit for manufacturers that make custom products or handle one-off projects.

Pipeline inspection came early

Alaska's main oil transport company, Alyeska Pipeline, has used robotics in its operations for more than 30 years.

Specifically, sensor-laden tools that inspect the pipeline from the inside — the industry calls them smart pigs and inline inspection tools — are run through the pipeline every three years. Their use is standard in pipelines around the world.

Inline inspection tools are an early example of a growing trend called predictive maintenance, which can reduce unexpected breakdowns or interruptions. Sensors monitor the health of industrial machines rather than relying on routine maintenance schedules, so they can catch maintenance problems in their infancy.

Sensors continuously detect vibration, pressure, force, acoustics, or energy loads and share those feeds wirelessly with a computer. The computer's machine learning programs, which recognize the healthy states of those feeds, can detect anomalies in real-time.

Alyeska uses three kinds of inline inspection tools:

• *Ultrasonic transducer pigs* use sound waves to measure the thickness of the pipeline's steel wall. The transducer pigs receive echoes from the internal and external surfaces of the pipe and, by timing these signals and comparing them to the expected speed of sound through steel, they can determine wall thickness. Ultrasonic inspection tools to detect wall thinning and X-ray tools used

for welding inspection were first developed in the 1970s.

• *Magnetic flux leakage pigs* saturate the pipe wall with magnetism. Sensors between the poles of the magnets detect damage from corrosion or physical impact. The first smart pigs developed in the 1960s used this technology.

• *Curvature pigs,* also known as deformation or caliper pigs, use navigation technology to provide a 3D model of the pipeline's centerline coordinates. Gyroscopes and accelerometers are used to calculate the pig's position rather than relying on external references such as satellites, which global positioning systems use. Comparing data to previous inspection runs allows engineers to monitor dents and "ovalities" in the pipe. (Ovalities are when a pipe is no longer perfectly round but bowed into an oval shape.) Engineers can also identify unstable ground by detecting pipeline movement.

Within the oil and gas sector nationally, advancing robotics centers on detecting methane gas leaks. Governments around the world have enacted regulations to reduce methane gas emissions. Methane is odorless and colorless, making it hard to detect, plus many points in the production stream are vulnerable to fugitive emissions. Sensors installed at production facilities or on aircraft, including drones, are two leading solutions launched recently.

Use in Alaska fisheries research

Fisheries researchers for the Alaska Department of Fish and Game use a remotely operated vehicle to assess the population size of yelloweye rockfish and other groundfish in Southeast Alaska and Prince William Sound. Researchers used a manned submersible until 2009, but high costs and limited availability prompted the department to switch to an ROV, which the department has owned since 2005 (shown in the photo on page 4). ROVs are equipped with high-definition video cameras and powerful lights.

Fish and Game has used its ROV, a Phantom 2 + 2 device nicknamed Buttercup, to assess the impact of development projects, to recover tools and moorings on the seafloor, and, more recently, to deploy and recover larval settlement structures for a deep sea coral study.

ROVs are tethered to a ship on the water's surface by

The Resilient Mat-Su Borough

Fastest-growing area keeps momentum through COVID

By NEAL FRIED

Growth isn't new for the Matanuska-Susitna Borough: its population and job count have been growing for more than 40 years. But the borough's ability to grow even during the pandemic put it in a category by itself.

Gains from within and outside Alaska

Mat-Su's population has continued to grow, including through migration, as the state and most areas lost people to migration for 10 straight years. In fact, Mat-Su is the only part of Alaska with consistently positive net migration and one of just three that gains residents from other places in the state.

Nearby Anchorage's net migration — in-movers minus out-movers — has been negative for nine years. Some of Anchorage's losses are Mat-Su's gains, and that exchange is an annual event. In 2021, 2,932 Anchorage residents moved to the borough, while 1,517 Mat-Su residents moved to the city. (See the May 2022 issue of *Alaska Economic Trends*.)

Last year, the Mat-Su Borough grew by 2.4 percent as Anchorage lost overall population for a fifth year in a row and the state grew by just a hair (451 people).

Between 2010 and 2022, the borough gained 22,757 residents as Anchorage lost a little more than 2,000 and the state as a whole grew by 26,325.

The Mat-Su Borough is now the second-most populous in Alaska, with a 2022 population of 111,752.

Mat-Su gains through Anchorage migrant exchange
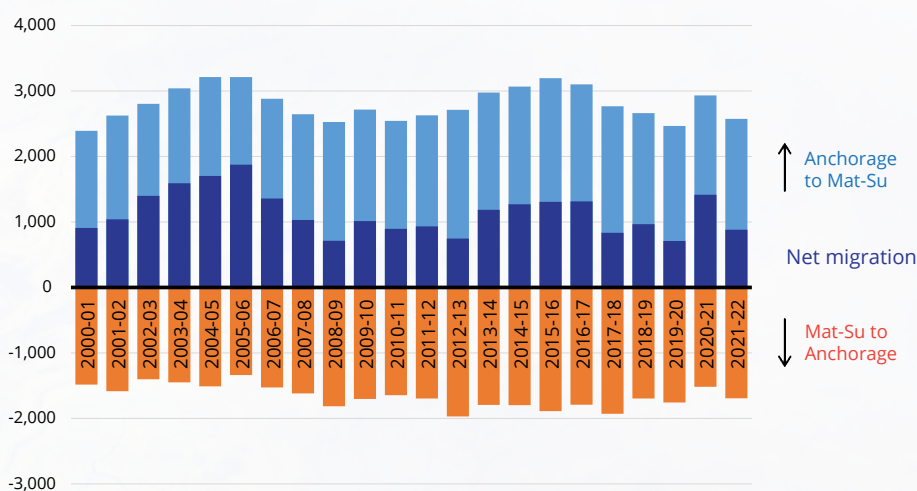
Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

Mat-Su and Anchorage are the only two areas in the state with more than 100,000 people, and combined they account for 55 percent of Alaska's population. Anchorage remains the lion's share of that equation, as a little over a quarter of the Anchorage/Matanuska-Susitna Region's residents live in the Mat-Su Borough. Still, as recently as 1990, Mat-Su was only 15 percent of the region.

While Mat-Su continues to grow, it still relies on Anchorage. As an economy they function as one, but they are two distinct political jurisdictions — and despite their proximity, their economic and demographic patterns diverge.

## The borough and its changes

The Mat-Su Borough, often called "the Valley" even though it includes the valleys of three rivers (the Matanuska, the Susitna, and the Knik), covers 25,260 square miles north of Anchorage. But 90 percent of its residents live in a tight corridor

Populations and towns in Mat-Su Borough, 2022

City/census-designated place	Population
Matanuska-Susitna Borough	**111,752**
Knik-Fairview CDP	20,098
North Lakes CDP	9,830
Meadow Lakes CDP	9,675
Wasilla city	9,547
Tanaina CDP	8,957
Gateway CDP	6,142
Palmer city	5,936
Fishhook CDP	5,761
South Lakes CDP	5,258
Big Lake CDP	4,023
Butte CDP	3,682
Farm Loop CDP	2,795
Willow CDP	2,386
Point MacKenzie CDP	2,092
Houston city	2,046
Susitna North CDP	1,639
Lazy Mountain CDP	1,578
Buffalo Soapstone CDP	1,081
Talkeetna CDP	1,060
Sutton-Alpine CDP	1,049
Knik River CDP	847
Trapper Creek CDP	504
Glacier View CDP	251
Chickaloon CDP	246
Skwentna CDP	51
Lake Louise CDP	40
Petersville CDP	31
Chase CDP	25
Eureka Roadhouse CDP	25
Susitna CDP	14
Outside a city or CDP	5,083

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

Mat-Su lost few jobs when COVID started
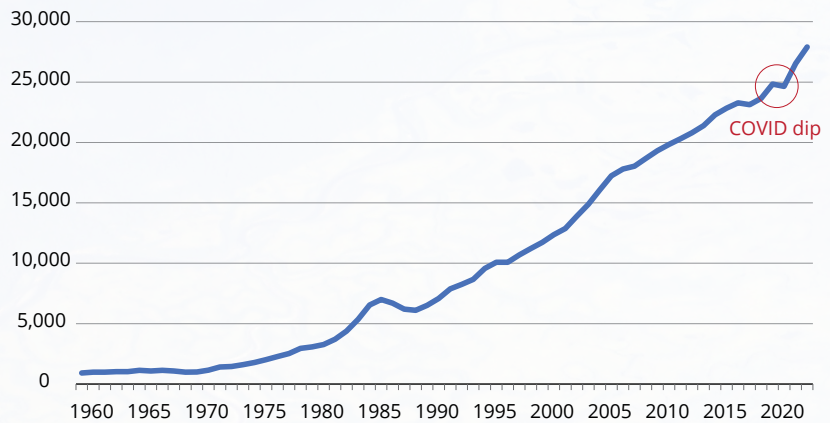
Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section

between the communities of Willow and Sutton. Three of its 30 communities are incorporated — Wasilla, Palmer, and Houston — but these three cities are home to just 16 percent of the borough's population.

Three unorganized communities, called census-designated places, have bigger populations than the City of Wasilla. For example, if Knik-Fairview were incorporated, it would be the seventh-largest city or borough in Alaska. (For more on how the Mat-Su came to be, see the March 2016 issue of *Trends*.)

Mat-Su began as mostly residential areas outside of Anchorage, and while it remains true that Mat-Su's chief export is its work-force, the borough has provided more of its own services as it has grown. Economists refer to this phenomenon as import substitu-tion: When an area becomes less reliant on services outside its boundaries, those now-locally available services generate even more economic activity.

For example, Mat-Su's health care sector grew 74 percent over the past decade, meaning fewer Valley residents needed to seek care in Anchorage. Other Valley industries have also expanded — a growing number of "headquarters"-type companies that provide services to other parts of the state have chosen Mat-Su as their home base. Examples include the Goose Creek prison, which hous-es inmates from all over Alaska; Cruz Construction, which takes on projects statewide; and Denali Brewing Company.

A very different pandemic experience

The pandemic is another recent example of Mat-Su's resilience and its divergence from most of the state. On the job front, 2020 repre-sented some of the largest annual employment losses in Alaska's history. The state lost 26,000 jobs that first pandemic year and Anchorage lost 12,000, or 8 percent of all its employment.

In 2022, Anchorage and the state as a whole hadn't yet regained

their pre-COVID job levels and they probably won't this year, either, but the concept of economic recovery never existed in Mat-Su.

Mat-Su lost just 1 percent of its jobs in 2020, and by year's end, its job count had climbed back into record territory. By 2021, Mat-Su employment hit a new high; 2022 was a repeat and 2023 will be as well.
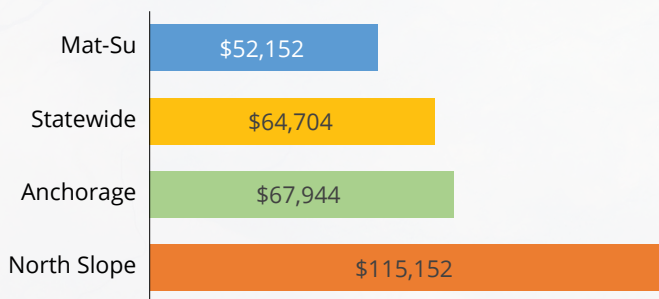
A handful of reasons for the difference

Several factors worked in Mat-Su's favor during the pandemic. In addition to ongoing population growth, its economy had momentum before COVID while the state and Anchorage had just emerged from a four-year recession.

Temporary business closures or reduced operations also hit harder elsewhere. Anchorage lost 9 percent of its retail jobs in 2020 and 21 percent from its bars and restaurants. Mat-Su's eating and drinking employment fell by 10 percent, but its retail grew by 7 percent. Sales tax revenues in Palmer and Wasilla actually went up in 2020.

The spectacular increase in working remotely worked in the Valley's favor during the pandemic. Many of the usual commuters to Anchorage turned to telework, and as a result, they spent more of their consumer dollars in the local economy instead,

Where Mat-Su residents work and earn, 2021

Place of work	Total workers from Mat-Su	Total wages
Total	**45,365**	**$2,248,262,197**
Matanuska-Susitna Borough	26,522	$1,012,323,078
Anchorage, Municipality	12,780	$815,683,192
North Slope Borough	2,257	$214,299,952
Fairbanks North Star Borough	1,108	$39,501,226
Other/Unknown	571	$34,376,095
Northwest Arctic Borough	350	$28,654,973
Kenai Peninsula Borough	312	$16,637,012
Juneau, City and Borough	177	$11,413,714
Bethel Census Area	173	$11,973,300
Chugach Census Area	141	$9,469,288
Ketchikan Gateway Borough	134	$3,610,533
Denali Borough	115	$6,090,274
Southeast Fairbanks Census Area	92	$8,136,072
Aleutians West Census Area	92	$6,670,724
Nome Census Area	84	$5,274,501
Yukon-Koyukuk Census Area	80	$5,734,859
Lake and Peninsula Borough	78	$3,548,525
Kodiak Island Borough	62	$3,281,037
Bristol Bay Borough	54	$2,600,419
Dillingham Census Area	40	$1,716,089
Kusilvak Census Area	40	$2,215,710
Aleutians East Borough	38	$1,911,241
Copper River Census Area	34	$1,433,682
Sitka, City and Borough	21	$1,364,261
Yakutat, City and Borough	10	$342,439

Notes: Unduplicated count of total workers employed at any time during the year. Workers are assigned to the borough/census area where they earned the most money.

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

Average wages a big reason 41% of Mat-Su residents commute, 2022

Mat-Su	$52,152
Statewide	$64,704
Anchorage	$67,944
North Slope	$115,152

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

further boosting local retailers and restaurants at Anchorage's expense. Anecdotal evidence further suggests some Anchorage residents sought services in the Valley that they would have typically consumed closer to home.

Finally, the labor shortage is likely more acute in Anchorage, further depressing its ability to regrow its workforce. This is not to say Mat-Su employers aren't having the same recruitment troubles as employers everywhere — they are but to a lesser degree. If wages are high enough, Mat-Su employers can lure some workers who might typically commute to Anchorage with the prospect of less driving.

Unemployment did rise in 2020

Despite the strong performance, Mat-Su wasn't

unscathed. The borough's unemployment spiked in 2020 as it did all over the state. Many Mat-Su residents lost their jobs in Anchorage, the North Slope, and elsewhere, and the area's unemployment rate hit 13.4 percent in April 2020 and stayed in the double digits through July.

At the same time, the number of Valley residents receiving unemployment benefits shot up from 3,675 in 2019 to more than 11,000 in 2020.

By 2022, though, unemployment claims had fallen below pre-pandemic levels. That April, the area's unemployment rate was 4.9 percent.

Close to half still commute, and wages remain relatively low

Mat-Su residents losing their jobs elsewhere in Alaska is significant because, while the worker patterns have shifted over the years, over 40 percent of Mat-Su residents still commute. Anchorage's proximity and higher average wages allow the borough to flourish.

As of 2021, the most recent year available, 28 percent of employed Mat-Su residents worked in Anchorage and 13 percent worked somewhere else in Alaska, largely on the North Slope. These commuters earn more than residents who work locally, and they return home to invest their wages in local
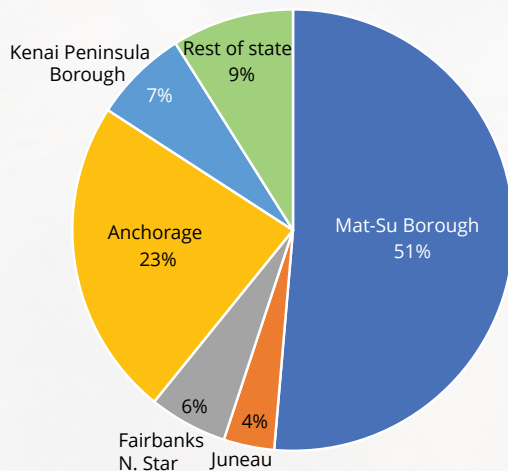
Half of new Alaska homes are built in Mat-Su, 2022

Source: Alaska Department of Labor and Workforce Development, Research and Analysis Section; and Alaska Housing Finance Corporation

Mat-Su Borough's industries, 2022

Industry	Jobs	Avg wage
Total	**27,900**	**$52,152**
Natural Resources and Mining	282	$43,596
Construction	3,193	$82,032
Manufacturing	465	$47,640
Wholesale Trade	186	$61,932
Retail Trade	4,253	$37,872
Transportation	762	$51,840
Utilities	346	$97,272
Information	442	$71,112
Finance and Insurance	530	$64,140
Real Estate	393	$41,940
Professional and Business Svcs	1,651	$51,948
Education, Private	404	$36,312
Health Care	4,345	$61,801
Social Assistance	930	$30,336
Leisure and Hospitality	3,391	$26,148
Arts, Entertainment, and Rec	474	$24,684
Accommodation	653	$36,660
Food Services	2,263	$23,424
Other Services	1,021	$33,744
Government	5,230	$58,752
Federal	260	$101,412
State	1,568	$64,620
Local	3,402	$52,788

Notes: State government includes the University of Alaska. Local government includes public schools and tribal government.

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

housing, consumer goods, and services.

In terms of total earnings, Mat-Su residents made $816 million in Anchorage in 2021 and $214 million on the North Slope, and the two combined were roughly equal to the dollars residents earned locally.

Commuter numbers have gone down over the last decade, though. In 2010, 45 percent commuted. That dipped only slightly over the next five years, to 44 percent, and then it dropped to 41 percent in 2021.

In 2010, 31 percent of Mat-Su residents commuted to Anchorage, which fell to 30 percent in 2015 and 28 percent in 2021. Fewer are commuting to the North Slope, as well, likely because Slope employment peaked in 2015 and then plunged by half through 2021.

These commuter numbers are conservative

Valley farming

At left, crew at the VanderWeele Farm in Palmer plant lettuce seedlings. VanderWeele Farm has been in business since 1967. Above, kohlrabi is harvested at Sun Circle Farm in Palmer, a 2.5-acre organic farm owned by Anne-Corinne Kell. Photos by USDA Natural Resources Conservation Service Alaska

because they exclude federal workers, uniformed military, and the self-employed.

The Bureau of Economic Analysis' personal income data, which are adjusted for residency, also show how much income Mat-Su draws from elsewhere. In 2021, Mat-Su enjoyed a net gain of $1.8 billion in income earned outside the borough, which represented about 30 percent of all personal income there.

Mat-Su is one of the few places in Alaska with a net inflow of personal income. Because most places in Alaska have a sizable nonresident workforce, personal income is typically a net outflow. For example, Anchorage lost $1.2 billion in 2021, meaning $1.2 billion earned in Anchorage went to residents of other places.

Commuting is still an attractive option in part because Mat-Su's average wages remain relatively low. In 2021, Mat-Su's annual earnings averaged $49,632, compared to $65,592 in Anchorage and $111,756 in the North Slope Borough.

> Agriculture plays a small but visible role in Mat-Su's economy.

Anchorage is home to a large share of high-wage jobs in the oil industry, government, and transportation, to name just a few. Many of the Valley's jobs exist to provide services to the local population, so they tend to be in lower-wage industries. Retail and leisure and hospitality employment, for example,

accounted for 27 percent of Mat-Su's jobs in 2021 and just 21 percent for Anchorage.

Housing is most affordable if buyer works elsewhere in Alaska

Housing remains a strong selling point, and the price differential is attractive to outside workers. So is the proximity to a large city, and for some, factors such as lifestyle and scenery may also play a role.
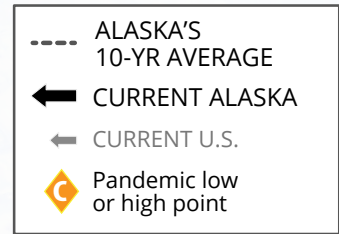
In 2022, the average sales price of a home was $422,490 in the Valley and $468,843 in Anchorage, and that's not accounting for differences in the average home. The Valley's housing stock is considerably younger, and because space is easier to come by, it's often larger or on more land. Fifty-nine percent of Mat-Su housing was built in 1990 or later versus less than a third of Anchorage's housing stock. (See the May 2023 issue of *Trends* for more on the current home sales market.)

In 2022, half of all new homes built in the state were built in the Valley, even though the Mat-Su is home to only 15 percent of the state's population.

Gauging The Economy

Job Growth

April 2023
Over-the-year percent change

16.0%

Post-'80s
high
[Mar 90]   6.6%

2.7% [U.S. revised]
2.3%

-0.4%

Recession
low, '80s
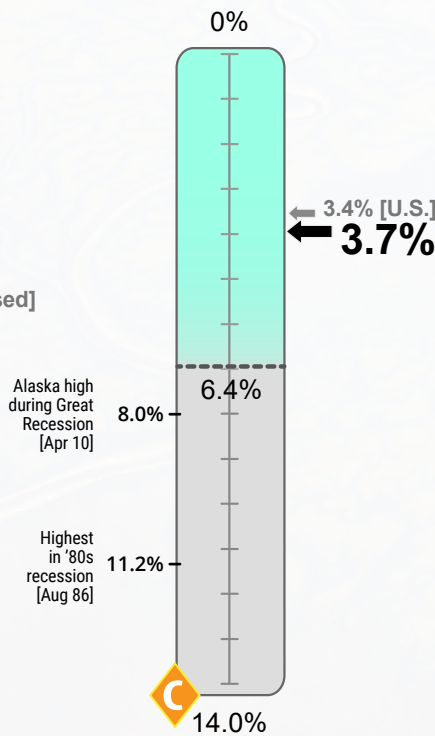[Jan 87]   -7.5%

C

-16.0%
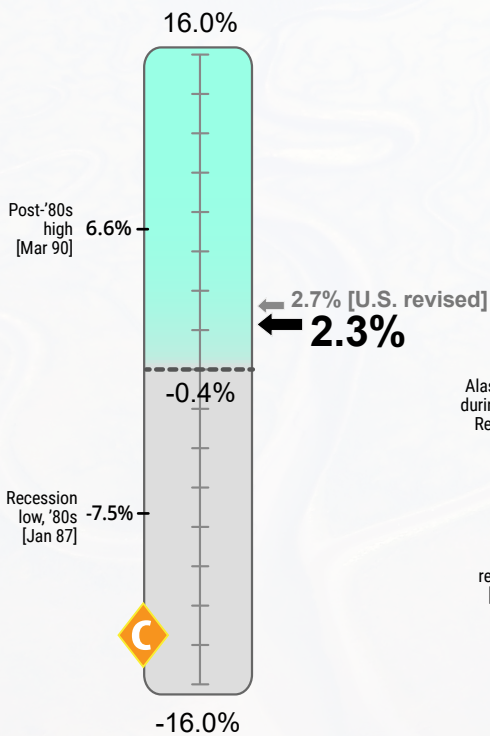
Alaska's April 2023 employment was 14.6 percent above April 2020, the first full month of COVID-related job losses.

U.S. employment, which was up 2.6 percent from April 4022, was 19.3 percent above its 2020 level in April.
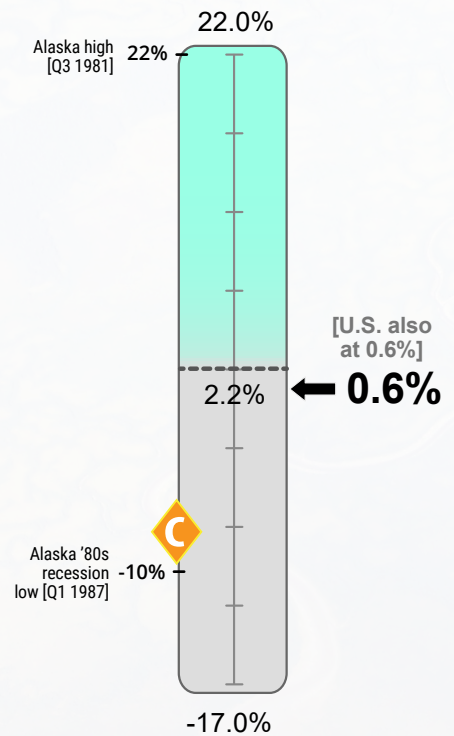
Unemployment Rate

April 2023
Seasonally adjusted

0%

3.4% [U.S.]
3.7%

6.4%

Alaska high
during Great
Recession
[Apr 10]   8.0%

Highest
in '80s
recession
[Aug 86]   11.2%

C

14.0%

Alaska's unemployment rate has been less useful as an economic measure during the pandemic and its aftermath because of data collection difficulties.

Wage Growth

4th Quarter 2022
Over-the-year percent change

22.0%

Alaska high
[Q3 1981]   22%

[U.S. also
at 0.6%]
2.2%   **0.6%**

Alaska '80s
recession
low [Q1 1987]   -10%

C

-17.0%

After being well down during the second and third quarters of 2020, total wages paid by Alaska employers climbed back above year-ago levels every quarter since the second quarter of 2021.
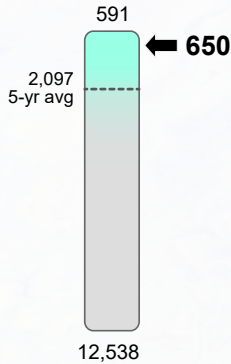
Wages were up 0.6 percent from year-ago levels in the third quarter of 2022 and 11.1 percent above third quarter 2019.

Gauging The Economy

Initial Claims

Unemployment, week ending May 13, 2023*

591
← **650**
2,097 5-yr avg
12,538

Unemployment claims jumped in the spring of 2020 with the pandemic as many businesses shut down or limited services. Pandemic-driven claims loads have fallen, and new claims for benefits are back below their long-term average.

*Four-week moving average ending with specified week

GDP Growth

4th Quarter 2022
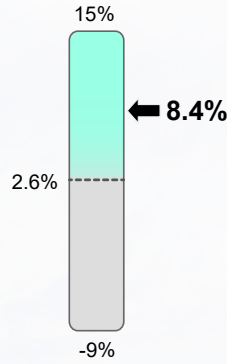Over-the-year percent change*

20%
← **4.9%**
1.2%
-20%
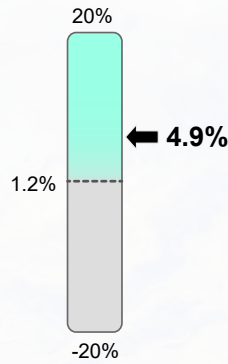
Gross domestic product is the value of the goods and services a state produces. Alaska's GDP fell hard in early 2020 but recovered most of those losses in 2021 and 2022.

*In current dollars

Personal Income Growth

4th Quarter 2022
Over-the-year percent change

15%
← **8.4%**
2.6%
-9%

Personal income consists of three main parts: 1) wages and salaries; 2) dividends, interest, and rents; and 3) transfer payments (payments from governments to individuals).

Change in Home Prices

Single-family, percent change from prior year, Q4 2022*

9%
← **6.5%**
3.7%
-5%
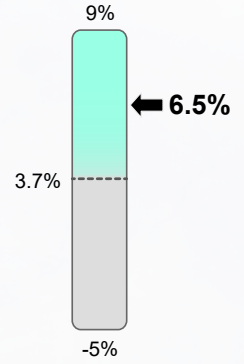
Home prices shown include only those for which a commercial loan was used. This indicator tends to be volatile from quarter to quarter.

*Four-quarter moving average ending with specified quarter

Population Growth

2021 to 2022

5%
0.1% ← **0.1%**
-5%
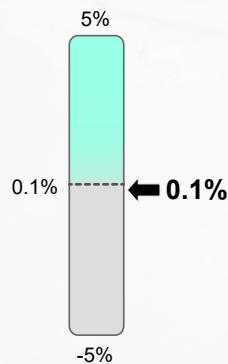
After four years of decline, Alaska's population grew slightly in 2021 and 2022, as natural increase (births minus deaths) slightly exceeded losses from migration.

Net Migration

2021 to 2022

+17,000
← **-2,489**
-5,341
-27,000

The state had net migration losses for the tenth consecutive year in 2022, although the losses have become smaller. Net migration is the number who moved to Alaska minus the number who left.

Employment by Region

Percent change in jobs, April 2022 to April 2023

Northern Region +1.2%

Interior Region +1.7%

+2.0% Statewide

Southwest Region +2.9%

Anchorage/Mat-Su Region +2.0% Anchorage/Mat-Su

Gulf Coast Region +0.3%

Southeast Region +1.5%

Map labels: North Slope, Northwest Arctic, Nome, Yukon-Koyukuk, Fairbanks, Denali, Southeast Fairbanks, Matanuska-Susitna, Copper River, Kusilvak, Chugach, Haines, Skagway, Juneau, Bethel, Kenai Peninsula, Anchorage, Yakutat, Petersburg, Wrangell, Dillingham, Hoonah-, Sitka, Bristol Bay, Kodiak Island, Prince of Wales-Hyder, Ketchikan, Lake & Peninsula, Aleutians West, Aleutians East
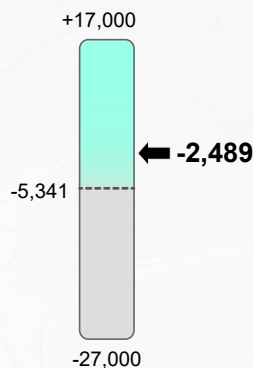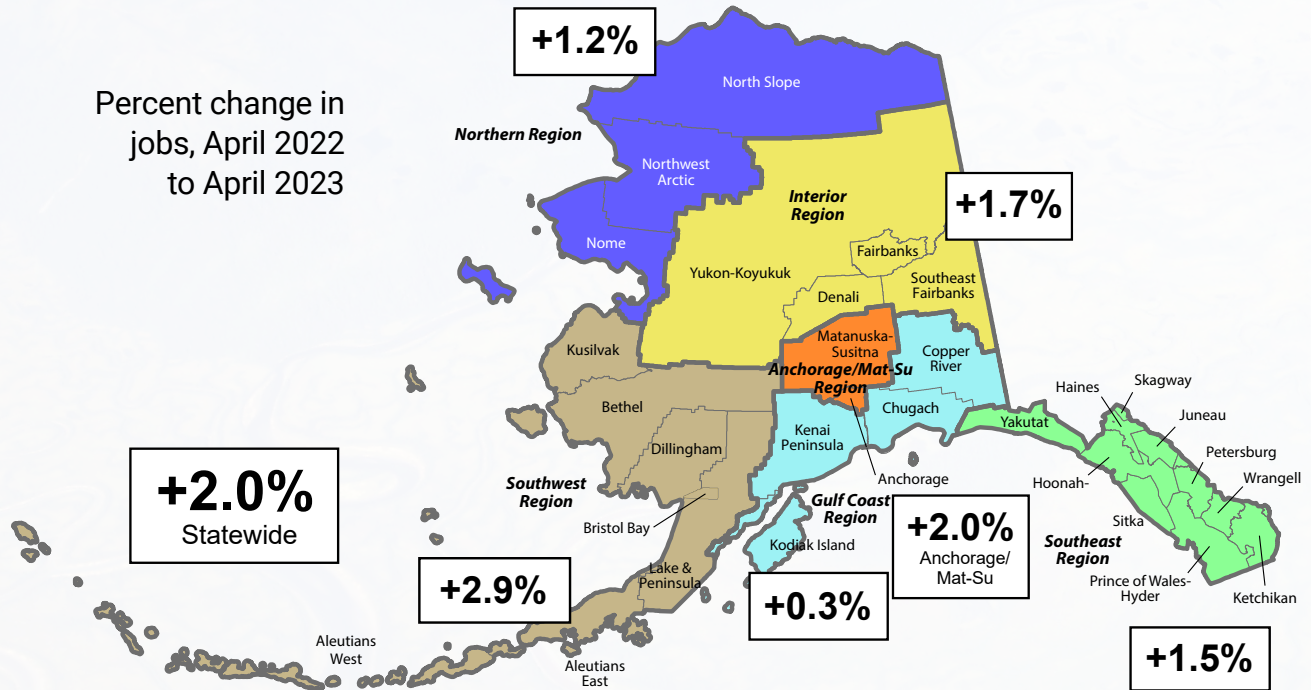
Unemployment Rates

Seasonally adjusted

	Prelim.	Revised	
	4/23	3/23	4/22
United States	3.4	3.5	3.6
Alaska	3.7	3.7	4.1

Not seasonally adjusted

	Prelim.	Revised	
	4/23	3/23	4/22
United States	3.1	3.6	3.3
Alaska	3.9	4.0	4.3

Regional, not seasonally adjusted

	Prelim.	Revised	
	4/23	3/23	4/22
Interior Region	**3.9**	**4.0**	**4.4**
Denali Borough	8.6	12.3	8.8
Fairbanks N Star Borough	3.5	3.6	3.9
Southeast Fairbanks Census Area	4.9	5.4	5.9
Yukon-Koyukuk Census Area	8.9	9.2	9.2
Northern Region	**6.9**	**6.9**	**7.4**
Nome Census Area	6.8	6.9	7.7
North Slope Borough	4.6	4.1	5.1
Northwest Arctic Borough	9.5	9.9	9.7
Anchorage/Mat-Su Region	**3.4**	**3.5**	**3.9**
Anchorage, Municipality	3.1	3.0	3.6
Mat-Su Borough	4.4	4.9	4.9

	Prelim.	Revised	
	4/23	3/23	4/22
Southwest Region	**6.6**	**6.1**	**7.0**
Aleutians East Borough	1.8	1.3	1.6
Aleutians West Census Area	2.7	1.8	2.9
Bethel Census Area	8.7	8.5	9.7
Bristol Bay Borough	4.1	8.6	3.9
Dillingham Census Area	5.7	5.6	5.8
Kusilvak Census Area	12.8	12.8	13.0
Lake and Peninsula Borough	5.9	5.6	6.7
Gulf Coast Region	**4.5**	**4.9**	**4.7**
Kenai Peninsula Borough	4.5	5.0	4.8
Kodiak Island Borough	3.5	3.0	3.8
Chugach Census Area	4.7	6.1	3.0
Copper River Census Area	8.6	9.5	10.0

	Prelim.	Revised	
	4/23	3/23	4/22
Southeast Region	**3.4**	**4.0**	**3.7**
Haines Borough	6.8	8.4	6.6
Hoonah-Angoon Census Area	5.1	10.3	5.5
Juneau, City and Borough	2.5	2.6	2.8
Ketchikan Gateway Borough	3.7	4.3	4.2
Petersburg Borough	4.7	4.9	6.7
Prince of Wales-Hyder Census Area	6.3	7.3	5.5
Sitka, City and Borough	2.6	2.9	2.7
Skagway, Municipality	5.1	9.3	6.2
Wrangell, City and Borough	4.8	4.8	5.2
Yakutat, City and Borough	4.9	7.0	4.6

How Alaska Ranks

Unemployment Rate[1]

1st
S. Dakota
1.9%

37th*
3.7%

50th
Nevada
5.4%

Tied with Kentucky, Ohio

Job Growth[2]

1st
Nevada
4.1%

27th*
2.0%

50th
Rhode Island
-1.0%

*Tied with Ariz., Del., Neb.,
N. Jersey, S. Dakota*

Job Growth, Private[2]

1st
Texas
4.0%

32nd*
2.2%

50th
Rhode Island
-1.5%

Job Growth, State Government[2]

1st
Idaho
12.7%

35th
0.4%

50th
Montana
-2.5%

Job Growth, Leisure and Hospitality[2]

1st
Georgia
7.9%

10th*
6.0%

50th
Rhode Island
-2.9%

Tied with Kentucky, Minnesota

Note: State government employment includes the University of Alaska.
[1]April seasonally adjusted unemployment rates
[2]April 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

	Current		Year ago	Change
Urban Alaska Consumer Price Index (CPI-U, base yr 1982=100)	260.576	2nd half 2022	252.271	+3.3%
Commodity prices				
Crude oil, Alaska North Slope,* per barrel	$82.83	Apr 2023	$109.41	-24.3%
Natural gas, Henry Hub, per thousand cubic feet (mcf)	$2.20	Apr 2023	$6.71	-67.2%
Gold, per oz. COMEX	$1,974.50	5/24/2023	$1,871.40	+5.5%
Silver, per oz. COMEX	$23.62	5/24/2023	$21.87	+8.0%
Copper, per lb. COMEX	$3.66	5/24/2023	$4.31	-15.1%
Zinc, per lb.	$1.04	5/24/2023	$1.74	-40.2%
Lead, per lb.	$0.91	5/24/2023	$0.97	-4.1%
Bankruptcies	44	Q4 2022	50	-12%
Business	4	Q4 2022	5	-20%
Personal	40	Q4 2022	45	-11.1%
Unemployment insurance claims				
Initial filings	3,395	Apr 2023	4,299	-21.0%
Continued filings	23,188	Apr 2023	21,977	5.5%
Claimant count	6,277	Apr 2023	6,624	-5.2%

*Department of Revenue estimate

Sources for this page and the preceding three pages include Alaska Department of Labor and Workforce Development, Research and Analysis Section; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; U.S. Energy Information Administration; Kitco; U.S. Census Bureau; COMEX; NASDAQ; Alaska Department of Revenue; and U.S. Courts, 9th Circuit

MAT-SU

Continued from page 13

Anchorage permitted less than half of Mat-Su's number.

Housing is most affordable for those earning higher wages elsewhere. Affordability factors in an area's average mortgage payment as well as its average earnings. Because Mat-Su's earnings are low, its housing is actually less affordable for those working in Mat-Su than housing in Anchorage is for Anchorage earners. In 2022, an Anchorage home required the monthly earnings of 1.48 typical Anchorage workers. For Mat-Su workers, a Mat-Su home required 1.74.

However, for Valley residents working in Anchorage, the equation changes considerably. It took just 1.33 Anchorage earners to afford the average Mat-Su mortgage. For a Slope worker, a Mat-Su home would be even more affordable.

Agriculture, tourism play small roles in local economy

In addition to the commuter culture and the local services that are growing to support a larger population, a few other industries play notable roles in Mat-Su's economy.

Agriculture is still a player, although its relative role is small. No specific agricultural production data exist for Mat-Su, but the numbers suggest its slate of farmers is growing. The advent of farmer's markets, a growing interest in local products, and meat and egg consumption are breathing new life into Mat-Su agriculture.

Marijuana cultivation is another big boost. The Valley is home to the largest number of cannabis growers in the state. (See the December 2022 issue of *Trends* for more on the marijuana industry.)

Mat-Su tourism also benefits from its proximity to both Anchorage and Denali National Park, home to the state's most popular mountain and national park. The Valley is also home to Denali State Park, a major fishing and hunting destination and the gateway to Denali tours and climbs.

The borough also draws winter visitors, peaking with the start of the Iditarod sled dog race that begins in Willow.

The visitor industry in Mat-Su stands out from much of Alaska, as it relies on a mix of Anchorage residents and others who own recreational property in the Valley plus thousands of visitors from elsewhere in Southcentral and around Alaska.

Visitor infrastructure has grown with new hotels, short-term rentals, the expansion of Denali State Park, and destinations such as the new downhill Skeetawk Ski Area in Hatcher Pass. With these amenities, a growing number of summer and winter visitors make their way to the Upper Susitna Valley.

Like elsewhere in the state, Mat-Su's visitor industry absorbed a blow in 2020, but given its proximity to Anchorage and other in-state sources of visitors, it fared better than places that depend on cruise ships and other out-of-state tourists, which were nearly nonexistent that year.

In 2021, the surge in independent travelers also bolstered the Valley's economy. By 2022, bed tax revenues had recovered to pre-COVID levels.

Neal Fried is an economist in Anchorage. Reach him at (907) 269-4861 or neal.fried@alaska.gov.

ROBOTICS

a group of cables that provide electrical power from the ship and transport data through optical fibers. ROVs are technically robotic devices rather than robots, a term that typically applies only to programmable devices. (See the sidebar on page 7.)

Side-by-side analysis of data obtained from ROV and manned submersible surveys showed the ROV provided comparable estimates.

Drones show broad promise

The University of Alaska Fairbanks is home to one of the Federal Aviation Administration's seven drone technology testing sites in the country. Earlier this year, its drone research center received an FAA waiver to test pilot drones along a 20-mile stretch of the pipeline. A pilot will fly the drones — which could be used to inspect the pipeline in future applications — beyond the line of sight. Ideas abound for commercial applications of drone technology in Alaska, such as cargo and medicine delivery to remote areas — but the FAA requires operators to fly drones only within their line of sight.

Regulations will have to change before the business case for most commercial applications pencils out, but Alaska researchers will continue to test new technology. This summer, UAF-affiliated researchers and their commercial partners will fly autonomous Cessna Grand Caravans between Fairbanks and Nenana to test technology that uses sensors to autonomously detect and avoid other flying objects. The goal is to eventually develop both remotely controlled and autonomous technology to safely deliver cargo to remote places.

Liz Brooks is a research analyst in Juneau. Contact her to share additional examples of robotics or automation used in your industry. She can be reached at liz.brooks@alaska.gov or (907) 465-5970.

EMPLOYER RESOURCES

Resources for Alaska's agricultural employers

Agriculture plays an essential and growing role in sustainability and the production of commodities throughout Alaska. Local farmers, producers, and growers enhance the state economy, provide fresh products, and allow the state to remain competitive in the global marketplace.

With more than 1,000 farms primarily located in the Matanuska-Susitna Borough, Fairbanks, and Kenai Peninsula, Alaskan agriculture includes livestock, nursery work, tree farming, and crops such as hay, potatoes, and barley. Alaska's aquaculture produces aquatic plants, including kelp and seaweed, and shellfish such as oysters, mussels, clams, and scallops. Agriculture and aquaculture are expanding in Alaska as new technologies and methods have emerged for growing and producing food in some of the harshest environments in the country, primarily through seasonal work.

Alaska's job center staff help agricultural employers fill seasonal positions by assisting with job orders in AlaskaJobs and referring qualified Alaskan workers. Recruiting employers can call (877) 724-2539 to connect with their nearest job center and visit jobs.alaska.gov/employer to find comprehensive information on recruiting, labor laws, and hiring incentives such as tax credits and bonding.

Agricultural employers are required by state and federal law to post the Notice of Migrant and Seasonal Agricultural Worker Protection Act poster in a space conspicuous to their workers to ensure that housing for migrant and seasonal workers is safe and habitable and that those workers receive equitable treatment.

For information and assistance on migrant and seasonal farmworkers, contact Alaska's State Monitor Advocate at nakita.mongar@alaska.gov. Employers may also review Alaska's most recent Agricultural Outreach Plan incorporated in the 2022 WIOA State Plan Modification. For information about hiring foreign temporary agricultural workers, employers can contact Alaska's Foreign Labor Certification program at dol.flc@alaska.gov.

Employer Resources is written by the Employment and Training Services Division of the Alaska Department of Labor and Workforce Development.