COMPREHENSIVE PLAN 2030: APPENDICES

2020 UPDATE

GARFIELD COUNTY

Adopted: November 10, 2010

Last Amended: February 26, 2020

Page Intentionally Left Blank

Table of Contents

COUNTY OVERVIEW

1. OVERVIEW

Appendix A: County Overview provides a summary of the most current information available regarding: (A) demographics; (B) land use; (C) municipal and special district growth areas, requirements, goals and policies; (D) finances; (E) air quality; (F) sensitive habitats; and, (G) natural hazards in Garfield County. The information in this appendix is intended to help inform county decision-making, policies and regulations. Appendix A is organized as follows:

1. Overview
2. Summary of Findings
3. County Overview Data & Information

Data for Appendix A were compiled from a number of sources. Those data sources include:

I. State of Colorado Agencies
Data from Colorado State Demography Office (SDO), Colorado Department of Public Health and Environment (CDPHE) and Colorado Parks and Wildlife (CPW) was used to identify:

- Demographic trends.
- Potential air quality issues associated with radon gas.
- High priority wildlife habitat areas.

II. Municipalities and Special Districts in Garfield County
Information from both municipal staff and municipal Comprehensive Plans was used to identify growth areas, annexation criteria/requirements and intergovernmental coordination goals and policies for the towns and cities in Garfield County.

Data obtained from special district staff and special district documents was used to identify the expansion policies/ requirements for select districts in Garfield County.

III. Garfield County Departments and County Plans
Data from the Garfield County Public Health (GCPH), Garfield County Assessor, county Finance Department were used to:

- Identify air quality conditions and historic trends.
- Prepare a summary of land ownership and land uses in the county.
- Identify existing financial conditions and historic trends.

Information from the 2017 Garfield County Hazard Mitigation Plan (https://www.garfield-county.com/emergency-management/natural-hazards-mitigation-plan.aspx) has been included in order to provide an overview of potential hazards in the county.

2. SUMMARY OF FINDINGS

Appendix A analyzes data and information regarding: (A) demographics; (B) land use; (C) municipal and special district growth areas, requirements, goals and policies; (D) finances; (E) air quality; (F) sensitive habitats; and, (G) natural hazards in Garfield County. The following are key findings from this work:

I. Brief description of Garfield County.
Garfield County, Colorado incorporated on February 10, 1883. The county was named in honor of the 20th President of the United States, James A. Garfield. Garfield County is the 6th largest county in Colorado, encompassing nearly 3,000 square miles (i.e. roughly 1,893,120 acres). Of the land in the county, approximately 62% (1,166,165-acres) is public lands and the remaining 38% (726,955-acres) is privately owned.

Garfield County is known for it's year-round recreational opportunities and related services. It is home to the second largest designated wilderness area in Colorado (the Flattops Wilderness), the world's largest mineral hot springs pool, and the natural wonder, Hanging Lake. Other important components of the county's economy include energy development, tourism, ranching and farming.

There are seven (7) municipalities in Garfield County: (1) the Town of Carbondale; (2) the City of Glenwood Springs; (3) the Town of New Castle; (4) the Town of Carbonate; (5) the Town of Silt; (6) the City of Rifle; and, (7) the Town of Parachute. The City of Glenwood Springs is the county seat.

The population of Garfield County is concentrated in the Roaring Fork Valley (RFV) between the Town of Carbondale and the City of Glenwood Springs (+/- 17,000 people reside in the RFV) and along the Interstate 70 (I-70) corridor between the City of Glenwood Springs and the Town of Parachute (+/- 18,516 people live along the I-70 corridor). The remainder of Garfield County's population, approximately 23,848 people, inhabit the unincorporated areas of the county.

II. SDO estimates indicate that Garfield County's population will change substantially over the next decade.
The SDO estimates that by 2030:

- The population of Garfield County will increase by roughly 30,762 people to a total population of around 75,000.
- The percent of total households, ages 65 and older, will grow by 12.2%. The percent of total households, ages 64 and younger will experience a slight decline.
- The percent of total households with children will decrease.
- The county's population center may continue shifting to the western part of the county. The New Castle to Parachute area is projected to account for roughly 54% of total population growth between 2017 and 2030. That equates to +/- 9,559 people. The Town of Carbondale and City of Glenwood Springs are expected to account for 21% (+/- 3,793 people) of future growth. The unincorporated areas of the county are projected to account for 25% (+/- 4,460 people) of future growth.
- There will be a substantial increase in the county's Generation Z (Gen Z) population and a significant decline in the Baby Boomer and Silent Generation populations. Numerous articles and studies available online indicate that the demands being generated by both Millennials and Gen Z are resulting in shifting economic and housing trends.
- The number of people in the "working age" cohort (16-64 years old) will shrink, while the number of people in the retirement age cohort (65 years old and older) will grow.
- The percent of the county's total population that is Hispanic will grow, while the percent of White (Non-hispanic) county residents will decline.

III. The county, municipalities and special districts could benefit from working together to plan for growth.
All towns and cities in Garfield County have adopted Comprehensive Plans that set forth their vision for the future of land use both within and surrounding their existing boundaries.

IV. Garfield County's total annual revenue is highly dependent upon sales and property tax revenues.
In 2018, tax revenues accounted for 52.6% ($43,512,050) of the county's total annual revenue. Out of the total 2018 tax revenues, 67.1% came from property tax, 26.5% came from sales tax and the remaining 6.4% came from specific ownership tax and other/severance tax.

In 2018, the City of Glenwood Springs, the unincorporated areas of the county, the City of Rifle and the Town of Carbondale were the top (4) four contributors to Garfield County's sales tax collections: (1) the City of Glenwood Springs contributed $4,622,420.28; (2) the unincorporated areas of the county contributed $2,271,893.04; (3) the City of Rifle contributed $1,892,020.28; and, (4) the Town of Carbondale contributed $1,146,871.89.

Oil and gas valuation remains an important component of property tax revenues in the county. In 2018, oil and gas production accounted for 31.6% ($752,029,270) of the total assessed value in Garfield County. The total assessed value in 2018 was $2,377,611,310.

V. GCPH is committed to air quality conditions.
GCPH's air quality projects fit within an overall air quality management program framework, a framework that has been implemented over the last several years through a variety of efforts. These have included: (1) on-going ambient air monitoring; (2) updates to local emissions inventories; (3) the development of health risk assessments; (4) an assortment of education and outreach efforts; and, (5) a variety of special collaborative projects.

Since 2008, all pollutants measured in Garfield County have remained below the National Ambient Air Quality Standards (NAAQS) limits, as defined by the Environmental Protection Agency (EPA). The GCPH monitors ozone (O_3), particulate matter ($PM_{2.5}$) and volatile organic compounds (VOCs).

VI. Radon is prevalent throughout Colorado but it's impacts can be mitigated.
Radon is a common issue across Colorado. While radon gas has no color, odor, or taste there are test kits available that allow radon to be tested for. In the event high levels of radon are detected, there are a number of simple and effective mitigation measures that can be installed to reduce the risk of radon gas build up in a building. Additional information about radon gas and mitigation measures can be found at: https://www.garfield-county.com/environmental-health/radon.aspx

VII. Potential impacts on high priority wildlife habitat could be important to consider in planning for future growth.
CPW has identified a number of wildlife areas in Garfield County that they consider to be high priority habitat (HPH). Refer to the online Comprehensive Plan maps for additional information (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan). There are fifteen (15) species in the county that CPW has identified HPH for. These species include bald eagles, bighorn sheep, cutthroat trout, elk and golden eagles.

Future growth in the county could result in potential conflict between HPH and areas in the county targeted for growth. Population growth could also mean more people participating in outdoor recreation activities, which has the potential to put greater pressures on wildlife. Garfield County and CPW could benefit from working together on exploring options for mitigating the potential impacts of future growth on wildlife in the county.

VIII. Natural hazards and climate trends could also be important factors to consider in planning for future growth.
Garfield County's 2017 Hazard Mitigation Plan identifies a number of natural hazards include wildfires, hazardous material spills, flooding, landslides, mud/debris flows, rockfall, soils and severe winter weather. The plan also notes that a number of the natural hazards in the county, such as wildfires, may worsen if current climate trends continue.

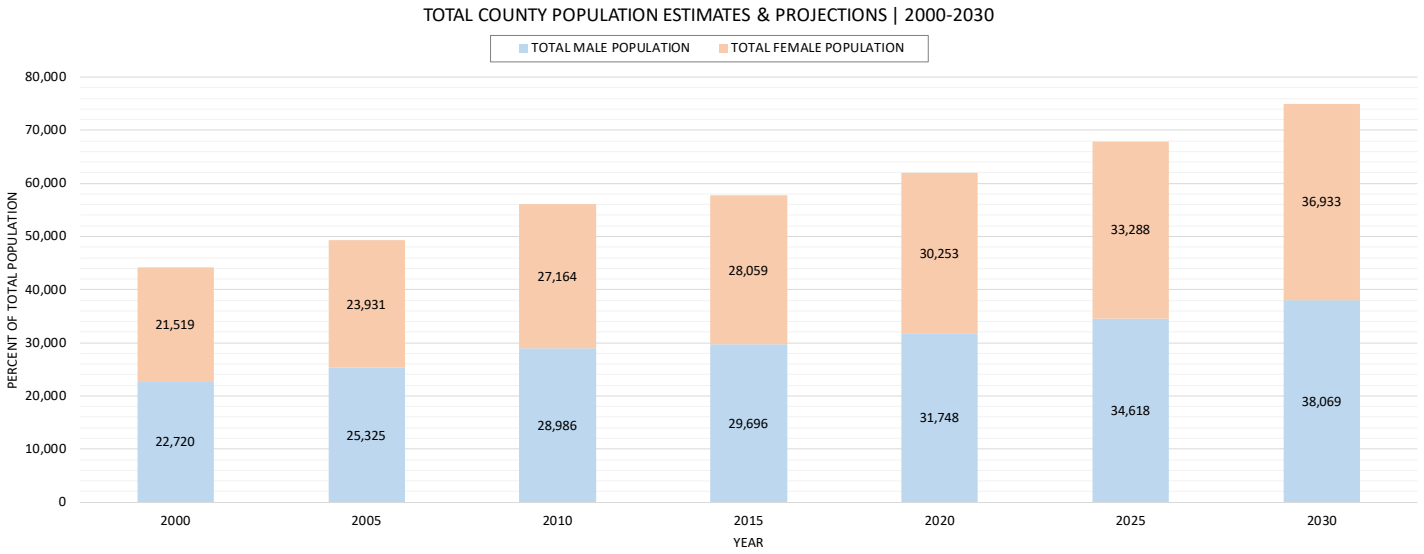
In planning for the future, Garfield County could benefit from using the information about the natural hazard areas identified in order to evaluate areas in the county and identify those that are least vulnerable to these hazards. The county may also find it helpful to explore the select hazards that could be exacerbated by current climate trends and factor that into its efforts to plan for future growth.

3. COUNTY OVERVIEW DATA & INFORMATION

A. DEMOGRAPHICS

I. CHANGE IN TOTAL POPULATION
The SDO estimates that between 2000 and 2030, total population in Garfield County will change in the following ways:

- Total population will grow from 44,239 to 75,001.
- Total male population will grow from 22,720 to 38,069.
- Total female population will grow from 21,519 to 36,933.



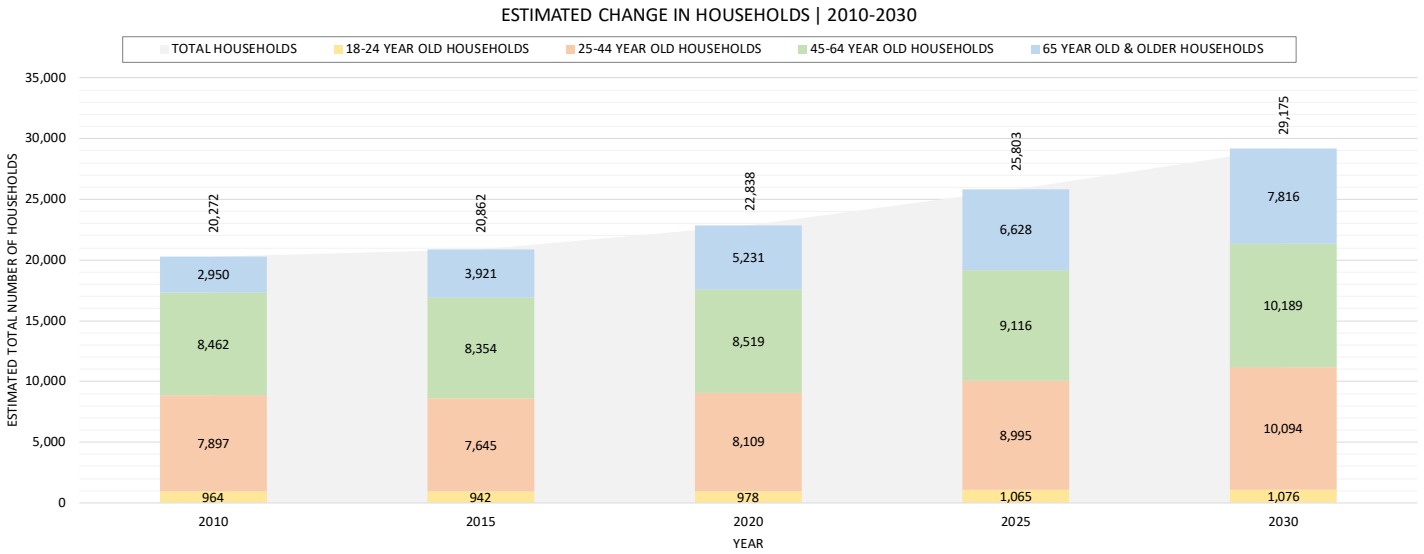
Over the next ten (10) years, Garfield County is projected to grow by around 31,000 people. This has a number of implications for the county that could include:

- Increasing needs for housing and jobs.
- Increasing impacts on local infrastructure, such as roads and water and sewer service.
- Increasing demands on public services, such as schools, law enforcement and fire protection.
- Increasing economic activity.

II. CHANGE IN HOUSEHOLD COMPOSITION

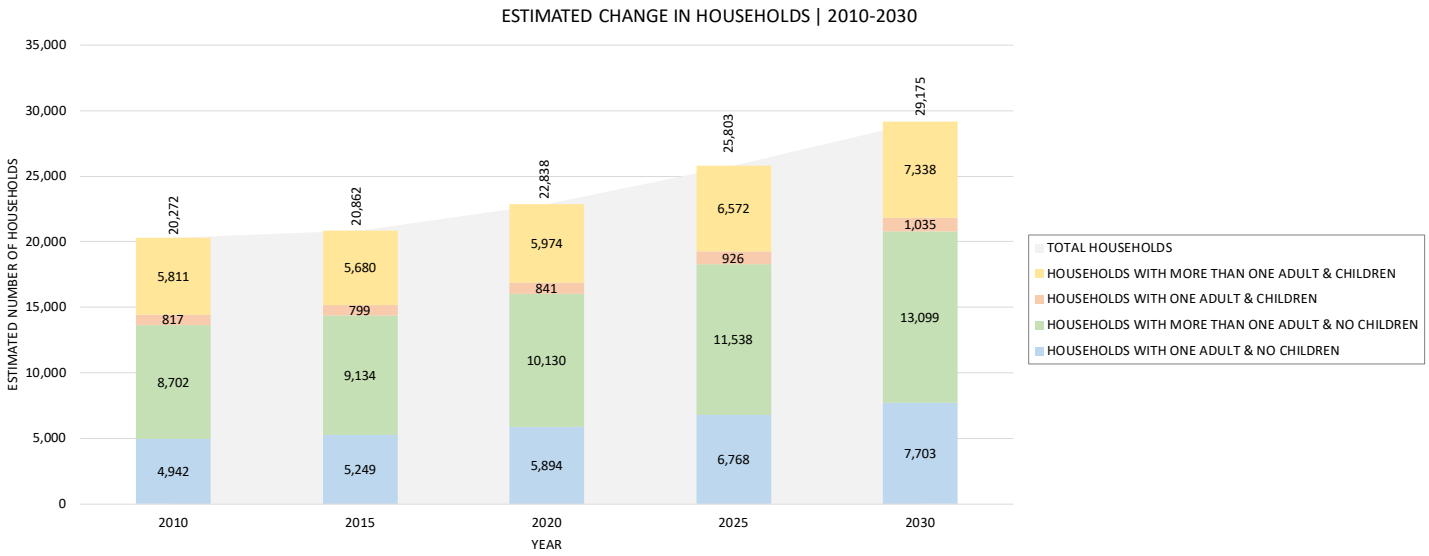
The SDO estimates that between 2010 and 2030 the percent of total households in Garfield County will change as follows:

- Total households, ages 18-24, will decline 1.1%.
- Total households, ages 25-44, will decline 4.4%.
- Total households, ages 45-64, will decline 6.8%.
- Total households, ages 65 and older, will grow 12.2%.



During that same period of time, the SDO also projects the percent of total households in Garfield County to change in the following ways:

- Total households with one adult and no children will grow 2%.
- Total households with more than one adult and no children will grow 2%.
- Total households with one adult and children will decline 0.5%.
- Total households with more than one adult and children will decline 3.5%.



Significant growth is projected for the percent of total households in Garfield County, ages 65 and older. Consequently, the county may experience:

- Workforce/labor shortages as more people in the county reach retirement age (65 and older).
- Greater demands on services for older households.
- Housing shortages, driven in part by retirees choosing to age in place and not freeing up their housing for younger households.

The anticipated decrease in the percent of total households with children can be correlated to an increasing percent of total households, ages 65 and older. Older households typically do not have children at home. Therefore, as the number of older households in Garfield County grows, the number of households with children will decline. Another factor contributing to this trend is the decline in the percent of total households in the county, ages 64 and younger. With less of these households, there will be fewer households that would be more likely to have children.

III. CHANGE IN TOTAL POPULATION BY LOCATION

The SDO estimates that between 2000 and 2017 the total population in Garfield County increased by 14,927. Over this period, population growth in the county was distributed as follows:

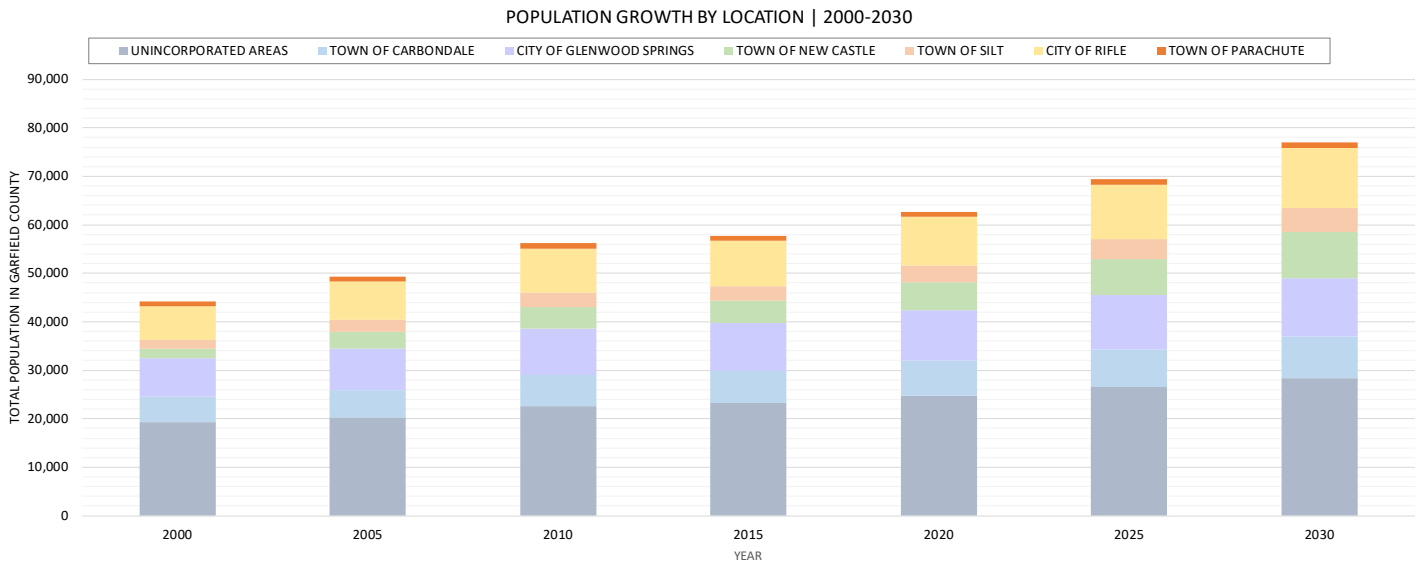
- The unincorporated areas of the county grew by 4,536 people.
- The Town of Carbondale grew by 1,549 people.
- The City of Glenwood Springs grew by 2,093 people.
- The Town of New Castle grew by 2,748 people.
- The Town of Silt grew by 1,341 people.
- The City of Rifle grew by 2,558 people.
- The Town of Parachute grew by 102 people.

Using the 2000-2017 data from the SDO, average annual growth rates for the towns, cities and unincorporated areas of Garfield County were calculated. The results of that work showed that between 2000-2017 the average annual growth rates were:

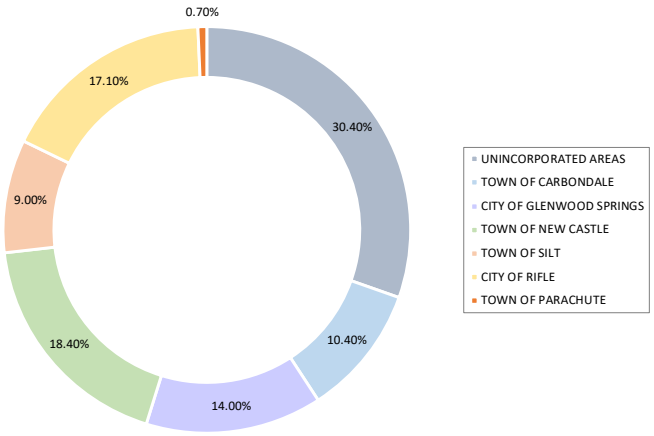
- 1.33% for unincorporated areas of the county.
- 1.78% for the Town of Carbondale.
- 1.44% for the City of Glenwood Springs.
- 5.2% for the Town of New Castle.
- 3.48% for the Town of Silt.
- 2.05% for the City of Rifle.
- 0.52% for the Town of Parachute.

2017-2030 population forecasts were calculated for the towns, cities and unincorporated areas using the 2000-2017 average annual growth rates. The total population growth projected for Garfield County between 2017-2030 is 17,812. The projected distribution of this future growth is as follows:

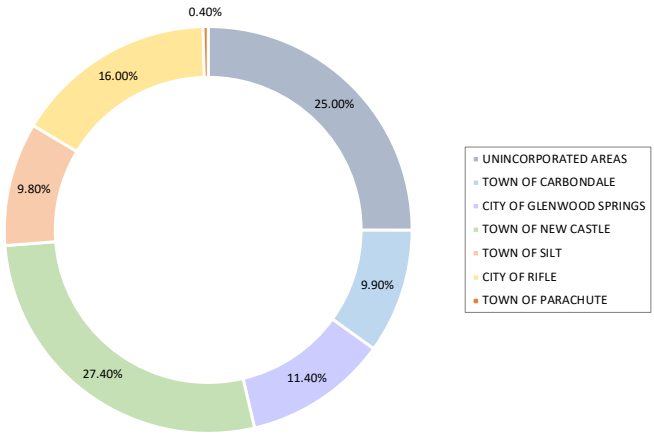
- Unincorporated areas of the county will grow by 4,460 people.
- The Town of Carbondale will grow by 1,756 people.
- The City of Glenwood Springs will grow by 2,037 people.
- The Town of New Castle will grow by 4,879 people.
- The Town of Silt will grow by 1,746 people.
- The City of Rifle will grow by 2,857 people.
- The Town of Parachute will grow by 77 people.



PERCENT OF TOTAL POPULATION GROWTH | 2000-2017



PERCENT OF TOTAL POPULATION GROWTH | 2017-2030



Based on the growth projections, it is estimated that the western part of Garfield County (i.e. the Town of New Castle to the Town of Parachute) will account for roughly 54% of total growth between 2017 and 2030. That equates to +/- 9,559 people. The Town of Carbondale and City of Glenwood Springs are projected to account for 21% (+/- 3,793 people) of future growth. The unincorporated areas of the county are projected to account for 25% (+/- 4,460 people) of future growth. These projections indicate that the county's population center could continue shifting west to the New Castle to Parachute area.

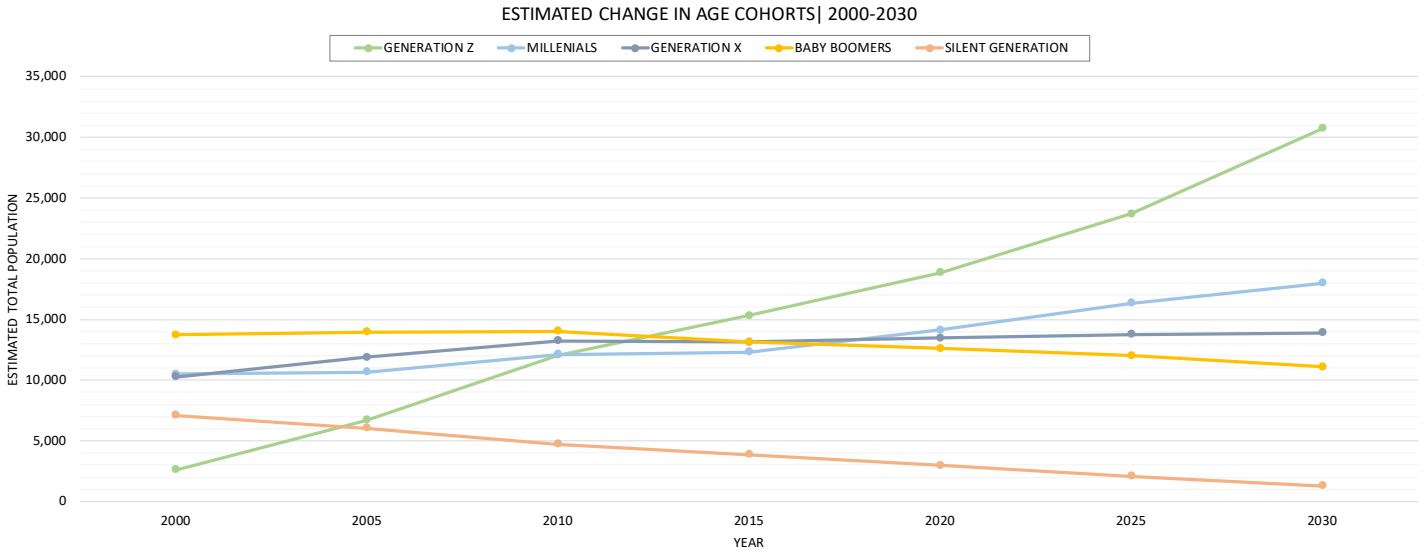
IV. CHANGE IN GENERATIONAL COMPOSITION

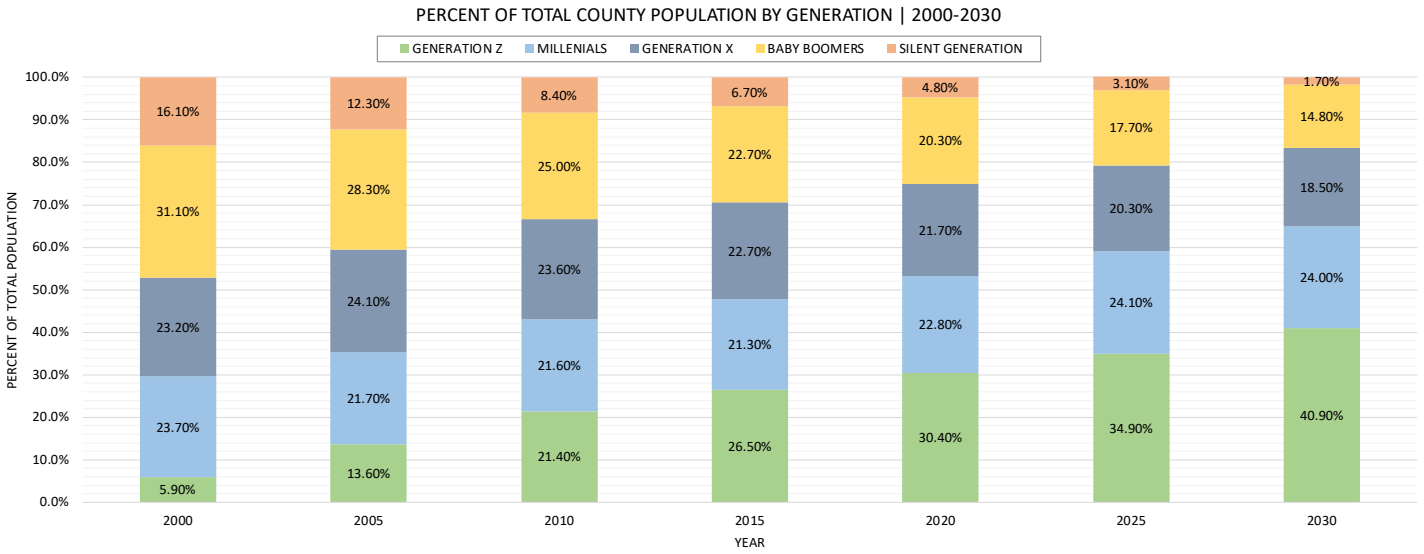
Generations in Garfield County are defined as:

- "Generation Z"- people born in 1997 or later.
- "Millennials" or "Generation Y"- people born between 1981 and 1996.
- "Generation X"- people born between 1965 and 1980.
- "Baby Boomers"- people born between 1946 and 1964.
- "The Silent Generation"- people born between 1928 and 1945.

Data from the SDO were used to estimate change in the percent of Garfield County's total population, by generation, between 2000 and 2030. Those estimates indicate that the composition of the county's total population will change as follows:

- Generation Z will increase by 35%.
- Millennials/Generation Y will increase by 0.3%.
- Generation X will decline by 4.7%.
- Baby Boomers will decline 16.3%.
- The Silent Generation will decline 14.3%.





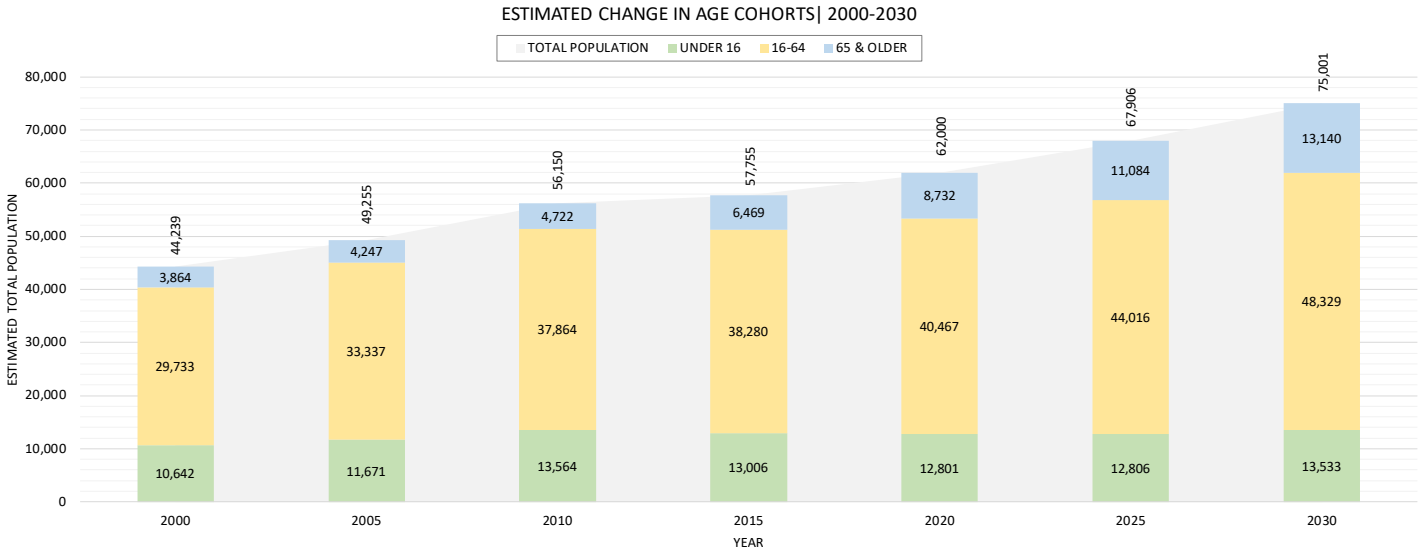
The changing generational composition of Garfield County's population is an important factor to consider in planning for the county's future. Specifically, Millennials and Generation Z are growing in influence and the demand they are generating is resulting in shifting market trends.

V. CHANGE IN WORKING AGE COHORT

The SDO estimates that between 2000 and 2030 age cohorts in Garfield County will change as follows:

- The 16 and under population will decline 6%.
- The 16-64 population will decline 2.8%.
- The 65 and older population will grow by 8.8%.

People in Garfield County that are in the 16-64 age cohort are considered to be of working age, while people in the 65 and older age cohort are considered to be of retirement age.



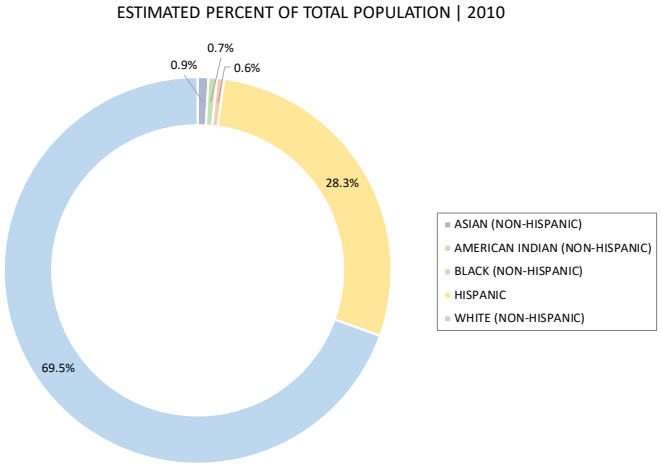
Declining growth in the county's working age population and a growing retirement population could impact Garfield County in a variety of ways, including:

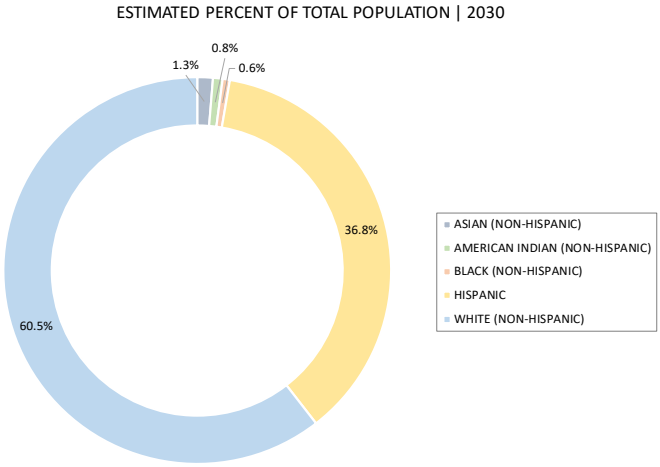
- Potential workforce/labor shortages.
- Greater demands on services for older populations, which in turn could result in more retiree generated jobs.
- Less disposable income resulting from a drop in the working age population and growth in the retiree population, many of whom may be living on a fixed income.
- Housing shortages, driven in part by retirees choosing to age in place and not freeing up their housing for the working age population.

VI. CHANGE IN RACIAL COMPOSITION

The SDO estimates that between 2010 and 2030 the percent of Garfield County's total population, by race, will change as follows:

- The American Indian (non-Hispanic) population will grow 0.1%.
- The Asian (non-Hispanic) population will grow 0.4%.
- The Black (non-Hispanic) population will remain unchanged.
- The Hispanic population will grow 8.5%.
- The White (non-Hispanic) population will decline 9%.





The changing racial composition of Garfield County, specifically continued growth in the percent of the total population that is Hispanic could have a number implications over the coming years.

B. LAND USE

Garfield County comprises roughly 2,958 square miles or, 1,893,120-acres. Approximately 62% (1,166,165-acres) of the county is public land and the remaining 38% (726,955-acres) is privately owned. Table 1 presents a breakdown of property ownership in Garfield County. Table 2 offers a breakdown of land uses on privately owned land in the county. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for additional information about property ownership and land uses.

Table 1: Summary of Property Ownership in Garfield County

Property Ownership	Approximate Acreage	Approximate Percent of Land in Garfield County	General Location(s) of Property Ownership in Garfield County
1. Public Lands	1,166,165-acres	62%	The majority of public lands are located: • North of the City of Glenwood Springs, Town of New Castle, Town of Silt and City of Rifle. • Between the Town of Parachute and the western county boundary. The remainder of public lands are west of the Town of Carbondale and southeast of the Town of Parachute.
a. Bureau of Land Management (BLM)	602,945-acres	52%	The bulk of BLM lands are located between the Town of Parachute and the western county boundary. The remaining BLM lands are: • North of the City of Glenwood Springs, Town of New Castle, Town of Silt and City of Rifle. • North of the Town of Carbondale. • West of the Town of Carbondale and southeast of the Town of Parachute.
b. Bureau of Reclamation	0.2-acres	0.0002%	The small amount of land held by the Bureau of Reclamation is located to the east of Rifle Garfield County Regional Airport.
c. US Forest Service (USFS)	511,606-acres	44%	USFS lands are: • North of the City of Glenwood Springs, Town of New Castle, Town of Silt and City of Rifle. • West of the Town of Carbondale and southeast of the Town of Parachute, along the southern county boundary.
d. US Naval Oil Shale Reserve	51,614-acres	4%	The US Naval oil Shale Reserves are located northeast of the Town of Parachute.
2. Private Ownership	726,955-acres	38%	Private lands are primarily: • In the Roaring Fork and Colorado River valleys. • Northeast of the Town of Carbondale and southeast of the City of Glenwood Springs. • South of the Town of New Castle, Town of Silt and City of Rifle. • Northwest of the Town of Parachute.

Data Source(s): Garfield County Assessor and GIS Department

Table 2: Summary of Land Uses on Privately Owned Land in Garfield County

Type of Land Use	Approximate Acreage	Approximate Percent of Land in Garfield County	General Location(s) of Land Use in Garfield County
1. Agricultural Uses	497,403-acres	26.3%	Agricultural uses are generally concentrated in areas: • North, east and west of the Town of Carbondale. • East of Glenwood Springs. • Southeast of the Town of New Castle. • Along the Colorado River between the Town of New Castle and Town of Parachute. • South of the City of Rifle and Town of Silt. • Northwest of the Town of Parachute.
2. Commercial Uses	5,219-acres	0.3%	Commercial uses are primarily in the towns and cities in the county. There are select pockets of commercial uses located: • East of the Town of Carbondale. • In between the Town of Carbondale and City of Glenwood Springs. • East of Glenwood Springs (i.e. Bair Ranch). • Southwest and southeast of the Town of Parachute.
3. Industrial Uses (ex. Utilities, Energy Development Facilities, Railroad Facilities, etc.)	59,693-acres	3.2%	The majority of industrial uses are located north/ northwest of the Town of Parachute. There are areas of industrial uses: • East of the Town of Carbondale. • In between the Town of Carbondale and City of Glenwood Springs. • Scattered throughout the City of Glenwood Springs. • Along the Town of New Castle's southern boundary. • In and around the Town of Silt and City of Rifle.
4. Recreation Uses (ex. Golf Courses, Ski Sunlight, etc.)	19,365-acres	1%	Recreation uses can be found in the Town of Carbondale, City of Glenwood Springs, Town of New Castle and Town of Silt. They are also: • West of Carbondale (i.e. Ski Sunlight). • In between the Town of Carbondale and City of Glenwood Springs. • North of the City of Rifle (i.e. Rifle Golf Course). • West of the Town of Parachute.
5. Residential Uses: Single-Family	47,249-acres	2.5%	Single-family residential uses are generally located in the towns and cities in the county. Areas of single-family residential uses can also be found: • Northeast of the Town of Carbondale. • In between the Town of Carbondale and City of Glenwood Springs. • Along Canyon Creek. • North of the Town of New Castle. • South of the City of Glenwood Springs.

Table 2: Summary of Land Uses on Privately Owned Land in Garfield County (continued)

Type of Land Use	Approximate Acreage	Approximate Percent of Land in Garfield County	General Location(s) of Land Use in Garfield County
5. Residential Uses: Single-Family (continued)			• North and south of the Town of Silt. • North and south of the City of Rifle. • In between the City of Rifle and Town of Parachute.
6. Residential Uses: Other (ex. Duplex, Triplex, Condominiums, Multi-Unit Buildings, etc.)	2,342-acres	0.1%	Other residential uses are in the towns and cities in the county, as well as: • In between the Town of Carbondale and City of Glenwood Springs. • South of the Town of Parachute. • In small pockets scattered throughout the county.
7. Vacant Land (Note: this includes lands that are owned by Garfield County, the towns and cities in the county and Colorado Parks and Wildlife.)	95,684-acres	5.1%	Vacant land is located: • West of the Town of Carbondale. • In between the Town of Carbondale and City of Glenwood Springs. • East and west of the City of Glenwood Springs. • South and northwest of the Town of New Castle. • North and south of the Town of Silt and City of Rifle. • North, east, south and west of the Town of Parachute.

Data Source(s): Garfield County Assessor and GIS Department

C. MUNICIPAL AND SPECIAL DISTRICT GROWTH AREAS, REQUIREMENTS, GOALS & POLICIES

Similar to Garfield County, each town and city in the county has prepared and adopted a Comprehensive Plan. These plans typically set forth:

- The town or city's future growth areas.
- The community's vision and goals for land uses both within and adjacent to the existing municipal boundaries.
- The criteria/requirements for annexation of land into the town or city.
- The town or city's intergovernmental goals and/or policies.

The special districts in Garfield County that provide water and sewer service (Mid Valley Metropolitan District, Roaring Fork Water and Sanitation District and Battlement Mesa Metropolitan District) have requirements and/or policies that they've adopted to regulate the expansion of district services.

The tables on the following pages summarize key elements from municipal Comprehensive Plans and special district rules and regulations that work to guide growth/expansion over the coming years. Future growth in Garfield County has the potential to impact local municipalities and special districts and vice versa. Therefore, the county, municipalities and special districts could benefit from collaborative efforts to plan for future growth. The information presented in the following tables may be helpful in informing any collaborative planning efforts that are pursued.

1. Town of Carbondale

Table 3: Summary of the Town of Carbondale's Growth Areas

Growth Areas	Description
1. Phase 1 Potential Annexation: Infill Areas	Phase 1 potential annexation areas are intended to promote infill and redevelopment on properties adjacent to Carbondale that currently function as part of town, but are not yet annexed. These areas were identified as the most logical for annexation because infill and redevelopment in these locations would maintain the town's compact footprint and promote walking and biking.

Table 3: Summary of the Town of Carbondale's Growth Areas (continued)

Growth Areas	Description
1. Phase 1 Potential Annexation: Infill Areas (continued)	An existing pattern of mixed density and fragmented ownership means that annexation and redevelopment could span decades of incremental change in some Phase 1 areas. Phase 1 areas identified in the town's 2013 Comprehensive Plan include the Colorado Rocky Mountain School.
2. Phase 2 Potential Annexation: Infill Areas	Phase 2 potential annexation areas are those where future redevelopment or demand for town sewer service could motivate petitions for annexation. The public benefit of Phase 2 areas are fewer than those associated with Phase 1 areas, reducing the level of priority. Phase 2 areas identified in the town's 2013 Comprehensive Plan include the Satank neighborhood and the mobile home park adjacent to the Red Rock Diner.
3. Phase 3 Potential Annexation: Conservation Development	Phase 3 potential annexation areas are intended to incentivize conservation development while allowing for limited expansion of Carbondale's footprint on the southern edge of town.

Data Source(s): 2013 Town of Carbondale Comprehensive Plan (https://www.carbondalegov.org/departments/planning/comprehensive_plan.php)

Table 4: Summary of the Town of Carbondale's Annexation Criteria/Requirements

Annexation Criteria/Requirements

The town's 2013 Comprehensive Plan recommends that the following criteria be taken into consideration during the annexation review process:

- Annexations should be reviewed by the town concurrently with development proposals for the property.
- Annexation/developments should promote multi-modal transportation by connecting to and enhancing the town's pathways, sidewalks, streets and transit systems.
- Annexation/developments should not adversely affect the town's fiscal conditions.
- Annexation/development should not degrade public infrastructure or level of service. An objective evaluation of the fiscal impacts of annexations should be included in the decision-making process.
- Annexation/development should include at least one (1) of these valued assets:
    1. Public trails, priority public open space, or public parks, all exceeding the minimum requirements of the municipal code.
    2. Affordable or attainable housing exceeding the minimum requirements of the municipal code.
    3. Agricultural land conservation.
- Development should avoid the floodplain, steep slopes and geologic hazard areas (rock-fall, landslides, debris flows, avalanches, expandable/collapsible soils, unstable slopes).

Data Source(s): 2013 Town of Carbondale Comprehensive Plan (https://www.carbondalegov.org/departments/planning/comprehensive_plan.php)

Table 5: Summary of Town of Carbondale's Intergovernmental Coordination Goals & Policies

Intergovernmental Coordination Goals & Policies

According to the Town of Carbondale's 2013 Comprehensive Plan, an Intergovernmental Agreement (IGA) for Development was established between Garfield County and its municipalities in 2001. This IGA established a protocol for referring applications for development in the county to nearby municipalities for review and comment. Carbondale supports this referral arrangement and the opportunity to comment on land use changes near town.

A map of "significant parcels" (i.e. the remaining in-tact, large private parcels near Carbondale) is included in Carbondale's 2013 Comprehensive Plan. Carbondale views these parcels as important components of the current and future geography of the town. By identifying these parcels in the plan, the town's intent is for the county and town to coordinate on planning for future development of these properties.

With the exception of certain areas specified in the town's 2013 Comprehensive Plan, the town has an expressed interest in Garfield County implementing the clustering policies included in Chapter 2 of the adopted 2010 Garfield County Comprehensive Plan on the significant parcels identified in Carbondale's plan. The town also urges Garfield County to consider the impacts of commercial and industrial development on traffic loads and safety on town streets, safety on town pathways, dark skies, noise, wildlife habitat, hazardous materials transport and storage in/near town, air and water quality and protection of scenic resources and scenic quality, particularly around the gateways into town.

Data Source(s): 2013 Town of Carbondale Comprehensive Plan (https://www.carbondalegov.org/departments/planning/comprehensive_plan.php)

2. City of Glenwood Springs

Table 6: Summary of the City of Glenwood Springs' Growth Areas

Targeted Growth & Development Areas	Description
1. Urban Growth Boundary (UGB)	The city's 2011 Comprehensive Plan describes and depicts Glenwood Springs' Urban Growth Boundary (UGB). The city's UGB represents an area that has been identified as suitable for urban development. The city's Future Land Use Map includes a number of relatively small unannexed properties within the UGB. Urban development is anticipated on these properties and is intended to occur through annexation and extension of municipal services. The city has an expressed interest in development outside of the UGB, but within the three-mile Area of Influence, being rural in nature, or clustered in areas where there are existing roads and central water/sewer services in order to leave the majority of the land undeveloped or dedicated as open space.
2. Downtown	Downtown is identified as the city's primary commercial center. Within the downtown, the Comprehensive Plan encourages redevelopment of existing buildings for affordable housing through incentives such as allowing greater densities and taller buildings than would otherwise be permitted.
3. Secondary Commercial Centers	The city's Comprehensive Plan encourages mixed-use redevelopment in the secondary commercial centers identified. The plan also recommends that sub-area plans be developed for each of these areas in order to determine the appropriate mix of uses and character of development. Secondary commercial centers identified on the Future Land Use Map for Glenwood Springs include: • The Roaring Fork Marketplace. • The "Confluence Area" (i.e. the area adjacent to the confluence of the Colorado and Roaring Fork rivers). • Commercial areas in the vicinity of Grand Avenue at 14th and 20th Streets • Glenwood Meadows. • The Glenwood Springs Mall area.
4. Municipal Airport	The city's Comprehensive Plan identifies the 64-acre municipal airport as an area that could be redeveloped into a mixed-use neighborhood but also recognizes the potential economic benefits of aviation in Glenwood Springs. The city is currently in the process of studying redevelopment options for the municipal airport.
5. Highway 6 Corridor	The city's Comprehensive Plan identifies the Highway 6 corridor as a mixed-use area.

Data Source(s): 2011 City of Glenwood Springs Comprehensive Plan; and, City of Glenwood Springs (http://www.ci.glenwood-springs.co.us/321/Long-Range-Planning)

Table 7: Summary of the City of Glenwood Springs' Annexation Criteria/Requirements

Annexation Criteria/Requirements
The 2011 Comprehensive Plan sets forth the city's position on annexation: • Within the UGB, annexation is preferred over development through Garfield County, unless there are extenuating circumstances and significant public benefit to do otherwise. • Annexation will occur through petition of the land owner(s). While it is not the intent of the city to compel annexation, the city reserves the prerogative to initiate annexation if found to be in the best interest of the community. • The city will consider annexation only within the UGB unless there is a compelling public benefit to consider annexation of a parcel outside the boundary. • The city is required to serve annexed parcels with infrastructure (electricity, water, wastewater) and services (police, emergency and other urban services) in a manner that is cost-effective and that does not unduly burden Glenwood Springs residents. • The city encourages and supports the annexation of the property immediately north of the Glenwood Mall to facilitate a compatible/ coordinated mixed-use development. • The city should work with Garfield County to jointly adopt a major street plan for the Bershenyi Ranch/Elk Meadows property that will assure mutual commitment to a unified vision for development and open space. The city's Comprehensive Plan identifies the area around Highway 82 and Red Canyon Road (County Road 115) as a future annexation area. The plan also states that although the city has entered into a pre-annexation agreements with some subdivisions along Four Mile Road and has extended sewer service to these areas, the City of Glenwood Springs does not intend to annex these properties in the foreseeable future.

Data Source(s): 2011 City of Glenwood Springs Comprehensive Plan; and, City of Glenwood Springs (http://www.ci.glenwood-springs.co.us/321/Long-Range-Planning)

3. Town of New Castle

Table 8: Summary of the Town of New Castle's Growth Areas

Growth Areas	Description
1. Urban Growth Boundary (UGB)	The town's 2009 Comprehensive Plan depicts New Castle's Urban Growth Boundary (UGB), which defines the limits of municipal growth. The town's general policy is to concentrate higher densities in and around the geographic center of New Castle. Densities are intended to decrease the closer development comes to the UGB. Development outside the UGB is to retain a rural residential and agricultural character.
2. Primary Growth Areas	Primary future growth areas identified in New Castle's 2009 Comprehensive Plan include: • East and north of the Colorado River, to a point near the intersection of County Road 240 and Highway 6 & 24. • Approximately 1-mile west along Highway 6 & 24. • Approximately 1.25-miles northwest along County Rd. 245.
3. Areas Outside of "Primary Growth Areas"	The town's Comprehensive Plan states that lands beyond the "Primary Future Growth Areas" should remain outside future municipal boundaries with the exception of properties east of the I-70 interchange and south of the Colorado River along County Road 335. This area has constraints due to single access, poor road condition and distance from municipal utilities/services. Annexation of these lands is a low priority because of these constraints.

Data Source(s): 2009 Town of New Castle Comprehensive Plan (https://newcastlecolorado.org/departments/planning)

Table 9: Summary of the Town of New Castle's Annexation Criteria/Requirements

Annexation Criteria/Requirements
All annexations to the Town of New Castle follow the requirements of Article 12 of Title 31 of the Colorado Revised Statutes as amended. The 2009 Comprehensive Plan sets forth a number of policies regarding annexation that include: • All new annexations shall be located within the UGB and contiguous to the existing municipal limits (Policy CG-2B). • New Castle will grow in logical increments out from the existing urban core to provide cost-effective infrastructure extensions, provision of services and sequential growth (Policy CG-3A). • Flagpole annexations resulting in "leap-frog" growth will be discouraged (Policy CG-3B). • Annexation development applications shall pay for a fiscal impact analysis analyzing, at a minimum, municipal revenues, expenditures, service delivery impacts, infrastructure impacts and other development-related impacts to ensure that a development will provide an overall benefit to the community and will not result in diminished levels of service or financial costs to New Castle (Policy CG-3C). • Annexation of new territory will be considered based upon an identified community need. Infill of existing undeveloped areas larger than 1-acre inside the municipal boundary is the highest priority (Policy CG-3E). • New annexations shall not decrease the existing levels of service to New Castle including utilities, emergency services, parks, open space, trails, law enforcement, town administration and schools (Policy CG-3F). • Annexed properties shall provide adequate legal water rights and physical water dedications required for raw water irrigation (Policy I-1G).

Data Source(s): 2009 Town of New Castle Comprehensive Plan (https://newcastlecolorado.org/departments/planning)

Table 10: Summary of Town of New Castle's Intergovernmental Coordination Goals & Policies

Intergovernmental Coordination Goals & Policies
The 2009 Comprehensive Plan presents policies regarding coordination on growth between the town and Garfield County that include: • New Castle will work with Garfield County to develop an expanded and updated intergovernmental agreement pertaining to new growth, infrastructure and demands placed on each entity by development (Policy IGC-1A). • A New Castle- Garfield County intergovernmental agreement (IGA) will support coordinated regional planning that is in the best interests of county residents (municipal & unincorporated) to ensure that costs of new development are not borne by existing residents (Policy IGC-1B). • Development outside town limits and within the UGB not eligible for annexation shall be reviewed jointly by the town and county under the auspices of an intergovernmental agreement (IGA) to ensure compliance with the comprehensive plan, adequate provision of municipal infrastructure/services and future urbanization (Policy CG-2C).

Table 10: Summary of Town of New Castle's Intergovernmental Coordination Goals & Policies (continued)

Intergovernmental Coordination Goals & Policies (continued)
• New Castle shall work cooperatively with other government or quasi-governmental agencies through adopted intergovernmental agreements (IGAs) to achieve compliance with the provisions of the comprehensive plan in areas outside of the incorporated area and within a 3-mile radius of the municipal boundary (Policy CG-6B).

Data Source(s): 2009 Town of New Castle Comprehensive Plan (https://newcastlecolorado.org/departments/planning)

4. Town of Silt

Table 11: Summary of the Town of Silt's Growth Areas

Growth Areas	Description
1. Tier I	Tier I is the town's priority growth area. This area is within a half (1/2) of a mile of existing town services, which enables the town to plan for and provide new services efficiently. Extending urban services beyond the Tier I area is something that the town could consider; however, development must pay the full costs of doing so. As Silt's downtown core grows, the Comprehensive Plan is to be amended to: • Expand Tier I to include the new downtown development. • Expand Tier II to a half (1/2) of a mile from existing infrastructure.
2. Tier II	Tier II is Silt's secondary growth area. This area has sufficient land to serve approximately twenty-five (25) years of growth in Silt and existing infrastructure is within one (1) mile. There are limitations to growth in Tier II as a gradual progression of growth from Tier I and II is recommended. Properties in Tier II can become eligible for annexation upon approval of an overall concept plan that addresses all issues associated with annexation. Upon annexation, the Comprehensive Plan shall be amended to: • Expand Tier I to include the new neighborhood. • Expand Tier II to a half (1/2) of a mile from existing infrastructure.
3. Tier III	The Tier III growth area contains all remaining lands within the Town of Silt's Planning Area. These area would require significant capital investments to provide public services.

Data Source(s): 2017 Town of Silt Comprehensive Plan (https://townofsilt.org/comprehensive_plan1)

Table 12: Summary of the Town of Silt's Annexation Criteria/Requirements

Annexation Criteria/Requirements
The Town of Silt requires applicants for annexation to participate in a pre-application conference with staff to determine if the proposed property is subject to annexation- both in terms of state statutes and the town's Comprehensive Plan. If the property is deemed suitable for potential annexation, the applicant may submit an application for annexation to the town. Upon submittal, an application for annexation is subject to the town's review process. The Silt Municipal Code requires an owner/developer of property requesting water services from the town to dedicate actual water rights or a fee "in lieu" of water rights. The dedication of water rights can occur as a result of annexation or as a result of increase in the intensity of use on a property. The town's 2017 Comprehensive Plan sets forth a number of policies and actions regarding annexation that include: • Reviewing annexation requests to ensure relative conformance with the adopted Comprehensive Plan (Policy A3). • Expanding the town's annexation review criteria to encourage annexations that meet the following criteria: a) adjacency to the town limits, b) location within Tier 1, c) provision of economic benefits to the town, d) efficient provision of public facilities and services. Only annex properties that meet those criteria (Action A3.1). • Requiring annexation applications to include concept plans and commit to a regulating plan that conforms to the intent of the Future Land Use Plan before annexing the subject property into Silt (Action A3.2). • Following the standard within the Silt Municipal Code for the level of service that should be provided for all public facilities and services (water, sewer, storm water, parks, streets, trails, police, and fire protection) prior to consideration of annexation of new properties (Action A2.1). • Requiring new development and annexations to contribute to the acquisition of land for public open space (Action G4.3).

Data Source(s): 2017 Town of Silt Comprehensive Plan (https://townofsilt.org/comprehensive_plan1)

Table 13: Summary of Town of Silt's Intergovernmental Coordination Goals & Policies

Intergovernmental Coordination Goals & Policies
The 2017 Comprehensive Plan recommends that the Town of Silt enter into Intergovernmental Agreements with the surrounding municipalities and Garfield County to help ensure that the town has input on any potential development applications in the Tier III area since changes in land use and transportation systems will directly affect Silt. The town's Comprehensive Plan also sets forth several policies and future land use designations related to growth in unincorporated areas near Silt: • Foster cooperation with adjacent municipalities and the county in establishing and/or updating intergovernmental agreements relating to issues such as community boundaries, revenue sharing, regional trail construction, compact urban development and provision of public facilities and services (Action A1.4). • **Agricultural/Rural Residential Reserve.** The town's future land use designation for properties that may develop on a small scale within the county. These lands are critical for the town because they serve as a buffer between urban and rural land uses. The town has an expressed interest in these areas remaining as a buffer until the town has adequately developed and/or re-developed its infill lots. • **Natural Resource Extraction - Future Public/Quasi-Public Parks and Open Space.** The town's future land use designation for properties that are existing or future natural resource extraction areas, which could be acquired by a public or quasi-public entity after the natural resources are extracted. These lands could then be converted to a use that benefits the public, such as a park, open space area or wildlife habitat protection area.

Data Source(s): 2017 Town of Silt Comprehensive Plan (https://townofsilt.org/comprehensive_plan1)

5. City of Rifle

Table 14: Summary of the City of Rifle's Growth Areas

Growth Areas	Description
1. Tier 1: Priority Growth Area	The following criteria was considered in identifying the City of Rifle's Tier 1 growth areas: • The area is either annexed or eligible for annexation. • The area is directly adjacent to existing neighborhoods. • The area is served by existing infrastructure (water, sewer, streets). Additional infrastructure can realistically be funded. • The area has proximity to schools, parks, civic destinations, and businesses (1/4 mile walkshed). • The lots are of a size, shape, and pattern conducive to neighborhood-style development. Tier 1 growth areas in Rifle are expected to be sufficient to absorb the city's expected growth over the next twenty (20) years. This includes 1,500- 2,000 residential units, over 100 acres of commercial property, and 700- 900 acres of industrial property.
2. Tier 2: Secondary Growth Area	Tier 2 growth areas represent a second ring of development that does not meet Tier 1 criteria. Properties in the Tier 2 areas generally require major infrastructure improvements or extensions that may be unaffordable. In addition, Tier 2 areas may not be conducive to high quality of life neighborhoods. The policy of the City of Rifle is that Tier 2 properties are unlikely to be preferable for development within the twenty (20) year time frame of the 2019 Comprehensive Plan update.
3. Tier III: Rural Preservation Reserve	The Tier 3 Rural Preservation Reserve represents a tertiary ring of land that should be preserved in agricultural use for the foreseeable future. Any development that may occur should utilize low-density clustered growth options that allow for long-term future city development.

Data Source(s): 2019 Draft City of Rifle Comprehensive Plan (https://www.rifleco.org/150/Long-Range-Planning)

Table 15: Summary of the City of Rifle's Annexation Criteria/Requirements

Annexation Criteria/Requirements
The City of Rifle's Tiered Growth System encourages infill development and discourages leap-frog development on the fringes of the community. This principle ensures that development can be served by public infrastructure in a cost-effective manner and preserves open spaces and agricultural lands that are not currently suitable for urban development. The City of Rifle will only annex properties that are identified as Tier 1 growth areas. Annexation of Tier 1 properties must provide substantial benefit to the community (ex. desirable housing, water rights, new employment opportunities, or commercial properties with positive sales tax implications). Even within Tier 1, there is no guarantee that a request for annexation will be approved by the city.

Data Source(s): 2019 Draft City of Rifle Comprehensive Plan (https://www.rifleco.org/150/Long-Range-Planning)

Table 16: Summary of City of Rifle's Intergovernmental Coordination Goals & Policies

Intergovernmental Coordination Goals & Policies
In 2007 Rifle entered into an intergovernmental agreement (IGA) with Garfield County regarding joint planning and review. The IGA and collaboration between the city and Garfield County has resulted in a strong working relationship between the town entities. The county's practice has been to consult the city's Comprehensive Plan and recommendations in reviewing land use applications within Rifle's Area of Influence. This ensures that patterns of development in the county accommodate the future growth of Rifle. There are many instances where City-County coordination is important. For example it is common practice to subdivide larger tracts of land in unincorporated Garfield County into 1 or 2 acre lots. As a result of Rifle's IGA with Garfield County, the city is able to review and comment on these type of subdivisions within the city's Sphere of Influence. For properties within Tier 1 and 2 growth areas, the city would recommend against this kind of subdivision. In Tier 3 growth areas, the city finds review on a case by case basis to be appropriate.

Data Source(s): 2019 Draft City of Rifle Comprehensive Plan (https://www.rifleco.org/150/Long-Range-Planning)

6. Town of Parachute

Unlike the other municipalities in Garfield County, the Town of Parachute's 2015 Comprehensive Plan does not identify prioritized growth areas. The town's Comprehensive Plan does identify some areas of unincorporated Garfield County that the town should consider annexing. Those areas are described in Table 17.

Table 17: Summary of the Town of Parachute's Potential Annexation Areas

Growth Areas	Description
1. Battlement Mesa	The Town of Parachute's 2015 Comprehensive Plan explored the feasibility of annexing Battlement Mesa into Parachute. According to the town's plan, a legal framework exists and financial estimates provide a compelling reason for the Town of Parachute and Battlement Mesa to join together into a single community. The joint approach may provide for operating efficiencies that neither community could experience as separate entities. Annexation of Battlement Mesa by the Town of Parachute would bring with it multiple sources of new revenue and expenses. Other potential benefits from incorporation, include: • Improved local political representation and support. • Faster maintenance and support services (e.g. snow removal). • Improved access to grants and potential financing sources. • Ability to benefit from commercial and real estate development occurring within Battlement Mesa.
2. Unincorporated Areas Identified on Parachute's "Planning Area and Land Use Overview" Map	Industrial, Commercial/Light Industrial, Riverfront Mixed-Use and Mixed-Use areas shown on the town's "Planning Area and Land Use Overview" map are currently located outside Town limits. These areas should be considered for future annexation.
3. Unincorporated Areas Northwest of Parachute	There are several major employers located up the canyon just beyond the town's northern boundary. These employers include Solvay Chemicals, The Williams Companies, and Encana Natural Gas. Extending the Town boundaries an additional three (3) miles to the northwest to encompass these employers will provide property tax benefits to the Town, and the businesses will benefit from the Town's infrastructure connections.
4. Unincorporated Areas South of Parachute	The town's boundary currently extends approximately a 1/4-mile past the southwest interchange. Several employers and gas wells are located slightly further to the south and should be considered for inclusion in the town's annexation plans.

Data Source(s): 2015 Town of Parachute Comprehensive Plan (https://www.colorado.gov/pacific/parachutecolorado/town-parachute-comprehensive-plan)

Table 18: Summary of the Town of Parachute's Annexation Criteria/Requirements

Annexation Criteria/Requirements
The Town of Parachute follows the requirements for annexations set forth in the Colorado Revised Statutes (specifically § 31-12-101 et seq., C.R.S.). The Town of Parachute has the ability to enter into a pre-annexation agreement with a property owner. A pre-annexation agreement may establish the terms and conditions for annexation of land into Parachute.

Data Source(s): Town of Parachute

Table 19: Summary of the Town of Parachute's Intergovernmental Coordination Goals & Policies

Intergovernmental Coordination Goals & Policies
The Town of Parachute's 2015 Comprehensive Plan presents the following as a specific action that the town should work on in collaboration with Garfield County: • Determine the political will of Garfield County and Associated Government of Northwest Colorado (AGNC) officials to lobby the state for funding and support. The town's Comprehensive Plan also provides an detailed analysis of the potential pros/cons of Parachute annexing Battlement Mesa. The Battlement Mesa community is currently located in unincorporated Garfield County so annexation into Parachute would have implications for the county.

Data Source(s): 2015 Town of Parachute Comprehensive Plan (https://www.colorado.gov/pacific/parachutecolorado/town-parachute-comprehensive-plan)

7. Mid Valley Metropolitan District (MVMD)

Table 20: Summary of MVMD's Expansion Policies/Requirements

District Expansion Policies/Requirements
The MVMD does not actively pursue expansion, however the district's Board of Directors does see the role of the district to provide service when approached. The MVMD Rules and Regulations set forth requirements for the inclusion of land in the district, as well as requirements for the provision of water and sewer service outside of the district's boundaries. Those requirements include: • Any property owner who desires water and/or sewer service from the MVMD must submit an inclusion petition. Inclusion of property into the MVMD is accomplished in accordance with the provisions of C.R.S. §§ 32-1-401,et seq. If the inclusion petition is approved, the property owner must include the entirety of their property into the MVMD, unless the district determines, in its discretion, otherwise. In addition, the property owner may be required to agree to a number of requirements and fees imposed by the MVMD. • The MVMD may require an applicant for inclusion to enter into a pre-inclusion agreement with the district (pursuant to C.R.S. § 32-1-402(1)(c)) as a condition of the district's approval of the inclusion petition. • The MVMD requires new customers to dedicate water rights prior to the extension of treated water service. • Any developer applying for new water service from the MVMD and seeking approval of a proposed water system is required to include a raw water system as part of their proposed water system. The district may, at its option, require oversizing of any raw water main in order to provide for later connection to other development within or outside of the developer's property. • The MVMD requires a dedication or transfer of direct flow water rights to be used for raw water irrigation on the property to be served by the district prior to the district extending potable water service to the property. • The MVMD requires all customers to connect to both the district's water and sewer services, unless exceptional circumstances exist and written approval is provided by the district's Board of Directors. • The MVMD may, in its sole discretion, provide water and sewer service to properties located outside of the district's boundaries. No service will ever be provided to such properties, without the written consent of the MVMD Board of Directors. The MVMD is not required to extend service outside of the district's boundaries. Charges for water and sewer service and taps outside of the district are a minimum of one and a half (1.5) times the current service charges for in-district service.

Data Source(s): Mid Valley Metropolitan District; and, 2013 Mid Valley Metropolitan District Rules and Regulations (https://www.mvmdco.org/)

8. Roaring Fork Water and Sanitation District (RFWSD)

Table 21: Summary of RFWSD's Expansion Policies/Requirements

District Expansion Policies/Requirements
The RFWSD Rules and Regulations set forth requirements for the inclusion of land in the district, as well as requirements for the provision of water and sewer service outside of the district's boundaries. Those requirements include: • Any property owner who desires water and/or sewer service from RFWSD must submit an inclusion petition. Inclusion of property into the RFWSD is accomplished in accordance with the provisions of C.R.S. §§ 32-1-401,et seq. If the inclusion petition is approved, the property owner must include the entirety of their property into the RFWSD, unless the district determines, in its discretion, otherwise. In addition, the property owner may be required to agree to a number of requirements and fees imposed by the RFWSD. • The RFWSD may require an applicant for inclusion to enter into a pre-inclusion agreement with the district (pursuant to C.R.S. § 32-1-402(1)(c)) as a condition of the district's approval of the inclusion petition. • The RFWSD requires new customers to dedicate water rights prior to the extension of treated water service.

Table 21: Summary of RFWSD's Expansion Policies/Requirements (continued)

District Expansion Policies/Requirements
• Any developer applying for new water service from the RFWSD and seeking approval of a proposed water system must submit a report on the feasibility of raw water irrigation on the land to be served by the district. In the event a developer does not own any irrigation water rights at the report shall discuss the feasibility of raw water irrigation through a lease of raw water irrigation rights from the RFWSD, the use of wells, or a combination thereof, and shall discuss the existing and/or potential infrastructure for delivering raw irrigation water to the land. • The RFWSD Board of Directors may, in its discretion, require a developer to oversize any ditches, pipelines or appurtenant facilities at the developer's expense in order to allow the district to deliver raw irrigation water to other water users in the district. • The RFWSD Board of Directors may, in its discretion, require the dedication of irrigation water rights and associated facilities necessary to implement any raw water irrigation plan. The dedication of irrigation water rights is in addition to the dedication of water rights required for connecting to the district's potable water system. • The RFWSD requires all customers to connect to both the district's water and sewer services, unless exceptional circumstances exist and written approval is provided by the district's Board of Directors. • The RFWSD may, in its sole discretion, provide water and sewer service to properties located outside of the district's boundaries. No service will ever be provided to such properties, without the written consent of the district's Board of Directors. RFWSD is not required to extend service outside of the district's boundaries. Charges for water and sewer service and taps outside of the district are a minimum of one and a half (1.5) times the current service charges for in-district service.

Data Source(s): 2019 Roaring Fork Water and Sanitation District Rules and Regulations (http://rfwsd.com/index.php?page=RulesAndRegs)

9. Battlement Mesa Metropolitan District (BMMD)

Table 22: Summary of BMMD's Expansion Policies/Requirements

District Expansion Policies/Requirements
Information obtained from the BMMD regarding the district's expansion policies and requirements includes: • The BMMD has adopted policies for annexation of properties into the district, primarily those properties within the Battlement Mesa Planned Unit Development (PUD). There is a limited ability to annex properties outside the PUD.

Data Source(s): Battlement Mesa Metropolitan District

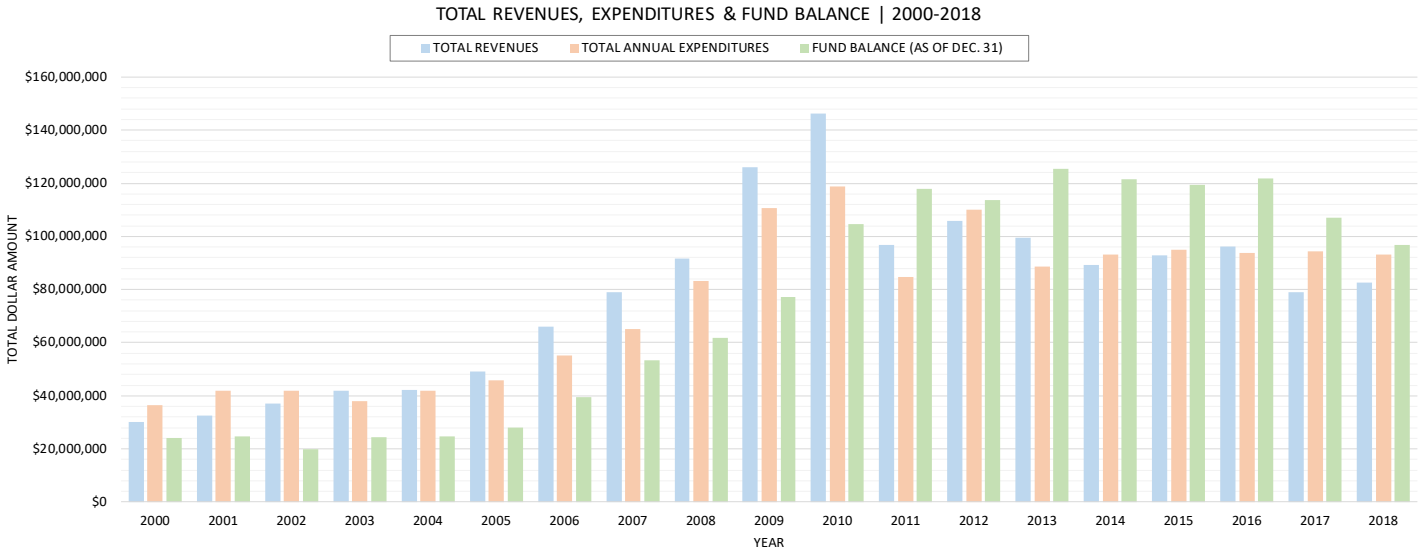
D. GARFIELD COUNTY FINANCES

I. TOTAL ANNUAL REVENUES, EXPENDITURES & FUND BALANCE

The Garfield County Finance Department reports that between 2000 and 2018:

- Total annual revenues have increased from $30,191,940 to $82,719,088.
- Total expenditures have increased from $9,935,598.00 to $93,078,045.00.
- The county's fund balance has increased from $24,234,872 to $96,702,548 (a change of $72,467,676).
- In 2010, total annual revenues peaked at $146,145,721.
- In 2012, 2014, 2015, 2017 and 2018 total annual expenditures have exceeded total annual revenues. This coincides with the decline in fund balance from $66,249,425 in 2012 to $44,336,435 in 2018.


Photo Credit: Western Slope Consulting



II. TOTAL ANNUAL TAX REVENUES

Data from the Garfield County Finance Department shows that between 2000 and 2018 total annual tax revenues in the county have increased from $12,844,500 to $44,336,435. Furthermore, between 2003 and 2018[1] the categories comprising the county's total annual tax revenues changed as follows:

- Total annual property tax revenues increased from $12,084,634 to $29,762,147.
- Total annual sales tax revenues have from increased from $4,795,781 to $11,337,745.
- Total annual specific ownership tax revenues have increased from $1,585,061 to $2,254,587.
- Total annual other/severance tax revenues have increased from $58,354 to $981,956.

NOTE:

[1]A breakdown of tax revenue data is not available for 2000-2002.

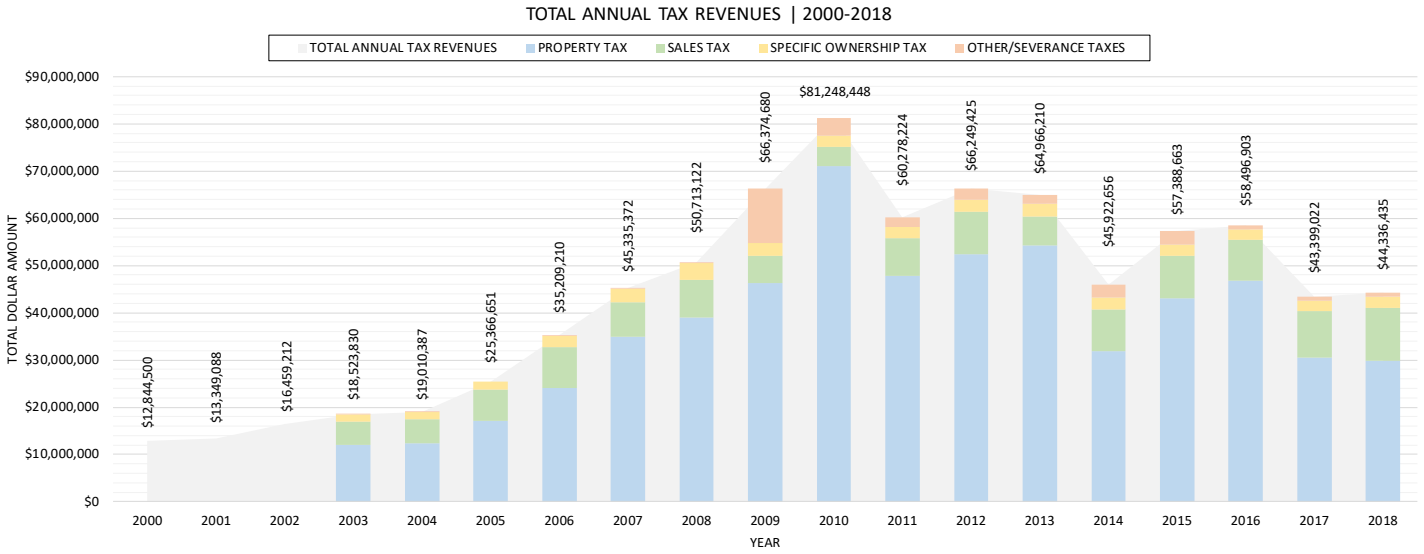


Table 23: Percent of Total County Tax Revenues (2003-2018)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Property Tax	65.2%	65.2%	67.6%	68.5%	77.2%	77.0%	69.7%	87.4%	79.3%	79.1%	83.5%	69.4%	74.9%	79.9%	70.3%	67.1%
Sales Tax	25.9%	26.7%	26.2%	24.6%	16.0%	15.7%	8.6%	5.0%	13.2%	13.7%	9.5%	19.3%	15.7%	14.8%	22.6%	25.6%
Specific Ownership Tax	8.6%	7.7%	6.2%	6.5%	6.5%	7.0%	4.1%	3.0%	4.1%	3.8%	4.0%	5.3%	4.3%	3.8%	5.4%	5.1%
Other/Severance Taxes	0.3%	0.3%	0.0%	0.4%	0.3%	0.3%	17.5%	4.6%	3.4%	3.5%	3.0%	6.0%	5.1%	1.5%	1.8%	2.2%

Data Source(s): Garfield County Finance Department

III. TOTAL ANNUAL ASSESSED VALUES

Data from the county Finance Department indicates that the total assessed value in Garfield County peaked in 2012 at $3,931,091,200. In 2012, the assessment of oil and gas production accounted for 54.3% of the total assessed value. As of 2018, the total assessed value in Garfield County was $2,377,611,310, $1,553,479,890 less than the peak in 2012.

Between 2000 and 2004, the assessment of oil and gas production accounted for between 12.8% and 25.3% of total assessed value in Garfield County. From 2005 to 2015, oil and gas accounted for between 40.2% and 61.4% of total assessed value. More recently, from 2016 to 2018, the assessment of oil and gas production has accounted for between 24.7% and 31.6% of total assessed value in the county.

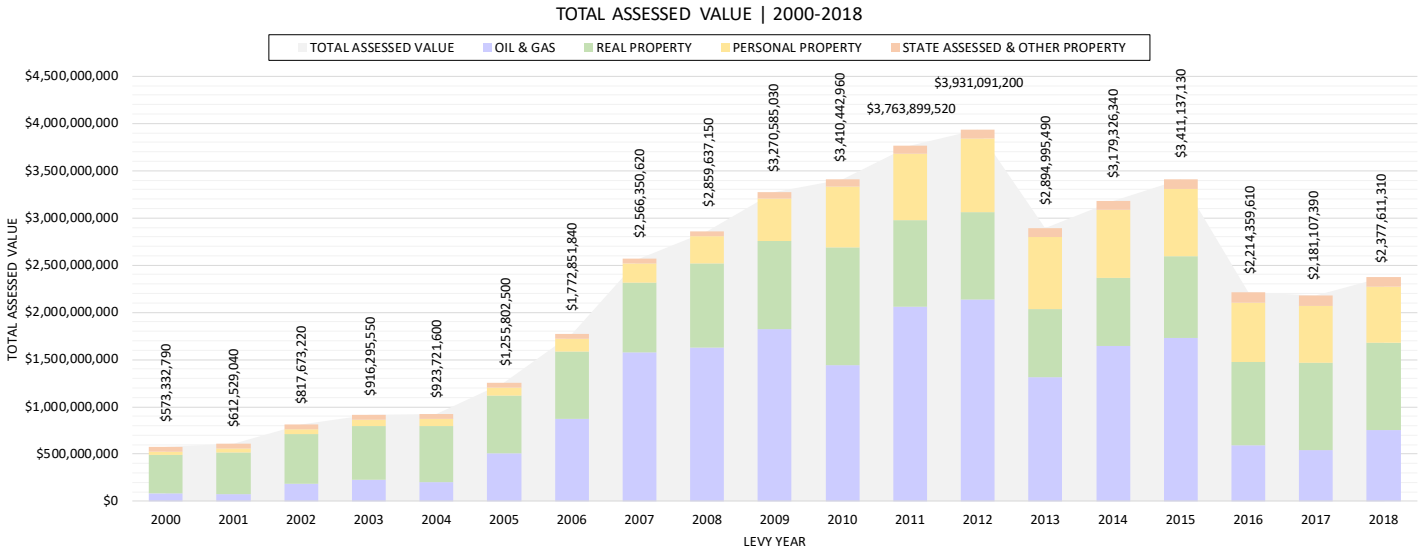


Table 24: Percent of Total Assessed Value (2000-2018)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Real Property	72.3%	72.0%	64.6%	61.3%	64.3%	48.8%	40.0%	28.8%	31.3%	28.5%	36.6%	24.3%	23.6%	24.9%	22.8%	25.5%	39.7%	42.7%	39.1%
Oil & Gas	14.1%	12.8%	22.6%	25.3%	21.9%	40.2%	49.4%	61.4%	56.8%	55.8%	42.2%	54.8%	54.3%	45.3%	51.7%	50.6%	26.9%	24.7%	31.6%
Personal Property	6.0%	6.8%	6.3%	7.5%	8.0%	6.9%	7.7%	7.8%	9.9%	13.7%	18.9%	18.7%	19.9%	26.4%	22.5%	20.8%	28.5%	27.5%	24.6%
State Assessed & Other Property	7.7%	8.4%	6.5%	5.9%	5.7%	4.0%	2.9%	2.0%	2.0%	1.9%	2.3%	2.2%	2.2%	3.3%	3.0%	3.1%	4.8%	5.1%	4.6%

Data Source(s): Garfield County Finance Department

IV. ANNUAL SALES TAX COLLECTIONS BY LOCATION

Between 2014 and 2018, the City of Glenwood Springs, the unincorporated areas of the county, the City of Rifle and the Town of Carbondale were the top (4) four contributors to Garfield County's sales tax collections. Over this period of time, sales tax collections from the:

- City of Glenwood Springs increased from $3,994,899.81 to $4,622,420.28.
- Unincorporated areas of the county increased from $865,340.06 to $2,271,893.04.
- City of Rifle decreased from $2,118,269.02 to $1,892,020.28.
- Town of Carbondale increased from $850,249.97 to $1,146,871.89.
- Town of Parachute increased from - $56,775.93 to $433,927.37.
- Remainder of Garfield County[1] increased from $257,323.40 to $282,931.39.

NOTE:

[1] Telecommunication/utility companies with no physical location in the county.

- Town of New Castle increased from $209,976.91 to $260,615.98.
- Town of Silt increased from $179,699.54 to $234,190.61.
- Clerk & Recorder increased $93,892.55 to $96,122.97.
- Battlement Mesa PUD decreased from $41,832.30 to $38,538.50.

V. BREAKDOWN OF TOTAL ANNUAL EXPENDITURES

The Garfield County Finance Department reports that between 2000 and 2018:

- General government expenditures have increased from 17.1% of total annual expenditures to 27.3%.
- Public safety expenditures have increased from 13.8% of total annual expenditures to 22.9%.
- Public works expenditures have decreased from 19.6% of total annual expenditures to 15.2%.
- Health and welfare expenditures have increased from 18.9% of total annual expenditures to 23.7%.
- Cultural and recreation expenditures have decreased from 3.2% of total annual expenditures to 2.9%.

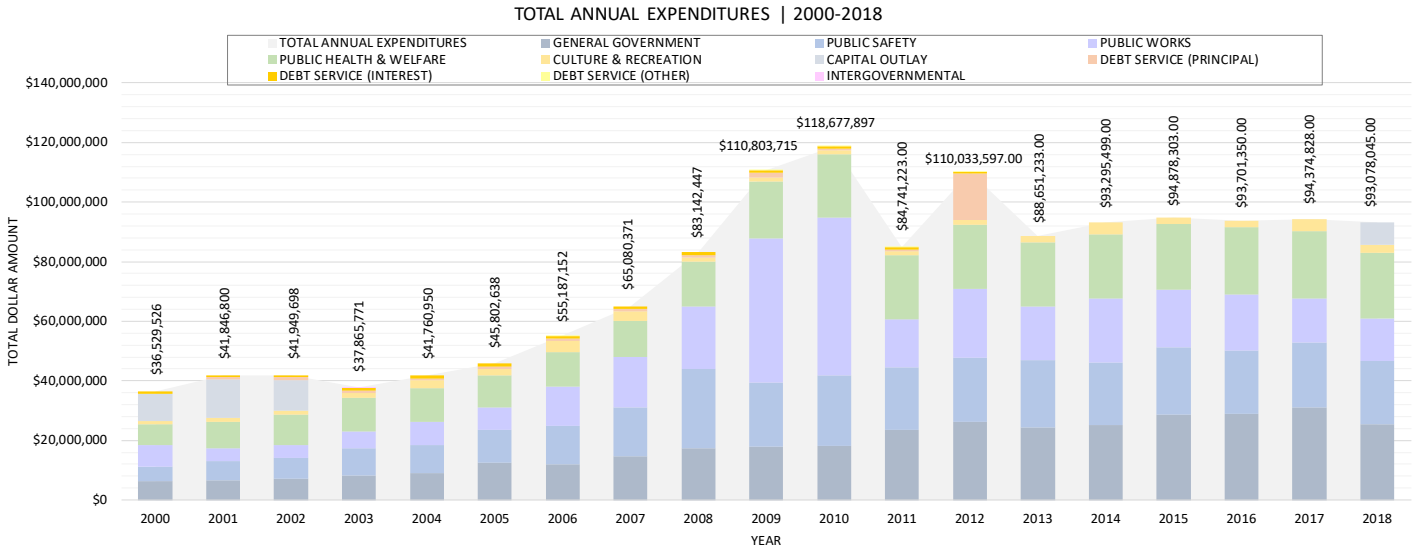


Table 25: Percent of Total Expenditures (2000-2018)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
General Gov't	17.1%	16.0%	16.7%	21.7%	21.8%	27.3%	21.8%	22.4%	21.0%	16.1%	15.3%	27.8%	23.9%	27.6%	27.0%	30.3%	30.9%	32.9%	27.3%
Public Safety	13.8%	15.0%	17.2%	24.3%	22.2%	24.3%	23.2%	25.5%	31.7%	19.5%	20.1%	24.7%	19.6%	25.2%	22.4%	23.6%	22.5%	23.0%	22.9%
Public Works	19.6%	10.2%	10.3%	14.8%	18.6%	16.4%	23.7%	25.8%	25.3%	43.7%	44.6%	19.2%	20.8%	20.3%	22.9%	20.3%	20.1%	15.6%	15.2%
Public Health & Welfare	18.9%	21.8%	24.2%	29.5%	27.0%	23.1%	21.3%	18.6%	18.3%	17.3%	17.8%	25.3%	19.6%	24.4%	23.1%	23.5%	24.3%	23.9%	23.7%
Culture & Rec.	3.2%	2.8%	3.3%	4.4%	6.6%	5.1%	6.5%	5.0%	1.6%	1.1%	1.2%	1.6%	1.5%	2.5%	4.5%	2.2%	2.2%	4.5%	2.9%
Capital Outlay	25.1%	30.9%	24.5%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.1%
Debt Srv.: Principal	-	1.7%	2.0%	2.3%	1.1%	1.4%	1.5%	1.2%	1.0%	1.6%	0.4%	0.6%	14.1%	-	-	-	-	-	-
Debt Srv.: Interest	2.2%	1.6%	1.9%	3.0%	2.6%	2.3%	1.6%	1.4%	1.0%	0.7%	0.6%	0.8%	0.4%	-	-	-	-	-	-
Debt Srv.: Other	-	-	-	-	-	-	0.39%	-	-	-	-	-	-	-	-	-	-	-	-
Intergov't	-	0.01%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Source(s): Garfield County Finance Department

E. AIR QUALITY

I. AIR QUALITY MANAGEMENT IN GARFIELD COUNTY

GCPH is committed to addressing citizen concerns about activities in the community, and the region, that affect air quality related values. In recent years, there has been a great deal of local support for the development of air quality programs in the county. GCPH's air quality projects fit within an overall air quality management program framework, a framework that has been implemented over the last several years through a variety of efforts. These efforts have included:

- On-going ambient air monitoring.
- Updates to local emissions inventories.
- The development of health risk assessments.
- An assortment of education and outreach efforts.
- A variety of special collaborative projects.

Since 2008, all pollutants measured in Garfield County have remained below the National Ambient Air Quality Standards (NAAQS) limits, as defined by the Environmental Protection Agency (EPA). The GCPH monitors the following air quality issues:

- **Ozone (O_3).** O_3 forms when pollutants emitted from vehicles and industrial sources react with sunlight. Ozone occurs naturally at ground-level in low concentrations, but prolonged exposure to elevated concentrations can irritate the lungs and cause lung tissue damage. Ozone can also affect the reproduction and growth of some plants.

Table 26: Ozone Air Quality Index (2014-2018)

Air Quality Index (AQI)	Number of Days in 2014	Number of Days in 2015	Number of Days in 2016	Number of Days in 2017	Number of Days in 2018
Good	357	305	323	284	262
Moderate (People who are unusually sensitive to air pollution should consider limiting prolonged or heavy exertion outdoors.)	8	60	43	80	101
Unhealthy for Sensitive Groups (Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors.)	0	0	0	1	1
Unhealthy (Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors.)	0	0	0	0	0
Missing	0	0	0	0	0

Data Source(s): Garfield County Public Health

According to GCPH, in 2018, the number of days in the "moderate" category of the AQI increased from 66 days due to heavy wildfire activity around the western US.

- **Particulate Matter ($PM_{2.5}$).** $PM_{2.5}$ (particulate matter smaller than 2.5 micrometers) originates from dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. $PM_{2.5}$ also contributes to decreased visibility. Breathing high levels of fine particulate matter can have serious health impacts including coughing and difficulty breathing, decreased lung function, irregular heartbeat and aggravation of heart and lung disease.


Photo Credit: Western Slope Consulting

Table 27: Particulate Matter Air Quality Index (2014-2018)

Air Quality Index (AQI)	Number of Days in 2014	Number of Days in 2015	Number of Days in 2016	Number of Days in 2017	Number of Days in 2018
Good	354	357	365	357	339
Moderate (People who are unusually sensitive to air pollution should consider limiting prolonged or heavy exertion outdoors.)	11	8	1	8	26
Unhealthy for Sensitive Groups (Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors.)	0	0	0	0	0
Unhealthy (Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors.)	0	0	0	0	0
Missing	0	0	0	0	0

Data Source(s): Garfield County Public Health

GCPH reports that in 2018, $PM_{2.5}$ concentrations in the county were lower than the NAAQS. However, the number of "moderate" AQI days for $PM_{2.5}$ increased from eight (8) days in 2017 to twenty-six (26) days in 2018. This could also be attributed to heavy wildfire activity in 2018.

- **Volatile Organic Compounds (VOCs).** VOCs are a class of carbon-based compounds that readily evaporate at room temperatures. Exposure to some VOC's have shown toxicological effects including cancer, respiratory or neurological, depending on the exposure dose. Motor vehicles and natural gas development operations are the primary sources of outdoor VOCs in Garfield County. In addition to a variety of short- and long-term health effects, VOCs contribute to the formation of ground-level ozone.

  GCPH currently monitors 90 VOCs at five (5) diverse sites in the communities in the county. Since the county began monitoring VOCs in 2008, concentrations of many these compounds have decreased significantly.

II. RADON

Radon is a naturally occurring gas most often derived from the breakdown of natural deposits of Uranium 238, which is commonly found in many geologic formations in Colorado. Radon gas can be drawn into buildings due to vacuums caused by natural thermal stack effects, building exhaust systems or episodic weather conditions. Long-term exposure to high levels of radon is the leading cause of lung cancer in nonsmokers, and the second leading cause of lung cancer in smokers.

Data from the CDPHE, indicates that between 2005 and 2017 a total of 1,075 radon samples were taken in Garfield County. Of those samples, 502 (46.70%) returned a radon reading of > 4 pCi/L (pico-curies/liter), which is the Environmental Protection Agencies' (EPA) "Action Limit." While radon gas has no color, odor, or taste there are test kits available that allow radon to be tested for. In the event high levels of radon are detected, there are a number of simple and effective mitigation measures that can be installed to reduce the risk of radon gas build up in a building. Additional information about radon gas and mitigation measures can be found at: https://www.garfield-county.com/environmental-health/radon.aspx

F. SENSITIVE HABITATS

CPW has identified wildlife areas in Garfield County that they consider to be high priority habitat (HPH). HPH has been identified for the following fifteen (15) species:

1. Bald Eagles
2. Bighorn Sheep
3. Cutthroat Trout
4. Elk
5. Golden Eagles
6. Greater Sage Grouse
7. Moose
8. Mule Deer
9. Northern Goshawk
10. Osprey
11. Peregrine Falcon
12. Prairie Falcon
13. Pronghorn Antelope
14. Kit Fox
15. White-Tailed Prairie Dog

Habitat areas most likely to be impacted by growth pressures in the county include elk and deer migration routes (crossing State Highway 82 between the Town of Carbondale and City of Glenwood Springs) and bald eagle nesting sites along the Colorado and Roaring Fork rivers. In planning for future growth, the county and CPW could benefit from working together on identifying options for mitigating potential impacts of growth on wildlife.

Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for additional information regarding the high priority wildlife habitat areas identified by CPW in Garfield County.

G. NATURAL HAZARDS

Garfield County's 2017 Hazard Mitigation Plan (https://www.garfield-county.com/emergency-management/natural-hazards-mitigation-plan.aspx) provides an assessment of potential risks in the county, as well as hazard mitigation, implementation and annual monitoring strategies. Table 28 presents a summary of the regional risk assessment from the county's 2017 Hazard Mitigation Plan.

Table 28: Regional Risk Assessment Summary

Type of Hazard	Previous Occurrence (Events / Years)	Approximate Annual Probability	Average Annual Losses (Property and Crop)	Likely Extent
TIER I HAZARDS				
1. Wildfires	2,288 events over the course of 36 years.	100%	$124,848.48	< 100-acres
2. Hazardous Materials	283 events over the course of 27 years.	100%	$11,729.63	827 liquid gallons (LGA).
3. Flooding	50 events over the course of 21 years.	100%	$32,324.93	Some inundation of structures (< 1% of structures) and roads near streams. Some evacuations of people may be necessary (< 1% of the population).
4. Landslides, Mud/Debris Flows and Rockfall	33 events over the course of 21 years.	100%	$37,619.27	Limited property damage.
5. Soils (Expansive Soils and Subsidence)	65 events over the course of 29 years.	100%	$92,517.24	Limited damage to property and roadways.
6. Severe Winter Weather	975 events over the course of 21 years.	100%	$228,202.41	10-20° below zero (wind chills) 6-12" snow 25-40 mph winds
TIER II HAZARDS				
1. Avalanches	50 events over the course of 21 years.	100%	$46.65	0.5- 5.0 ton/ft^2
2. Droughts (Meteorological, Agricultural, Hydrological and Socioeconomic)	477 events over the course of 1,465 months.	32.6%	$17,152.66	D2
3. Earthquakes	88 events over the course of 43 years.	100%	$0	< 4.0
4. Erosion and Deposition	Unknown	100%	Unknown	Unknown
5. Lightning	10,700 events over the course of 1 year.	100%	$2,202.33	Undefined
6. Pest Infestation	Unknown	100%	Unknown	Unknown
7. Severe Wind	92 events over the course of 21 years.	100%	$9,366.89	9 BWF
8. Terrorism (Political, Bio-Terrorism, Cyber-Terrorism, Eco-Terrorism, Nuclear-Terrorism, Narco-Terrorism and Agro- Terrorism)	0 events over the course of 47 years.	< 1%	$0	Undefined

Data Source(s): 2017 Garfield County Hazard Mitigation Plan (https://www.garfield-county.com/emergency-management/natural-hazards-mitigation-plan.aspx)

Table 29 presents a summary of the potential impact that current climate trends could have on the natural hazards identified in Garfield County.

Table 29: Summary of Potential Climate Trend Impacts

Type of Hazard	Description of Potential Impact
TIER I HAZARDS	
1. Wildfires	Current climate trends are expected to result in an increase in frequency and severity of wildfires throughout the state of Colorado.
2. Hazardous Materials	Climate trends are not expected to have an impact on hazardous material spills.
3. Flooding	Current climatic trends are expected to result in decreased streamflow in Colorado's major rivers. As a result, the risk of riverine flooding may reduce. However, it is probable that the state will experience an increase in frequency and magnitude of winter precipitation, this in combination in warming air and surface temperatures may produce earlier spring runoff. This may lead to an increase in riverine flooding during the early months of the year, and a decrease in riverine flooding towards the end of the year.
4. Landslides, Mud/Debris Flows and Rockfall	While specific projections for landslide probability and extent are not available, certain deductions can be made based on weather/climatic phenomenon that influence landslides. Climate reports indicate there will likely be an increase in drought and wildfire events across the state, as previously stated drought and wildfire events increase the probability and intensity of landslides. The connection between drought, fire and flood are all likely to influence the occurrence of landslides. The county's Hazard Mitigation Plan anticipates that if current climate trends continue, it is probable that landslide events in Garfield County will increase in frequency.
5. Soils (Expansive Soils and Subsidence)	Specific projections related to the probability and extent of hazardous soil events are not available. However, certain deductions can be made based on weather/climatic phenomenon that influence hazardous soils. Climate reports indicate there will likely be an increase in the frequency and intensity of drought events across the state. Drought can increase the frequency of subsidence. The county's Hazard Mitigation Plan anticipates that if current climate trends continue, it is probable that hazardous soils events in Garfield County will increase in frequency.
6. Severe Winter Weather	Winter precipitation events are projected to increase in frequency and magnitude in the future climate.
TIER II HAZARDS	
1. Avalanches	Snowpack is projected to decline and spring runoff is projected to shift one (1) to three (3) weeks earlier in the future Colorado climate. Wet avalanches are expected to occur earlier in the year than historical averages.
2. Droughts (Meteorological, Agricultural, Hydrological and Socioeconomic)	Drought is expected to increase in frequency and severity in Colorado due to the projected overall warming.
3. Earthquakes	There is no known association between climate and earthquake events. There is no expected impact.
4. Erosion and Deposition	Climate trends may result in decreased snowpack, intensification of winter precipitation events, and an increased frequency of drought and wildfires. Erosion/deposition will be a secondary hazard following these other hazards.
5. Lightning	Nationwide, the frequency and magnitude of severe storms is expected to increase due to climate trends. These storms likely will include lightning. However, studies have indicated that there is no evidence of increasing trends of heavy precipitation events in Colorado.
6. Pest Infestation	Changing climatic conditions, including more frequent periods of drought, increased temperature, and the suppression of natural wildfire regimes may result in an increase in insect and disease activity.
7. Severe Wind	Studies have indicated that the frequency and magnitude of severe winter storms may increase in Colorado due to climate trends. These storms may include severe wind; however, there is no known direct relationship between climate trends and severe wind.
8. Terrorism (Political, Bio-Terrorism, Cyber-Terrorism, Eco-Terrorism, Nuclear-Terrorism, Narco-Terrorism and Agro- Terrorism)	There is no known direct relationship between climate trends and terrorism incidents.

Data Source(s): 2017 Garfield County Hazard Mitigation Plan (https://www.garfield-county.com/emergency-management/natural-hazards-mitigation-plan.aspx)

Table 30 offers a summary of the vulnerability assessments provided in the 2017 Hazard Mitigation Plan.

Table 30: Summary of Vulnerability Assessments

Type of Hazard	Vulnerability Assessment
	TIER I HAZARDS
1. Wildfires	Vegetative conditions vary widely throughout Garfield County. Vegetation ranges from semi-desert grass and shrubland to sub-alpine forests. The combination of steep terrain, highly flammable vegetation, and hot/dry summers in the county can result in high fire danger. Much of the development in Garfield County is located in the lower elevation zones of sagebrush, Gambel oak, and pinyon-juniper woodlands. People living in or near wildland settings in the county are vulnerable to the threat of wildfire. The development of homes and other structures that encroach into the forest wildland and natural areas is of concern. This type of growth results in the expansion of the Wildland-Urban Interface. The vulnerability of structures and homes in the interface area is increased by: • Combustible roofing and construction material. • No or insufficient defensible space. • Poor access to structures. • Heavy natural fuel types. • Steep slopes. • Limited water supplies. • Winds over 30 miles per hour. Urban areas can experience the effects of wildland fires such as smoke, ash, and fire particulates in the air. Poor air quality is not only a health concern for residents, but can impact tourism activities. The availability of fire protection services can be limited in rural areas. Therefore, fire protection may rely more on a landowner's initiative to implement measures that protect their property. Public education and awareness can be helpful in rural or interface areas. In the event of a wildfire, vegetation, structures, and other flammables can combine to create unwieldy and unpredictable events. Factors relevant to the fighting of such fires include access, firebreaks, proximity of water sources, distance from fire station and available fire fighting personnel and equipment. Much of the land in Garfield County is publicly owned and managed under federal regulations. While this land may have higher fire risk, the risk incurred by people, economic factors or physical infrastructure is minimal. The key to managing fire risk on these lands and the impacts on communities in Garfield County will be coordination between county administration, fire districts and federal agencies that have ultimate responsibility for these public lands.
2. Hazardous Materials	Hazardous materials are shipped daily on Interstate 70 and along the railroads in Garfield County. These shipping routes run near the county's major population centers and rivers that serve as a primary source of drinking water. Communities and households adjacent to sites that house hazardous materials, pipelines, railroads, and Interstate 70 may be more susceptible to hazardous materials spills in Garfield County. If an incident were to occur that necessitated an evacuation, populations that may be especially vulnerable include: households without access to a vehicle, the elderly and facilities with populations with low mobility such as hospitals, nursing homes and housing units.
3. Flooding	Careful attention should be paid to development in the 100-year flood zone and floodway to ensure that structures do not exacerbate flooding and are prepared to withstand flooding events. According to the Colorado Department of Natural Resources, there are a total of 68 dams located within Garfield County. According to Garfield County Emergency Management, the following dams could impact the county if they were to fail as a result of flooding: • Alsbury • Dillon • Green Mountain • Homestake • Lake Christine • Polaris • Ruedi Reservoir • Spring Park

Table 30: Summary of Vulnerability Assessments (continued)

Type of Hazard	Vulnerability Assessment
3. Flooding (continued)	• Wildcat • Williams Fork
4. Landslides, Mud/Debris Flows and Rockfall	Although landslides are a natural geologic process, the incidence of landslides and their impacts on people can be exacerbated by human activities. Examples of these activities include: • Grading for road construction and development that increases slope steepness and decreases the slope stability by adding weight to the top of a slope, removing support at the base of the slope and increasing water content. • Excavation. • Drainage and groundwater alterations. • Changes to native vegetation. Development sites with the greatest risk from landslides are those at the base of very steep slopes, in confined stream channels (small canyons) and on fans (rises) at the mouth of these confined channels. Development-related activities that can put people and structures at risk include: • **Creating Steeper Slopes.** Excavation practices, sometimes aggravated by drainage, can reduce the stability of otherwise stable slopes. These failures commonly affect only a small number of homes. Without these excavation practices, there is little risk of landslides in areas not prone to landslide movement. • **Development on or Adjacent to Existing Landslides.** Existing landslides are generally at risk of future movement regardless of excavation practices. Excavation and drainage practices can further increase risk of landslides. In many cases, there are no development practices that can completely assure stability. Homeowners and communities in these situations accept some risk of future landslide movement. • **Development on Gentle Slopes.** Development on gentle slopes can be affected by landslides that begin a long distance from the development. Utilities, including potable water, wastewater, telecommunications, natural gas and electric power can be impacted as a result of landslide activity. Roads and bridges can be subject to closure during landslide events. Lifelines and critical facilities should remain accessible, if possible, during a landslide event. The impact of roadway closures may increase if a closed road or bridge is a critical access route to hospitals or other emergency facilities.
5. Soils (Expansive Soils and Subsidence)	Soil hazards can affect buildings, driveways, roadways, pipelines, and other infrastructure. When soil hazards are not identified, improper structure design, faulty construction, inappropriate landscaping, and long-term maintenance practices unsuited to the specific soil conditions can lead structures to be more vulnerable to the impacts of soil hazards.
6. Severe Winter Weather	Winter storms that bring snow, ice and high winds can impact health and property in a number of ways: • Severe winter storm deaths occur as a result of traffic accidents on icy roads, heart attacks when shoveling snow, and hypothermia from prolonged exposure to the cold. The temporary loss of home heating can be particularly hard on the elderly, young children, and other vulnerable individuals. • Ice, wind and snow can affect the stability of trees, power and telephone lines, and TV and radio antennas. Downed trees and limbs can become major hazards for houses, cars, utilities and other property. • Below freezing temperatures can lead to breaks in uninsulated water lines serving schools, businesses and industry, and individual homes. Such damage in turn can become major obstacles to providing critical emergency response, police, fire and other disaster recovery services. • Severe winter weather can cause the temporary closure of key roads and highways, air and train operations, businesses, schools, government offices, and other important community services. These effects, if lasting more than several days, can create significant economic impacts for the communities affected as well for the surrounding region. • Property is at risk due to flooding and landslides that may result from heavy snowmelt.

Table 30: Summary of Vulnerability Assessments (continued)

Type of Hazard	Vulnerability Assessment
6. Severe Winter Weather (continued)	Rising population growth and new infrastructure in Garfield County creates a higher probability for damage to occur from severe winter weather as more life and property are exposed to risk.
	TIER II HAZARDS
1. Avalanches	Areas of Garfield County where development has encroached into steep mountainous terrain have an increased vulnerability to avalanches. Based on the historic record, avalanches are unlikely to result in significant property damages within Garfield County. Injuries and fatalities due to avalanches may occur as winter recreation activities are popular in the county. Individuals that engage in winter recreation activities in mountainous areas of Garfield County have an increased risk of exposure to this hazard. Education and outreach will be the most effective strategy in mitigating the impacts of avalanches.
2. Droughts (Meteorological, Agricultural, Hydrological and Socioeconomic)	Drought often causes significant economic, environmental, and social impacts. Although agriculture is the major sector affected, impacts on rural and municipal water supplies, fish and wildlife, tourism, recreation, water quality, soil erosion, the incidence of wildfires, electricity demand, and other sectors are also significant. Furthermore, indirect impacts of drought on personal and business incomes, tax revenues, unemployment, and other areas are of concern. In general, drought produces a complex web of impacts that ripple through many sectors of the economy. This is largely due to the dependence of so many sectors on water to produce goods and provide services.
3. Earthquakes	Earthquake damage can occur when structures are not built to withstand severe shaking. Buildings, airports, schools, and lifelines (i.e. highways and phone, gas and water lines) can all suffer damage in earthquakes. Earthquakes can also result in death or injury to humans. The welfare of homes, major businesses, and public infrastructure is very important. Addressing the reliability of buildings, critical facilities and infrastructure is a challenge faced by Garfield County. Further, understanding the potential costs to government, businesses and individuals as a result of an earthquake is an important consideration. Garfield County has unique social and physical characteristics that affect its vulnerability to earthquakes: • **Oil and Gas Infrastructure.** The oil and gas industry represents a significant portion of Garfield County's economy. Pipelines (both above and below ground) carry high pressure liquid and gas throughout the county. The proximity of these pipes to communities and to the Colorado River increases the potential risk of air or water contamination if the infrastructure is damaged in an earthquake. • **Transportation Infrastructure.** Transportation infrastructure in Garfield County is of critical importance to the county and its residents, as well as to the state and national highway system. An earthquake could result in significant damage to bridges and highway surfaces, hampering the movement of people and goods.
4. Erosion and Deposition	Erosion can cause impacts to property, critical facilities, and water quality. Structures located near streams have an increased risk of damages to stream erosion and deposition. Erosion from wind can adversely impact populations who have respiratory issues. These populations are more vulnerable during erosion events that negatively impact air quality. Efforts to control erosion may include drainage management, vegetation of disturbed lands, and the rip-rapping of erosion-prone stream banks.
5. Lightning	Building stock, infrastructure, and people outdoors during storms are at risk of lightning strikes. In addition to direct damages from lightning strikes, the potential for lightning to start wildfires is of great concern. Lightning from one (1) storm has the potential to start dozens of wildfires throughout Garfield County.
6. Pest Infestation	No structures are anticipated to be impacted by pest infestation. However, infestations may have significant impacts for the economy. Pest infestations can cause damages to crops and rangeland, negative impacts on tourism, and an increase in municipal spending in urban areas. Pest infestations may lead to an increased risk to overhead utilities, as well as an increased fire hazard. Forest management can maintain healthy forests that are more resilient to insect and disease activity, and reduce the likelihood of forest pest epidemics.

Table 30: Summary of Vulnerability Assessments (continued)

Type of Hazard	Vulnerability Assessment
7. Severe Wind	All building stock and above ground infrastructure, including critical facilities, are at risk of being damaged or affected by severe winds. Severe winds can cause structure loss, downed power lines, loss of electricity, obstruction to traffic flow, and significant damage to trees. A catastrophic event could lead to major economic loss for the jurisdiction. High wind speeds and flying debris can pose a significant threat to human life. Trees blown down by severe wind have the potential to lead to increased fire hazard. Severe winds can impact a wide range of people and properties. People living in mobile homes are particularly susceptible to the effects of severe winds. Mobile homes that are not anchored or are not anchored properly can be blown over by winds as fast as 60 to 70 mph. Other factors that may increase vulnerability to the threat posed by severe winds include age, poverty levels, and home rentals.
8. Terrorism (Political, Bio-Terrorism, Cyber-Terrorism, Eco-Terrorism, Nuclear-Terrorism, Narco-Terrorism and Agro- Terrorism)	The unpredictable nature of terrorism is such that impacts can range from isolated occurrences of property damage with limited injuries to large scale events with catastrophic impacts to lives and property. Infrastructure that may be vulnerable include: water supply, power plants, utilities, and governmental buildings.

Data Source(s): 2017 Garfield County Hazard Mitigation Plan (https://www.garfield-county.com/emergency-management/natural-hazards-mitigation-plan.aspx)

AGRICULTURE

1. OVERVIEW

Appendix B: Agriculture provides the most current information available regarding agriculture in Garfield County. The information in this appendix is intended to help inform county decision-making, policies and regulations. Appendix B is organized as follows:

1. Overview
2. Summary of Findings
3. Agriculture Data & Information

Data for Appendix B were compiled from a number of sources. Those data sources include:

I. US Department of Agriculture (USDA)
Much of the data used in the analysis of agriculture in Garfield County was sourced from the USDA's Census of Agriculture. The USDA's Census of Agriculture can be accessed online by visiting: www.nass.usda.gov/AgCensus/

II. Colorado Water Conservation Board (CWCB) and Colorado Division of Water Resources (DWR)
Data from the CWCB and DWR were used to identify historic and current irrigation trends in Garfield County.

III. Colorado State Demography Office (SDO)
Data from the SDO were used to better understand the impact of agriculture on Garfield County's economy. Additional economic information can be found in Appendix C: Economy.

IV. Bureau of Land Management (BLM) and US Forest Service (USFS)
Data from the BLM and USFS were used to identify grazing pastures on public lands in the county.

V. Garfield County
Data from Garfield County were used to better understand the location and size of conservations easements in the county and to identify the amount of county funding contributed to local agricultural programs and activities.

In addition, a 2019 study prepared by Jenny Godwin, on behalf of the county, was used as a source of information for the potential benefits that agricultural tourism (i.e. "Agri-tourism") could have on Garfield County.

VI. Online Resources
Data from online resources were compiled to provide information about current agricultural trends. The online resources used included: (1) AgAmerica.com and (2) AgWeek.com.

2. SUMMARY OF FINDINGS

Appendix B analyzes and reports on the condition of agriculture in Garfield County. This appendix focuses on the historic and current state of agriculture, as well as on trends that might influence the future of agriculture in the county. The following are key findings from this work:

I. Agriculture accounts for a small percentage of jobs in Garfield County.
According to the SDO, in 2017, approximately 3.5% of total jobs in Garfield County were in "Agribusiness" (1,191 of 34,046 total jobs). Agribusiness comprises "Agricultural production," "Agricultural inputs," and "Agricultural processing."

In 2017, 1.6% of total jobs in the county (552 jobs) were in Agricultural production, 0.5% of total jobs (156 jobs) were in Agricultural inputs and 1.4% of total jobs (483 jobs) were in Agricultural processing.

II. The amount of land in farms has increased, while the average farm size has declined.
Between 2002 and 2017, farms in Garfield County have consistently accounted for approximately 1.7% of all farms in Colorado.

The amount of land in farms in Garfield County has increased by 66,294-acres over the past 20-years. This correlates to an increase of 166 farms over the same period of time. This could be indicative of a growing agricultural sector in the county, which supports the county's goals of sustaining it's agricultural heritage.

The average size of farms in Garfield County has declined by 107-acres between 1997 and 2017. This is likely a result of an increase in the number of farms that are 49-acres or less in size and a decline in farms that are 50-acres or greater in size.

III. Irrigation practices are slowly shifting but, flood irrigation is still the most prevalent.
The increase in farmland in Garfield County has resulted in an increase in amount of irrigated land in the county. However, the increase in irrigated land has been relatively nominal, an additional 578-acres. Agricultural uses are known for being significant water consumers and growth in the agricultural sector could result in greater pressures on the county's water resources. It may be beneficial for Garfield County to consider, policies, strategies and actions to curtail agricultural water use and/or increase water use efficiency. There are a number of resources available to assist with developing these types of policies, strategies and actions, such as the 2016 Colorado Water Plan (https://www.colorado.gov/cowaterplan).

It appears that between 1993 and 2015 there has been a shift in irrigation practices in the county. Use of sprinkler irrigation has increased by 5.8%, whereas use of flood irrigation has declined by 1.2% and use of furrow irrigation has declined by 2.8%. This shift may indicative an effort by local farmers to use more efficient means to irrigate their lands. With that said, flood irrigation still accounts for roughly 80% of all irrigation in the county.

IV. Three (3) types of farms have consistently accounted for the majority of farms in the county.
Between 2002 and 2017, three (3) types of farms have accounted for 83-88% (depending on the year) of all farms in Garfield County. Those are: (1) Animal aquaculture and other animal production; (2) Beef cattle ranching and farming; and, (3) Sugarcane farming, hay farming, and all other crop farming. The county may want to explore opportunities to increase the number of other types in farms in order to strengthen and diversify its overall agricultural economy.

V. Some farms are experiencing healthy profits however, a growing number of farms are not.
As of 2017, the net farm income for Garfield County is $4,696,000. This is the highest it has been in the last 20-years. Despite the increase in net farm income, the percent of total farms in the county with net losses has increased by 13.7%. This, along with other farm profitability data, indicates that there are a growing number of farms struggling to become profitable, however those farms that are profitable are experiencing healthy growth in their net gains.

Between 2002 and 2017, the number of farms that generate income from "Agri-tourism and Recreational Services" has not changed. However, the farm income generated by agri-tourism and recreational services has increased by $2,283,000. This could be indicative of strong growth in sector of the county's overall agricultural economy. The "Cultivating Appreciation: Growing Agri-tourism in Garfield County" report prepared by Jenny Godwin provides a number of recommendations for bolstering agri-tourism in the county.

The number of farms that generate income from "Customwork and Other Agricultural Services" increased by 7 farms between 2002 and 2017. The farm income generated from customwork and other agricultural services increased by $1,042,000 over that same period.

Interestingly, the number of farms that generate income from "Other Farm-Related Income Sources" declined by 8 farms between 2002 and 2017. However, the farm income generated by other farm-related income sources increased by $1,051,000.

VI. Farm production expenses in Garfield County are becoming increasingly expensive.

In 2017, total farm production expenses in Garfield County reached $30,190,000, or an average of $58,135 per farm. This is an increase of $19,711,000 from the total farm production expenses in the county in 1997 (which were $18,717,000 or an average of $37,435). The increase in farm expenditures could be resulting in a positive impact on Garfield County's overall economy, assuming that those dollars are spent within the county.

Between 1997 and 2017, farms saw the greatest increase in expenses associated with: (1) Hired farm labor (increased by $33,534 per farm); (2) Contract labor (increased by $14,991 per farm); and, (3) Interest paid on debts (increased by $10,123 per farm). Other notable increases include: (1) Feed purchased (increased by $4,269 per farm); (2) Supplies, repairs and maintenance (increased by $3,542 per farm); and, (3) Livestock and poultry purchased or leased (increased by $3,066 per farm).

VII. The number of "full-time" farm owners is increasing, as is the average age of farm producers.

Over the last 20-years, roughly 70-75% of all farms in Garfield County have been operated by "full-owners." Full-owners are people who only operate on land they own. Interestingly, the percent of total farms operated by full-owners increased by 5.1% between 1997 and 2017. In contrast, the percent of total farms operated by "part-time owners" and "tenants" declined by 3.7% and 4.6%, respectively.

Between 1997 and 2017, the average age of producers in Garfield County has increased from 54 years old to 58 years old. In addition, the percent of total producers under the age of 35 declined by 0.2% and the percent of total producers 65 or older increased by 15.6%. This indicates that there are fewer young producers to replace the producers in the county that are at retirement age. This could have implications for the long-term health of agriculture in Garfield County.

VIII. The number of farm workers and the payroll per worker is increasing.

Over the last 20-years, the total number of farms in Garfield County with hired labor has increased from 121 farms to 151 farms. Coincidentally, the total number of farm workers employed by farms in the county has increased from 419 to 695.

Between 1997 and 2017, the payroll per farm worker in Garfield County increased from $6,179.00 to $11,782.73. Over this same timeframe the payroll per farm worker in Colorado increased from $5,721.54 to $14,886.23. Between 2012 and 2017 the payroll per worker in Garfield County only increased from $11,456.07 to $11,782.73 (an increase of $326.66). This resulted in the amount of payroll per worker in Garfield County falling behind that of Colorado.

Between 1997 and 2017, the percent of total farms in Garfield County that employed 5-9 workers increased by 5.5% and farms that employed 10 or more workers increased by 1.3%. Consequently, the total number of workers employed by these types of farms increased by 65 workers (for farms with 5-9 workers) and 213 workers (for farms with 10 or more workers).

IX. Approximately 1.7% of Garfield County is held in Conservation Easements.

121 Conservation Easements have been established in Garfield County (94 of which were established between 1990 and 2019). This has resulted in approximately 31,947-acres being conserved (+/- 1.7% of Garfield County).

Data from the Garfield County Assessor and the Aspen Valley Land Trust (AVLT) indicates that 80, of the 121 total Conservation Easements, are held by AVLT. 25 are held by an unknown person, persons or entity. The remainder of the Conservation Easements in Garfield County are held by Colorado Parks and Wildlife, the Bureau of Land Management, the Roaring Fork Conservancy, Colorado Open Lands, the Rocky Mountain Elk Foundation and the Humane Society of the United States Wildlife Land Trust.

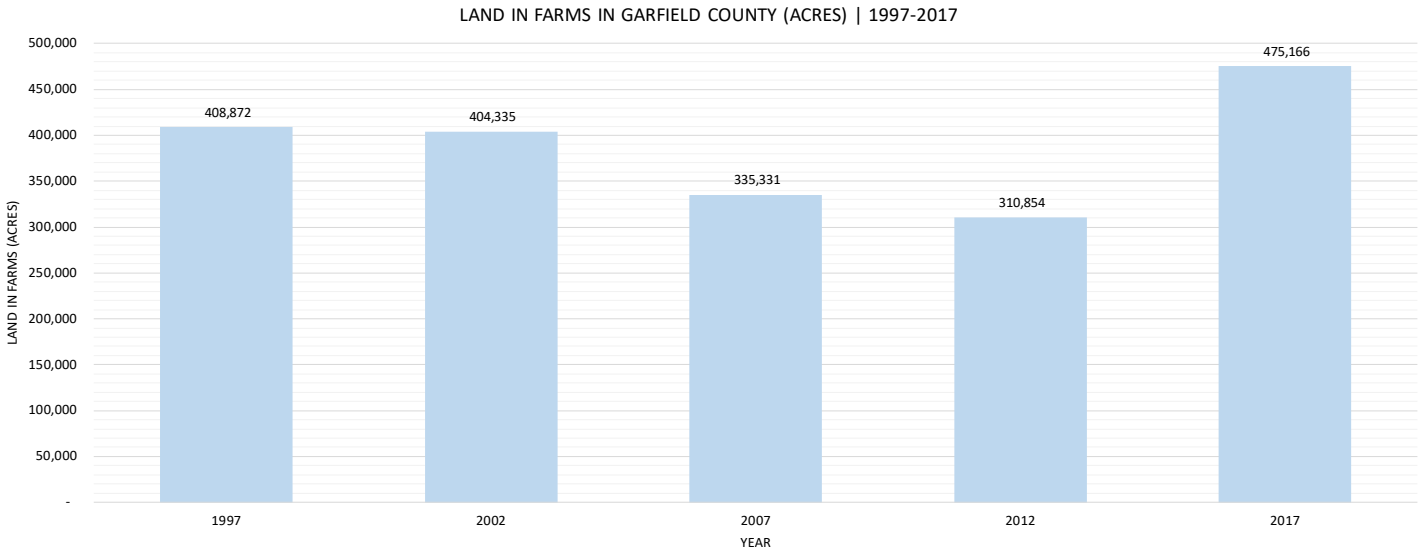
Given that many Conservation Easements are held in perpetuity, the county may want to explore options for working with easement holders to establish a single record keeping system that will ensure information about Conservation Easements in the county will be maintained over the long-term.

X. There are roughly 1.3-million acres of grazing pasture on public lands in Garfield County.
There are 510-grazing pastures on Bureau of Land Management (BLM) and United States Forest Service (USFS) lands in Garfield County. This equates to approximately 1,306,746.6-acres of grazing pasture (+/- 69% of the county) on public lands in the county.

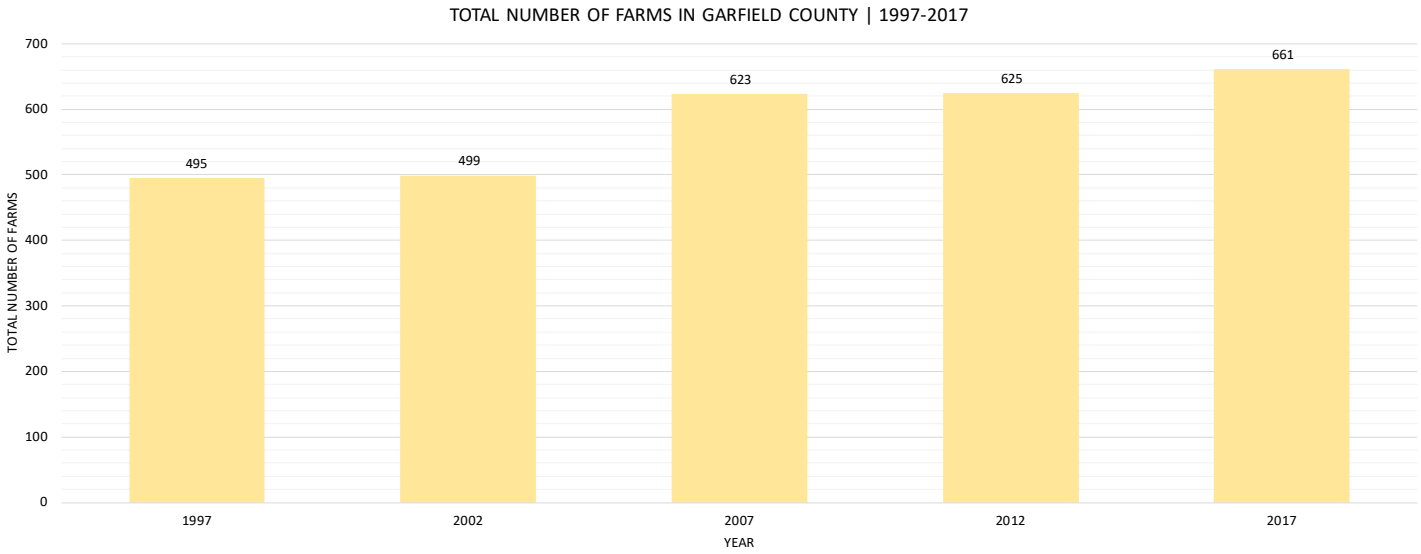
3. AGRICULTURE DATA & INFORMATION

A. OVERVIEW OF AGRICULTURE IN GARFIELD COUNTY

I. AMOUNT OF LAND IN FARMS
Between 1997 and 2017, the amount of land in Garfield County allocated to farms increased from 408,872-acres (+/- 21.6% of Garfield County) to 475,166-acres (+/- 25.1% of Garfield County). This represents a net increase of 66,294-acres of land in the county being used for farming.

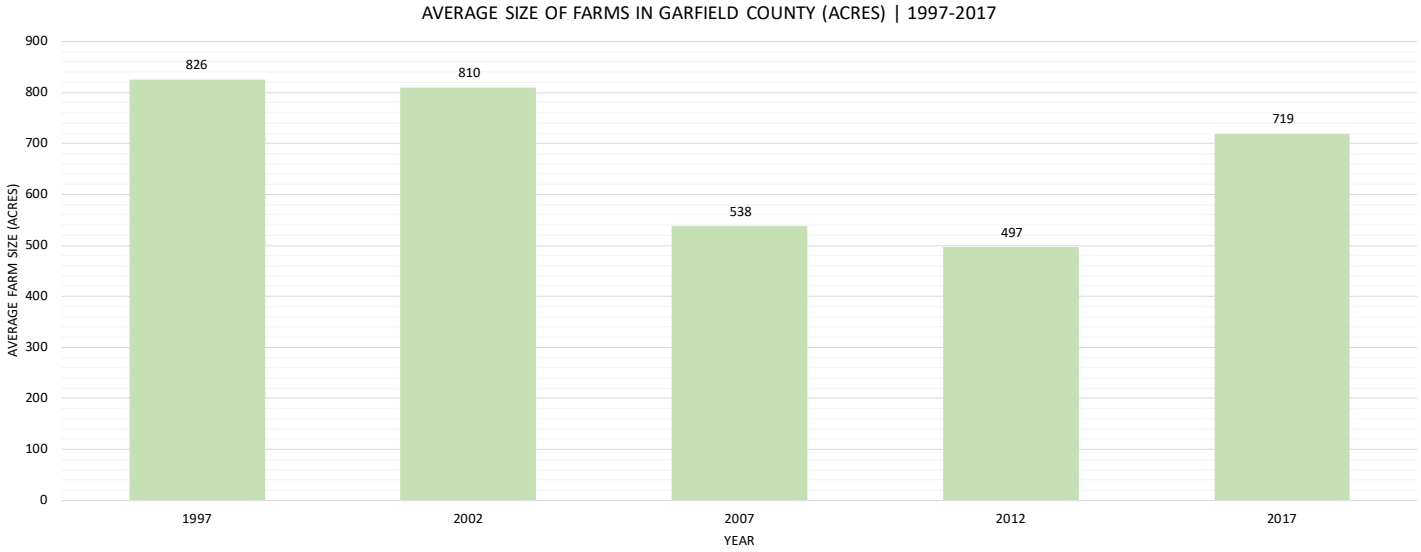


II. TOTAL NUMBER OF FARMS
Between 1997 and 2017, the number of farms in Garfield County rose from 495 to 661. This is a net increase of 166 farms.



III. AVERAGE SIZE OF FARMS

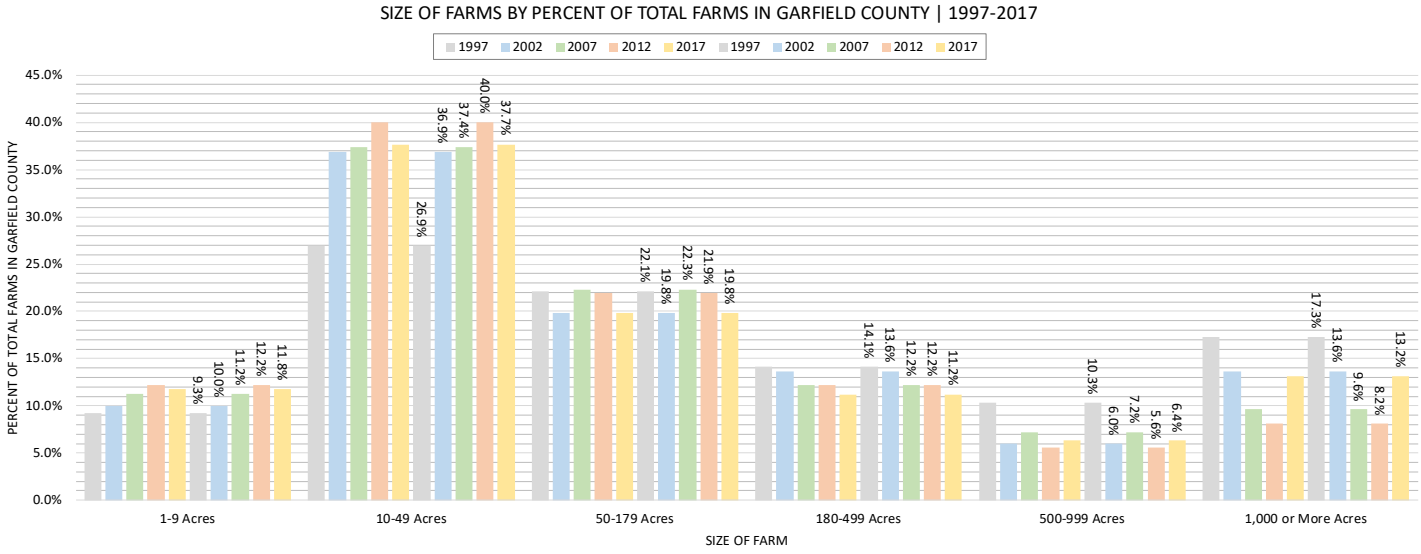
Between 1997 and 2017, the average size of farms in Garfield County decreased from 826-acres to 719-acres, a net decrease of 107-acres.



IV. SIZE OF FARMS BY PERCENT OF TOTAL FARMS

Between 1997 and 2017, the percent of total farms in Garfield County changed as follows:

- 1-9 acres farms increased 2.5%.
- 10-49 acres farms increased 10.8%.
- 50-179 acres farms decreased 2.3%.
- 180-499 acres farms decreased 2.9%.
- 500-999 acres farms decreased 3.9%.
- 1,000 or more acres farms decreased 4.1%.

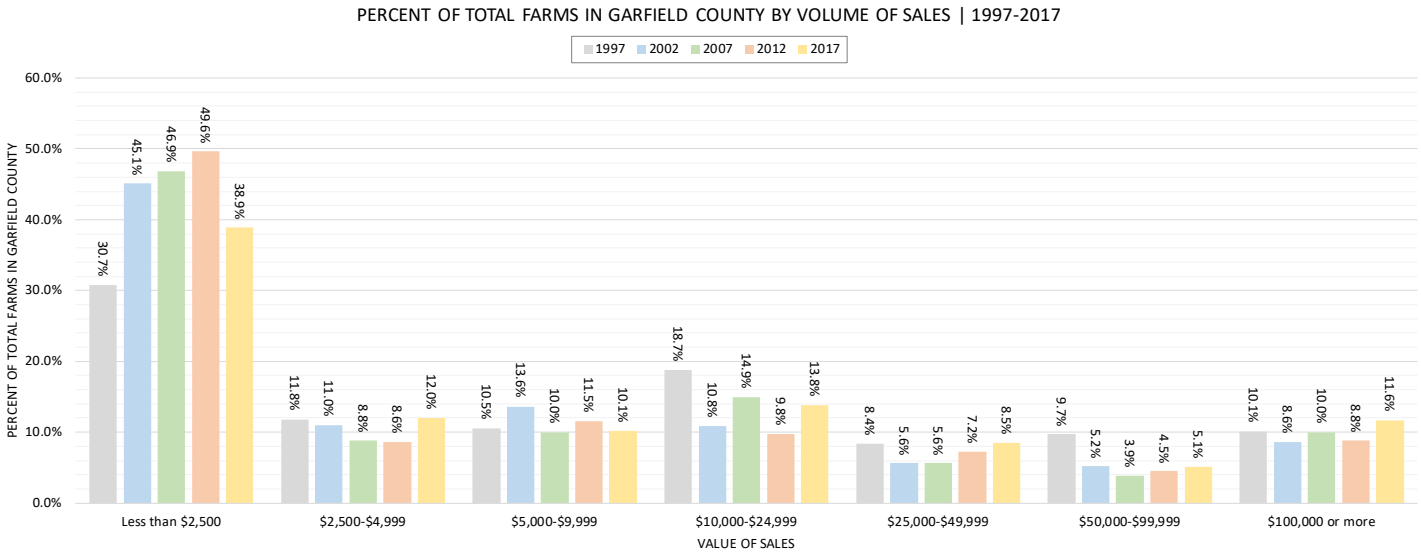


V. PERCENT OF TOTAL FARMS BY VALUE OF SALES

Between 1997 and 2017, the percent of total farms in Garfield County changed in the following ways:

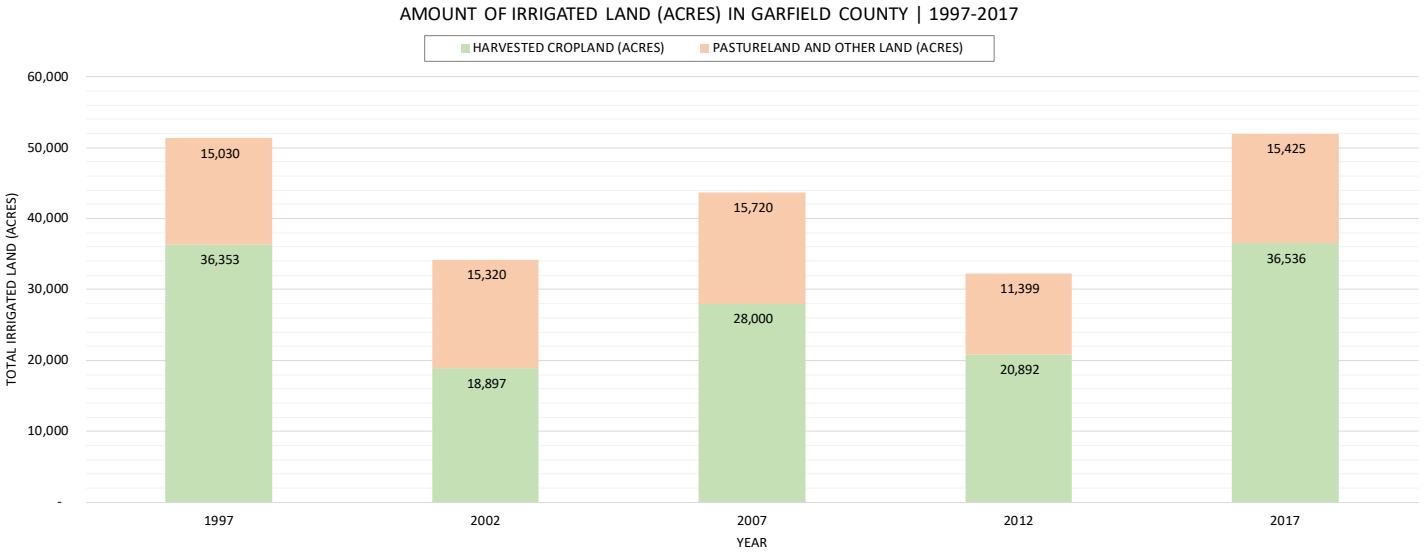
- Farms with sales less than $2,500 increased 8.2%.
- Farms with $2,500-$4,999 in sales increased 0.2%.

- Farms with $5,000-$9,999 in sales decreased 0.4%.
- Farms with $10,000-$24,999 in sales decreased 4.9%.
- Farms with $25,000-$49,999 in sales increased 0.1%.
- Farms with $50,000-$99,999 in sales decreased 4.6%.
- Farms with $100,000 or more in sales increased 1.5%.



VI. AMOUNT OF IRRIGATED LAND

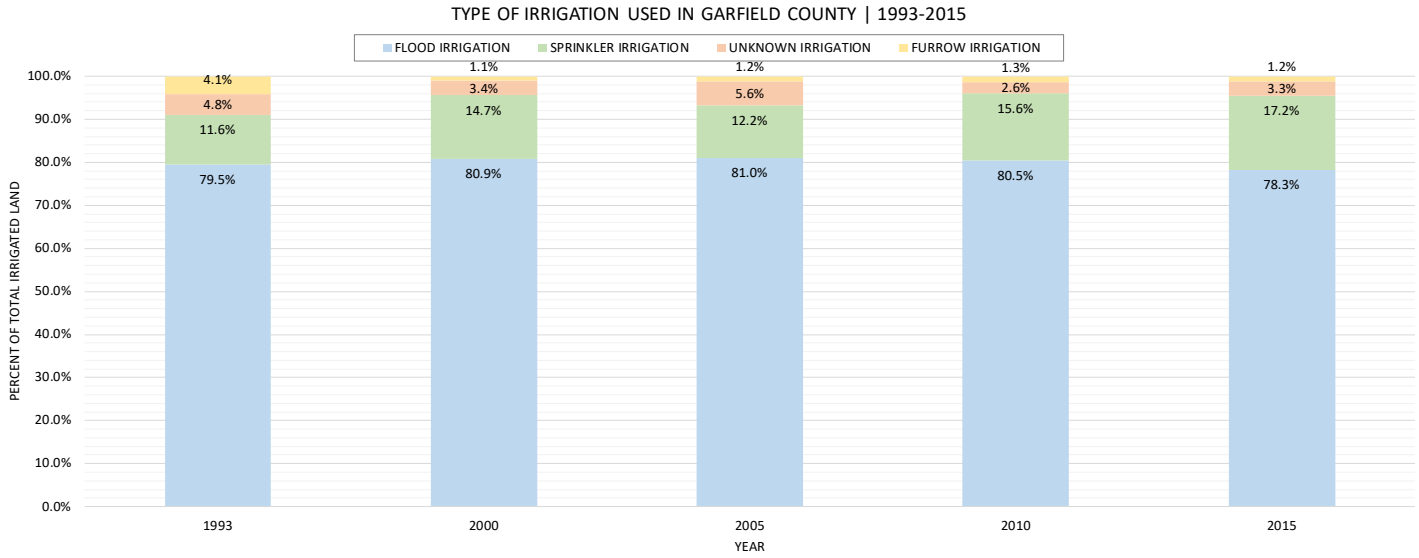
Between 1997 and 2017, the amount of Total Irrigated Land in Garfield County increased by 578-acres. Over this same period, the amount of Irrigated Harvested Cropland in the county increased by 183-acres and the amount of Irrigated Pastureland and Other Land increased by 395-acres.



VII. TYPE OF IRRIGATION

Data from the DWR indicate that between 1993 and 2015 irrigation practices in Garfield County changed in the following ways:

- Use of Flood Irrigation decreased 1.2%.
- Use of Sprinkler Irrigation increased 5.6%.
- Use of Furrow Irrigation decreased 2.8%.
- Use of Unknown Irrigation decreased 1.5%.



B. TYPES OF FARMS IN GARFIELD COUNTY

I. TOP 3 FARM TYPES IN GARFIELD COUNTY (2002-2017)

The following three (3) types of farms comprise approximately 83-88% (depending on the year) of all farms in Garfield County.

Table 1: Top 3 Farm Types in Garfield County (2002-2017)

North American Industry Classification System (NAICS)	2002 (499 total farms)	2007 (623 total farms)	2012 (625 total farms)	2017 (661 total farms)	Net Change (2002-2017)
Animal aquaculture and other animal production (1125, 1129)	Rank: 3rd 128 farms (25.7% of all farms)	Rank: 2nd 185 farms (29.7% of all farms)	Rank: 2nd 190 farms (30.4% of all farms)	Rank: 3rd 148 farms (22.4% of all farms)	+20 farms
Beef cattle ranching and farming (112111)	**Rank: 1st** **144 farms** **(28.9% of all farms)**	Rank: 3rd 155 farms (24.9% of all farms)	Rank: 3rd 162 farms (25.9% of all farms)	**Rank: 1st** **231 farms** **(34.9% of all farms)**	+87 farms
Sugarcane farming, hay farming, and all other crop farming (11193, 11194, 11199)	Rank: 2nd 141 farms (28.3% of all farms)	**Rank: 1st** **193 farms** **(31.0% of all farms)**	**Rank: 1st** **192 farms** **(30.7% of all farms)**	Rank: 2nd 200 farms (30.3% of all farms)	+59 farms

Data Source(s): US Department of Agriculture

In 2017, Garfield County accounted for: 2.0% of animal aquaculture and other animal production (1125, 1129); 1.9% of beef cattle ranching and farming (112111); and, 1.9% of sugarcane farming, hay farming and all other crop farming (11193, 11194, 11199) in Colorado.

II. OTHER FARM TYPES IN GARFIELD COUNTY (2002-2017)

The following nine (9) types of farms comprise approximately 27-12% (depending on the year) of all farms in Garfield County.

Table 2: Other Farm Types in Garfield County (2002-2017)

North American Industry Classification System (NAICS)	2002 (499 total farms)	2007 (623 total farms)	2012 (625 total farms)	2017 (661 total farms)	Net Change (2002-2017)
Cattle feedlots (112112)	Rank: 6th 14 farms (2.8% of all farms)	Rank: 10th 4 farms (0.6% of all farms)	Rank: 10th 4 farms (0.6% of all farms)	Rank: 10th 2 farms (0.3% of all farms)	-12 farms
Dairy cattle and milk production (11212)	Rank: 12th 0 farms (0% of all farms)	Rank: 11th 4 farms (0.6% of all farms)	Rank: 12th 2 farms (0.3% of all farms)	Rank: 12th 0 farms (0% of all farms)	No Net Change

Table 2: Other Farm Types in Garfield County (2002-2017) (continued)

North American Industry Classification System (NAICS)	2002 (499 total farms)	2007 (623 total farms)	2012 (625 total farms)	2017 (661 total farms)	Net Change (2002-2017)
Fruit and tree nut farming (1113)	Rank: 7th 11 farms (2.2% of all farms)	Rank: 4th 22 farms (3.5% of all farms)	Rank: 7th 8 farms (1.3% of all farms)	Rank: 5th 11 farms (1.7% of all farms)	No Net Change
Greenhouse, nursery, and floriculture production (1114)	Rank: 4th 24 farms (4.8% of all farms)	Rank: 6th 15 farms (2.4% of all farms)	Rank: 6th 15 farms (2.4% of all farms)	Rank: 6th 11 farms (1.7% of all farms)	-13 farms
Hog and pig farming (1122)	Rank: 8th 10 farms (2.0% of all farms)	Rank: 8th 10 farms (1.6% of all farms)	Rank: 8th 6 farms (1.0% of all farms)	Rank: 8th 8 farms (1.2% of all farms)	-2 farms
Oilseed and grain farming (1111)	Rank: 10th 4 farms (0.8% of all farms)	Rank: 12th 1 farms (0.2% of all farms)	Rank: 11th 2 farms (0.3% of all farms)	Rank: 11th 1 farms (0.2% of all farms)	-3 farms
Poultry and egg production (1123)	Rank: 9th 5 farms (1.0% of all farms)	Rank: 7th 13 farms (2.1% of all farms)	Rank: 5th 16 farms (2.6% of all farms)	Rank: 7th 9 farms (1.4% of all farms)	+4 farms
Sheep and goat farming (1124)	Rank: 5th 15 farms (3.0% of all farms)	Rank: 5th 17 farms (2.7% of all farms)	Rank: 4th 23 farms (3.7% of all farms)	Rank: 4th 33 farms (5.0% of all farms)	+18 farms
Vegetable and melon farming (1112)	Rank: 11th 3 farms (0.6% of all farms)	Rank: 9th 4 farms (0.6% of all farms)	Rank: 9th 5 farms (0.8% of all farms)	Rank: 9th 7 farms (1.1% of all farms)	+4 farms

Data Source(s): US Department of Agriculture

III. DEFINITIONS

Table 3: NAICS Farm Classification Definitions

NAICS FARM CLASSIFICATION	DEFINITION[1]
1. Aquaculture (1125)	Comprises establishments primarily engaged in the farm raising of finfish, shellfish, or any other kind of animal aquaculture. These establishments use some form of intervention in the rearing process to enhance production, such as holding in captivity, regular stocking, feeding, and protecting from predators.
2. Beef cattle ranching and farming (112111)	Comprises establishments primarily engaged in raising cattle (including cattle for dairy herd replacements). Pastureland-only farms, those with only 100 or more acres of pastureland, were classified as “All other animal production farming (11299).”
3. Cattle feedlots (112112)	Comprises establishments primarily engaged in feeding cattle for fattening.
4. Dairy cattle and milk production (112120)	This industry comprises establishments primarily engaged in milking dairy cattle.
5. Fruit and tree nut farming (1113)	Comprises establishments primarily engaged in growing fruit and/or tree nut crops. These crops are generally not grown from seeds and have a perennial life cycle.
6. Greenhouse, nursery, and floriculture production (1114)	Comprises establishments primarily engaged in growing crops of any kind under cover and/or growing nursery stock and flowers. ‘‘Under cover’’ is generally defined as greenhouses, cold frames, cloth houses, and lath houses. Crops grown are removed at various stages of maturity and have annual and perennial life cycles. The category includes short rotation woody crops and Christmas trees that have a growing and harvesting cycle of 10 years or less.
7. Hog and pig farming (1122)	This industry comprises establishments primarily engaged in raising hogs and pigs. These establishments may include farming activities, such as breeding, farrowing, and the raising of weanling pigs, feeder pigs, or market size hogs.
8. Oilseed and grain farming (1111)	Comprises establishments primarily engaged in (1) growing oilseed and/or grain crops and/or (2) producing oilseed and grain seeds. These crops have an annual life cycle and are typically grown in open fields. This category includes corn silage and grain silage.

Table 3: NAICS Farm Classification Definitions (continued)

NAICS FARM CLASSIFICATION	DEFINITION[1]
9. Other animal production (1129)	Comprises establishments primarily engaged in raising animals and insects (except cattle, hogs and pigs, poultry, sheep and goats, and aquaculture) for sale or product production. These establishments are primarily engaged in one of the following: bees, horses and other equine, rabbits and other fur-bearing animals, etc. and producing products such as honey and other bee products. Establishments primarily engaged in raising a combination of animals with no one animal or family of animals accounting for one-half of the establishment's agricultural production are included in this industry group. Farms with only 100 acres or more of pastureland were classified as "All other animal production farming (11299)."
10. Poultry and egg production (1123)	This industry group comprises establishments primarily engaged in breeding, hatching, and raising poultry for meat or egg production.
11. Sheep and goat farming (1124)	This industry group comprises establishments primarily engaged in raising sheep, lambs, and goats, or feeding lambs for fattening.
12. Vegetable and melon farming (11121)	Comprises establishments primarily engaged in one or more of the following: (1) growing vegetables and/or melon crops, (2) producing vegetable and melon seeds, and (3) growing vegetable and/or melon bedding plants.

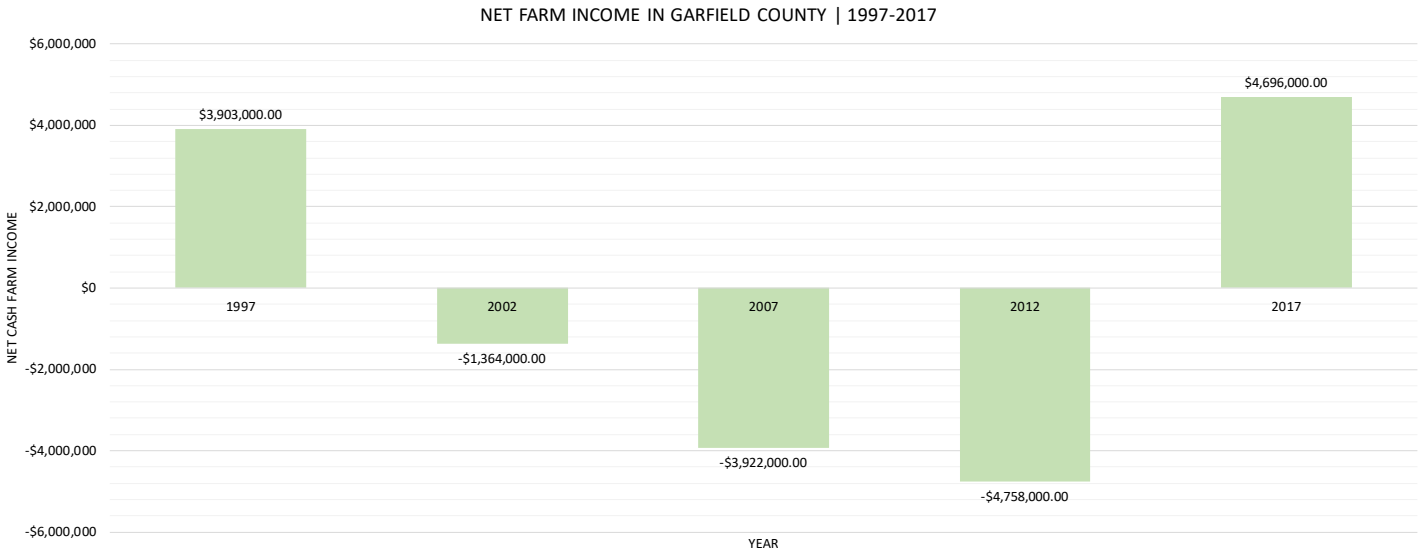
NOTES:
[1]Definitions from Appendix B of the 2017 Census of Agriculture.

Data Source(s): US Department of Agriculture

C. FARMING PROFITABILITY

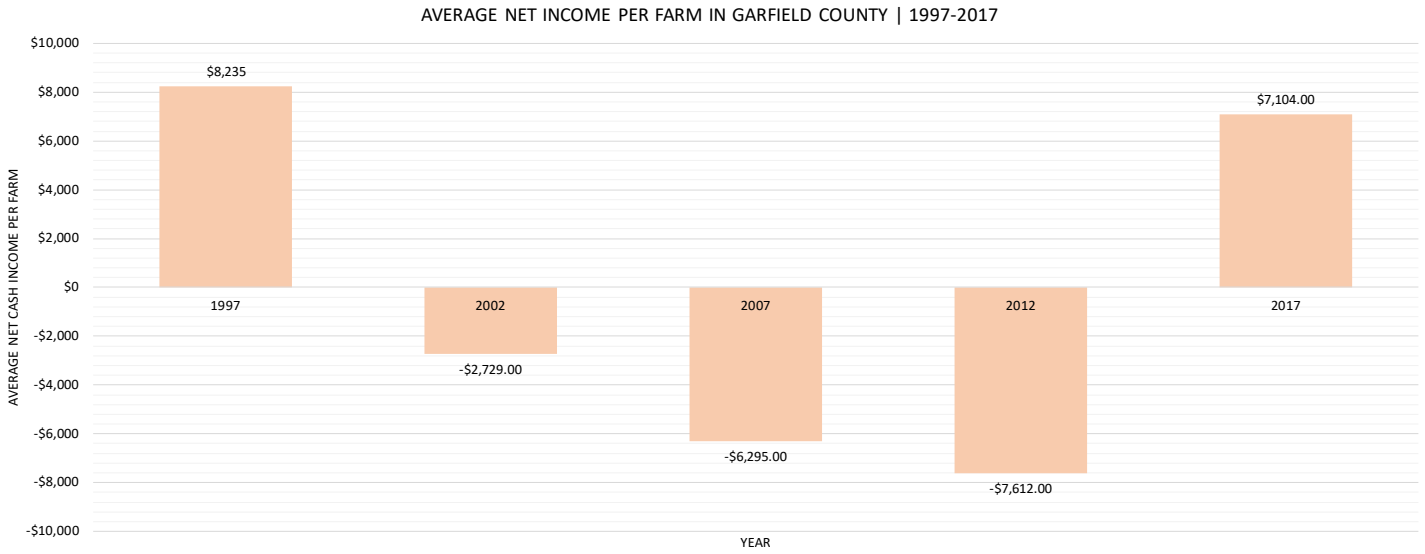
I. NET FARM INCOME

Between 1997 and 2017, the net farm income in Garfield County increased from $3,903,000 to $4,696,000. This is a change of $793,000. However, between 2002 and 2012, farms in Garfield County recorded a net loss of between $1,364,000 and $4,758,000.



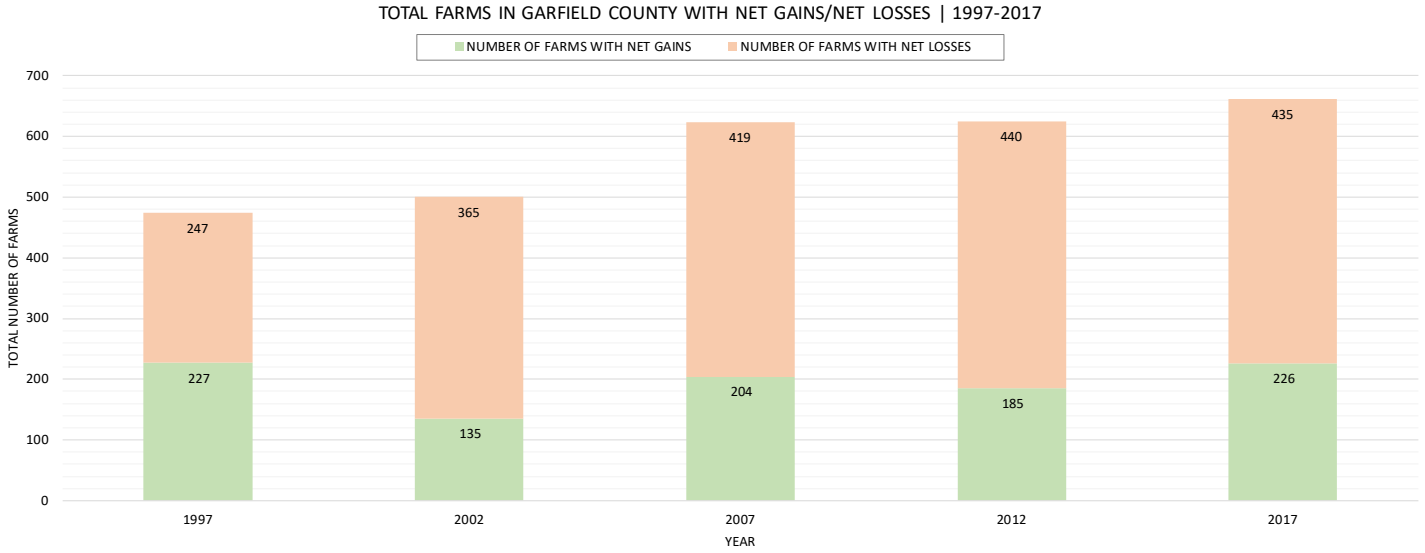
II. AVERAGE NET INCOME PER FARM

Between 1997 and 2017, the average net income per farm in Garfield County decreased from $8,235 to $7,104. A change of $1,131. Despite an overall increase in net farm income of $793,000, between 1997 and 2017, the average net income per farm in Garfield County declined.



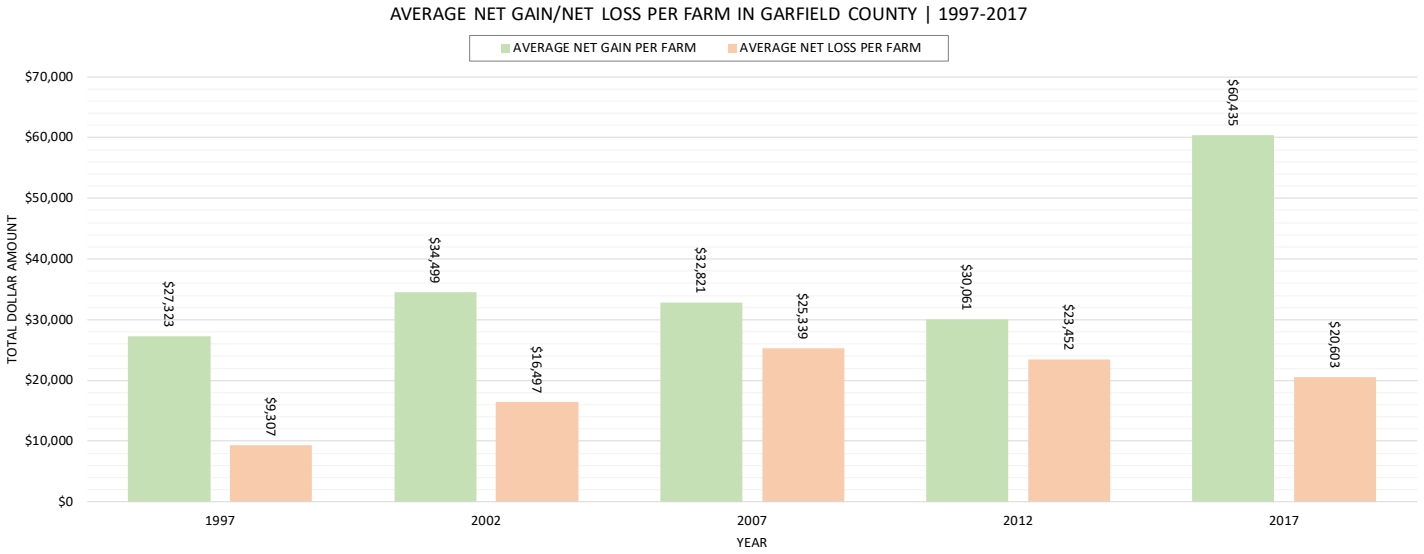
III. PERCENT OF TOTAL FARMS WITH NET GAINS/NET LOSSES

Between 1997 and 2017, the percent of total farms in Garfield County with net gains decreased by 13.6%. During that same period, the percent of total farms in Garfield County with net losses increased by 13.7%.



IV. AVERAGE NET GAIN/NET LOSS PER FARM

Between 1997 and 2017, the average net gain per farm increased from $27,323 to $60,435. This is a change of $33,112. Furthermore, between 1997 and 2017, the average net loss per farm increased from-$9,307 to-$20,603. A change of -$11,296.



D. INCOME FROM FARM-RELATED SOURCES

I. NUMBER OF FARMS COLLECTING INCOME FROM FARM-RELATED SOURCES

Between 2002 and 2017, the number of farms in Garfield County collecting income from:

- Agri-tourism and Recreational Services did not change and remained at 35.
- State and Local Government Agricultural Payment Programs increased from 0 to 5 (+5 farms).
- Crop and Livestock Insurance Programs increased from 0 to 13 (+13 farms).
- Customwork and Other Agricultural Services increased from 21 to 28 (+7 farms).
- Gross Cash Rent or Share Payments increased from 48 to 67 (+19 farms).
- Other Farm-Related Income Sources decreased from 59 to 51 (-8 farms).
- Patronage Dividends and Refunds from Cooperatives have increased from 19 to 42 (+23 farms).
- Sales of Forest Products (excluding Christmas Trees and Maple Products) decreased from 6 to 4 (-2 farms).

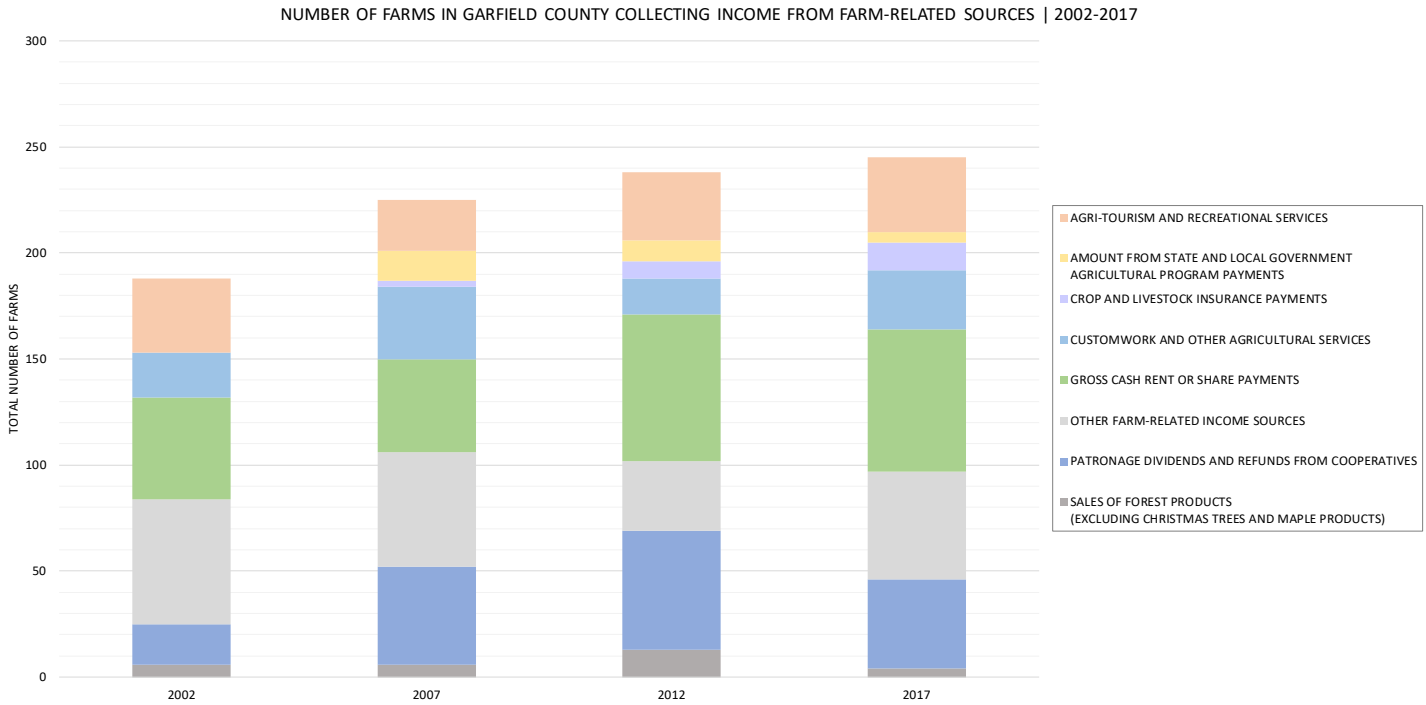


Table 4: Number of Farms in Garfield County Collecting Income from Farm-Related Sources (2002-2017)

FARM-RELATED INCOME SOURCES	2002	2007	2012	2017
Agri-tourism and Recreational Services	35	24	32	35
Amount from State and Local Government Agricultural Program Payments	0	14	10	5
Crop and Livestock Insurance Programs	0	3	8	13
Customwork and Other Agricultural Services	21	34	17	28
Gross Cash Rent or Share Payments	48	44	69	67
Other Farm-Related Income Sources	59	54	33	51
Patronage Dividends and Refunds from Cooperatives	19	46	56	42
Sales of Forest Products (excluding Christmas Tree and Maple Products)	6	6	13	4

Data Source(s): US Department of Agriculture

II. FARM INCOME GENERATED FROM FARM-RELATED SOURCES

Between 2002 and 2017, farm income in Garfield County generated from:

- Agri-tourism and Recreational Services increased by $2,283,000.
- State and Local Government Agricultural Payment programs increased by $11,000.
- Crop and Livestock Insurance Programs increased by $110,000.
- Customwork and Other Agricultural Services increased by $1,042,000.
- Gross Cash Rent or Share Payments increased by $318,000.
- Other Farm-Related Income Sources increased by $1,051,000.
- Patronage Dividends and Refunds from Cooperatives increased by $45,000.
- Sales of Forest Products (excluding Christmas Trees and Maple Products) decreased by $38,000.

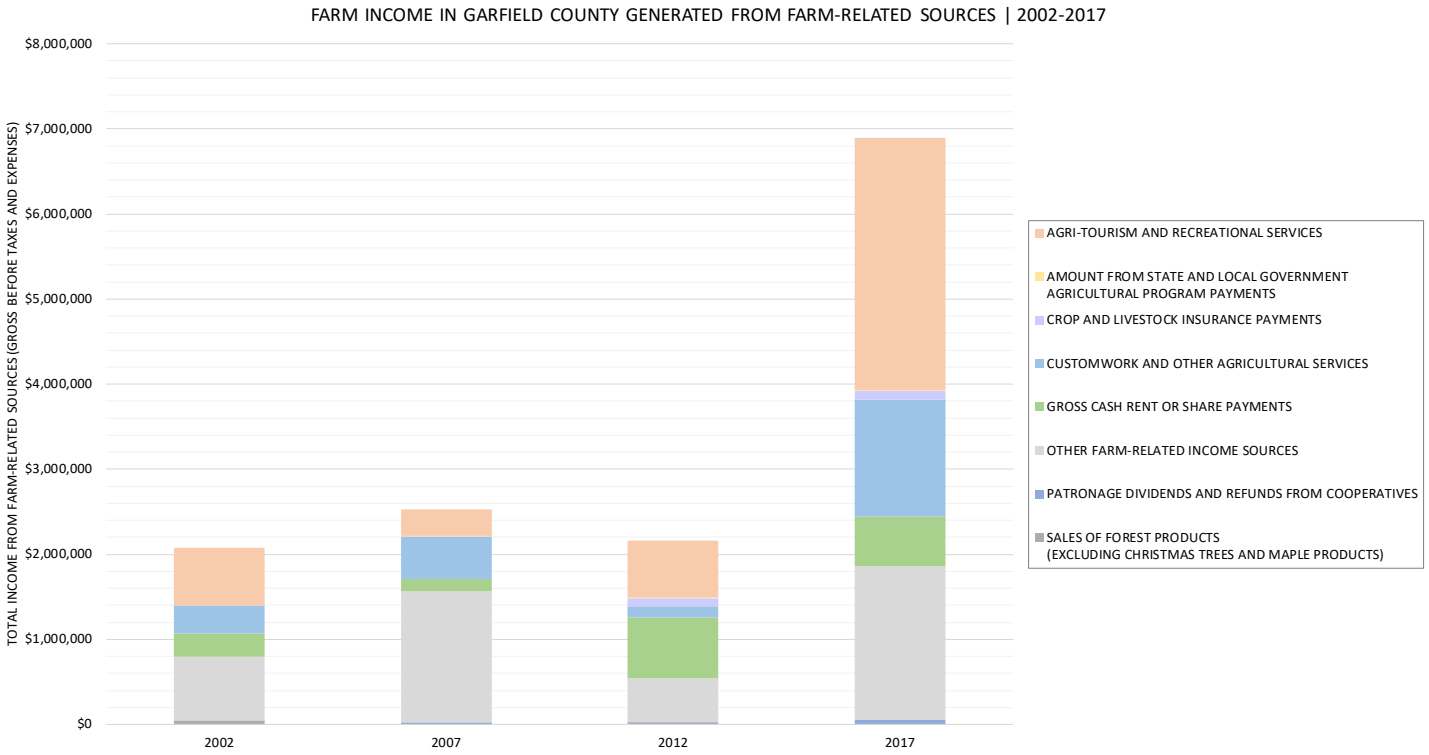


Table 5: Farm Income in Garfield County Generated from Farm-Related Sources (2002-2017)

FARM-RELATED INCOME SOURCES	2002	2007	2012	2017
Agri-tourism and Recreational Services	$682,000	$306,000	$663,000	$2,965,000
Amount from State and Local Government Agricultural Program Payments	$0	$9,000	$12,000	$11,000
Crop and Livestock Insurance Programs	$0	$7,000	$91,000	$110,000
Customwork and Other Agricultural Services	$330,000	$492,000	$138,000	$1,372,000
Gross Cash Rent or Share Payments	$266,000	$143,000	$718,000	$584,000
Other Farm-Related Income Sources	$751,000	$1,542,000	$502,000	$1,802,000
Patronage Dividends and Refunds from Cooperatives	$5,000	$21,000	$15,000	$50,000
Sales of Forest Products (excluding Christmas Tree and Maple Products)	$43,000	$6,000	$21,000	$5,000

Data Source(s): US Department of Agriculture

III. DEFINITIONS

Table 6: Definitions of Farm-Related Income Sources

TERM	DEFINITION[1]
1. Agri-tourism and Recreational Services	This income includes income from recreational services such as hunting, fishing, farm or wine tours, hay rides, etc.
2. Amount from State and Local Government Agricultural Program Payments	This income includes State and local government agricultural program payments. Respondents were to exclude the State and local portion of Conservation Reserve Enhancement Program (CREP) payments if they were reported in the amount received for participation in CREP in section 5, item 2 of the report form.
3. Crop and Livestock Insurance Programs	This income includes insurance payments from crop and livestock losses.
4. Customwork and Other Agricultural Services	This income includes gross receipts received by the farm producers for providing services for others such as planting, plowing, spraying, and harvesting. Income from customwork and other agricultural services is generally included in the agriculture census if it is closely related to the farming operation. However, it is excluded if it constituted a separate business or was conducted from another location.
5. Gross Cash Rent or Share Payments	This income includes gross cash or share payments received from renting out farmland, payments received from the lease or sale of allotments, and payments received for livestock pastured on a per-head, per month, or per pound basis. It excludes rental income from nonfarm property.
6. Other Farm-Related Income Sources	This is other income which is closely related to the agricultural operation. This income includes animal boarding, breeding fees (horse breeding or stud fees received were reported in the Value of Sales section in the Other animals and other animal products category), tobacco quota buyouts, State fuel tax refunds, farm generated energy, etc. Crop and livestock insurance payments received and amount from State and local government agricultural program payments were published separately.
7. Patronage Dividends and Refunds from Cooperatives	This income includes payments to a farmer or rancher for business done with a cooperative to which he/she usually belongs. The payment is usually for goods sold through the co-op.
8. Sales of Forest Products (excluding Christmas Tree and Maple Products)	This income includes gross receipts from sales of standing timber, pulpwood, firewood, etc. from the farm or ranch operation. It excludes income from nonfarm timber tracts, sawmill businesses, cultivated Christmas trees, maple products, and short rotation woody crops.

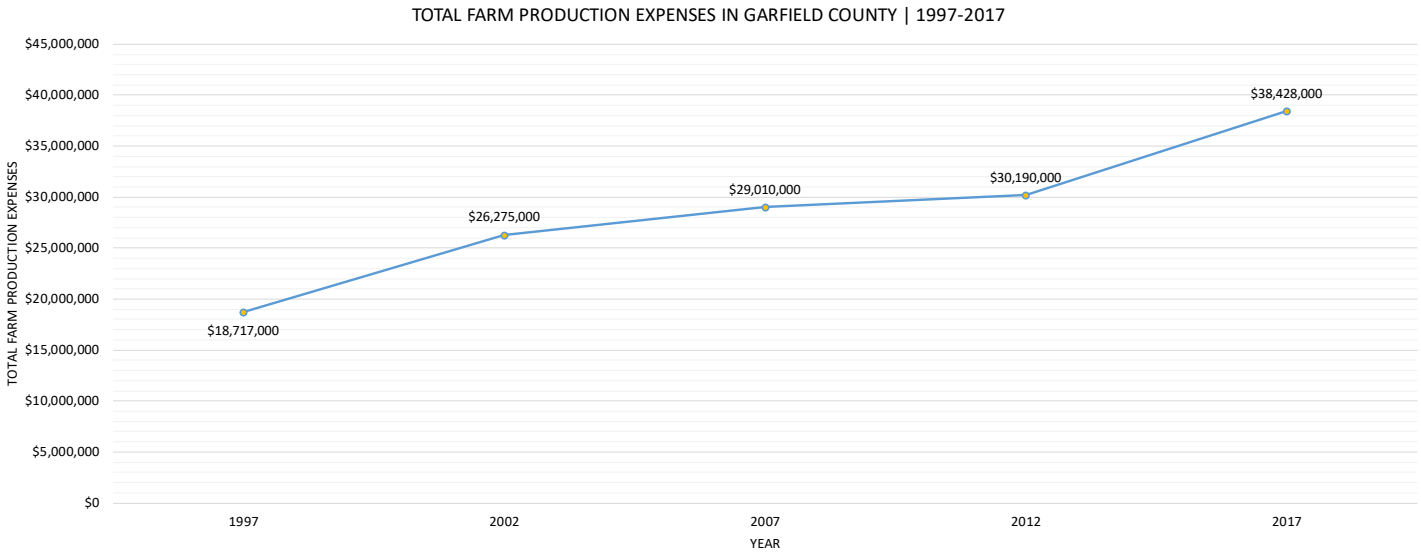
NOTES:
[1]Definitions from Appendix B of the 2017 Census of Agriculture.

Data Source(s): US Department of Agriculture

E. FARM PRODUCTION EXPENSES

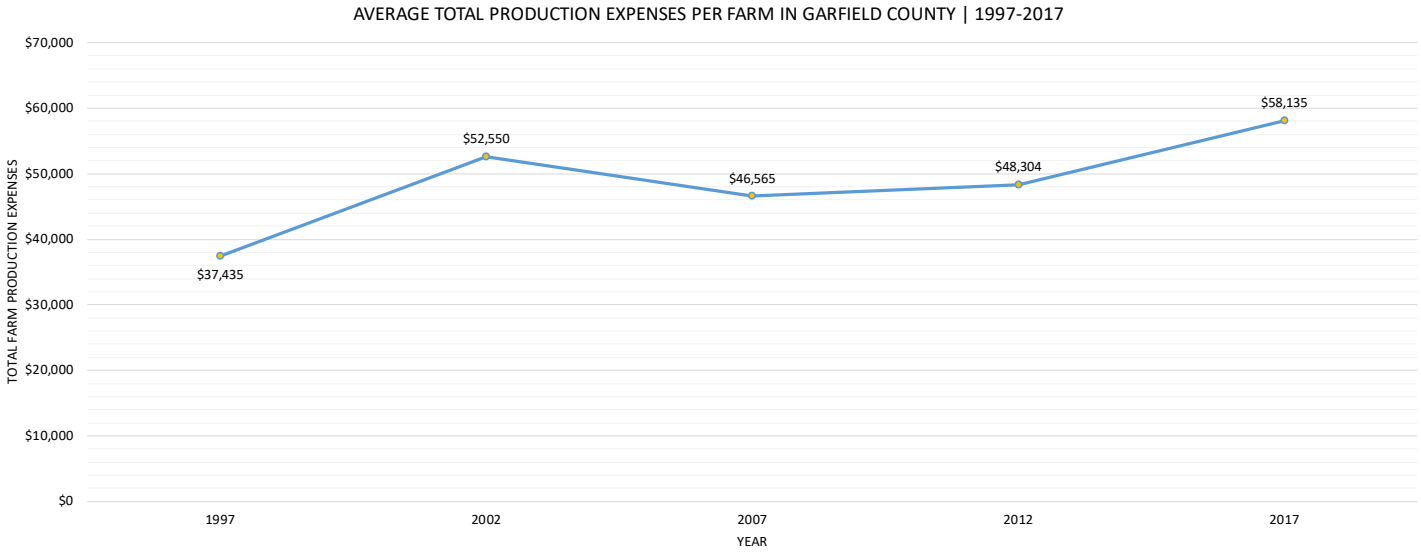
I. TOTAL FARM PRODUCTION EXPENSES

Between 1997 and 2017, the total production expenses for farms in Garfield County increased from $18,717,000 to $38,428,000. A change of $19,711,000.



II. AVERAGE TOTAL PRODUCTION EXPENSES PER FARM

Between 1997 and 2017, the average total production expenses for farms in Garfield County increased from $37,435 to $58,135. A change of $20,700.



III. AVERAGE PRODUCTION EXPENSES PER FARM

Between 1997 and 2017, the average production expenses per farm in Garfield County changed as follows:

- Cash rent for land, buildings and grazing fees decreased by $86.
- Chemicals increased by $1,293.
- Contract labor increased by $14,991.
- Customwork and custom hauling increased by $1,172.
- Feed purchased increased by $4,269.
- Fertilizer, lime and soil conditioners increased by $471.
- Gasoline, fuels and oils increased by $641.

- Hired farm labor increased by $33,534.
- Interest paid on debts increased by $10,123.
- Livestock and poultry purchased or leased increased by $3,066.
- Property taxes paid increased by $2,773.
- Rent and lease expenses for machinery, equipment and farm share of vehicles increased by $2,343.
- Seeds, plants, vines and trees increased by $526.
- Supplies, repairs and maintenance increased by $3,542.
- Utilities increased by $522.
- All other production expenses increased by $924.

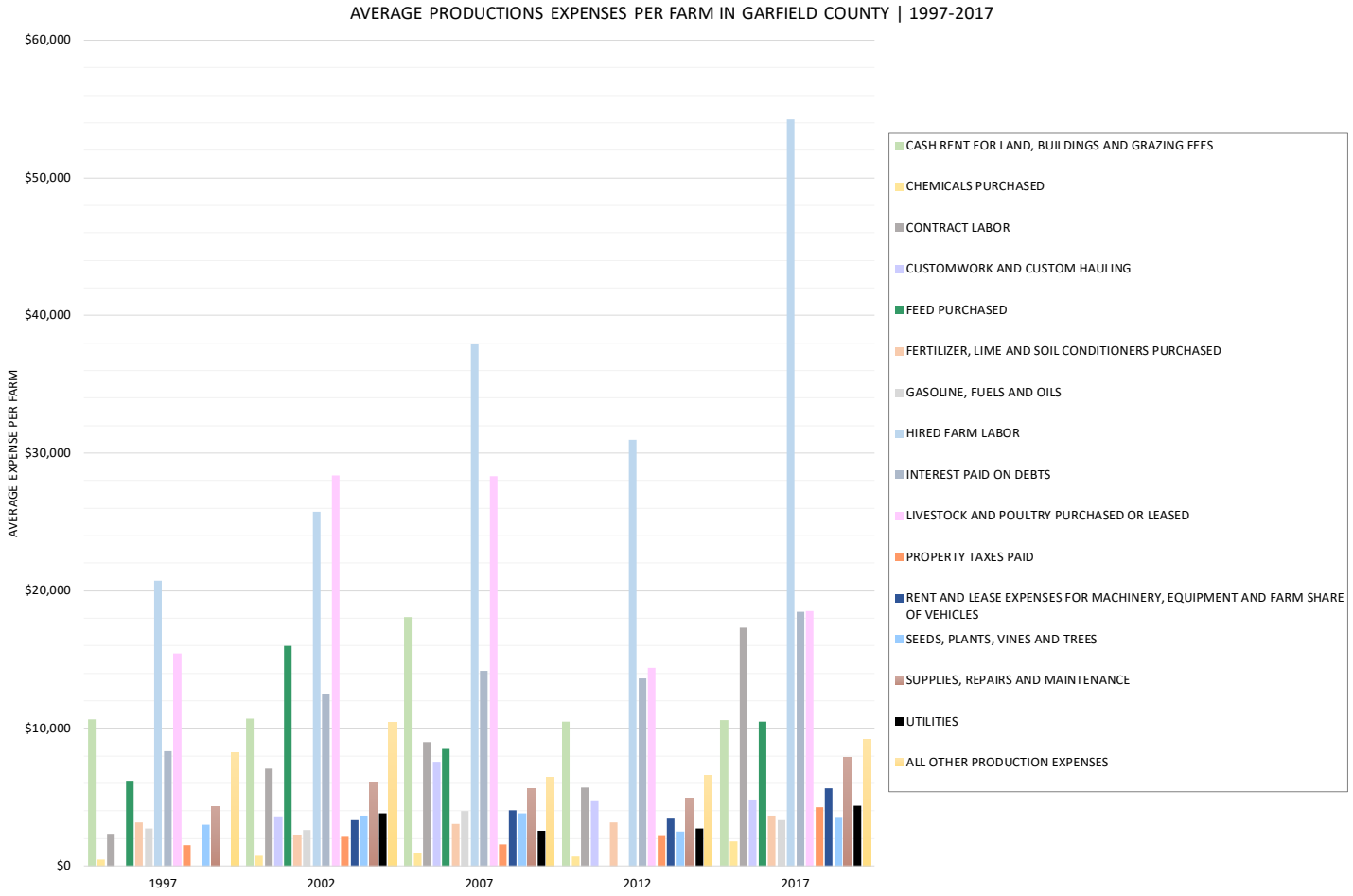


Table 7: Average Production Expenses Per Farm in Garfield County (1997-2017)

TYPE OF PRODUCTION EXPENSE	1997	2002	2007	2012	2017
Cash Rent for Land, Buildings and Grazing Fees	$10,667	$10,699	$18,089	$10,503	$10,580
Chemicals Purchased	$482	$759	$921	$699	$1,775
Contract Labor	$2,330	$7,063	$9,014	$5,708	$17,321
Customwork and Custom Hauling	$0	$3,582	$7,580	$4,724	$4,754
Feed Purchased	$6,199	$16,016	$8,484	$0	$10,469
Fertilizer, Lime and Soil Conditioners Purchased	$3,189	$2,288	$3,063	$3,164	$3,660
Gasoline, Fuels and Oils	$2,717	$2,624	$3,992	$0	$3,358
Hired Farm Labor	$20,698	$25,760	$37,918	$30,938	$54,232
Interest Paid on Debts	$8,364	$12,486	$14,183	$13,620	$18,488
Livestock and Poultry Purchased or Leased	$15,459	$28,393	$28,324	$14,382	$18,526

Table 7: Average Production Expenses Per Farm in Garfield County (1997-2017) (continued)

TYPE OF PRODUCTION EXPENSE	1997	2002	2007	2012	2017
Property Taxes Paid	$1,520	$2,138	$1,582	$2,172	$4,294
Rent and Lease Expenses for Machinery, Equipment and Farm Share of Vehicles	$0	$3,310	$4,071	$3,421	$5,653
Seeds, Plants, Vines and Trees	$2,983	$3,647	$3,841	$2,530	$3,510
Supplies, Repairs and Maintenance	$4,346	$6,027	$5,620	$4,942	$7,888
Utilities	$0	$3,848	$2,575	$2,730	$4,370
All Other Production Expenses	$8,231	$10,421	$6,392	$6,567	$9,156

Data Source(s): US Department of Agriculture

III. DEFINITIONS

Table 8: Definitions of Production Expenses

TERM	DEFINITION[1]
1. Cash Rent for Land, Buildings and Grazing Fees	These data include the cost of renting land and buildings and grazing fees that were part of the operation. Rent paid for the producer's dwelling or other non-farm property and the value of the shares of crops and livestock paid to landlords were excluded.
2. Chemicals	These expenses include insecticides, herbicides, fungicides, and other pesticides, including costs of custom application. Data exclude commercial fertilizer purchased.
3. Contract Labor	These data include payments made to contractors, crew leaders, cooperatives, or any other organization hired to furnish a crew of laborers to do a job that may involve one or more agricultural operations. In some cases, a crew leader may furnish some equipment. Data exclude expenses made on a contractual basis for repair or maintenance or for capital improvements, such as construction of farm buildings, installation of fences or irrigation systems, and land leveling.
4. Customwork and Custom Hauling	These expenses include costs incurred for having customwork done on the place and for renting machines to perform agricultural operations. The cost of cotton ginning is excluded. The cost of labor involved in the customwork service is included in the customwork expense. Some examples of customwork are planting, spraying, harvesting, preparation of products for marketing, grinding and mixing feed, corn picking, grain drying, and silo filling. The cost of custom application of fertilizer and chemicals is included in expenditures for fertilizer and chemicals. The cost of hired labor for operating rented or hired machinery is included as a hired farm and ranch labor expense.
5. Feed Purchased	These expenses include the cost of all feed purchased for livestock and poultry including grain, hay, silage, mixed feeds, concentrates, etc.
6. Fertilizer, Lime and Soil Conditioners	These expenses include fertilizer, lime, rock phosphate, and gypsum and the costs of custom application.
7. Gasolines, Fuels and Oils	These expenses include the cost of all gasoline, diesel, natural gas, LP gas, motor oil, and grease products for the farm. Expenses exclude fuel for personal use of automobiles by the family and others, fuel used for cooking and heating the farmhouse, and any other use outside of farmwork on the operation.
8. Hired Farm Labor	These expenses include the total amount paid for farm or ranch labor including regular workers, part-time workers, and members of the producer's family if they received payments for labor. Expenses include Social Security taxes, State taxes, unemployment tax, payment for sick leave or vacation pay, workman's compensation, insurance premiums, and pension plans.

Table 8: Definitions of Production Expenses (continued)

TERM		DEFINITION[1]
9.	Interest Paid on Debts	These expenses include interest and finance charges paid for debts secured by real estate and on debt not secured by real estate. Interest expenses excluded from this category are non-farm interest expenses and interest expenses originating from machinery and equipment used for a separate customwork business or for other operations. Interest expense for the producer's dwelling, where the amount is separate from interest on farm land and buildings on the operation, is excluded.
10.	Livestock and Poultry Purchased or Leased	These data include breeding livestock purchased or leased and other livestock and poultry purchased or leased.
11.	Property Taxes Paid	These data include property taxes paid by the producers for the farm share of land, machinery, buildings, and livestock, excluding taxes paid by this producer's landlords.
12.	Rent and Lease Expenses for Machinery, Equipment and Farm Share of Vehicles	These data include the farm share cost of renting or leasing machinery, equipment, and vehicles. Rental and lease expenses of items used only for custom hire are excluded here.
13.	Seeds, Plants, Vines and Trees	These expenses include the cost of all seeds, bulbs, plants, propagation materials, trees, seed treatments, seed cleaning costs, etc. purchased. Excluded were items purchased for immediate resale or the value of seed grown on the operation.
14.	Supplies, Repairs and Maintenance	These expenses include all costs for the repair and upkeep of buildings, motor vehicles, fences, and farm equipment used for the farm business. Repairs to equipment used both for the farm business and for performing customwork are included.
15.	Utilities	These data show the farm share cost of electricity, telephone charges, internet fees, and water purchased. Included in the water cost is water purchased for irrigation purposes, livestock watering, etc. Household utility costs were excluded from these items.
16.	All Other Production Expenses	All other production expenses include all expenses not listed on the report form. Examples include storage and warehousing, marketing and ginning expenses, insurance, etc. Health insurance premiums and payroll taxes are reported in hired labor expenses.

NOTES:
[1]Definitions from Appendix B of the 2017 Census of Agriculture.

Data Source(s): US Department of Agriculture

F. FARM PRODUCERS

The term "producer" designates a person who is involved in making decisions for farm operations. Decisions may include those related to planting, harvesting, livestock management, and marketing. The producer may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper. If a person rents land to others or has land worked on shares by others, he/she is considered the producer only of the land which is retained for his/her own operation.

I. FARMS BY TENURE OF PRODUCERS

Between 1997 and 2017, the percent of total farms in Garfield County operated by:

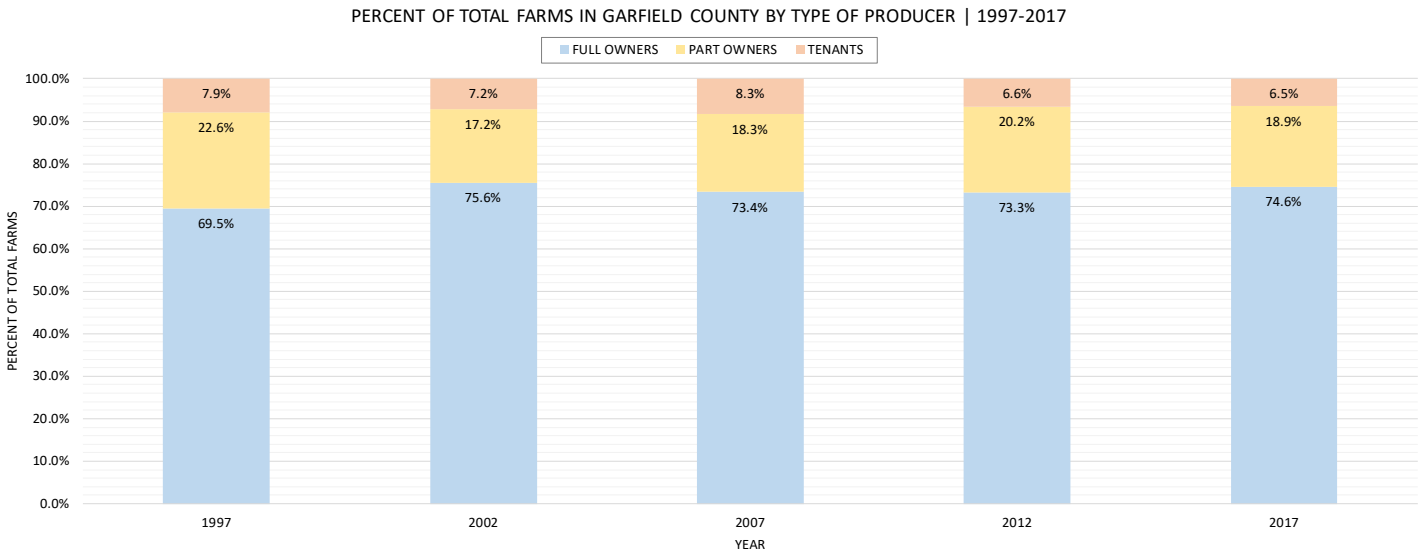
- Full owners[1] increased by 5.1%.
- Part owners[2] decreased by 3.7%.
- Tenants[3] decreased by 4.6%.

NOTES:

[1]Full owners only operate land they own. Definition from Appendix B of the USDA's 2017 Census of Agriculture.

[2]Part owners operate land they own, as well as land they rent from others. Definition from Appendix B of the USDA's 2017 Census of Agriculture.

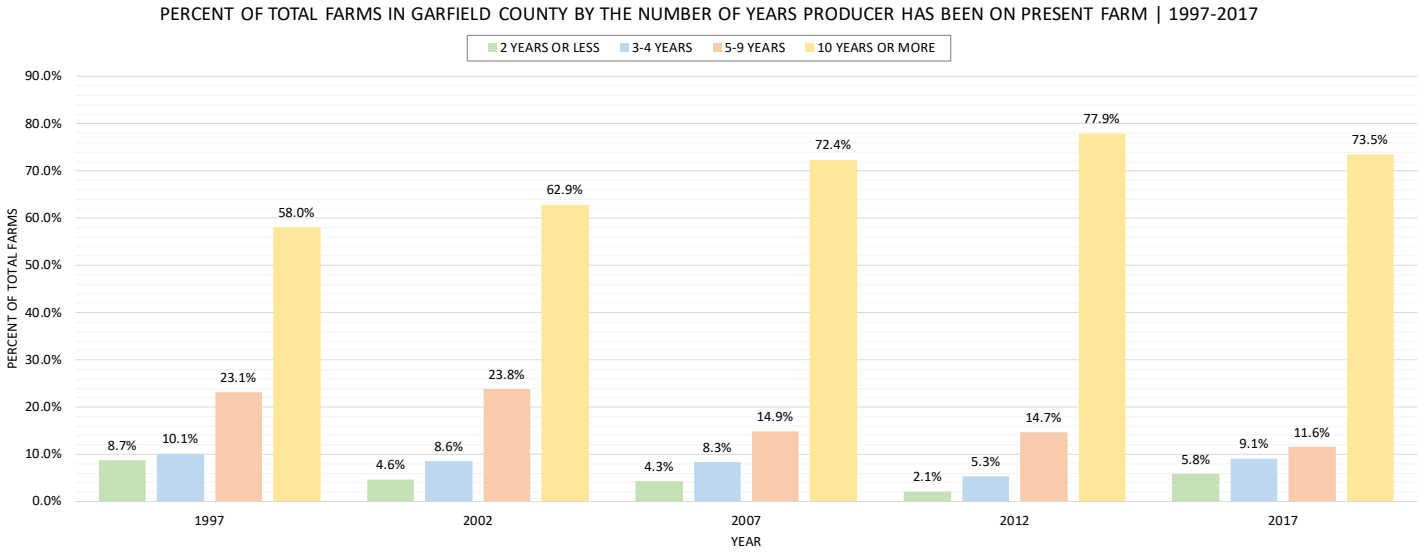
[3]Tenants only operate land they rent from others or work on shares for others. Definition from Appendix B of the USDA's 2017 Census of Agriculture.



II. PRODUCERS BY YEARS ON PRESENT FARM

Between 1997 and 2017, the percent of total farms in Garfield County with producers that had been on the present farm for:

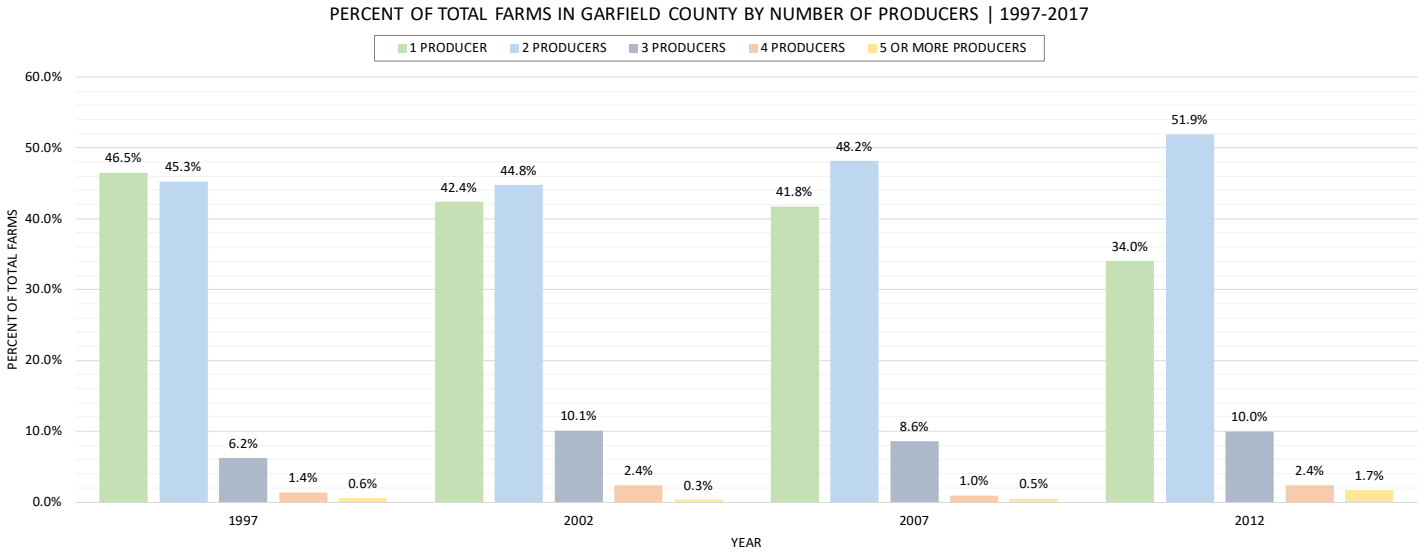
- 2 years or less decreased 2.9%.
- 3-4 years decreased 1.0%.
- 5-9 years decreased 11.5%.
- 10 years or more increased 15.5%.



III. FARMS BY NUMBER OF PRODUCERS

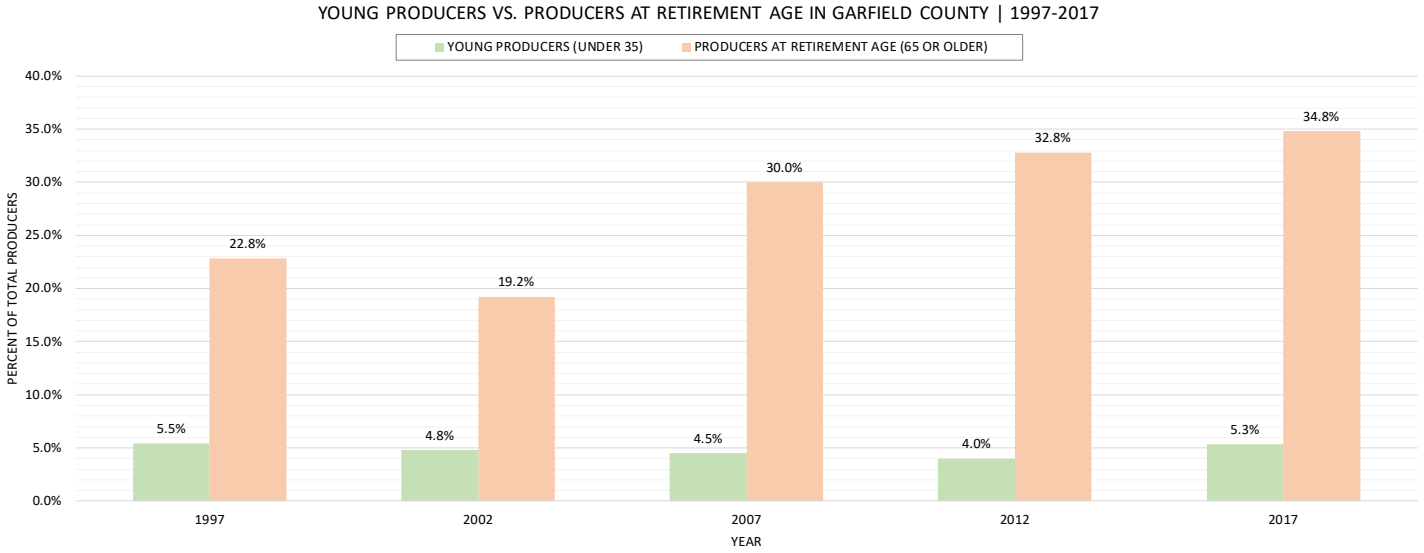
Between 1997 and 2017, the percent of total farms in Garfield County with:

- 1 Producer decreased 12.5%.
- 2 Producers increased 6.6%.
- 3 Producers increased 3.8%.
- 4 Producers increased 1.0%.
- 5 or More Producers increased 1.1%.



IV. PERCENT OF YOUNG PRODUCERS VS. PRODUCERS AT RETIREMENT AGE

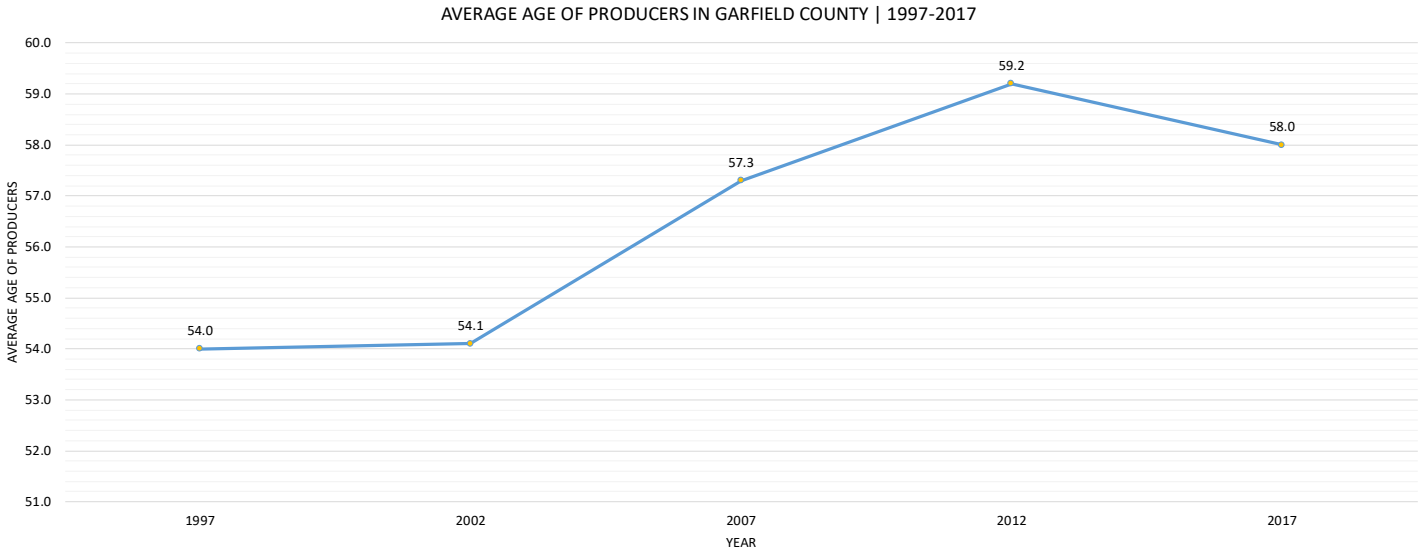
Between 1997 and 2017, the percent of total producers under 35 years old (i.e. young producers) decreased by 0.2% while the percent of total producers 65 years of age or older (i.e. producers at retirement age) increased by 15.6%.



V. AVERAGE AGE OF PRODUCERS

Between 1997 and 2017, the average age of producers in Garfield County increased from 54.0 years old to 58.0 years old. A change of 4.0 years. Over that same period, the average age of producers in the State of Colorado increased from 53.8 years old to 57.6 years old. A change of 3.8 years.

In the United States, the average age of producers increased from 54.3 years old to 57.5 years old, a change of 3.2 years, between 1997 and 2017.



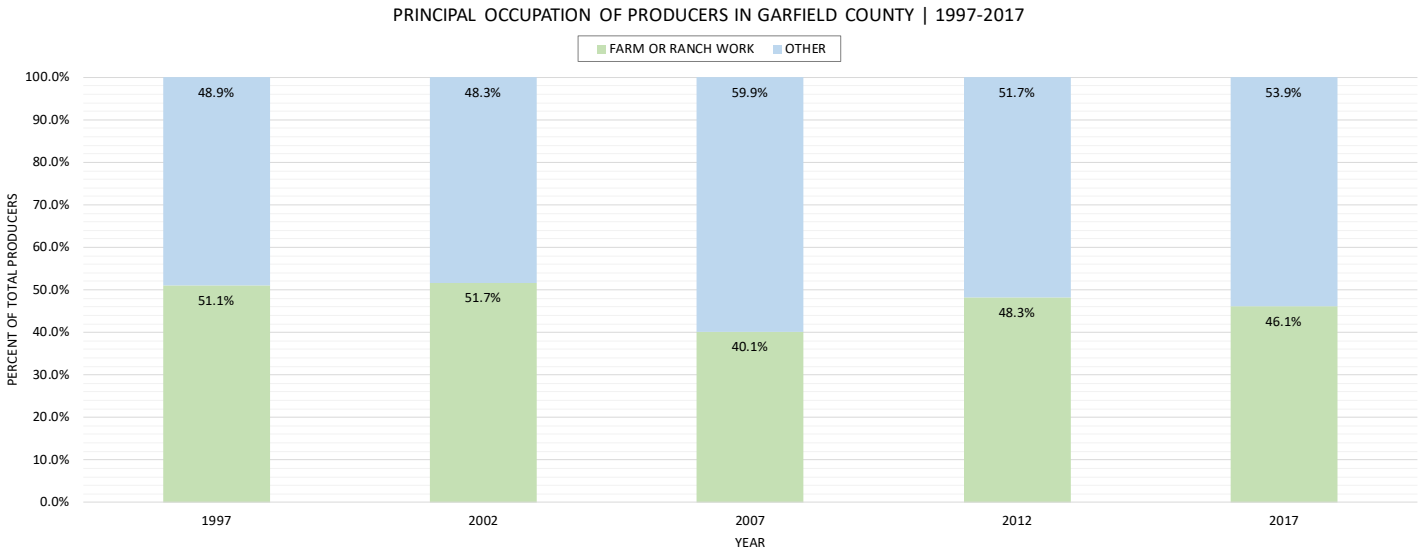
VI. PRODUCER'S PRINCIPAL OCCUPATION

Between 1997 and 2017, the percent of total producers in Garfield County whose principal occupation was "Farm or Ranch Work[1]" declined from 51.1% to 46.1%. A change of 5.0%. Consequently, the percent of total producers whose principal occupation was "Other[2]" increased from 48.9% to 53.9%, a change of 5.1%, over that same period.

NOTES:

[1]Farm or ranch work- The producer spent 50% or more of his/her worktime farming or ranching.

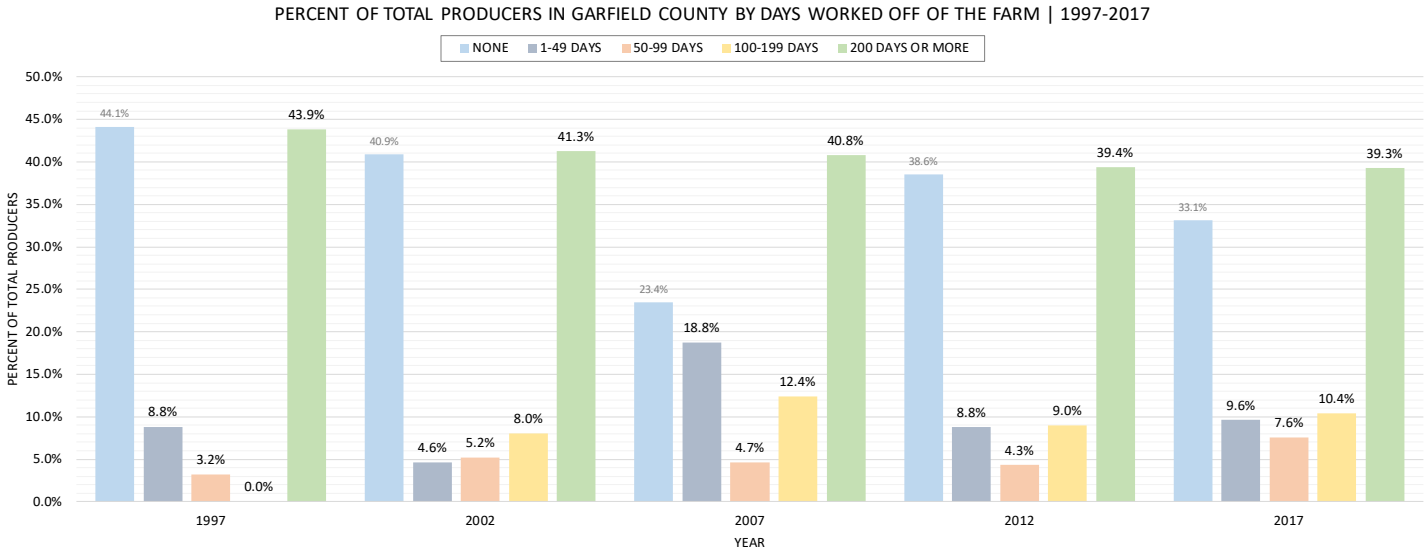
[2] Other- The producer spent less than 50% of his/her worktime farming or ranching.



VII. PRODUCERS BY DAYS WORKED OFF OF FARM

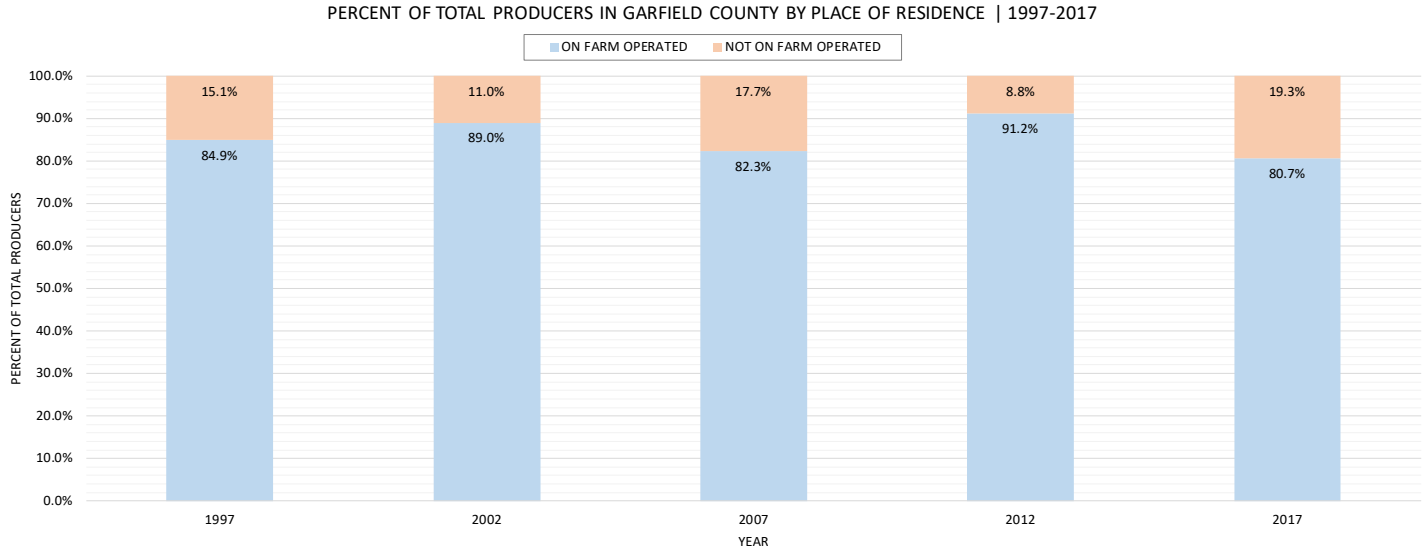
Between 1997 and 2017, the percent of total producers in Garfield County that spent time working off of the farm changed in the following ways:

- Producers with no days working off of the farm decreased 11.0%.
- Producers with 1-49 days working off of the farm increased 0.8%.
- Producers with 50-99 days working off of the farm increased 4.4%.
- Producers with 100-199 days working off of the farm increased 10.4%.
- Producers with 200 days or more working off of the farm decreased 4.6%.



VIII. PRODUCER'S PLACE OF RESIDENCE

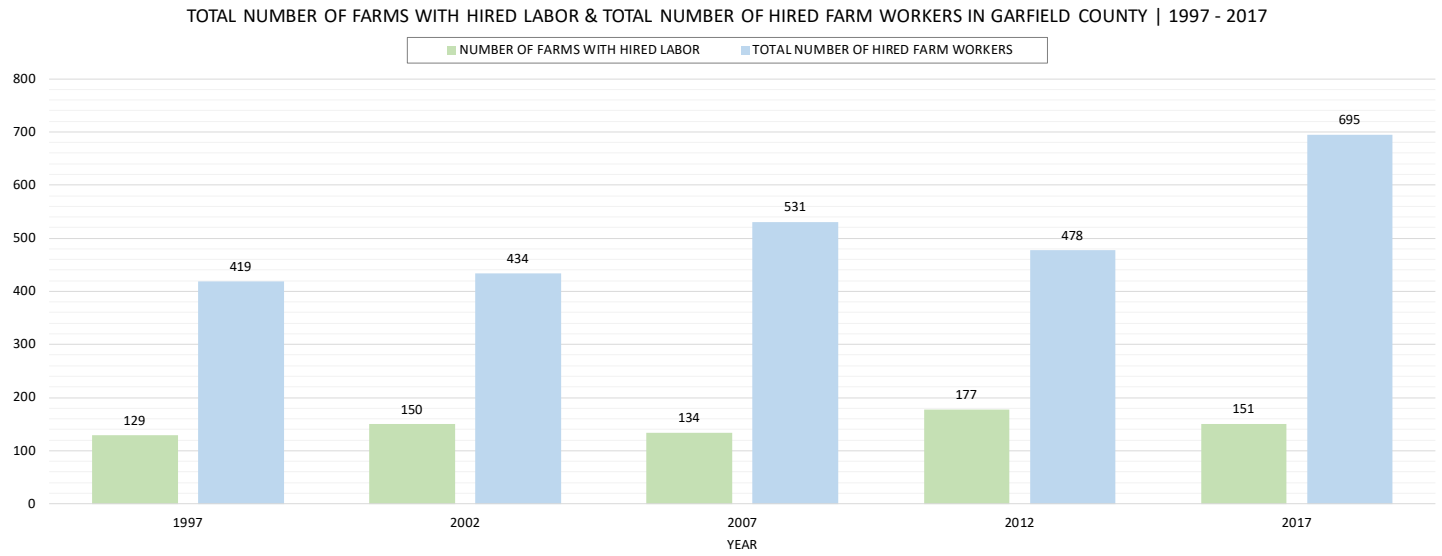
Between 1997 and 2017, the percent of total producers that lived on the farm they operated decreased by 4.2%, while the percent of total producers that did not live on the farm they operated increased by 4.2%.



G. FARM LABOR

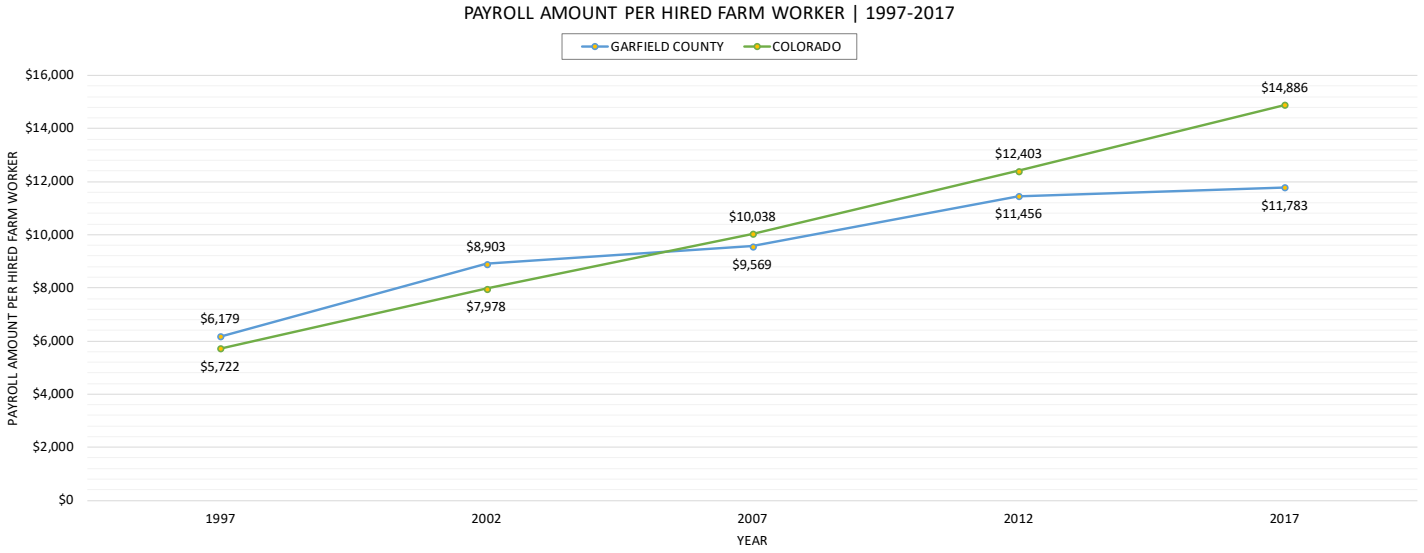
I. TOTAL NUMBER OF FARMS WITH HIRED FARM LABOR & TOTAL NUMBER OF HIRED FARM WORKERS

Between 1997 and 2017, the total number of farms with hired farm labor increased from 129 farms to 151 farms, an increase of 22 farms. Over that same period of time, the total number of hired farm workers increased from 419 to 695, an increase of 276 workers.



II. PAYROLL AMOUNT PER HIRED FARM WORKER

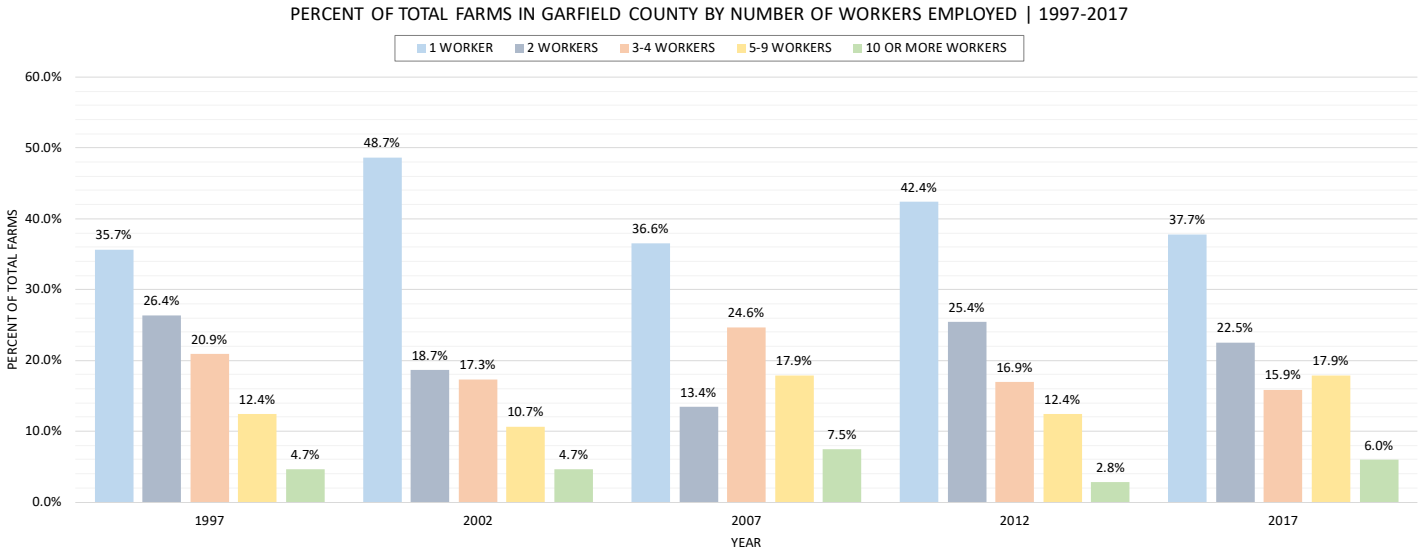
Between 1997 and 2017, the payroll amount per hired farm worker in Garfield County increased from $6,179.00 to $11,782.73. An increase of $5,603.74. By contrast, during that same period, the payroll amount per hired farm worker in Colorado increased from $5,721.54 to $14,886.23. An increase of $9,164.69.



III. FARMS BY NUMBER OF WORKERS

Between 1997 and 2017, the percent of total farms that:

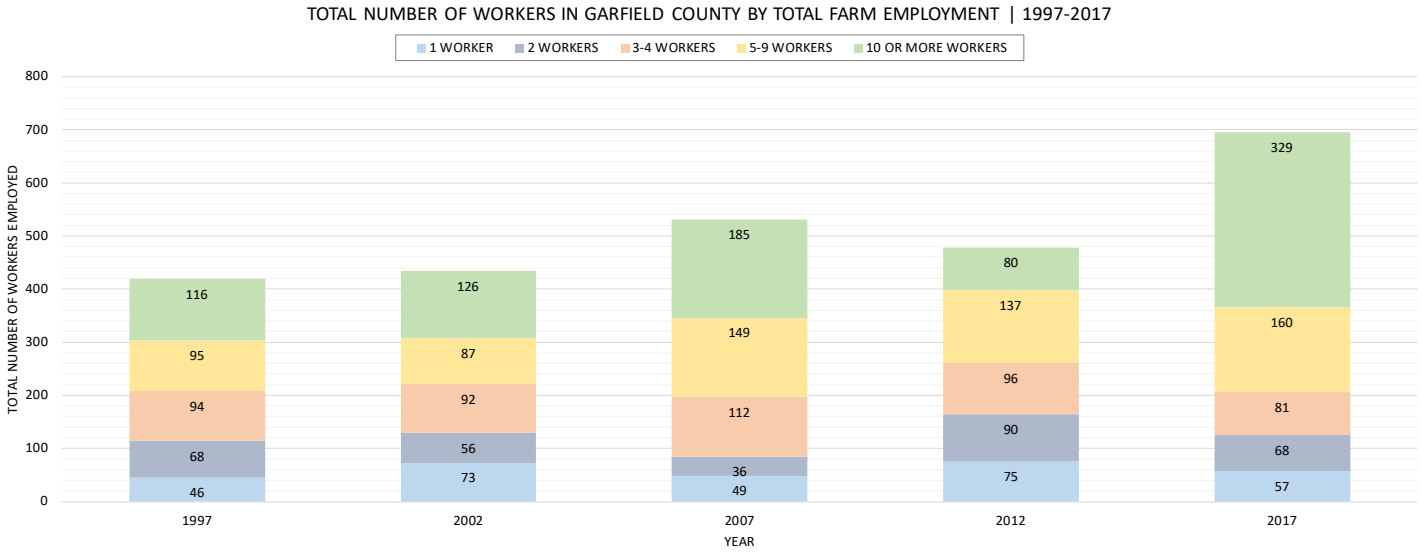
- Employed 1 worker increased by 2.0%.
- Employed 2 workers decreased by 3.8%.
- Employed 3-4 workers decreased by 5.0%.
- Employed 5-9 workers increased by 5.5%.
- Employed 10 or more workers increased by 1.3%.



IV. TOTAL NUMBER OF WORKERS EMPLOYED BY TOTAL FARM EMPLOYMENT

Between 1997 and 2017, the total number of workers employed by farm changed as follows:

- Farms employing 1 worker increased by 11 workers.
- Farms employing 2 workers did not change.
- Farms employing 3-4 workers decreased by 13 workers.
- Farms employing 5-9 workers increased by 65 workers.
- Farms employing 10 or more workers increased by 213 workers.



H. GARFIELD COUNTY CONTRIBUTIONS TO LOCAL AGRICULTURAL PROGRAMS

Table 9 offers a summary of the funds and in-kind amounts that the county contributed to agricultural programs and activities in 2019.

Table 9: Summary of Garfield County's Contributions to Agricultural Programs & Activities (2019)

	AGRICULTURAL PROGRAM OR ACTIVITY	AMOUNT CONTRIBUTED
1.	CSU Extension	$300,000
2.	Garfield County Fair	$630,000

Table 9: Summary of Garfield County's Contributions to Agricultural Programs & Activities (2019) (continued)

	AGRICULTURAL PROGRAM OR ACTIVITY	AMOUNT CONTRIBUTED
3.	Livestock Committee	roughly $20,000.00 in-kind staff time
4.	Fair & Community Events	$550,000
5.	Revenue from the sale of animals reinvested in kids programs	$150,000
6.	In-Kind Staff Support	$10,000

Data Source(s): Garfield County Finance Department

I. OVERVIEW OF CONSERVATION EASEMENTS IN GARFIELD COUNTY

Data from the Garfield County Assessor and the Aspen Valley Land Trust (AVLT) indicate that 121 Conservation Easements have been established in Garfield County (94 of which were established between 1990 and 2019). This resulted in approximately 31,947-acres being conserved (+/- 1.7% of Garfield County).

Table 10: Overview of Conservation Easements in Garfield County (1990-2019)

	1990-1999	2000-2009	2010-2019	Unknown
Total Number of Conservation Easements Established	10	64	20	27
Amount of Land Conserved (approximate)	5,114-acres	14,690-acres	8,299-acres	3,844-acres
Entities Conservation Easements Held By	Aspen Valley Land Trust (5 Easements) Colorado Parks & Wildlife (3 Easements) Humane Society of the United States Wildlife Land Trust (1 Easement) Rocky Mountain Elk Foundation (1 Easement)	Aspen Valley Land Trust (57 Easements) Bureau of Land Management (1 Easement) Colorado Open Lands (3 Easements) Colorado Parks & Wildlife (3 Easements)	Aspen Valley Land Trust (18 Easements) Colorado Open Lands (2 Easements)	Colorado Open Lands (1 Easement) Roaring Fork Conservancy (1 Easement) Unknown (25 Easements)

Data Source(s): Garfield County Assessor; and, Aspen Valley Land Trust

J. GRAZING PASTURES ON PUBLIC LANDS IN GARFIELD COUNTY

OVERVIEW

There are 510-grazing pastures on Bureau of Land Management (BLM) and United States Forest Service (USFS) lands in Garfield County. This equates to roughly 1,306,746.6-acres of grazing pasture (+/- 69% of the county) on public lands in the county.

BLM GRAZING PASTURES

March 2019 data from the Bureau of Land Management identifies 228-grazing pastures within Garfield County. This equates to approximately 860,411.82-acres of grazing pasture on BLM lands in the county. The BLM defines a "grazing pasture" as a subset of a grazing allotment, where the grazing of livestock occurs. A "grazing allotment" is defined as an area that has one or more pastures, or can have no pastures on it at all.

The majority of BLM grazing pastures are located between Rifle and the county's western border. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for additional information.

USFS GRAZING PASTURES

GIS data from the USFS identifies 282-grazing pastures within Garfield County. This equates to roughly 446,334.8-acres of grazing pasture on USFS lands in the county. Grazing pastures are rangeland resources that the USFS permits individuals or

organizations to graze livestock on.

Most of the USFS grazing pastures are located in the northeast part of Garfield County. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for additional information.

1. OVERVIEW

Appendix C: Economy provides current information regarding the economy in Garfield County. The information in this appendix is intended to help inform county decision-making, policies and regulations. Appendix C is organized as follows:

1. Overview
2. Summary of Findings
3. Economic Data & Information

Data for Appendix C were compiled from a number of sources. Those data sources include:

I. State of Colorado Agencies

- Data from Colorado State Demography Office (SDO) and Colorado Department of Transportation (CDOT) were used to identify demographic trends and the economic impact of the Rifle Garfield County Airport (RIL).
- Colorado Oil and Gas Conservation Commission (COGCC) data were used to evaluate trends in the volume of coalbed methane, natural gas and oil produced and sold by Garfield County. These data were also used to better understand what share of the total volume of coalbed methane, natural gas and oil produced and sold by Colorado was attributed to the county.
- Data from the Colorado Division of Taxation were used to evaluate changes in the amount of land assessed as "Agricultural" in the county.

II. Federal Agencies

- Data from the Bureau of Economic Analysis (BEA) were used to identify employment and income trends.
- US Census Zip Code Business Pattern data were used to evaluate the number of jobs and annual average wages for the towns/cities in the county.
- US Energy Information Administration (EIA) data were used to identify natural gas and oil price trends. In addition, information from the EIA was used to understand the key factors that influence natural gas and oil pricing.
- Data from the US Department of Agriculture (USDA) were used to identify trends in agricultural industries in Garfield County.

III. Related Reports/Studies

- Key findings were pulled from a 2015 study titled, "Place Value: How Communities Attract, Grow and Keep Jobs and Talent in the Rocky Mountain West," prepared by a non-profit organization, Community Builders (www.communitybuilders.org).
- Information was sourced from a 2016 study titled, "Rural Economic Resiliency in Colorado: Study of Factors Impacting Resiliency" prepared by the Colorado Office of Economic Development & International Trade (OEDIT). This was used to prepare a list of key factors that have been identified as important to the success of rural economies.
- Excerpts from the 2019 Garfield County Profile (https://www.garfield-county.com/economic-development/garfield-county-profile.aspx) were used to elaborate on the economic cycles (i.e. booms and busts) experienced by the county in recent years.
- Data were sourced from the "Economic Contribution of the Oil and Gas Industry in the Piceance Basin," prepared by Colorado Mesa University (CMU) in 2018 (https://www.coloradomesa.edu/energy/documents/economic-contribution-of-oil-and-gas-in-the-piceance.pdf). These data helped to detail the economic impact of natural resource extraction industries in Garfield County.
- A 2018 report prepared on behalf of the Middle Colorado Watershed Council (https://www.midcowatershed.org/resources) offered a wealth of information regarding the economic contributions of recreation in the Middle Colorado River Watershed, which encompasses much of Garfield County. This report is titled, "The Economic Contribution of Recreation in the Middle Colorado Watershed."
- Dean Runyan Associates (www.deanrunyan.com) have prepared a number of studies regarding the impact of overnight travel on Colorado's economy. Included within these studies are data specific to the economic impact of overnight travel on Garfield County. Study data were used to evaluate economic trends influenced by overnight travel in the county. The relevant studies prepared by Dean Runyan Associates include: "Colorado Travel Impacts: 1996-2015p" (https://www.colorado.com/sites/default/master/files/Dean%20Runyan%20Eco%20Impact%202015%20FINAL_0.pdf); and, "Colorado Travel Impacts: 2000-2018p" (http://www.deanrunyan.com/doc_library/COImp.pdf).

2. SUMMARY OF FINDINGS

The following is a summary of select economic trends and projections for Garfield County that are of particular interest for planning purposes. Further information on economic trends and projections for the county can be found in the Economic Data & Information section of this appendix.

I. A number of factors have been identified as important for attracting, growing and keeping jobs and talent.
A 2015 study prepared by Community Builders, titled "Place Value: How Communities Attract, Grow and Keep Jobs and Talent in the Rocky Mountain West," identified a number factors relevant to the strength of economies in rural western communities. The findings of the study were based on a survey of nearly 1,000 employers and community members in Colorado, Idaho, Montana and Wyoming. Key findings from the study include:

- *Jobs Follow People.* Many business owners (70% of those surveyed via the study) establish residence in a community first, and then decide to start a business at a later date.
- *Community Quality is a Top Priority for Businesses and Residents.* In selecting a location to live, the most highly considered factor for business owners and community members was the overall quality of the community.
- *Being in a Place that Can Attract Talented Employees is Important to Growing Businesses.* 68% of business owners surveyed, with unfilled positions, said that the ability to attract or retain talented employees was an important factor in choosing their business location.

- *People on the Move are Looking for Great Places.* When making relocation decisions, people consider both the quality of the community and job opportunities. 44% of survey respondents felt that job opportunities and the quality of the community were equally important factors in their decision to relocate. Just 17% of respondents indicated that job opportunities were the most important consideration.
- *People are Willing to Sacrifice Salary for the Ideal Community.* 83% of survey respondents favored "living in an ideal community with a lesser salary" over "living in a community that's less than ideal with a high salary." Safety, open space and trails, access to recreation, neighborhood character, and short commute times are all highly rated factors that people consider when deciding where to live.
- *Housing Costs are a Concern for Businesses and Employees.* 60% of business owners surveyed felt that housing costs had some impact on the ability to attract employees. That number jumps to 76% for business owners that are hiring.

A copy of the Community Builder's study can be found here:
https://communitybuilders.org/uploads/Reports/PlaceValue_11lowresa.pdf

In 2016, the Colorado Office of Economic Development & International Trade (OEDIT) prepared a study titled, "Rural Economic Resiliency in Colorado: Study of Factors Impacting Resiliency." In preparing this study, OEDIT conducted thirteen (13) focus groups with community leaders from ten (10) rural Colorado counties, which included Garfield County. Community leaders were asked to assess their county's economic resiliency, and identify factors that either contributed to or hindered it. Many of the key findings from OEDIT's study mirror the findings from Community Builder's study.

Recurring factors that community leaders identified as important to economic resiliency included:

- *Quality of Life.* The "quality of life" offered in smaller rural communities was a factor that drives people to stay and continue to work even when they could leave for opportunities to earn a higher salary.
- *Industry Diversity.* Focus group participants identified having a diverse set of industries within a community as being key to economic resiliency. Heavy dependence on a single industry creates economic uncertainty within a community, especially during times of economic downturn. Focus group participants expressed that from their perspective economic resiliency is a community's ability to rebound from a slowdown in its primary industry and to adapt to take advantage of a changing economic environment. Building employment in industries such as, health care, retail, education, and government were identified as potential opportunities to provide a buffer when a primary industry experiences a slowdown. During the Garfield County focus group it was noted that expansion in the tourism industry has helped mitigate the effect of the slowing natural resources industry.
- *Community Leadership.* Many focus group participants expressed that strong community leadership was a key factor for long-term economic success. The different types of leadership included political leaders such as mayors and town councils, business leadership, and community collaboration. In order for a community to be resilient, focus group participants expressed that leadership must be forward thinking and open to change.
- *Education and Health Care.* Education and health care systems were frequently discussed among focus groups as factors necessary for a resilient community. Having quality schools and modern, easy-to-access medical facilities are important to community success and are important for attracting new families to an area. In addition, schools and hospitals are employers, providing jobs that are in demand even during challenging economic times.
- *Transportation Access.* Transportation, including proximity to highways, access to rail lines and airports, and public transportation options, was identified as another key factor contributing to economic resiliency. Accessible transportation systems allow for easier tourist/visitor access to a community, as well as an indirect impact from those who pass through to nearby destinations. Transportation (especially rail and air)

helps to create opportunities for industry in a community as businesses are able to export their goods, and convenient transportation is available for their employees.

Community leaders also assessed certain factors that hindered economic resiliency. These included:

- *Housing Availability and Supply.* In order for rural counties to become more economically diverse, multiple focus group participants emphasized the need to grow existing small businesses and attract other businesses to the community. However, certain factors limit rural counties from being attractive to outside business. One of the major issues hindering business growth is a lack of affordable housing options for employees. Although home prices within many rural communities are reasonable for incoming retirees and second-home buyers they are not for low- to mid-wage earners who are needed to fill many of the local jobs.
- *Labor Market.* Nearly every focus group identified challenges related to the pool of available labor. Some communities have a significant shortage of skilled workers, while others have the challenge of not having an adequate number of jobs and too many overqualified workers.
- *Childcare.* The availability of childcare is a difficulty faced by many working families as it is either cost-prohibitive or unavailable in many areas. Thus, it makes more economic sense for parents to stay home and care for their children rather than work, thereby lowering income and employment within the community. OEDIT's study suggests that the addition of affordable childcare options within rural communities could serve to attract new families to the region, as well as allow parents to participate in the local workforce.
- *Youth and Family Retention.* Rural communities have often had a difficult time retaining younger generations for a number of reasons, including wages, education, and social issues. Communities depend on younger, more educated workers and leaders to grow and survive. Within many rural counties, a disconnect exists between the skill of the workforce and the type of worker that employers need. While many young people graduate high school in their communities and desire to extend their skills by going to college, there is little to bring them back after graduation. It was noted in OEDIT's study that community leaders believe that attempts to retain youth must begin at a young age, rather than waiting until they are in high school.
- *Smart Growth.* Focus group participants expressed the need for their county to grow to survive. However, the question of how to facilitate growth was difficult to answer. Common words used to describe the desired type of growth were "slow," "controlled," "smart," and "managed." Another growth-related challenge identified is bringing new businesses while convincing existing businesses to stay. The issue of broadband access was identified by focus group participants. Broadband was mentioned as a top business requirement during many of the discussions; broadband would allow companies to stay connected even in more remote locations and offer an appealing factor to "location-neutral" businesses.

A copy of OEDIT's study can be found here: https://choosecolorado.com/wp-content/uploads/2016/07/Resiliency-StudyUpdated.pdf

II. Historically, employment in Garfield County has been influenced by fluctuations in the national economy. Data from the SDO and BEA illustrates that the county has experienced a number of ebbs and flows in total employment between 1969 and 2017, a number of which appear to be tied to fluctuations in the national economy. For example, Garfield County experienced a peak and subsequent decline in total employment during the "Dot-Com Crash" (2000-2004). During the Great Recession, the county again saw a peak and subsequent decline in total employment. As of 2017, the total number of jobs in Garfield County still lags behind peak employment in 2008.

III. From 1990-2017, Garfield County's job to population ratio has been roughly equivalent to Colorado's. Between 1990-2000, Garfield County's ratio of jobs per person was roughly that of Colorado's, with the exception of 1991, 1992, 1997 and 1998. From 2001-2003, the county's jobs per person ratio dipped below that of the state. This could be attributed to the 2000-2004 Dot-Com Crash, which appears to have impacted the county more so than it did the state as a whole. Between 2004-2009, Garfield County's jobs per person ratio

exceeded Colorado's. During this period, the county's ratio peaked at 1.00 jobs per person in 2008. Colorado's ratio was 0.88 in 2008. Since 2009, the county has been within +/- 0.2 of the state's jobs per person ratio.

IV. Population and employment in Garfield County has, and is expected to, grow.
Despite the ebbs and flows in total employment in Garfield County, the overall trend in the county has been steady job and population growth. Between 2000 and 2017, the county's total population grew in relative proportion to total employment, with 30.2% cumulative growth in total employment and 33.7% cumulative growth in total population. The similarities between these cumulative growth rates underscores the strong relationship between jobs and population in Garfield County.

Based on projections from the SDO, Garfield County can anticipate substantial growth in both jobs and population through 2030, at average growth rates greater than those exhibited between 2001 and 2017. Specifically, the SDO projects that the county will add an average of 817 jobs per year over the 2017-2030 period (up 76.1% from job growth rates between 2000-2017). The SDO also projects that the county's population will increase by an average of 1,218 people per year between 2017-2030 (up 38.7% from 2000-2017 population growth rates).

Growth in the Garfield County's population and employment presents economic opportunities but also raises important planning considerations such as how to ensure that transportation systems, public infrastructure and services, schools, housing, etc. can keep pace with future demands.

V. Garfield County's economic drivers shifted between 2000-2017 and are anticipated to continue changing.
Garfield County has a mix of economic drivers, or "Base Industries," that bring "new money" (i.e. dollars from outside of the county) into the local economy. Without base industries and the influx of outside dollars that they bring into the county, the local economy would not exist. Base industries generate additional secondary jobs in the economy that are classified as either "Indirect Basic" or "Local Resident Services." Base industry jobs, or direct basic jobs, are organized into four (4) categories:

1. *Traditional Base Industries.* This is the category for industries/jobs that have existed for over a century, such as agribusiness, mining, manufacturing and state/federal government. These industries/jobs produce goods that are sold almost entirely outside the economic region.
2. *Regional Center/National Services.* The category for industries/jobs primarily engaged in the provision of services to a region (i.e. a group of counties) or the nation. Industries in this category include: construction; communications; trade & transportation; professional & business services; finance, insurance & real estate services; and, education & health services.
3. *Tourism.* The category for industries/jobs associated with activities related to tourism and others that benefit from the spending of tourists. This category is inclusive of trip-related expenditures by visitors, as well as the construction and upkeep of second homes.
4. *Households.* A catch-all category that includes jobs supported by personal income derived from outside of the region, such as: dollars that come from transfer payments; money earned at a prior point in time (savings); dollars that commuters earn outside of the region but spend locally; and, unearned income from assets (ex. dividends, interest and rents).

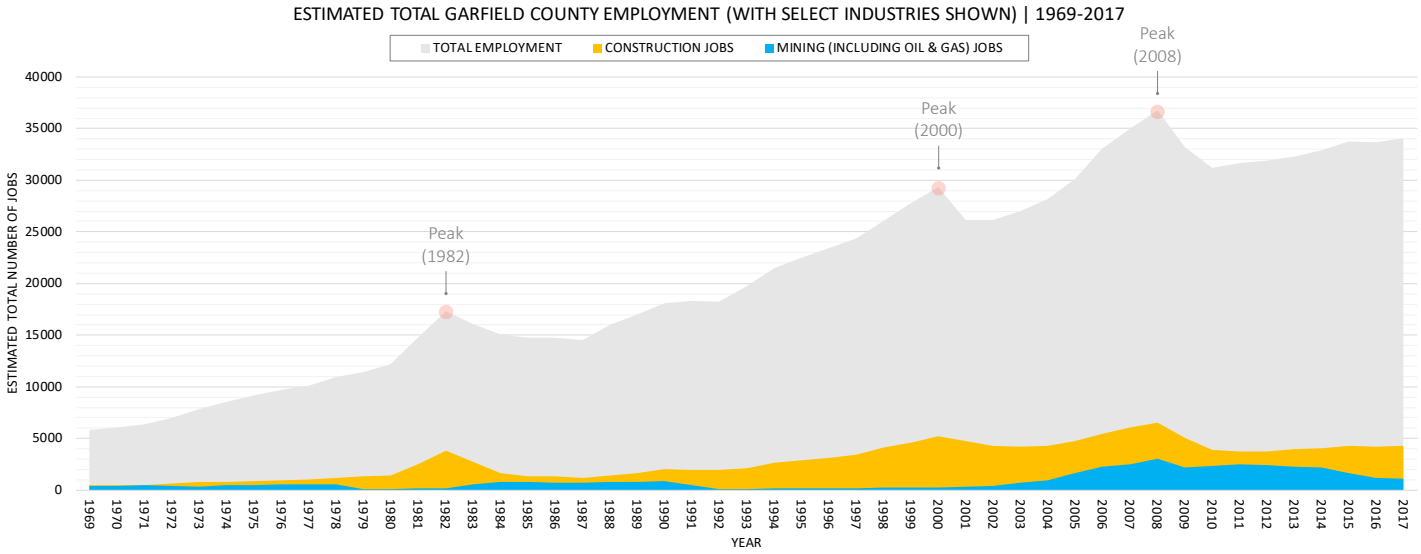
Data from the SDO show that between 2000 and 2017, the county's economic drivers (i.e. the four (4) base industry categories) shifted. Households grew to account for 35% of direct basic jobs, up from 28% in 2000 (an increase of 7%), likely attributed to growth in the retiree population in the county. Traditional Basic Industry jobs rose from 19% in 2000 to 21% in 2017. By contrast, proportionate declines occurred for Regional Center/ National Services, dipping from 32% in 2000 to 27% in 2017, and Tourism, falling from 21% in 2000 to 17% in 2017.

Looking ahead, the SDO projects that the Households category (especially retiree generated jobs) will continue

to outpace other basic industry categories, growing by 52% over the 2017-2030 period. Other basic industry categories are projected to exhibit more moderate growth. Traditional Basic Industry jobs are projected to grow by 22%, Regional Center/National Services jobs by 19%, and Tourism jobs by 11%.

If the SDO's projections are realized, the outsized economic impact of Households (especially retiree generated jobs) could significantly reshape Garfield County's economy. Seniors are disproportionate consumers of medical and social assistance services, likely implying significant future growth in those sectors. Additionally, the projected growth of the elderly population has important implications for transportation services, accessible/universal housing design, recreation and community services, the nature of the tax base, and other wide-ranging impacts. The SDO offers a number of resources for better understanding the potential implications of a growing senior population. Those can be found here: https://demography.dola.colorado.gov/demography/publications-and-presentations/

VI. Since 1969, Garfield County has experienced a number of "boom/bust" economic cycles.
Between 1969 and 2017, Garfield County experienced several "boom/bust" economic cycles (refer to the graph below). The most recent boom/bust cycle (approximately 2001-2010) was driven in large part by energy development in the county. Booms and busts can be difficult to predict and control. They can also result in short-term opportunities, as well as short- and long-term challenges for communities. Garfield County could benefit from monitoring potential signs of future "bubbles" and economic cycles, and endeavor to plan and budget around them with caution and flexibility. Further economic diversification could enable the county to build additional economic resiliency and help to smooth out economic fluctuations by reducing dependence on a single industry.



VII. Employment data indicates that Garfield County is moving towards a more diversified economy.
According to data from BEA and SDO, from 2001 to 2017, Garfield County's industry/employment mix became more diversified, with less dependence on Construction (4000) and Retail Trade (7000) and increased roles for sectors such as, Government (15000), Health Services (12015), Mining, including Oil & Gas (2000) and Transportation & Warehousing (8000).

In 2001, Construction (4000) accounted for 18.2% of total jobs in the county. By 2017, that percentage had decreased to 12.5%. During that same period, percent of total jobs attributed to Retail Trade (7000) changed by -2.6%.

By contrast, the share of total jobs in the county from Government (15000) increased from 14.4% to 16.8%. Health Services (12015) grew to 9.2% (+2.7%) total jobs in the county. Mining (2000), which includes oil and gas industries/jobs, grew from 1.3% in 2001 to 3.3% in 2017. Transportation & Warehousing's (8000) share of total jobs increased from 1.3% to 2.3%.

VIII. In 2016, Glenwood Springs, Carbondale and Rifle were the largest employment centers in the county.
In 2016, the City of Glenwood Springs had an estimated 9,614 total jobs. The Town of Carbondale and City of Rifle had estimated total jobs of 4,714 and 4,014, respectively. The Town of Parachute, Town of New Castle and Town Silt offer employment opportunities but significantly less than those available in Glenwood Springs, Carbondale and Rifle.

IX. Natural resource extraction industries are important but are influenced by factors outside of the county's control.
Natural resource development, specifically natural gas and prospectively oil shale, has had the most dramatic influence on Garfield County's economy in recent years. Between 2007-2016, the county accounted for approximately 30-40% of coalbed methane and natural gas produced and sold by Colorado. The natural gas boom, which spurred Garfield County's economy in the 2000s, was driven in part by a rapid escalation in gas prices. However, prices have declined since their peak in 2008 ($8.86 per million British thermal units (Btu)). As of October 2019, natural gas prices are $2.33 per million Btu.

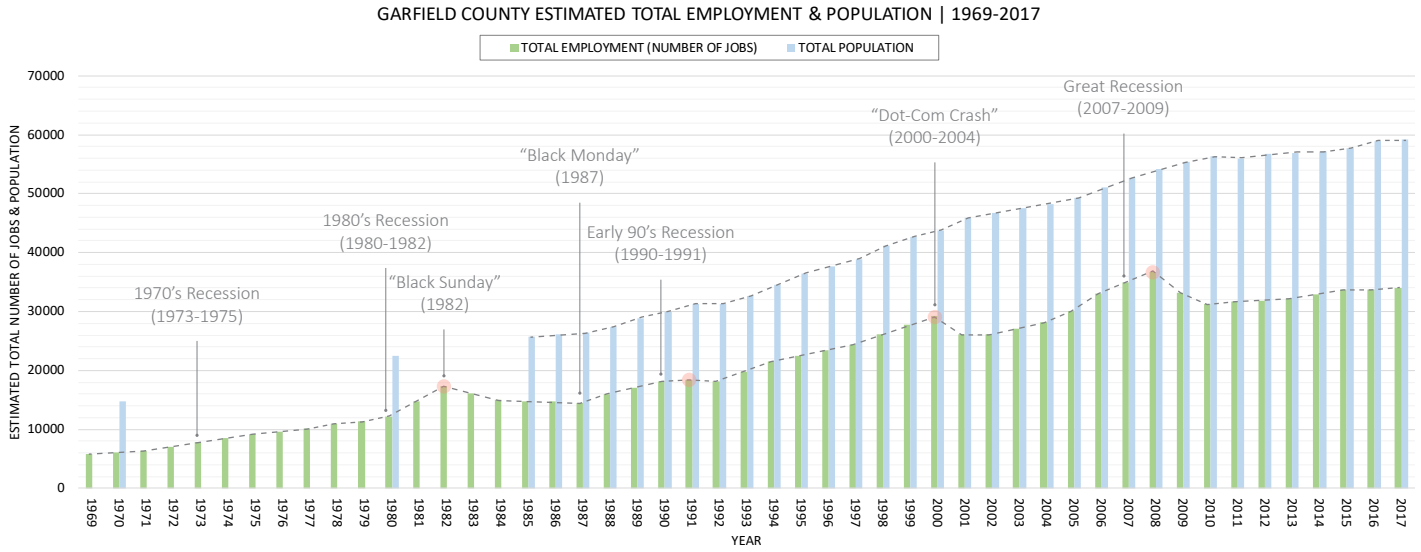
According to the EIA, there are three (3) major supply-side factors that affect natural gas prices: (1) amount of natural gas production; (2) level of natural gas in storage; and, (3) volumes of natural gas imports and exports. There are also three (3) major demand-side factors that affect prices: (1) variations in winter and summer weather (i.e. demand for heating and cooling); (2) level of economic growth; and, (3) availability and prices of other fuels. Garfield County has little to no control over supply-side and demand-side factors that influence natural gas prices. Therefore, it is important to understand that natural resource extraction industries, such as oil and gas, can be a volatile sector of the economy.

X. Renewable energy efforts in Garfield County are having positive economic impacts.
Since 2009, Garfield Clean Energy projects have resulted in $40 million in materials purchased from retailers and work done by contractors. This has benefited 353 businesses. The cumulative energy savings from these projects are valued at more than $7 million. In addition, 340 businesses, churches and organizations, as well as 1,241 households have made energy upgrades with assistance from Garfield Clean Energy. Altogether, these upgrades deliver energy cost savings of $1.4 million per year.

XI. Outdoor recreation and tourism contribute substantially to Garfield County's economy.
The Middle Colorado Watershed Council's 2018 study estimated that outdoor recreation in the Middle Colorado River Watershed (that encompasses much of the county) accounted for $139 million in expenditures, supported 972 jobs and contributed $5.9 million to state and local tax revenues. Dean Runyan Associates estimated that in 2018, overnight travel in Garfield County accounted for $185.1 million in expenditures, supported 1,795 jobs and contributed $8.6 million to local tax revenues. According to CDOT, roughly 9,000 visitors arrive in Colorado via the RIL on an annual basis and the he economic activities related to RIL generate $947,000, annually, in local and state tax revenues.

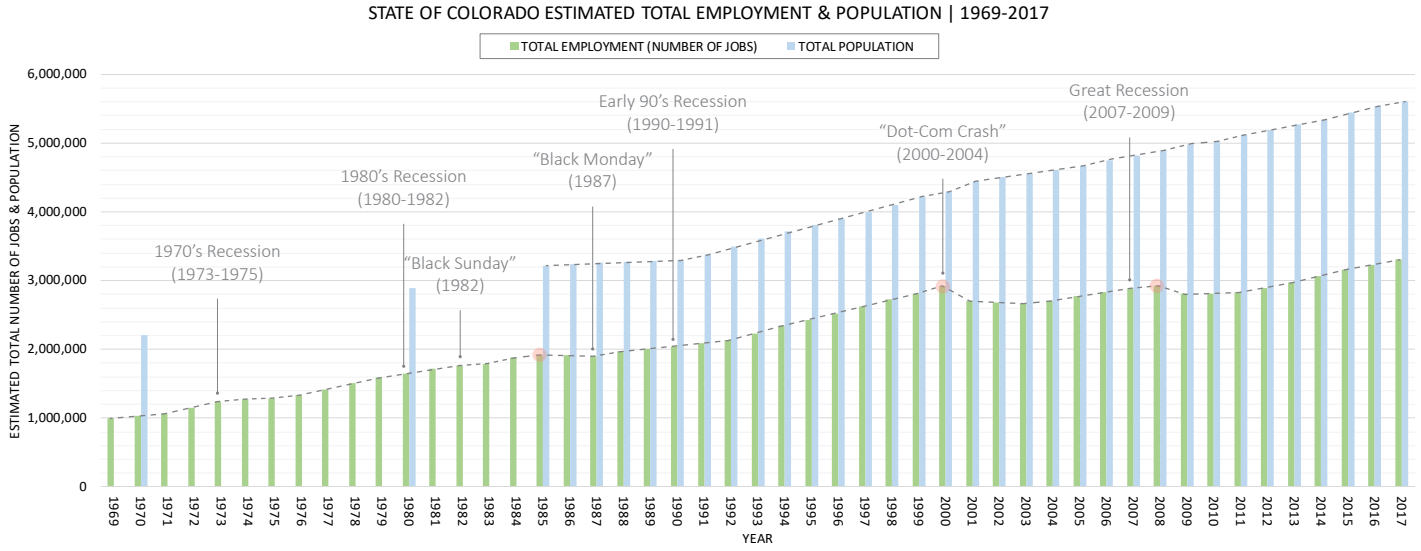
3. ECONOMIC DATA & INFORMATION

I. GARFIELD COUNTY EMPLOYMENT AND POPULATION TRENDS AND PROJECTIONS
Employment is fundamental driver of conditions and change in a community, influencing trends in population and demand for housing, transportation, and public services and infrastructure. Understanding employment dynamics in Garfield County is key to informing efforts to planning for economic opportunities and challenges. The following graph was prepared using data from the BEA and SDO. It depicts changes in the county's total employment and total population between 1969 and 2017 (population data is unavailable for 1969, 1971-1979 and 1981-1984).



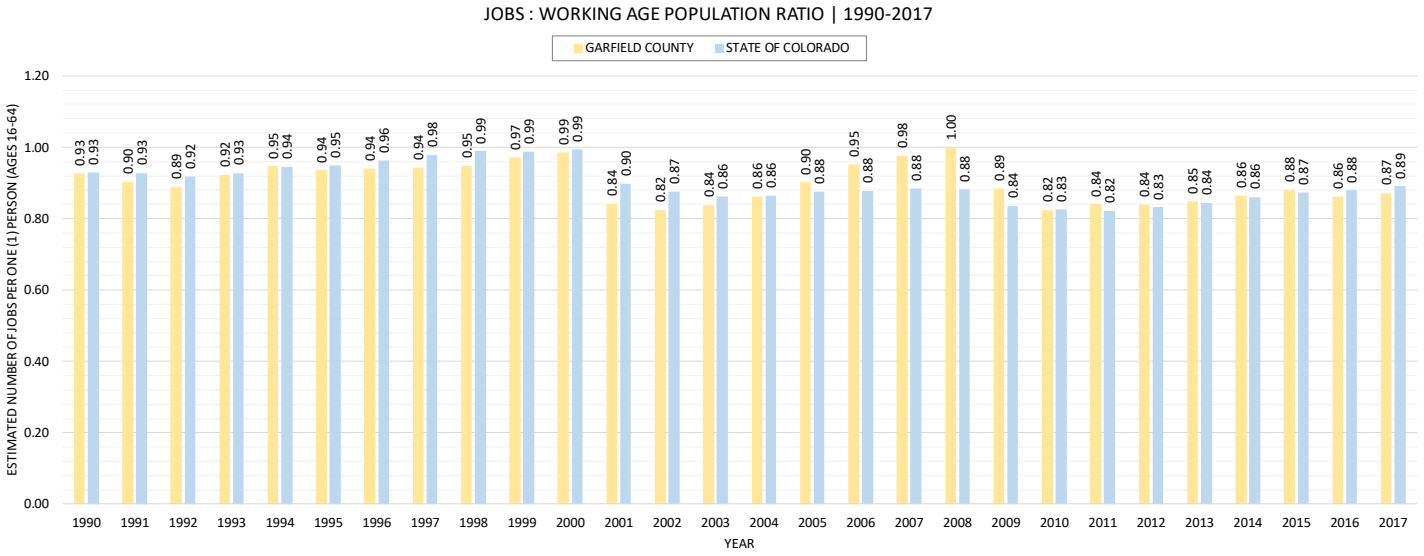
The graph above illustrates that although there were ebbs and flows in total employment in Garfield County, the overall trend has been steady job and population growth in the county.

Data from the BEA and SDO were also used to prepare a graph of total employment and total population for the State of Colorado between 1969 and 2017 (population data was unavailable for 1969, 1971-1979 and 1981-1984). This graph (shown below) is useful for comparing/contrasting state population and employment trends with those of Garfield County.

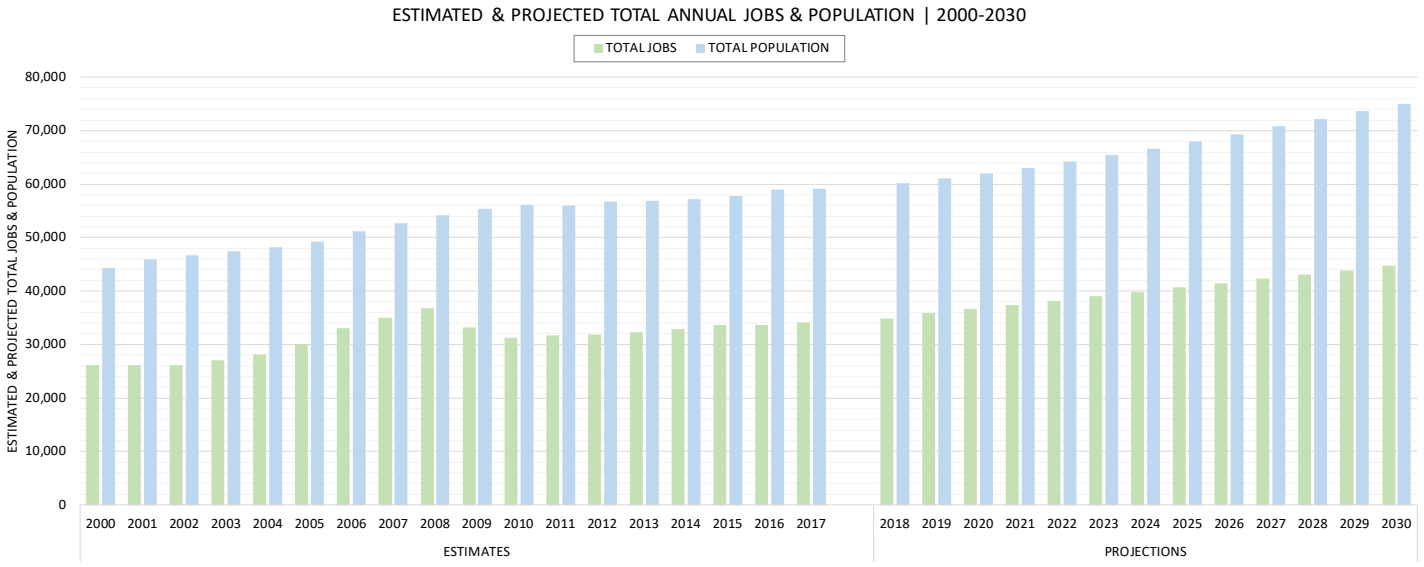


Comparing Garfield County data against that for the State of Colorado illustrates that the county and state have experienced similar changes in total employment, most of which appear to be tied to fluctuations in the national economy. For example, both Garfield County and Colorado experienced a peak and subsequent decline in total employment during the "Dot-Com Crash" (2000-2004). The county does seem to have started recovering from the Dot-Com Crash in 2003, while the state appears to have begun its recovery in 2004. The county's quicker recovery could be attributed to the oil and gas boom that began in the early 2000's. During the Great Recession, the county and the state again saw a peak and subsequent decline in total employment. As of 2017, Colorado looks to have recovered from the Great Recession with total employment exceeding pre-recession levels. However, as of 2017, the total number of jobs in Garfield County is still lower than peak employment in 2008.

Data from the BEA and SDO were used to estimate the ratio of jobs per working age person (ages 16-64) for Garfield County and for Colorado between 1990-2017. This ratio was calculated in order to better understand trends in employment opportunities available in the county versus those across the state.



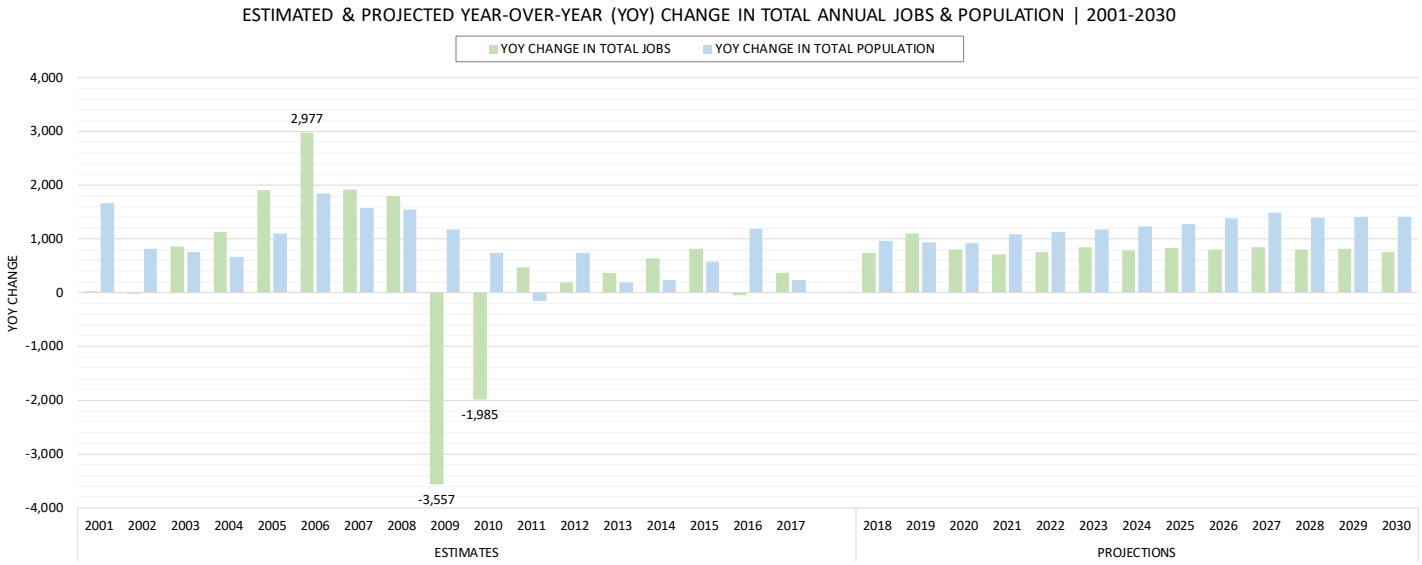
Between 1990-2000, the ratio of jobs per person in Garfield County was roughly that of Colorado, with the exception of 1991, 1992, 1997 and 1998. During this period, the county's ratio ranged from a high of 0.99 jobs per person in 2000 to a low of 0.89 in 1992. From 2001-2003, the county's jobs per person ratio dipped below that of the state. This could be a result of the 2000-2004 Dot-Com Crash impacting the county more so than it did the state as a whole. Between 2004-2009, Garfield County's jobs per person ratio exceeded Colorado's ratio. During this time frame, the county's ratio peaked at 1.00 jobs per person in 2008. Colorado's ratio was 0.88 in 2008. Since 2009, the county has been within +/- 0.2 of the state's jobs per person ratio. This indicates that since 2009, overall employment opportunities in Garfield County have been roughly equivalent to those across the state.



Over the 2000-2017 period, Garfield County experienced 30.2% cumulative growth in total employment, and a similar 33.7% cumulative growth in total population, underscoring the strong relationship between job growth and population growth. Between 2000-2017, the number of total jobs in the county increased by an estimated annual average of 464 jobs per year, while population grew by estimated annual average of 878 people per year.

Looking ahead, the SDO projects that between 2017-2030 total employment and total population in Garfield County will continue to grow and that average annual rates will be greater than those experienced from 2000-2017. Specifically, the SDO projects that the county will add an average of 817 jobs per year over the 2017-2030 period (up 76.1% from job growth rates between 2000-2017). In addition, the SDO projects that Garfield County's population will increase by an average of 1,218 people per year between 2017-2030 (up 38.7% from 2000-2017 population growth rates).

On a cumulative basis, total employment is projected to increase by 28.4% in Garfield County over the 2017-2030 period, while the total population is projected to grow by a similar 24.7%.



To the extent that the SDO's projections are correct, Garfield County can anticipate substantial growth in both jobs and population over the next decade, at average rates greater than those exhibited between 2000-2017. Future population and job growth presents economic opportunities for the county, as well as potential challenges for other planning considerations such as transportation systems, public infrastructure and services, educational services, housing, etc.

II. ECONOMIC CYCLES

Historically, Garfield County's economy has been susceptibility to "boom and bust" economic cycles. In the late 1970's and early 1980's, Garfield County experienced an economic boom, fueled by the prospect of oil shale development and a subsequent bust between 1982-1985, following Exxon's decision on May 2, 1982 (aka "Black Sunday") to halt its oil shale development in the region.

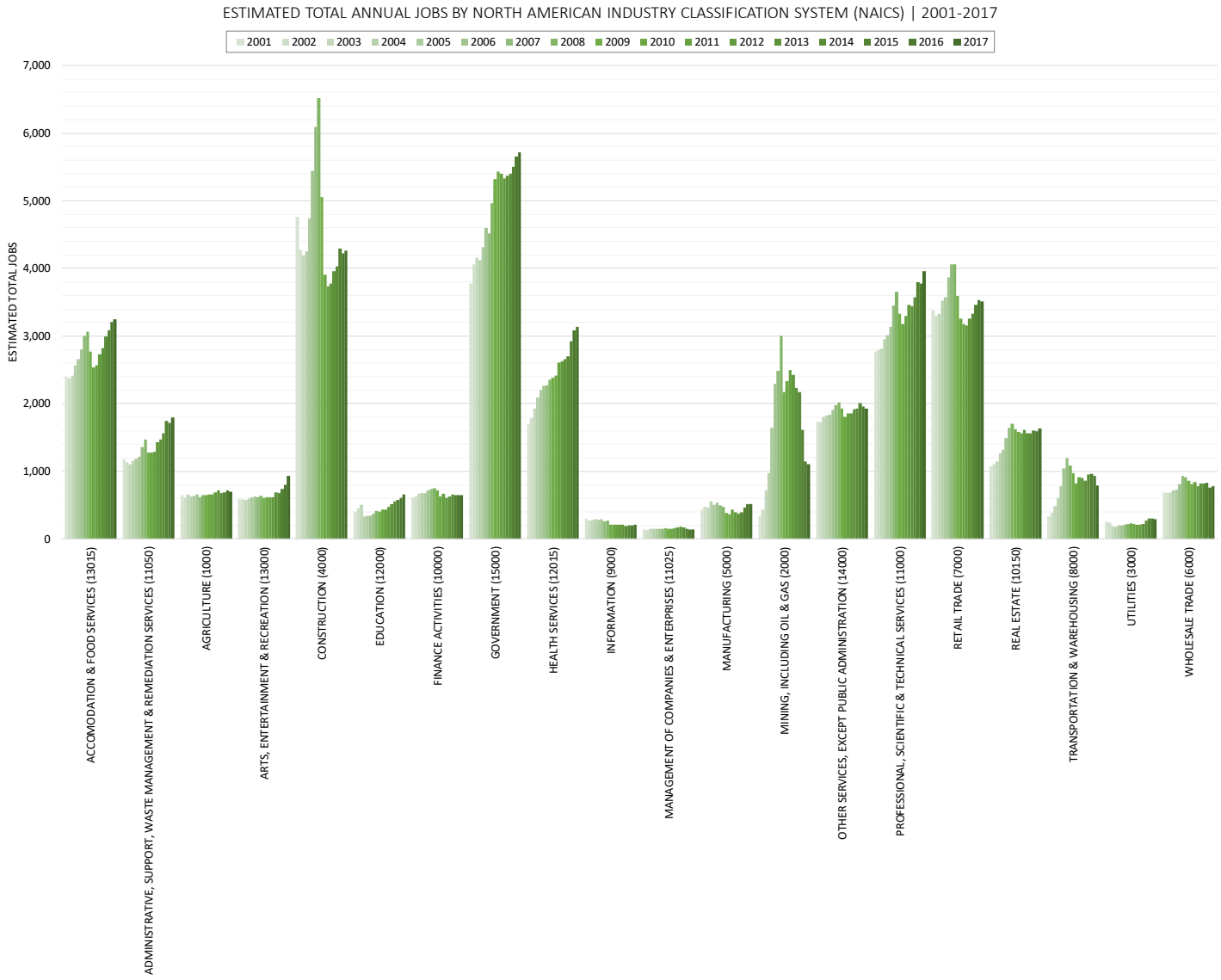
More recently, the county experienced a boom between 2004-2008, followed by a sharp decline (i.e. bust) during the Great Recession (approximately 2007-2009). The 2019 Garfield County Profile (https://www.garfield-county.com/economic-development/garfield-county-profile.aspx) characterizes 2004-2010 this way:

"[The 2004-2008] growth was largely the result of a burgeoning natural gas extraction industry, but also due to an ongoing expansion of tourism, second home development, health care, and regional services. There was a significant in-migration of new workers and families, which fueled housing development, retail expansion, and rapid wage growth. At times during this period, Garfield County experienced shortages of labor and a rapidly appreciating housing market.

In 2008, an abundance of new natural gas reserves were uncovered elsewhere around the country and the value of natural gas began a national decline. The Great Recession also cut spending on travel, tourism and second home development, with predictable declines in all measures of local economic activity."

As illustrated by the following graph, and consistent with the summary from the 2019 Garfield County Profile,

many industry sectors in Garfield County experienced significant growth in the mid to late 2000's, followed by decline during the Great Recession. Substantial changes occurred in the mining (including oil and gas) and construction sectors. Professional services, retail trade, accommodation and food services, retail trade, transportation and warehousing, and wholesale trade also experienced fluctuations.



Economic booms and busts are notoriously difficult to predict and control, and create short-term opportunities and short- and long-term challenges for communities. Garfield County and its communities can nonetheless be vigilant for potential signs of future "bubbles" and economic cycles, and endeavor to plan and budget around them with caution and flexibility. Economic diversification can also help build economic resilience and smooth out economic fluctuations by reducing dependence on a single industry.

Most recently, since the Great Recession, jobs in Garfield County have resumed growing, increasing by a cumulative 9.0% from 2010 through 2017. Population grew by a cumulative 5.4% over the same period. Notwithstanding this growth, jobs in 2017 remained 7.4% below the peak level registered in 2008.

III. JOBS & EARNINGS BY INDUSTRY SECTORS

According to data from BEA and SDO, Garfield County's industry mix shifted between 2001-2017 (refer to Table 1), as have the fundamental drivers of the county's economy. According to data from the BEA and SDO, the following industries experienced a significant decrease in their share of total jobs and earnings in Garfield County:

- **Construction (4000).** Garfield County experienced a significant decrease in the share of jobs and earnings attributed to Construction (4000). In 2001, Construction (4000) accounted for 18.2% of total jobs in the county, decreasing to 12.5% by 2017 (a change of-5.7%). Furthermore, in 2001, Construction (4000) accounted for 25% of total earnings in Garfield County. By 2017, this had decreased to 16.9% of total earnings (a change of -8.1%).
- **Retail Trade (7000).** The share of jobs from Retail Trade (7000) changed by-2.6% during the 2001-2017 period. The share of earnings from Retail Trade (7000) declined by 3.2% between 2001 and 2017.

By contrast, economic activity in Garfield County resulted in the proportionate share of jobs and earnings increasing for a variety of sectors during the 2001-2017 period, including:

- **Government (15000).** The share of total jobs and earnings from Government (15000) both increased by 2.4%.
- **Health Services (12015).** Health Services (12015) saw significant growth in its share of the county's total jobs (+2.7%), as well as its share of total earnings (+4.2%).
- **Mining, including Oil & Gas (2000).** This sector saw its share of total jobs grow by 2.0% and in its share of total earnings increase by 4.1%.
- **Transportation & Warehousing (8000).** Transportation & Warehousing's (8000) share of total jobs increased by 1.1%. Moreover, its share of total earnings in Garfield County increased by 1.7%.

Combined, these patterns suggest an evolution towards a more diversified economy, with less dependence on Construction (4000) and Retail Trade (7000), and increased roles for sectors such as, Government (15000), Health Services (12015), Mining, including Oil & Gas (2000) and Transportation & Warehousing (8000).

Table 1: Garfield County Jobs & Earnings by NAICS Sector | 2001 vs. 2017

	ESTIMATED TOTAL JOBS			SHARE OF JOBS			EARNINGS BY INDUSTRY			SHARE OF TOTAL EARNINGS		
NAICS SECTOR NAME & CODE	2001	2017	Change in Jobs	2001	2017	% Change	2001	2017	Change in Earnings	2001	2017	% Change
Accommodation & Food Services (13015)	2,394	3,248	+ 854	9.1%	9.5%	+ 0.4%	$44,085	$94,625	+ $50,540	4.4%	5.1%	+ 0.7%
Administrative, Support, Waste Management & Remediation Services (11050)	1,181	1,799	+ 618	4.5%	5.3%	+ 0.8%	(D)	$72,441	-	-	3.9%	-
Agriculture (1000)	644	696	+ 53	2.5%	2%	- 0.5%	$4,953	$5,643	+ $690	0.5%	0.3%	- 0.2%
Arts, Entertainment & Recreation (13000)	592	799	+ 339	2.3%	2.7%	+ 0.5%	$10,053	$27,806	+ $17,753	1.0%	1.5%	+ 0.5%
Construction (4000)	4,760	4,265	- 495	18.2%	12.5%	- 5.7%	$248,795	$316,329	+ $67,534	25.0%	16.9%	- 8.1%
Education (12000)	402	654	+ 252	1.5%	1.9%	+ 0.4%	$10,263	$22,275	+ 12,012	1%	1.2%	+ 0.2%
Finance Activities (10000)	621	649	+ 28	2.4%	1.9%	- 0.5%	$26,343	$48,478	+ $22,135	2.7%	2.6%	- 0.1%
Government (15000)	3,777	5,711	+ 1,934	14.4%	16.8%	+ 2.4%	$150,010	$326,904	+ $176,894	15.1%	17.5%	+ 2.4%
Health Services (12015)	1,694	3,138	+ 1,444	6.5%	9.2%	+ 2.7%	$72,679	$215,924	+ $143,245	7.3%	11.6%	+ 4.2%
Information (9000)	308	214	- 94	1.2%	0.6%	- 0.5%	$15,049	$8,349	- $6,700	1.5%	0.4%	- 1.1%
Management of Companies & Enterprises (11025)	141	145	+ 4	0.5%	0.4%	- 0.1%	(D)	- $1,015	-	-	-0.1%	-
Manufacturing (5000)	435	516	+ 81	1.7%	1.5%	- 0.2%	$17,797	$32,122	+ $14,325	1.8%	2.7%	- 0.1%
Mining, including Oil & Gas (2000)	333	1,110	+ 777	1.3%	3.3%	+ 2.0%	$26,551	$126,441	+ $99,890	2.7%	6.8%	+ 4.1%
Other Services, except Public Administration (14000)	1,732	1,931	+ 199	6.6%	5.7%	- 0.9%	$45,105	$80,877	+ $35,772	4.5%	4.3%	- 0.2%

Table 1: Garfield County Jobs & Earnings by NAICS Sector | 2001 vs. 2017 (continued)

NAICS SECTOR NAME & CODE	ESTIMATED TOTAL JOBS 2001	2017	Change in Jobs	SHARE OF JOBS 2001	2017	% Change	EARNINGS BY INDUSTRY 2001	2017	Change in Earnings	SHARE OF TOTAL EARNINGS 2001	2017	% Change
Professional, Scientific & Technical Services (11000)	2,770	3,958	+ 1,188	10.6%	11.6%	+ 1%	$57,695	$115,686	+ $57,991	5.8%	6.2%	+ 0.4%
Retail Trade (7000)	3,376	3,512	+ 136	12.9%	10.3%	- 2.6%	$106,121	$139,047	+ $32,926	10.7%	7.4%	- 3.2%
Real Estate (10150)	1,072	1,638	+ 566	4.1%	4.8%	+ 0.7%	$41,570	$75,985	+ $34,415	4.2%	4.1%	- 0.1%
Transportation & Warehousing (8000)	331	793	+ 462	1.3%	2.3%	+ 1%	$20,432	$69,493	+ $49,061	2.1%	3.7%	+ 1.7%
Utilities (3000)	253	297	+ 44	1.0%	0.9%	- 0.1%	$19,286	$38,330	+ $19,044	1.9%	2.1%	+ 0.2%
Wholesale Trade (6000)	688	782	+ 94	2.6%	2.3%	- 0.3%	$30,759	$51,320	+ $20,561	3.1%	2.7%	- 0.4%
TOTALS	26,182	34,045	+ 7,863	100%	100%	-	$993,304	$1,867,060	+ $873,756	100%	100%	-

NOTE(S):
(D) Data not shown to avoid disclosure of confidential information.

Data Source(s): Colorado State Demography Office; and, US Bureau of Economic Analysis

SDO data was used to prepare the following graph, which offers a comparison of the 2001 and 2017 estimated percent of total jobs by NAICS sector for Garfield County with those of Colorado. Interestingly, the fluctuations in the share of total jobs by NAICS sector for the county generally mimic the changes experienced at the state level.

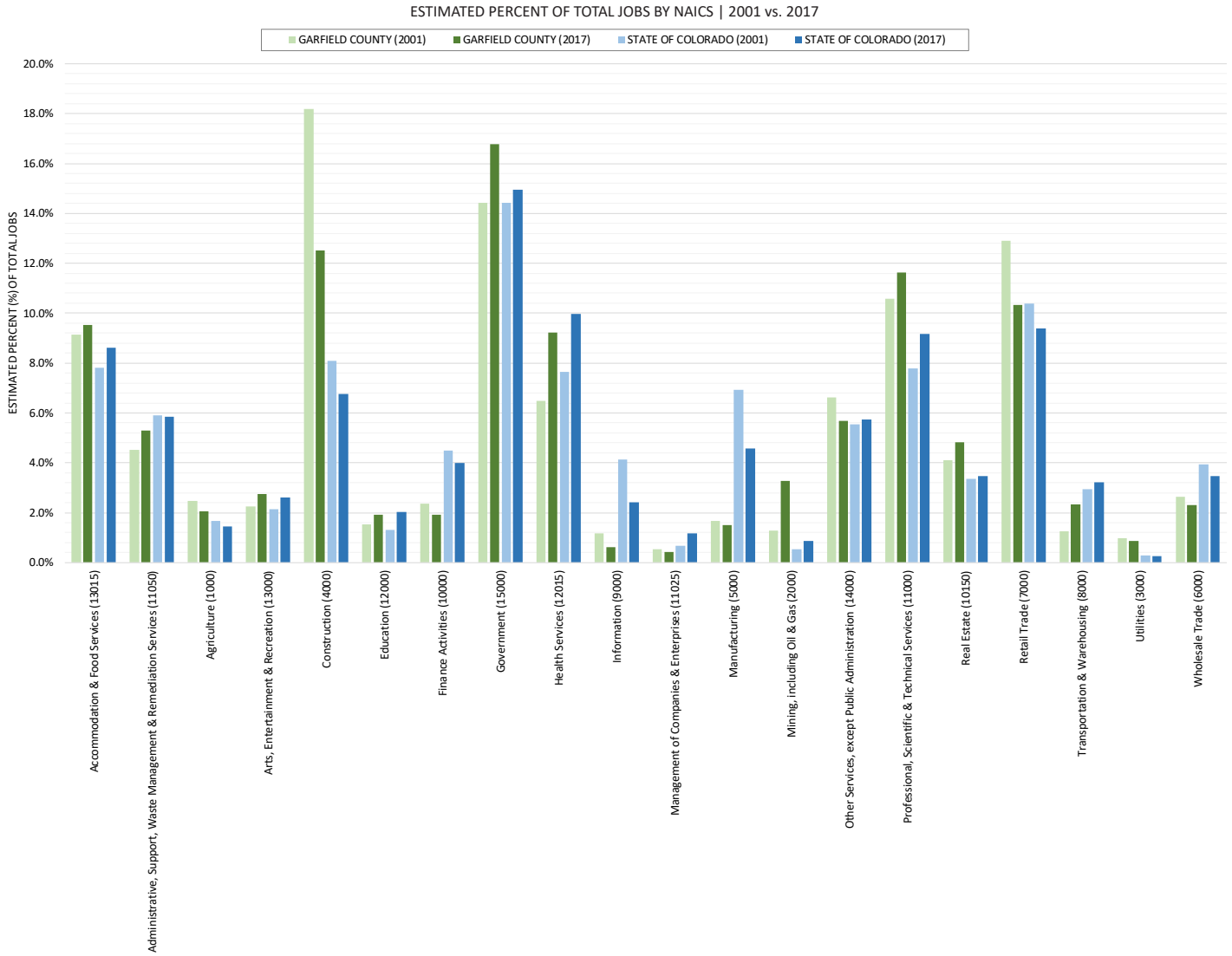


Table 2 presents a listing of NAICS Sectors and Sub-Sectors. This information is included in order to provide greater detail regarding the composition of NAICS Sectors analyzed in this appendix.

Table 2: NAICS Sector Names & Codes

NAICS Code	NAICS Sector Name
1000	Agriculture
1010	Crops an livestock production
1020	Farm services
2000	Mining
2010	Oil and gas extraction
2020	Mining (except oil and gas)
2030	Support activities for mining
3000	Utilities
3030	Utilities
4000	Construction
4010	Construction of buildings
4020	Heavy and civil engineering construction
4030	Special trade contractors
5000	Manufacturing
5010	Wood product and furniture manufacturing
5020	Nonmetallic mineral product manufacturing
5030	Primary and fabricated metal manufacturing
5040	Machinery manufacturing
5050	Computer and electrical equipment manufacturing
5060	Motor vehicle and transportation manufacturing
5070	Miscellaneous manufacturing
5080	Food and beverage product manufacturing
5090	Textile mills and product, apparel and similar manufacturing
5100	Paper and printing manufacturing
5110	Chemical manufacturing
5120	Plastics and rubber products manufacturing
6000	Wholesale Trade
6010	Wholesale Trade
7000	Retail Trade
7010	Motor vehicle and parts dealers
7020	Furniture, electronics, appliances and home furnishings
7030	Food and beverage stores
7040	Health and personal care stores
7050	Gasoline stations
7060	Clothing and clothing accessories stores
7070	Sporting goods, hobby, book and music stores
7080	General merchandise stores
7090	Miscellaneous store retailers
7100	Nonstore retailers
8000	Transportation & Warehousing
8010	Air transportation
8020	Rail transportation
8030	Truck transportation
8040	Support activities for transportation
8050	Transit and ground passenger transportation
8060	Pipeline transportation
8070	Scenic, sightseeing and water transportation
8080	Couriers and messengers and postal service
8090	Warehousing and storage
9000	Information
9010	Publishing industries
9020	Motion picture and broadcasting, except internet
9030	Telecommunications
9040	ISPs, search portals and data processing
10000	Finance Activities
10010	Monetary authorities and credit intermediation
10020	Securities, commodity contracts and other financial investments
10030	Insurance carriers, funds, trusts and other financial vehicles
10150	Real Estate
10200	Real estate
11000	Professional, Scientific & Technical services
11020	Professional, scientific and technical services
11050	Administrative, Support, Waste Management & Remediation Services
11090	Administrative and support services
11100	Waste management and remediation services
12000	Education
12010	Private educational services
12015	Health Services
12020	Ambulatory health care services
12030	Hospitals
12040	Nursing and residential care facilities
12050	Social assistance
13000	Arts, Entertainment & Recreation
13010	Arts, entertainment and recreation
13015	Accommodation & Food Services
13020	Accommodation
13030	Food services and drinking places
14000	Other Services, except Public Administration
14010	Automotive and other repair and maintenance
14020	Personal and laundry services
14030	Religious, civic, professional and similar membership
14040	organizations
	Private households
15000	Government
15010	Federal government, civilian
15020	Military
15030	State government
15040	Local government

Data Source(s): Colorado State Demography Office

IV. ECONOMIC DRIVERS: ANALYSIS OF GARFIELD COUNTY'S BASE INDUSTRIES

Industries that sell goods or services outside of a defined area (ex. a county, city, town, etc.) are considered the base of the economy. These "Basic/Base Industries" are responsible for the existence of the local economy as they bring in dollars from outside of the community. Base industries also generate additional secondary jobs in the economy that are classified as either "Indirect Basic" or "Local Resident Services."

1. **Direct Basic Jobs.** These jobs bring in dollars from outside the region. In other words, sales or income are derived from outside sources, such as exports, sales to tourists, retiree income, etc. Without the continual infusions of outside dollars provided by these jobs, money in the local economy would drain away as a result of purchases of imported goods and services.
2. **Indirect Basic Jobs.** These are jobs that result from basic/base industries purchasing goods or services necessary for their operations.
3. **Local Resident Services or Worker Local Resident Services Jobs.** These jobs, also known as "induced" jobs, are generated as the community spends their earnings locally on goods and services, such as food, clothes, health care and taxes. Local Resident Services jobs include most retailers, lawyers, public school teachers and local police officers.

The SDO undertakes an analysis of base industries for Colorado counties as part of its efforts to forecast population and employment. The SDO measures and forecasts direct basic jobs in the following four (4) categories:

1. **Traditional Base Industries.** Agribusiness, mining, manufacturing and state/federal government comprise the sectors of "Traditional Base Industries." These industries have existed for over a century and produce goods that are sold almost entirely outside the economic region.
2. **Regional Center/National Services.** Industries primarily engaged in the provision of services to a region (i.e. a group of counties) or the nation. Industries in this category include: construction; communications; trade & transportation; professional & business services; finance, insurance & real estate services; and, education & health services. The Rifle Garfield County Regional Airport is an example of a facility that would fall into the Regional Center/National Service category.
3. **Tourism.** Industries with activities related to tourism and others that benefit from the spending of tourists. This category is inclusive of trip-related expenditures by visitors, as well as the construction and upkeep of second homes.
4. **Households.** This is a catch-all category. It includes jobs supported by personal income derived from outside of the region, such as: dollars that come from transfer payments; money earned at a prior point in time (savings); dollars that commuters earn outside of the region but spend locally; and, unearned income from assets (ex. dividends, interest and rents).

As of 2017, the largest source of direct basic jobs in Garfield County was Households (34.6%), followed by Regional Center/National Services (25.9%), Traditional Basic Industries (22.6%), and Tourism (16.9%). Going a level deeper:

- Within the **Households** category, retiree spending supported the largest share of direct basic jobs (22.7%), followed by dividend, interest and rental income (9.7% of direct basic jobs).
- Within the **Regional Center/National Services** category, the largest sub-sectors were education & health services (11.6% of direct basic jobs) and finance, insurance & real estate services (9.8% of direct basic jobs).
- Within the **Traditional Basic Industries** category, the largest sub-sector was state/federal government (11.6% of direct basic jobs), followed by agribusiness (4.9%), mining (4.5%) and manufacturing (1.7%).

- Within the **Tourism** category, resorts accounted for 10.9% of direct basic jobs, followed by second homes (4.3%), service employment (1.3%) and transportation employment (0.5%)

Table 3 offers additional information regarding direct basic and indirect basic jobs in Garfield County, in 2017.

Table 3: Garfield County Direct Basic and Indirect Basic Jobs, by Sector (2017)

DIRECT BASIC JOBS	Employment	Employment Percent of Total Direct Basic Jobs	Percent of Total Employment All Industries
Traditional Base Industries (Total)	5,516	22.6%	16.2%
Agribusiness (Total)	1,191	4.9%	3.5%
Agricultural Production (Raising crops and livestock for sale)	552	2.3%	1.6%
Agricultural Inputs (Goods and services that enable production, such as farm equipment manufacture and sales)	156	0.6%	0.5%
Agricultural Other (Activities that add value to agricultural products and prepares them for market, such as milling, brewing or curing)	483	2%	1.4%
Mining (All mining operations and mining support activities, including quarries and oil and gas wells)	1,095	4.5%	3.2%
Manufacturing (All activities related to manufacturing, except for agricultural processing)	415	1.7%	1.2%
Government (State/Federal) (Includes Federal and State ownerships regardless of activity, as well as higher education and military activities)	2,815	11.6%	8.3%
Regional Center/National Services (Total)	6,300	25.9%	18.5%
Construction (Establishments engaged in construction of buildings or engineering projects as well as those that prepare sites for new construction)	33	0.1%	0.1%
Communications (Establishments included in the NAICS Information (9000) sector)	439	1.8%	1.3%
Trade & Transportation (Non-agriculture related wholesale; truck and rail transportation; and, Non-agriculture warehousing & storage)	130	0.5%	0.4%
Professional & Business Services (Scientific research & development; and, computer systems design)	440	1.8%	1.3%
Finance, Insurance & Real Estate Services	2,398	9.8%	7%
Education & Health Services (Primary base industries include: private education; and, health care)	2,833	11.6%	8.3%
Tourism (Total)	4,121	16.9%	12.1%
Resort (Resorts, attractions, lodging, etc.)	2,652	10.9%	7.8%
Service Employment (Dining, shopping, entertainment, etc.)	305	1.3%	0.9%
Transportation Employment (Airfare, car rental, gas, etc.)	115	0.5%	0.3%
Second Homes (Construction, upkeep, sales, etc.)	1,049	4.3%	3.1%
Households (Total)	8,422	34.6%	24.7%
Retirees (Earnings and employment associated with expenditures made by retirees on local resident services)	5,534	22.7%	16.3%
Commuters (Earnings and employment associated with dollars earned outside of the region but spent locally)	-76	-0.3%	-0.2%
Transfer Payments (aka Public Assistance) (Medicaid, Earned Income Tax Credit (EITC), Supplemental Nutrition Assistance Program (SNAP), and Unemployment Insurance Compensation)	591	2.4%	1.7%
Other Household Income (Earnings and employment associated with unearned income received from dividends, interest and rents)	2,373	9.7%	7%

Table 3: Garfield County Direct Basic and Indirect Basic Jobs, by Sector (2017) (continued)

DIRECT BASIC JOBS	Employment	Employment Percent of Total Direct Basic Jobs	Percent of Total Employment All Industries
TOTAL DIRECT BASIC JOBS	24,360	100%	71.5%
OTHER JOB CATEGORIES			
Indirect Basic Jobs	4,218	n/a	12.4%
TOTAL BASIC JOBS (DIRECT BASIC + INDIRECT BASIC)	28,578	n/a	83.9%
Worker/Local Resident Services (i.e. Non Basic Jobs)	5,468	n/a	16.1%
TOTAL LOCAL RESIDENT SERVICES JOBS (HOUSEHOLDS + NON BASIC)	13,890	n/a	40.8%
EMPLOYMENT ALL INDUSTRIES (TOTAL)	34,046	n/a	100%

Data Source(s): Colorado State Demography Office

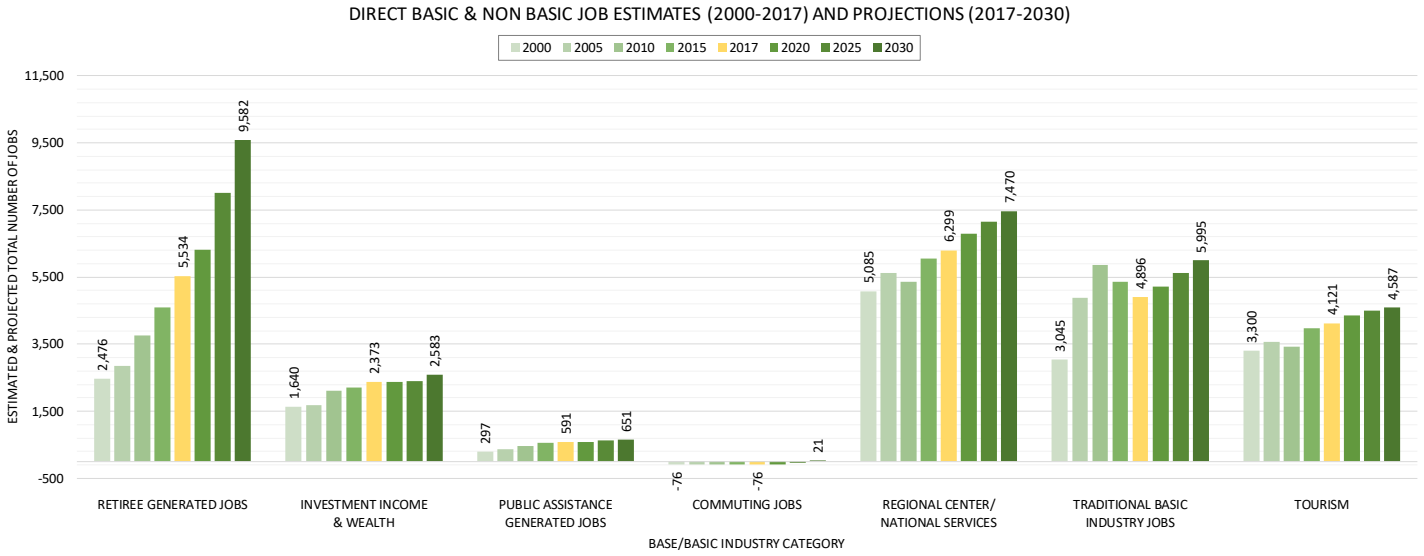
The mix of base industries in Garfield County has evolved over the past 17-years (2000-2017), as shown in Table 4. Altogether, the total number of direct basic jobs grew by 51% over that period. All four (4) base industry categories (i.e. Traditional Basic Industries, Regional Center/National Services, Tourism and Households) exhibited growth between 2000-2017. The most substantial growth occurred in jobs associated with the Households category, particularly retirees (up 94%). Traditional Basic Industry jobs grew by 61%. Slower rates of growth are estimated to have occurred in Tourism (up 25%) and Regional Center/National Services (up 24%).

Table 4: Garfield County Direct Basic and Non Basic Job Estimates (2001-2017) & Projections (2017-2030)

JOB CATEGORY	JOB ESTIMATES				% Change	JOB PROJECTIONS		% Change	% OF DIRECT BASIC JOBS		
	2000	2005	2010	2017	2000-2017	2020	2030	2017-2030	2000	2017	2030
1. Households (Total)	4,338	4,814	6,277	8,422	94%	9,199	12,837	52%	28%	35%	42%
Retiree generated jobs	2,476	2,848	3,766	5,534	124%	6,318	9,582	73%	16%	23%	31%
Investment income & wealth jobs	1,640	1,680	2,113	2,373	45%	2,370	2,583	9%	10%	10%	8%
Public assistance generated jobs	297	362	473	591	99%	586	651	10%	2%	2%	2%
Commuting jobs	-76	-76	-76	-76	0%	-76	21	127%	0%	0%	0%
2. Regional Center/ National Services	5,085	5,632	5,353	6,299	24%	6,781	7,470	19%	32%	27%	24%
3. Traditional Basic Industry Jobs	3,045	4,894	5,857	4,896	61%	5,208	5,995	22%	19%	21%	19%
4. Tourism Jobs	3,300	3,572	3,432	4,121	25%	4,354	4,587	11%	21%	17%	15%
TOTAL DIRECT BASIC JOBS	15,768	18,912	20,919	23,739	51%	25,542	30,888	30%	100%	100%	100%
TOTAL NON BASIC JOBS (Worker/Local Resident Services Jobs)	10,389	11,162	10,304	10,306	-1%	11,145	13,776	34%	n/a	n/a	n/a
TOTAL JOBS	26,157	30,073	31,223	34,045	30%	36,687	44,664	31%	n/a	n/a	n/a

NOTES:
Job counts for traditional industrial basic jobs differ somewhat between Table 3 and Table 4. Data are derived from different reports on the SDO's website.

Data Source(s): Colorado State Demography Office



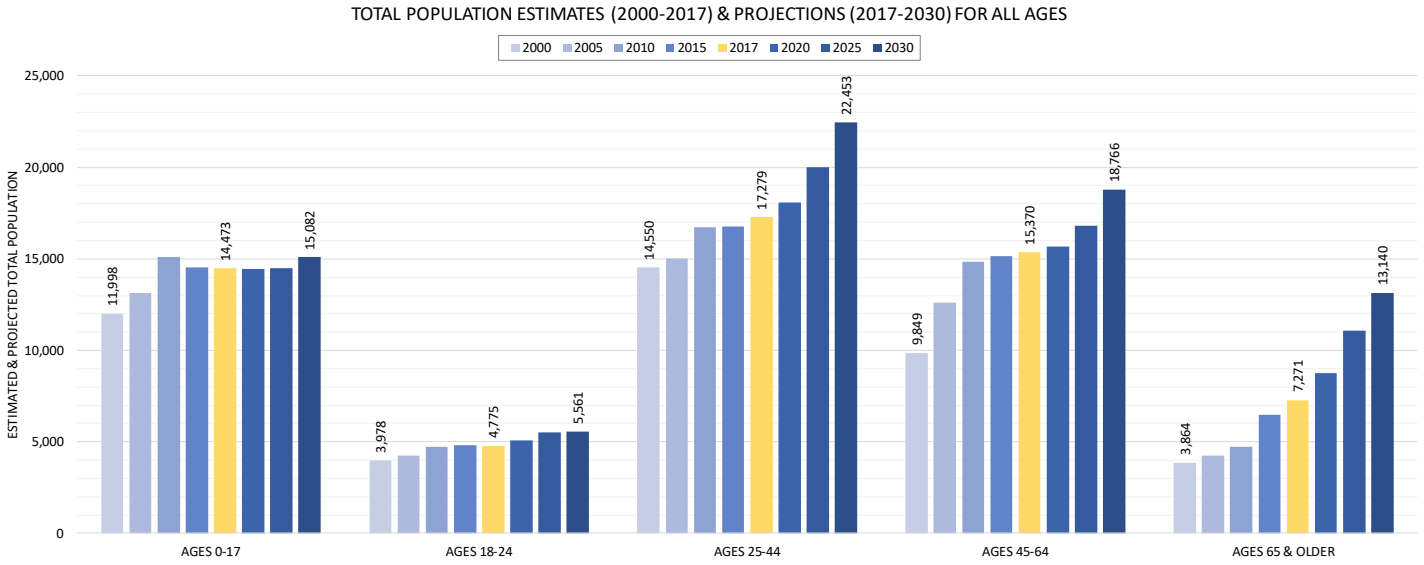
As a result of the growth in these four (4) categories, the mix of economic drivers in Garfield County changed over the 2000-2017 period. Households grew to account for 35% of direct basic jobs, up from 28% in 2000 (an increase of 7%). This can likely be attributed to growth in the number of retirees in the county. Traditional Basic Industry jobs also rose, from 19% in 2000 to 21% in 2017. By contrast, proportionate declines occurred for Regional Center/National Services, dipping from 32% in 2000 to 27% in 2017, and Tourism, falling from 21% in 2000 to 17% in 2017.

Looking ahead, the SDO projects that the Households category (especially retiree generated jobs) will continue to outpace other basic industry categories, growing by 52% over the 2017-2030 period. Other basic industry categories are projected to exhibit more moderate growth. Traditional Basic Industry jobs are projected to grow by 22%, Regional Center/National Services jobs by 19%, and Tourism jobs by 11%.

The result of these disproportionate growth rates, the Household category is projected to expand to 42% of direct basic jobs by 2030, up from 35% in 2017. A major contributing factor will be continued substantial growth in retiree-supported jobs from 2017 to 2030. All other categories are expected to decline in proportionate terms (i.e. percent of direct basic jobs), while increasing in absolute terms (i.e. total number of jobs).

V. IMPACT OF A GROWING RETIREE POPULATION IN GARFIELD COUNTY

The dramatic increases in retiree-generated jobs are largely a function of growth in the senior population. As illustrated in the graph below, Garfield County's population aged 65 and older jumped by 88% between 2000 and 2017, and is projected to further increase by 81% between 2017 and 2030. The most rapid growth over the next decade or so is projected to occur in older seniors, ages 75-84 and 85 and older.



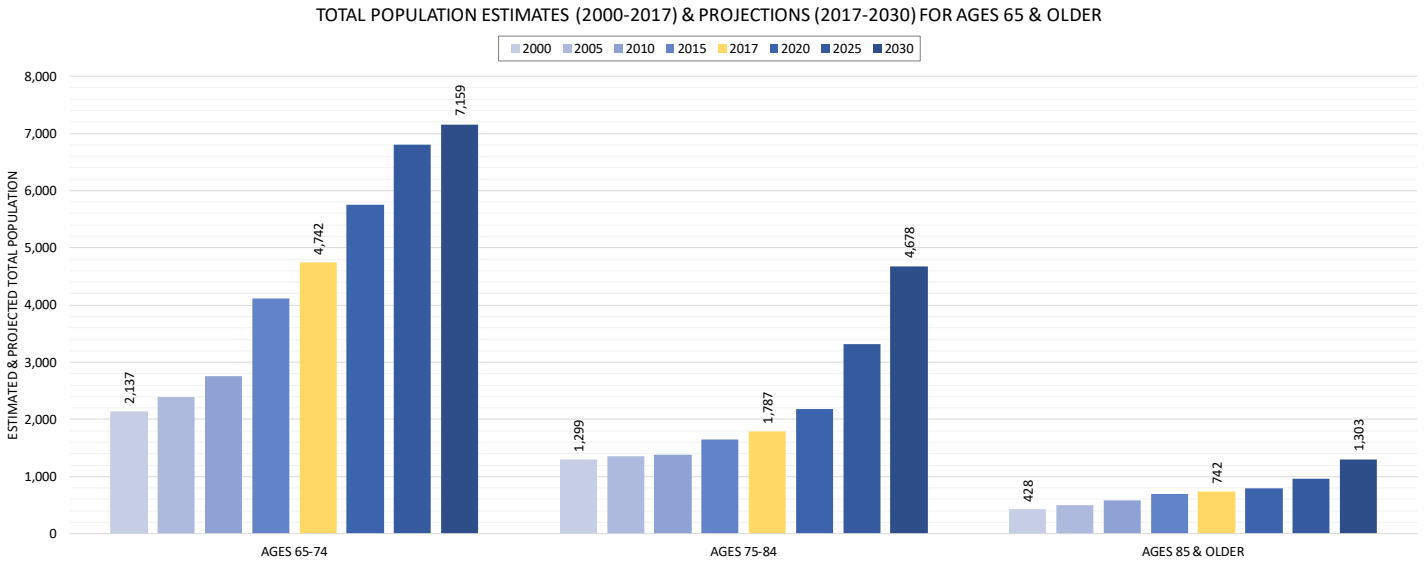


Table 4: Industry Share of Employment Supported by Direct Spending of Seniors in Colorado (2014)

	SENIOR SUPPORTED JOBS	
INDUSTRY SECTOR	Share of Total Jobs	Number of Jobs
Health Services (12015)	32.8%	78,838
Retail Trade (7000)	14.4%	34,541
Other Services, except Public Administration (14000) (includes repair & maintenance, personal & laundry, private households, etc.)	11.9%	28,564
Accommodation & Food Services (13015)	8.7%	20,964
Construction (4000) (ex. 55+ communities, continuing care facilities, home modifications, etc.)	7.4%	17,758
Finance Activities (10000)	6.5%	15,529
Real Estate (10150) (includes rentals, leasing, etc.)	4.1%	9,859
Arts, Entertainment & Recreation (13000)	2.9%	6,992
Professional, Scientific & Technical Services (11000)	2.7%	6,577
Information (9000)	2.5%	5,993
Wholesale Trade (6000)	2.0%	4,857
Transportation & Warehousing (8000)	1.6%	3,761

Table 4: Industry Share of Employment Supported by Direct Spending of Seniors in Colorado (2014) (continued)

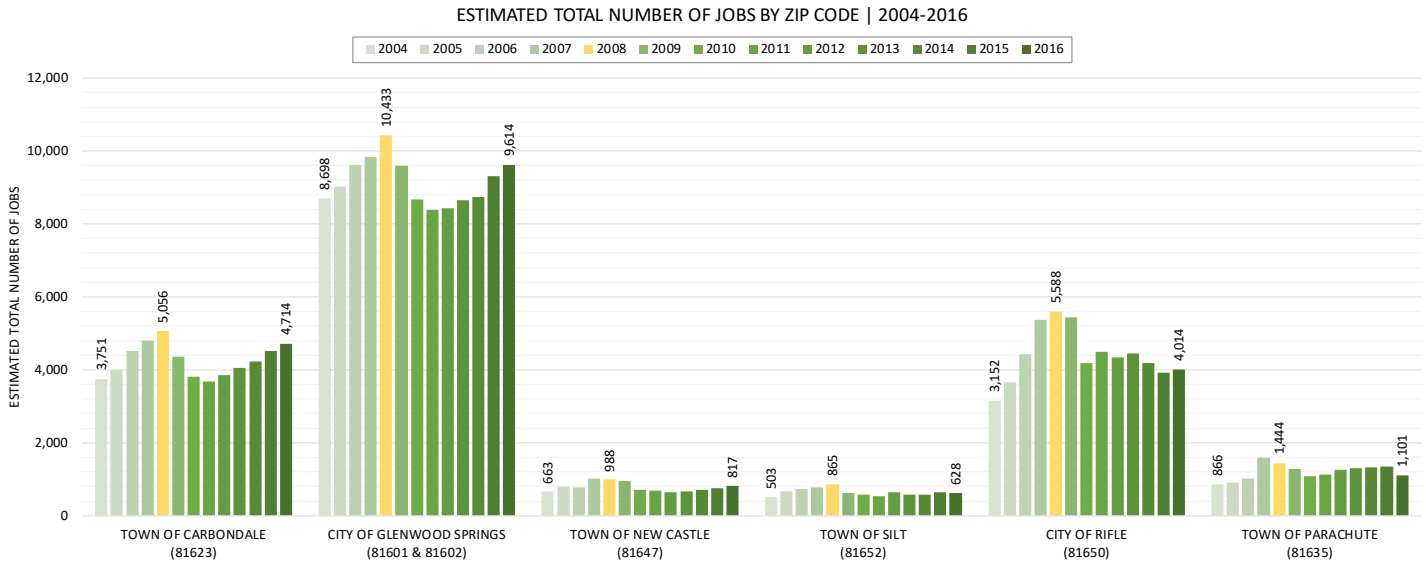
	SENIOR SUPPORTED JOBS	
INDUSTRY SECTOR	Share of Total Jobs	Number of Jobs
Administrative, Support, Waste Management & Remediation Services (11050)	1.5%	3,565
Education (12000)	0.6%	1,507
Utilities (3000)	0.3%	812
Manufacturing (5000)	0.2%	371
TOTALS	100.0%	240,488

Data Source(s): Colorado State Demography Office

According to "Employment Impact from Senior Spending in Colorado in 2014," a report prepared by the SDO in 2017, 33% of jobs currently supported by seniors in Colorado are in the Health Services (12015) industry. Other leading sectors supported by seniors include: Retail Trade (7000) (14% of jobs); Other Services, except Public Administration (14000) (12% of jobs); and, Accommodations & Food Services (13015) (9% of jobs). The SDO's report can be found here: https://www.colorado.gov/pacific/sites/default/files/Employment%20Impact%20by%20Senior%20Spending%20in%20Colorado%20in%202014%20Final.pdf

VI. JOBS & WAGES BY LOCATION IN GARFIELD COUNTY

Data from the US Census Zip Code Business Patterns were used to approximate the total number of jobs by municipality in Garfield County. The results of this work are presented in the graph below. Note that the data does not include self-employed individuals, employees of private households, railroad employees, agricultural production employees and most government employees.

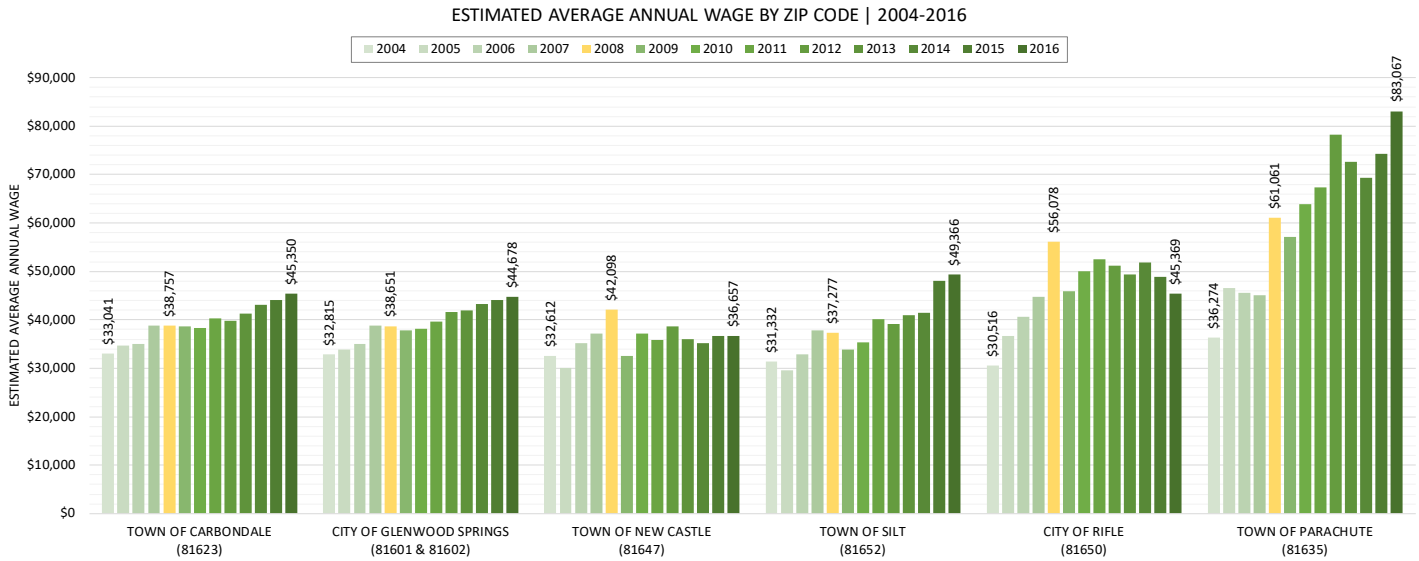


As of 2016, the City of Glenwood Springs was the largest employment center in Garfield County, with an estimated 9,614 total jobs. The Town of Carbondale and City of Rifle were also substantial employment centers in the county with estimated total jobs of 4,714 and 4,014 (in 2016), respectively. The Town of Parachute, Town New Castle and Town of Silt have employment opportunities but significantly less than those in Glenwood Springs, Carbondale and Rifle.

The estimated total number of jobs peaked in all towns/cities in 2008, with the exception of the Town of Parachute where the estimated total number of jobs peaked in 2007. Peak employment was followed by a decline in the total number of jobs across the board. This can be attributed to the Great Recession (duration approximately 2007-2009). Since the Great Recession, it appears that the Town of Carbondale, City of Glenwood Springs and Town of New Castle have experienced a steady increase in total job growth. The Town of Silt, City of Rifle and Town of Parachute seem to have experienced less consistent job growth following the Great Recession.

The decline of the oil and gas industry in Garfield County, which began in 2009, is likely a factor contributing to the ebbs and flows in job growth in Silt, Rifle and Parachute between 2009 and 2016. As of 2016, none of the towns/cities in the county have returned to 2008 employment levels.

US Census Zip Code Business Patterns data were used to estimate the 2004-2016 average annual average wage by municipality in Garfield County (refer to the graph below). Note that the data does not include self-employed individuals, employees of private households, railroad employees, agricultural production employees and most government employees.



The data indicates that between 2004-2016, average annual wages have steadily increased in Carbondale, Glenwood Springs, Silt and Parachute. The Town of New Castle and City of Rifle have experienced more variable increases in average annual wages. Furthermore, as of 2016, annual average wages were at their highest point over the past 12-years for all towns/cities in Garfield County, except for in New Castle and Rifle. Both New Castle and Rifle saw peak annual average wages in 2008. The Town of Parachute has had the greatest increase in annual average wages between 2004-2016. This could be a result of the number of high paying oil and gas jobs in the Parachute area.

VI. NATURAL RESOURCE EXTRACTION INDUSTRIES

Natural resource development, specifically natural gas and prospectively oil shale, has had the most dramatic influence on the county's economy in recent years. Garfield County has been one of the leading producers of natural gas in Colorado for a number of years. Between 2007-2016, the county accounted for approximately 30-40% of coalbed methane and natural gas produced and sold by Colorado (refer to Table 5). The natural gas boom, which spurred Garfield County's economy in the 2000s, was driven in part by a rapid escalation in gas prices. However, prices have declined since their peak in 2008 ($8.86 per million Btu). As of October 2019, natural gas prices are $2.33 per million Btu.

The 2019 Garfield County Profile describes the recent history of the oil and natural gas industry in the county:

"As of 2008, nearly one-third of all mining industry employment for the state of Colorado was located in Garfield County and the neighboring Mesa and Rio Blanco counties. Between 2004 and 2005, Garfield County experienced a rapid increase in its share of statewide mining employees, which then leveled off and modestly declined between 2006 and 2009. The industry slowed dramatically in 2009 as gas prices fell and operators began pulling drilling rigs to pursue emerging gas field prospects elsewhere in the U.S.

The natural gas boom, which spurred Garfield County's economy in the 2000s, was driven in part by a rapid escalation in gas prices. Since 2012, gas prices have been declining, which has had a direct impact on the total

natural gas and oil production in the county. Garfield County, however, continues to dominate regional gas production. In 2018, Garfield County produced 1.4 million barrels of oil and 494 million cubic feet of natural gas. Garfield County's energy production represents a significant share of the statewide totals. Prices however, continue to be low, with a 2018 average of $3.15 per million Btu (versus $8.86 per million Btu in 2008).

Natural Gas Liquids (NGLs), which are often a by product of gas well production, are used to produce lower grade liquid fuels and NGL values typically follow crude oil prices. As the price of natural gas has declined, the value of NGL products have become a more important element of the overall economics of well drilling and production. The price of NGLs mirrors the price of crude oil which, although experiences price fluctuations, currently remains at high levels, and boosting the value of gas production within Garfield County.

Prospects for future growth in northwest Colorado gas drilling have been bolstered by the completion of the $6.7 billion Rockies Express pipeline, which has alleviated some well-to-market shipping constraints that had previously restricted local natural gas distributions. Although the growth in production has been notable, the decline in drilling activity has become even more pronounced with declining drill rig numbers. More than twenty-one percent (21.7%) of Colorado's drilling permits were for projects located in Garfield County and 87% of Colorado's 53,732 wells are located in six (6) counties as of October 2018.

As of December 2018, there were five (5) active natural gas drilling rigs in Garfield County. The number in Garfield County has continued to decrease over the past several years, and is now among the fewest number of drill rigs in over 20-years."

Data from the SDO, BEA, Colorado Oil and Gas Conservation Commission (COGCC) and US Energy Information Administration (EIA) were used to create the following graphs. These graphs illustrate the relationship between: oil and gas prices; oil and gas production and sales in Garfield County; and, employment in Garfield County.

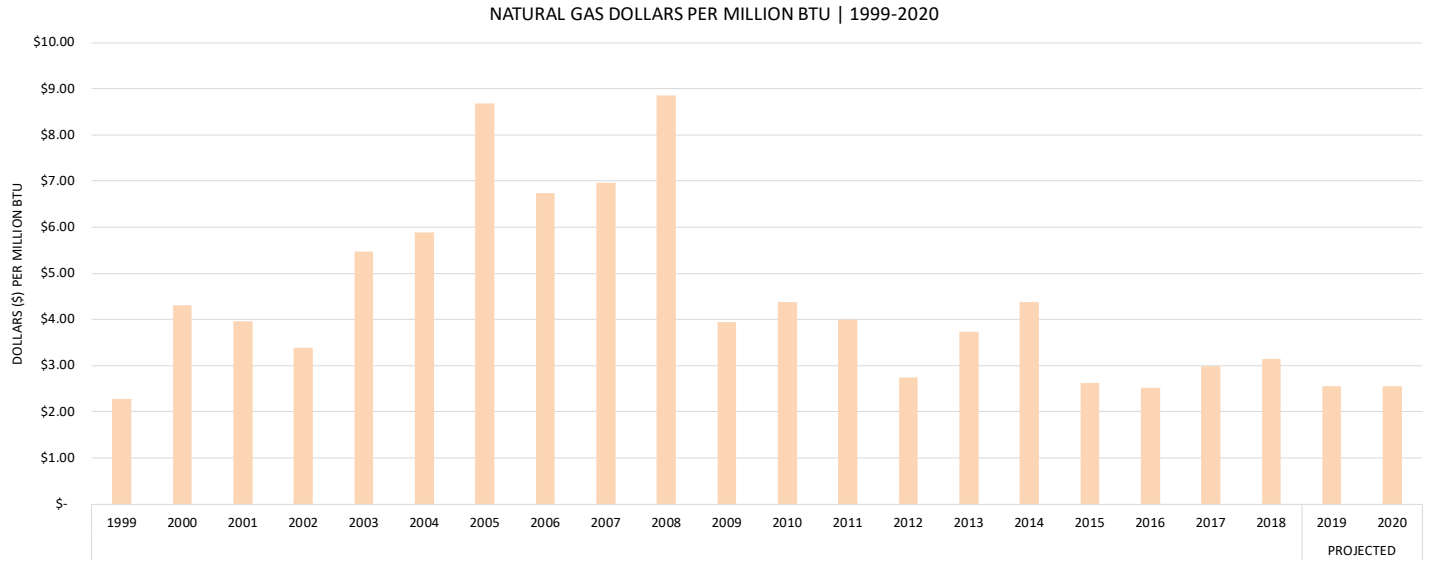
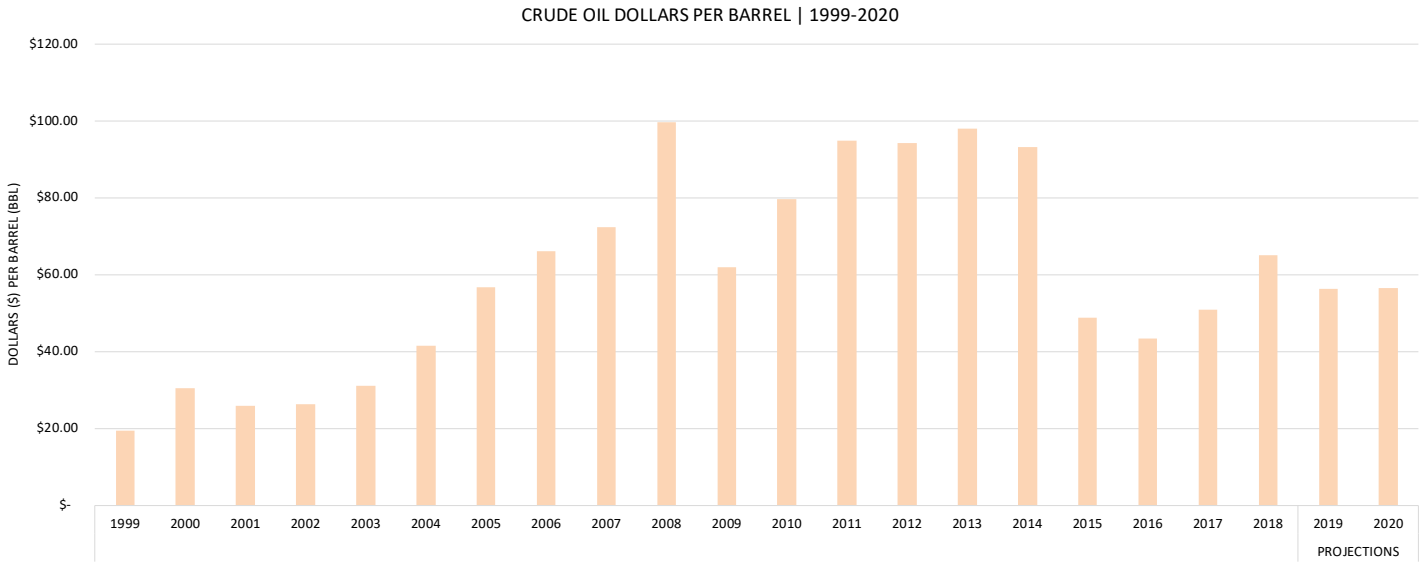
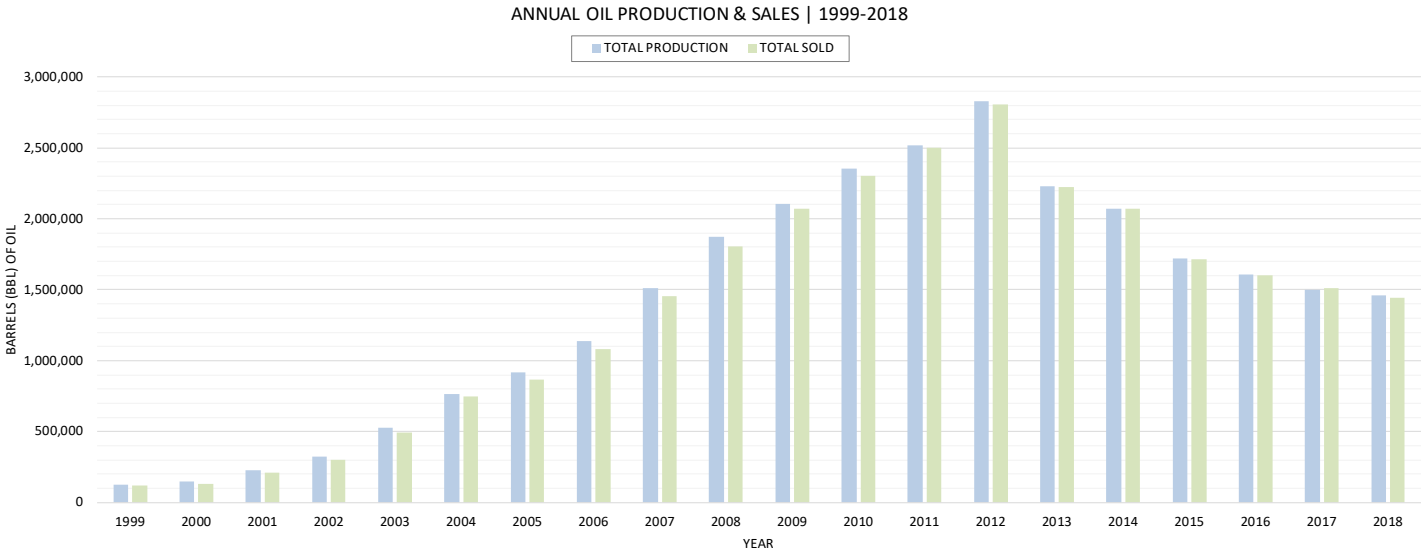



Photo Credit: Kirby Winn/Garfield County


ANNUAL COALBED METHANE & NATURAL GAS PRODUCTION & SALES | 1999-2018
TOTAL PRODUCTION
TOTAL SOLD
CUBIC FEET OF METHANE & NATURAL GAS
800,000,000
700,000,000
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR


CRUDE OIL DOLLARS PER BARREL | 1999-2020
DOLLARS ($) PER BARREL (BBL)
$120.00
$100.00
$80.00
$60.00
$40.00
$20.00
$-
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
PROJECTIONS


ANNUAL OIL PRODUCTION & SALES | 1999-2018
TOTAL PRODUCTION
TOTAL SOLD
BARRELS (BBL) OF OIL
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
YEAR

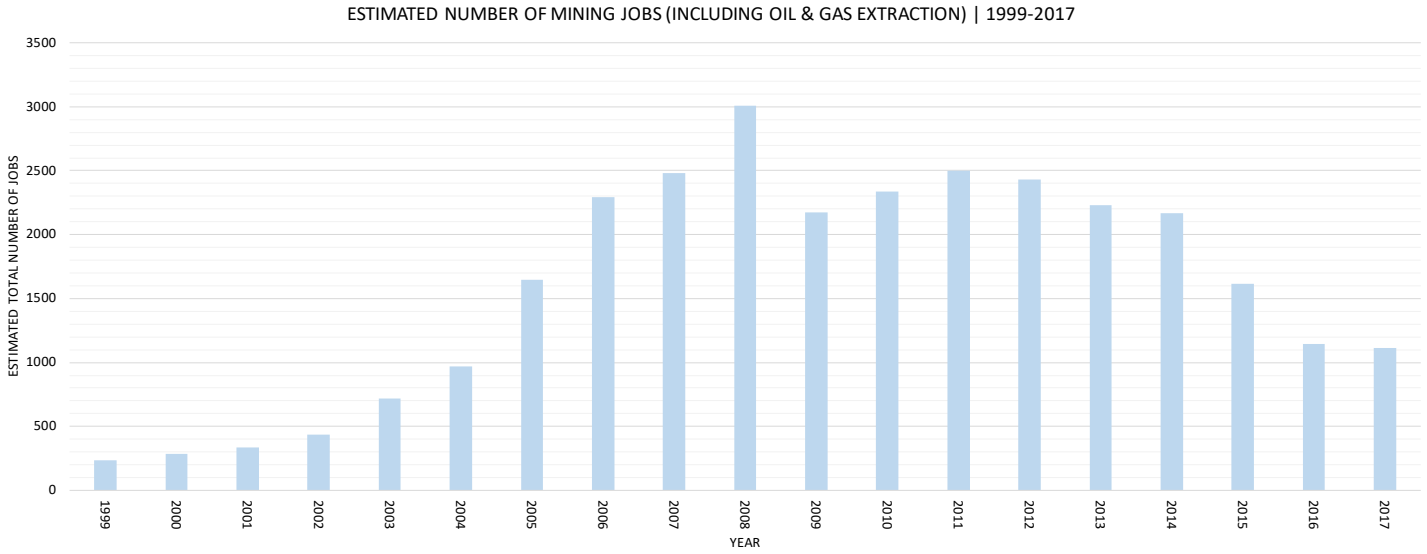


Table 5 presents a detailed breakdown of the total volume of natural gas and oil produced and sold by Garfield County from 1999-2018. The table also provides information about Garfield County's contribution to the total volume of natural gas and oil produced and sold by Colorado during the same time frame.

Table 5: Volume of Natural Gas and Oil Produced and Sold by Garfield County (1999-2018)

	NATURAL GAS[1]				OIL[2]			
YEAR	Total Volume Produced by Garfield County	Share of Colorado's Total Volume Produced	Total Volume Sold by Garfield County	Share of Colorado's Total Volume Sold	Total Volume Produced by Garfield County	Share of Colorado's Total Volume Produced	Total Volume Sold by Garfield County	Share of Colorado's Total Volume Sold
1999	56,885,283	7.6%	56,629,929	7.8%	126,836	0.6%	119,499	0.6%
2000	70,316,336	8.8%	69,911,011	9.0%	147,730	0.7%	131,071	0.7%
2001	88,472,174	10.4%	87,932,265	10.7%	230,109	1.1%	210,605	1.1%
2002	117,093,639	12.3%	116,596,991	12.7%	322,277	1.6%	302,342	1.5%
2003	150,082,042	14.5%	149,473,791	14.9%	527,913	2.4%	494,086	2.3%
2004	210,386,737	19.2%	209,573,188	19.6%	766,442	3.4%	749,988	3.4%
2005	270,711,179	23.4%	269,355,463	24.0%	916,174	3.9%	867,579	3.8%
2006	351,044,453	27.7%	348,753,754	28.4%	1,137,397	4.6%	1,080,631	4.5%
2007	446,016,594	32.5%	442,683,199	33.3%	1,511,958	5.8%	1,453,778	5.7%
2008	565,681,104	36.3%	562,005,950	37.3%	1,871,192	6.2%	1,806,990	6.0%
2009	607,762,605	37.9%	600,357,752	38.6%	2,103,606	6.9%	2,071,792	6.9%
2010	649,106,918	39.0%	641,541,683	39.7%	2,356,159	7.1%	2,304,078	7.0%
2011	675,502,829	39.8%	666,653,204	40.5%	2,515,396	6.4%	2,497,991	6.4%
2012	702,238,037	40.7%	692,095,459	41.5%	2,830,244	5.7%	2,806,008	5.7%
2013	652,322,177	40.0%	643,899,846	40.9%	2,227,681	3.4%	2,222,975	3.4%
2014	613,235,601	37.4%	604,104,876	38.0%	2,073,531	2.2%	2,070,662	2.2%
2015	554,896,373	32.8%	546,750,918	33.3%	1,718,267	1.4%	1,717,227	1.4%
2016	496,485,704	29.1%	488,368,501	29.4%	1,607,167	1.3%	1,601,631	1.3%
2017	481,255,540	28.0%	472,465,849	28.3%	1,500,266	1.1%	1,512,522	1.1%
2018	494,102,589	26.5%	485,075,918	26.7%	1,457,587	0.8%	1,446,112	0.8%

NOTES:
[1]Natural gas volume measured in cubic feet (cf).
[2]Oil volume measured in barrels (bbl).

Data Source(s): Colorado Oil and Gas Conservation Commission

A 2018 study titled, "Economic Contribution of the Oil and Gas Industry in the Piceance Basin," was prepared by Colorado Mesa University (CMU). Included in the study is information regarding the economic impact of natural resource extraction industries in Garfield County. Table 6 provides excerpts from this study that are relevant to Garfield County. A copy of the CMU study can be found here: https://www.coloradomesa.edu/energy/documents/economic-contribution-of-oil-and-gas-in-the-piceance.pdf

Table 6: Relevant Excerpts from 2018 CMU Study - "Economic Contribution of the Oil and Gas Industry in the Piceance Basin"

1. Average Weekly Wage in Garfield County	In 2017, the average weekly wage for oil and gas jobs in Garfield County was $1,768.		
2. % of Total Wages in Garfield County	A high average weekly wage leads to a high percentage of total wages in high oil and gas production areas. In 2017, oil and gas wages accounted for roughly 10% of total wages in Garfield County.		
3. Estimated Changes in Garfield County Employment per Rig	It is estimated that Garfield County experiences a change of 70 jobs per rig.		
4. Impact of Natural Gas Price Changes on Employment in Garfield County	For every dollar ($1) change in Rocky Mountain Opal natural gas pricing, there's an estimated change of 828 jobs in Garfield County.		
5. Impact of Natural Gas Price Changes on Rig Count in the Piceance Basin	It is estimated that for every dollar ($1) change in the price of natural gas there is a resulting change of 8.8 rigs in the Piceance Basin.		
6. Direct Distribution in Garfield County[1]	Direct distribution to local government budgets: $954,960.	Direct distribution to counties and municipalities from FML: $3,222,604.	Direct distribution to school districts from FML: $273,921.
7. State Public School Fund Federal Mineral Lease (FML) Local Proportion	Total school funding in Garfield County: $62,293,423.	Proportion of Garfield County school funding from FML: $979,720 (1.6%).	Proportion of Garfield County school funding from oil and gas: $734,006 (1.2%).
8. Garfield County Ad Valorem Property Taxes Received from Oil and Gas Production in 2017	$70,869,554		
9. Estimated Impact to Garfield County Sales Tax Revenues	$1,144,138 in county sales tax revenues would cease to exist if the oil and gas industry in the Piceance Basin were to disappear.		

NOTES:
[1] Direct distribution is money from both severance and Federal Mineral Lease (FML) that is distributed to the county, municipalities, and school districts based on certain formulas. These revenues come from the State severance tax receipts and the FML non-bonus payments. There are three types of direct distribution: (1) direct distribution to local government budgets from severance taxes; (2) direct distribution to counties and municipalities from FML; and, (3) firect distribution to school districts from FML.

Data Source(s): Economic Contribution of the Oil and Gas Industry in the Piceance Basin (2018) (https://www.coloradomesa.edu/energy/documents/economic-contribution-of-oil-and-gas-in-the-piceance.pdf)

In 2014, the "Garfield County Energy Resource Inventory" was prepared. This inventory includes data regarding the potential for extraction of conventional natural resources in Garfield County, including coal, oil, natural gas, coal bed methane, oil shale, uranium and gravel/aggregate. For each conventional resource, constraints were identified in order to provide a more realistic picture of the land in the county available for development of these resources. Constraints identified in the inventory include:

- Physical constraints (ex. steep slopes, 100-year floodplain, wildlife habitat, geologic hazards, etc.).
- Regulatory constraints (ex. local, state, and/or federally protected areas such as conservation areas, no surface occupancy (NSO), wilderness areas, areas of critical environmental concern (ACEC), etc.).
- Land use compatibility.

Table 7 presents data from the Energy Resource Inventory that describes the approximate amount of unconstrained/constrained acreage in the county available for various types of conventional natural resource development. The county's Energy Resource Inventory can be found here: https://www.garfield-county.com/community-development/garfield-county-energy-master-plan.aspx

Table 7: Availability of Land in Garfield County for Conventional Natural Resource Development

Type of Renewable Energy		Least Constrained 0	1	2	3	4	5	6	7	8	9	10	Most Constrained 11+
1. Coal	Acres	10	9	61	48,340	283,726	471,871	556,040	334,342	159,263	36,347	2,970	413
	% of County	<1%	<1%	<1%	3%	15%	25%	29%	18%	8%	2%	<1%	<1%
2. Oil	Acres	10	9	61	48,527	285,063	497,458	586,213	332,763	124,167	16,843	1,878	400
	% of County	<1%	<1%	<1%	3%	15%	26%	31%	18%	7%	1%	<1%	<1%
3. Natural Gas	Acres	10	9	61	48,527	285,063	497,458	586,213	332,763	124,167	16,843	1,878	399
	% of County	<1%	<1%	3%	15%	26%	31%	18%	7%	1%	<1%	<1%	<1%
4. Coal Bed Methane	Acres	10	9	61	48,527	285,063	497,458	586,213	332,763	124,167	16,843	1,878	399
	% of County	<1%	<1%	3%	15%	26%	31%	18%	7%	1%	<1%	<1%	<1%
5. Oil Shale	Acres	10	9	61	48,527	285,063	497,458	586,213	332,763	124,167	16,843	1,878	399
	% of County	<1%	<1%	3%	15%	26%	31%	18%	7%	1%	<1%	<1%	<1%
6. Uranium	Acres	2	9	38	30,756	196,648	353,403	513,412	514,787	218,072	57,442	7,259	1,562
	% of County	<1%	<1%	<1%	2%	10%	19%	27%	27%	12%	3%	<1%	<1%
7. Gravel/ Aggregate	Acres	2	8	38	38,054	286,108	461,485	601,479	377,100	112,720	14,536	1,435	424
	% of County	<1%	<1%	<1%	2%	15%	24%	32%	20%	6%	1%	<1%	<1%

Data Source(s): 2014 Garfield County Energy Resource Inventory (https://www.garfield-county.com/community-development/garfield-county-energy-master-plan.aspx)

In addition to the data provided in Table 7, the 2014 Garfield County Energy Resource Inventory includes the following descriptions for each of the conventional energy sources identified. These descriptions are to be used in conjunction with Table 6 and the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan).

- **Coal.** Coal is primarily composed of carbon from ancient plant material exposed to heat and pressure. Five (5) coal fields are found in Garfield County. The largest field, the Piceance, is overlain with 2,000 to 7,500 feet of overburden. Historically, mining was conducted at fields along the margin of the basin. Since 1888, eight (8) million short tons were extracted from Garfield County coal fields. The most productive mine in the county was the McClane Canyon mine, which had a cumulative production of about 1.5 million short tons. McClane Canyon mine, which is located in a BLM coal lease area, is the last active coal mine in the county, but has been idle since Xcel Energy's Cameo Power Generation Station was decommissioned in 2011.

  Subsurface coal deposits are located west of the Town of Carbondale and the Grand Hogback through central and western Garfield County. However, the area where the overburden is less than 80 feet is located in the western part of the county on lands managed by the Bureau of Land Management (BLM). Thicker coal beds (ranging from 1-100 feet) are located in the central part of the county but have an overburden greater than 3,000 feet.

  The US Geological Survey (USGS) estimates that 34,200 million short tons of coal are technically recoverable for the Piceance Basin in areas where overburden is less than 6,000 feet (located along the basin edges). However, areas with the thickest depths may not be economically feasible to mine given the present technology and economic demand.

  87% of the coal areas in Garfield County have moderate constraints (ranging from 4-7). Areas in the western part of the county where the overburden is thinner have low to moderate constraints (ranging from 1-4). Areas with higher moderate constraints (ranging from 5-9) are located west of the McClane Canyon mine. Both of these areas are within BLM managed lands. Areas of greater coal thickness are encumbered by thicker overburden and low to moderate constraints (ranging from 2-8). These areas have mixed ownership including private, state, and BLM managed lands.

- **Oil.** According to the 2014 Energy Resource Inventory, conventional oil production does not currently occur in Garfield County. Consequently, the inventory compiled information regarding BLM oil and gas lease areas, oil well locations, roads, transmission lines, water wells, and schools for future study and consideration.

The BLM oil and gas lease areas in Garfield County have constraints that range from low (2) to moderate (8) with small areas of high constraints (ranging from 10-11) located northwest of Parachute and in the western part of the county. In the central part of the county, there is a dendritic-like pattern of areas with moderate constraints (ranging from 6-7) that follow drainages or streams.

- **Natural Gas.** Natural gas is a naturally-occurring hydrocarbon gas mixture consisting primarily of methane. In Garfield County, natural gas resources are located in the central and western parts of the county, primarily in the Uinta-Piceance (within the Mesaverde geologic formation). In 2014, most of the active natural gas wells were found in the central part of the county west of Glenwood Springs, on BLM Communization and BLM Oil and Gas Exploratory Units. In addition, natural gas wells could be found on private lands north and south of Parachute. The BLM Oil and Gas Exploratory Units north and west of Parachute had some active wells but the area was not as active as the central part of the county. As of 2014, there were no recorded natural gas wells north and east of Glenwood Springs.

  The BLM oil and gas lease areas in Garfield County have constraints that range from low (2) to moderate (8) with small areas of high constraint (10-11) northwest of Parachute and in the western part of the county. The Town of Silt, City of Rifle, and Town of Parachute are adjacent to BLM oil and gas lease areas. These areas have low to moderate constraints (ranging from 2-5) near the municipal boundaries. In the central part of the county, there is a dendritic-like pattern of moderate constraint (ranging from 6-7) that follows drainages or streams. Three (3) schools in the western part of the county are near the BLM oil and gas lease area where there are low to moderate constraints. The area around Glenwood Springs has moderate (8) to high constraints (11).

- **Coal Bed Methane.** Coal bed methane is a type of natural gas extracted from coal beds that is adsorbed into the solid matrix of the coal. In Garfield County, coal bed gas is found in the Mesaverde Formation of the Piceance Basin. The Piceance Basin has long been recognized as the “gassiest coal region” in the western United States. The high gas content of the Piceance Basin coals is likely due to the combination of the large coal overburden thickness and the high heat flows present in the basin. Many of the sandstone gas fields found in the basin occur in the coal-bearing Mesaverde Group, and it is thought that these fields derived much of their gas from coal beds.

  The USGS estimates that the Mesaverde Formation, which spans the entire Piceance and part of the Uinta Basin, contains a mean estimate of 138.72 billion cubic feet (bcf) of undiscovered coal gas resources. The EIA estimates that the Piceance Basin’s reserves to be in the range of 0.1 – 50 bcf. The Potential Gas Committee (PGC) estimated the coal bed methane resources for the combined Unita-Piceance-Park basins to be 5.528 trillion cubic feet.

  The coal bed methane resources analyzed as part of the county’s Energy Resource Inventory were located in the Mesaverde Group. In 2014, the area of concentration for coal bed methane development was located in an area of the Grand Valley north of Parachute and north of Rulison with a few smaller developments near Rifle. The inventory found that the smaller coal bed methane field boundary areas have low (3) to moderate (7) constraints. The Grand Valley has low (4) to moderate (8) constraints in an area of privately-owned and BLM lands. Lands with fewer constraints (ranging from 2-5) are located south of Parachute. The area near Rulison, south of Interstate 70, has moderate constraints (ranging from 5-8).

  In the inventory it was noted that the depths of the coal beds in the Piceance Basin inhibit gas permeability which hinders the economic viability of coal bed gas production. Therefore, development of these resources is expected to occur primarily in existing natural gas wells once the existing gas is depleted.

- **Oil Shale.** Oil shale is a fine-grained type of sedimentary rock rich with organic material that can be processed to produce liquid shale oil. The Piceance Basin contains more than 80% of the recoverable resources of the Green River formation. Typically, recoverable resources are zones at least fifteen (15’) feet thick and projected to yield fifteen (15) or more gallons per ton shale. The Piceance Basin shales are

expected to yield more than 25 gallons/ton. The USGS estimates there are 1.5 trillion barrels of recoverable shale oil in the Piceance Basin, the rights to two-thirds of which are owned by the federal government. However, the economic viability of shale extraction is uncertain. In the Piceance Basin, the BLM has permitted five (5) 160-acre tracts of federal land for research, development, and demonstration projects in Rio Blanco County.

Oil shale resources are located in the central and western portions of Garfield County with greater potential north and west of Parachute. This area is the location of active and legacy oil shale operations and is primarily privately-owned with some BLM managed lands on the periphery.

The central part of Garfield County is characterized by low to moderate constraints where oil shale resources have the most potential. There are scattered pockets of moderate to high constraints (ranging from 7-9) near the Garfield County-Rio Blanco County line. Generally, the areas of oil shale with high constraints are associated with BLM managed lands.

- **Uranium.** Uranium is primarily used to fuel nuclear power plants. It is estimated that one pound of Uranium-235 can produce as much energy as 1,500 pounds of coal. Garfield County lies within the Colorado Plateau Uranium Province which is estimated to contain six (6) million tons of uranium. The county sits north of the Uravan Mineral Belt where the greatest densities of uranium and vanadium are found. However, deformations in the underlying geology have made Garfield County home to one of the largest vanadium-uranium deposits in the Colorado Plateau Uranium Province.

  Uranium resources in the county are located in the area north, east, and west of Glenwood Springs, New Castle and Rifle. Five (5) historic producers and the Rifle mill attest to the legacy of mining the resource in the central part of Garfield County. The highest concentration (6-13 ppm) of the resource occurs in a horseshoe-shaped formation extending from Glenwood Springs to nearly New Castle and an area south of the Rifle Mine. Adjacent areas also have higher values with 5-6 ppm.

  Most of Garfield County's uranium resources have moderate constraints (ranging from 5-8) with areas of high constraints near Glenwood Springs, west of Carbondale and in small areas near Rifle. The areas with high constraints occur on lands that are privately owned and on lands managed by the BLM and US Forest Service.

- **Gravel/Aggregate.** Sand, gravel, and crushed stone are all considered aggregate materials. Aggregate is considered a high volume/low value commodity because transportation costs typically restrict the export of aggregate to areas within thirty (30) miles of the source. It is typically mined via surface extraction or open pits. In areas where sand and gravel aren't abundant, stones such as limestone or dolomite, may be crushed at the quarry site to create crushed stone.

  The most usable aggregate resources in Garfield County are found along the Colorado River because of its high quality gravel and proximity to improved roadways and Interstate 70. The gravel is derived from rocks of the Rocky Mountains, the White River uplift in the Glenwood Canyon area, and the areas between. Most of the Colorado River gravel is mined from terraces along the river rather than within or immediately adjacent to the river. Gravel found in stream tributaries to the Colorado River is typically local, and derived from the Roan Cliffs and Battlement Mesa area. There are other scattered active sand and gravel operations in Garfield County and many are located adjacent to existing roadways. The highest concentration of active and inactive sand and gravel operations are located between Rifle and Silt with a small cluster near Parachute.

  Moderate to high potential for aggregate resources are concentrated in an area along the Interstate 70 corridor from Silt to Parachute, with most of the resource area south of the interstate and along a network of existing roads. Land ownership in the moderate to high potential resource area is privately-owned or managed by the BLM and includes incorporated areas of Silt, Rifle, and Parachute.

In the moderate to high potential aggregate resource area, constraints are low (1) to moderate (7). In 2014, there were fifteen (15) active sand and gravel operations in the moderate to high potential resource area. Other sand and gravel operations active as of 2014, were in areas with low to moderate constraints (ranging from 4-7) and located along existing streams, creeks or rivers. There is an aggregate resource area around Glenwood Springs that has moderate to high constraints (ranging from 7-11).

VII. RENEWABLE ENERGY INDUSTRIES

The Garfield Clean Energy Collaborative was established in 2012 to help residents, businesses and governments throughout Garfield County, become more energy efficient and tap clean energy as a means for creating a stronger, more resilient economy. The vision of Garfield Clean Energy is for "Garfield County to be the most energy efficient county in the country." To achieve this vision, Garfield Clean Energy has set forth four (4) goals:

1. Increase per capita energy efficiency by 20% by 2030, over a 2015 baseline.
2. Reduce petroleum consumption 25% by 2020, over a 2009 baseline.
3. Obtain 35-50% of our energy from renewable sources by 2030.
4. Identify and implement adequate and sustainable funding for Garfield Clean Energy.

The Garfield Clean Energy Collaborative is an independent local government authority that oversees programs and services that help residents, businesses, and local governments become more energy efficient and reduce energy costs. Members of Garfield Clean Energy Collaborative include: Town of Carbondale; City of Glenwood Springs; Town of New Castle; Town of Silt; City of Rifle; Town of Parachute; Garfield County; Colorado Mountain College; and, the Roaring Fork Transportation Authority (RFTA). Clean Energy Economy for the Region (CLEER), is the local non-profit that contracted by Garfield Clean Energy to deliver programs and services.

The efforts of Garfield Clean Energy have resulted in the following outcomes:

- **Overall Economic Benefits.** Since 2009, Garfield Clean Energy projects have resulted in $40 million in materials purchased from retailers and work done by contractors. This has benefited 353 businesses. Cumulative energy savings are valued at more than $7 million.
- **Economic Impact of Energy Efficiency Efforts.** Since 2009, 340 businesses, churches and organizations, as well as 1,241 households have made energy upgrades with assistance from Garfield Clean Energy. Altogether, these upgrades deliver energy cost savings of $1.4 million per year.
- **Use of Renewable Energies.** As of April 2019, there are 32 government buildings and facilities, schools and libraries powered by solar energy in Garfield County. These facilities generate 4.6 megawatts (MW) of clean, local power. In addition, Garfield County is home to six (6) community solar gardens that generate 6.6 megawatts of electricity.

Included in the 2014 "Garfield County Energy Resource Inventory" are data regarding the potential for renewable energies in Garfield County. The renewable energies identified in the inventory include solar, wind, geothermal, biomass and hydroelectric. Similar to conventional natural resources, the inventory identifies constraints for each type of renewable energy. The constraints identified include:

- Physical constraints (ex. steep slopes, 100-year floodplain, wildlife habitat, geologic hazards, etc.).
- Regulatory constraints (ex. local, state, and/or federally protected areas such as conservation areas, no surface occupancy (NSO), wilderness areas, areas of critical environmental concern (ACEC), etc.).
- Land use compatibility.

Table 8 presents data from the inventory that helps to describe the estimated amount of unconstrained/ constrained acreage in Garfield County potentially available for different types of renewable energy.

Table 8: Availability of Land in Garfield County for Renewable Energy Development

Type of Renewable Energy		Least Constrained 0	1	2	3	4	5	6	7	8	9	10	Most Constrained 11
1. Solar	Acres	13	39	627	212,564	454,203	666,866	387,575	144,878	23,449	2,762	390	23
	% of County	<1%	<1%	<1%	11%	24%	35%	20%	8%	1%	<1%	<1%	<1%
2. Wind	Acres	342,497	580,042	693,539	218,983	51,460	6,081	751	36	<1	<1	-	-
	% of County	18%	31%	37%	12%	3%	<1%	<1%	<1%	<1%	<1%	-	-
3. Geothermal	Acres	13	39	754	369,214	773,405	535,059	186,404	26,219	2,261	22	<1	-
	% of County	<1%	<1%	<1%	20%	41%	28%	10%	1%	<1%	<1%	<1%	-
4. Biomass	Acres	2	40	334	196,399	469,914	709,674	394,954	109,434	11,863	774	1	-
	% of County	<1%	<1%	<1%	10%	25%	37%	21%	6%	1%	<1%	<1%	-
5. Hydroelectric	Acres	589,478	969,132	284,819	46,711	3,202	47	1	-	-	-	-	-
	% of County	31%	51%	15%	2%	<1%	<1%	<1%	-	-	-	-	-

Data Source(s): 2014 Garfield County Energy Resource Inventory (https://www.garfield-county.com/community-development/garfield-county-energy-master-plan.aspx)

In addition to the data provided in Table 8, the 2014 Garfield County Energy Resource Inventory includes the following descriptions for each renewable energy source identified. These descriptions are to be used in conjunction with Table 8 and the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan).

- **Solar.** Solar power is derived from direct beam and diffuse radiation. Direct beam radiation comes in a direct line from the sun, while diffuse beam is scattered from the direct beam by small particles, such as water droplets or dust. On a clear day, most solar radiation is direct beam, however, on a cloudy day, solar radiation is characterized by diffuse beam. Photovoltaic panels are the most common way to convert sunlight directly into electricity. Smaller scale solar projects are common on small sites and rooftop installations and may vary from several hundred kilowatts (kW) to 3 megawatts (MW). Utility-scale photovoltaic arrays can range from 7 MW to 20 MW but utilize larger sites. In Garfield County, small scale photovoltaic arrays are common because of their smaller footprint. The energy generated by these systems can be used directly or fed in to the grid through net metering.

  Areas with high potential for solar energy are scattered throughout Garfield County. The two (2) largest areas are located in the valley between Silt to Parachute, and in the Carbondale area. There is also an area of high solar potential in Glenwood Springs. These lands are mostly privately-owned and adjacent to BLM managed lands.

  Roughly 90% of Garfield County has moderate constraints (ranging from 3-6) for solar energy development. The valley from Silt to Parachute and the area near Carbondale are characterized as having low to moderate constraints. The Glenwood Springs area has moderate to high constraints for solar energy development.

- **Wind.** Wind power is the conversion of wind energy into electricity using wind turbines, windmills, or windpumps. A consistent source of wind of an annual minimum wind speed of 6.5 meters per second is optimal for utility or large-scale wind generation. Hilltops, ridge crests, mountain summits, large clearings, and other locations free of local obstruction to wind are desirable for the siting of wind turbines. In contrast, locations in narrow valleys and canyons, downwind of hills or obstructions, or in forested or urban areas are likely to have poor wind exposure. Utility-based turbines are typically 350 to 450 feet in height (measurement to top of blade) and can generate up to 1.5 MW per structure. Community-scale turbines are shorter in height, typically less than 200 feet to the blade tip.

  Garfield County has scattered areas of marginal to fair wind resources at 50 meters above the ground. There are areas of excellent to superb wind resources in the northeast portion of the county on US Forest Service managed lands. An existing small wind system consisting of a 1.6 kW project is located in Rifle.

  Garfield County has low constraints for wind energy development, with most of the county ranging from 0-3. However, much of the land available for wind energy development is: managed by the US Forest Service;

located in remote parts of the county; and, is over ten (10) miles from a high voltage electric transmission line. There are small areas of marginal to fair wind potential located throughout the central and western parts of the county. Small areas of marginal wind potential exist between Rifle and Silt and are located near an existing 230kV transmission line. Small wind projects that feed into the local grid may be most feasible to develop.

- **Geothermal.** Geothermal energy is heat derived from the earth. Heat is produced deep within the earth through a number of processes including volcanic or radioactive decay. The heat then flows from the earth's depths to the surface, where it can be captured, and depending on the temperature and available water, used in applications ranging from building heating to electrical generation.

  Geothermal energy is described using heat flow gradient. Heat flow contours depict the movement of heat from the earth's interior to its surface in MW/m^2. Geothermal gradients describe the change in temperature with depth. In Garfield County, heat flow in increases in a northwest to southeasterly direction. The highest geothermal gradients in Garfield County are found around Glenwood Springs and in the far western portion of the county.

  The geothermal springs and wells, found at the earth's surface or at shallow depths, are used for recreation and health purposes in Garfield County (ex. the Glenwood Springs Hot Springs, the Yampa Spa and Iron Mountain Hot Springs). Deep subterranean geothermal resources, are found at the bottom of non-producing gas wells in the county. These resources hold the potential to be developed using Enhanced Geothermal Systems technology (EGS) through engineered hydrothermal reservoirs made by drilling and fracturing. The eastern third of Garfield County is the most favorable area for EGS development. More information about EGS can be found here: https://www.energy.gov/eere/forge/enhanced-geothermal-systems

  Most of the potential for geothermal energy is concentrated in the eastern half of Garfield County near existing geothermal springs in Glenwood Springs, potential areas in Carbondale and in isolated areas in the central and western parts of the county. The highest heat flow contours are found between Glenwood Springs and Carbondale.

  Much of Garfield County has low constraints (ranging from 3-5) for the development of geothermal resources. Areas with moderate constraints (ranging from 5-6) are identified in the areas around Glenwood Springs. The area with highest concentration of constraints is located north and east of Glenwood Springs.

- **Biomass.** Biomass is any biologically-produced matter in sufficient quantities that can be used to generate electrical power by fueling a boiler or producing biogas (methane). Depending on the energy production configuration, biomass can supply both power and heat, incorporating several resource feedstock streams, and can be more flexible and reliable than other sources of renewable energy. Garfield County's first biomass processing plant is located on the Colorado Mountain College's (CMC) West Garfield Campus in Rifle. This facility converts biomass to ethanol and butanol to be used as an alternative for gasoline.

  Biomass feedstock in Garfield County is generated from suburban and rural sources, as well as forest resources. Existing sources of feedstock for biomass, such as public landfills and wastewater treatment plants, have ongoing operations and infrastructure. In 2009, the National Renewable Energy Laboratory (NREL) estimated that Garfield County's biomass resources were about 50,000 tons per year.

  In forested areas, the spread of the pine bark beetle is affecting forest resources by killing large areas of trees. In 2012, the US Forest Service found that over 20,000 acres of forest in Garfield County were damaged by the pine bark beetle and/or other forest disease. Several of the affected forest areas are in remote areas. Therefore, the removal of large areas of dead trees would require logging roads. The US Forest Service does selectively remove hazard trees from recreation sites, camping areas, and trailheads. These trees could serve as a potential source of biomass feedstock.

Over 93% of Garfield County has low to moderate constraints (ranging from 3-6) for biomass energy development. Areas of moderate to high constraints (ranging from 6-9) are located north and east of Glenwood Springs, as well as in northeast Garfield County on US Forest Service managed lands. Some of these moderate to high constraint areas coincide with remote forest areas that have been impacted by the pine bark beetle and/or other forest disease. There is potential to use beetle-killed trees for biomass, but only if there is a network of roads to move the material out. There are established sources of biomass in Garfield County, such as agricultural waste, wood waste, and animal manures that could be transported along existing roads to existing biodigesters or boilers.

- **Hydroelectric.** Hydroelectricity is generated from the gravitational force of falling or flowing water. Water flows through a penstock into a turbine, where it powers a hydroelectric generator that converts mechanical energy into electricity. In Garfield County, hydroelectric power is produced at the Shoshone Hydroelectric Dam, the Zilm Project, and at two small generation sites in Parachute.

  In the early to mid 2000s, the Idaho National Laboratory (INL) modeled water energy sources in Garfield County. The results of this work indicated that the potential for hydroelectric generation is widespread across the county. The potential for generating hydroelectricity is the highest along the Colorado River and in the northeast corner of the county. INL's models identified several hundred sites in Garfield County where new low power or small hydropower plants could potentially be constructed. It is important to note that INL's models did not incorporate feasibility criteria.

  According to the 2014 Energy Resource Inventory, hydroelectric resources occur on public and private lands in the central, eastern, and northeastern parts of Garfield County. These are either on the Colorado River or tributaries to the Colorado River. Most of Garfield County has low constraints (ranging from 0-2) for developing hydroelectric resources. There are small areas with moderate constraints along the Colorado River in the eastern part of the county, upstream from Glenwood Springs. Approximately half of the potential areas for low power hydropower and/or small hydropower plants occur on public lands in the county.

VIII. ECONOMIC IMPACT OF OUTDOOR RECREATION

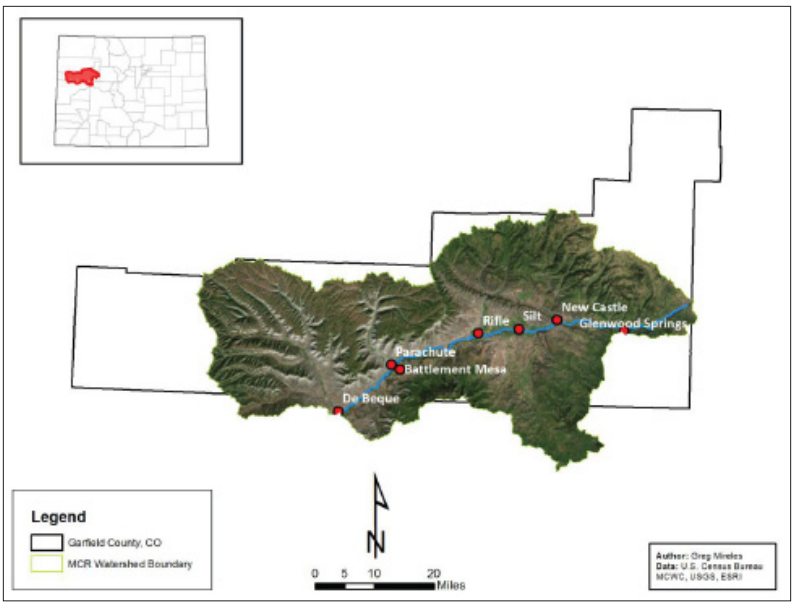
2017 and 2018 data from Colorado Parks and Wildlife (CPW), indicate that 92% of Coloradans exercise outdoors and 64% of Coloradans use local parks, open space or trails one (1) or more times per week. Out of the many outdoor recreation opportunities that Colorado has to offer, the top (10) ten activities among Coloradans are presented in Table 9.

Table 9: Outdoor Activity Participation

	Type of Recreation Activity	% of Coloradans who Participate		Type of Recreation Activity	% of Coloradans who Participate
1.	Walking	74%	6.	Playground Activities	28%
2.	Hiking	52%	7.	Running	28%
3.	Picnicking	32%	8.	Skiing	27%
4.	Camping	32%	9.	Wildlife Viewing	26%
5.	Fishing	29%	10.	RV Camping	26%

Data Source(s): 2017 Economic Contributions of Outdoor Recreation in Colorado

In 2018, the Middle Colorado Watershed Council investigated the economic contributions of recreation in the Middle Colorado River Watershed. The results of this work are captured in a report titled, "The Economic Contribution of Recreation in the Middle Colorado Watershed." The Middle Colorado River Watershed encompasses much of Garfield County (refer to the map on the following page) and therefore is a good corollary for the economic impact of outdoor recreation on the county as a whole. A copy of the Middle Colorado Watershed Council's report can be found here: https://www.midcowatershed.org/resources



In order to better understand the economic contributions of recreation in the Middle Colorado River Watershed, the study looked at the following factors:

- Number of annual visits per recreation activity in the watershed (refer to Table 10).
- Approximate expenditures per visit (refer to Table 11). Note, these estimates do not include expenditures on "equipment" (ex. clothes, binoculars, etc.) or expenditures by public institutions for construction and maintenance.
- Total expenditures per recreation activity in the watershed (refer to Table 12).

Ultimately, the study found that the total for all outdoor recreation activities in the Middle Colorado River Watershed amounted to $139,127,151. The study also found that 972 jobs in Garfield County are supported by outdoor recreation, outdoor recreation in the Middle Colorado River watershed contributes approximately $43 million to the Gross Domestic Product (GDP) and generates roughly $6 million in state and local tax revenues (refer to Table 12).

Table 10: Annual Recreation Visits in the Middle Colorado River Watershed

TYPE OF RECREATION ACTIVITY	NUMBER OF VISITS
National Forests	
1. General Recreation	903,094
2. Camping	3,124
SUBTOTAL	906,218 (37.1% of total visits)
BLM Lands	
1. Hiking/Walking/Running	28,655
2. Camping	20,844
3. Social Gathering	11,462
4. Off-Highway Vehicles (OHV)	6,192
5. Mountain Biking	5,650
6. Boat Launching	2,458
7. Picnicking	1,167
8. Guided Hunting	700
9. Target Practice	617
SUBTOTAL	77,745 (3.2% of total visits)

TYPE OF RECREATION ACTIVITY	NUMBER OF VISITS
Local Parks	
1. Walking	263,492
2. Jogging/Running	153,637
3. Golf	36,872
4. Team or Individual Sports	22,964
5. Picnicking	18,005
SUBTOTAL	494,970 (20.3% of total visits)
Various Public and Private Lands	
1. Big Game Hunting	71,448
SUBTOTAL	71,448 (2.9% of total visits)
Rivers	
1. Fishing	217,320
2. Rafting (Private)	107,387
3. Kayak/Dory/Float	77,746
4. Rafting (Commercial)	57,824

Table 10: Annual Recreation Visits in the Middle Colorado River Watershed (continued)

State Parks	
1. Hiking/General	413,589
2. Camping (In-State)	12,540
3. Camping (Out-of-State)	2,816
SUBTOTAL	428,945 (17.6% of total visits)

5. Jet Boating	1,400
SUBTOTAL	461,677 (18.9% of total visits)
TOTAL VISITS	**2,441,004**

Data Source(s): The Economic Contribution of Recreation in the Middle Colorado Watershed (2018) (https://www.midcowatershed.org/resources)

Table 11: Outdoor Recreation Expenditures by Type of Outdoor Recreation Activity Type

Type of Recreation Activity	Number of Visits	Per Visit Expenditures	Total Expenditures
1. Wilderness Recreation	983,963	$78.71	$77,450,678
2. State Park Recreation	428,945	$35.17	$15,086,644
3. Fishing	217,320	$58.48	$12,709,580
4. Rafting (Private)	107,387	$79.25	$8,509,905
5. Local Park Recreation	494,971	$16.14	$7,990,120
6. Rafting (Commercial)	57,824	$117.78	$6,810,548
7. Big Game Hunting	71,448	$89.82	$6,417,666
8. Kayaking, Rowing, Floating	77,746	$51.28	$3,987,117
9. Jet Boating	1,400	$117.78	$164,893
TOTALS	**2,441,004**	**N/A**	**$139,127,151**

Data Source(s): The Economic Contribution of Recreation in the Middle Colorado Watershed (2018) (https://www.midcowatershed.org/resources)

Table 12: Total Economic Effects from Middle Colorado River Watershed Recreation Expenditures

All Middle Colorado River Watershed Outdoor Recreation Expenditures	**$139,127,151**
Jobs in Garfield County Supported by Outdoor Recreation in the Middle Colorado River Watershed	972
Contribution to the Gross Domestic Product (GDP)	$42,927,000
Contribution to State and Local Tax Revenues	$5,967,000

Data Source(s): The Economic Contribution of Recreation in the Middle Colorado Watershed (2018) (https://www.midcowatershed.org/resources)

Dean Runyan Associates has prepared a number of studies, on behalf of the Colorado Tourism Office, that explore the economic impact of overnight travel in Colorado. These studies include data specific to the economic impact of overnight travel on Garfield County. Data complied from the studies are presented in Table 12. Copies of the studies prepared by Dean Runyan Associates can be found here:

- Colorado Travel Impacts: 1996-2015p (https://www.colorado.com/sites/default/master/files/Dean%20Runyan%20Eco%20Impact%202015%20FINAL_0.pdf)
- Colorado Travel Impacts: 2000-2018p (http://www.deanrunyan.com/doc_library/COImp.pdf)

Photo Credit: Glenwood Springs Resort Chamber Association

Table 12: Garfield County Overnight Travel Impacts (2000-2018)

	Travel Spending (in millions of dollars)	Earnings (in millions of dollars)	Employment (number of jobs)	Local Taxes (in millions of dollars)	State Taxes (in millions of dollars)
2000	$60.6	$18.0	990	$2.0	$2.2
2002	$85.6	$26.8	1,367	$3.3	$2.9
2004	$97.0	$29.5	1,412	$3.6	$3.2
2006	$125.5	$36.8	1,588	$5.1	$4.0
2008	$145.0	$43.5	1,654	$5.8	$4.4
2010	$121.2	$36.1	1,431	$5.1	$3.8
2012	$143.9	$38.9	1,514	$6.0	$4.3
2013	$144.1	$40.9	1,581	$6.1	$6.8
2014	$157.1	$45.2	1,699	$4.3	$4.7
2015	$163.2	$49.0	1,743	$7.3	$5.0
2016	$168.1	$52.2	1,802	$7.8	$5.2
2017	$175.7	$54.3	1,803	$8.1	$5.3
2018	$185.1	$57.1	1,795	$8.6	$5.5
CHANGE 2000-2018	**$124.5**	**$39.1**	**805 jobs**	**$6.6**	**$3.3**

Data Source(s): Colorado Travel Impacts: 1996-2015p (2016) (https://www.colorado.com/sites/default/master/files/Dean%20Runyan%20Eco%20Impact%202015%20FINAL_0.pdf); and, Colorado Travel Impacts: 2000-2018p (2019) (http://www.deanrunyan.com/doc_library/COImp.pdf)

IX. AGRICULTURE

The following is a summary of select metrics regarding the agricultural industries in Garfield County. For additional information regarding agriculture in the county, refer to Appendix B: Agriculture.

Agribusiness. According to the SDO, Agribusiness, which is inclusive of agricultural production, agricultural inputs, and agricultural other, generated approximately 1,191 jobs in Garfield County in 2017 (refer to Table 13). These jobs accounted for 3.5% of total jobs in the county, and 4.9% of total direct basic jobs.

In 2017, agricultural production- the raising crops and livestock for sale- accounted for the largest number of Agribusiness jobs. Agricultural production generated 552 jobs (i.e. 1.6% of total jobs in the county and 2.3% of total direct basic jobs).

Agricultural inputs- goods and services that enable production, such as farm equipment manufacture and sales, fertilizer production, or the sale of seeds and feed grains- accounted for 156 jobs (i.e. 0.5% of total jobs in Garfield County and 0.6% of total direct basic jobs) in 2017.

Agricultural other- activities that add value to agricultural products and prepares them for market, including milling, transportation to market, brewing, curing, packing food manufacturing or otherwise creating a finished food product- accounted for 483 jobs (i.e. 1.4% of total jobs in Garfield County and 2% of total direct basic jobs).

Table 13: Garfield County Basic and Non-Basic Jobs, by Agribusiness (2017)

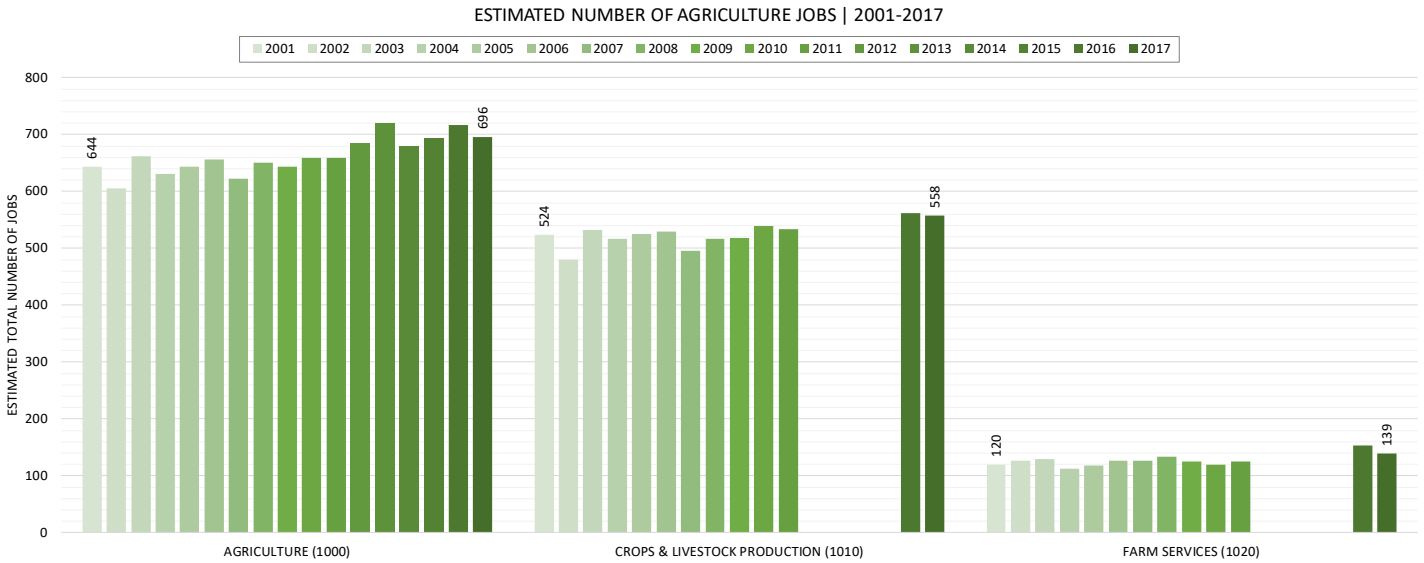
DIRECT BASIC JOBS	Employment	Employment Percent of Total Direct Basic Jobs	Percent of Total Employment All Industries
Agribusiness (Total)	1,191	4.9%	3.5%
Agricultural Production (Raising crops and livestock for sale)	552	2.3%	1.6%
Agricultural Inputs (Goods and services that enable production, such as farm equipment manufacture and sales)	156	0.6%	0.5%
Agricultural Other (Activities that add value to agricultural products and prepares them for market, such as milling, brewing or curing)	483	2%	1.4%

Data Source(s): Colorado State Demography Office

Agriculture Job Trends (2001-2017). Based on somewhat different analysis of agriculture job data from the SDO, it appears that jobs in agricultural production and farm services have trended upwards over the past several years, rising by a cumulative 8.2% to 696 jobs in 2017. Over this same period:

- Crops and livestock production jobs grew by 6.5%, to 558 jobs in 2017.
- Farm services jobs grew by 15.5%, to 139 jobs in 2017.

The following graph illustrates the estimated change in total jobs for the Agriculture (1000), Crops and Livestock Production (1010) and Farm Services (1020) industry sectors. Note that jobs data were unavailable for the Crops and Livestock Production (1010) and Farm Services (1020) sectors between 2012-2015.



Altogether, agricultural employment has exhibited a relatively high degree of stability year to year, in contrast to significant "booms and busts" that have occurred for several other industry sectors (ex. construction and mining).

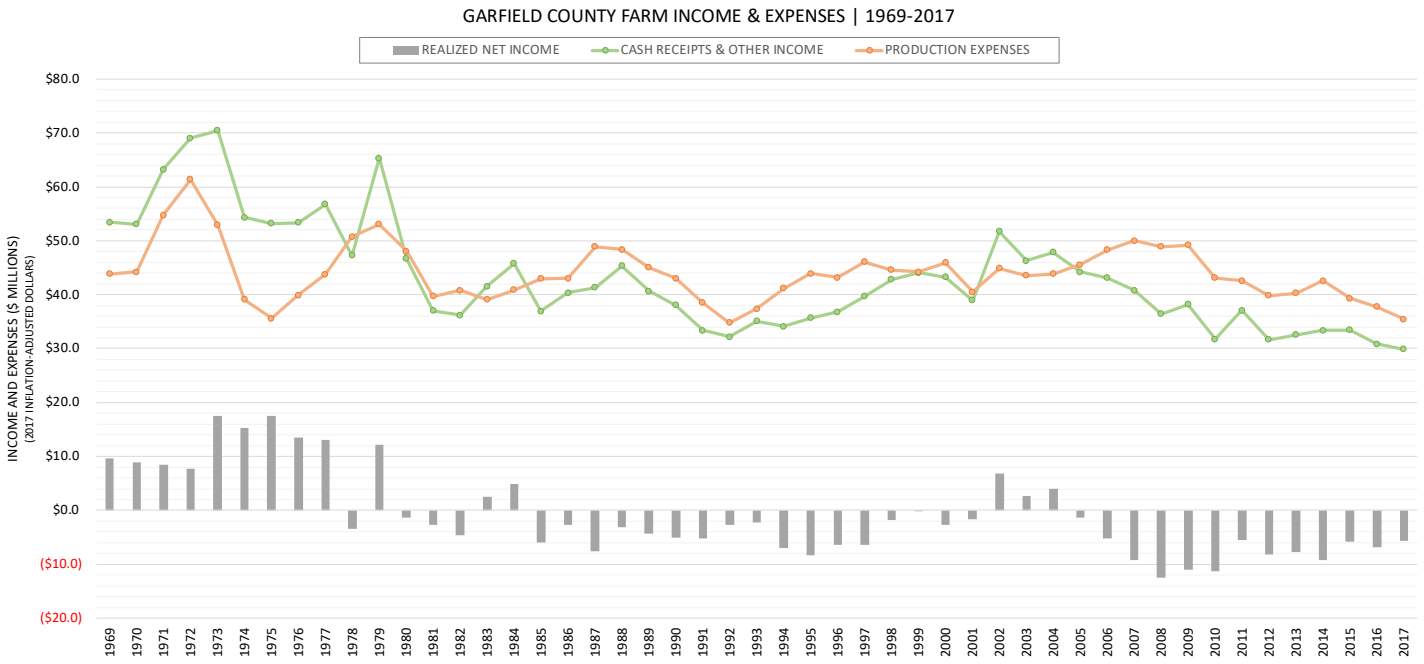
Agricultural Sales and Income. Aggregate sales of agricultural products have exhibited significant fluctuations over the past 50 or so years. Sales hit a peak of $67 million (in 2017 dollars) in 1973, before trending down erratically to a low of $25 million in 1991. Sales then generally trended up to $38 million in 2004, before trending back down to $21 million in 2016 and $23 million in 2017.

Livestock and livestock products have historically accounted for most of Garfield County's agricultural sales. Livestock/livestock products generated a relatively steady 66-71% of cash receipts over the 2006-2017 period, albeit down from the 80-91% percent levels experienced between 1969-1988.

Aggregate crop sales in Garfield County have fluctuated between $4 million and $13 million (in 2017 dollars) between 1969 and 2017, including $7 million in 2017. Crop sales rose to a peak of $13 million in 1997 and 1998, and have since declined.

Aggregate farm income totaled $30 million in 2017 (refer to the graph below), reflecting: $23 million in cash receipts from product sales; $0.4 million from government payments; and, $6 million in other income (including the imputed rental value of farm residences and other farm-related income components such as, machine hire and custom work income).

2017 farm production expenses totaled $35 million. Consequently, the net income realized was negative $6 million.



Data Source(s): US Bureau of Economic Analysis; US Bureau of Labor Statistics (CPI adjustment); and, RRC Associates.

Realized net income has been negative annually since 1985, except for an interlude of profitability between 2002-2004, a likely indicator of the financial challenges of farming and ranching. Nonetheless, the modest increases in agricultural employment noted previously from 2001 through 2017 suggests an appreciable degree of resilience and persistence.

Land Area Assessed as Agricultural. In 2018, a total of 572,649-acres of land were assessed as agricultural in Garfield County (refer to Table 14). This amounts to 30.4% of the total 1.886 million acres of land in Garfield County and speaks to the geographic scale and importance of lands used or taxed as agricultural in the county.

In 2018, the largest share of agriculturally assessed lands were grazing lands (60.1% / 344,442-acres). Second largest were farm/ranch wastelands (29.7% / 170,361-acres). Farm/ranch wastelands are lands that cannot be converted to an economically beneficial use and include areas such as river bottoms, sand hills, rock outcroppings, sand washes and soil salinity areas. Flood irrigated lands accounted for 6.6% (37,827-acres) of agriculturally assessed lands, followed by: meadow hayland (2.7% / 15,665-acres); dry farmland (0.3% /1,954-acres); sprinkler irrigated land (0.2% /1,280-acres); and timberland (0.2% /1,120-acres).

Table 14: Acreage of Land Assessed as Agricultural in Garfield County (2003-2018)

Year	Total Acreage	Grazing Land (acres)	Farm/Ranch Wasteland (acres)	Flood Irrigation (acres)	Meadow Hayland (acres)	Dry Farmland (acres)	Sprinkler Irrigation (acres)	Timberland (acres)	All Other Agricultural Property (acres)
2003	572,649	344,442	170,361	37,827	15,665	1,954	1,280	1,120	0
2004	573,766	351,683	163,795	38,176	15,307	2,542	1,140	1,120	3
2005	573,439	349,496	165,660	38,514	15,480	3,010	107	1,120	52
2006	576,647	350,484	168,761	38,297	14,861	3,036	36	1,120	52
2007	579,184	352,972	169,064	38,021	14,821	3,120	13	1,120	53
2008	576,170	350,369	168,481	37,909	15,120	3,120	0	1,119	52
2009	575,317	348,302	170,750	37,446	14,872	3,891	0	0	56
2010	576,666	347,928	172,651	37,266	14,221	4,205	0	0	395
2011	581,116	343,480	174,793	35,519	15,018	4,231	0	0	8,075
2012	583,585	343,291	175,269	37,046	15,392	4,324	0	0	8,263
2013	587,214	344,195	180,022	34,315	15,460	4,579	0	0	8,643

Table 14: Acreage of Land Assessed as Agricultural in Garfield County (2003-2018) (continued)

Year	Total Acreage	Grazing Land (acres)	Farm/Ranch Waste Land (acres)	Flood Irrigation (acres)	Meadow Hay Land (acres)	Dry Farm Land (acres)	Sprinkler Irrigation (acres)	Timber Land (acres)	All Other Agricultural Property (acres)
2014	586,168	342,193	180,252	34,306	15,555	4,614	0	0	9,248
2015	588,071	342,309	180,810	34,656	15,655	4,639	0	0	10,002
2016	597,883	347,370	185,056	34,022	16,281	4,986	0	0	10,168
2017	598,678	348,119	184,302	33,750	17,073	5,071	0	0	10,363
2018	599,088	346,592	186,796	33,523	16,739	5,090	0	0	10,348
No. Change 2003-2018	-26,439	-2,150	-16,435	4,304	-1,074	-3,136	1,280	1,120	-10,348
% Change 2003-2018	-4%	-1%	-9%	13%	-6%	-62%	-	-	-100%
% of 2018 Total	100.0%	60.1%	29.7%	6.6%	2.7%	0.3%	0.2%	0.2%	0.0%

Data Source(s): Colorado Division of Property Taxation

Between 2003-2018, the total land area assessed as "Agricultural" in Garfield County has declined by 26,439-acres (4%). A declining trend has occurred for the following sub-categories: farm/ranch wasteland (net decline of 16,435-acres); dry farmland (-3,136-acres); and, all other agricultural property (-10,348 acres). By contrast, acreage has increased for flood irrigated lands (+4,304-acres) and sprinkler irrigation (+1,280-acres). Some amount of the decline in farm acreage is presumably due to the conversion of agricultural lands to other purposes, such as residential, industrial and mining.

Profile of Agriculture in Garfield County in 2017. A variety of aspects of agriculture in Garfield County are summarized below. The data were sourced from the US Department of Agriculture's (USDA) 2017 Census of Agriculture. Additional information can be found at: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Colorado/

Number and Size of Farms. Garfield County had an estimated 661 farms in 2017. Aggregate land in farms totaled 475,166-acres, for an average size of 719-acres per farm and a median farm size of 50-acres. Roughly half of all farms were 49-acres or less (49% / 327 farms), while 20% (131 farms) were between 50-179-acres, 11% (74 farms) were between 180-499-acres and 20% (129 farms) were 500-acres or larger.

Value of Sales. Most farms had modest volumes of sales, with 39% selling less than $2,500 in products and another 22% selling $2,500-$9,999 annually. Just 12% of farms sold $100,000 or more annually.

Livestock Inventory. At year-end, Garfield County farms and ranches had approximately 34,267 cattle and calves, 10,529 sheep and lambs, and a variety of other livestock. Cattle and calves were the largest livestock segment measured in terms of sales, accounting for 78% of livestock sales revenue in 2017 and 59% of total agricultural product sales.

Primary Occupation of Principal Farm Operators. Of the 939 people identified as principal farm operators, just 46% considered farming to be their primary occupation, while 54% had a primary occupation outside of farming. Also of note, fully 67% of principal farm operators worked at least one (1) day off farm, including 41% who worked 200 or more days off farm. The challenging economics of farming is often identified as a driver of such multiple job-holding.

Selected Operational Characteristics.

- 7% of farms sell direct to consumers.
- 23% of farms hire farm labor.
- 1% of farms farm organically.

- Most land in farms is pastureland (65%), with lesser shares comprised of cropland (16%) and woodland.

X. ECONOMIC IMPACT OF THE RIFLE GARFIELD COUNTY AIRPORT (RIL)

The RIL is located in Rifle, Colorado. The airport is located in a mild climate zone, making it a preferred alternative to nearby mountain and resort regional airports where winter storm closures often inhibit air travel. RIL is highly suitable for private aircraft and is designated as a preferred General Aviation Mountain Business Jet Airport in Colorado. RIL offers a 7,000-foot long by 100-foot wide seamless runway, paved in continuous uniformity to avoid jolts for landing aircraft. The runway and full parallel taxiway are designed for heavy aircraft traffic (up to 134,500 pounds gross landing weight) making the RIL suitable for a wide range of aircraft.

In 2010, RIL underwent $47 million ($7.5 million of which were county funds) in infrastructure improvements. These improvements included: a $39.5 million overhaul and upgrade from the Federal Aviation Administration (FAA); nine (9) developed hangar parcels; an asphalt overlay for the ramp; new aircraft parking ramp; and, more.

In 2015, RIL became the new location for the Colorado Division of Fire Prevention and Control's Center of Excellence for Advanced Technology Aerial Firefighting.

In 2013, the Colorado Department of Transportation (CDOT) prepared an Economic Impact Study of RIL. This effort studied the economic contributions of RIL that stem from on-airport activities and off-airport spending by visitors who arrive in Colorado via the airport. These economic contributions were measured via jobs, associated payroll and economic output. According to CDOT's study, "The airport's economic contribution to the communities it serves is $56.9 million in output and 456 jobs, with an annual payroll of $21.7 million."

On-Airport Activities. The on-airport activities considered in CDOT's study included the administration, operation and maintenance of the airport, as well as the activities of airport tenants that provide aviation services or support the airport's customers. In addition, the study analyzed the economic impact of capital investment spending that supports jobs and payroll in the local economy for the duration of the project. Table 15 presents CDOT's findings for the economic impact of on-airport activities at RIL.

Table 15: Annual Airport, Tenant and Capital Improvement Economic Impact for Garfield County Regional Airport

	Initial	Multiplier Effect	Total
Jobs	271	153	425
Payroll	$14,738,000	$5,964,000	$20,703,000
Output	$35,254,000	$18,708,000	$53,963,000

Data Source(s): Colorado Department of Transportation (CDOT)

Off-Airport Activities. Visitors travel to Colorado on commercial airline flights or general aviation aircraft for business or vacation. According to CDOT's study, roughly 9,000 visitors arrive in Colorado via RIL on an annual basis. Some only stay for the day, while others stay longer and thus greater expenditures. These visitors spend money locally on food, lodging, transportation, entertainment and retail purchases. These expenditures support jobs and payroll while producing additional economic impacts through multiplier effects. Table 16 offers CDOT's findings for the economic impact of off-airport activities generated by visitors traveling to Colorado via RIL.

Table 16: Annual Visitor Economic Impact for Garfield County Regional Airport

	Initial	Multiplier Effect	Total
Jobs	23	8	31
Payroll	$690,000	$304,000	$994,000
Output	$1,997,000	$979,000	$2,976,000

Data Source(s): Colorado Department of Transportation (CDOT)

Local and State Tax Revenues. CDOT's study estimates that the economic activities related to RIL generate $947,000, annually, in local and state tax revenues. These revenues are generated by visitors paying taxes on lodging, rental cars, restaurant meals, and other purchases, as well as by workers whose jobs are supported by the airport. The roughly $947,000 in tax revenues is not included in RIL's total estimated economic contribution of $56.9 million.

XI. BROADBAND

The internet has, and is, impacting the way we work and live including our entertainment, our culture, the way government services are provided and accessed, the way health care is being delivered, and the way we educate our youth and provide educational services for improving the workforce. Affordable, reliable and quality broadband service is becoming the most critical utility of our time. The importance of broadband was reflected in the Federal Communications Commission's (FCC) determination that broadband internet access is a utility, as necessary to contemporary life as electricity, roads, and water systems.

Advanced broadband infrastructure has the potential to: create jobs; increase a community's ability to compete on a global scale; catalyze and support innovation and new technologies; increase opportunities for a region's companies; enhance public safety; provide better and less expensive health care; and, provide greater educational opportunities.

Fiber optic telecommunications infrastructure and primary demand for broadband services in Garfield County are concentrated along the Interstate 70 and Highway 82 corridors. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) or visit the Colorado Broadband Office's online map: http://maps.co.gov/coloradobroadband

BroadbandNow (https://broadbandnow.com/Colorado) is an online resource that summarizes data sets from the National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC) and other sources regarding broadband availability, speeds, government spending and pricing information. According to data sourced from Broadband Now:

- 82.8% of Garfield County has access to 25 Mbps internet service.
- 82.3% of Garfield County has access to 100 Mbps internet service.
- 0% of Garfield County has access to 1 Gigabit (1,000 Mbps) internet service.
- Approximately 7,000 people in Garfield County do not have access to any wired internet service.
- Approximately 11,000 people in Garfield County do not have access to 25 Mbps wired broadband.
- Statewide, the average download speed in Colorado is 54.4 Mbps.

Table 17 presents additional data from Broadband Now specific to the towns/cities in Garfield County.

Table 17: Select Data from Broadband Now for Garfield County

	Average Download Speed	Comparison to State-wide Average Download Speed	Number of Internet Service Providers (ISPs)	Average Cost per Mbps	Approximate Percent of Residents Serviced by Multiple Wired ISPs
Town of Carbondale	77.2 Mbps	+22.8 Mbps	12	$0.75	74%
City of Glenwood Springs	94.2 Mbps	+39.8 Mbps	13	$0.73	81%
Town of New Castle	185.3 Mbps	+130.9 Mbps	9	$0.73	73%
Town of Silt	20.1 Mbps	-34.3 Mbps	9	$0.73	62%
City of Rifle	46.6 Mbps	-7.8 Mbps	10	$0.73	75%
Town of Parachute	55.5 Mbps	+1.1 Mbps	9	$0.73	88%

Data Source(s): https://broadbandnow.com/Colorado

In 2016, Garfield County and its member municipalities participated in a joint broadband study with Mesa County. The goal of the study was to assess existing broadband infrastructure and to work with private and public stakeholders, to provide affordable, reliable and quality broadband services to community anchor institutions, citizens, businesses and visitors. The outcome of this effort was the 2017 "Garfield and Mesa Counties Strategic Broadband Plan." A copy of this plan can be found here: https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view

Key data from the 2017 Strategic Broadband Plan related to broadband infrastructure and services in Garfield County is presented in the following tables. The data included in the tables offers information about: the types of broadband technologies available in the county; the availability and speeds of wireline broadband services; and, the availability and speeds of wireless broadband services.

Table 18: Summary of Broadband Technologies

Type of Technology	Brief Description	Maximum Speed(s) Supported
1. DSL (Digital Subscriber Line)	DSL uses existing copper phone lines to deliver download and upload broadband speeds typically of 1.5 Mbps to 7 Mbps. DSL speeds diminishes as distance increases from the telephone company's central office.	10-30 Mbps
2. Cable Modem Service	Cable modem service uses coaxial cables already installed by the cable TV operators to provide broadband service. Most cable networks support speeds comparable to DSL. This connection type is a shared service, meaning, as more people are on the network within a neighborhood, the speed available to each customer diminishes.	30 Mbps
3. Fiber Optic Technology	Fiber optic technology converts electrical signals carrying data to light and sends the light through glass fibers about the diameter of a human hair. Fiber transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps. Fiber is the best way to provide abundant broadband, but it often is the most capital-intensive to build. Fiber is unique because it can carry high bandwidth signals over long distances without signal or bandwidth degradation and it can provide that capacity in both directions – for both upload and downloading information.	Exceeds DSL or Cable Modem Service by tens or even hundreds of Mbps.
4. Wireless Broadband	Wireless broadband connects a home or business to the internet using a radio link between the customer's location and the service provider's facility. Wireless technologies using longer-range directional equipment provide broadband service in remote or sparsely populated areas where DSL or cable modem service would be costly to provide or fiber network installations may be too capital intensive.	Generally comparable to DSL or Cable Modem Service.
5. Cellular 4G and LTE	"4G" refers to the fourth and latest generation technology for data transmission over a cellular network. It can support greater data speeds than most public Wi-Fi networks and is used primarily when a customer is out of the range of a Wi-Fi network. LTE, which stands for "Long Term Evolution," is the fastest, most consistent variety of 4G. To date, the cellular companies have charged for data usage either by the amount of data used or with a flat fee for unlimited data use	-
6. Wireless Local Area Networks (WLANs)	WLANs provide wireless broadband access over shorter distances and are often used to extend the reach of a "last-mile" wireline or fixed wireless broadband connection within a home, building, or campus environment	-
7. Satellite Broadband	Satellite broadband is another form of wireless broadband, and is also useful for serving remote or sparsely populated areas. Service can be disrupted in extreme weather conditions and are typically oversubscribed.	500 Kbps (Download) 80 Kbps (Upload)

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

Table 19 offers information about the percent of towns/cities in Garfield County that have access to different types of broadband technologies.

Table 19: Percent of Garfield County with Access to Broadband Technologies

	DSL	Fiber	Cable	Wireless
Town of Carbondale	97.34%	3.88%	95.63%	100%
City of Glenwood Springs	94.24%	34.28%	91.74%	100%
Town of New Castle	92.63%	0%	94.53%	100%
Town of Silt	99.85%	0%	96.57%	100%
City of Rifle	96.41%	0%	94.42%	100%
Town of Parachute	99.28%	0%	94.51%	100%

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

Wireline Broadband Availability and Speeds. Most of Garfield County's population has access to technology that meets the FCC's minimum definition of "broadband"- 25 Mbps download speed and 3 Mbps upload speed. Refer to Table 20 and Table 21 for additional information regarding the availability and speeds of wireline broadband in the towns/cities in Garfield County. It should be noted that the majority of the county's population has access to technology that supports over 100 Mbps in download speeds.

Table 20: Percent of Garfield County with Access to Available Wireline Download Speeds

	Town of Carbondale	City of Glenwood Springs	Town of New Castle	Town of Silt	City of Rifle	Town of Parachute
768k	97.94%	98.14%	96.77%	99.94%	96.66%	99.46%
1.5 Mbps	97.94%	98.14%	96.77%	99.94%	96.66%	99.46%
3 Mbps	97.88%	97.33%	96.50%	99.94%	96.63%	98.20%
6 Mbps	97.88%	96.74%	96.50%	99.33%	96.57%	94.51%
10 Mbps	97.53%	95.57%	96.50%	99.33%	95.14%	94.51%
25 Mbps	95.63%	92.94%	94.78%	96.57%	94.57%	94.51%
50 Mbps	95.63%	92.94%	94.53%	96.57%	94.42%	94.51%
100 Mbps	95.63%	92.94%	94.53%	96.57%	94.42%	94.51%
1 Gigabit	3.88%	0.09%	0%	0%	0%	0%

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

92.94% (City of Glenwood Springs) to 96.57% (Town of Silt) of Garfield County's residents have access to wireline download speeds of 25 Mbps (i.e. the minimum download speed necessary to meet the FCC's definition of "broadband").

Table 21: Percent of Garfield County with Access to Available Wireline Upload Speeds

	Town of Carbondale	City of Glenwood Springs	Town of New Castle	Town of Silt	City of Rifle	Town of Parachute
768k	97.94%	97.81%	96.77%	99.94%	96.61%	97.57%
1.5 Mbps	95.63%	92.94%	94.78%	96.57%	94.57%	94.51%
3 Mbps	95.63%	92.94%	94.78%	96.57%	94.57%	94.51%
6 Mbps	95.63%	92.94%	94.78%	96.57%	94.57%	94.51%
10 Mbps	95.63%	92.94%	94.78%	96.57%	94.57%	94.51%
25 Mbps	3.88%	34.28%	0%	0%	0%	0%
50 Mbps	3.88%	34.28%	0%	0%	0%	0%
100 Mbps	3.88%	34.28%	0%	0%	0%	0%
1 Gigabit	3.88%	0.09%	0%	0%	0%	0%

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

92.94% (City of Glenwood Springs) to 96.57% (Town of Silt) of Garfield County's residents have access to wireline upload speeds of 3 Mbps (i.e. the minimum upload speed necessary to meet the FCC's definition of "broadband").

Wireless Broadband Availability and Speeds. As of 2017, the wireless broadband available in Garfield County did not support download speeds of 25 Mbps. However, 100% of the county's population had access to wireless technology supporting 3 Mbps upload speeds. Refer to Tables 22 and 23 for additional information about access to wireless services.

Table 22: Percent of Garfield County with Access to Available Wireless Download Speeds

	Town of Carbondale	City of Glenwood Springs	Town of New Castle	Town of Silt	City of Rifle	Town of Parachute
768k	100%	100%	100%	100%	100%	100%
1.5 Mbps	100%	100%	100%	100%	100%	100%
3 Mbps	100%	100%	100%	100%	100%	100%
6 Mbps	100%	100%	100%	100%	100%	100%
10 Mbps	100%	100%	100%	100%	100%	100%
25 Mbps	0%	0%	0%	0%	0%	0%
50 Mbps	0%	0%	0%	0%	0%	0%
100 Mbps	0%	0%	0%	0%	0%	0%
1 Gigabit	0%	0%	0%	0%	0%	0%

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

Table 23: Percent of Garfield County with Access to Available Wireless Upload Speeds

	Town of Carbondale	City of Glenwood Springs	Town of New Castle	Town of Silt	City of Rifle	Town of Parachute
768k	100%	100%	100%	100%	100%	100%
1.5 Mbps	100%	100%	100%	100%	100%	100%
3 Mbps	100%	100%	100%	100%	100%	100%
6 Mbps	0%	0%	0%	0%	0%	0%
10 Mbps	0%	0%	0%	0%	0%	0%
25 Mbps	0%	0%	0%	0%	0%	0%
50 Mbps	0%	0%	0%	0%	0%	0%
100 Mbps	0%	0%	0%	0%	0%	0%
1 Gigabit	0%	0%	0%	0%	0%	0%

Data Source(s): 2017 Garfield and Mesa Counties Strategic Broadband Plan (https://drive.google.com/file/d/0B-vz6H4k4SESME9WaG9YZXdjUTA/view)

TRANSPORTATION

1. OVERVIEW

Appendix D: Transportation provides the most current information available regarding transportation systems in Garfield County. The information in this appendix is intended to help inform county decision-making, policies and regulations. Appendix D is organized as follows:

1. Overview
2. Summary of Findings
3. Transportation Data & Information

Data for Appendix D were compiled from a number of sources. Those data sources include:

I. Garfield County
Data from the Garfield County GIS Department and Road and Bridge Department were used to evaluate the condition of existing roads and existing/projected congestion levels for county roads.

II. The Colorado Department of Transportation (CDOT)
Data and studies from the CDOT were used to evaluate total daily vehicle miles of travel (DVMT), existing road and bridge conditions and existing/projected congestion levels for state roads in Garfield County.

III. INRIX
INRIX (www.inrix.com) data were used to identify congested intersections (i.e. "bottlenecks) in the county.

IV. The Roaring Fork Transportation Authority (RFTA)
Data and studies from RFTA were used to better understand commuting and bus ridership in Garfield County, as well as potential opportunities for Transit Oriented Development (TOD).

V. STRAVA
Data from STRAVA (www.strava.com) were used to identify the popular trail systems and cycling routes in the county.

2. SUMMARY OF FINDINGS

The following is a summary of selected transportation trends and projections for Garfield County that are of particular interest for planning purposes. Further information on transportation trends and projections for the county can be found in the Transportation Data & Information section of this appendix.

I. Garfield County has a multifaceted transportation system that includes roads, railroads, trails and airports. Garfield County has multifaceted transportation system that offers a number of mobility options for people traveling to/from and within the county. Components of the county's transportation system include: (1) Interstate 70; (2) State Highways 82, 133, 6, 13, 325 and 139; (3) an extensive network of county and municipal roads; (4) the Rifle Garfield County Regional Airport (RIL); (5) CDOT's Interregional Express Bus Service called "Bustang"; (6) Bus service provided by RFTA; (7) Amtrak passenger rail service; (8) Union Pacific and BNSF freight rail; and, (9) the Rio Grande, Glenwood Canyon and Lower Valley (LOVA) Trail Systems.

II. Crash and congestion data can be useful metrics for evaluating county road systems and intersections. *CDOT Crash Data.* CDOT collects crash data for state and local roadways throughout Colorado. These data can be useful for identifying and analyzing the type and frequency of crashes along roads and at intersections. Crash data can be helpful in understanding where there might be unsafe sections of roads or unsafe intersections. The data can also be helpful in determining the type of safety improvements that may be necessary.

Volume Capacity (V/C) Ratios. Volume-to-Capacity Ratio (V/C) compares roadway demand (i.e. vehicle volumes) with roadway supply (i.e. carrying capacity). V/C ratios are a metric that can be used to understand roadway congestion levels. Typically, a V/C ratio of 0.8 or less indicates that a road has adequate carrying capacity. V/C ratios of 0.8 to 1.0 indicate that vehicle volumes are near, or at, carrying capacity and that a road could be experiencing moderate to high levels of congestion. V/C ratios greater than 1.0 indicate that a road is overcapacity and is likely to show signs of high levels of congestion (ex. instability, excessive delays and queuing problems).

CDOT provides existing and projected V/C ratio data for the state roads in the county. These data are presented in Table 8. Existing and projected V/C ratios have been approximated for select roads in Garfield County (refer to Table 3). A county-wide transportation planning effort could serve as an opportunity to: (1) develop a detailed database of current and projected V/C ratios for all roads in Garfield County; (2) better understand current and future congestion levels within the county's road system; (3) develop a long-term plan for maintaining and improving the road system in Garfield County; and, (4) evaluate the potential impacts of future growth in different parts of the county.

Data from "Big Data" Sources. INRIX (www.inrix.com) is a company that compiles and makes available a variety of historic and current data for state roads in Garfield County. INRIX also offers a number of tools for evaluating the data. These tools include: Performance Summaries; Congestion Scans; Bottleneck Rankings; and, User Delay Cost Analyses. Refer to Table 7 for an overview of bottlenecks in the county. Currently, CDOT has an agreement with INRIX that allows governmental agencies, such as Garfield County, to access these data and analytical tools at no cost. INRIX data is can be used to glean additional insight into the impacts of congestion on state roads in Garfield County.

III. Many of Garfield County's roads appear to have adequate capacity to accommodate future growth. Current and projected Volume-to-Capacity Ratios (V/C) were calculated for select major roads in Garfield County. The results of these calculations are presented in Table 3. It is important to note that these calculations are based on broad assumptions and therefore only offer general approximations of the V/C ratios for these roads. A more detailed analysis of V/C ratios for the county's road system could be addressed via a county-wide transportation planning effort.

Based on the approximate V/C ratios calculated, it appears that many of the roads in Garfield County have adequate carrying capacity to accommodate vehicle volumes generated by future growth. There were a few

County Roads, identified through this work, that may have existing and/or future congestion issues. These roads include: (1) the portion of North Battlement Mesa Parkway (CR 300N) east of West Battlement Mesa Parkway; and, (2) Cattle Creek Road (CR 113) near the Eagle County line. A more detailed evaluation of these roads could help to better understand existing and projected congestion levels.

IV. Heavy truck traffic has considerable impacts on county roads, but road impact fees could be modified to address this.

A single large truck can cause as much damage as thousands of automobiles, and the configuration of the truck can affect the amount of damage as well. Road Impact Fees can be assessed using a number of different metrics. Garfield County's existing road impact fees (refer to Section 7-405 of the Land Use and Development Code) are assessed based on the type and square footage of development being proposed. Consequently, the road impact fees do not appear to account for the type of traffic generated by different development/land uses. Since much of the impact on Garfield County's roads results from heavy vehicle traffic, there's an ideal nexus to base an impact fee calculation on Equivalent Single Axle Loads (ESALs).

V. Portions of SH-82 are experiencing moderate to high levels of congestion and this is projected to increase.

CDOT data indicate that the segment of Highway 82/Grand Avenue between the Interstate 70 interchange (mile marker 0) and 23rd Street (mile marker 1.405), in Glenwood Springs, currently has moderate to high levels of congestion. The V/C ratios along this section of Highway 82 are between 0.96 (near capacity) and 1.01 (overcapacity). By 2040, CDOT projects that this section of Highway 82 will have high levels of congestion, with V/C ratios that range between 1.05 (overcapacity) and 1.1 (overcapacity). These V/C ratios indicate high levels of instability and are likely to result in long delays and excessive queues.

Midland Avenue is the only alternative route for vehicles wanting to cross the Colorado River in Glenwood Springs. Midland Avenue could see an increase in vehicle volumes, and potentially congestion levels, as the segment of Highway 82/Grand Avenue between the Interstate 70 interchange and 23rd Street becomes increasingly congested over the coming years.

Large vehicle volumes and the resulting levels of congestion can be largely attributed to the number of people commuting for work. Refer to Appendix E: Housing for more information about commuting patterns in Garfield County. Transportation management programs, such as efforts to increase the use of RFTA's bus system, car pooling and telecommuting, could serve as effective ways to reduce vehicle volumes and congestion. Furthermore, efforts to increase opportunities to live and work in the same community could help to reduce the need for people to commute for their job.

VI. The county could benefit from collaboration with CDOT on issues with state roads in Garfield County.

Many of the key roads in Garfield County are state roads under the jurisdiction of CDOT. Therefore, the county could benefit from working with CDOT to explore options for addressing existing and future issues with the state roads in the county.

VII. Federal and state transportation funding programs could help fund projects in Garfield County.

There are a number of federal and state financial assistance/grant programs available for funding projects that address specific transportation issues. These programs can be highly competitive and usually require a match from the local jurisdiction. Table 1 offers a listing of select federal and state financial assistance/grant programs that Garfield County could consider pursuing to fund transportation projects. "Colorado Downtown Streets- A Tool for Communities, Planners, and Engineers" is another resource that provides helpful information regarding federal and state financial assistance/grant programs (https://www.colorado.gov/pacific/dola/colorado-downtown-streets).

Table 1: Federal and State Financial Assistance/Grant Programs

Name of Program	Description of Program
1. Transportation Alternatives Program (TAP) For More Information: https://www.fhwa.dot.gov/fastact/	TAP, which now falls under the Federal Highway Administration's (FHWA) Surface Transportation Block Grant Program, provides funding for programs and projects defined as transportation alternatives, including both on and off road pedestrian and bicycle facilities. CDOT solicit applications for TAP funds.
2. Highway Safety Improvement Program (HSIP) For More Information: https://www.codot.gov/library/traffic/hsip	The HSIP is a Federal Highway Administration (FHWA) that funds highway safety projects aimed at reducing fatalities and serious injuries. Bicycle and pedestrian projects (ex. bike lanes, bike parking, crosswalks and signage) are eligible for HSIP funding. Any improvements funded by HSIP MUST USE crash data to demonstrate that there is a safety issue that the improvements will help to address. Colorado's HSIP funds are administered by the Safety and Traffic Engineering (S&TE) branch of the Colorado Department of Transportation (CDOT).
3. Safe Routes to School (SRTS) For More Information: https://www.codot.gov/programs/bikeped/safe-routes	Colorado's SRTS program uses a comprehensive approach to make walking and biking routes to school safe for children. The Colorado Department of Transportation (CDOT) administers Colorado's SRTS program. SRTS funding can be used for education and infrastructure that enable children to walk and bike to school safely.

VIII. RFTA stops in Garfield County present opportunities for Transit Oriented Development (TOD).
The purpose of Transit Oriented Development (TOD) is to create mixed-use neighborhoods (i.e., mixture of housing, retail, office, entertainment and/or other amenities) within walking distance of public transportation hubs. TOD is intended to make public transit as convenient a transportation option as one's personal vehicle. There are a number of opportunities to explore TOD adjacent to the bus stops in Garfield County. Garfield County could benefit from collaboration with RFTA in exploring opportunities for TOD in the county.

3. TRANSPORTATION DATA & INFORMATION

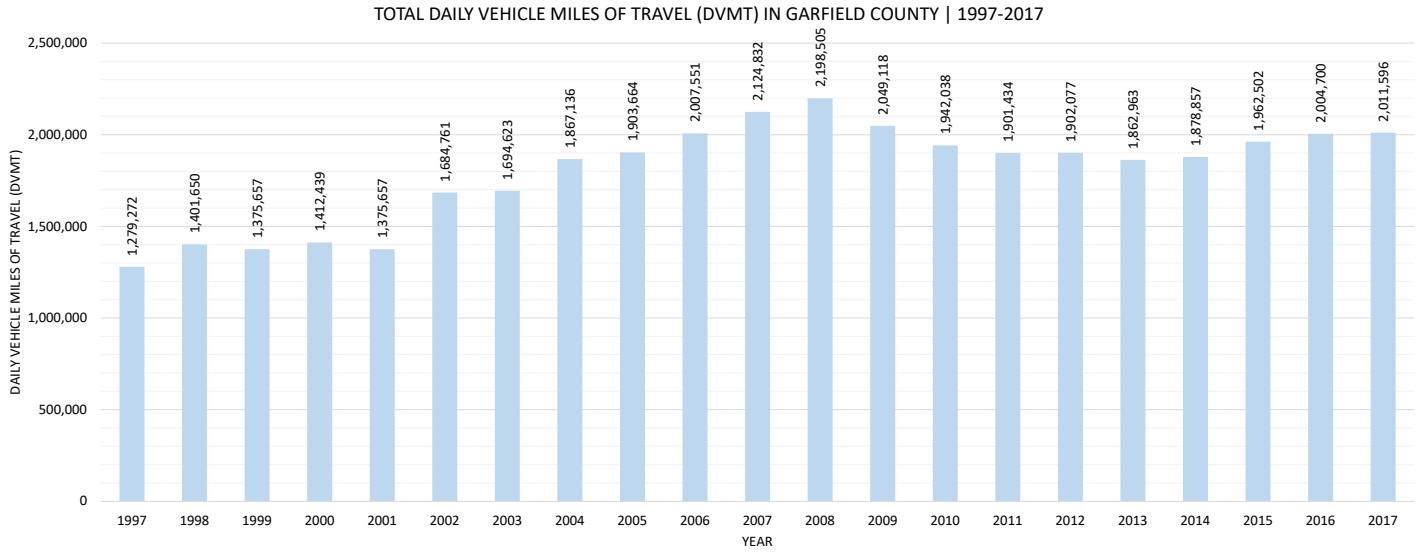
I. DAILY VEHICLE MILES OF TRAVEL (DVMT) IN GARFIELD COUNTY

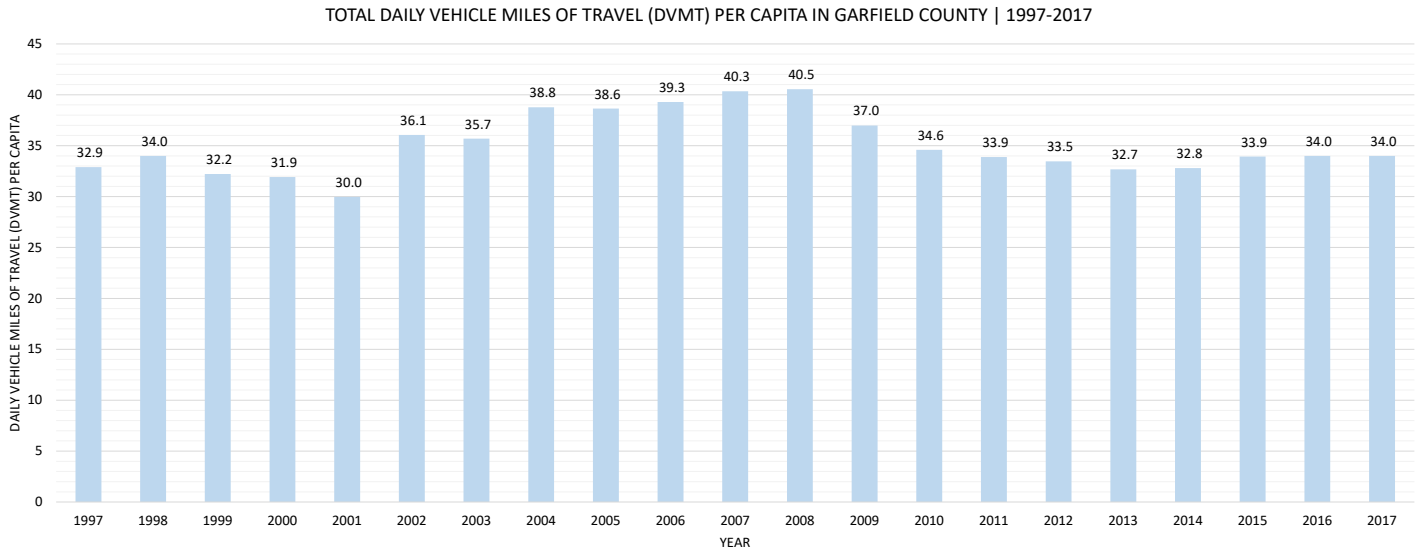
CDOT data for state roads in Garfield County indicate that: (1) total DVMT in the county grew from 1,279,272 to 2,124,832 (+845,560 or +66.1%) between 1997 and 2007; (2) total DVMT in the county declined from 2,124,832 to 2,011,596 (-113,236 or-0.5%) between 2007 to 2017; and, (3) total DVMT in the county peaked in 2008 at 2,198,505. Overall, total DVMT on state roads in Garfield County has grown at an average annual rate of 2.9% over the past twenty (20) years. According to the State Demography Office (SDO), total population in Garfield County grew at an average annual rate of 2.1% during that same period.

Total DVMT per capita in Garfield County, between 1997 and 2017, was calculated by dividing CDOT's total DVMT data by total population data from the SDO. The results of these calculations found that: (1) total DVMT per capita grew from 32.9 to 40.3 (+7.4 or +22.5%) between 1997 and 2007; (2) total DVMT per capita declined from 40.3 to 34.0 (-6.3 or -15.6%) between 2007 to 2017; and, (3) total DVMT per capita peaked in 2008 at 40.5. Overall, total DVMT per capita in Garfield County has grown at an average annual rate of 0.2% (vs. an average annual population growth rate of 2.1%) over the past twenty (20) years.

The graphs on the following page illustrate the annual changes in total DVMT and total DVMT per capita in Garfield County between 1997 and 2017.

Photo Credit: Roaring Fork Transportation Authority





The 2014 Regional Travel Patterns Study prepared for RFTA (https://www.rfta.com/wp-content/uploads/2015/12/2014-RFTA-Travel-Patterns-Report_2015-09-09.pdf) identifies a number of factors that influence vehicle miles traveled. The factors identified in that study are presented in Table 1.

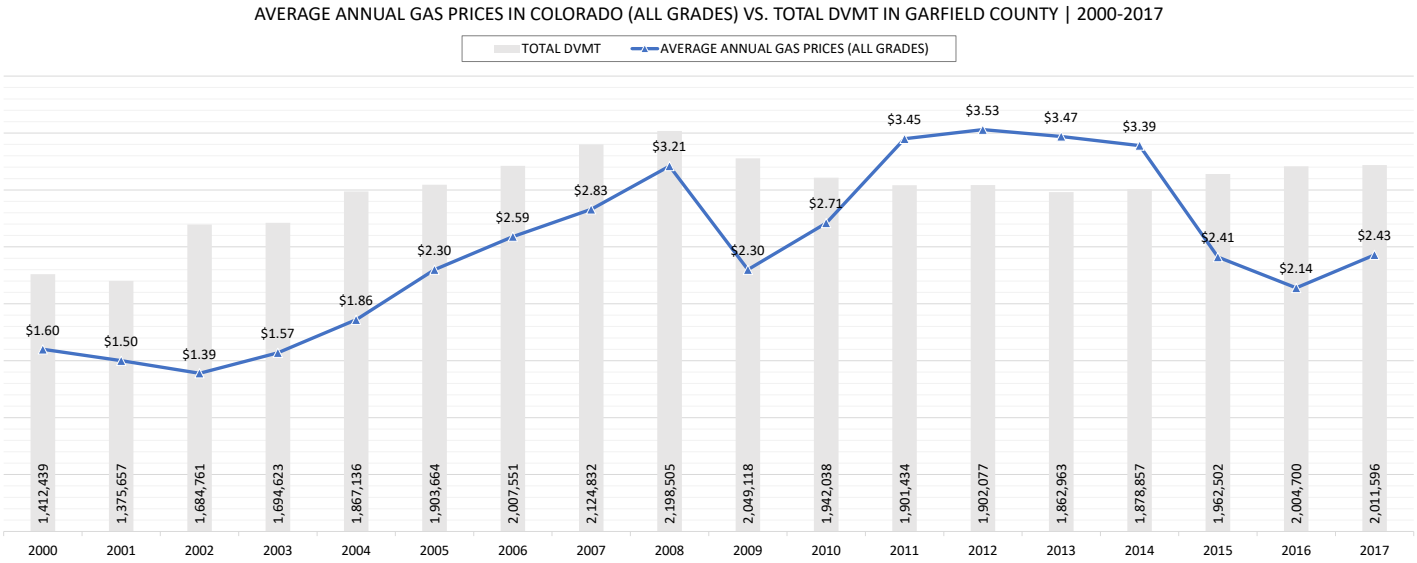
Table 2: Factors that Influence Vehicle Miles Traveled

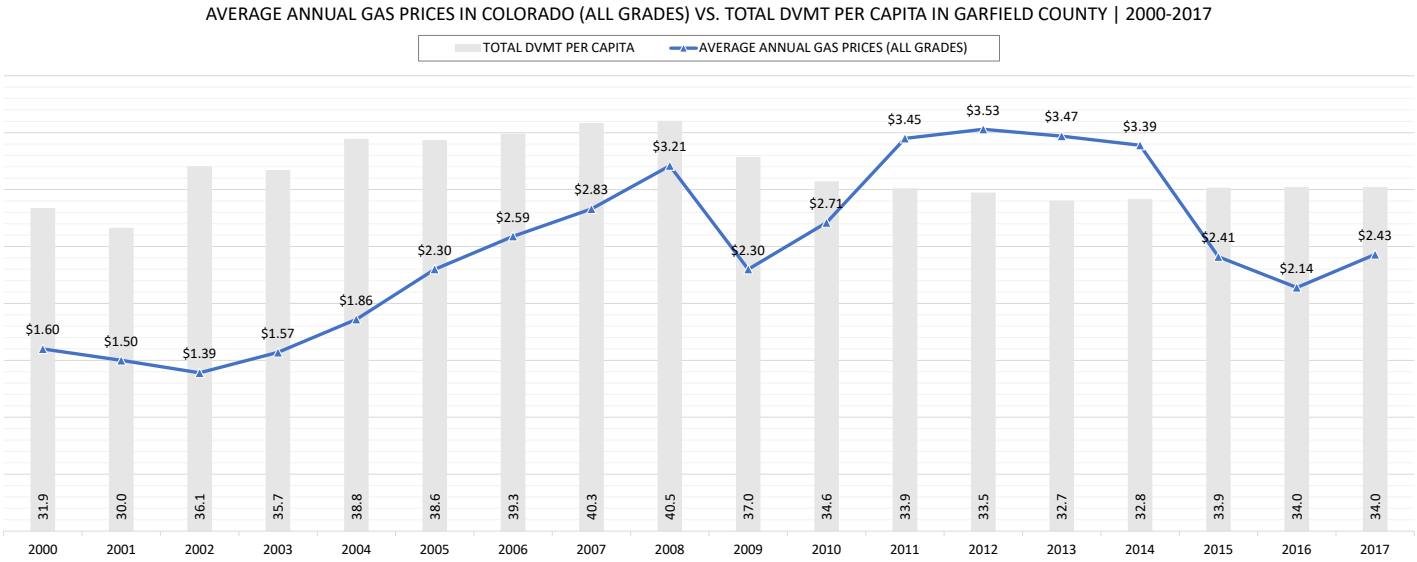
Demographic & Economic Factors	Traffic Enablers
1. Workforce Participation Rates	1. New/Increased Road Capacity
2. Household Income	2. Energy Subsidies/Lower Gas Prices
3. Driver License Rates	3. Road Subsidies
4. Vehicle Ownership	4. Sprawling Growth Patterns
5. Total Population	5. Auto-Oriented Community Design

Data Source(s): 2014 Regional Travel Patterns Study

The following graphs illustrate how the price of gasoline plays a role in the fluctuation of total DVMT and total DVMT per capita. The graphs present data for 2000 to 2017. As shown, from 2011 to 2014, gasoline prices ranged between $3.39 to $3.53 per gallon. These higher gas prices, in conjunction with an economy recovering from the Great Recession (2007-2009), resulted in a decline in total DVMT and total DVMT per capita. By contrast, between 2015 and 2017, gasoline prices ranged from $2.14 to $2.43 per gallon, which appears to have

supported an increase in total DVMT and total DVMT per capita.



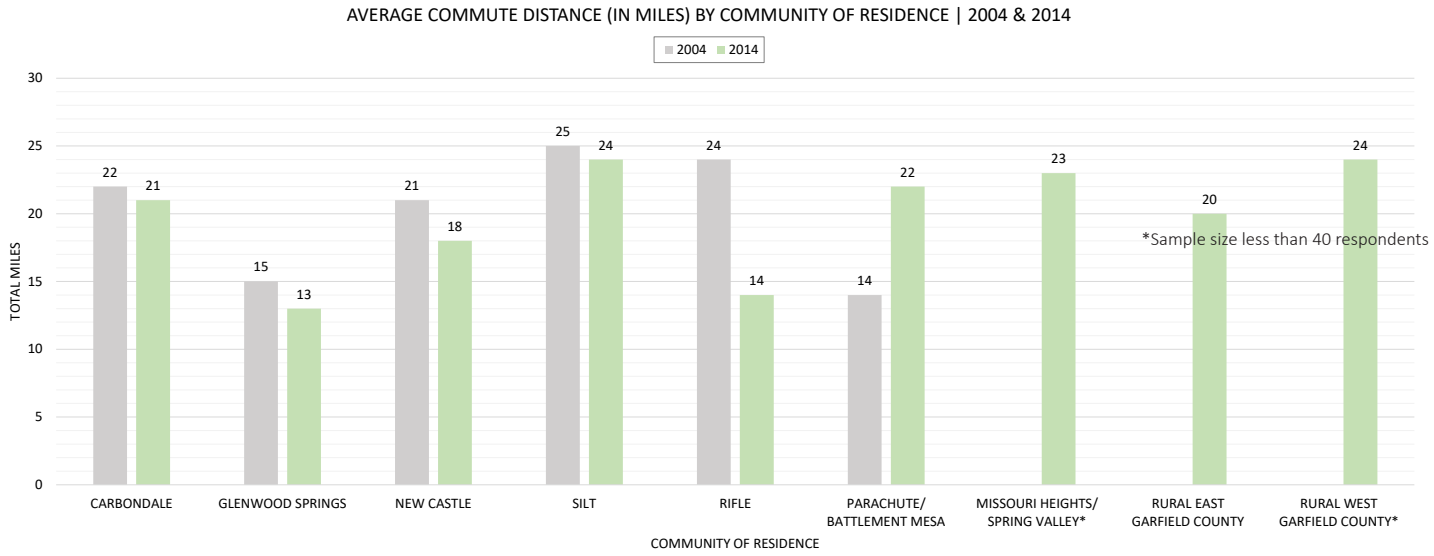


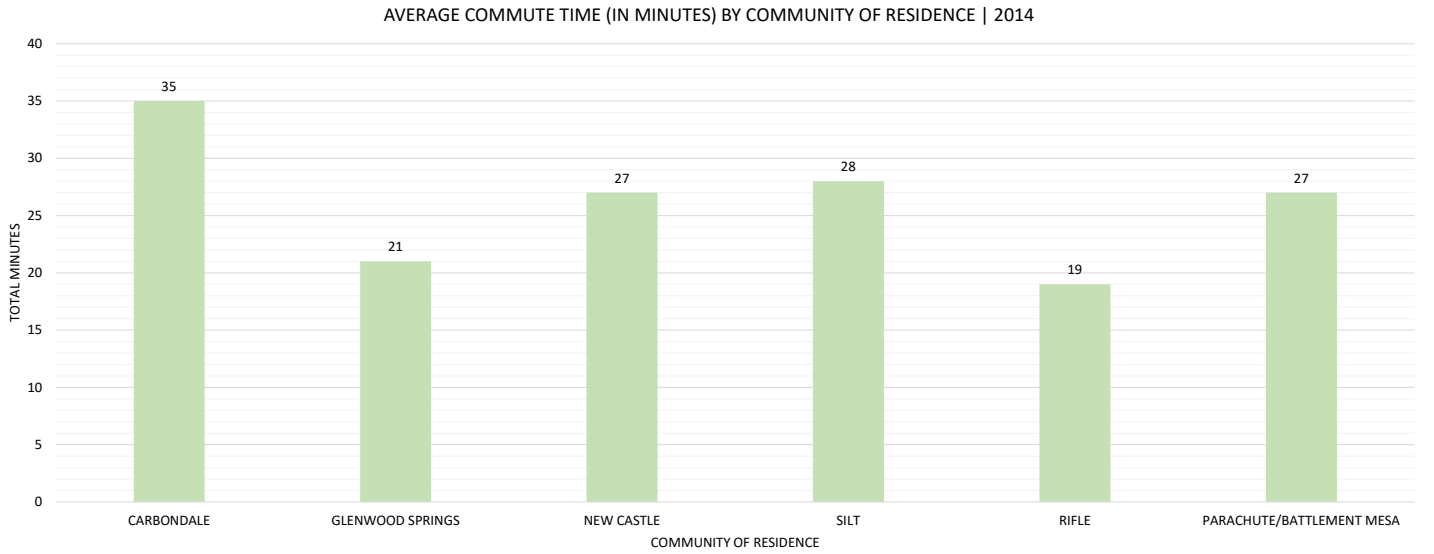
Total DVMT in Garfield County declined by 0.5% over the ten (10) years from 2007 to 2017. While the Great Recession played a role in this trend, larger factors were at work. Personal vehicle trips (i.e. total DVMT per capita) have been on the decline since their peak in 2008. Between 2007 and 2017, per capita DVMT in Garfield County has dropped 15.6%. The phenomenon of reduced driving is not just a regional trend; it is playing out statewide in Colorado, across the western states and nationally. At work are cultural shifts away from reliance on driving. In addition, there has been an increase in the number of people telecommuting and working at home, as well as significant improvement in public transit service (ex. VelociRFTA BRT service, which began in 2013).

However, continued population growth in Garfield County may tend to counterbalance declines in personal vehicle trips. In years of substantial economic growth or surges in tourism (potentially driven by lower gas prices), there may be net increases in total DVMT, while in other years there may be net decreases. Over the long-term, it is not anticipated that total DVMT in Garfield County will return to pre-2008 annual growth rates.

II. COMMUTING IN GARFIELD COUNTY

The 2014 Regional Travel Patterns Study prepared for RFTA (https://www.rfta.com/wp-content/uploads/2015/12/2014-RFTA-Travel-Patterns-Report_2015-09-09.pdf) provides some interesting insights into the average distance and average time people spend commuting in Garfield County based on what community they live in. The data presented in the study was gathered via a survey of local employees and residents in 2004 and 2014. The graphs on the following pages depict the average commute distance (in miles) and average commute time (in minutes) data that is included in the 2014 Regional Travel Patterns Study. Additional information regarding commuting in Garfield County can be found in Appendix E: Housing.





Between 2004 and 2014, the average commute distance in most communities appears to have decreased. For some communities this may be more of a reflection of the differences in data collected via the 2004 and 2014 surveys. According to the 2014 Regional Travel Patterns Study, "*In 2004 respondents were asked which community they "live in or nearest to," thus grouping those who live in rural areas with the community they are closest to. In 2014 rural locations were identified separately from towns and cities. Since residents of rural areas have a longer average commute this may actually explain most of the change from 2004 at the community level.*" The study notes that Rifle is the one exception to this, as the average commute distance decreased dramatically from 24 miles (2004) to 14 miles (2014). This is a reflection of an increase in the number of people living and working in Rifle.

III. MAJOR ROADS IN GARFIELD COUNTY

According to the 2019 Garfield County Budget (https://www.garfield-county.com/finance/2019-garfield-county-budget.aspx), the county's Road and Bridge Department maintains 742 miles of roads.

2019 data from the Garfield County Road and Bridge Department were used to approximate existing V/C ratios, projected average annual daily trips (AADT) and, projected V/C ratios for select roads in the county. These data are presented in Table 5.

Typically, a V/C ratio of 0.8 or less indicates that a road has adequate carrying capacity (these V/C ratios are highlighted in **green** in Table 5). V/C ratios of 0.8 to 1.0 indicate that vehicle volumes are near, or at, carrying capacity and that a road could be experiencing moderate to high levels of congestion (these V/C ratios are highlighted in **yellow** in Table 5). V/C ratios greater than 1.0 indicate that a road is overcapacity and is likely to show signs of high levels of congestion (these V/C ratios are highlighted in **red** in Table 5) Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for additional information regarding County Roads in Garfield County.

The road capacities and growth rates presented in Table 3 and Table 4 were used in calculating projected AADT and V/C ratios for County Roads in 2040. The weighted annual AADT growth rates presented in Table 4 were calculated using the 20-Year Growth Factors from CDOT's Online Transportation Information System (OTIS) (http://dtdapps.coloradodot.info/otis).

Table 3: Summary of Estimated Road Capacities

Type of Road	Road Capacity in Vehicles per Day (vpd)[1]
2-Lane Gravel Road[2]	500 vpd
2-Lane Paved Road without Shoulders	8,000 vpd
2-Lane Paved Road with Shoulders	10,000 vpd
4- Lane Paved Road without Shoulders	20,000 vpd

NOTES:

[1] LSC Transportation Consultants, Inc. used the following numbers for daily general road capacities in the Transportation Report (Appendix E) prepared as part of the previous version of the Garfield County Comprehensive Plan 2030: (1) Local (Residential) Roadway = 2,000 vpd; (2) 2-Lane Collector Roadway = 10,100 vpd; and, (3) 2-Lane Arterial Roadway = 14,900 vpd. The road capacities presented above are similar to those used by LSC Transportation Consultants, Inc.

[2] 2-lane gravel roads can typically handle daily vehicle volumes greater than 500 vpd without congestion issues. However, exceeding 500 vpd will result in significant and rapid road degradation and surfacing issues. 500 vpd represents the threshold at which a gravel road should be paved.

Data Source(s): McDowell Engineering

Table 4: Summary of Approximate Annual AADT Growth Rates by Area/Zone in Garfield County

Area/Zone	Weighted Annual AADT Growth Rate[1]
Highway 6: Between the City of Rifle and the Town of New Castle.	1.82%
Highway 82: The City of Glenwood Springs to the Eagle County line.	0.88%
Highway 139: Western Garfield County	1.70%
Highway 13: North of the City of Rifle to the Rio Blanco County line.	1.59%
Highway 133: The Town of Carbondale and south to the Pitkin County line.	0.35%
Highway 325: North of the City of Rifle to Silt Mesa and north of the Town of New Castle.	1.48%
Interstate-70(E): East of the Town of New Castle to the Eagle County line.	1.22%
Interstate-70(W): West of the City of Rifle to the Mesa County line.	1.55%

NOTE:

[1] Weighted annual AADT growth rates were extrapolated and calculated using CDOT OTIS data (http://dtdapps.coloradodot.info/otis).

Data Source(s): McDowell Engineering; and, Colorado Department of Transportation (CDOT)

Table 5: Summary of Major Roads in Garfield County

Reference Point	Road Type	Road Capacity (VPD)	ESTIMATES (2019) AADT	% Trucks	V/C Ratio	PROJECTIONS (2040) Growth Rate	AADT	V/C Ratio	% Change AADT (2019-2040)
1. Catherine Store Road (CR 100); near bridge over the Roaring Fork River	2-Lane Paved Road with Shoulders	10,000	4,589	1.37%	0.46	0.88%	5,516	0.55	+ 20.2%
2. Catherine Store Road (CR 100); north of Highway 82 near 25 MPH speed limit sign	2-Lane Paved Road with Shoulders	10,000	1,240	3.06%	0.12	0.88%	1,490	0.15	+ 20.2%
3. Crystal Springs Road (CR 103); above weight limit sign	2-Lane Paved Road with Shoulders	10,000	1,759	7.47%	0.18	0.88%	2,114	0.21	+ 20.2%
4. Thompson Creek Road (CR 108); near Carbondale	2-Lane Paved Road without Shoulders	8,000	1,989	4.3%	0.25	0.35%	2,140	0.27	+ 7.6%
5. Hardwick Bridge Road (CR 109); near bridge	2-Lane Paved Road with Shoulders	10,000	2,876	2.83%	0.29	0.88%	3,457	0.35	+ 20.2%
6. Old Dump Road (CR 110); near intersection with Cattle Creek Road (CR 113)	2-Lane Paved Road without Shoulders	8,000	1,328	0.9%	0.17	0.88%	1,596	0.20	+ 20.2%
7. Prince Creek Road (CR 111); near intersection with Highway 133	2-Lane Paved Road without Shoulders	8,000	973	3.51%	0.12	0.35%	1,047	0.13	7.6%
8a. Cattle Creek Road (CR 113); near intersection with Highway 82	2-Lane Paved Road without Shoulders	8,000	928	4.13%	0.12	0.88%	1,115	0.14	+ 20.2%
8b. Cattle Creek Road (CR 113); near Eagle County line	2-Lane Gravel Road	500	421[1]	-	0.84	0.88%	506	1.01	+ 20.2%
9. CMC Road (CR 114); near storage units at beginning of the road	2-Lane Paved Road with Shoulders	10,000	2,135	5.25%	0.21	0.88%	2,566	0.26	+ 20.2%
10. Red Canyon Road (CR 115); near intersection with Highway 82	2-Lane Paved Road without Shoulders	8,000	345	1.8%	0.04	0.88%	415	0.05	+ 20.2%
11. Four Mile Road (CR 117); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	2,878	1.61%	0.36	0.88%	3,459	0.43	+ 20.2%
12. Upper Cattle Creek Road (CR 122); at beginning of the road	2-Lane Gravel Road	500	279	2.1%	0.56	0.88%	335	0.67	+ 20.2%
13. Donegan Road (CR 130); near intersection with Pinon Drive	2-Lane Paved Road without Shoulders	8,000	2,002	1.25%	0.25	1.22%	2,583	0.32	+ 29.0%
14. Mel Ray Road (CR 133); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	2,361	1.24%	0.30	0.88%	2,838	0.35	+ 20.2%
15a. Old Highway 82 (CR 154N); near intersection with Highway 82	2-Lane Paved Road without Shoulders	8,000	2,518	2.55%	0.31	0.88%	3,027	0.38	+ 20.2%
15b. Old Highway 82 (CR 154S); near cemetery	2-Lane Paved Road without Shoulders	8,000	1,325	2.33%	0.17	0.88%	1,593	0.20	+ 20.2%

Table 5: Summary of Major Roads in Garfield County (continued)

			ESTIMATES (2019)				PROJECTIONS (2040)		
Reference Point	Road Type	Road Capacity (VPD)	AADT	% Trucks	V/C Ratio	Growth Rate	AADT	V/C Ratio	% Change AADT (2019-2040)
16. Storm King Road (CR 181); above the mall near intersection with Center Drive	2-Lane Paved Road without Shoulders	8,000	1,539	1.03%	0.19	1.22%	1,985	0.25	+ 29.0%
17. Mile Pond Road (CR 210); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,464	1.27%	0.18	1.82%	2,138	0.27	+ 46.0%
18. Parachute Creek Road (CR 215); at beginning of the road before the railroad crossing	2-Lane Paved Road with Shoulders	10,000	1,282	10.34%	0.13	1.55%	1,771	0.18	+ 38.1%
19. Little Box Canyon Road (CR 217); near bridge	2-Lane Gravel Road	500	408	1.3%	0.82	1.48%	555	1.11	+ 36.1%
20. Peterson Lane (CR 223); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,770	1.39%	0.22	1.48%	2,410	0.30	+ 36.1%
21. Miller Lane (CR 227); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,111	4.12%	0.14	1.48%	1,513	0.19	+ 36.1%
22. Harvey Gap Road (CR 237); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,204	1.8%	0.15	1.48%	1,639	0.20	+ 36.1%
23. Buford Road (CR 245); at beginning of the road near New Castle town limits	2-Lane Paved Road without Shoulders	8,000	1,826	1.88%	0.23	1.48%	2,486	0.31	+ 36.1%
24. Prefontaine Avenue (CR 265); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,517	0.45%	0.19	1.59%	2,113	0.26	+ 39.3%
25. North Graham Road (CR 293); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	2,018	1.41%	0.25	1.82%	2,947	0.37	+ 46.0%
26. Stone Quarry Road (CR 300); near the fire station	4-Lane Paved Road without Shoulders	20,000	6,263	0.87%	0.31	1.55%	8,651	0.43	+ 38.1%
27. Spencer Parkway (CR 300B); at beginning of the road by Alpine Bank	4-Lane Paved Road without Shoulders	20,000	1,707	0.59%	0.09	1.55%	2,358	0.12	+ 38.1%
28a. North Battlement Mesa Parkway (CR 300N); west of intersection with West Battlement Mesa Parkway (CR 300W)	2-Lane Paved Road with Shoulders	10,000	10,253	3.14%	1.03	1.55%	14,162	1.42	+ 38.1%
28b. North Battlement Mesa Parkway (CR 300N); east of intersection with West Battlement Mesa Parkway (CR 300W)	4-Lane Paved Road without Shoulders	20,000	10,253	3.14%	0.51	1.55%	14,162	0.71	+ 38.1%
29. South Battlement Mesa Parkway (CR 300S); near Kum and Go gas station	4-Lane Paved Road without Shoulders	20,000	2,096	3.08%	0.10	1.55%	2,895	0.14	+ 38.1%

Table 5: Summary of Major Roads in Garfield County (continued)

			ESTIMATES (2019)			PROJECTIONS (2040)			
Reference Point	Road Type	Road Capacity (VPD)	AADT	% Trucks	V/C Ratio	Growth Rate	AADT	V/C Ratio	% Change AADT (2019-2040)
30. West Battlement Mesa Parkway (CR 300W); near crosswalk	4-Lane Paved Road without Shoulders	20,000	6,337	1.23%	0.32	1.55%	8,753	0.44	+ 38.1%
31. Divide Creek Road (CR 311); above Colorado River Road (CR 335)	2-Lane Paved Road without Shoulders	8,000	888	3.93%	0.11	1.55%	1,227	0.15	+ 38.1%
32. Rifle-Rulison Road (CR 320); at east end of road	2-Lane Paved Road without Shoulders	8,000	991	0.87%	0.12	1.55%	1,369	0.17	+ 38.1%
33. Dry Hollow Road (CR 331); above Rifle-Silt Road (CR 346)	2-Lane Paved Road without Shoulders	8,000	1,252	8.44%	0.16	1.48%	1,704	0.21	+ 36.1%
34. Colorado River Road (CR 335); at east end of road before Mountain Shadows	2-Lane Paved Road without Shoulders	8,000	2,799	3.49%	0.35	1.82%	4,088	0.51	+ 46.0%
35. Rifle-Silt Road (CR 346); at west end of road	2-Lane Paved Road without Shoulders	8,000	1,159	4.56%	0.14	1.82%	1,693	0.21	+ 46.0%
36. Garfield County Airport Road (CR 352); at west end of road	2-Lane Paved Road with Shoulders	10,000	1,541	3.55%	0.15	1.82%	2,251	0.23	+ 46.0%
37. Monument Trail (CR 372); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	2,057	0.46%	0.26	1.55%	2,841	0.36	+ 38.1%
38. Northstar Trail (CR 372EE); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,282	0.55%	0.16	1.55%	1,771	0.22	+ 38.1%
39. Tamarisk Trail (CR 373); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,860	0.28%	0.23	1.55%	2,569	0.32	+ 38.1%
40. Rainbow Trail (CR 373A); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,420	0.37%	0.18	1.55%	1,961	0.25	+ 38.1%
41. Blackhawk Trail (CR 373B); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,429	0.16%	0.18	1.55%	1,974	0.25	+ 38.1%
42. Mineral Springs Circle (CR 374C); at beginning of the road	2-Lane Paved Road without Shoulders	8,000	1,148	1%	0.14	1.55%	1,586	0.20	+ 38.1%

Data Source(s): Garfield County; McDowell Engineering; Colorado Department of Transportation (CDOT); and, Eagle County

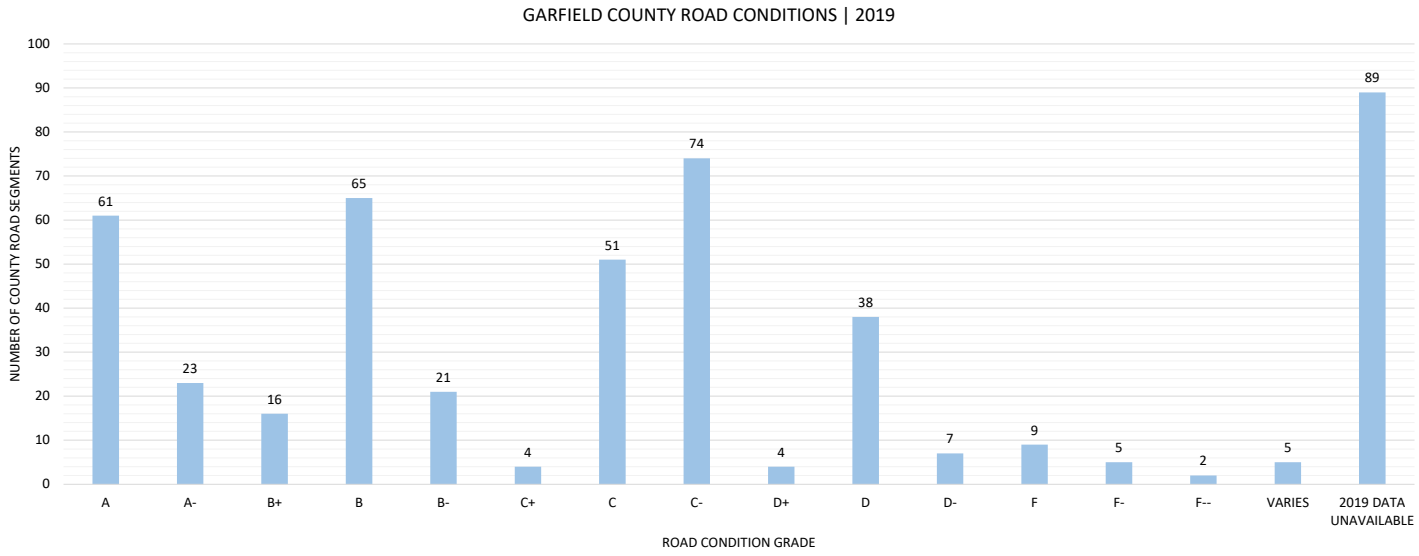
Garfield County uses an A through F grading system to describe the condition of roads in the county (refer to Table 6).

Table 6: Garfield County Road Condition Grading System

Grade	Description
A (Excellent Condition)	Recently overlayed/paved.
B (Good Condition)	Maintaining well after having been re-paved, overlayed or chipsealed in the last couple of years.
C (Fair-Good Condition)	May need to start watching for signs of deterioration. Look at adding to 5-year projections.
D (Poor-Fair Condition)	May need corrective measures soon.
F (Failing Condition)	Needs corrective measures now.

Data Source(s): Garfield County

As illustrated by the following graph, approximately 84 road segments in the county are in excellent condition, 102 are in good condition, 129 are in fair-good condition, 49 are in poor-fair condition and 16 are failing.



Based on the inventory of county road projects completed between 2017 and 2019 (refer to Table 7), it appears that the county typically uses road condition grades to identify road projects. While road conditions are an important factor, AADT and % Trucks data are also important to consider as these data can be used to identify heavily traveled/key routes. If a comprehensive process for identifying, evaluating and prioritizing road projects does not currently exist, the county could benefit from developing such a process. This process could be developed as part of a county-wide transportation master planning effort.

Table 7: Inventory of Recent County Road Projects (2017-2019)

Year	County Road	AADT 2019	% Trucks 2019	Project Description	Change in Road Condition Grade 2016	2019
2019	Catherine Store Road (CR 100)	4,589	1.37%	This project encompassed 3.5-miles of CR 100, starting on the south side of Highway 82 to the Carbondale town limits. The work completed on CR 100 included a 3/8 inch chipseal overlay.	C	A
2019	Mitchell Creek Road (CR 132)	290	0.69%	This project encompassed 1.3-miles of CR 132, starting at Highway 6 to the Fish Hatchery. The work completed on CR 132 included a 2 inch asphalt mat and 3/4 inch gravel shoulders.	D	A
2019	Middle Rifle Creek (CR 219)	122	3.05%	This project will encompassed 0.5-miles of CR 219. The work completed on CR 252 included 3/8 inch chip followed by fog seal.	A-	A-
2019	Peterson Lane (CR 223)	1,770	1.39%	This project encompassed 1.4-miles of CR 223, starting at Highway 6 to the intersection with Silt Mesa Road (CR 233). The work completed on CR 233 included 3/8 inch chip followed by fog seal.	C	C-
2019	Miller Lane (CR 227)	1,111	4.12%	This project encompassed 1.1-miles of CR 227, starting at Highway 6 to the intersection with Silt Mesa Road (CR 233). The work completed on CR 227 included 3/8 inch chip followed by fog seal.	A-	A-
2019	Davis Point Road (CR 235)	399	3.68%	This project encompassed 0.7-miles of CR 235, starting at Highway 6 to the intersection with Silt Mesa Road (CR 233). The work completed on CR 235 included 3/8 inch chip followed by fog seal.	B-	B+
2019	Hasse Lane (CR 251)	123	1.44%	This project encompassed 1-mile of CR 251, starting at Highway 325 to the end of the existing pavement. The work completed on CR 251 included 3/8 inch chip followed by fog seal.	B-	A-
2019	West Rifle Creek Road (CR 252)	-	-	This project will encompassed 2.1-miles of CR 252. The work completed on CR 252 included 3/8 inch chip followed by fog seal.	C	B+

Table 7: Inventory of Recent County Road Projects (2017-2019) (continued)

Year	County Road	AADT 2019	% Trucks 2019	Project Description	Change in Road Condition Grade 2016	2019
2019	Mesa Drive (CR 257)	191	2.32%	This project encompassed 1-mile of CR 257, starting at Highway 325 to the cul-de-sac. The work completed on CR 257 included 3/4 inch chip, followed by 3/8 inch chip, followed by fog seal.	B-	B+
2019	Weare Lane (CR 263)	211	3.77%	This project encompassed 0.3-miles of CR 263, starting at Highway 6 to the intersection with Peach Valley Road (CR 214). The work completed on CR 263 included a 2 inch asphalt mat and 3/4 inch gravel shoulders.	D	A
2019	Stephens Hill Road (CR 291)	201	2.2%	This project encompassed 0.6-miles of CR 291, starting at Highway 13 and ending at the Y-intersection. The work completed on CR 291 included 3/8 inch chip followed by fog seal.	A-	A
2019	Stone Quarry Road (CR 300)	505	9.54%	This project encompassed 4.7-miles of CR 300, starting at the bottom of the RV Park Hill to the railroad tracks. The work completed on CR 300 included 4-miles of 2 inch asphalt mat and 0.7-miles of 4 inch gravel and 4 inch asphalt mat.	C-	A
2019	West Mamm Road (CR 319)	831	5.7%	This project encompassed 7-miles of CR 319, starting at the intersection with Airport Road (CR 352) to the end of the existing pavement. The work completed on CR 319 included 3/8 inch chip followed by fog seal.	C-	A
2019	Airport Road (CR 352)	1,541	3.55%	This project encompassed 2.8-miles of CR 352, starting at the Rifle city limits to the intersection with Mamm Creek Road (CR 315). The work completed on CR 352 included 3/8 inch chip followed by fog seal.	B-	A
2018	Red Hill Road (CR 107)	331	1.97%	This project encompassed the section of CR 107, starting at the top of the road to within an 1/8 of a mile of the intersection with Highway 82. The work completed on CR 107 included 3/4 inch and 3/8 inch chip with prime.	B	A
2018	Prince Creek Road (CR 111)	973	3.51%	This project encompassed 1.35-miles of CR 111, starting at Highway 133 to the Pitkin County line. The work completed on CR 111 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders.	D	A
2018	Sweetwater Lake Road (CR 150)	216	5.13%	This project encompassed 3.3-miles of CR 150, starting at the bottom of the road to the lodge. The work completed on CR 150 included 3/4 inch and 3/8 inch chip with fog coat.	D-	A
2018	Peach Valley Road (CR 214)	460	1.84%	This project encompassed 6.1-miles of CR 214, starting at the Silt town limits to the intersection with Highway 6. The work completed on CR 214 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders.	C	A
2018	Ukele Lane (CR 229)	645	3.03%	This project encompassed 1.4-miles of CR 229, starting at the intersection with Silt Mesa Road (CR 233) to the intersection with Highway 6. The work completed on CR 229 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders.	D-	A
2018	Buford Road (CR 245)	1,826	1.88%	This project encompassed 4-miles of CR 245, starting at the New Castle town limits to the intersection with Grass Valley Road (CR 226). The work completed on CR 245 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders.	C-	A
2018	Buford Road (CR 245)	1,826	1.88%	This project encompassed 4.3-miles of CR 245, starting at the intersection with Grass Valley Road (CR 226) to the cattle guard. The work completed on CR 245 included 3/4 inch and 3/8 inch chip with fog coat.	C	B+
2018	Divide Creek Road (CR 311)	888	3.93%	This project encompassed 3.3-miles of CR 311, starting at the Silt River Bridges to Jolley Mesa. The work completed on CR 311 included 3/4 inch and 3/8 inch chip with fog coat.	C	A

Table 7: Inventory of Recent County Road Projects (2017-2019) (continued)

Year	County Road	AADT 2019	% Trucks 2019	Project Description	Change in Road Condition Grade 2016	2019
2018	West Chipperfield Road (CR 326)	207	8.53%	This project encompassed 1.5-miles of CR 326, starting at the intersection with Dry Hollow Road (CR 331) to the end of existing pavement. The work completed on CR 326 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders.	D	A
2018	Colorado River Road (CR 335)	-	-	This project encompassed 4.1-miles of CR 335, starting at the intersection with Garfield Creek Road (CR 312) to the intersection with Divide Creek Road (CR 311). The work completed on CR 335 included a 2 inch asphalt mat followed by 3/4 inch road base shoulders..	C-	A
2017	Catherine Store Road (CR 100)	4,589	1.37%	This project encompassed 2.3-miles of CR 100, starting at Highway 82 to the intersection with CR 102. The work completed on CR 100 included 3/8 inch chip.	C	D
2017	Hardwick Bridge Road (CR 109)	2,876	2.83%	This project encompassed 1.2-miles of CR 109, starting at starting at mile marker 1.8 to mile marker 3.0. The work completed on CR 109 included milling of the road followed by 4 inches of new asphalt and 3/4 inch road base shoulders.	D-	F
2017	Four Mile Road (CR 117)	2,878	1.61%	This project encompassed the portion of CR 117 starting at the beginning of the road to mile marker 2.8. The work completed on CR 117 included 3/8 inch chip.	A/D	B/D
2017	Old Highway 82 (CR 154)	2,518	2.55%	This project encompassed 1-mile of CR 154, starting at Hardwick Bridge Road (CR 109) to the intersection with Highway 82(CMC Intersection). The work completed on CR 154 included a 2 inch leveling course followed by 3/4 inch road base shoulders.	D	B+
2017	Mile Pond Road (CR 210)	1,464	1.27%	This project encompassed 2.1-miles of CR 210, starting at mile marker 1.2 to mile marker 3.3. The work completed on CR 210 included milling of the road followed by 4 inches of gravel and 2 inches of asphalt.	D-	D-
2017	Silt Mesa Road (CR 233)	990	2.05%	This project encompassed 4.1-miles of CR 233, starting at the beginning of the road to the intersection with Peach Valley Road (CR 214). The work completed on CR 233 included 3/8 inch chip.	B-	B-
2017	Wittwer Lane (CR 297)	53	0.34%	This project encompassed 0.5-miles of CR 297, starting at the intersection with Highway 325 to the end of the road. The work completed on CR 297 included a 2 inch asphalt overlay.	D	A
2017	Stone Quarry Road (CR 300)	6,263	0.87%	This project encompassed 0.5-miles of CR 300, starting at the top of RV Park Hill to the ranch driveway at the bottom of the hill. The work completed on CR 300 included milling of the road followed by 2 inches of 3/4 inch road base and 4 inches of asphalt.	B	B-
2017	Divide Creek Road (CR 311)	-	-	This project encompassed 1.2-miles of CR 311, starting at the surface change at 80117 Jolley Mesa to the 6 Lazy K. The work completed on CR 311 included a 2 inch asphalt overlay.	B	B
2017	Rifle-Rulison Road (CR 320)	991	0.87%	This project encompassed 0.3-miles of CR 320, starting at Rulison-Parachute Road (CR 309) to the gravel portion of the road. The work completed on CR 320 included a 2 inch asphalt overlay.	C	C
2017	Maxfield Road (CR 324)	220	12.16%	This project encompassed 0.9-miles of CR 324, starting at the intersection with Dry Hollow Road (CR 331) to the intersection with Halls Gulch (CR 327). The work completed on CR 324 included 3/8 inch chip.	B	B-
2017	Dry Hollow Road (CR 331)	1,252	8.44%	This project encompassed 7.5-miles of CR 331, starting at the intersection with Divide Creek Road (CR 311) to the intersection with Maxfield Road (CR 324). The work completed on CR 331 included 3/8 inch chip.	C	C

Data Source(s): Garfield County

IV. HEAVY TRUCK TRAFFIC ON COUNTY ROADS

While roads will deteriorate if simply left unused, most deterioration is associated with use. The damage caused by heavy vehicles is orders of magnitude greater with size and weight. Therefore, costs associated with maintenance are greater for trips made by heavy vehicles. A single large truck can cause as much damage as thousands of automobiles and the configuration of the truck can affect its impact as well. Road damage comes in the form of cracking, rutting, failure of the road structure, and potential damage to traffic control devices and stormwater infrastructure along the roadways. The structural integrity of bridges can also be harmed. More axles, shorter spacing of axles, and dual tires on trucks are key ways to reduce the magnitude of downward force that loads exert on roads, and help to minimize the impacts of road damage. However, these methods, which allow weight to be distributed across a larger surface area, do not completely eliminate road damage.

Roads in Garfield County need to be designed based upon anticipated vehicle volumes and anticipated loads. If a roadway segment is not designed accordingly, or, if more than anticipated heavy truck volumes impact a roadway, its design life will be significantly reduced. In areas where heavy truck traffic volumes exceed those anticipated, Garfield County could consider mitigating impacts by using a computed Equivalent Single Axle Load (ESAL) calculation for vehicles. One ESAL is defined as the impact to a roadway caused by a single 18,000 lb. axle load. Fully loaded tractor trailers may generate 3-4 ESALs per trip, where a passenger car may only generate 0.003 ESALs. Therefore, the impact of roadway damage is substantially weighted towards heavier vehicles.

Road Impact Fees can be assessed using a number of different metrics; the most popular methods being vehicle trips and vehicle miles traveled. Garfield County's existing road impact fees (refer to Section 7-405 of the Land Use and Development Code) are assessed based on the type and square footage of development being proposed. Consequently, the road impact fees do not appear to account for the type of traffic generated. Given that much of the impact on County Roads results from heavy vehicle traffic, there's an ideal nexus to base an impact fee calculation on ESALs. The county could perform an impact fee study that analyzes the anticipated number of vehicles and vehicle loads for different types of development/land use, convert these into ESALs and use ESALs as the base unit for impact fee calculations. As a part of this effort, it is recommended that the county consider incorporating additional types of development/land uses into the existing impact fee table, such as mining operations, oil/gas wells, etc. that typically generate heavy vehicle traffic.

It should be noted that a combination of ESALs, vehicle trips, and vehicle miles traveled offers a comprehensive method for capturing all road users in a fair and equitable method that would allow the county to recapture capital investment costs for future development with impact fees.

Table 8 offers data for the top (20) twenty county roads with the greatest percent of trucks, as of 2019. Data for this table was sourced from Garfield County's Road and Bridge Department.

Table 8: Summary of County Roads with High Percentage of Truck Traffic

County Road	% Trucks 2014	% Trucks 2019	% Change in Trucks (2014-2019)	County Road Grade 2014	County Road Grade 2019
1. Porcupine Creek Road (CR 325)	13.57%	30.89%	+ 17.32%	D (Poor-Fair Condition)	D (Poor-Fair Condition)
2. Anvil Points Road (CR 246)	26.92%	29.84%	+ 2.92%	F (Failing Condition)	F (Failing Condition)
3. Landfill Road (CR 246A)	24.73%	20.88%	- 3.85%	B (Good Condition)	B (Good Condition)
4. Shaeffer Road (CR 322)	36.88%	20.86%	- 16.02%	B- (Good Condition)	C (Fair-Good Condition)
5. Rifle-Rulison Road (CR 320)	29.59%	18.38%	- 11.21%	D- (Poor-Fair Condition)	B- (Good Condition)
6. Conn Creek Road (CR 213)	19.58%	17.85%	- 1.73%	C (Fair-Good Condition)	B+ (Good Condition)
7. Four Corners Road (CR 308)	26.77%	17.23%	- 9.54%	C (Fair-Good Condition)	C (Fair-Good Condition)

Table 8: Summary of County Roads with High Percentage of Truck Traffic (continued)

County Road	% Trucks 2014	% Trucks 2019	% Change in Trucks (2014-2019)	County Road Grade 2014	County Road Grade 2019
8. Beaver Creek Road (CR 317)	26.19%	16.7%	- 9.49%	B (Good Condition)	A (Excellent Condition)
9. Richardson Road (CR 304)	34.41%	13.83%	- 20.58%	C (Fair-Good Condition)	C (Fair-Good Condition)
10. Roan Creek Road (CR 204)	15.62%	13.21%	- 2.41%	B- (Good Condition)	B- (Good Condition)
11. Rifle-Silt Road (CR 346)	14.7%	13.06%	- 1.64%	B (Good Condition)	B (Good Condition)
12. Jenkins Cutoff (CR 336)	28.89%	12.7%	- 16.19%	D- (Poor-Fair Condition)	B+ (Good Condition)
13. Maxfield Road (CR 324)	15.21%	12.16%	- 3.05%	B (Good Condition)	B- (Good Condition)
14. South Canyon Creek Road (CR 134)	12.09%	11.17%	- 0.92%	B (Good Condition)	C (Fair-Good Condition)
15. Scribner Lane (CR 317A)	31.86%	11.06%	- 20.8%	F (Failing Condition)	F- (Failing Condition)
16. Rulison-Parachute Road (CR 309)	5.93%	10.76%	+ 4.83%	C (Fair-Good Condition)	C- (Fair-Good Condition)
17. Mamm Creek Road (CR 315)	19.18%	10.56%	- 8.62%	C (Fair-Good Condition)	A (Excellent Condition)
18. River Bluff Road (CR 307)	4.92%	10.51%	+ 5.59%	C- (Fair-Good Condition)	D (Poor-Fair Condition)
19. Old Stone Quarry Road (CR 300O)	35.34%	10.47%	- 24.87%	A (Excellent Condition)	A- (Excellent Condition)
20. Parachute Creek Road (CR 215)	14.77%	10.34%	- 4.43%	F (Failing Condition)	F- (Failing Condition)

Data Source(s): Garfield County

V. INTERSECTIONS IN GARFIELD COUNTY

Table 9 and 10 provide 2008-2017 crash data for select County Road intersections in Garfield County. This data was sourced from CDOT. The data presented in these tables is useful for identifying intersections in the county that may need to be improved in order to address safety issues and/or to accommodate additional traffic. The intersections listed in Table 10 were selected as they are located in the unincorporated areas of the county. The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) provide additional 2008-2017 crash information for both the incorporated and unincorporated areas of Garfield County.

Table 9: Summary of Crash Types

Crash Type	Crash Description
1. Approach Turn	This type of crash occurs when a vehicle traveling through an intersection in the opposite direction strikes a left-turning vehicle.
2. Bicycle	This type of crash occurs when a vehicle and bicyclist collide within the roadway, and when this type of collision is the primary event that has occurred.
3. Broadside	This type of crash occurs when a vehicle traveling through an intersection in the opposite direction strikes a left-turning vehicle at a 90-degree angle.
4. Pedestrian	This type of crash occurs when a vehicle and pedestrian collide within the roadway, and when this type of collision is the primary event that has occurred.
5. Rear End	This type of crash occurs when one vehicle strikes the rear of the vehicle in front of it because that vehicle is stopped or slowing down.
6. Sideswipe (same direction)	This type of crash typically involves the side of one vehicle making contact with the side of another vehicle that is traveling in the same direction.

Data Source(s): Colorado Department of Transportation (CDOT)

Table 10: Summary of Crashes at Select County Road Intersections in Garfield County (2008-2017)

Intersection	Approach Turn	Bicycle	Broadside	Pedestrian	Rear-End	Sideswipe (Same Direction)	TOTALS
1. Catherine Store Road (CR 100) & Highway 82	5	-	5	-	28	1	39
2. CMC Road, CR 154 & Highway 82	6	1	7	2	14	3	33
3. CR 154 & Highway 82 (near Buffalo Valley)	3	1	5	1	16	1	27
4. CR 154 & Highway 82 (near FedEx facility)	-	-	5	-	9	1	15
5. Cattle Creek Road (CR 113) & Highway 82	-	1	7	-	2	2	12
6. Main Street & 7th Street (in New Castle)	-	1	8	-	3	-	12
7. Antlers Lane (CR 225) & Highway 6	-	-	2	-	3	-	5
8. Mile Pond Road (CR 210) & Highway 6	2	-	-	-	3	-	5
9. Coal Ridge High School & Highway 6	1	-	3	-	-	-	4
10. Miller Lane (CR 227) & Highway 6	-	-	1	-	2	1	4

NOTE:
Bicycle and pedestrian crashes in the table are highlighted in red because these types of crashes have a high incidence of serious bodily injury or death. Even though the frequency of these types of crashes may be lower than other crash types, their severity is among the highest.

Data Source(s): Colorado Department of Transportation (CDOT)

Table 11 offers 2019 INRIX data that identifies the top (10) ten most congested intersections (i.e. "bottlenecks") in Garfield County. It is important to understand where bottlenecks occur in the county's road system as these constrict the overall function of the system.

Table 11: Summary of Top Ten "Bottlenecks" in Garfield County (2019)

Intersection	Average Maximum Length[1]	Average Daily Duration[2]	Total Duration[3]
1. Southbound Highway 82 & Highway 133	0.23 miles	6 hrs 58 mins	87 days 3 hrs 11 mins
2. Southbound Highway 82 & 27th Street	0.1 miles	4 hrs 46 mins	59 days 16 hrs 37 mins
3. Northbound Highway 133 & Highway 82	0.2 miles	2 hrs 52 mins	35 days 22 hrs 46 mins
4. Southbound Highway 13 & Highway 6	0.11 miles	2 hrs 42 mins	33 days 19 hrs
5. Southbound Highway 82 & 6th Street	0.1 miles	2 hrs 16 mins	28 days 12 hrs 53 mins
6. Southbound Highway 13 & Interstate 70	0.17 miles	1 hrs 39 mins	20 days 16 hrs 56 mins
7. Northbound Highway 82 & 6th Street	0.53 miles	1 hrs 35 mins	19 days 20 hrs 28 mins
8. Northbound Highway 13 & Interstate 70	0.12 miles	1 hrs 33 mins	20 days 16 hrs 56 mins
9. Southbound Highway 133 & Highway 82	0.04 miles	49 mins	19 days 11 hrs 57 mins
10. Westbound Interstate 70 @ Exit 125	3.54 miles	44 mins	9 days 8 hrs 32 mins

NOTES:
[1]Average Maximum Length: the average maximum length, in miles, of queues formed by congestion originating at each location.
[2]Average Daily Duration: the average amount of time per day that congestion is identified originating at each location.
[3]Total Duration: the total amount of time each location congestion was identified originating at each location.

Data Source(s): INRIX (www.inrix.com)

CDOT crash and INRIX data are useful for identifying problematic intersections that impact the overall function of the county's transportation system.

IV. CDOT ROADS IN GARFIELD COUNTY

Many of the key roads in Garfield County (ex. Highway 82, Interstate 70, etc.) are state roads under the jurisdiction of CDOT. Table 12 offers current estimates (2018) and projections (2040) for CDOT's roads in the county. Similar to the Table 5, Table 12 offers estimates for current V/C ratios and projected V/C ratios. V/C ratios of 0.8 or less indicates that a road has adequate carrying capacity (these V/C ratios are highlighted in green in Table 12). V/C ratios of 0.8 to 1.0 indicate that vehicle volumes are near, or at, carrying capacity and that a road could be experiencing moderate to high levels of congestion (these V/C ratios are highlighted in yellow in Table 12). V/C ratios greater than 1.0 indicate that a road is overcapacity and is likely to show signs of high levels of

congestion (these V/C ratios are highlighted in **red** in Table 12).

Data presented in Table 12 are to be used in conjunction with the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan), as well as CDOT's online transportation information system (http://dtdapps.coloradodot.info/otis/).

Table 12: Summary of CDOT Roads in Garfield County

				ESTIMATES (2018)				PROJECTIONS (2040)				
Road Segment	Mile Marker (Start)	Mile Marker (End)	AADT	% Single Trucks	% Combined Trucks	V/C Ratio	AADT	% Single Trucks	% Combined Trucks	V/C Ratio	% Change AADT (2018-2040)
1. Interstate 70 (070A)	61.648	65.419	19,000	2.9%	12.6%	0.4	25,897	2.9%	12.6%	0.53	+ 36.3%
2. Interstate 70 (070A)	65.419	72.323	18,000	2.9%	12.8%	0.38	24,534	2.9%	12.8%	0.51	+ 36.3%
3. Interstate 70 (070A)	72.323	74.661	18,000	2.9%	12.8%	0.38	25,524	2.9%	12.8%	0.52	+ 41.8%
4. Interstate 70 (070A)	74.661	81.236	20,000	2.8%	12.0%	0.41	28,140	2.8%	12.0%	0.56	+ 40.7%
5. Interstate 70 (070A)	81.236	86.85	21,000	2.8%	11.9%	0.44	29,316	2.8%	11.9%	0.6	+ 39.6%
6. Interstate 70 (070A)	86.85	90.422	18,000	3.0%	12.2%	0.37	25,722	3.0%	12.2%	0.51	+ 42.9%
7. Interstate 70 (070A)	90.422	97.427	23,000	2.0%	8.7%	0.43	31,096	2.0%	8.7%	0.57	+ 35.2%
8. Interstate 70 (070A)	97.427	105.26	25,000	2.3%	8.0%	0.47	34,625	2.3%	8.0%	0.63	+ 38.5%
9. Interstate 70 (070A)	105.26	109	33,000	2.3%	8.2%	0.65	49,335	2.3%	8.2%	0.94	+ 49.5%
10. Interstate 70 (070A)	109	114.295	29,000	2.3%	9.0%	0.54	38,889	2.3%	9.0%	0.71	+ 34.1%
11. Interstate 70 (070A)	114.295	116.38	25,000	2.3%	10.0%	0.46	32,150	2.3%	10.0%	0.58	+ 28.6%
12. Interstate 70 (070A)	116.38	118.64	19,000	2.1%	11.1%	0.42	24,016	2.1%	11.1%	0.52	+ 26.4%
13. Interstate 70 (070A)	118.64	134.053	16,000	1.9%	10.6%	0.33	20,752	1.9%	10.6%	0.42	+ 29.7%
14. Interstate 70 (070E)	0	0.222	8,800	4.0%	1.3%	0.65	10,542	4.0%	1.3%	0.77	+ 19.8%

MILE MARKER (MM) REFERENCE POINTS:

MM 65.419 = Mesa-Garfield County line
MM 74.661 = Town of Parachute Interchange
MM 86.85 = West Rifle Interchange
MM 90.422 = City of Rifle Interchange
MM 97.427 = Town of Silt Interchange
MM 109 = CR 137 Interchange
MM 111.328 = CR 134 Interchange
MM 114.295 = West Glenwood Interchange
MM 116.38 = City of Glenwood Springs Interchange
MM 118.648 = CR 129 Interchange
MM 130.286 = Garfield-Eagle County line

1. Highway 6 (006D)	92.275	93.426	5,200	4.6%	1.9%	0.31	7,088	4.6%	6.5%	0.41	+ 36.3%
2. Highway 6 (006D)	93.426	98.735	5,500	3.8%	2.5%	0.28	7,557	3.8%	6.4%	0.38	+ 37.4%
3. Highway 6 (006D)	98.735	99.114	5,400	4.1%	1.9%	0.32	7,598	4.1%	5.9%	0.44	+ 40.7%
4. Highway 6 (006D)	99.114	99.232	7,700	4.5%	1.3%	0.37	11,257	4.5%	5.8%	0.53	+ 46.2%
5. Highway 6 (006D)	99.232	104.429	5,800	3.4%	1.0%	0.26	9,245	3.5%	4.5%	0.4	+ 59.4%
6. Highway 6 (006D)	104.429	105.906	2,800	5.4%	1.1%	0.15	3,940	5.4%	6.4%	0.21	+ 40.7%

Table 12: Summary of CDOT Roads in Garfield County (continued)

Road Segment	Mile Marker (Start)	Mile Marker (End)	ESTIMATES (2018) AADT	% Single Trucks	% Combined Trucks	V/C Ratio	PROJECTIONS (2040) AADT	% Single Trucks	% Combined Trucks	V/C Ratio	% Change AADT (2018-2040)
7. Highway 6 (006D)	105.906	107.118	5,400	3.1%	1.3%	0.28	7,182	3.1%	4.4%	0.36	+ 33.0%
8. Highway 6 (006D)	107.118	110.806	2,100	4.8%	2.4%	0.12	3,324	4.8%	7.1%	0.18	+ 58.3%
9. Highway 6 (006K)	0	0.338	11,000	5.2%	1.2%	0.56	11,363	5.2%	1.2%	0.58	+ 3.3%
10. Highway 6 (006L)	88.895	90.394	3,600	3.6%	6.9%	0.21	5,065	3.6%	6.9%	0.29	+ 40.7%
11. Highway 6 (006L)	90.394	91.24	4,300	5.8%	7.4%	0.24	5,956	5.8%	7.4%	0.32	+ 38.5%
12. Highway 6 (006M)	65.411	72.284	550	10.9%	9.1%	0.04	1,149	10.9%	9.1%	0.08	+ 108.9%
13. Highway 6 (006M)	72.284	74.28	2,100	6.7%	4.8%	0.14	4,456	6.7%	4.8%	0.28	+ 112.2%
14. Highway 6 (006M)	74.28	75.422	3,400	7.1%	4.7%	0.16	4,597	7.0%	4.7%	0.21	+ 35.2%
15. Highway 6 (006M)	75.422	88.895	530	7.5%	3.8%	0.03	734	7.5%	3.8%	0.04	+ 38.5%

MILE MARKER (MM) REFERENCE POINTS:
MM 92.275 (006D) = East City of Rifle limits
MM 93.426 (006D)= CR 120 Intersection
MM 99.232 (006D) = Town of Silt Interchange
MM 104.429 (006D) = CR 214 Intersection
MM 107.21 (006D) = CR 240 Intersection
MM 110.799 (006D) = Canyon Creek Interchange
MM 88.8959 (006L) = West Rifle Interchange
MM 62.305 (006M) = Mesa-Garfield County line
MM 75.422 (006M) = CR 215 Intersection
MM 88.795 (006M) = West Rifle Interchange

1. Highway 13 (013A)	1.998	2.607	6,000	9.0%	7.2%	0.44	9,894	9.0%	7.2%	0.7	+ 64.9%
2. Highway 13 (013A)	2.607	2.688	11,000	2.4%	4.2%	0.49	16,687	2.4%	4.2%	0.72	+ 51.7%
3. Highway 13 (013A)	2.688	3.137	8,800	2.6%	4.1%	0.3	12,672	2.6%	4.1%	0.42	+ 44.0%
4. Highway 13 (013A)	3.137	4.114	4,200	2.4%	7.4%	0.34	5,124	2.4%	7.4%	0.41	+ 22.0%
5. Highway 13 (013A)	4.114	18.268	2,800	3.9%	10.0%	0.24	3,940	3.9%	10.0%	0.33	+ 40.7%

MILE MARKER (MM) REFERENCE POINTS:
MM 1.059 = Highway 6 (006L) Intersection
MM 2.607 = Railroad Avenue Intersection
MM 4.114 = Highway 325 (325A) Intersection
MM 16.894 = Garfield-Rio Blanco County line

1. Highway 325 (325A)	0	4.102	1,100	1.8%	1.8%	0.1	1,318	1.8%	1.8%	0.12	+ 19.8%
2. Highway 325 (325A)	4.102	6.977	510	3.9%	3.9%	0.07	718	3.9%	3.9%	0.1	+ 40.8%
3. Highway 325 (325A)	6.977	11.395	310	6.5%	6.5%	0.07	470	6.4%	6.4%	0.1	+ 51.6%

MILE MARKER (MM) REFERENCE POINTS:
MM 0 = Highway 13 (013A) Intersection
MM 3.445 = Enter Rifle Gap State Park
MM 4.102 = CR 252 Intersection
MM 6.977 = CR 226 Intersection
MM 11.274 = CR 292 Intersection

Table 12: Summary of CDOT Roads in Garfield County (continued)

Road Segment	Mile Marker (Start)	Mile Marker (End)	ESTIMATES (2018) AADT	% Single Trucks	% Combined Trucks	V/C Ratio	PROJECTIONS (2040) AADT	% Single Trucks	% Combined Trucks	V/C Ratio	% Change AADT (2018-2040)
1. Highway 82 (082A)	0	0.02	28,000	2.4%	1.6%	0.98	31,388	2.4%	1.6%	1.09	+ 12.1%
2. Highway 82 (082A)	0.02	0.07	25,000	2.4%	1.6%	1.01	26,100	2.4%	1.6%	1.05	+ 4.4%
3. Highway 82 (082A)	0.07	0.176	29,000	2.6%	1.5%	0.96	32,509	2.6%	1.5%	1.07	+ 12.1%
4. Highway 82 (082A)	0.176	1.405	29,000	2.6%	1.5%	0.99	32,509	2.6%	1.5%	1.1	+ 12.1%
5. Highway 82 (082A)	1.405	2.194	25,000	2.5%	1.4%	0.67	28,300	2.5%	1.4%	0.75	+ 13.2%
6. Highway 82 (082A)	2.194	7.824	24,000	2.3%	1.4%	0.55	30,336	2.3%	1.4%	0.68	+ 26.4%
7. Highway 82 (082A)	7.824	11.699	25,000	2.7%	1.4%	0.56	27,200	2.7%	1.4%	0.6	+ 8.8%
8. Highway 82 (082A)	11.699	13.553	22,000	3.0%	1.3%	0.59	26,840	3.0%	1.3%	0.71	+ 22.0%
9. Highway 82 (082A)	13.553	19.044	25,000	3.1%	1.1%	0.67	32,425	3.1%	1.1%	0.85	+ 29.7%

MILE MARKER (MM) REFERENCE POINTS:

MM 0 = City of Glenwood Springs Interchange
MM 0.176 = 6th Street Intersection
MM 0.225 = Grand Avenue Bridge
MM 1.405 = 23rd Street Intersection
MM 1.714 = 27th Street Intersection
MM 2.194 = Blake Avenue Intersection
MM 3.553 = CR 154 Intersection
MM 5 = CR 154 Intersection
MM 6.655 = CR 154 & CR 114 Intersection
MM 7.87 = CR 113 Intersection
MM 11.699 = Highway 133 (133A) Intersection
MM 15.535 = CR 100 Intersection

1. Highway 133 (133A)	56.805	66	3,700	2.4%	1.4%	0.21	3,822	2.4%	1.4%	0.22	+ 3.3%
2. Highway 133 (133A)	66	67.044	4,000	2.3%	1.0%	0.26	4,176	2.3%	1.0%	0.27	+ 4.4%
3. Highway 133 (133A)	67.044	67.422	7,200	2.4%	0.8%	0.46	7,675	2.4%	0.8%	0.49	+ 6.6%
4. Highway 133 (133A)	67.422	67.799	11,000	1.5%	0.5%	0.75	12,815	1.5%	0.5%	0.86	+ 16.5%
5. Highway 133 (133A)	67.799	68.821	18,000	3.5%	1.3%	1	20,376	3.5%	1.3%	1.12	+ 13.2%

MILE MARKER (MM) REFERENCE POINTS:

MM 66.183 = CR 111 Intersection
MM 67.044 = River Valley Ranch Drive Intersection
MM 67.799 = Main Street Intersection
MM 68.4 = Dolores Way Intersection
MM 68.706 = Cowen Drive Intersection
MM 68.821 = Highway 82 (082A) Intersection

1. Highway 139 (139A)	5.029	13.595	760	6.6%	7.9%	0.05	1,228	6.6%	7.9%	0.08	+ 61.6%
2. Highway 139 (139A)	13.595	65.153	660	6.1%	9.1%	0.05	950	6.1%	9.1%	0.07	+ 43.9%

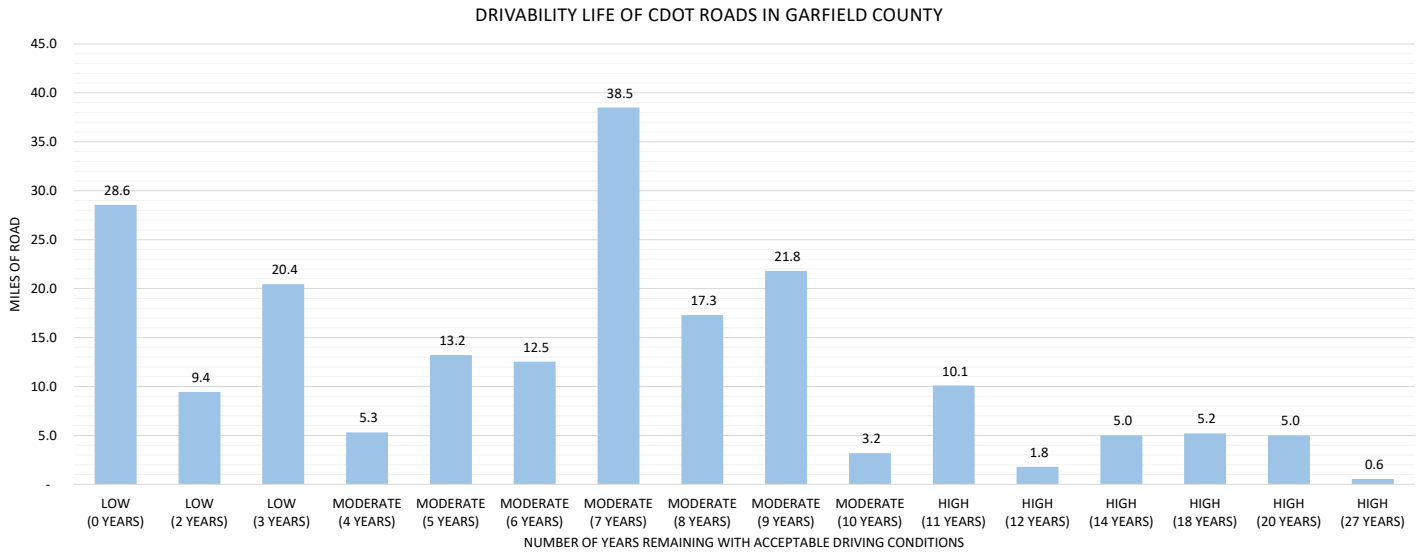
MILE MARKER (MM) REFERENCE POINTS:

MM 13.601 = King Road Intersection
MM 15.712 = East Salt Wash Intersection
MM 39.301 = Garfield-Rio Blanco County line

Data Source(s): Colorado Department of Transportation (CDOT)

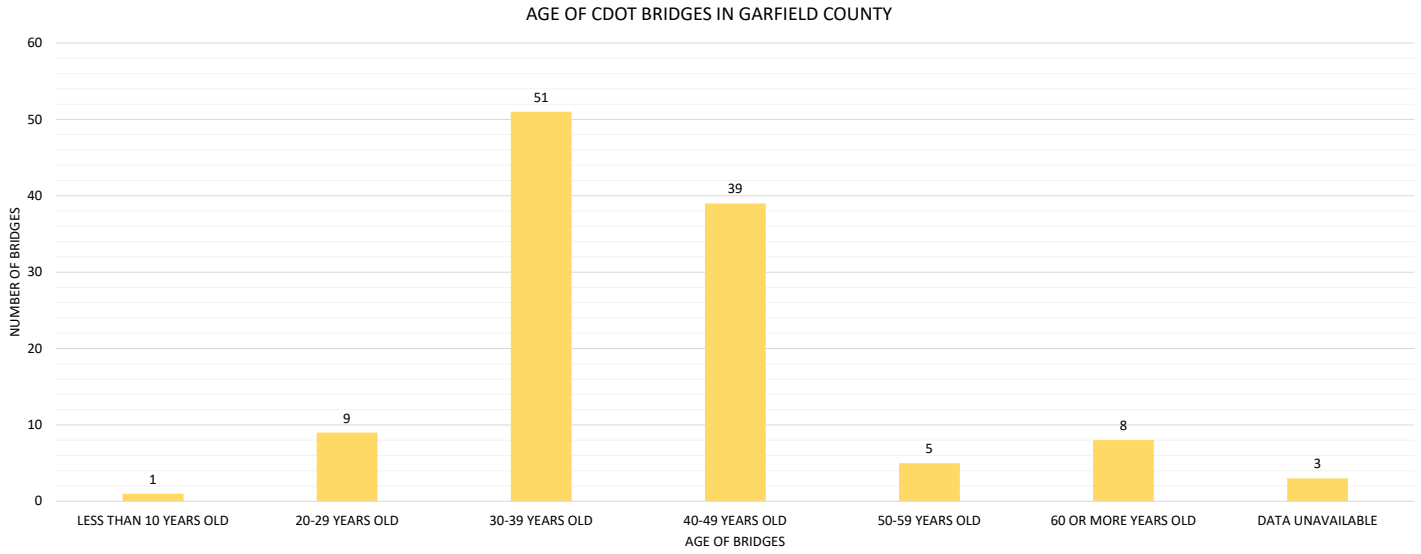
Similar to the county, CDOT tracks the condition of state roads in Garfield County. CDOT classifies its roads based on "drivability life." In other words, the pavement condition and acceptable driving condition of the road based on an assessment of smoothness, pavement distress, and safety. CDOT uses three (3) categories to describe the

drivability life of its roads: (1) Low (3 years or less remaining); (2) Moderate (4-10 years remaining); and, (3) High (Greater than 10 years remaining). The following graph illustrates the miles of CDOT roads in Garfield County per remaining drivability life. There are approximately 58-miles in the "Low" category, 112-miles in the "Moderate" category and 28-miles in the "High" category.



V. CDOT BRIDGES IN GARFIELD COUNTY

In addition to monitoring the condition of state roads in Garfield County, CDOT also monitors the condition of the bridges that it has jurisdiction over in the county. According to data from CDOT, there are a total of 116 state bridges in Garfield County. The graph below offers information regarding the age of CDOT bridges in the county.



Of the 116 CDOT bridges in Garfield County, 108 (93.1%) are in "good" condition, 4 (3.4%) are in "fair" condition and 1 (0.9%) is in "poor" condition. There are three (3) CDOT bridges that data is unavailable for. The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) offer additional information regarding CDOT bridges in Garfield County. Table 13 presents detailed information regarding the five (5) bridges in Garfield County that are in "fair" or "poor" condition.

Table 13: Summary of CDOT Bridges in Fair or Poor Condition in Garfield County

Bridge	Year Built	Location	Route	Condition	Images
1. F-06-A	1933 (86 years old)	The bridge over Elk Creek at the west end of Main Street in the Town of New Castle.	Highway 6 (006D)	Poor	 
2. F-06-T	1972 (47 years old)	The bridge over railroad tracks at the entrance to Town of Silt off of Interstate 70 (i.e. the 9th Street bridge).	Interstate 70 (070E)	Fair	 
3. F-06-Z	1975 (44 years old)	The westbound Interstate 70 bridge over the Colorado River, just west of the interchange for the Town of Silt.	Interstate 70 (070A)	Fair	 
4. F-05-L	1975 (44 years old)	The westbound Interstate 70 bridge over the Colorado River, just west of the main interchange for the City of Rifle.	Interstate 70 (070A)	Fair	 
5. G-04-R	1934 (85 years old)	The Highway 6 bridge over Parachute Creek, in the Town of Parachute.	Highway 6 (006D)	Fair	 

Data & Photo Source(s): Colorado Department of Transportation (CDOT)

VI. PUBLIC BUS SERVICE IN GARFIELD COUNTY

RFTA is the second largest transit system in Colorado, the largest rural transit system in the United States and the first rural transit agency to construct and operate a Bus Rapid Transit (BRT) system (the VelociRFTA BRT began operation in September 2013).

The Roaring Fork Transportation Authority (RFTA) has been in operation since 1983, and functions as a Regional Transportation Authority (RTA). Members of the RTA include the City of Aspen, Town of Snowmass Village, Pitkin County, Town of Basalt, a portion of Eagle County, Town Carbondale, City of Glenwood Springs and the Town of New Castle. RFTA is primarily funded by dedicated sales taxes levied in each community that is a member of the RTA. Although RFTA is funded by the RTA member communities, RFTA does provide bus services to communities in Garfield County that are not members of the RTA.

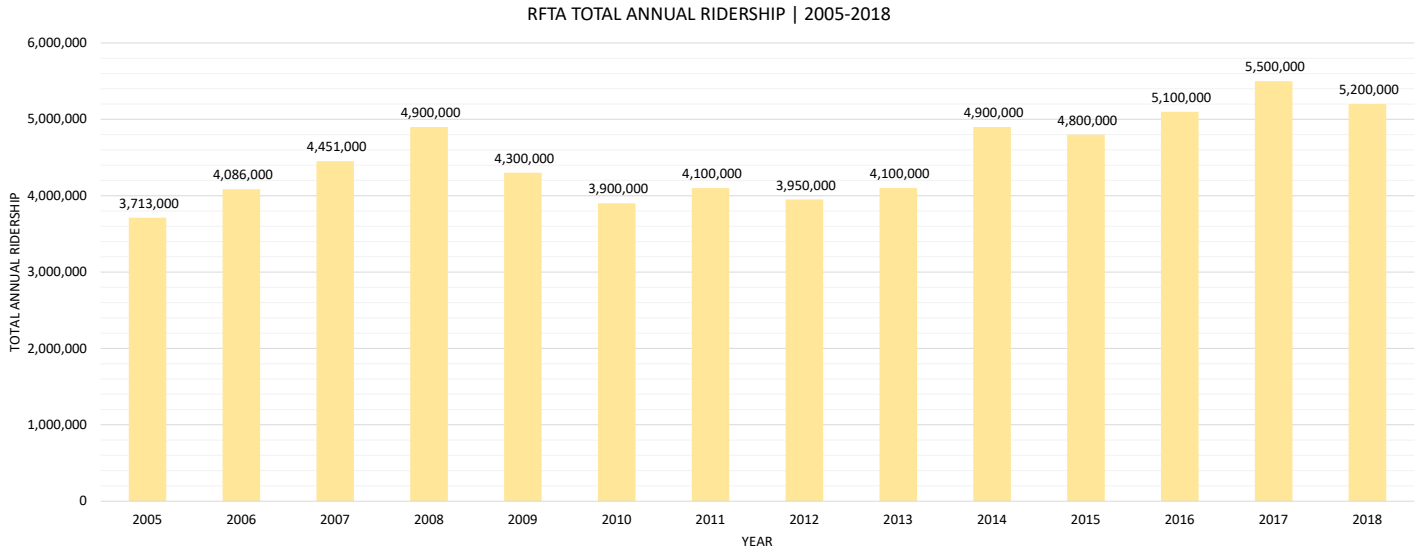
Table 14 provides a summary of the RFTA and CDOT bus services that operate in Garfield County. The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) offer additional information regarding the RFTA and CDOT bus routes and stops in the county.

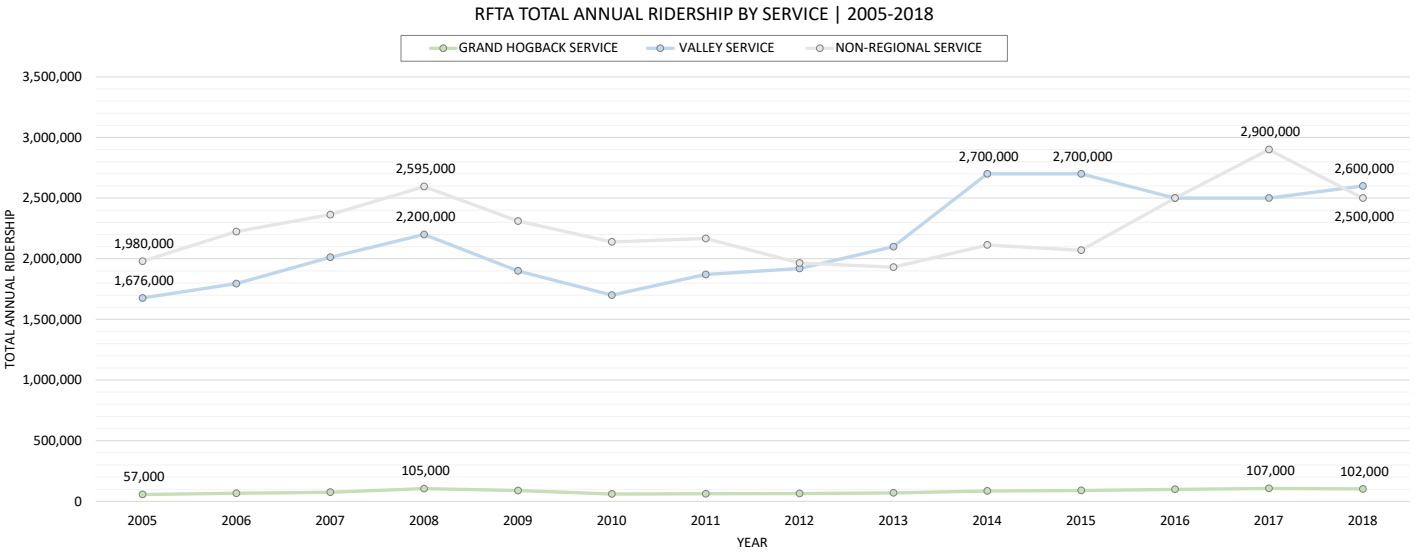
Table 14: Summary of RFTA and CDOT Bus Services that Operate in Garfield County

Bus Service	Service Description
1. Bustang	Bustang is CDOT's Interregional Express (IX) bus service. By linking major local transit systems together, the Bustang service responds to demand from the traveling public to have a reliable transit alternative along the highest traveled corridors in the state. Bustang travels between Grand Junction and Denver along Interstate 70. In Garfield County, Bustang has stops in Parachute/Battlement Mesa, Rifle and Glenwood Springs.
2. Bustang Outrider	Bustang Outrider is an expansion of CDOT's Bustang service. The Outrider service provides Interregional Express bus service to more remote communities in Colorado. There is currently no Outrider service in Garfield County. However, CDOT may, at some point in the future, offer an Outrider route between Grand Junction and Steamboat Springs. This route would travel along Interstate 70 and then north, through Rifle, along Highway 13.
3. VelociRFTA Bus Rapid Transit (BRT) Service	In 2013, RFTA began offering the VelociRFTA Bus Rapid Transit (BRT), which at the time, was the first rural bus rapid transit system in the nation. The BRT service gives people in the Roaring Fork Valley the convenience of a bus system usually only found in urban areas. VelociRFTA travels between Glenwood Springs and Aspen. The BRT buses make the trip in about one (1) hour. During peak commuter times, buses come roughly every 12 minutes.
4. Roaring Fork Valley Express/Local Service	The Roaring Fork Valley Local service offers buses that travel throughout Glenwood, Carbondale, El Jebel, Basalt, Snowmass Village and Aspen. By contrast, the Express service offers buses with more direct routes (i.e. buses do not stop between Basalt and Aspen).
5. Grand Hogback Service	In 2002, RFTA began providing bus service along the Interstate 70 corridor. This service is called the Grand Hogback. The Grand Hogback provides bus service between Glenwood Springs, New Castle, Silt, and Rifle. In Glenwood, riders have the option of transferring to the BRT or Roaring Fork Valley Express/Local services.
6. Ride Glenwood	Ride Glenwood Springs (RGS) is the City of Glenwood Springs' year-round public transit bus service. RGS buses operate daily. RGS stops are located throughout Glenwood Springs, near tourist attractions, the downtown area, shopping centers and neighborhoods. RGS also provides connections to RFTA's regional bus services, Greyhound Bus routes, and Amtrak.
7. Carbondale Circulator	The Carbondale Circulator is a free service provided by RFTA. The service enables people to travel to/from the Carbondale Park and Ride, as well as to/from any of the bus stops in Carbondale.

Data Source(s): Roaring Fork Transportation Authority (RFTA) (www.rfta.com); and, Colorado Department of Transportation (CDOT)

The following graphs present RFTA's total annual ridership and total annual ridership from 2005-2018.





Over the 13-year period between 2005 and 2018, RFTA's total annual ridership and total annual ridership by service have experienced ups and downs. However, the overall trend is upwards. Between 2005 and 2018, total annual ridership has increased from 3,713,000 to 5,200,000 (+1,487,000 or +40%). Similarly, total annual ridership by service has increased from 1,676,000 to 2,600,000 (+924,000 or +55%) for regional bus services in the Roaring Fork Valley; 57,000 to 102,000 (+45,000 or +79%) for regional bus service along the Interstate 70 corridor (i.e. Grand Hogback); and, 1,980,000 to 2,500,000 (+520,000 or +26%) for all non-regional bus services.

Table 15 presents weekday passenger boarding/de-boarding data for RFTA's bus stops in Garfield County, as well as select stops in the Aspen/Snowmass area. The data in the table was collected by RFTA between July 1, 2018 and August 31, 2018, as well as between December 1, 2018 and January 21, 2019.

Table 15: Summary of RFTA Weekday Ridership in Garfield County (2018-2019)

		July 1, 2018 - Aug. 31, 2018		**Dec. 1, 2018 - Jan. 21, 2019**		
Bus Service	Bus Stop	Passengers On	Passengers Off	Passengers On	Passengers Off	TOTALS
1. VelociRFTA Bus Rapid Transit (BRT) Service	Glenwood Meadows	9	14	7	13	**43**
	Glenwood Springs Community Center	4	4	4	5	**17**
	Glenwood Springs Park and Ride	56	55	55	39	**205**
	Grand Avenue & 9th Street	-	-	28	29	**57**
	Grand Avenue & 14th Street	-	-	20	20	**40**
	Grand Avenue & 20th Street	-	-	20	18	**38**
	Grand Avenue & 27th Street (Upvalley)	295	21	322	18	**656**
	Grand Avenue & 27th Street (Downvalley)	18	352	19	355	**744**
	Glenwood Springs Courthouse	-	-	12	11	**23**
	Carbondale Park and Ride	423	375	448	425	**1,671**
	DSC Napa	3	11	0	0	**14**
	Brush Creek Road Interchange Lot	107	277	-	-	**384**
	Rubey Park	862	887	-	-	**1,749**

Table 15: Summary of RFTA Weekday Ridership in Garfield County (2018-2019) (continued)

		July 1, 2018 - Aug. 31, 2018		Dec. 1, 2018 - Jan. 21, 2019		
Bus Service	Bus Stop	Passengers On	Passengers Off	Passengers On	Passengers Off	TOTALS
2. Roaring Fork Valley Express Service	Glenwood Meadows	0	1	0	1	2
	Glenwood Springs Community Center	0	0	0	1	1
	Glenwood Springs Park and Ride	0	4	0	7	11
	Glenwood Springs Courthouse	-	-	0	1	1
	Grand Avenue & 9th Street	-	-	0	3	3
	Grand Avenue & 14th Street	-	-	0	2	2
	Grand Avenue & 20th Street	-	-	0	1	1
	Grand Avenue & 27th Street	1	10	1	4	16
	CMC/Roaring Fork Marketplace	1	1	1	1	4
	Highway 82 @ Aspen Glenn	0	0	0	0	0
	Carbondale Park and Ride	-	-	2	16	18
	Main Street & Highway 133	4	0	-	-	4
	Carbondale Pool	5	0	-	-	5
	Rubey Park	22	23	-	-	45
3. Roaring Fork Valley Local Service	West Glenwood Mall	2	0	-	-	2
	Glenwood Meadows	30	27	27	25	109
	Glenwood Springs Community Center	-	-	8	8	16
	Glenwood Springs Park and Ride	58	56	70	59	243
	Glenwood Springs Courthouse	-	-	21	19	40
	Grand Avenue & 9th Street	-	-	56	51	107
	Grand Avenue & 14th Street	-	-	35	40	75
	Grand Avenue & 20th Street	-	-	29	30	59
	Grand Avenue & 27th Street	95	89	92	172	448
	CMC/Roaring Fork Marketplace	63	65	85	91	304
	Highway 82 @ Aspen Glenn	2	3	1	1	7
	Carbondale Park and Ride	-	-	104	119	223
	Main Street & Highway 133	17	29	9	25	80
	Carbondale Pool	1	0	0	3	4
	Highway 82	11	14	-	-	25
	Brush Creek Road Interchange Lot	76	359	-	-	435
	Rubey Park	569	240	-	-	809

Photo Credit: Roaring Fork Transportation Authority

Table 15: Summary of RFTA Weekday Ridership in Garfield County (2018-2019) (continued)

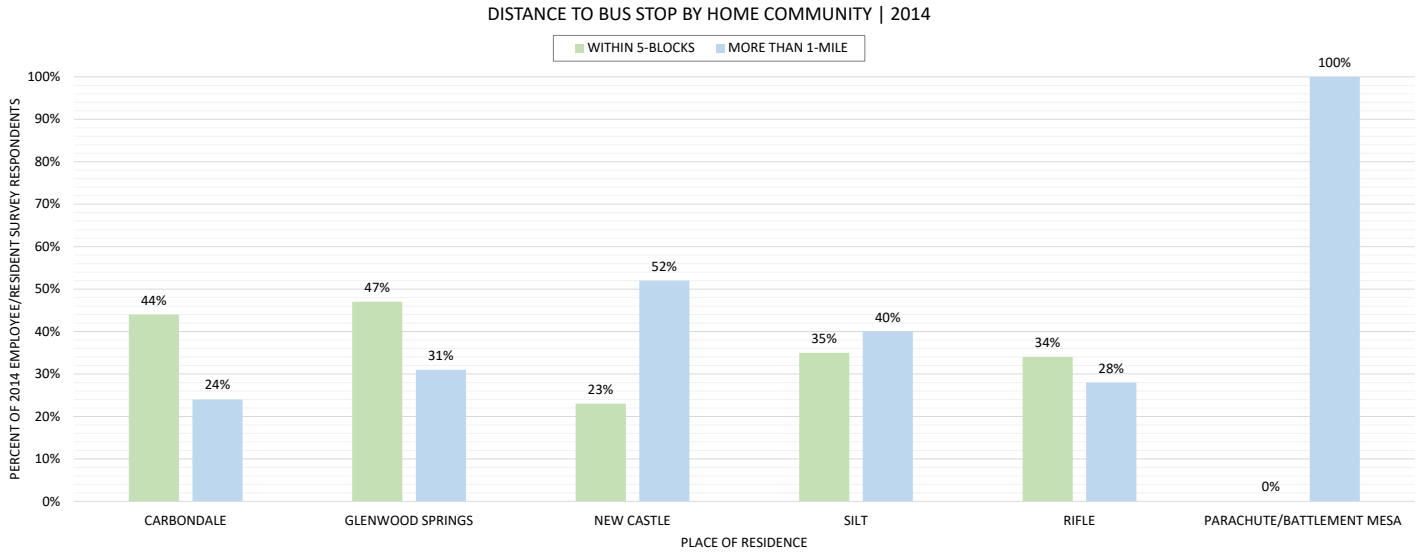
		July 1, 2018 - Aug. 31, 2018		Dec. 1, 2018 - Jan. 21, 2019		
Bus Service	Bus Stop	Passengers On	Passengers Off	Passengers On	Passengers Off	TOTALS
4. Hogback	Rifle Park and Ride	29	30	29	30	**118**
	Railroad Avenue & 4th Street	0	9	1	8	**18**
	Railroad Avenue & 5th Street	11	1	11	0	**23**
	Rifle Metro Park	30	33	28	39	**130**
	Cottonwood	5	6	3	3	**20**
	Silt Coop	8	8	6	5	**27**
	Silt Firehouse	25	23	22	23	**93**
	New Castle Convenience Stores	23	25	-	-	**48**
	Main Street & 6th Street	22	23	16	20	**36**
	New Castle Park and Ride	-	-	21	22	**43**
	West Glenwood Mall	21	24	18	28	**46**
	Glenwood Meadows	13	8	11	8	**18**
	Glenwood Springs Community Center	-	-	1	2	**3**
	Glenwood Springs Park and Ride	6	31	4	26	**30**
	Glenwood Springs Courthouse	-	-	14	14	**28**
	Grand Avenue & 9th Street	-	-	8	5	**14**
	Grand Avenue & 14th Street	-	-	20	10	**31**
	Grand Avenue & 20th Street	-	-	11	9	**20**
	Grand Avenue & 27th Street	-	-	55	38	**93**

Data Source(s): Roaring Fork Transportation Authority (RFTA)

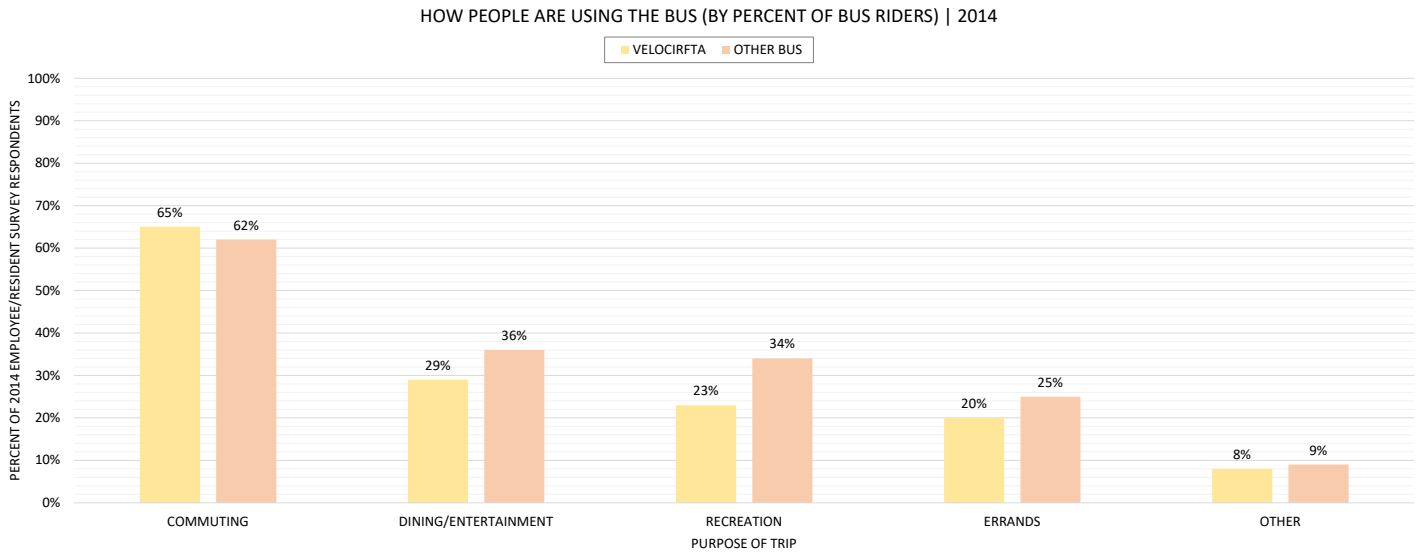
The data presented in Table 15 offers a small glimpse into the popularity of RFTA's bus services and stops in Garfield County. The county could work with RFTA to compile and analyze additional ridership data, if available, to further explore the bus service and bus stop ridership trends in Garfield County. Understanding these trends could be helpful in planning for the future of RFTA in Garfield County, as well as planning for Transit Oriented Development (TOD) in the county.

The graphs on the following pages present select data from RFTA's 2014 Regional Travel Patterns Study prepared for RFTA (https://www.rfta.com/wp-content/uploads/2015/12/2014-RFTA-Travel-Patterns-Report_2015-09-09.pdf). These graphs provide information regarding: (1) the distance between bus stops and where people live, by community; (2) why people choose to ride the bus (ex. to commute for work, to go out to eat, to go to the movies, etc.); (3) the public transit services that people chose to use to commute, other than VelociRFTA; (4) suggestions for how to improve RFTA's bus service, which would encourage current riders to use the bus more regularly; and, (5) input from riders on what new/additional routes would help to improve RFTA's bus services.

Photo Credit: Roaring Fork Transportation Authority



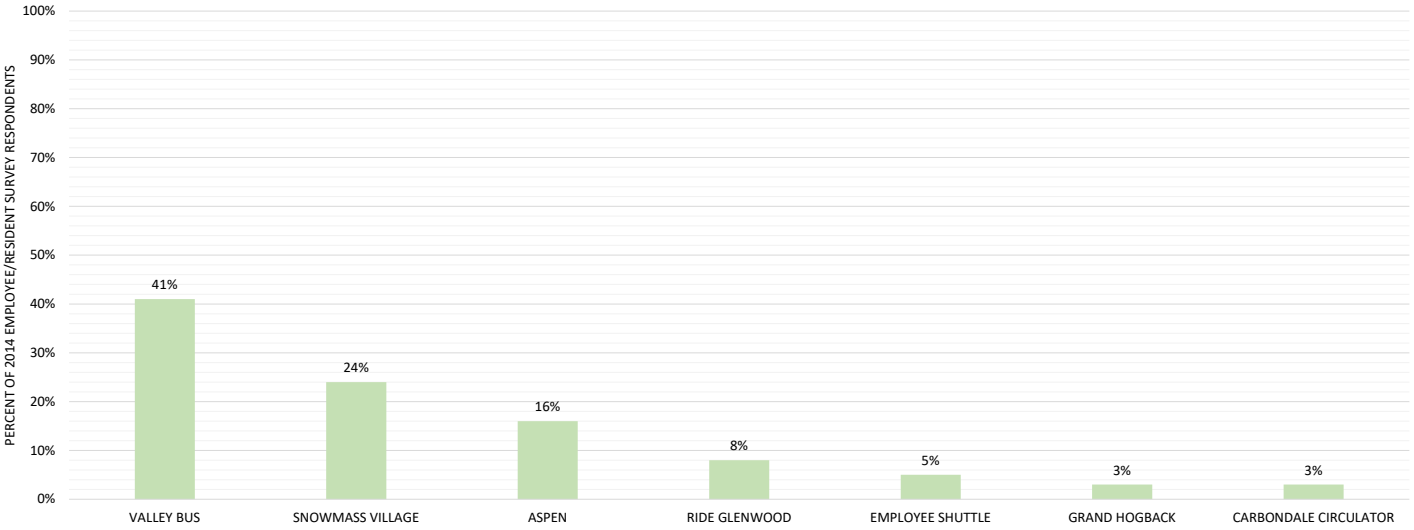
Generally, the percent of people living within a short walk of the nearest bus stop (i.e. within 5-blocks) gradually increases from down-valley communities to up-valley communities. As of 2014, New Castle residents live the farthest from the nearest bus stop and Glenwood Springs residents live the closest. Respondents to the 2014 Employee/Resident Survey, conducted as part of the 2014 Regional Travel Patterns Study, indicate that one of their top reasons for not riding the bus is bus stops are too far from their home.



As of 2014, most people (over 60%) ride RFTA in order to commute. Less than 40% of people riding RFTA do so for non-commuting purposes (i.e. dining/entertainment, recreation, errands and other). Of those using RFTA to commute, a slightly higher percentage ride VelociRFTA (65%) as compared to RFTA's other bus service (62%). While not depicted in the above graph, the 2014 Regional Travel Patterns Study notes that 68% of Glenwood Springs residents, who ride the bus to commute, use VelociRFTA and 49% use RFTA's other bus services. Furthermore, 74% of Carbondale residents, who ride the bus to commute, use VelociRFTA and 71% use RFTA's other bus services. The study does not include data for New Castle, Silt, Rifle or Parachute/Battlement Mesa.

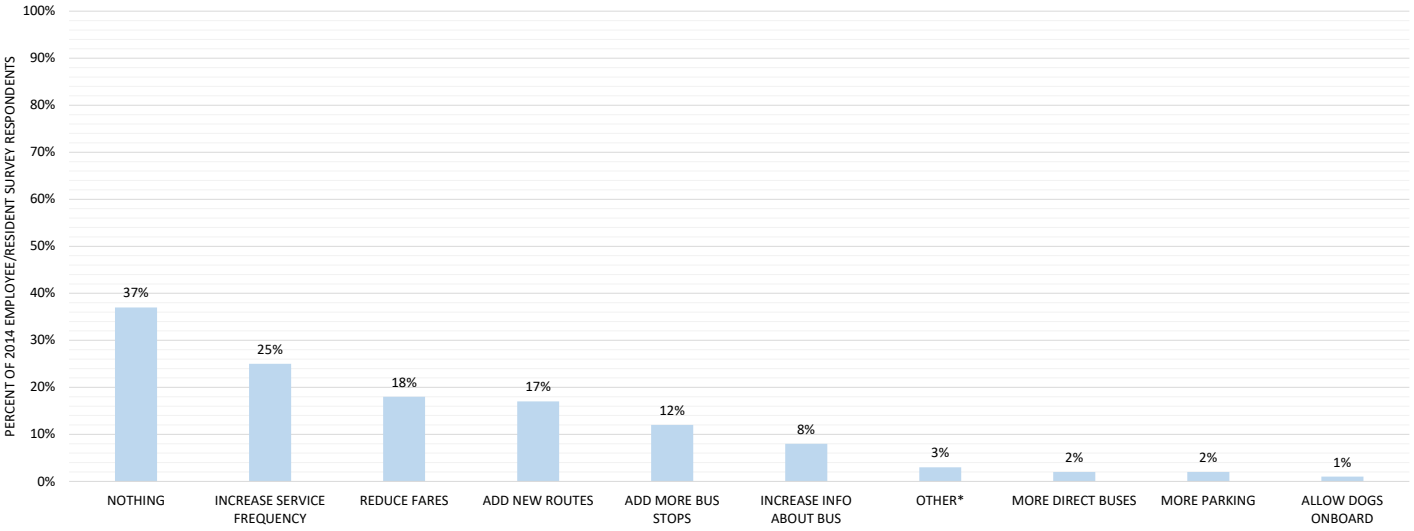
The study goes on to explore what buses riders typically use for their commute. It was discovered that 42% only use VelociRFTA, 40% only use RFTA's other bus services and 18% use both VelociRFTA and RFTA's other bus services. The study also found that roughly 11% of trips on VelociRFTA were induced trips that people didn't take before the service was initiated. The graph on the following page offers a breakdown of what "other" bus services these riders typically use for their commute.

"OTHER" (NON VELOCIRFTA) BUS USED FOR TYPICAL COMMUTE* | 2014



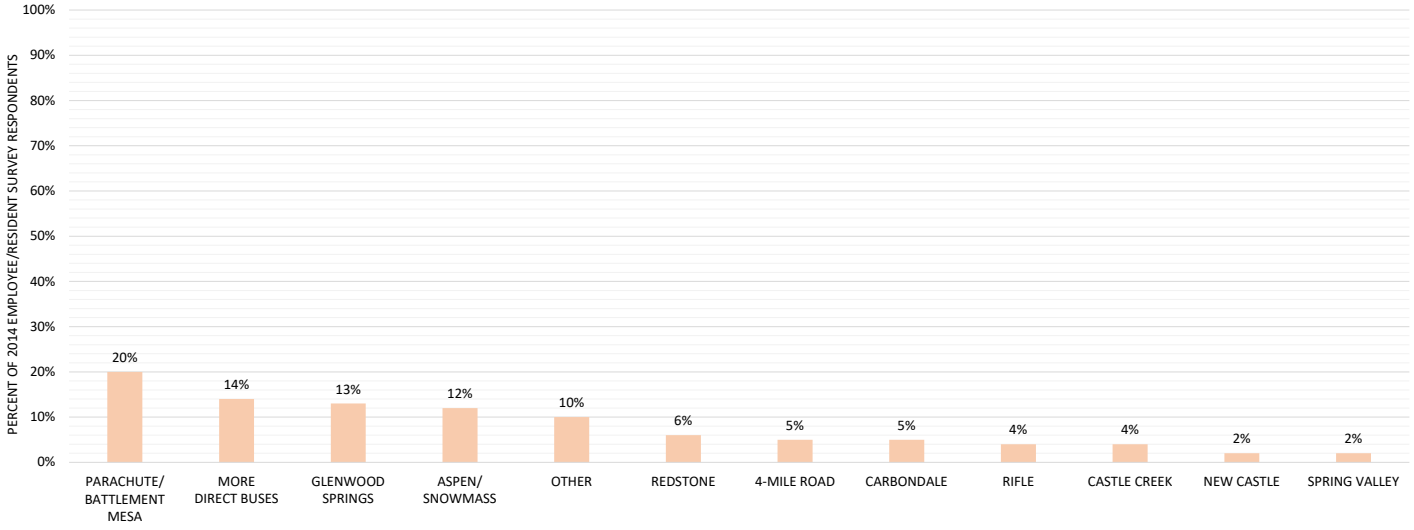
*Sample size less than 40 respondents

WHAT WOULD ENCOURAGE YOU TO USE THE BUS MORE?| 2014



*Other includes make buses free, improve connections, improve bike-on-bus, reduce overcrowding, use friendlier/safer drivers, add WiFi and improve safety.

WHERE SHOULD NEW ROUTES BE ADDED?| 2014



As depicted by the middle graph on the previous page, 37% of people said that "nothing" would encourage them to use RFTA's bus services on a more regular basis. From this, one could infer that 63% would use the bus more with certain improvements such as, increased service frequency, reduced fares, new routes and more bus stops. Of those who said the addition of new bus routes would encourage them to ride the bus more, the most popular route suggestion (20%) was to add a route to Parachute and Battlement Mesa (the current nearest bus service is 17 miles away in Rifle). Other popular suggestions included the addition of more direct buses (14%) and new routes within Glenwood Springs (13%).

VII. TRAILS & CYCLING ROUTES IN GARFIELD COUNTY

There are a number of paved regional trail systems in Garfield County. Table 16 offers an inventory of these trail systems. The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) offer additional information regarding regional trail systems in the county.

Table 16: Inventory of Regional Trail Systems in Garfield County

Regional Trail System	Description
1. Rio Grande Trail	The RFRHA was created in 1993, in order to acquire 34-miles of the Rio Grande Railroad corridor in the Roaring Fork Valley. RFRHA purchased the corridor in 1997. In 2001, the Roaring Fork Railroad Holding Authority (RFRHA) merged with RFTA. Consequently, the Rio Grande Railroad corridor was assumed by RFTA, which is preserving it for a future mass transit system and, in the interim, is using it for a recreational trail (i.e. the Rio Grande Trail). The Rio Grande Trail is a paved trail system that travels between Glenwood Springs and Aspen. Additional information about the Rio Grande Trail can be found here: https://www.rfta.com/trail-information/
2. Glenwood Canyon Trail	The Glenwood Canyon trail is paved trail system in Garfield County that begins in Glenwood Springs and follows Interstate 70 to the eastern end of Glenwood Canyon. At this point, the trail ties into Eagle County's EcoTrail system (i.e. Eagle County's regional trail system). Additional information about the Glenwood Canyon Trail can be found here: https://www.fs.usda.gov/recarea/whiteriver/recarea/?recid=41261
3. Lower Valley (LOVA) Trail	The vision for the LOVA Trail is a continuous non-motorized multi-use trail (accommodating, where feasible, equestrians, wheeled uses, and pedestrians) along the length of the Colorado River Valley from Glenwood Springs to the Garfield County line west of Parachute. The LOVA Trail would connect to the regional trail systems heading east (i.e. Glenwood Canyon Trail) and south (i.e. Rio Grande Trail) out of Glenwood Springs and eventually connect to the regional trail systems being built in Mesa County. Currently, there are sections of the LOVA Trail that have been constructed, while other sections of the trail are still being worked on. Additional information about the LOVA Trail can be found here: http://www.lovatrails.org/
4. Crystal Valley Trail	The Crystal Valley Trail opened in 2010. The trail currently travels south along Highway 133 for seven (7) miles. The trail provides connections between the Town of Carbondale, the new fire station, Prince Creek Road and the Prince Creek Trail system, and the BRB Campground Resort along the Crystal River. The ultimate vision for the Crystal Valley Trail is to connect the Town of Carbondale with the Town of Crested Butte. Additional information about the Crystal Valley Trail can be found here: https://www.pitkinostprojects.com/carbondale-to-crested-butte-trail-plan.html

Table 17 presents 206-2017 total annual trip data, sourced from Strava (www.strava.com), for select trail segments and cycling routes in Garfield County. The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) offer additional information regarding trail segments and biking routes in the county.

Table 17: Summary of Total Annual Trips for Select Trail/Route Segments in Garfield County (2016-2017)

Trail/Route Segment	Total Annual Trips Along Segment (2016-2017)
1. The Rio Grande Trail, starting in Glenwood Springs to the Garfield-Eagle County line.	2,100 to 4,500
2. The Glenwood Canyon Trail, starting in Glenwood Springs to the Garfield-Eagle County line.	200 to 2,200
3. The Crystal Valley Trail, starting at Meadow Creek Drive in Carbondale to Prince Creek Road (CR 111).	2,600 to 2,700
4. Prince Creek Road (CR 111) starting at the intersection of Highway 133/ Prince Creek Road (CR 111) to the Garfield-Pitkin County line.	2,500 to 2,600

Table 17: Summary of Total Annual Trips for Select Trail/Route Segments in Garfield County (2016-2017) (continued)

Trail/Route Segment	Total Annual Trips Along Segment (2016-2017)
5. Route starting on Main Street in Carbondale to the intersection of Hardwick Bridge Road (CR 109)/Old Highway 82 (CR 154).	1,000 to 1,800
6. Catherine Store Road (CR 100), starting at the bridge over the Roaring Fork River to the intersection of Catherine Store Road (CR 100)/Cattle Creek Road (CR 113).	1,100 to 2,600
7. Crossing of Highway 82 between the Rio Grande Trail and Cattle Creek Road (CR 113).	1,000 to 1,200
8. Cattle Creek Road (CR 113), starting at the intersection of Highway 82/Cattle Creek Road (CR 113) to the intersection of Cattle Creek Road (CR 113)/ Catherine Store Road (CR 100).	1,200 to 1,500
9. Crossing of Highway 82 between the CMC Road (CR 114) and the Rio Grande Trail.	1,300

Data Source(s): Strava (www.strava.com)

The Strava data presented in Table 17, in addition to the Strava data depicted on the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) serves as a useful guide for understanding popular trails systems and cycling routes in Garfield County. These data could be used to inform trail planning efforts, as well as efforts to plan for cycling facilities/infrastructure (ex. bike lanes, widening of county road shoulders, etc.) in the county.

HOUSING

1. OVERVIEW

Appendix E: Housing provides a summary of current information regarding housing availability and needs in Garfield County. The information in this appendix is intended to help inform county decision-making, policies and regulations. Appendix E is organized as follows:

1. Overview
2. Summary of Findings
3. Summary of County & Municipal Information
4. Summary of Garfield County Housing Data

Data for Appendix E were compiled from a number of sources. Those data sources include:

I. Garfield County and Towns/Cities in the County
Information was obtained from Garfield County and the municipalities in the county in order to understand:

- What capacity the unincorporated and incorporated areas of the county have to accommodate future growth and housing.
- What solutions the county and the towns/cities in the county are implementing to address local housing issues.

A compilation of the data gathered is included in this appendix.

II. The 2019 Greater Roaring Fork Regional Housing Study
The 2019 Greater Roaring Fork Regional Housing Study investigated housing conditions and issues in the region from Aspen to the Parachute/Battlement Mesa area (i.e. the Greater Roaring Fork Region (GRFR)). Data from this study were used to analyze housing issues specific to Garfield County, which are discussed in this appendix.

A summary of Garfield County specific data from the housing study is included in this appendix.

III. Online Resources

Data from online resources were compiled in order to supplement data provided by the county and municipalities, as well as the data from the 2019 Greater Roaring Fork Regional Housing Study. Data were sourced from the following online resources:

1. Colorado Association of Realtors
2. Aspen Board of Realtors
3. Glenwood Springs Association of Realtors
4. H+T® Affordability Index
5. AirDNA
6. Shift Research Lab

2. SUMMARY OF FINDINGS

I. Garfield County generates demand for housing that exceeds local supply.

The conclusion from the 2019 GRFR Housing Study is that high levels of need exist today for more housing that is affordable to local residents and that this need will increase in the future.

An analysis was performed to estimate existing and future unit shortfalls for areas in Garfield County (refer to Table 1). This investigation indicates that the housing units needed to address demand will increase over the next decade in every community in the county. This is a pivotal finding, as Garfield County will need to plan for growth and increased housing demand at prices that are affordable to the local workforce.

In 2017, the Area Median Income (AMI) for Garfield County was $70,400 and the county had approximately:

- A 1,700-unit shortfall for households at 60% AMI ($42,240) and below.
- A 107-unit shortfall for households at 61- 100% AMI ($42,944- $70,400).
- A 169-unit shortfall for those at 101- 120% AMI ($70,400- $84,480).
- A 1,000-unit shortfall for the “missing middle” (i.e. households in the 121- 160% AMI range ($85,184- $112,640).

By 2027, it is projected that:

- The shortfall of units affordable to households at or below 100% AMI will grow to roughly 2,300-units.
- The shortfall of missing middle units will almost double to around 1,750-units.

Table 1: Summary of Housing Needs by Area Median Income (AMI) by Area in Garfield County

	Carbondale Area		Glenwood Springs Area		New Castle to Parachute Area	
	2017	2027	2017	2027	2017	2027
Less than 60% AMI	591	615	1,126	483	-	-
61%- 80% AMI	-	128	107	688	-	-
81%- 100% AMI	-	-	-	403	-	-
101%- 120% AMI	-	52	169	-	-	-
121%- 140% AMI	-	264	157	597	136	-
141%- 160% AMI	-	-	381	436	321	457
Greater than 160% AMI	-	-	301	-	334	65
TOTALS	**591**	**1,059**	**2,241**	**2,607**	**791**	**522**

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Carbondale Area	In 2018, the median sales price of single-family housing in the Carbondale area was $779,000 - $131,000 less than the median sales price in the Basalt area and $4,196,000 less than the median sales price in the Aspen area. The median townhouse-condo sales price in the Carbondale area was $475,000. On the basis of affordability, the Carbondale area's current 591-unit shortfall at less than 60% AMI is projected to increase slightly by 2027, and unit shortfalls at nearly every level between 60%-140% AMI are anticipated to emerge. Data Source(s): 2019 Greater Roaring Fork Regional Housing Study; Aspen Board of Realtors
Glenwood Springs Area	In 2018, the median single-family home sales price in the Glenwood Springs area was $537,000. This median sales price was $242,000 lower than the Carbondale area, $373,000 lower than the Basalt area and $4,438,000 lower than the Aspen area. Consequently, this part of the GRFR generates more housing demand than it supplies. The 2018 median townhouse-condo sales price in the Glenwood Springs area was $298,000. As of 2017, the Glenwood Springs area has a 2,200-unit shortfall, which is projected to increase to roughly 2,600-units over the next ten (10) years. The unit shortfall is spread across almost every income level, and is projected to expand in the "missing middle" category (120%-160% AMI) by 2027. Data Source(s): 2019 Greater Roaring Fork Regional Housing Study; Aspen Board of Realtors
New Castle to Parachute Area	The New Castle to Parachute area is currently the most affordable part of the region. In 2018, median sales prices for single-family homes in this area ranged between $399,500 (New Castle) and $225,000 (Parachute-Battlement Mesa). The median sales prices for townhouse-condos ranged between $280,000 (New Castle) and $160,851 (Parachute-Battlement Mesa). Overall, over the next ten (10) years, housing supply needs in this area are projected to remain constant and may even slightly decline. On the basis of affordability, it is anticipated that there will continue to be a shortfall of units in the 141% and above AMI range. Data Source(s): 2019 Greater Roaring Fork Regional Housing Study; and, Glenwood Springs Association of Realtors

II. Year-round business growth means increasing demand for resident housing.

Between 2001 and 2017, the GRFR added more than 10,000 jobs to its year-round business sectors. Relative to the state, the GRFR accounts for 2% of Colorado's total jobs, but captured more than 2.5% of the state's total job growth during this time. Job growth is a sign of a healthy economy. It is anticipated that Garfield County's economy will continue to grow and this growth will generate additional housing demand.

III. Between 2000-2017, the overall housing inventory grew proportionally to jobs.

While a significant number of new housing units have been constructed in Garfield County over the past 17 years, the location of those units is resulting in ever expanding commuting patterns in the county.

The GRFR added 11,900 housing units (nearly 750 units per year) between 2000 and 2017 – almost identical to the net increase in wage and salary jobs. Much (60%) of that construction took place in primarily out-commuting locations – in other words, the New Castle to Parachute and Eagle to Gypsum areas (36% and 25%, respectively). Moreover, 16% of the new housing inventory is estimated to have been built for the second homeowner market – defined as "vacant, for seasonal use."

IV. The cost to build housing has increased and there is no indication that costs will decline in the future.
Since 2001, materials and labor costs have risen significantly, resulting in higher construction costs. The outcome of increasing construction costs is greater housing costs. Unfortunately, there is no indication that construction costs will decline in the future.

Rising home prices are not just the product of market demand factors; they are the result of costs and/or shortages of labor and materials. Since 2001, materials costs have appreciated 56%, and the cost of labor has risen by 70%. Confounding this trend was the net loss (and lack of recovery) of more than 1,300 construction jobs after 2008.

V. Between 2000-2017, the population of the GRFR grew and is expected to continue growing over the coming years.
The GRFR grew by 28,000 residents (approximately 10,000 households) between 2001 and 2017- that is an increase of more than 1,700 people per year. Over the next 10 years, the regional population is projected to grow by 24,000 people- so a projected average annual growth rate of roughly 2,400 people per year.

VI. Housing costs prevent some people in the GRFR from living where they would like to.
The workforce in the GRFR has struggled for decades with the price of housing. This is one of the main reasons why the region has grown to be so large. Workers have sought out housing that is more affordable and available but located farther and farther from their place of employment. In 2017 and 2018, the (weighted) average price of housing in the GRFR fluctuated between $700,000 and $1,000,000. It ranged from just under $400,000 in the New Castle to Parachute area to $2.4 million in the Aspen to Snowmass area.

The following table (Table 2) presents 2018 median sales price information for single-family and townhome-condos in Carbondale, Glenwood Springs, New Castle, Silt, Rifle, Parachute and the county as a whole. The table also includes estimates for monthly mortgage payments (which includes monthly principal, interest and private mortgage insurance (PMI)) and estimates for the annual income necessary to "afford" (i.e. housing costs account for a maximum of 28% of annual income) median sales prices.

Table 2: Summary of 2018 Median Sales Prices for Single-Family Homes and Townhomes-Condos

Location		2018 Median Single-Family Home Sale Price[1]	Estimated Monthly Mortgage Payment[2]	Estimated Annual Income Needed[3]	% of Garfield County 2018 Area Median Income[4]
1.	County-Wide	$384,000	$1,929	$82,671	104%
2.	Town of Carbondale	$779,000	$3,914	$167,743	211%
3.	City of Glenwood Springs	$537,000	$2,698	$115,629	145%
4.	Town of New Castle	$399,500	$2,007	$86,014	108%
5.	Town of Silt	$343,500	$1,726	$73,971	93%
6.	City of Rifle	$288,000	$1,447	$62,014	78%
7.	Town of Parachute	$ 225,000	$1,130	$48,429	61%


Photo Credit: Western Slope Consulting

Table 2: Summary of 2018 Median Sales Prices for Single-Family Homes and Townhomes-Condos (continued)

Location		2018 Median Townhome-Condo Sale Price[1]	Estimated Monthly Mortgage Payment[2]	Estimated Annual Income Needed[3]	% of Garfield County 2018 Area Median Income[4]
1.	County-Wide	$270,000	$1,357	$58,157	73%
2.	Town of Carbondale	$475,000	$2,386	$102,257	128%
3.	City of Glenwood Springs	$298,000	$1,497	$64,157	81%
4.	Town of New Castle	$280,000	$1,407	$60,300	76%
5.	Town of Silt	$243,000	$1,221	$52,329	66%
6.	City of Rifle	$188,500	$947	$40,586	51%
7.	Town of Parachute	$160,851	$829	$35,529	45%

Data Source(s): Colorado Association of Realtors; Aspen Board of Realtors; Glenwood Springs Association of Realtors; Zillow.com; FreddieMac; and, U.S. Department of Housing & Urban Development (HUD)

NOTES:

[1]2018 median single-family home and townhome-condo sales price data obtained from the: Colorado Association of Realtors; Aspen Board of Realtors; and, Glenwood Springs Association of Realtors.

[2]Monthly mortgage payment amount includes mortgage principal interest and private mortgage insurance (PMI) but **DOES NOT** take into account: homeowner's insurance; property taxes; or, homeowner association (HOA) dues. The monthly mortgage payment amount assumes: 10% down-payment; and, a 30-year fixed rate mortgage with an interest rate of 4.54% (2018 Average Annual Interest Rate per FreddieMac). The monthly mortgage payment amount, including PMI, was calculated using the Zillow.com Mortgage Calculator (www.zillow.com/mortgage-calculator/).

[3]Annual income needed assumes 28% of annual income spent on mortgage principal, interest and PMI. 28% of annual income is a standard used by many lenders.

[4]Per the U.S. Department of Housing & Urban Development (HUD), the 2018 Area Median Income (AMI) for Garfield County was $79,600.

Table 3 illustrates that the majority of people in Garfield County live in the community they want to. However, there are a number of people who are unable to afford their community of choice because of housing costs. For example, the 2019 GRFR Housing Study found that 37% of people who live in New Castle would prefer to live in Glenwood Springs if they could afford the cost of housing there.

Table 3: Summary of Where People Live vs. Where They Would Most Like to Live If They Could Afford The Cost of Housing

		Where Do You Live Now (closest community)?					
		Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/Battlement Mesa
Where Would You Most Like To Live If You Could Afford the Cost of Housing?	Aspen	**11%**	4%	1%	2%	1%	-
	Snowmass	3%	2%	-	-	-	1%
	Woody Creek	-	2%	2%	1%	1%	-
	Old Snowmass	2%	-	-	-	1%	-
	Basalt	**6%**	**5%**	3%	-	-	-
	Willits	2%	-	2%	-	-	-
	El Jebel	-	1%	1%	-	-	1%
	Carbondale	**75%**	**21%**	**8%**	5%	**11%**	6%
	Glenwood Springs	1%	**64%**	**37%**	**19%**	**18%**	**17%**
	New Castle	-	1%	**41%**	**10%**	7%	**18%**
	Silt	-	-	-	**43%**	3%	5%
	Rifle	-	-	2%	9%	**50%**	3%
	Parachute/ Battlement Mesa	-	-	-	**10%**	1%	**43%**
	Dotsero/Gypsum/ Eagle Area	-	-	3%	1%	2%	5%
	Edwards/Avon/Vail Area	-	-	-	-	2%	1%
Top 3 communities where people would like to live if they could afford housing.		1. Carbondale 2. Aspen 3. Basalt	1. Glenwood Springs 2. Carbondale 3. Basalt	1. New Castle 2. Glenwood Springs 3. Carbondale	1. Silt 2. Glenwood Springs 3. Parachute/ Battlement Mesa	1. Rifle 2. Glenwood Springs 3. Carbondale	1. Parachute/Battlement Mesa 2. New Castle 3. Glenwood Springs

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

VII. Cross-commuting patterns are the "market" response to affordability challenges.

Cross-commuting patterns are what result when the "market is left to its own devices." That is, the market may be "taking care of itself," but it is not necessarily taking care of workforce's quality-of-life. This could be an important consideration from a policy perspective.

Table 4 presents information about the approximate number of jobs in different parts of the GRFR, as well as the number of workers that these areas import or export in order to fill local employment needs.

Table 4: Summary of Workforce Import/Export in the Aspen to Parachute Area

	Aspen to Snowmass Area		Basalt Area		Carbondale Area		Glenwood Springs Area		New Castle to Parachute Area	
	2015	As %	2015	As %	2015	As %	2015	As %	2015	As %
Total Local Jobs	15,605	100%	2,241	100%	4,594	100%	11,236	100%	9,256	100%
Local Residents/ Local Workers	5,692	36%	329	15%	1,598	35%	3,905	35%	5,166	56%
In-Commuters	**9,913**	**64%**	**1,912**	**85%**	**2,996**	**65%**	**7,331**	**65%**	**4,090**	**44%**
Total Working Residents	8,157	100%	3,171	100%	8,219	100%	8,798	100%	14,909	100%
Local Residents/ Local Workers	5,692	70%	329	10%	1,598	19%	3,905	44%	5,166	35%
Out-Commuters	**2,465**	**30%**	**2,842**	**90%**	**6,621**	**81%**	**4,893**	**56%**	**9,743**	**65%**
Net Import (+) or Export (-) of Workers	**+7,448**		**-930**		**-3,625**		**+2,438**		**-5,653**	

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Aspen to Snowmass Area

In 2015, the Aspen to Snowmass area had roughly 15,600 jobs. Of these, 36% were filled by local residents/workers and 64% were filled by in-commuters (i.e. workers who live outside of the area and commute in).

This finding does not come as a surprise. It is well established that much of the workforce for the Aspen to Snowmass area commutes from other communities in the Roaring Fork Valley, Colorado River Valley and other Western Slope communities. The daily stream of traffic along Interstate 70 and Highway 82 is an outcome of this large commuting workforce.

It is worth noting that as "downvalley" communities, such as Glenwood Springs or Rifle, work to grow and diversify their economies, some of the workers in these communities, who currently commute to the Aspen to Snowmass area, may pursue employment opportunities closer to where they live. This in turn may present challenges for employers in the Aspen to Snowmass area.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Basalt Area

In 2015, the Basalt area had around 2,200 jobs. 15% of these jobs were filled by local residents/workers, while the remaining 85% of jobs were filled by in-commuters.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Carbondale Area

In 2015, it is estimated that there were 4,600 jobs in the Carbondale area. 35% of these jobs were filled by local residents/workers and 65% were filled by in-commuters.

Characteristic of a community that has historically been more of a bedroom community than an employment center (although it has twice as many jobs as the Basalt area), there are 8,200 employed residents in the Carbondale, 80% of whom commute somewhere else in the GRFR for employment.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Glenwood Springs Area

In 2015, there were an estimated 11,200 jobs in the Glenwood Springs area. 35% of these jobs were filled by local resident/workers and 65% were filled by in-commuters.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

New Castle to Parachute Area

In 2015, there were an estimated 9,300 jobs in the New Castle to Parachute area. 56% of the jobs in this area were filled by local residents/workers, while 44% were filled by people who live outside of the area and commute in.

Similar to the bedroom community dynamic of the Carbondale area, the New Castle to Parachute area contains significantly more employed residents than are necessary to fill local jobs. The area has 14,900 employed residents, 65% of which commute somewhere else in the region (as well as to extra-regional locations, such as Grand Junction).

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Table 5 presents additional information regarding where people in Garfield County live and where at least one (1) member of their household is employed. Table 5 builds upon the data presented in Table 4.

Table 5: Summary of Place of Residence vs. Place of Work

		Where Do You Live Now (closest community)?					
		Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/Battlement Mesa
Share of Households that Have At Least One (1) Member Working In These Places	Aspen	**49%**	**16%**	18%	20%	8%	7%
	Snowmass	20%	11%	4%	16%	5%	4%
	Basalt	**31%**	11%	7%	15%	5%	3%
	Willits	14%	5%	4%	9%	1%	2%
	El Jebel	17%	5%	5%	12%	4%	5%
	Carbondale	**69%**	**21%**	**19%**	20%	7%	7%
	Glenwood Springs	**31%**	**84%**	**77%**	**54%**	**41%**	**38%**
	New Castle	4%	7%	**29%**	20%	10%	10%
	Silt	3%	6%	13%	**28%**	8%	13%
	Rifle	5%	7%	18%	**44%**	**73%**	**67%**
	Parachute/ Battlement Mesa	-	2%	2%	9%	9%	**41%**
	Dotsero/Gypsum/ Eagle Area	3%	2%	6%	11%	9%	6%
	Edwards/Avon/Vail Area	2%	2%	3%	5%	4%	4%
	Outside the Region/ Telecommute	8%	4%	3%	3%	8%	6%
	Other	5%	6%	8%	11%	**11%**	19%
Top 3 locations that at least one (1) member of a household is employed (organized by current place of residence).		1. Aspen 2. Carbondale 3. Basalt & Glenwood Springs	1. Glenwood Springs 2. Carbondale 3. Aspen	1. Glenwood Springs 2. New Castle 3. Carbondale	1. Glenwood Springs 2. Rifle 3. Silt	1. Rifle 2. Glenwood Springs 3. Other	1. Rifle 2. Parachute/Battlement Mesa 3. Glenwood Springs

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

VIII. Combining housing + transportation costs provides a more comprehensive picture of "affordability."

Traditionally, housing alone has been deemed "affordable" if it accounted for no more than 30% of a household's income. The H+T® Affordability Index (https://htaindex.cnt.org/map/), an online resource, combines transportation costs- usually a household's second-largest expense- with housing costs to demonstrate that although the cost of housing may be less in certain places, when transportation costs are added in, the places with lower housing costs are not necessarily more affordable.

While people may live in areas where the cost of housing is lower, their home may be located far from job opportunities, amenities, etc. and therefore they may end up spending more on transportation to reach their destinations. Therefore, combining housing and transportation costs provides a more comprehensive perspective on affordability.

Another factor to consider is greenhouse gas (GHG) emissions that result from household automobile use. The more households that drive the greater the GHG's that are typically emitted by these households.

Table 6 presents data sourced from the H+T® Affordability Index. The data includes: (1) Average Housing + Transportation Costs; (2) Transportation Costs; and, (3) Greenhouse Gas Emissions for the county as a whole, as well as the individual communities within the county.

The H+T® Affordability Index establishes "Average Housing + Transportation Costs" by dividing average housing and transportation costs in a community by that community's representative income. This is done in order to illustrate the % of a typical household's income that is spent on housing and transportation expenses.

Table 6: Summary of Housing + Transportation Costs & Greenhouse Gas Emissions for Communities in Garfield County

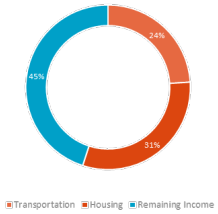
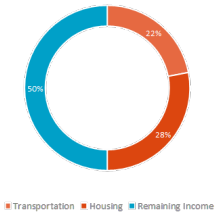
Location	Average Housing + Transportation Costs		Transportation Costs		Greenhouse Gas (GHG) Emissions	
1. Garfield County				Annual Transportation Costs $14,246		Annual GHG Per Household 10.00 Tonnes
	Housing + Transportation Costs	55%		Autos Per Household 2.00		
	Remaining Household Income	45%		Average Household VMT 24,049		
2. Town of Carbondale				Annual Transportation Costs $13,029		Annual GHG Per Household 9.03 Tonnes
	Housing + Transportation Costs	50%		Autos Per Household 1.83		
	Remaining Household Income	50%		Average Household VMT 21,641		

Table 6: Summary of Housing + Transportation Costs & Greenhouse Gas Emissions for Communities in Garfield County (continued)

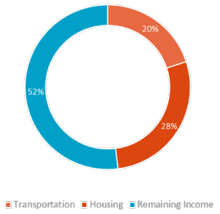
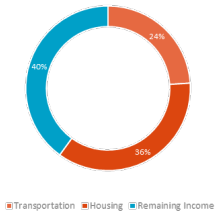
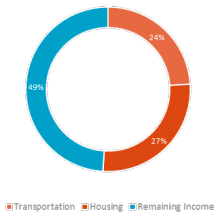
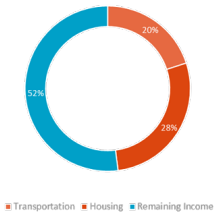
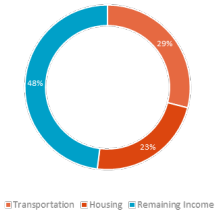
Location	Average Housing + Transportation Costs	Transportation Costs	Greenhouse Gas (GHG) Emissions
3. City of Glenwood Springs		Annual Transportation Costs $12,225	Annual GHG Per Household 8.53 Tonnes
	Housing + Transportation Costs 48%	Autos Per Household 1.69	
	Remaining Household Income 52%	Average Household VMT 21,325	
4. Town of New Castle		Annual Transportation Costs $14,173	Annual GHG Per Household 10.09 Tonnes
	Housing + Transportation Costs 60%	Autos Per Household 2.00	
	Remaining Household Income 40%	Average Household VMT 23,397	
5. Town of Silt		Annual Transportation Costs $14,594	Annual GHG Per Household 10.75 Tonnes
	Housing + Transportation Costs 51%	Autos Per Household 2.04	
	Remaining Household Income 49%	Average Household VMT 24,812	
6. City of Rifle		Annual Transportation Costs $13,616	Annual GHG Per Household 8.83 Tonnes
	Housing + Transportation Costs 46%	Autos Per Household 1.90	
	Remaining Household Income 54%	Average Household VMT 23,343	

Table 6: Summary of Housing + Transportation Costs & Greenhouse Gas Emissions for Communities in Garfield County (continued)

Location	Average Housing + Transportation Costs	Transportation Costs	Greenhouse Gas (GHG) Emissions
7. Town of Parachute & Battlement Mesa		Annual Transportation Costs $13,859	Annual GHG Per Household 10.14 Tonnes
	Housing + Transportation Costs 52%	Autos Per Household 1.93	
	Remaining Household Income 48%	Average Household VMT 24,016	

Data Source(s): H+T® Affordability Index

IX. Garfield County and its towns/cities have capacity to accommodate many additional housing units.

Data from Garfield County and the municipalities in the county indicate that there is capacity to accommodate an estimated 8,747 to 9,247 housing units. Table 7 provides a break down of the estimated number of units that could be accommodated in the unincorporated areas of the county, as well as in each municipality. Given the capacity for additional housing units, it may be beneficial to explore why these units aren't being built when there's significant need for them.

Table 7: Inventory of Capacity for New Housing Units in Garfield County

Location	Estimated Capacity for Additional Housing Units	Projected Housing Needs by 2027[8]
1. Unincorporated Garfield County (includes Battlement Mesa PUD)[7]	5,790 units[1]	-
2. Town Carbondale	458 units[2]	1,059 units (Carbondale Area)
3. City of Glenwood Springs	Limited without major infrastructure upgrades[3]	2,067 units (Glenwood Springs Area)
4. Town of New Castle	999 units[4]	2,067 units (New Castle to Parachute Area)
5. Town of Silt	500 units[5]	
6. City of Rifle	1,000-1,500 units[6]	
7. Town of Parachute	Data Not Available	
TOTAL	**8,747 - 9,247 units**	

Data Source(s): Garfield County; Town of Carbondale; City of Glenwood Springs; Town of New Castle; Town of Silt; City of Rifle; Battlement Mesa Metropolitan District; and, 2019 Greater Roaring Fork Regional Housing Study

NOTES:

[1] Based on a GIS analysis of unconstrained vacant lands (i.e. vacant lands located outside of floodplains,without steep slopes, etc.) zoned Rural (R), Resource Lands (RL), Residential Suburban (RS) and Residential Urban (RU) in Garfield County.

[2] Based on information from the Town of Carbondale's 2013 Comprehensive Plan.

[3] Based on information provided by the City of Glenwood Springs.

[4] Based on information provided by the Town of New Castle.

[5] Based on information provided by the Town of Silt.

[6] According to the 2019 City of Rifle Comprehensive Plan, the city can accommodate an estimated 1,000-1,500 residential units.

[7] According to the Battlement Mesa Metropolitan District (BMMD), Battlement Mesa currently has 90 vacant single-family lots and entitlements for an additional 1,400 units.

[8] Data from the 2019 Greater Roaring Fork Regional Housing Study.

X. Each jurisdiction in Garfield County is taking their own approach to addressing local housing issues.

Table 8 provides a summary of what Garfield County and the towns and cities in the county are doing to address local housing issues. As shown, there are similarities and differences between each jurisdiction's housing efforts.

Table 8: Summary of Housing Efforts in Garfield County

Government Agency	What is Being Done?
1. Garfield County	• Inclusionary zoning requirements for residential subdivisions proposing 15 or more lots located in select part of the county that encompasses the Roaring Fork Valley (refer to Figure 8-1 in the Garfield County Land Use & Development Code). • County modified its Land Use & Development Code and Building Code to allow for "Tiny-Homes." • County permits Accessory Dwelling Units (ADUs). • County's Housing Authority focuses on rental assistance (ex. housing voucher program) and they administer the sale of housing that comes into their system.
2. Town Carbondale	• Town modified its land-use regulations to facilitate construction of more affordable housing. • Town permits Accessory Dwelling Units (ADUs). • Town is exploring opportunities to amend PUD's and/or subdivision covenants in Carbondale to allow for more housing options to be constructed. • Town has inclusionary zoning requirements but is working to modify those based on comments from the Garfield County Housing Authority.
3. City of Glenwood Springs	• City permits Accessory Dwelling Units (ADUs). • City has established a voluntary deed restriction program. • City is working with a Housing Committee comprising citizens. • City is working to address impacts from vacation rentals. • City is planning for and exploring options for future residential development.
4. Town of New Castle	• The Town of New Castle is open to hearing proposals for affordable housing from developers and will evaluate these proposals on a case-by-case basis. • Town permits Accessory Dwelling Units (ADUs).
5. Town of Silt	• The town has 500 lots approved for residential development and is their strategy for addressing local housing needs. • Town permits Accessory Dwelling Units (ADUs).
6. City of Rifle	• There is a requirement for Planned Unit Developments (PUDs) to "... provide benefits to the city such as high quality project design, transportation amenities, community facilities, open space, *affordable housing* or other benefits." • City permits Accessory Dwelling Units (ADUs). • City has enacted programs that reduce fees in exchange for construction of affordable units. • City has pursued and assisted others with Low-Income Housing Tax Credit (LIHTC) projects.
7. Town of Parachute	• The town believes that the affordable cost of housing in Parachute makes it the housing solution for Garfield County. • The town is open to accommodating significant residential development. • Town permits Accessory Dwelling Units (ADUs).

Data Source(s): Garfield County; Town of Carbondale; City of Glenwood Springs; Town of New Castle; Town of Silt; City of Rifle; Town of Parachute; and, Battlement Mesa Metropolitan District

XI. Short-term/vacation rentals appear to affect communities in Garfield County differently.

Short-term/vacation rentals have become a topic of debate in recent years. Common arguments made for or against short-term/vacation rentals include:

- Short-term/vacation rentals take away housing units that are needed for local residents.
- Short-term/vacation rentals are necessary because they enable local residents to afford housing.

Table 9 and Table 10 present data for the number of short-term/vacation rentals in Garfield County. Based on the data in the tables it appears that the popularity and impact of short-term/vacation rentals varies from place to place in Garfield County. Table 9 also offers a summary of whether or not local governments have found it necessary to enact regulations for short-term/vacation rentals.

Table 9: Summary of Short-Term/Vacation Rentals in Garfield County

Location	Estimated Number of Short-Term/Vacation Rentals	Are Short-Term/Vacation Rentals Regulated?
1. Unincorporated Garfield County	304[1]	No
2. Town of Carbondale	94[3]	Yes
3. City of Glenwood Springs	150[2] (approximately 3.6% of city's housing stock)	Yes
4. Town of New Castle	16[3]	No
5. Town of Silt	0[3]	No
6. City of Rifle	4[3]	No
7. Town of Parachute	0[4]	No

Data Source(s): Garfield County; City of Glenwood Springs; Town of Parachute; and, AirDNA

NOTES:
[1]Data provided by Garfield County.
[2]Data provided by the City of Glenwood Springs.
[3]Data sourced from www.airdna.co
[3]Data provided by the Town of Parachute.

Table 10: Summary of Garfield County Short-Term/Vacation Rental Data From 2019 GRFR Housing Study

Location	Housing Inventory	Short-Term Rentals (STRs)	STRs as % of Housing Inventory
1. Carbondale Area	6,672	203	3.0%
2. Glenwood Springs Area	6,508	149	2.3%
3. New Castle to Parachute Area	12,955	28	0.2%

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

3. SUMMARY OF COUNTY & MUNICIPAL INFORMATION

1. UNINCORPORATED GARFIELD COUNTY

Data source(s): (1) Town of Parachute; and, (2) Battlement Mesa Metropolitan District

I. Existing capacity for additional housing units.
Based on a GIS analysis of unconstrained vacant lands (i.e. vacant lands that are located outside of floodplains, without steep slopes, etc.) zoned Rural (R), Resource Lands (RL), Residential Suburban (RS) and Residential Urban (RU) in Garfield County, it is estimated that there is capacity for approximately 5,790 housing units in the unincorporated areas of the county. This number is inclusive of the Battlement Mesa PUD's existing capacity for 1,490 additional housing units.

II. Short-term/vacation rentals.
Short-term/vacation rentals are permitted in unincorporated Garfield County. In August 2019, it was estimated that there were 304 short-term/vacation rentals in the unincorporated areas of the county.

III. What is being done to address local housing issues?
The county has inclusionary zoning requirements for residential subdivisions proposing fifteen (15) or more lots located in select part of the county that encompasses the Roaring Fork Valley (refer to Figure 8-1 in the Garfield County Land Use & Development Code).

The county has modified its Land Use & Development Code and Building Code to allow for "Tiny-Homes."

The county permits Accessory Dwelling Units (ADUs).

The Garfield County Housing Authority focuses primarily rental assistance (ex. housing voucher program) and they administer the sale of housing that comes into their system.

2. TOWN OF CARBONDALE

Data source(s): Town of Carbondale; 2013 Town of Carbondale Comprehensive Plan; 2015 Town of Carbondale Municipal Water Efficiency Plan; U.S. Census Bureau; and, AirDNA

I. Existing capacity for additional housing units.

Appendix 1- Background Information of the Town of Carbondale's 2013 Comprehensive Plan includes an inventory of existing residential developments that are approved but have yet to be fully developed (refer to Table 11). That inventory indicates that in 2013, the Town of Carbondale had existing capacity for an additional 458 residential units.

Table 11: Approved vs. Built Residential Units by Development in the Town of Carbondale

Development	Number of Dwelling Units Approved	Number of Dwelling Units Not Built	% Build-Out of Development
Keator Grove	52	14	73%
Balentine	12	6	50%
Mountain Sage	26	12	54%
Gianetti	4	3	25%
Community Partnership	120	120	0%
Thompson Park	45	45	0%
River Valley Ranch	685	218	68%
Church at Carbondale	24	24	0%
1342 Main Street	8	8	0%
Cleveland II	20	8	60%
TOTALS	**996**	**458**	**54%**

Data Source(s): 2013 Town of Carbondale Comprehensive Plan

According to the U.S. Census Bureau, Carbondale's estimated 2018 population was 6,879. Based on projections from Carbondale's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the town's water service area will reach approximately 16,100 by 2050. The town's Water Efficiency Plan states that Carbondale's water rights are sufficient to meet the supply needs of the community beyond 2050, as is the water supply infrastructure including the water treatment plants, transmission mains, and storage facilities.

II. Short-term/vacation rentals.

According to AirDNA , in August 2019 there were 94 active listings for short-term/vacation rentals in the Town of Carbondale. The Town of Carbondale has regulations in place for short-term/vacation rentals.

III. What is being done to address local housing issues?

In 2016, the Town of Carbondale adopted a Unified Development Code (UDC) that included regulations aimed at addressing housing affordability issues in town. These regulations include:

- Eliminating the minimum size of dwelling units to allow for micro-units.
- Reducing parking requirements for residential units, particularly smaller dwelling units, and eliminating the guest parking requirement.
- Reducing setback requirements.
- Allowing for Accessory Dwelling Units (ADUs).
- Requiring residential developments to provide a variety of housing types, such as a combination of duplex, stacked tri-plex/quad-plex, live/work, townhomes, apartments and single family units in a range of sizes.
- Streamlining and clarifying the land use process.

Recognizing that the town's affordable housing issues would not be resolved solely by the new 2016 UDC, town staff prepared a memo in 2016 suggesting that the town explore the following ideas:

- Creating a streamlined process for converting vacant or underdeveloped lots in a Planned Unit Development (PUD) to affordable housing developments without starting over with a new PUD.

- Work with property owners in PUD's and in subdivisions with covenants that prohibit Accessory Dwelling Units (ADUs) in order to amend these regulations to allow for ADUs.
- Amend Section 5.11: Community Housing Inclusionary Requirements of the UDC to:
  - Adjust the threshold for affordable housing requirements in order to limit attempts by developers to skirt these requirements.
  - Modify the required housing categories (i.e. % AMI Category) in order to create units in the categories with high demand.
  - Include the option of a fee-in-lieu of housing. It was noted that if such a fee were to be established that it would need to be realistic, otherwise developers would find a way to construct affordable units rather than paying the fee.
  - Address discrepancies between the UDC and the town's Community Housing Guidelines.

In 2019, the town amended the UDC revised their regulations for minimum lot area per dwelling unit required in the R/HD zone district.

3. CITY OF GLENWOOD SPRINGS

Data source(s): City of Glenwood Springs

I. Existing capacity for additional housing units.

The city recognizes that Glenwood Springs produces more housing demand than supply and is working to create effective policy to mitigate that deficit. In the past two years, the city has approved approximately 500 rental housing units. Two of those projects are currently under construction, and several smaller projects have been completed.

Most of what Glenwood Springs is able to absorb is infill and redevelopment due to the city's geographic/ topographic constraints, which limit the amount of buildable land. The city has indicated that major infrastructure upgrades are also necessary to accommodate additional housing units.

The new City Council, with three new Councilors elected in April 2019, has shown a willingness to tackle affordable housing issues within the city. It is yet to be seen what housing strategies the new council will prioritize, though meetings aimed at prioritizing council's goals are scheduled for late summer 2019.

II. Short-term/vacation rentals.

2019 data from the city identified 150 permitted Vacation Rentals in Glenwood Springs. Those short-term/ vacation rentals account for 3.6% of the city's total housing stock.

III. What is being done to address local housing issues?

The city has implemented a voluntary deed restriction program that waives all system improvement fees for rental properties that agree to limit rent to 100% AMI as determined by CHFA. This program is aimed at providing workforce housing and only applies to residents that work in the 81601 zip code, are a full time student, or are receiving disability or social security.

The city participated in funding the 2019 Greater Roaring Fork Regional Housing Study to better understand the breadth of housing needs within Glenwood Springs and the region as a whole.

City Council reinstituted a Housing Commission tasked with making recommendations on policy and actions that the city can take to further its housing goals.

City Council has extensively reviewed Glenwood Springs' Vacation Rental program to assess the impacts to the city's housing stock. New regulations are being proposed to mitigate the perceived negative impacts of this industry.

A study was conducted regarding future uses of the Glenwood Springs Airport. Housing options were explored

as a part of this study. This is an on-going project.

4. TOWN OF NEW CASTLE

Data source(s): Town of New Castle; and, AirDNA

I. Existing capacity for additional housing units.

Currently the Castle Valley Ranch and Lakota Canyon Ranch areas have the capacity to build out several hundred homes and commercial space (refer to Table 12). While these areas have dedicated water rights, they lack utility and road infrastructure. As of 2019, no major plans for either of these areas was under permit.

Table 12: Build-Out Analysis of Castle Valley Ranch and Lakota Canyon Ranch

Project Name	Number of Unbuilt Housing Units (approximate)	Amount of Additional Commercial Space (approximate)
Castle Valley Ranch	450	100,000 square feet
Lakota Canyon Ranch	549	100,000 square feet
TOTALS	**999 units**	**200,000 square feet**

Data Source(s): Town of New Castle

II. Short-term/vacation rentals.

The town is aware of one (1) operational Vacation Rental By Owner (VRBO) within municipal limits. It is not believed that VRBO's have an impact on the local economy or housing stock. In August 2019, AirDNA identified sixteen (16) active listings for short-term/vacation rentals in the Town of New Castle.

III. What is being done to address local housing issues?

Recently, the town has made recent major financial concessions to a developer of a 50-unit, age and income restricted housing project.

The town remains sensitive to the needs for affordable housing and will consider hearing proposals from developers that prove to be in the best interest of New Castle's existing population.

5. TOWN OF SILT

Data source(s): (1) Town of Silt; and, AirDNA

I. Existing capacity for additional housing units.

The town has over five hundred (500) lots available for development. The town has the political will and the physical infrastructure to expand by the number of approved lots/units (which is 500).

II. Short-term/vacation rentals.

The town does not currently regulated or monitor vacation rentals within town limits. This topic may be taken up by the Planning & Zoning Commission in the future, if it is found that the impacts from short-term/vacation rentals exceed the benefits.

It is possible that the town has existing vacation rentals that operate without collecting the town's lodging tax, and the town might find it necessary to ferret out those properties to ensure proper collection of the tax.

August 2019 data from AirDNA, indicated that there are zero (0) active listings for short-term/vacation rentals in the Town of Silt.

III. What is being done to address local housing issues?

The Town of Silt recognizes that it has served as a bedroom community to the Roaring Fork and Vail valleys for decades. Consequently, the town has endured large costs for attending to a substantially residential population.

The town has approved numerous lots for development, which can accommodate all variety of residential products.

6. CITY OF RIFLE

Data source(s): City of Rifle; Draft 2019 City of Rifle Water Efficiency Plan; Draft 2019 City of Rifle Comprehensive Plan; and, AirDNA

I. Existing capacity for additional housing units.

According to the City of Rifle's 2019 Comprehensive Plan, the city has the capacity to accommodate 1,500-2,000 residential units in Tier 1 Growth Areas. The city's Tier 1 Growth Areas were established by considering the following criteria:

- The area is either annexed or eligible for annexation.
- The area is directly adjacent to existing neighbor¬hoods.
- The area is served by existing infrastructure (water, sewer, streets). Additional infrastructure can realistically be funded.
- The area has proximity to schools, parks, civic destinations, and businesses (1/4-mile walkshed).
- The lots are of a size, shape, and pattern.

Within the city's Tier 1 areas, an estimated 1,000- 1,500 residential units can be developed on properties that have already been planned for development.

According to the U.S. Census Bureau, Rifle's estimated 2018 population was 9,732. Based on projections from Rifle's 2019 Municipal Water Efficiency Plan, it is anticipated that the city's water supplies can accommodate a population greater than 20,000, which would carry the city to around 2042, assuming a 3% growth rate.

II. Short-term/vacation rentals.

The city has no information available regarding vacation rentals. In August 2019, AirDNA identified four (4) active listings for short-term/vacation rentals in the City of Rifle.

III. What is being done to address local housing issues?

The city has a requirement for Planned Unit Developments (PUDs) to "... provide benefits to the city such as high quality project design, transportation amenities, community facilities, open space, *affordable housing* or other benefits."

The city permits Accessory Dwelling Units (ADUs).

The city does not have any broad policies for affordable housing, but does have done programs to reduce fees in exchange for affordable units.

The city has pursued Low-Income Housing Tax Credit (LIHTC) projects and assisted others with pursuing them.

7. TOWN OF PARACHUTE & BATTLEMENT MESA

Data source(s): Town of Parachute; Battlement Mesa Metropolitan District; and, AirDNA

I. Existing capacity for additional housing units.

The town is open to all types of residential development including both single-family and multi-family housing. The town also has water and sewer resources and capacity, as well as political will to absorb significant residential and commercial development.

The Battlement Mesa PUD currently has 90 vacant single-family lots and entitlements for 1,400 additional housing units.

The Battlement Mesa Metropolitan District's (BMMD) water and sewer facilities are at around 50% capacity. Battlement Mesa's current population is approximately 5,000. Therefore the community has the ability to serve additional housing and a population of approximately 10,000.

II. Short-term/vacation rentals.

To the best of the town's knowledge there are no vacation rentals in Parachute. According to AirDNA, there are

currently zero (0) active listings for short-term/vacation rentals in the Town of Parachute.

III. What is being done to address local housing issues?
The Town of Parachute and the Battlement Mesa community currently provide some of the most affordable housing in Garfield County.

Rents in Parachute are as low as $500 per month for an apartment and the Cottonwood View Apartments has a continual waiting list.

The Town of Parachute believes that it is the affordable housing solution for Garfield County.

4. SUMMARY OF GARFIELD COUNTY HOUSING DATA FROM THE 2019 GRFR HOUSING STUDY

1. OVERVIEW OF THE STUDY
The 2019 Greater Roaring Fork Regional Housing Study is a housing needs analysis that was conducted in 2018/2019 for a region that covers the Roaring Fork Valley and the Colorado River Valley; from Aspen and Snowmass Village to Glenwood Springs, and from Parachute to Edwards. This summary is based on data that was re-aggregated from that study and focuses on Garfield County (a part of the region originally analyzed in the regional effort).

The introduction to the Greater Roaring Fork Regional Housing Study states...

"Study after study has documented unaffordable housing prices, inventory shortages, and an ever-expanding commute shed for workers. Moreover, decades of implementing best practices in most of the region's communities has helped many but left still many more needs unmet. This study provides an understanding of the dynamics, interdependencies, and the "face" (with a regional workforce, resident, and employer survey) of regional housing needs. The purpose is to create a common language with uniformly-collected information and analysis from which regional solutions can finally address regional problems."

This introduction also applies to the conditions that have been identified in Garfield County.

2. KEY TAKEAWAYS FROM THE REGIONAL HOUSING STUDY
The region has a 2,100-unit shortfall in housing for households at 60% of area median income (AMI) and less, and a 1,900-unit shortfall for households between 100% and 160% AMI (i.e. the "missing middle"). While the regional study did not specifically call out estimates of the shortfall for Garfield County separate from the region, it is clear from the analysis that there is considerable housing need at the present time and the units needed to address demand will increase over the next decade.


Photo Credit: Western Slope Consulting

Figure 1: Housing Units Needed by AMI, 2017 & 2027

Income Category	Units Needed in 2017	Units Needed in 2027
Less than 60% AMI	2,118	2,383
61% to 80% AMI	---	2,748
81% to 100% AMI	---	590
101% to 120% AMI	703	---
121% to 140% AMI	195	---
141% to 160% AMI	968	1,105
Greater than 160% AMI	---	---

Source: Economic & Planning Systems
Y:\Projects\DEN\173102-Roaring Fork Valley Regional Housing Needs\Data\[173102-Housing Gaps-Version 2.xlsx]Units Needed Table for Report

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

- Market imbalances throughout the region mean that shortfalls by affordability level are much worse in certain areas. In Garfield County, affordability issues are highest in the southern part of the county.
- Year-round business has grown, which can increase the region's resilience to another down-turn.
- The population is aging and retiring; over the next ten (10) years, it is projected that the population in the region over 65 years old will increase 60% (7,800 people).
- Non-local property ownership and short-term rentals (STRs) put undue pressure on the housing market's prices, which impacts the local workforce and the permanent resident population.

3. WHAT GEOGRAPHICAL AREA DID THE HOUSING STUDY ANALYZE?

The regional study area geography was built on the boundaries of zip codes throughout the Greater Roaring Fork Region (GRFR) and is divided into six (6) distinct areas, illustrated in Figure 3. This analysis focuses on just Garfield County and the incorporated towns of Glenwood Spring, New Castle, Silt, Rifle, Parachute and Battlement Mesa.

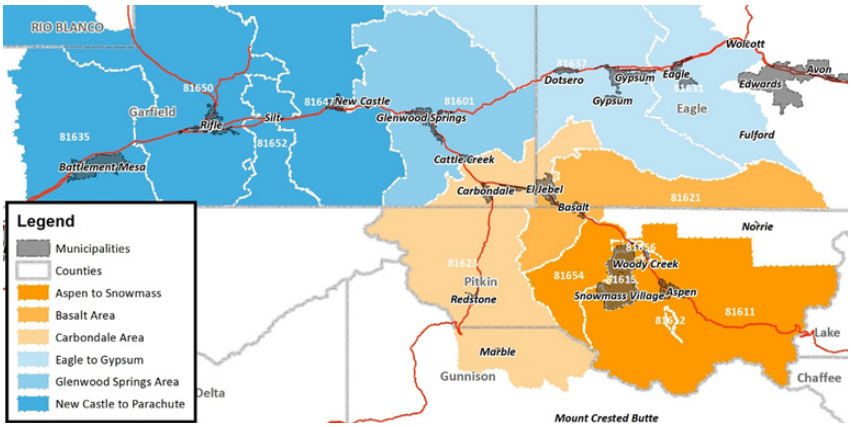
Figure 2: Study Area Geography Definitions

Area	Municipality	Zip Code
Aspen to Snowmass Village	Aspen	81611, 81612
	Snowmass	81615, 81654
	Woody Creek	81656
Basalt Area	Basalt	81621
Carbondale Area	Carbondale	81623
Glenwood Springs Area	Glenwood Springs	81601, 81602
New Castle to Parachute	Battlement Mesa	81635
	Parachute	81635
	New Caslte	81647
	Rifle	81650
	Silt	81652
Eagle to Gypsum	Eagle	81631
	Dotsero	81637
	Gypsum	81637

Source: Economic & Planning Systems
Y:\Projects\DEN\173102-Roaring Fork Valley Regional Housing Needs\Data\[173102-Text Boxes.xlsx]Units Needed Table for Report

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Figure 3: Garfield County and the Greater Roaring Fork Region Study Areas



4. SUMMARY OF FINDINGS AS THEY RELATE TO GARFIELD COUNTY

This summary highlights the major findings of the research, analysis, and process that address the questions at the heart of the region's relevant housing questions. The findings are also delineated by demand-side trends, supply-side trends, considerations of stated preferences, and case studies.

I. The region generates more demand for housing than it has.

In 2017, the region had a 2000-unit shortfall for households at 60% AMI and below, a 700-unit shortfall for those at 100% to 120% AMI, and a 1,200-unit shortfall for the "missing middle" (i.e. households between 120% and 160% percent AMI). By 2027, it is projected that the shortfall of units affordable to households at or below 100% AMI will balloon to 5,700-units, and the shortfall for the missing middle will remain the same.

II. Where is the demand for housing coming from?

Jobs and people generate demand for housing. Business and employment growth translate to housing demand, and households choose where to live based on a variety of factors. At different life stages, people and households have different preferences for what they want in a house, their neighborhood, and a community.

i. Year-round business growth means more need for resident housing.

Job growth is a sign of the economic health, and between 2001 and 2017, the GRFR added more than 10,000 jobs to its year-round business sectors. Relative to the state, the region accounts for 2% of Colorado's jobs, but captured more than 2.5% of the state's growth during this time.

ii. Seasonal housing needs are relatively the same as they were more than a decade ago.

The magnitude of seasonal jobs has remained relatively constant in actual numbers but declined as a portion of overall employment. During the recession, many of the seasonal workforce needs were met by international workers.

iii. The regional population grew by young and old, but mostly old.

The GRFR grew by 28,000 residents (approximately 10,000 households) between 2001 and 2017- more than 1,700 persons per year. Just over 20% of the growth was in population between 35 and 64; more than 40 was under 35; and nearly 60%was over 65. Over the next 10 years, the regional population is projected to grow by 24,000 people – 33% under 35 years old; 30% between 35 to 64 years old; and 30% over 65 years old.

iv. An aging population requires different housing solutions, care, and services.

Although longer life expectancies can be attributable to advances in medical treatment and healthier life-style, living longer means these medical services and treatments need to be available. It also means that different housing solutions need to be addressed. Elderly households frequently express an interest in downsizing and lower maintenance living arrangements, but also express frustration that there are so few if any opportunities in the region. Not only does the lack of appropriate housing impact their quality of life, it negatively impacts the region and municipal sales tax revenue collections.

v. Lower mortgage interest rates were supposed to work in people's favor.

Although approximately 3,500 households in the region paid off their mortgages between 2000 and 2017, they were not replaced by a proportional number of new owner households. As a result, the percentage of owner households with a mortgage dropped from 79% to 73% over this time. Ironically, historically low borrowing conditions were supposed to incent more households into home-ownership, but they exacerbated the unsustainable increase in housing sales prices and instead ushered in a period of ownership disinvestment.

III. Housing supply matters by type, price, and location.

Housing supply constraints, land availability, and a variety of factors (adequate infrastructure, roads, sewer, utilities, and public services) impact where a household chooses to live. Add substantial rates of second home-ownership and inventory used for short-term rentals, and this set of circumstances becomes a major market challenge.

i. The overall housing inventory grew proportionally to jobs.
The region added 11,900 housing units (nearly 750 units per year) between 2000 and 2017 – almost identical to the net increase in wage and salary jobs. Unfortunately, much (60%) of that construction took place in primarily out-commuting locations – i.e. the New Castle to Parachute and Eagle to Gypsum areas (36% and 25%, respectively). Moreover, 16% of the new inventory are estimated to have been built for the second homeowner market – defined as "vacant, for seasonal use".

ii. Non-local ownership increased its toehold in the region.
While the portion of residential properties (single-family and multifamily) in local ownership decreased from 73% to 72%, nearly 60% of new residential property valuation added between 2005 and 2017 was in the hands of non-locals.

iii. Short-term rentals (STR) are a constraint on housing for residents.
A current snapshot of STRs in the GRFR reveals more than 1,600 listing – more than 3% of the region's entire housing stock (i.e. total housing inventory). As expected, a majority of STRs are located in the Aspen to Snowmass area, with smaller proportions in the other areas of the region, ranging from less than 1% of total inventory in New Castle to Parachute to approximately 3% of the Carbondale area's inventory.

iv. The cost to build housing has increased.
Rising home prices are not just the product of market demand factors; they are the result of costs and/or shortages of labor and materials. Since 2001, materials costs have appreciated 56%, and the cost of labor has risen by 70%. Confounding this trend was the net loss (and lack of recovery) of more than 1,300 construction jobs after 2008.

IV. How unaffordable are housing prices?
Put together, the type of demand and supply constraints the region experiences translate inevitably lead to affordability challenges. Rates of commuting increase, ownership and investment declines, and the community and environment suffer. Most concerning is that this impacts the community, its heritage, and the people's quality of life.

i. A second homeowner-driven market has driven its workforce away from their jobs.
The region's workers have struggled for decades with the price of housing, and that is one of the main reasons why the region has become so large; workers have sought more affordable and available housing farther and farther away from their jobs. In 2017 and 2018, the (weighted) average price of housing in the GRFR fluctuated between $700,000 and $1,000,000 – from just under $400,000 in the New Castle to Parachute area to the out-of-reach high in the Aspen to Snowmass area of $2.4 million.

ii. Cross-commuting patterns are the "market" solution to affordability challenges.
The Aspen to Snowmass area imports an average of 7,500 workers per day, and Glenwood Springs is a net importer of 2,400 workers. The other areas generally export workers. From a policy perspective, these cross-commuting patterns are what happens when the "market is left to its own devices." That is, the market may be "taking care of itself", but it is not taking care of these workers' quality-of-life (at least for those who would rather not commute as far).

iii. Cost burden costs the region $54 million a year.
Although some households are making quality of life trade-offs when they choose to spend more than 30% of their incomes on housing, the economic impact of "overspending" cannot be overlooked. It is estimated that overspending amounted to approximately $54 million in 2017, averaging $320 per month for each of the region's 14,100 cost-burdened households. The impact is that $320 per month spent regionally would recirculate locally in very different ways (creating jobs) in the hands of households rather than the hands of non-local landlords or residential mortgage bond-holders (e.g. Wall Street).

5. HOUSEHOLD AND EMPLOYER SURVEYS WERE USED TO UNDERSTAND HOUSING CONDITIONS

The survey-based component of the Regional Study was conducted during late winter and spring, 2018. The extensive effort targeted both local residents/employees and employers. Selected highlights of the survey research as it applies to Garfield County are summarized in this section of the report.

I. What are workers and residents saying?

Feedback from the surveys support some overall conclusions:

i. Residents and employers throughout the region are experiencing housing problems.

Similarities between survey results from both groups are striking. To a large extent, housing issues are being felt throughout the area and the problems generally don't respect city or county boundaries.

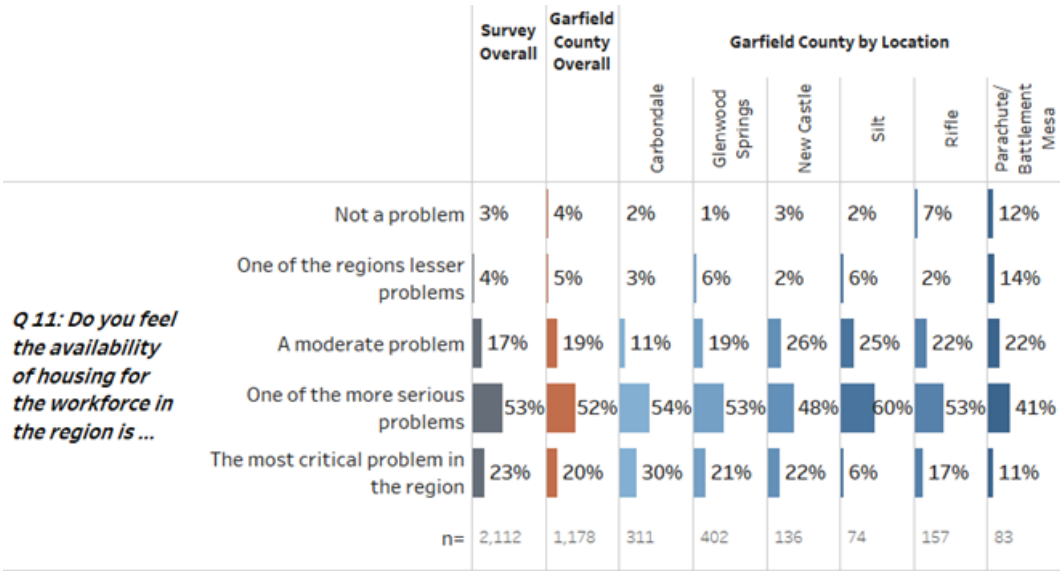
ii. Some residents are dissatisfied with local housing.

Among residents, dissatisfaction with current residence was probed in a variety of ways. Overall, about 1 in 10 residents report they are "somewhat" or "very" dissatisfied with their current residence. Similarly, about 9% report dissatisfaction with the community where they live. Responses to this question are similar across the region although average satisfaction ratings with residence are somewhat lower (more dissatisfaction) in the Aspen/Snowmass area (3.8) compared to the Garfield County area- Glenwood Springs through Battlement Mesa (4.0). Survey results show that renters are more than twice as likely to be dissatisfied (19% compared to 7% for owners).

iii. Housing is rated a critical or serious problem by a majority of all residents in all communities in the region.

The relatively low level of dissatisfaction of residents is in seeming contrast to the widely held belief by residents and employers alike that housing is a "serious" or "critical" problem. While many are not dissatisfied with their homes, they recognize the housing problems are widespread and that housing issues create other impacts including traffic and commuter-related congestion and service quality issues as explained in open-ended comments obtained through the survey. The fact that this opinion is shared by most residents living throughout the region (76%), is illustrated by the graph below. Similarly, employers called it a problem at the same level, 76%. Consensus between residents and employers that availability of housing represents a major problem provides an environment where public and private sector cooperative efforts become more viable.

Figure 4: How significant of a problem do you think the availability of workforce housing in the region is?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

iv. Retiring workers want to stay in their current community and residence.

These current residents will present a challenge over the next decade- problems exist today but they will only get worse, and they will be felt in upper Roaring Fork (Aspen/Snowmass) locations, as well as all of Garfield

County. The currently housed workforce will be getting smaller because of increasing percentages of retirees in the next few years, and a significant number of retiring workers now live in deed restricted units exacerbating the challenges. The survey finding that many older households want to stay in their community and in their current residence worsens the problems.

v. How do survey respondents expect to use their home in the future?
Overall, the results show general similarities across the region; in other words, all communities can expect a significant number of residents to want to stay in their community and in their current home into the future. However, the survey results also suggest that there is a segment of the community that will be interested in renting or purchasing a smaller home upon retirement – about 26% say they are "extremely" or "very" likely. Encouraging the development of some new smaller homes for retiring workers should be considered as a part of local housing plans.

vi. Relationship between where households live and where they work.
The relationship between where households live and where they work in the region is central to understanding housing current housing demand patterns and to planning for future housing and transportation policies. Analyzing these patterns is complex because households typically have more than one worker and for most, the decision where to live is based on a calculus that includes a variety of considerations. Commuting patterns and demand are closely tied to housing problems. The fact that significant percentages of employees are commuting long distances in Garfield County has a variety of implications. The survey data can support analysis of policy options and the relationship between commuting and housing trade-offs.

vii. Commuting workforce.
With the exception of Aspen, most households in the region have one or more workers working outside their community. Another way of looking at these data is to consider the pull of Aspen as an employment center. Survey results show that in communities between Snowmass and El Jebel, between 62% and 97% of respondents have one or more household member working in Aspen. Among Carbondale residents the figure drops to 49%, and it then falls off even more sharply among Glenwood Springs (16%) and Rifle (8%) residents. Nonetheless, a still significant 18-20% of New Castle and Silt households report one or more persons working in Aspen. The survey clearly identifies and measures widespread commuting that provides the demand that is served in part by RFTA and by other efforts including employer transportation assistance or subsidies.

viii. Where do survey respondents most want to live?
The survey explored where current residents "would like to live if you could afford the cost of housing?" Results show 91% of Aspen respondents prefer Aspen, a not surprising finding. However, significant majorities living in Carbondale (75%) and Glenwood Springs (64%) also prefer their communities as a first choice. Among towns further west the figure dips to between 40% and 50%. These data are important, with many implications for communities in Garfield County. For example, they suggest that while Aspen may be the location of employment for many, it is not everyone's preferred place to live. This "first choice place to live" metric could be used to measure change over time as individual Garfield County communities work on policies and infrastructure to enhance their livability and attractiveness.

ix. Open-Ended Comments.
The Household Survey contained a large number of "open-ended" questions that permitted respondents to comment or expand upon a quantitative response. Taken together, these comments represent over 300 pages of input. In an effort to make these results readily available, the consultant team provided several different summaries of the results. A listing of verbatim comments from Garfield County respondents on several of the key open-ended questions are included in this appendix.

II. What are employers saying?
The primary purpose of the Employer Survey was to understand local housing and employment issues from the perspective of employers. This section of the report summarizes Employer Survey responses from throughout the region, not just employers in Garfield County. The nature of employment patterns and the fact that many

businesses work in multiple locations makes it difficult to disaggregate employer information to a single locale. The 2018 survey collected a variety of data including: employment patterns, the impact of housing availability on retaining/recruiting employees and business operations, employer opinions, and activities regarding local workforce housing, and related issues. Altogether, a total of 300 employer surveys were received. The responding employers represent a diverse range of sizes, locations, and industry sectors. The responding employers account for 14,485 total peak-season employees (taking the maximum of winter employment and summer employment for each employer), an appreciable share of total employment in the region.

i. Employer demographics.
The survey contained a series of questions designed to characterize employers on the basis of location, industry sector, square footage, and other functional characteristics.

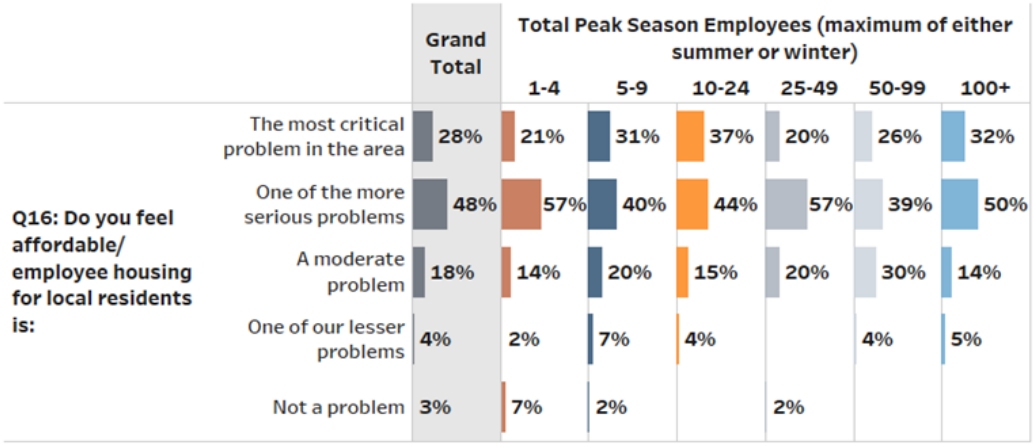
- Employer location: Responses were obtained from employers throughout the region, with the greatest representation in the employment centers of Aspen (43%) and Glenwood Springs (20%).
- Industry sector: Survey respondents were distributed across a broad variety of industry sectors, led by construction (10% of respondents), retail trade (10%), professional/scientific/technical services (8%), and bar/restaurant (7%).

ii. Employees by job status.
Employers were asked to report their total number of year-round full-time, year-round part-time, seasonal full-time, and seasonal part-time employees, in both the summer and winter seasons.

- Unfilled jobs at the present time: Fully 45% of responding employers said they had unfilled jobs at the present time, including 37% with unfilled full-time jobs and 19% with unfilled part-time jobs. This past winter (2017/18 season), 32% of responding employers had jobs they were unable to fill. The share of employers with unfilled jobs varied from 18% at employers with 1-4 workers to 60% at employers with 50+ workers. Altogether, including respondents both fully staffed and understaffed, employers were on average understaffed by 2.8% this past winter.

iii. Ease of finding and retaining qualified employees, and challenges in recruiting.
Most employers (57%) say it has gotten harder to find and retain qualified employees over the past three (3) years, while 28% say it has stayed about the same, and just 1% say it has gotten easier (13% don't know). Fully 86% of responding employees say they have challenges in recruiting and retaining employees, including 74% of the smallest employers and 100% of the largest. The biggest challenge by far is a lack of affordable housing, cited by 66% of employers.

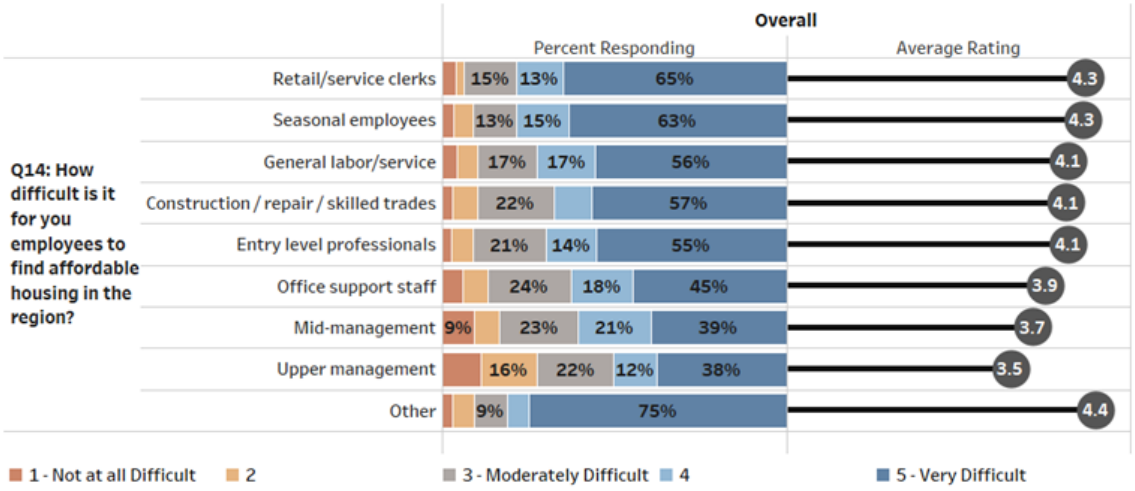
Figure 5: How significant of a problem do you think the availability of workforce housing in the region is?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Employer Survey

iv. How difficult is it for your employees to find affordable housing?
Employers were asked to rate how difficult it is for various employee groups to find affordable housing. A majority of employers believe it is "5-very difficult" for: retail/service clerks (65%), seasonal employees (63%), general labor/service (56%), construction/repair/skilled trades (57%), and entry level professionals (55%). A significant but smaller share of employers say that finding affordable housing is very difficult for office support staff (45%), mid-management (39%), and upper management (38%).

Figure 6: How difficult is it for your employees to find affordable housing in the region?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Employer Survey

v. Impact of housing availability on work performance of employees.
Almost three-quarters of employers (73%) feel that the availability of affordable housing has impacted the work performance of their employees, rising from 61% of the smallest employers to 81% of the largest. Impacts include displeasure with wage rates due to high housing costs (48%), high turnover (29%), tardiness from long commutes (29%), high absentee rates (8%), and other issues (7%, e.g. fatigue from long commutes, inability to expand business, etc.

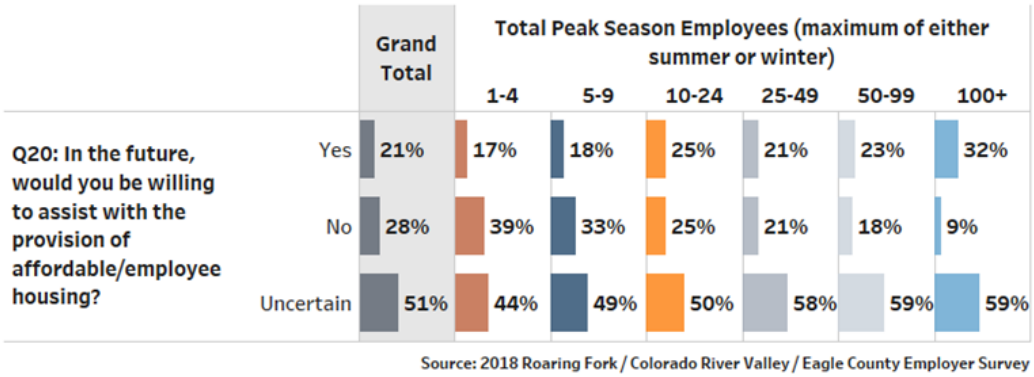
vi. Seriousness of the issue of affordable/employee housing for local residents.
In a key finding from the research, there is broad agreement among employers of all sizes that affordable housing is a problem for residents. This opinion is shared by residents. Most employers feel that affordable/employee housing is a serious issue, with 28% rating it as "the most critical problem in the area," and 48% rating it as "one of the more serious problems."

vii. Employer actions. The survey probed specific actions currently being undertaken by employers to address housing needs, as well as their potential willingness to assist in the future. Provision of housing and housing assistance to employees was evaluated. A significant share of employers – and especially the largest employers – provide some type of housing assistance to their employees.

Additionally, responding employers provide other types of housing assistance, roughly equivalent to 2% of their summer and winter employees.

- Willingness to assist with provision of affordable housing in the future: About one in five employers (21%) stated they would be willing to assist with the provision of affordable housing in the future, while 28% are unwilling, and fully half (51%) are uncertain. The high level of uncertainty may imply a potential openness to assisting, subject to the details of what that might entail.

Figure 7: In the future, would you be willing to assist with the provision of affordable/employee housing?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Employer Survey

viii. Open-ended comments.

The Employer Survey included several opportunities for open-ended comments. A complete listing of these comments is presented under separate cover. The comment feedback obtained from the following question included responses that have been grouped into the various topics:

- Q24- Do you have any other comments or suggestions regarding affordable housing for employees in the region?
  - Affordable Housing Concerns.
  - Support vs. Opposition to Employee Housing.
  - The Role of Government in Affordable Housing.
  - Other Themes and Comments.

6. THE RESULTS FROM THE REGIONAL HOUSING SURVEY

I. Distribution

Survey packets were mailed to a random sampling of households located between Aspen and Parachute/ Battlement Mesa along the Roaring Fork/Colorado River valleys, as well as to residents of Eagle County located between Eagle and Dotsero. The mailing list was purchased from a commercial vendor and provides a relatively current source of addresses that included owner and renter households. The mailed packet consisted of a cover letter (explaining options to complete the survey, including on-line in either English or Spanish), a paper survey, and a postage paid return envelope. Additionally, the survey included an invitation to participate in a prize drawing for one of ten (10) $50 grocery store gift certificates. That prize drawing message was presented on a small slip of paper separate from the survey form in order to preserve the anonymity of respondents.

II. Survey Responses

The sample consisted of 6,000 surveys sent, with a total of 273 surveys returned as undeliverable. The mailing resulted in 948 returned paper forms (including 6 Spanish language surveys), an overall response rate of 16.5% based on delivered surveys. Additionally, the survey was publicized via Facebook in the valleys with ads in English and Spanish. A total of 100 surveys were completed based on the Facebook invitations. Finally, an “open link” version of the survey was made available throughout the study area with ads, public notices and some advertising. As summarized below, the open invitation version of the survey resulted in 1,063 responses.

The mailed invitation segment of survey responses was obtained through random distribution and as a result, confidence intervals have been estimated for that set of survey respondents. The 95% confidence interval for a sample of 948 is +/-3.0 percentage points (larger for subgroups of respondents and questions with smaller sample sizes). The responses from the Facebook and Open Invitation sources were not obtained through random sampling and as a result, confidence intervals were not calculated for these subgroups. It is noted that

survey responses from all sources of survey distribution have been compared and are similar.

Table 13: Summary of Survey Distribution - Responses by Source

Source	Number of Responses
Mailed Invitation to Random Sample	948
Facebook Invitation	100
Open Invitation	1,063
TOTAL RESPONSES	**2,111**

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

III. Analysis of the Survey Results

The survey results provide a large data set that can be analyzed in a variety of ways. The consultant team considers the Mailed Invitation pool of responses to be most representative of regional households. However, because the results from the Facebook and Open Invitation segments of the sample closely resemble the random sample, the entire set of responses have been combined for much of this report. The sample is sufficiently large to permit analysis based on geographic subareas of the region, as well as by individual communities. The following discussion is primarily oriented around graphs that portray the "Overall" set of responses, as well as responses from Garfield County and the distinct geographic subareas (towns) based on zip codes of respondents: Carbondale, and Glenwood Springs through Battlement Mesa/Parachute.

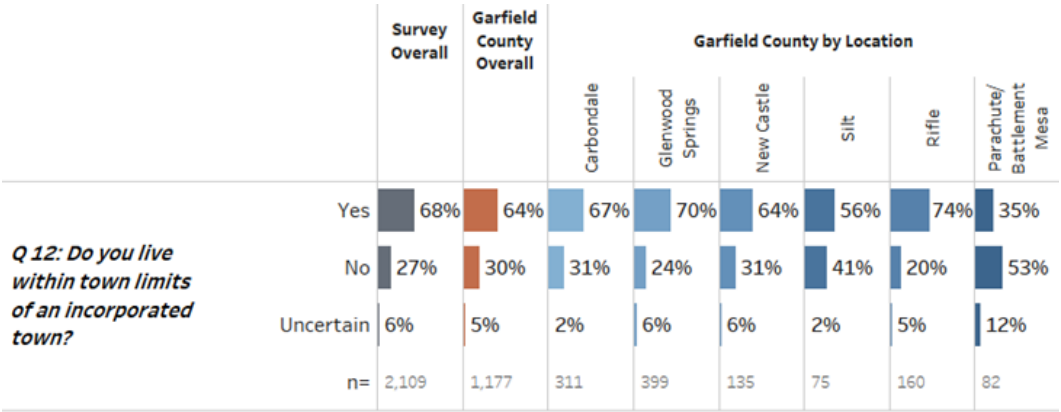
7. GARFIELD COUNTY RESPONDENT CHARACTERISTICS

The survey contained a series of questions designed to characterize household demographics as well as other background information.

I. Where in Garfield County do survey respondents live?

The survey obtained responses from residents throughout Garfield County. The data indicate that there is a significant percentage of residents that live outside incorporated communities (30% of survey respondents). These data are potentially significant as various policy options are considered by regional decision-makers. While both towns and counties in the region, including Garfield County, have considerable experience trying to address affordable housing problems, the challenges are confounded by residents living in unincorporated areas resulting in a significant role for counties as well as towns/cities, and the need for coordination between jurisdictions.

Figure 8: Where do you live?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

II. Do respondents own or rent?

Overall, about 67% of Garfield County responses are from owners, 31% from renters, with 3% indicating other circumstances such as care-taking, living with parents, work exchange, etc.

Figure 9: Do you own or rent the residence where you currently live?

		Survey Overall	Garfield County Overall	Garfield County by Location					
				Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
Q 3: Do you own or rent the residence where you currently live?	Own	68%	67%	66%	59%	75%	87%	63%	67%
	Rent	30%	31%	33%	38%	24%	13%	35%	23%
	Other	1%	2%	1%	2%	1%		1%	7%
	Currently don't have housing	0%	1%	0%	1%				3%
	n=	2,146	1,192	311	405	137	76	164	84

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

III. Employer Assistance with Housing

A notable share of respondents (9% in Garfield County) live in housing provided or subsidized by their employer. Sharp geographic differences are evident, ranging from 28% among Aspen/Snowmass area residents to 10% in the Glenwood Springs area and 2% in the Parachute/Battlement Mesa area.

Figure 10: Does your current employer provide subsidized housing?

		Survey Overall	Garfield County Overall	Garfield County by Location					
				Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
Q 4: Does your current employer provide subsidized housing?	Yes	15%	9%	19%	10%	7%	3%	2%	2%
	No	79%	86%	75%	86%	88%	94%	94%	86%
	Uncertain	6%	5%	5%	4%	5%	3%	4%	11%
	n=	2,040	1,124	297	380	132	73	150	78

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

IV. Multiple job holding continues to be prevalent among workers in Garfield County.

As is common in mountain communities, the average number of jobs held per individual significantly exceeds 1 job. As shown below, the average is 1.2 jobs per person in Garfield County. In Aspen, Carbondale and Glenwood Springs the figure is 1.3 jobs, in down Valley communities it is approximately 1.1. The figure is an important measure of how a segment of local residents respond to costs of living, they are working multiple jobs to augment income or because some jobs are not available year round or full time.

Photo Credit: Western Slope Consulting

Figure 11: How many jobs do the employed adults (18 & older) in your household currently work?

			Survey Overall	Garfield County Overall	Garfield County by Location					
					Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
Q 22: How many jobs do the employed adults (age 18 and over) in your household currently work?	YOU (ADULT #1): TOTAL JOBS	0	1%	2%		2%	1%		5%	
		1	78%	80%	75%	78%	82%	88%	79%	93%
		2	16%	14%	20%	13%	16%	11%	14%	6%
		3	4%	3%	5%	7%	1%	1%	2%	
		4	1%	0%	1%					1%
		5	0%	0%		0%				
		8	0%							
		AVERAGE	1.3	1.2	1.3	1.3	1.2	1.1	1.1	1.1
		n=	1,660	887	244	296	102	62	122	51

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

V. How long have survey respondents lived in the region?

Survey results suggest that a large percentage of residents have lived in the region for some time, with over 66% of Garfield County respondents indicating 10 years or more. This measure shows relatively little geographic variation. This question is used to segment some of the other survey questions; typically, relative newcomers to the region have differing opinions about the housing situation and they often encounter differing experiences and particular challenges.

Figure 12: How long have you lived in the area?

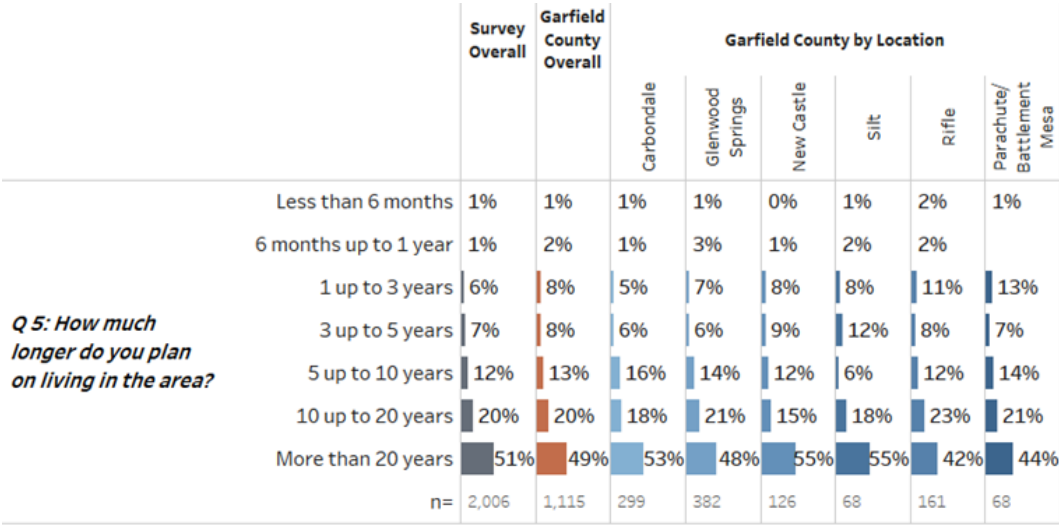
		Survey Overall	Garfield County Overall	Garfield County by Location					
				Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
Q 5: How long have you lived in the area (Pitkin/Garfield/ Eagle Counties)?	Less than 6 months	1%	1%	2%	1%	1%		1%	1%
	6 months up to 1 year	3%	3%	3%	3%	5%	1%	2%	
	1 up to 3 years	8%	8%	9%	11%	10%	5%	6%	7%
	3 up to 5 years	7%	7%	6%	6%	6%	6%	8%	11%
	5 up to 10 years	14%	15%	15%	14%	15%	8%	21%	10%
	10 up to 20 years	20%	21%	21%	19%	25%	12%	19%	32%
	More than 20 years	47%	45%	44%	46%	38%	69%	43%	40%
	n=	2,034	1,130	300	390	128	69	159	73

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

VI. How long do survey respondents expect to live in the region?

In a related finding, the majority of respondents anticipate continuing to live in the region long-term. Only 11% of Garfield County respondents anticipate moving out of the region in the next three (3) years. There is little variation in this measure across the geographic areas. In general, the data suggest that in spite of housing and other challenges, most residents want to stay in the area.

Figure 13: How much longer do you plan on living in the area?



Q 5: How much longer do you plan on living in the area?	Survey Overall	Garfield County Overall	Garfield County by Location: Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
Less than 6 months	1%	1%	1%	1%	0%	1%	2%	1%
6 months up to 1 year	1%	2%	1%	3%	1%	2%	2%	
1 up to 3 years	6%	8%	5%	7%	8%	8%	11%	13%
3 up to 5 years	7%	8%	6%	6%	9%	12%	8%	7%
5 up to 10 years	12%	13%	16%	14%	12%	6%	12%	14%
10 up to 20 years	20%	20%	18%	21%	15%	18%	23%	21%
More than 20 years	51%	49%	53%	48%	55%	55%	42%	44%
n=	2,006	1,115	299	382	126	68	161	68

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

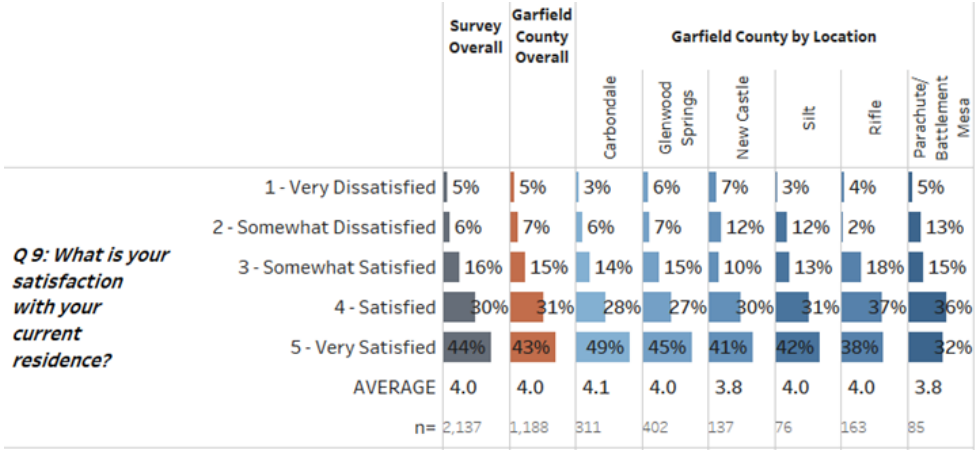
8. SATISFACTION

The survey asked respondents about their satisfaction with their current residence and the community in which they live. These questions represent an important indicator of overall opinion and they also serve to segment survey results permitting the exploration of those respondents that are least satisfied. As described below, a large percentage of residents are satisfied with both their residence and the community in which they live. Yet, there is widely help sentiment that housing is a "critical" or "serious" problem in the region, one that is in need of attention.

I. Satisfaction with personal housing situation.

Overall, just under half of the respondents (43% in Garfield County) rate their satisfaction with their residence a "5" or "very satisfied", and another 33% are "satisfied." In contrast, about 12% are "very" or "somewhat dissatisfied." In other words, while the focus of much of the local discussion is on problems with housing and the challenges felt by many segments of residents, the prevailing sentiment in terms of the individual situation of residents is generally quite positive.

Figure 14: What is your level of satisfaction with your current residence?

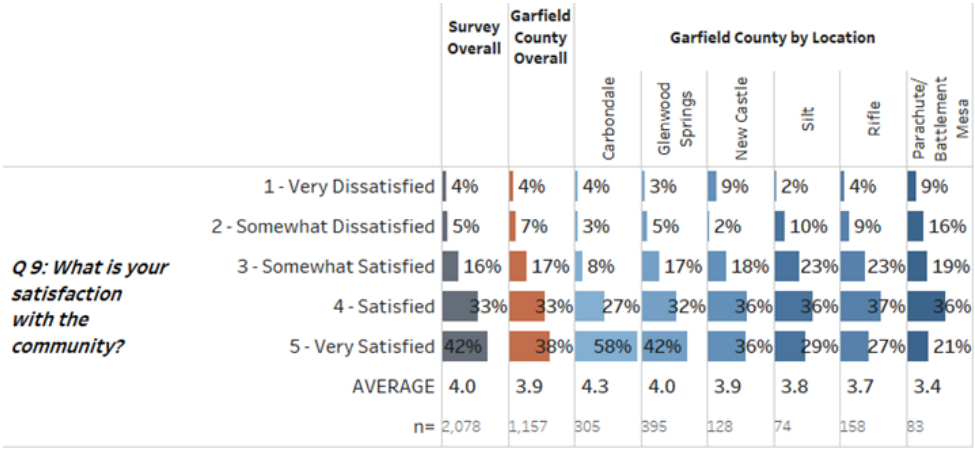


Q 9: What is your satisfaction with your current residence?	Survey Overall	Garfield County Overall	Garfield County by Location: Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
1 - Very Dissatisfied	5%	5%	3%	6%	7%	3%	4%	5%
2 - Somewhat Dissatisfied	6%	7%	6%	7%	12%	12%	2%	13%
3 - Somewhat Satisfied	16%	15%	14%	15%	10%	13%	18%	15%
4 - Satisfied	30%	31%	28%	27%	30%	31%	37%	36%
5 - Very Satisfied	44%	43%	49%	45%	41%	42%	38%	32%
AVERAGE	4.0	4.0	4.1	4.0	3.8	4.0	4.0	3.8
n=	2,137	1,188	311	402	137	76	163	85

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

Further, Garfield County respondents are also generally satisfied with the community in which they live, overall 38% responding "very satisfied" and 33% "satisfied." These results are especially positive among respondents from Carbondale, while several other towns have relatively greater levels of dissatisfaction.

Figure 15: What is your level of satisfaction with the community you currently live in?

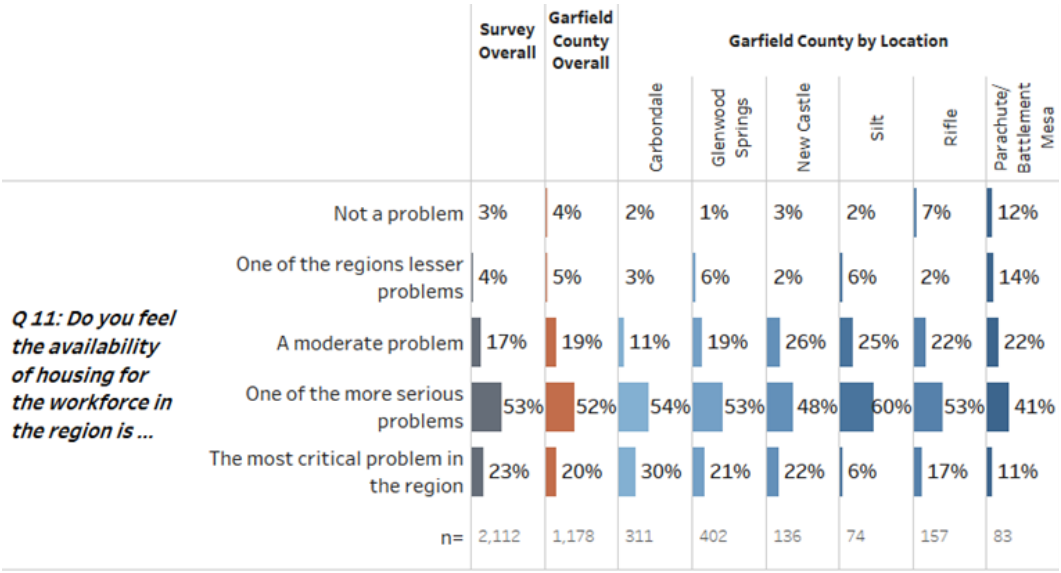


Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

II. Perceived extent of the housing problem.

The survey contained a question that provides insight into the local opinions about the extent of the "housing problem." As shown below, overall 20% of Garfield County respondents consider housing to be the "most critical" problem in the region, with an additional 52% calling it "one of the more serious problems." However, there are significant differences in response by geography. Not surprisingly, housing is widely identified as a serious or critical issue among Aspen area respondents (86%). In the geographic areas Glenwood Springs and west, below that number drops progressively. In other words, housing is widely perceived to be a problem but there are variations in opinion that could be weighed as regional efforts are considered. Within Garfield County, the problem of housing is widely identified but there are other problems that also are considered important and in need of being addressed.

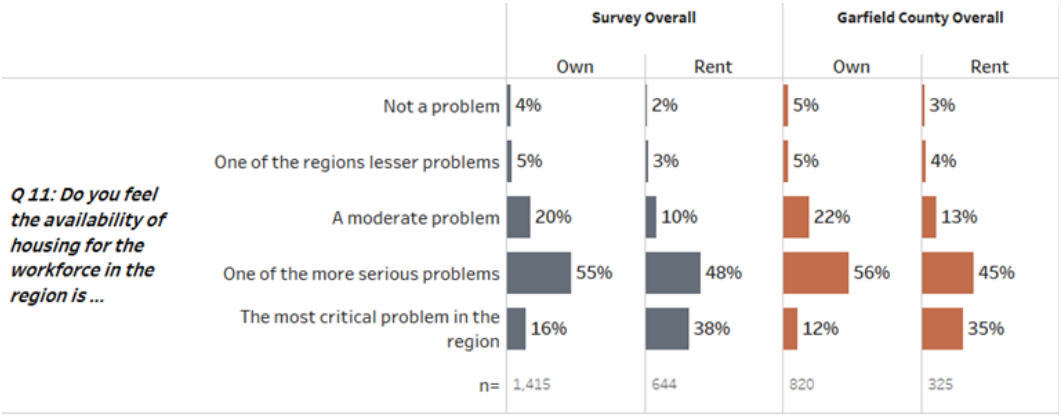
Figure 16: How significant of a problem do you think the availability of workforce housing in the region is?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

Perhaps not surprising is the finding that renters perceive the problem go be more "critical" than owners. However, the strong majority of respondents share the opinion that it is a critical or serious problem.

Figure 17: How significant of a problem do you think the availability of workforce housing in the region is?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

9. RETIREMENT ISSUES

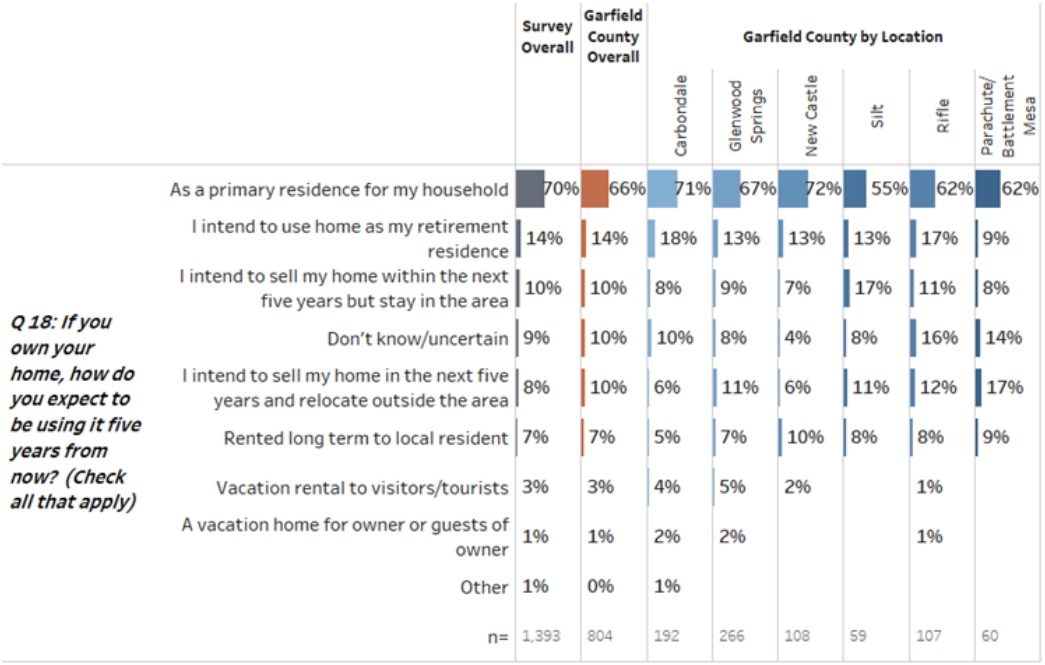
A topic of considerable local discussion has revolved around the challenges of an aging workforce and the potential retirement of a large segment of residents. As noted above, many residents indicate that they would like to stay in the region for the long term. The impacts of retirees on housing demand, and on the current inventory of deed-restricted units are significant; the surveys were designed to permit these topics to be explored.

I. Expected use of home five (5) years from now.

Survey respondents were asked how they expect to use their home in the future. Note that this question permitted multiple responses so totals sum to greater than 100%. Most respondents (66% Garfield County) expect to use their home as a primary residence. This figure varies from approximately 82% in Aspen/Snowmass (not shown on graph) to 67% in Glenwood and 62% in Rifle and Parachute. While few respondents expect to sell and move outside the area (10% overall among Garfield County respondents), this expectation was relatively higher in the down valley areas. Overall, the results show similarities across the region, in other words, all communities can expect a significant number (well over 50%) of residents to want to stay in their community and in place in the future. The interest in renting long-term to year-round residents is a low 7% overall in Garfield County, but interestingly the percentage saying they expect to rent to visitors (i.e. Rent by Owner) is even lower, less than 3%.


Photo Credit: Western Slope Consulting

Figure 18: If you own your home, how do you expect to be using it five (5) years from now?



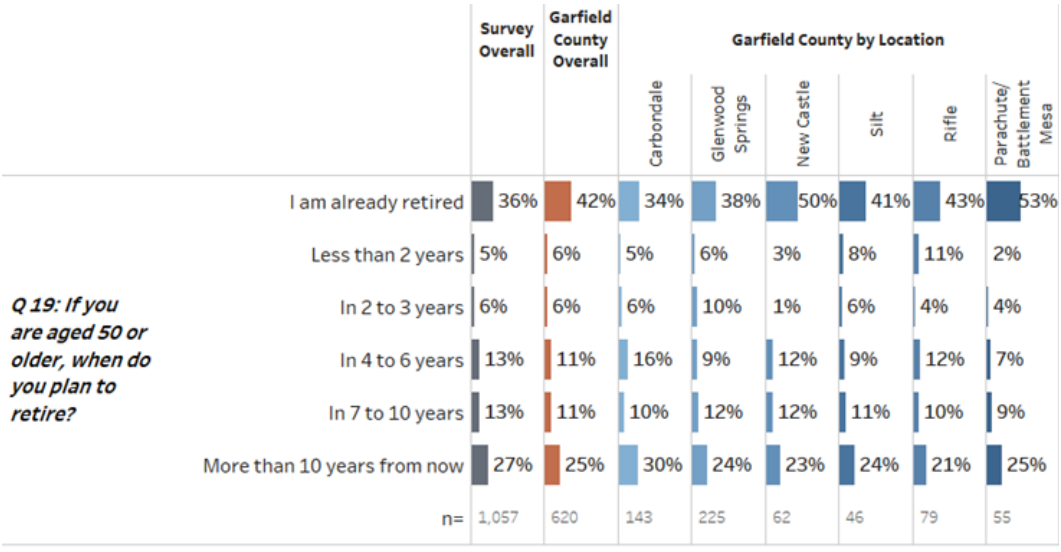
Q 18: If you own your home, how do you expect to be using it five years from now? (Check all that apply)	Survey Overall	Garfield County Overall	Garfield County by Location: Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
As a primary residence for my household	70%	66%	71%	67%	72%	55%	62%	62%
I intend to use home as my retirement residence	14%	14%	18%	13%	13%	13%	17%	9%
I intend to sell my home within the next five years but stay in the area	10%	10%	8%	9%	7%	17%	11%	8%
Don't know/uncertain	9%	10%	10%	8%	4%	8%	16%	14%
I intend to sell my home in the next five years and relocate outside the area	8%	10%	6%	11%	6%	11%	12%	17%
Rented long term to local resident	7%	7%	5%	7%	10%	8%	8%	9%
Vacation rental to visitors/tourists	3%	3%	4%	5%	2%		1%	
A vacation home for owner or guests of owner	1%	1%	2%	2%			1%	
Other	1%	0%	1%					
n=	1,393	804	192	266	108	59	107	60

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

II. Timing of retirement.

Survey results suggest that the retirement challenges are likely to be felt on a continuing basis over the next ten years. About 11% of all respondents aged 50 and older overall, and 12% of Garfield County respondents say they will be retiring in the next 2 to 3 years. The survey results suggest that challenges of retiring workers will continue to increase in the foreseeable future throughout the region.

Figure 19: If you are 50 or older, when do you plan to retire?



Q 19: If you are aged 50 or older, when do you plan to retire?	Survey Overall	Garfield County Overall	Garfield County by Location: Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/ Battlement Mesa
I am already retired	36%	42%	34%	38%	50%	41%	43%	53%
Less than 2 years	5%	6%	5%	6%	3%	8%	11%	2%
In 2 to 3 years	6%	6%	6%	10%	1%	6%	4%	4%
In 4 to 6 years	13%	11%	16%	9%	12%	9%	12%	7%
In 7 to 10 years	13%	11%	10%	12%	12%	11%	10%	9%
More than 10 years from now	27%	25%	30%	24%	23%	24%	21%	25%
n=	1,057	620	143	225	62	46	79	55

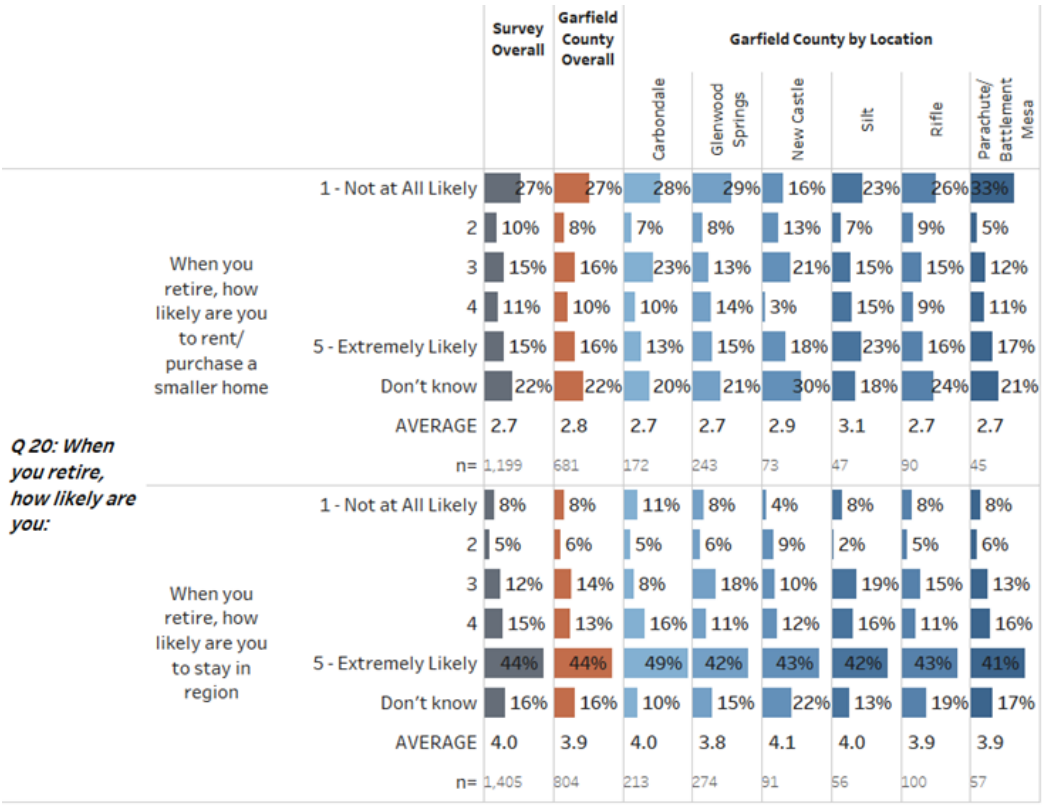
Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

III. Retirement preferences.

When asked to look ahead to their retirement, most respondents aged 50 and older indicated a high likelihood of staying within the region, with Aspen/Snowmass residents indicating the highest likelihood. Among Garfield County respondents 57% are "extremely" or "very" likely to stay. Additionally, most respondents indicated that they were unlikely to rent or purchase a smaller home, suggesting a preference to age in their current place of residence. These results suggest that much of the housing stock will not turn over as residents retire, thereby

exacerbating some of the current housing shortages.

Figure 20: When you retire, how likely are you... To rent/purchase a smaller home? To stay in the region?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

10. LIVE/WORK PATTERNS

The relationship between where households live and where they work in the region are central to understanding housing current housing demand patterns and to planning for future housing and transportation policies. Analyzing these patterns is complex because households typically have more than one worker; for most, the decision where to live is based on a calculus that includes a variety of considerations as explored below.

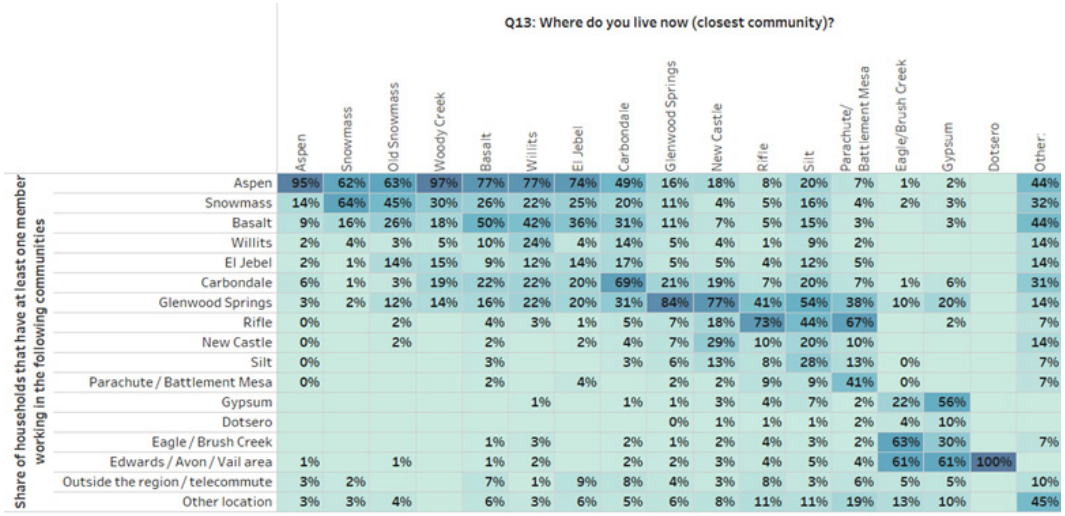
I. Relationship between place of residence and place of work.

Understanding commuting begins with data that describe where working households live now and where they work. As shown below, with the exception of Aspen, most households in the region have one or more workers working outside their community. Moving diagonally across the chart below, it shows that 95% of Aspen working respondents have at least one household member working in Aspen. For Snowmass it is 64% working in Snowmass, and in Basalt, Willits and El Jebel less than 50% of households have workers employed in the same town. For Carbondale residents the figure is 69%. Glenwood Springs (84%) and Rifle (73%) are well established employment centers. However, further west in Garfield County, out-commuting is the norm, as only 29% of New Castle residents and 28% of Silt residents have all household members working in their community of residence, and in Parachute/Battlement Mesa it is approximately 41%. These figures provide one metric of the current relationship of employment location in relation to residency.

Another way of looking at these data is to consider the pull of Aspen as an employment center. Moving across the top line in the chart below, survey results show that in communities between Snowmass and El Jebel, between 62% and 97% of respondents have one or more household member working in Aspen. Among Carbondale residents the figure drops to 49%, and it then falls off even more sharply among Glenwood Springs (16%) and Rifle (8%) residents. Nonetheless, a still significant 18-20% of New Castle and Silt households report

one or more persons working in Aspen. Clearly, the survey shows widespread commuting that provides the demand that is served in part by RFTA and by other efforts including employer transportation assistance or subsidies.

Figure 21: Where do you currently live? Which communities do members of your household work in?



Q13: Where do you live now (closest community)?

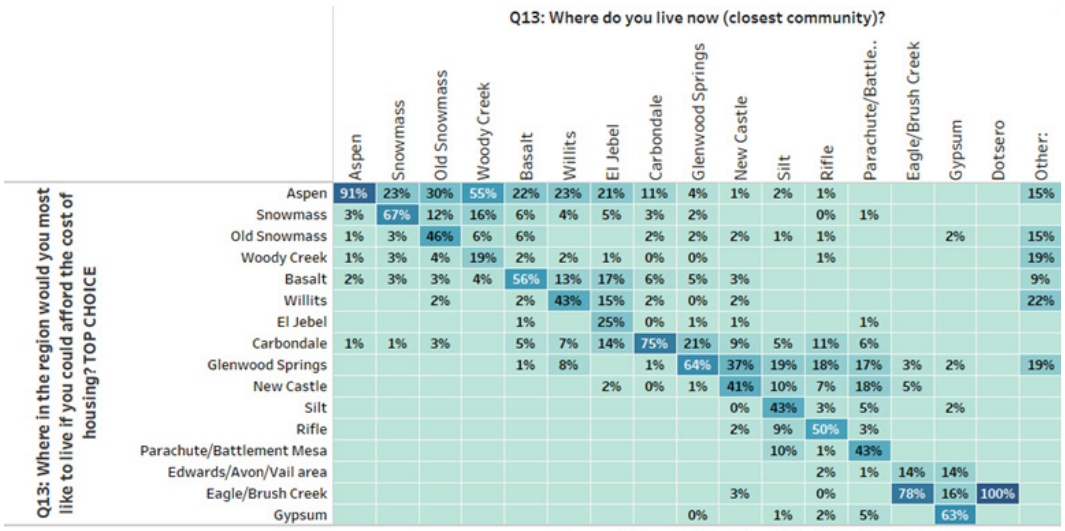
Share of households that have at least one member working in the following communities	Aspen	Snowmass	Old Snowmass	Woody Creek	Basalt	Willits	El Jebel	Carbondale	Glenwood Springs	New Castle	Rifle	Silt	Parachute/ Battlement Mesa	Eagle/Brush Creek	Gypsum	Dotsero	Other:
Aspen	95%	62%	63%	97%	77%	77%	74%	49%	16%	18%	8%	20%	7%	1%	2%		44%
Snowmass	14%	64%	45%	30%	26%	22%	25%	20%	11%	4%	5%	16%	4%	2%	3%		32%
Basalt	9%	16%	26%	18%	50%	42%	36%	31%	11%	7%	5%	15%	3%		3%		44%
Willits	2%	4%	3%	5%	10%	24%	4%	14%	5%	4%	1%	9%	2%				14%
El Jebel	2%	1%	14%	15%	9%	12%	14%	17%	5%	5%	4%	12%	5%				14%
Carbondale	6%	1%	3%	19%	22%	22%	20%	69%	21%	19%	7%	20%	7%	1%	6%		31%
Glenwood Springs	3%	2%	12%	14%	16%	22%	20%	31%	84%	77%	41%	54%	38%	10%	20%		14%
Rifle	0%		2%		4%	3%	1%	5%	7%	18%	73%	44%	67%		2%		7%
New Castle	0%		2%		2%		2%	4%	7%	29%	10%	20%	10%				14%
Silt	0%				3%			3%	6%	13%	8%	28%	13%	0%			7%
Parachute / Battlement Mesa	0%				2%		4%		2%	2%	9%	9%	41%	0%			7%
Gypsum						1%		1%	1%	3%	4%	7%	2%	22%	56%		
Dotsero									0%	1%	1%	1%	2%	4%	10%		
Eagle / Brush Creek					1%	3%		2%	1%	2%	4%	3%	2%	63%	30%		7%
Edwards / Avon / Vail area	1%		1%		1%	2%		2%	2%	3%	4%	5%	4%	61%	61%	100%	
Outside the region / telecommute	3%	2%			7%	1%	9%	8%	4%	3%	8%	3%	6%	5%	5%		10%
Other location	3%	3%	4%		6%	3%	6%	5%	6%	8%	11%	11%	19%	13%	10%		45%

Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

II. Where do you live now? Where would you like to live if you could afford the cost of housing?

The survey also explored where current residents "would like to live if you could afford the cost of housing." The highlighted blue color that runs diagonally across the chart below illustrates the percentage of respondents that responded that their current residence location is their preferred location. For example, 91% of Aspen respondents prefer Aspen, 67% of Snowmass residents prefer Snowmass, and 56% of Basalt residents prefer Basalt. Significant majorities living in Carbondale (75%) and Glenwood Springs (64%) also prefer their communities. Among towns further west the figure dips to between 40 and 50%. These data are important, with many implications. For example, they suggest that while Aspen may be the location of employment for many, it is not necessarily everyone's preferred place to live. Additionally, the data provide a measure of current living conditions in the region; this metric could be used to measure change over time as individual communities work on policies and infrastructure to enhance their livability and attractiveness.

Figure 22: Where do you currently live? Where would you like to live if you could afford housing?



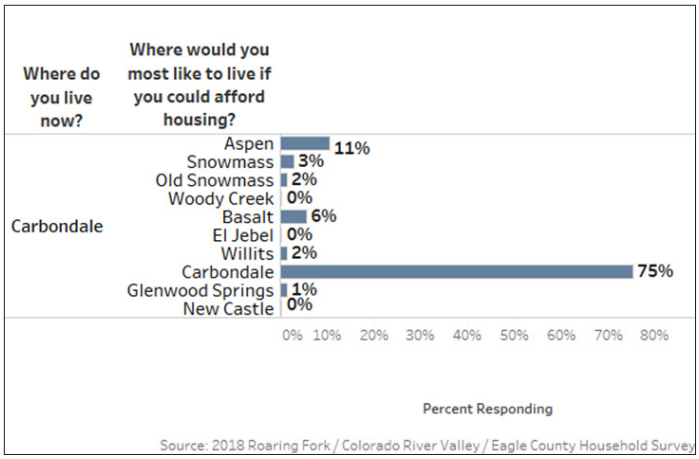
Q13: Where do you live now (closest community)?

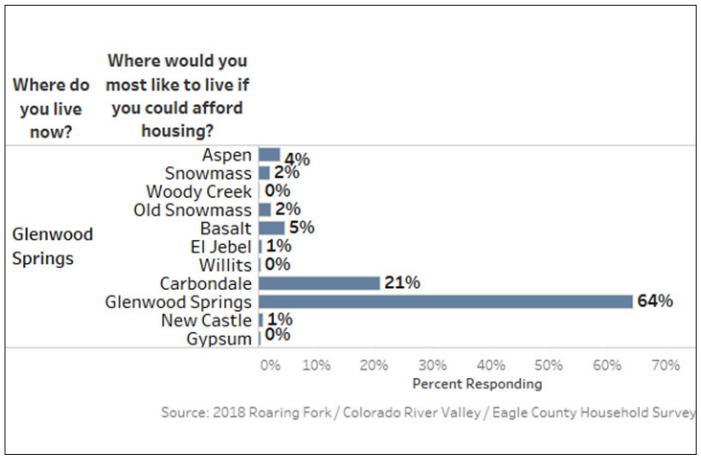
Q13: Where in the region would you most like to live if you could afford the cost of housing? TOP CHOICE	Aspen	Snowmass	Old Snowmass	Woody Creek	Basalt	Willits	El Jebel	Carbondale	Glenwood Springs	New Castle	Silt	Rifle	Parachute/Battle..	Eagle/Brush Creek	Gypsum	Dotsero	Other:
Aspen	91%	23%	30%	55%	22%	23%	21%	11%	4%	1%	2%	1%					15%
Snowmass	3%	67%	12%	16%	6%	4%	5%	3%	2%			0%	1%				
Old Snowmass	1%	3%	46%	6%	6%			2%	2%	2%	1%	1%			2%		15%
Woody Creek	1%	3%	4%	19%	2%	2%	1%	0%	0%			1%					19%
Basalt	2%	3%	3%	4%	56%	13%	17%	6%	5%	3%							9%
Willits			2%		2%	43%	15%	2%	0%	2%							22%
El Jebel					1%		25%	0%	1%	1%			1%				
Carbondale	1%	1%	3%		5%	7%	14%	75%	21%	9%	5%	11%	6%				
Glenwood Springs					1%	8%		1%	64%	37%	19%	18%	17%	3%	2%		19%
New Castle							2%	0%	1%	41%	10%	7%	18%	5%			
Silt										0%	43%	3%	5%		2%		
Rifle										2%	9%	50%	3%				
Parachute/Battlement Mesa											10%	1%	43%				
Edwards/Avon/Vail area												2%	1%	14%	14%		
Eagle/Brush Creek										3%		0%		78%	16%	100%	
Gypsum									0%		1%	2%	5%		63%		

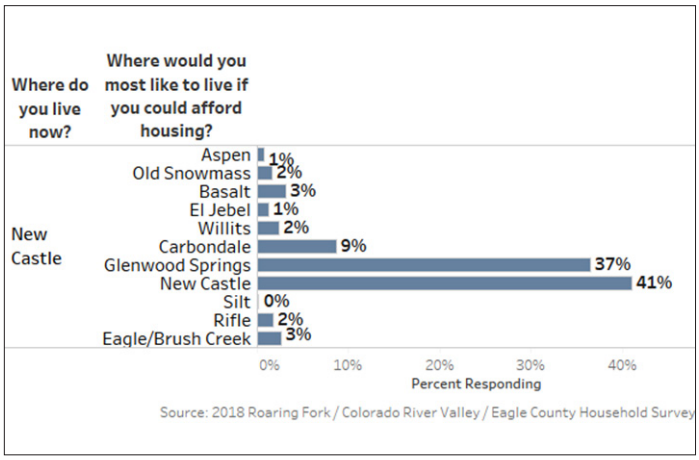
Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

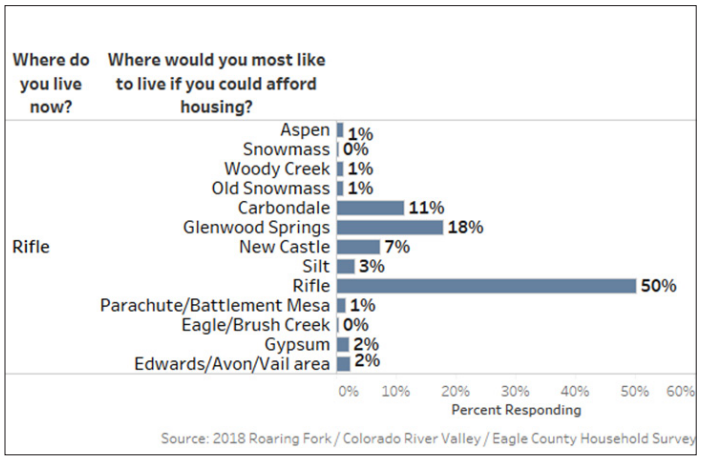
The charts below illustrate the percentage of Garfield County residents living in their preferred location, as well as the communities people would most like to live if they could afford the cost of housing.

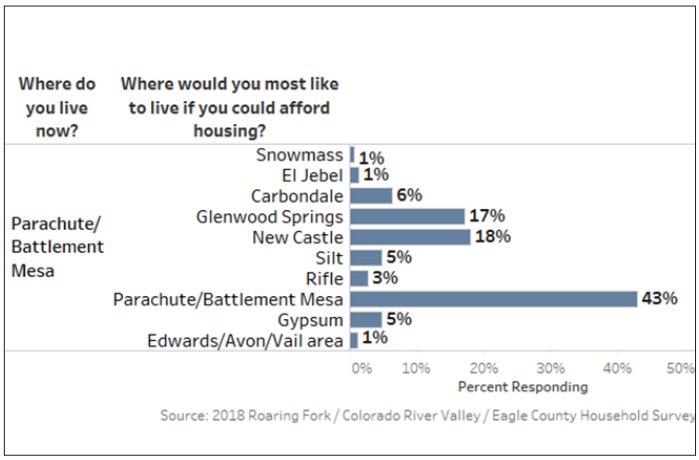
Figure 23: Where do you currently live? Where would you like to live if you could afford housing?









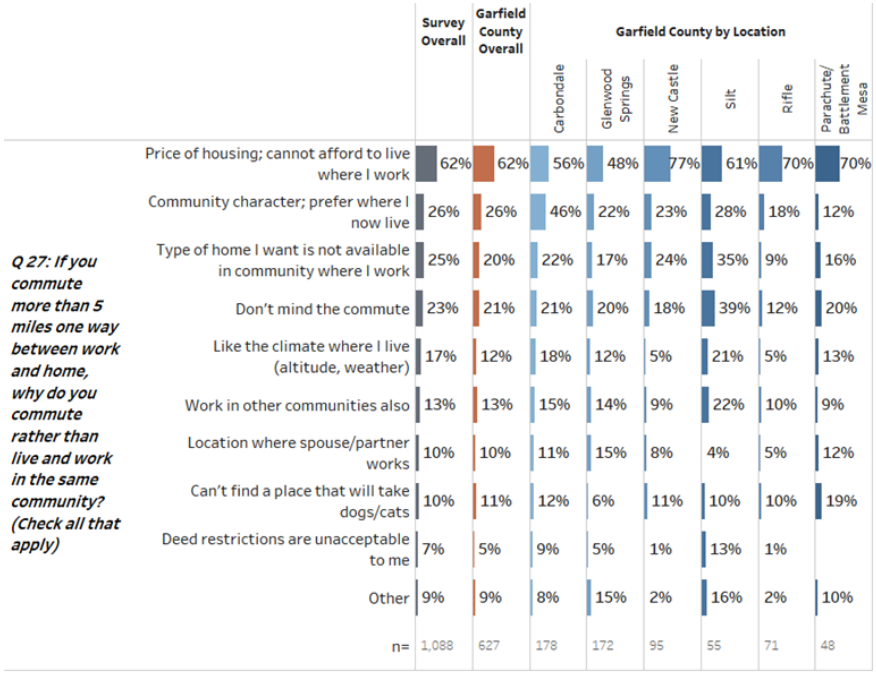


Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

III. Reasons for commuting.

The survey explored methods of commuting (walk, drive, bus, etc.) and reasons for commuting if the home to work distance is greater than five miles. Results show that most respondents commute by driving alone. For the majority of commuters, the price of housing is the most identified reason for commuting (63%). However, for many the “type of home I want is not available where I work” (25%) and “community character, I prefer where I live” (26%) were also frequently mentioned. Additionally, almost one in four say they “don’t mind the commute” including a very high percentage (50%) of Eagle/Gypsum commuters.

Figure 24: If you commute more than 5-miles between work and home, why?

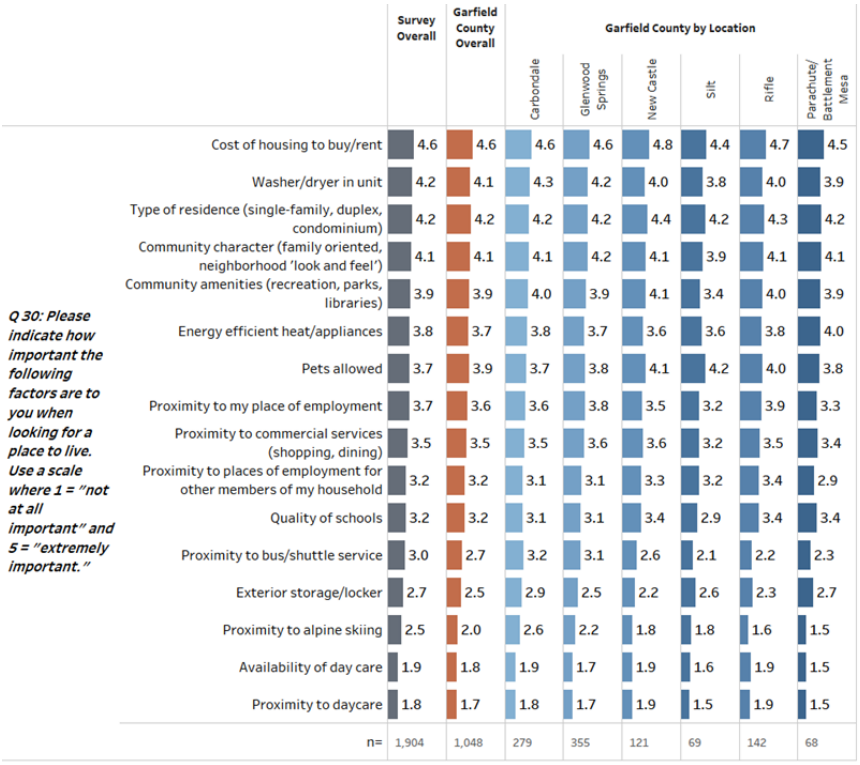


Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

i. Preferences – Important Factors in Looking for a Place to Live.

The survey asked respondents to identify the importance of a series of factors in looking for a place to live. Cost of housing to buy/rent was most identified (receiving an average score of 4.6 on a five-point scale). Of interest, while there are some differences by community (for example, Aspen residents choosing "proximity to place of employment" and "proximity to bus/shuttle") the overall averages are fairly similar across the geographic areas. Examples include "community character" and "energy efficiency" which were rated of relatively high importance and received similar ratings from all geographic areas.

Figure 25: What factors are important to you when looking for a place to live?



Data Source(s): 2018 Roaring Fork/Colorado River Valley/Eagle County Household Survey

IV. Workforce commuting patterns in Garfield County.

i. Carbondale Area.

In 2015, it is estimated that there were approximately 4,600 jobs in the Carbondale Area, 35% of which were filled by local residents and 65% of which were filled by in-commuters.

Characteristic of a community that has historically been more of a bedroom community than an employment center (although it has twice as many jobs as the Basalt Area), there are 8,200 employed residents in the Carbondale, 80% of whom commute somewhere else in the region for their jobs.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Figure 26: Carbondale Area worker import/export

Carbondale Area	2015	as %
Total local jobs	4,594	100%
Local residents / Local workers	1,598	35%
In-commuters	**2,996**	**65%**
Total working residents	8,219	100%
Local residents / Local workers	1,598	19%
Out-commuters	**6,621**	**81%**

Source: Economic & Planning Systems

Y:\Projects\DEN\17310 2-RoaringFork Valley Regional Housing Needs Data\[17310 2-LEHD-by zip-083119-Version2.xlsx]Hist Gaps Tables for Report

ii. Glenwood Springs Area.

In 2015, there were an estimated 11,200 jobs in the Glenwood Springs Area, 35% of whom were local resident/ workers, and 65% of which were filled by in-commuters. In the local labor force, however, there were an estimated 8,800 employed residents, more than 55% of whom commuted somewhere else for their jobs.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Figure 27: Glenwood Springs Area worker import/export

Glenwood Springs	2015	as %
Total local jobs	11,236	100%
Local residents / Local workers	3,905	35%
In-commuters	**7,331**	**65%**
Total working residents	8,798	100%
Local residents / Local workers	3,905	44%
Out-commuters	**4,893**	**56%**

Source: Economic & Planning Systems

Y:\Projects\DEN\17310 2-RoaringFork Valley Regional Housing Needs Data\[17310 2-LEHD-by zip-083119-Version2.xlsx]Hist Gaps Tables for Report

iii. New Castle to Parachute Area.

In 2015, there were an estimated 9,300 jobs in the New Castle to Parachute Area, more than 55% of whom live and work in the area, and slightly less than 45% of which commute in from elsewhere.

Similar to the bedroom community dynamic of the Carbondale Area, this area contains significantly more employed residents than are necessary for its workforce. The area has 14,900 employed residents, 65% of which commute somewhere else in the region (as well as to extra-regional locations, such as Grand Junction).

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

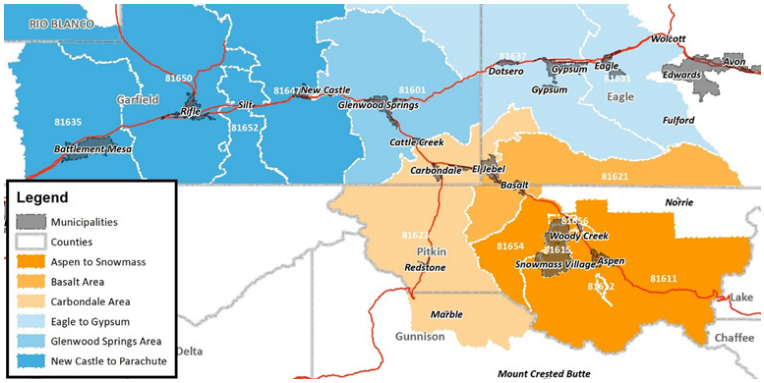
Figure 28: New Castle-Parachute Area worker import/export

New Castle to Parachute	2015	as %
Total local jobs	9,256	100%
Local residents / Local workers	5,166	56%
In-commuters	**4,090**	**44%**
Total working residents	14,909	100%
Local residents / Local workers	5,166	35%
Out-commuters	**9,743**	**65%**

Source: Economic & Planning Systems

Y:\Projects\DEN\17310 2-RoaringFork Valley Regional Housing Needs Data\[17310 2-LEHD-by zip-083119-Version2.xlsx]Hist Gaps Tables for Report

Figure 29: Garfield County and the Greater Roaring Fork Region Study Areas



Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

11. RESIDENT SURVEY OPEN-ENDED COMMENTS AND SUGGESTIONS – SELECTED QUESTIONS

Q6: If planning on leaving the area in three (3) years or less, why are you likely to leave the area?
Repeated themes include cost of living and affordability, desire to own a home and few (expensive) options locally, changing communities and retirement.

At the end of the survey, respondents were asked to provide any other comments or suggestions regarding local housing issues. In total, approximately 450 comments were evaluated. Survey respondents provided verbatim input which was organized into five (5) general categories:

1. Affordable housing issues.
2. Free-market housing issues.
3. The role of government in affordable housing.
4. Cost of living issues.
5. General sentiments about housing issues.

Common themes and example comments are provided below for the affordable housing issues, free-market housing issues, the role of government in affordable housing and cost of living issues categories.

I. Affordable housing issues.

As may be expected, residents expressed a wide variety of concerns related to affordable housing options in the Greater Roaring Fork Region. Overall the most prominent theme in this category was a need for more subsidized senior housing options; numerous comments that plainly point to the issue, such as "we need more affordable senior housing in our area" and "I hope through this survey that action will be taken to provide long term affordable housing especially for those nearing retirement age," express a clear concern for an aging segment of the population in the Greater Roaring Fork Region. The frequency of these comments is followed closely by concerns for affordable housing rates still being too high, coupled with poor living conditions and maintenance, and often an expressed desire or intention to leave.

"I can barely afford my 'Affordable Housing' rent with 2 jobs (1 full-time, 1 part-time). I don't have many bills or debt, so I'm not living beyond my means, but I have no money because everything goes towards rent. I have no cable because I can't afford it. My apartment is so poorly insulated, and we have electric heat, my bill in winter is ridiculous, even with me turning my heat down to 50 degrees when I leave. It's absurd we can't get cable or other utilities included in rent, which goes up every year!!! I can barely take a real shower because my hot water runs out so quickly. So, also, since I can never seem to get ahead financially because I'm putting everything towards rent and electric, how am I supposed to come up with $2000 to put down towards a house if I win the lottery? I have been here 14 years and see no real housing in my future. I have been here 14 years and see no real housing in my future. I'm moving to Denver."

"New 'affordable' housing is aimed at 80% of median. Already paying more than 50% of net income for rent and do not make median income. Off seasons I just make rent, forget anything else. Do not want to leave, but it is no longer possible to stay."

Other issues with affordable housing included needs for alternative housing assistance such as down payment and deposit assistance, as well as a common interest in prioritizing affordable housing for long-term residents of the area.

II. Free-market housing issues.

Overwhelmingly, residents discussed the need for lower-cost market-level homes. Many of these comments specifically addressed the existence of a substantial gap between maximum earnings for housing assistance, and the cost of appropriate housing on the free market. Many other comments cited concerns for HOA fees driving up the cost of housing. The most common theme within these concerns was related to affordable homes that were appropriate for families, while other themes addressed starter homes and affordable market options for young adults.

"I am in the process of purchasing a new home with my partner. Together, we represent a good financial means/ middle class. We both have homes that went under contract within 3 days each (Carbondale and New Castle). We had trouble finding a home to work for our future (family, size of home, garage, location to each of our work places). The one takeaway I found in our search is that attainable housing exists for us, but with very steep HOA dues (RVR, Iron Bridge... $400/month!). The next generation of homeowners is very likely matching our demographic and not willing to subsidize golf courses. Otherwise, we could integrate into those neighborhoods and communities."

"We've been looking to buy for 3 years. The market has only gotten worse for people like us. Small to average homes, or fixer uppers that we would be looking to buy are usually well over $400K. This is going to be a problem for those looking to put down a root in this town. Average first-time home owners around the country are looking to pay half that. The housing lotto only pops up once every few months and 60+ families vie for a home that would be considered average price elsewhere around the country."

"Housing is extremely difficult to find. I don't even qualify for affordable housing because I apparently make too much, which is insane to me. I shouldn't have to living pay check to pay check in order to pay for housing. I'm in one of the few professions who live in the Greater Roaring Fork Region year-round, architecture. I have a college degree and work more than 40+ hours a week. It's stupid how restrictive housing is here."

"It is heart breaking to know our children will not be able to afford to live in this beautiful community. We were lucky to build our home when we did- my husband has worked for the resort for 30+ years and at his current salary we could not afford to purchase our home. The turn-over of core employees such as teachers and police/fire officers is greatly impacted by the lack of 'decent' affordable housing. Many of the deed-restricted developments have become slums- yet still too expensive. I would not want my children living there. We could sell our home for a lot of money but we wouldn't be able to replace it in the valley. Pay (all 3 have college degrees) versus cost of living don't add up."

"Build housing to support young professionals. We don't need 4/5-bedroom golf communities. We need more inventory in the 2/1 1000-1200 sf range so that young people can afford housing to start families and not be burdened by deed restrictions or rent stipulations."

Aside from these issues, commenters also frequently voiced concerns over short-term rentals, vacation homes, and rent-by-owner services (AirBnB, VRBO, etc.).

"The Airbnb vacation rentals have decimated the available rental market for new employees in C'dale and G'wood area."

"I am concerned that the housing prices are too high for people to get out of renting and the renting inventory is being pinched by units being taken off the rental market and being put into platforms like air B&B, further hurting people trying to get a home. If people can't live in their town, the town will cease to be a community."

III. The role of government in affordable housing.
Regarding how town, city and county governments should be involved in affordable housing initiatives, the respondents were split between two different positions. Many respondents argued that governments should not be involved in housing at all and to eliminate development barriers to better serve a free-market, while many others called for the creation of a regional housing authority, increased regulation of the housing market (particularly to regulate rent-by-owner programs, like AirBnB), and more effort into planning and zoning for new developments to regulate traffic flow and water usage.

"The Greater Roaring Fork Region needs an active regional housing authority that governs or makes recommendations with teeth to local municipal and county governments about housing placement. County/ municipal governments must work together so that the Hwy 82 corridor does not over-reach its carrying capacity. Inter-county planning is a must. Municipal infill is also a must to avoid sprawl. The GRFR needs affordable options for senior housing and so forth but mainly coordinated planning efforts. The amount of water available for housing must also be taken into consideration since studies have shown that the state's population will increase beyond water capacity very soon."

"The problem with housing is one of excessive zoning and regulation. Take these barriers of the free market away and there would be affordable housing in Aspen. The studies are clear. Please read the studies before enacting another government scheme that will de-facto zone out and exclude minorities and the poor. Look at results, not intentions as a guide to your actions. Free up the marketplace and the housing shortage will quickly disappear, and the local economy will get a boost when more efficient builders who were excluded from the market due to cronyism enter and flourish..."

IV. Cost of living issues.
By far, the most common theme related to cost of living was a concern for low wages. One commenter explains "Housing costs compared to incomes are horrifying. I have zero savings because of the rental market. I have little recreation time because I work so much for so little, and I have a masters degree," while another argues "We don't have a housing problem, we have a wage problem. Our family's income is less than 12 years ago for same type of work, while expenses have increased." Aside from wages, common themes included cost of health insurance and childcare.

12. EMPLOYER SURVEY OPEN-ENDED COMMENTS AND SUGGESTIONS

The Employer Survey included several opportunities for open-ended comments. Select findings from the open-ended comments recorded are summarized below.

Q24: Do you have any other comments or suggestions regarding affordable housing for employees in the region?
At the end of the Employer Survey, respondents were asked to provide any other comments or suggestions regarding affordable housing for employees in the region. In total, 87 employers provided comments. These responses have been organized into four (4) general categories:

1. Affordable housing needs/concerns.
2. General support for or opposition to employee housing.
3. The role of government in affordable housing.
4. Other themes and general comments about living in the area.

For each category, common themes and example comments are provided below.

I. Affordable housing needs/concerns.
The most common theme in this category was obstacles; many respondents discussed how there are a number of obstacles that contribute to the problem of finding affordable housing in the region. These obstacles including a lack of information about the issue, a risk of misrepresentation in eligibility for assistance, qualifications that are too restrictive, and a lack of general community buy-in to addressing the issues. In one example, a respondent emphasized a concern with a lack of community buy-in by explaining as follows:

"There's a lot of 'talk' about affordable and workforce-level housing in this valley, but when decent developments are presented to councils/town halls, etc. they always seem to be denied because of neighbor disapproval. The community needs to be willing to accept some amount of workforce housing, even if it's not exactly in the ideal location for each individual in this valley."

Another common theme was found among respondents who used this opportunity to express specific needs for the community, including affordable family-oriented homes, housing for emergency services personnel, long-term supportive housing, seasonal housing, and upkeep/maintenance of existing homes.

II. General support or opposition to employee housing.
Overall, responses related to employer sponsored housing were mixed. Many commenters said that the lack of availability of affordable housing negatively impacts the local economy.

"As a small business owner in Eagle County, for over 20 years, the lack of affordable housing has limited my selection of qualified applicants."

"From a resort Standpoint-As a luxury, high end destination we are losing our ability to service our guests. From a Community Standpoint- we are losing the demographic that has school age children, losing our doctors and nurses, our teachers, our backbones of a sustainable community."

However, a number of other employer respondents emphasized reasons they are opposed to employer sponsored housing, such as high property taxes, high cost of upkeep, and an inability for the program to address other issues that contribute to the housing economy and living conditions in the area.

"Simply increasing the number of affordable housing units is a very limited approach. Each new job creates the need for additional services in the community resulting in the need for more employees and more housing units, etc. There is no current method for building our way out of the lack of housing and affordability. Our current approach to housing leads to reductions in the quality of life in the communities and increased stresses. A primary focus should be on infrastructure like real multi-modal transportation corridors/options. Multi-family units linked to these multi-modal transportation corridors would have long range benefits for our communities that are currently undervalued."

III. The role of government in affordable housing.
Many respondents offered suggestions and opinions regarding the involvement of local and county-level governments in solving the problem of affordable housing. Themes within these comments emphasized the government's responsibility to provide regulation, to incentivize new developments, and to focus on issues that contribute to the housing market. Other comments called for better collaboration between counties, implementing a housing authority or similar dedicated division of government, and developing city-owned land for affordable housing.

"Offer tax incentive to employer to offer employee housing assistance."

"Very complicated issue. Very little incentive for developers to build new housing stock that matches the price point that makes economic sense for the working people of the area. Perhaps a housing authority could be formed."

"I hate adding to government size but to have an in-house affordable construction division would be a good way for the housing department to control additions, code issues, costs, etc. and to a certain extent keep better tabs on having legitimate owners."

"Eagle, Garfield and Pitkin Counties need to learn to work together to help each other as the cost of housing problem and being able to attract hires from out of area or even in is only going to worsen. It is in the best interest for all, (the mountain communities) to allow families to for example live in Pitkin County housing but work in Eagle County and vice versa. The County lines in the valley are a problem in more ways than one."

IV. Other themes and general comments about living in the area.
Other themes included an emphasis on using local resources to complete housing developments. One respondent commented;

"I would be happy to talk about constructing employee housing with other small businesses so we can pull our resources and start to handle this extremely important issue. Or anything really, it is a huge problem for the health of my businesses, it is the number 1 problem in all my businesses. I am open to doing everything I can to help fix it."

13. SUMMARIES OF ESTIMATED HOUSING NEEDS, 2017 AND 2027

i. Carbondale Area.
The average price of housing in the Carbondale Area was approximately $720,000 in the 3rd quarter of 2018 – nearly 10% lower than the average price of housing in the Basalt Area, and approximately 70% lower than the Aspen to Snowmass Area.

The area's housing supply has a net of 1,200 unit meeting non-local housing demand, which is projected to remain relatively constant through 2027. On the basis of affordability level, the current 600-unit shortfall at 60% AMI is projected to stay the same, and shortfalls at nearly every level between 60% to 140% AMI are anticipated to emerge.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Figure 30: Carbondale Area housing needs

Carbondale Area	2017	2027
Less than 60% AMI	591	615
61% to 80% AMI	---	128
81% to 100% AMI	---	---
101% to 120% AMI	---	52
121% to 140% AMI	---	264
141% to 160% AMI	---	---
Greater than 160% AMI	---	---

Source: Economic & Planning Systems

ii. Glenwood Springs Area.
The average housing price in the Glenwood Springs Area was approximately $530,000 in the 3rd quarter of 2018. Although this was approximately 30% lower than the Basalt Area, 25% lower than the Carbondale Area, and nearly 80% lower than the Aspen to Snowmass Area, this part of the region generates more housing demand than it supplies.

Overall, the area has a 2,000-unit shortfall, which is projected to remain relatively the same over the next ten (10) years. That shortfall is also spread across every income level, and is projected to expand in the "missing middle" category (120% to 160% AMI) by 2027.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

Figure 31: Glenwood Springs Area housing needs

Glenwood Springs	2017	2027
Less than 60% AMI	1,126	483
61% to 80% AMI	107	688
81% to 100% AMI	---	403
101% to 120% AMI	169	---
121% to 140% AMI	157	597
141% to 160% AMI	381	436
Greater than 160% AMI	301	---

Source: Economic & Planning Systems

iii. New Castle to Parachute Area.

The New Castle to Parachute Area is currently the most affordable part of the region with average housing prices at approximately $310,000 in the 3rd quarter of 2018 – nearly 90% lower than the Aspen to Snowmass Area, more than 60% lower than the Basalt Area, more than 40% lower than the Glenwood Springs area, and nearly 60% lower than the average in the Carbondale Area.

As a result, demand pressures from the entire region have created a market in which there are currently an estimated 2,600 housing units meeting non-local demands. Over the next ten (10) years, this supply surplus is projected to remain relatively constant. On the basis of affordability level, the market has only minor shortfalls, but for the missing middle spectrum.

Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

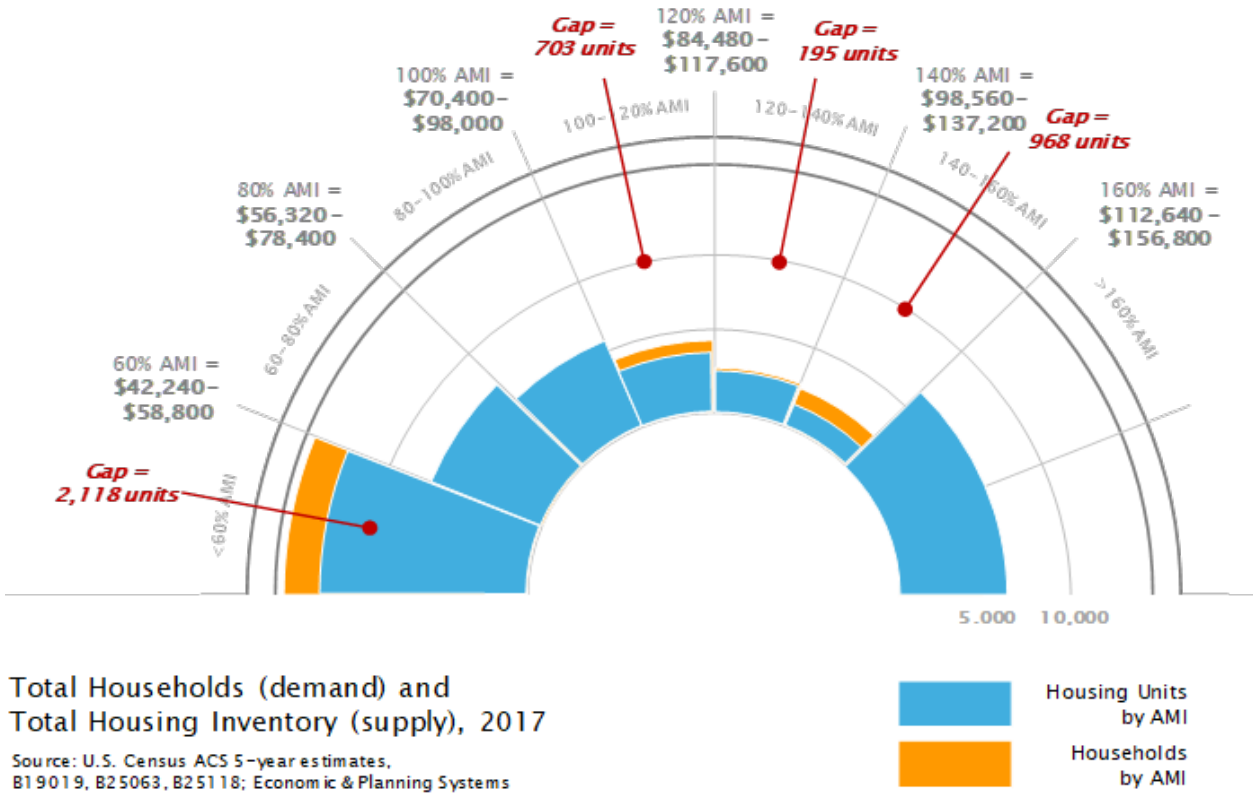
Figure 32: New Castle-Parachute Area housing needs

New Castle to Parachute	2017	2027
Less than 60% AMI	---	---
61% to 80% AMI	---	---
81% to 100% AMI	---	---
101% to 120% AMI	---	---
121% to 140% AMI	136	---
141% to 160% AMI	321	457
Greater than 160% AMI	334	65

Source : Economic & Planning Systems

Y:\Projects\EBN\173102-Roaring Fork Valley Regional Housing Needs\Data\[173102-Housing Gaps Version 2.xlsx]Hist Gaps Tables\for

Figure 33: Overall GRFR Housing Gaps by AMI, 2017



Data Source(s): 2019 Greater Roaring Fork Regional Housing Study

14. OTHER

Although not a focus of this report, the GRFR Housing Study found that:

- The Basalt area's housing market is relatively balanced.
- Demand for housing in the Aspen to Snowmass area far exceeds supply.

1. OVERVIEW

Appendix F: Water provides the most current information available regarding water resources in Garfield County. The information in this appendix is intended to be used to inform county decision-making, policies and regulations related to water resources. Appendix F is organized as follows:

1. Overview
2. Summary of Findings
3. Water Supplies in Garfield County
4. Water Quality & Quantity in Garfield County
5. Drought & Water Conservation in Garfield County
6. Water Resource Data & Information

Data for Appendix F were compiled from a number of sources. Those data sources include:

I. Information from Garfield County, Towns, Cities, Special Districts, and Water Conservancy Districts
Much of data used in the analysis of water resources in Garfield County were sourced from the county as well as the towns, cities, Special Districts and Water Conservancy Districts in the county. Data compiled from these sources include:

- Information about water service areas.
- Information about current and projected capacity of water systems.
- Water quality information.
- Information about water conservation efforts.

II. Information from the Colorado Division of Water Resources (DWR)
Geographic Information Service (GIS) data were obtained from the DWR in order to better understand:

- Locations of alluvial and bedrock aquifers in Garfield County.
- Well production yields in the county.

Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) to view the DWR GIS data.

III. Information from Water Efficiency Plans, Source Water Protection Plans (SWPP), and Other Water Plans
The most recent Water Efficiency Plans, SWPP's and other Water Plans prepared for the municipalities in Garfield County served as another valuable source of information. Information sourced from these plans include:

- Information regarding municipal water systems.
- Information about local water conservation efforts.
- Information about potential contamination sources.

2. SUMMARY OF FINDINGS

This appendix analyzes and reports on the condition of water resources in Garfield County. This work describes the existing water resources with an emphasis on the availability of water supplies for existing and future development in the county. The following are highlights from this work.

I. Protecting local water resources is important to Garfield County's future.
The quality and quantity of water resources in Garfield County is, and will continue to be, important to the long-term economic, social and environmental health of the county. Water plays an important role in:

- Supporting growth and development in Garfield County.
- The county's economy- for example, the agriculture, outdoor recreation and mineral extraction sectors of the county's economy rely heavily on the availability of water resources.
- Supporting healthy ecosystems and a healthy natural environment in the county.

As Colorado and other western states continue to grow, it is anticipated that there will be increasing demands for, and pressures on, water resources in the western United State. Therefore, Garfield County could benefit from continued efforts to protect its water resources.

II. Water issues transcend jurisdictional boundaries.
Water issues span jurisdictional boundaries and efforts to address water issues could benefit from collaboration and coordination across these boundaries. Developing a coordinated regional water strategy in collaboration with the towns, cities, special districts, conservancy districts, private water service providers, state agencies, and other key stakeholders could serve as an opportunity to:

- Establish a comprehensive and coordinated source water protection strategy for Garfield County.
- Better understand how drought conditions could impact water resources in the county over the coming years.
- Better understand what impact irrigation practices have on water resources in the county.
- Identify and develop a comprehensive and coordinated plan for implementing water conservation measures.
- Investigate and identify areas in Garfield County with or without sufficient water quality and/or quantity.
- Reach some level of consensus on how the county, municipalities and special districts can work together to address future growth and development based on the current and future availability water resources.

An organization comprised of stakeholders could be established and could serve as the lead on regional efforts on water.

III. There are a variety of water service providers in Garfield County.
There are several types of water service providers in the county. Table 1 provides a list and brief description of the various water service providers in the county. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) to view the service area boundaries for the municipalities, special districts and water conservancy districts in Garfield County.

Table 1: Summary of Water Service Providers in Garfield County

Type of Water Service Provider	Description
1. Municipal	Municipal water service providers (i.e. town's or city's) serve residents within town or city limits. In some instances municipal water service providers serve residents who live outside of town or city limits. For information regarding municipal annexation policies please refer to Appendix A. Municipal water service providers in Garfield County include: • Town of Carbondale • City of Glenwood Springs • Town of New Castle • Town of Silt • City of Rifle • Town of Parachute
2. Special District	Colorado law limits the types of services that county governments can provide to its residents. Therefore, Special Districts are often created to fill the gaps that may exist between county services and the services that residents desire, such as water. The majority of Special Districts draw limit their boundaries to unincorporated county land. However, areas within municipalities can be included in the boundaries of one or more Special District. In Colorado, Special Districts are a political subdivision of the state- in other words, they are a governmental entity. The Special Districts in Garfield County that actively provide water service to residents in unincorporated areas include: • Battlement Mesa Metropolitan District (BMMD) • Mid Valley Metropolitan District (MVMD) • Roaring Fork Sanitation and Water District (RFWSD) For information regarding special district service area expansion policies please refer to Appendix A.
3. Water Conservancy District or Colorado River Water Conservation District (CRWCD)	The Water Conservancy Districts and the CRWCD provide water right legal mechanisms and physical water supplies to water users within the district boundaries. Conservancy Districts are a type of Special District so they are also political subdivisions of the state (i.e. governmental entities). The Water Conservancy Districts in Garfield County include: • Basalt Water Conservancy District (BWCD) • Silt Water Conservancy District (SWCD) • West Divide Water Conservancy District (WDWCD)
4. Homeowner Association (HOA) or Other Private Entity	There are 78 community water systems in unincorporated Garfield County. These systems provide water to approximately 25,497 county residents receive. Community water systems are typically owned, operated and maintained by a private service provider (i.e. non-governmental entity), such as Homeowner's Association (HOA). A summary of community water systems in Garfield County can be found on pages 49-51 of this appendix.
5. Individual Private Well, Spring or Other Means	Residents who live in unincorporated Garfield County and are not served by a Special District, HOA or other private water service provider may rely on a individual private well, spring or other means as their source of domestic water supply.

IV. Water in Garfield County is sourced from two (2) types of aquifers: alluvial and bedrock.

According to information from the DWR, there a two (2) types of aquifers in Garfield County, Bedrock Aquifers and Alluvial Aquifers. Table 2 provides a listing of the Bedrock and Alluvial Aquifers located in the county. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) to view the geographic location of these aquifers.

Table 2: Summary of Aquifers in Garfield County

Type of Aquifer	Aquifer Name	
1. Bedrock Aquifer	• Eagle Basin • Piceance Basin • Sand Wash Basin	
2. Alluvial Aquifer	• Brush Creek • Colorado River • Crystal River • Dry Fork • East Salt Creek • Gonn Creek • Kimball Creek	• Mc ay Creek • North Dry Fork • Parachute Creek • Roaring Fork River • South Dry Fork • West Salt Creek

Data Source(s): Colorado Division of Water Resources

V. Water in unincorporated Garfield County is often sourced from groundwater wells.

In the unincorporated areas of Garfield County, water supplies for domestic uses come mostly from groundwater wells. All groundwater wells require a well permit issued by the DWR. There are two types of well permits, exempt and non-exempt. Table 3 explains the differences between exempt and non-exempt well permits.

Table 3: Exempt vs. Non-Exempt Well Permits

Type of Well Permit	Description
1. Exempt Well Permits	Wells with exempt well permits supply many existing rural single-family home domestic uses. Exempt well permits indicate that the well's water use is not administered under the water rights priority system.
2. Non-Exempt Well Permits	New development in unincorporated Garfield County will most likely require non-exempt water well permits. Non-exempt water wells are permitted with an accompanying water augmentation plan that describes water operations and supplies that ensure no injury to existing senior water rights.

Data Source(s): Colorado Division of Water Resources

VI. Water quality and quantity from groundwater wells in Garfield County is highly variable.

The production yield and quality of water from groundwater wells is highly varied and site specific within Garfield County. There are certain areas in unincorporated Garfield County with potential issues concerning groundwater quality and quantity. In some areas, groundwater wells may have low yields, insufficient to supply domestic uses. In addition, certain areas may have relatively high concentrations of total dissolved solids and undesirable water quality. Water quantity and quality depend on a number of factors including the depth of the well, geology, and local geohydrology.

There are areas in unincorporated Garfield County that have been identified as having issues with either groundwater quality or quantity. Those areas are:

- Silt Mesa.
- South of Rifle, Beaver Creek, Dry Hollow Creek and surrounding areas.
- Certain areas southwest of Spring Park Reservoir on Missouri Heights.

In locations with inadequate groundwater supplies, rural domestic uses are often supplied by residents hauling water and storage in household water cisterns.

VII. Water hauling is not a reliable solution for water quality and/or quantity issues in Garfield County.

Hauled water as a source of supply works if municipalities are willing to continue retail sales and do not experience conditions that limit the availability of potable water. Water hauling may be the only option for users that do not have safe on-site water and because of that, should be considered a fragile supply. Users in unincorporated Garfield County may get by using hauled water, but this tenuous source of water should be considered unacceptable for new lots because of the potential for it to be curtailed.

VIII. Monitoring and tracking groundwater issues could help the county better understand the availability and quality of water resources in unincorporated Garfield County.

The DWR compiles and makes available a variety of information about groundwater wells in unincorporated Garfield County. This appendix and the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) highlight select DWR data. Given the variability of water quality and quantity in areas of unincorporated Garfield County, the county could benefit from working with the DWR, local well drilling companies and other local experts to better understand trends existing groundwater well trends. Moreover, the county could benefit from on-going collaboration with the DWR to monitor and identify groundwater well trends that may emerge as future wells are constructed in unincorporated Garfield County.

IX. Water Conservancy District's play an important role in supplying Garfield County with water.

The WDWCD and the BWCD have developed regional water supply augmentation plans that provide augmentation water supplies to new development and uses in the Roaring Fork and Colorado River corridors within Garfield County (refer to Figure 1 and Figure 2).

- The WDWCD provides regional water supply augmentation plans in certain areas west of the Roaring Fork River and south of Glenwood Springs and the Colorado River corridor from Glenwood Springs to the Garfield County line southwest of Parachute.
- The BWCD provides a regional water supply augmentation plan to certain areas east of the Roaring Fork River and south of Glenwood Springs to Carbondale.

In areas of Garfield County that are outside of municipal, special district or water conservancy district service areas, new water uses must rely on changing the use of existing agricultural water supplies, exempt water wells, or other means sufficient to supply water and allow the new uses. Consequently, new water uses in these areas must secure sufficient physically available water supplies and develop their own water supply augmentation plans. Figure 3 identifies privately owned lands that fall outside of water conservancy district augmentation plan areas.

X. The Colorado Department of Public Health and Environment (CDPHE) regulates water quality in Garfield County.

The CDPHE regulates public water systems that serve municipalities, special districts and subdivisions in unincorporated Garfield County. Additional information about the public water systems that the CDPHE regulates in Garfield County can be found on pages 22-51 of this appendix.

XI. Droughts could impact water service providers in different ways.

Droughts may impact municipal surface water supplies as overall water supplies are reduced and less water is available for diversion. During droughts, the sources of municipal surface water supplies may change. For example, diversions of raw water supplies may switch from tributary streams to municipal intakes on the mainstem of the Roaring Fork River or Colorado River.

In periods of drought, groundwater wells may have reduced yields and physical water availability becomes a more widespread problem for domestic water users with groundwater wells. Droughts may affect groundwater well supplies in the following ways:

- Decreased well water yields.
- Water wells "drying-up."
- Diminishment of water quality.

Conservancy District augmentation plans account for drought conditions. The DWR requires augmentation plans to prove that there are adequate supplies considering drought conditions. Therefore, if a water use has dry-year physical supplies and is included in a water district or other approved augmentation plan, then the general understanding is that the water supplies are fairly drought resilient and reliable.

XII. Changes in irrigation practices could impact Garfield County's water supplies.

There are approximately 38,000 acres of irrigated land in Garfield County[1]. The vast majority of the irrigated area's supplies are surface water diversions out of the Colorado and Roaring Fork River and their many tributaries. The primary irrigated areas include:

- The Colorado River Valley from New Castle to Parachute.
- Hunter Mesa and the area between West Divide Creek and Mamm Creek.
- Silt Mesa and the Grass Valley area north of Colorado River from Silt to Rifle.
- The Crystal River valley and area surrounding Carbondale.
- The Cattle Creek area and Missouri Heights.

In these rural areas, most household water supplies come from groundwater wells. Locally and depending on the site-specific conditions, surface water irrigation practices may affect groundwater and potentially, water wells.

The State Engineer's estimate of irrigated area includes characterization of the irrigation practices. In Garfield County, the irrigation methods are flood, furrow, sprinkler, and unknown. The predominant crop types are grass pasture and alfalfa. Of the 38,000 acres of irrigated land in Garfield County, 80% is classified as flood irrigated, 15% as irrigated by sprinkler, and 5% as unknown irrigation and furrow.

Irrigation efficiency, for the purposes of this appendix, is the ratio of water used by the crop to the volume of water diverted to irrigate the crop. Flood irrigation is typically 20-50% efficient, whereas sprinklers may be 60-90% efficient[2]. Water diverted and not used by the crop may evaporate, return overland (surface/tailwater returns), and infiltrate the soils and deep percolate to the groundwater system.

Irrigation practices influence local groundwater conditions. In areas where flood irrigation is a common practice, infiltrating water may result in perched aquifers and/or may be a primary local source to groundwater. Improving irrigation ditches, converting to sprinkler irrigation, changing crop types, and other factors may result in changes to the volumes of groundwater recharge, groundwater levels, and ground water quality.

Data Source(s): [1]http://water.state.co.us/DataMaps/GISandMaps/Pages/GISDownloads.aspx; and, [2]https://coagnutrients.colostate.edu/ag-best-management-practices/irrigation-management/

XIII. Special Districts and municipalities in Garfield County are well positioned for future growth.

Based on the information compiled for Special Districts and municipalities in Garfield County (i.e. the incorporated areas of the county), these entities are expected to have sufficient water resources for additional development and therefore are well positioned for future growth in the county. Table 4 provides a brief description of each Special District's and municipality's capacity for additional growth within their service area.

Table 4: Summary of Municipal Water Capacity for Future Growth

Entity		Description
1.	Mid Valley Metropolitan District (MVMD)[1]	The MVMD existing water system has capacity for approximately 1,200 additional single-family dwelling equivalencies (EQRs).
2.	Roaring Fork Water & Sanitation District (RFWSD)[2]	The RFWSD existing water system has capacity for approximately 5,015 additional EQRs.
3.	Battlement Mesa Metropolitan District (BMMD)[3]	As of 2019, BMMD's water facilities are at approximately 50% capacity. Battlement Mesa's current population is approximately 5,000 which would indicate an ability to provide water service to a population of roughly 10,000.
4.	Town of Carbondale[4]	Based on projections from the Town of Carbondale's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the town's service area will be approximately 16,100 by 2050. The plan goes on to state that Carbondale's water rights are sufficient to meet the supply needs of the community beyond 2050, as is the water supply infrastructure including the water treatment plants, transmission mains, and storage facilities.

Table 4: Summary of Municipal Water Capacity for Future Growth (continued)

Entity		Description
5.	City of Glenwood Springs[5]	Based on projections from Glenwood Spring's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the city's service area will increase to approximately 18,771 by 2050. According to the plan, the city has an ample raw water supply and excess water treatment capacity to meet current demands and the supply needs of the community beyond the 2050 planning horizon, even if minimal or no additional conservation measures are implemented.
6.	Town of New Castle[6]	As of 2019, the town's water treatment facility (recently expanded to 3.6 million gallons per day) is expected to have sufficient capacity to accommodate the build out of all properties currently within the town's boundaries. In other words, the town can accommodate approximately 999 additional housing units and 200,000 square feet of additional commercial space.
7.	Town of Silt[7]	The town's potable water system is currently at about 50% capacity (1,685 EQRs). According to the town's 2019 Water-Wastewater-Irrigation Master Plan, the Town of Silt should be able to serve up to 2,590 EQRs, possibly more. The additional 905 EQRs equates to roughly 905 additional single-family dwellings that the town could accommodates with its existing water system.
8.	City of Rifle[8]	The 2019 City of Rifle Water Efficiency Plan projects that city water supplies can serve a population of 20,000 or more, which would carry the city to 2042, assuming a 3% growth rate.
9.	Town of Parachute	Data not available.

Data Source(s): [1]Mid Valley Metropolitan District; [2]2016 Roaring Fork Water & Sanitation District Service Plan Amendment; [3]Battlement Mesa Metropolitan District; [4]2015 Municipal Water Efficiency Plan; [5]2015 Municipal Water Efficiency Plan; [6]Town of New Castle; [7]Town of Silt and 2019 Town of Silt Water-Wastewater-Irrigation Master Plan; and, [8]Draft 2019 City of Rifle Water Efficiency Plan

XIV. Local governments have undertaken a number of water planning efforts.

Garfield County and the municipalities in the county have participated in a number of water resource planning efforts. These efforts have resulted in planning documents such as Source Water Protection Plans or Water Efficiency Plans. It is important to note that these planning documents are available as they can serve as useful guides for identifying areas in Garfield County that may be sensitive to future land-uses, growth and development. They can also be used to better understand what actions the towns and cities in the county are taking to conserve water resources. Table 5 provides an inventory of the most recent water plans that the county and municipalities have participated in the development of.

Table 5: Summary of Water Plans

Governmental Entity		Name of Water Plan
1.	Garfield County	• 2015 Town of Carbondale Source Water Protection Plan • 2014 City of Glenwood Springs Source Water Protection Plan • 2013 Source Water Protection Plan for the Colorado River Partnership
2.	Town of Carbondale	• 2015 Town of Carbondale Source Water Protection Plan • 2015 Town of Carbondale Municipal Water Efficiency Plan • 2015 Roaring Fork Watershed Regional Water Efficiency Plan
3.	City of Glenwood Springs	• 2015 Roaring Fork Watershed Regional Water Efficiency Plan • 2015 City of Glenwood Springs Municipal Water Efficiency Plan • 2014 City of Glenwood Springs Source Water Protection Plan
4.	Town of New Castle	• 2013 Source Water Protection Plan for the Colorado River Partnership
5.	Town of Silt	• 2019 Town of Silt Water-Wastewater-Irrigation Master Plan • 2013 Source Water Protection Plan for the Colorado River Partnership

Table 5: Summary of Water Plans (continued)

Governmental Entity		Name of Water Plan
6.	City of Rifle	• 2019 City of Rifle Water Efficiency Plan • 2013 Source Water Protection Plan for the Colorado River Partnership
7.	Town of Parachute	• 2013 Source Water Protection Plan for the Colorado River Partnership

Data Source(s): 2019 City of Rifle Water Efficiency Plan; 2019 Town of Silt Water-Wastewater-Irrigation Master Plan; 2015 Town of Carbondale Source Water Protection Plan; 2015 Town of Carbondale Municipal Water Efficiency Plan; 2015 Roaring Fork Watershed Regional Water Efficiency Plan; 2015 City of Glenwood Springs Municipal Water Efficiency Plan; 2014 City of Glenwood Springs Source Water Protection Plan; and, 2013 Source Water Protection Plan for the Colorado River Partnership

XV. Water conservation efforts vary widely among the towns, cities, and Special Districts in Garfield County. The towns, cities, and Special Districts are each approaching water conservation in their own, unique way. Table 6 offers a brief synopsis of water conservation efforts in the county. Additional information can be found on pages 22-48.

Table 6: Summary of Water Conservation Efforts in Garfield County

Entity		Description
1.	Town of Carbondale[1] City of Glenwood Springs[2] City of Rifle[3]	These municipalities have implemented numerous water conservation measures and are exploring the feasibility of additional measures.
2.	Town of New Castle[4] Town of Silt[5] MVMD[7] RFWSD[8]	These municipalities are employing certain conservation measures primarily focused on curtailing outdoor watering.
3.	Town of Parachute[6]	The Town of Parachute has no water conservation measures in place. The town provides its residents with recommendations for outside watering but these are not enforced.

Data Source(s): [1]2015 Town of Carbondale Municipal Water Efficiency Plan; [2]2015 City of Glenwood Springs Municipal Water Efficiency Plan; [3]2019 City of Rifle Water Efficiency Plan; [4]Town of New Castle; [5]Town of Silt; [6]Town of Parachute; [7]Mid Valley Metropolitan District; and, [8]2019 Roaring Fork Water and Sanitation District Rules and Regulations.

XVI. The county could serve as a common resource for "best practices."
Given the variation in municipal and Special District water conservation efforts, there could be an opportunity for the county to serve as a common resource for information on "best practices." The county could research and compile information about water conservation initiatives and/or projects in order to identify "best practices" (that have been tested and proved successful) and make that information available to local municipalities and Special Districts.

3. WATER SUPPLIES IN GARFIELD COUNTY

A. WATER SUPPLIES IN UNINCORPORATED GARFIELD COUNTY

In the unincorporated areas of Garfield County, domestic water uses are typically supplied by groundwater wells. The wells and water supply systems are typically developed and maintained by one of the following:

- Special District/Metropolitan District
- Homeowners Association (HOA) or Other Private Entity
- Individual Homeowner

I. Special District Water Systems. There are a several Special Districts that have been established to supply water to development in unincorporated areas of Garfield County. Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for information regarding the location of special districts in the county. Table 7 provides a listing of the principal water sources for each special district in Garfield County. A comprehensive set of data for special district water systems can be found pages 22-25 of this appendix.

Table 7: Summary of Special District Water Sources

Special District	Existing Water Source(s)
1. Mid-Valley Metropolitan District (MVMD)[1]	• Eight (8) production wells throughout the district
2. Roaring Fork Water & Sanitation District (RFWSD)[2]	• Five (5) wells drilled into the Roaring Fork alluvium
3. Battlement Mesa Metropolitan District (BMMD)[3]	• Colorado River

Data Source(s): [1]Mid Valley Metropolitan District; [2]Roaring Fork Water & Sanitation District; and, [3]Battlement Mesa Metropolitan District

II. HOA or Other Private Entity. According to data from the Colorado Department of Public Health and Environment (CDPHE) there are approximately 78 community water systems (not including municipal or special district water systems) in Garfield County that obtain their water from either groundwater or surface water sources. The community water systems serve roughly 25,497 people that reside in unincorporated Garfield County. Community water systems are often owned, operated and maintained by an HOA. Some HOA's contract with a private entity to operate and maintain their water system.

III. Individual Homeowner. A number of individual homeowners in unincorporated Garfield County own, operate and maintain their water supply. These homeowners typically source their water from a groundwater well or spring located on their property. Some homeowners source their water by other means, such as having water hauled to their property. Property owners that source their water from a groundwater well, spring or by other means are those that are unable to obtain water from a municipal water system, special district water system or a community water system.

B. TYPES OF GROUNDWATER WELL PERMITS

Groundwater wells require a water well permit issued by the Colorado Department of Natural Resources (DNR) (https://drive.google.com/file/d/1tPSZuqsFk4pR1dmr-hJ1HRrZhOopuzI9/view). There are two (2) classes of wells:

I. Exempt Wells. These are wells that are exempt from water rights administration and are not administered under the priority system. In most cases, exempt well permits limit pumping to no more than fifteen (15) gallons per minute (GPM) and require that return flow from the use of the well is returned to the same stream in which the well is located. There are a number of permit types for exempt wells, which are described in Table 8.

Table 8: Summary of Exempt Well Permit Types

Type of Exempt Well Permit	Description
1. Household Use Only Exempt Well Permits	Exempt well permits issued for ordinary household uses in one (1) single-family dwelling and do not allow for outside watering or livestock watering. Generally, individuals may obtain this type of permit if the lot is in a subdivision created prior to June 1, 1972.
2. Domestic and Livestock Exempt Well Permits	Exempt well permits issued on tracts of land of 35 acres or more where the proposed well will be the only well on the tract (along with other conditions and qualifications, see DNR webpages for complete description).
3. Commercial Exempt Well Permits	Exempt well permits available for small businesses located on lots that were created prior to June 1, 1972, or by an exemption to the subdivision laws, along with other conditions and qualifications (refer to the Colorado Division of Water Resources website for additional information).
4. Monitoring and Observation Wells	Exempt well permits for the construction of a well to be used for the purpose of locating water, pump aquifer testing, monitoring groundwater, or collection of water quality samples.
5. Replacement Well Permits	Exempt well permits for the purpose of replacing or deepening an existing well.
6. Geo-exchange Systems Exempt Permits	Exempt well permits for the construction and installation of loop fields in geo-exchange systems.

Data Source(s): Colorado Division of Water Resources

II. Non-Exempt Wells. These are wells that are non-exempt and are governed by the priority system. Non-exempt wells are for any type of use other than those listed for exempt wells. New non-exempt wells must replace any out-of-priority stream depletions in time, place, amount, and quality by having augmentation/ replacement water available. A plan of augmentation must be approved by the water court to prevent injury to senior water right users (along with other conditions and qualifications- refer to the Colorado Department of Natural Resources website for complete description).

C. WATER SUPPLIES IN INCORPORATED GARFIELD COUNTY

The towns and cities operate and maintain the water systems that serve the incorporated areas of Garfield County. Figure 1, depicts the boundaries of the municipalities/incorporated areas in the county. Table 9 provides a listing of the principal water sources for each municipality in the county. Comprehensive data regarding municipal water systems are included on pages 25-48 of this appendix.

Table 9: Summary of Municipal Water Sources

Municipality	Existing Water Source(s)
1. Town of Carbondale[1]	• Nettle Creek • Crystal River • Roaring Fork River
2. City of Glenwood Springs[2]	• Grizzly Creek • No Name Creek • Ruedi Reservoir via the Roaring Fork River
3. Town of New Castle[3]	• East Elk Creek • Ruedi Reservoir via the Colorado River
4. Town of Silt[4]	• Colorado River
5. City of Rifle[5]	• Colorado River
6. Town of Parachute[3]	• Colorado River • Revelle Springs

Data Source(s): [1]2015 Town of Carbondale Source Water Protection Plan; [2]2014 City of Glenwood Springs Source Water Protection Plan; [3]2013 Source Water Protection Plan for the Colorado River Partnership; [4]2019 Town of Silt Water-Wastewater-Irrigation Master Plan; and, [5]2019 City of Rifle Water Efficiency Plan

D. WATER CONSERVANCY DISTRICTS AND REGIONAL WATER SUPPLY AUGMENTATION PLANS

Water Conservancy Districts in Garfield County include:

- Basalt Water Conservancy District (BWCD)
- Colorado River Water Conservation District (CRWCD)
- Silt Water Conservancy District (SWCD)
- West Divide Water Conservancy District (WDWCD)

Refer to the online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) for information about the boundaries of the Water Conservancy Districts in Garfield County. Water Conservancy Districts service areas may change from time to time. Therefore, the descriptions included in this appendix and areas shown on the online maps should be considered preliminary and interested parties **must** check with the respective districts for specific details regarding their property.

Photo Credit: Sheryl Bower/Garfield County

Table 10 provides additional information regarding the Water Conservancy Districts in Garfield County.

Table 10: Summary of Water Conservancy Districts

Water Conservancy District	Description
1. Basalt Water Conservancy District (BWCD)[1, 3]	The BWCD has developed a regional water supply augmentation plan that provides augmentation water supplies to new development and uses to certain areas east of the Roaring Fork River and south of Glenwood Springs to Carbondale (refer to online Comprehensive Plan maps). The BWCD owns reservoir and other water supplies that they contract to water users in Garfield County. The district holds contracts for storage rights in Ruedi Reservoir and Green Mountain Reservoir as well as direct flow frights, which it uses to secure dependable water supplies for water users within the district's boundaries. The general BWCD sub-area/service area in Garfield County is demarked by Area A-4.
2. Colorado River Water Conservation District (CRWCD)[2, 3]	The CRWCD includes the thirteen (13) western slope counties with streams and rivers tributary to the Colorado River. The district owns Wolford Mountain Reservoir, water supply contracts for Ruedi Reservoir supplies (Round I and Round II), water supply contracts in Green Mountain Reservoir, and other water rights and contracts that are available to new uses and industrial development in Garfield County. The CRWCD also markets water supplies for agricultural, municipal, domestic, and all other beneficial uses. The CRWCD has developed the Kobe Pipeline to serve industrial uses and irrigation in Roan Creek. The CRWCD does not specify any sub-areas/service areas.
3. Silt Water Conservancy District (SWCD)[3]	The SWCD provides irrigation water supplies and operates Rifle Gap and Harvey Gap reservoirs. The Silt Project is located in west-central Colorado near the towns of Rifle and Silt. The project is owned by the US Bureau of Reclamation and operated by the SWCD. The project stores the flows of Rifle Creek and pumps water from the Colorado River to supply irrigation water for approximately 7,000 acres of land. Principal features of the project are Rifle Gap Dam and Reservoir, a pumping plant, and a lateral system. Recreation facilities are available at Rifle Gap Reservoir. The SWCD also operates the private Farmers Irrigation company facilities. The SWCD does not specify any sub-areas/service areas.
4. West Divide Water Conservancy District (WDWCD)[3,4]	The WDWCD has developed a regional water supply augmentation plan that provides augmentation water supplies to new development and uses in certain areas west of the Roaring Fork River and south of Glenwood Springs and the Colorado River corridor from Glenwood Springs to the Garfield County line southwest of Parachute (refer to Figure 1). The WDWCD owns reservoir and other water supplies that they contract to water users in Garfield County. The district owns contracts for Colorado River reservoir water supplies with the Bureau of Reclamation (Ruedi and Green Mountain Reservoir) and the CRWCD (Wolford Mountain Reservoir). The WDWCD has six (6) sub-areas/service areas: (1) the Colorado River; (2) Silt Mesa; (3) Rifle Creek (including Upper Rifle Creek); (4) Elk Creek; (5) Fourmile; and, (6) Alsbury (refer to Table 11 and Figure 2). The WDWCD also has Colorado River contract water supplies available to new uses and industrial development within Garfield County and provides water hauler contracts for Colorado River water supplies.

Data Source(s): [1] www.bwcd.org; [2] www.coloradoriverdistrict.org; [3]Canyon Water Resources LLC; and, [4]www.wdwcd.org

Table 11 provides information about the service areas within each Water Conservancy District in Garfield County.

Table 11: Summary of Water Conservancy District Service Areas

Water Conservancy District	Sub-Area/Service Area[1,2,3]	Description
1. BWCD	Area A-4	The BWCD's Area A4 includes the north and south sides of the Roaring Fork River from Basalt to the Crystal River (Carbondale) and north and east of the Roaring Fork from Carbondale to Glenwood Springs.
2. WDWCD	Colorado River (i.e. Area A)	The WDWCD's general service area is the so-called Area A category.. Within Area A, Colorado River water supplies may serve new or expanding uses.
3. WDWCD	Silt Mesa	The Silt Mesa service area includes areas north of the Colorado River (near or on Silt Mesa) from New Castle to Rifle. The WDWCD's Colorado River supplies and agreements with the Silt Water Conservancy District provide augmentation water supplies to this area.
4. WDWCD	Rifle Creek	The Rifle Creek and Upper Rifle Creek service areas include Rifle Creek and certain tributary drainages to Rifle Creek north of the City of Rifle. Within the Rifle Creek sub-area, the WDWCD's Colorado River supplies and agreements with the Silt Water Conservancy District provide augmentation water supplies. The Upper Rifle Creek subarea above Harvey Gap reservoir cannot be served with Colorado River supplies.
5. WDWCD	Elk Creek	The Elk Creek service area includes areas north of Silt Mesa and near Elk Creek. The Elk Creek service area above Harvey Gap reservoir cannot be served with Colorado River supplies.
6. WDWCD	Four-mile	The Four-mile service area includes the Four-mile Creek drainage. The WDWCD has developed local water supplies for the Fourmile subarea including Martin Reservoirs and the Atkinson Ditch.
7. WDWCD	Alsbury	The Alsbury service area includes the East Divide Creek area. Local augmentation water supplies may be available from WDWCD's Alsbury Reservoir.

Data Source(s): [1]Basalt Water Conservancy District; [2]West Divide Water Conservancy District; and, [3]Canyon Water Resources LLC

In areas of Garfield County outside of the municipal, special district and water conservancy district service areas, new water uses must rely on changing the use of existing agricultural water supplies, exempt water wells, or other means to supply water and allow the new uses. Consequently, new water uses in these areas must secure sufficient physically available water supplies (i.e., a productive well) and develop their own water supply augmentation plans.

The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) identify privately owned lands that fall outside of water Conservancy District augmentation plan areas. The following areas (beginning in the southeastern part of the county and working west) will most likely require privately developed water supply augmentation plans to expand existing water uses:

- Cattle Creek and tributaries including Mesa Creek.
- North of Three-mile Creek and south of Glenwood Springs.
- Portions of Alkali Creek and West Garfield Creek (south of the Colorado River).
- East Elk Creek and Elk Creek east of the WDWCD Elk Creek sub-area (north of the Colorado River).
- Divide Creek, Mamm Creek, and Dry Hollow Creek south of the WDWCD Colorado River sub-area (south of the Colorado River).
- West Rifle Creek north of the WDWCD Rifle Creek sub-area.
- Certain areas near Battlement Creek, Cottonwood Creek, and Wallace Creek east and south of Battlement Mesa.
- Roan Creek in Garfield County.

4. WATER QUALITY & QUANTITY IN GARFIELD COUNTY

A. INDIVIDUAL CONSUMER WATER QUALITY & QUANTITY

I. Water Quality. The quality of water from groundwater wells is highly varied and site specific in the unincorporated areas of Garfield County. Water quality depends on a number of factors including the depth of the well, geology, and local geohydrology. Groundwater water quality is known to be highly variable across Garfield County. Water wells drilled into certain sedimentary formations may exhibit high Total Dissolved Solids (TDS) and other water chemistry concerns. Refer to Table 12 for information about areas in unincorporated Garfield County that have been identified as areas that may have groundwater quality issues.

The CDPHE's Water Quality Control Division (www.colorado.gov/pacific/cdphe/divisions) regulates the quality of water from groundwater wells.

II. Water Quantity. The production yield from groundwater wells is also highly varied and site specific in unincorporated Garfield County. Similar to water quality, water quantity depends on a host of factors including the depth of the well, geology, and local geohydrology. Water wells along alluvial valleys and in the drainage bottoms near annually flowing streams and rivers may exhibit adequate water quantity and quality. In certain areas, well water yields vary because of seasonal changes in water table/groundwater conditions. Yet in other areas, groundwater wells may not have sufficient yield to supply domestic uses. In locations with inadequate groundwater supplies, rural domestic uses are often supplied by residents hauling water and storage in household water cisterns.

Table 12 identifies areas in unincorporated Garfield County that have been identified as areas that may have groundwater yield/quantity issues.

Table 12: Summary of Areas in Unincorporated Garfield County with Potential Groundwater Quality or Quantity Issues

Area	Description of Potential Issues
1. Certain Areas Southwest of Spring Park Reservoir	Residents have deepened existing domestic wells or drilled replacement wells because of falling water table elevations.
2. South of Rifle, Beaver Creek, Dry Hollow Creek and Surrounding Areas	These areas may have insufficient groundwater supplies and poor water quality. Residents in these areas are known to haul water for domestic uses.
3. Silt Mesa	Domestic water wells on Silt Mesa may exhibit: • Poor water yields • Water yields that vary by season (ex. more water when irrigation ditches are operating) • Water quality issues Silt Mesa is known to have site-specific water supply issues. Residents in the Silt Mesa area have been known to haul water to supply domestic uses. Wells on Silt Mesa may encounter seasonal water level fluctuations depending on the water flow in local drainages, operations of irrigation ditches, and place of use of irrigation supplies. Wells constructed within or drawing water from certain sedimentary rocks in the Silt Mesa area often have high TDS because of layers with evaporite deposits.

Data Source(s): Canyon Water Resources; and, GIS data from the Colorado Division of Water Resources

The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) depict private properties in Garfield County that overlay alluvial aquifers, bedrock aquifers or that do not overlay an aquifer. Groundwater wells are anticipated to have better water quality and quantity when they source water from alluvial aquifers. Groundwater wells that source water from bedrock aquifers may encounter poor water quality. The quantity of water produced by wells that source water from bedrock aquifers is highly variable and therefore it is unknown whether these wells can be expected to have sufficient yields.

The online Comprehensive Plan maps (https://data-garfieldcolorado.opendata.arcgis.com/pages/compplan) also provide information regarding production yield of constructed wells in the county, which may help to provide further clarification around the well yields that are experienced in different areas of Garfield County.

III. Water Hauling. Hauling water from potable water sales facilities is another method by which residents and businesses can procure safe drinking water in unincorporated Garfield County. Most often, these water sales are made by municipalities from their treated water systems. Rifle, Silt, Parachute and New Castle each have water sales facilities. Hauled water for potable use is necessary for some rural residents or businesses that do not have access to a community water supply or where water is either unavailable or not suitable for consumption. For example, the gas extraction industry uses potable water for fracking and other purposes requiring high quality treated water.

Commercial haulers of potable water for human consumption are regulated by the CDPHE. Regulation of these haulers is intended to ensure that water tanks are sanitary and acceptable for drinking water. Individuals may haul their own potable water from water sales facilities but are not regulated by CDPHE for personal use.

Municipalities provide bulk water sales as a courtesy and as a revenue source. They typically charge a higher per gallon rate for this water because these water sales are not a necessity for municipal customers and because end users do not pay tap fees/system investment fees that are required for connection to a municipal water system. Water haulers have limited options for purchasing quality treated domestic water because there are few bulk water service providers outside of municipalities.

The relationship between water users and suppliers can become tenuous in the event of local or regional water shortages resulting from droughts, treatment system limitations or other circumstances that adversely impact municipal water supply availability. Municipalities typically reserve the right to curtail use of water during times of water shortages. When water is scarce, municipalities will often curtail nonessential use of water such as outside irrigation, car washing, swimming pools and other activities including retail sales of water to non-municipal users. Historically, curtailment of retail water sales has been infrequent. However, as municipalities continue to grow and in-town use stretches the capacity of water supplies or other circumstances limit water availability, users that rely on these sources could be forced to drive longer distances to purchase water or seek other options.

Hauled water as a source of supply works well if municipalities are willing to continue retail sales and do not experience conditions that limit the availability of potable water. Water hauling may be the only option for users that do not have safe on-site water and because of that, should be considered a fragile supply. Users in unincorporated Garfield County may get by using hauled water, but this tenuous source of water should be considered unacceptable for new lots because of the potential for it to be curtailed.

B. SPECIAL DISTRICT WATER QUALITY & QUANTITY

I. Water Quality. The CDPHE regulates public water systems owned, operated and maintained by Special Districts in Garfield County. Every Special District is required to submit water quality information to the CDPHE to ensure compliance with the state's requirements for public water system water quality. Detailed information regarding the water quality of Special District water systems can be found in water quality reports prepared by and made available to the public by each district.

II. Water Quantity. Based on information provided by the Special Districts in Garfield County, it appears that the Special Districts have sufficient water supplies to meet current and future needs. Table 13 provides a summary of water quantity information for the Special Districts in the county.

Table 13: Summary of Special District Water Quantity

Special District	Description	Approximate Number of Additional Equivalent Residential Units
1. Mid Valley Metropolitan District (MVMD)[1]	The MVMD water system currently sources its water from eight (8) wells (two (2) of which are seasonal wells) that are capable of producing 2,000 gallons per minute. The MVMD has the ability to construct 7-8 new wells in the future. The water systems current capacity 3,500 EQRs. Current summer peak demand for water on the system is 2,300 EQRs. The MVMD has an extensive water rights portfolio as a result of water rights dedicated by new development over the years. Water rights dedication are a requirement to ensure new development provides water rights necessary to provide domestic service to the new communities. The MVMD holds a significant amount of ditch and Ruedi Reservoir water for augmentation purposes. The MVMD has a water augmentation plan in place and has an augmentation plan update in the late review process. As of 2019, the district is at approximately 45% of water augmentation plan capabilities.	1,200
2. Roaring Fork Water & Sanitation District (RFWSD)[2]	According to a 2016 Report prepared by SGM Engineering, in 2016 the RFWSD provided water and wastewater services to approximately 585 EQR's within Aspen Glen, Coryell Ranch and Ironbridge. As of 2016, the five (5) wells that serve the RFWSD were at a capacity of 1,820 GPM. The wells have a maximum capacity of 3,340 GPM (roughly 45% additional capacity). At 3,340 GPM, it is approximated that the existing wells could service 5,600 EQR's at maximum day demand. The RFWSD has four (4) additional locations for future wells within Aspen Glen and nine (9) additional locations for future wells within Coryell Ranch. SGM's report states that the RFWSD's existing and future water supply options are more than enough to meet the demands of future development within the district.	5,015
3. Battlement Mesa Metropolitan District (BMMD)[3]	As of 2019, BMMD's water facilities are at approximately 50% capacity. Battlement Mesa's current population is approximately 5,000 which would indicate an ability to provide water service to a population of roughly 10,000.	EQR data not available.

Data Source(s): [1]Mid Valley Metropolitan District; [2]2016 Roaring Fork Water & Sanitation District Service Plan Amendment; and, [3]Battlement Mesa Metropolitan District

C. WATER CONSERVANCY DISTRICT WATER QUANTITY

The existing and future water supplies associated with Water Conservancy District water supply augmentation plans are described in Table 14.

Table 14: Summary of Conservancy District Water Quantity

Conservancy District	Description
1. Basalt Water Conservancy District (BWCD)[1]	The BWCD service area includes portions of Pitkin County and the Roaring Fork River corridor from Carbondale to Glenwood Springs in Garfield County. The BWCD owns water supply contracts with the Bureau of Reclamation for 1,790 acre-feet of Ruedi Reservoir and 1,000 acre-feet of Green Mountain Reservoir supplies. The district also has water supplies from converted irrigation consumptive use of 360 acre-feet in the Robinson Ditch and 412.9 acre-feet in the Troy and Eden Ditches. The BWCD's existing contracts, based on year-around augmentation requirements and all contracts active, required approximately 2,300 acre-feet of supply.

Table 14: Summary of Conservancy District Water Quantity (continued)

Conservancy District		Description
2.	West Divide Water Conservancy District (WDWCD)[1]	The WWCD has six (6) service areas that it provides augmentation water supplies via contract with the district. The WDWCD serves about 700 acre-feet of existing water supply contracts (volumes based on year-around depletions). WDWCD has planned up to approximately 1,600 acre-feet of Colorado River water supplies (so potentially 900 acre-feet for new uses). The following bullets highlight WDWCD's future water supplies for the potentially affected service areas: • The WDWCD has sufficient supplies for future growth within the Colorado River service area. • The Four-mile service area's existing augmentation water supplies are nearly fully subscribed. Certain Four-mile Creek water supplies used by the WCWCD are leased supplies, so the district is actively planning new supplies. • WDWCD's augmentation water supplies are generally available in Silt Mesa, Elk Creek, and Rifle Creek because of the operational agreement between Silt Water Conservancy District and the WDWCD. • The Alsbury service area water supply is not fully subscribed. It is believed that this service area has sufficient future water supplies.

Data Source(s): [1]Canyon Water Resources LLC

D. MUNICIPAL WATER QUALITY & QUANTITY

I. Water Quality. The CDPHE regulates municipal/public water systems. Each municipality in Garfield County is required to provide the CDPHE with water quality information to ensure compliance with the state's requirements for municipal water quality. Detailed information regarding the water quality of municipal water systems can be found in water quality reports prepared by and made available to the public by each municipality.

Each municipality in Garfield County has completed a voluntary SWPP that is recorded with the State of Colorado. Each SWPP identifies and includes an evaluation of:

- The source water basins and the rivers and streams that feed water to municipal groundwater wells, spring boxes and/or river/stream water intakes.
- Potential sources of water contamination- these vary by municipality based on the type of contaminates that the community's water source(s) could be exposed to.

The Town of Silt and City of Rifle have water intakes on the Colorado River. Consequently, these municipalities have potential contamination exposure created by railroad accidents and/or vehicle accidents that may leak contaminants directly into the Colorado River above their water intakes. In contrast, other municipal water sources, such as Grizzly Creek and No Name Creek (water sources for the City of Glenwood Springs) may not have exposure to contamination from railroad accidents but may have potential contamination exposure resulting from other sources that could include agricultural practices, septic systems and/or oil & gas operations.

Examples of potential contamination sources are listed in Table 16. This list is not intended to be all-inclusive but is used to identify and serve as an overview of potential sources of contamination.

Table 16: Examples of Potential Contamination Sources

Potential Source of Contamination		Description
1.	Above/Below Ground Fuel Storage Tanks	Gasoline, diesel, oils or other chemicals could leak into the groundwater thereby affecting wells and springs.
2.	Agricultural Practices	Application of fertilizers, herbicides, pesticides or other chemicals can leach into groundwater.
3.	Camps, Campgrounds & Outdoor Recreation	Human/pet waste directly buried in the ground or on the surface, can contaminate surface & ground water sources. Vault toilets can leak into the groundwater.

Table 16: Examples of Potential Contamination Sources (continued)

Potential Source of Contamination		Description
4.	Dry/Abandoned Wells	Wells that are dry holes or that have been abandoned and not properly sealed can be a source of groundwater contamination by fecal matter, chemicals, or other materials that enter the well and reach deep into the ground.
5.	Existing/Abandoned Mine Sites & Gravel Pits	Heavy metals that wash from mine portals can contaminate surface and groundwater sources. Similarly, gravel operations (active or inactive) can be potential sources for surface and groundwater impacts.
6.	Golf Courses	Application of fertilizers, herbicides and/or other golf course chemicals can leach into surface and groundwater sources.
7.	Industrial & Commercial Areas/Operations	Uncontained chemical storage, spills and other related contaminants can leach into surface and groundwater supplies.
8.	Land Use Changes/Future Land Development	Land use changes/land development can result in the runoff of sediment and construction materials from sites, disturbances to groundwater, and/or the introduction of residential, commercial and industrial issues.
9.	Livestock Grazing & Stockyards	Animal waste either scattered or concentrated can cause fecal contamination of water supplies by E.Coli.
10.	Pipelines	Broken pipelines or perforated pipelines may leak oils, chemicals and contaminants.
11.	Railroads	Spills from railroad cargo (be it accident related or leaking rail cars) and weed management along train tracks can result in the contamination of water supplies.
12.	Septic Systems	Failed or improperly maintained septic systems may leach wastes into surface or groundwater supplies.
13.	Stormwater Runoff	Oils, antifreeze and other vehicle fluids that leaked from vehicles onto paved or graveled surfaces can be carried by stormwater runoff into groundwater or directly into surface waters resulting in contamination.
14.	Transportation, Roadways, Surfaces, Spills & Landslides	Vehicle accidents may result in spilled fuel, transported chemicals or other contaminants onto ground surfaces or waterways. Application of chemicals to roadways for snow/ice conditions or oil/tars for road maintenance can result in leaching of these contaminants into groundwater or surface water sources.
15.	Wildland & Structure Fires	Fires remove vegetation and create ash and other chemical compounds. These materials can be carried into streams, spring boxes and other water sources resulting in contamination. Debris flows from denuded burned areas can wash into streams, rivers and other water bodies causing contamination and blockage of wells, water intakes and spring boxes.

Data Source(s): 2015 Town of Carbondale Source Water Protection Plan; 2014 City of Glenwood Springs Source Water Protection Plan; and, 2013 Source Water Protection Plan for the Colorado River Partnership

It is important to note that the contamination sources identified in the SWPP's are those that could potentially impact municipal water sources but **in no way** indicate that the municipality's water source is actually contaminated. Additional information on potential sources of surface and groundwater contamination can be found on:

- Pages 25-48 of this appendix.
- CDPHE's website.
  (https://www.colorado.gov/pacific/coepht/public-drinking-water-and-your-health)
- Garfield County Environmental Health Department's website.
  (https://www.garfield-county.com/environmental-health/drinking-water-systems.aspx)

II. Water Quantity. Based on information sourced from municipal water efficiency plans and information provided by the towns and cities in Garfield County, it appears that the municipalities in the county have sufficient supplies of water to meet current and future needs. Table 17 provides a summary of water quantity information for the towns and cities in the county.

Table 17: Summary of Municipal Water Quantity

Municipality		Description
1.	Town of Carbondale[1]	Based on projections from the Town of Carbondale's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the town's service area will be approximately 16,100 by 2050. The plan goes on to state that Carbondale's water rights are sufficient to meet the supply needs of the community beyond 2050, as is the water supply infrastructure including the water treatment plants, transmission mains, and storage facilities.
2.	City of Glenwood Springs[2]	Based on projections from Glenwood Spring's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the city's service area will increase to approximately 18,771 by 2050. According to the plan, the city has an ample raw water supply and excess water treatment capacity to meet current demands and the supply needs of the community beyond the 2050 planning horizon, even if minimal or no additional conservation measures are implemented.
3.	Town of New Castle[3]	As of 2019, it is expected that the expansion of the town's water treatment facility (expanded to to 3.6 million gallons per day) provides New Castle with sufficient capacity to accommodate the build out of all properties currently within the town's boundaries. This means that the town can accommodate the 999 additional housing units and 200,000 square feet of additional commercial space that are approved, but not built, in the Castle Valley Ranch and Lakota Canyon Ranch PUDs.
4.	Town of Silt[4]	The town's potable water system is currently at about 50% capacity (1,685 EQRs). According to the town's 2019 Water-Wastewater-Irrigation Master Plan, the Town of Silt should be able to serve up to 2,590 EQRs, possibly more. The town's master plan does recommend that the town begin planning for augmentation of its water rights and current domestic water source. The additional 905 EQRs equates to roughly 905 additional single-family dwellings that the town could accommodate with its existing water system. This assumes that no other types of development (ex. commercial or industrial development) consume any of the town's remaining 905 EQRs.
5.	City of Rifle[5]	The 2019 City of Rifle Water Efficiency Plan projects that city water supplies can serve a population of 20,000 or more, which would carry the city to 2042, assuming a 3% growth rate. Given the city's current water supplies, drastic water efficiency efforts are not necessary. However, to prepare for future unforeseen population growth and/or increased pressure on the Colorado River, the city is exploring implementation of efficiency activities to reduce strain on the existing water supply and to promote continued growth with the current supply.
6.	Town of Parachute	Data not available.

Data Source(s): [1] 2015 Town of Carbondale Municipal Water Efficiency Plan; [2] 2015 City of Glenwood Springs Municipal Water Efficiency Plan; [3] Town of New Castle; [4] Town of Silt and 2019 Town of Silt Water-Wastewater-Irrigation Master Plan; and, [5] Draft 2019 City of Rifle Water Efficiency Plan

5. DROUGHT AND WATER CONSERVATION IN GARFIELD COUNTY

A. PLANNING FOR DROUGHT IN THE COLORADO RIVER BASIN

Since 2000, the Colorado River Basin has experienced a prolonged drought. There have been a few wet years-2008, 2010, and 2014, but the remaining years have been dry. 2002 was one of the driest years on record and 2012-2013 were the driest consecutive two years on record.

The recent drought has demonstrated that curtailment of some uses of Colorado River water in the Upper Division states may become a possibility, if the flow in the river ever becomes so low that the Upper Division could not meet its obligations under the Colorado River Compact. There is much uncertainty surrounding the consequences of continuing drought and its impacts[1,2]. Consequently, water interests and agencies are developing risk management strategies.

The seven (7) Colorado River basin states and the U.S. Bureau of Reclamation are working on a "contingency plan" to avoid the unacceptable consequences of the continuing drought in the Colorado River Basin. The Colorado River District, Southwestern Water Conservation District (SWCD), Colorado Water Conservation Board (CWCB), The Nature Conservancy and Front Range Water Council (FRWC) are jointly investigating the feasibility

of a water bank and water supply operations under a contingency plan[3].

The goal of the contingency plan is to avoid water levels in Lake Powell from falling below the minimum level of 3,490 feet elevation. When lake levels are at or above the minimum, the stored volume is approximately four (4) million acre-feet and the hydroelectric system can still produce power.

The contingency plan includes three (3) basic elements:

1. **Extended Operations.** Federal reservoirs upstream of Lake Powell- Flaming Gorge, Aspinall and Navajo Reservoirs- would release additional water for storage and use in Lake Powell.
2. **System Augmentation.** Enhanced cloud seeding and accelerated removal of non-native vegetation such as tamarisk.
3. **Demand Management.** Additional conservation by municipal and irrigation users and deficit irrigation or fallowing by agricultural users.

The extended operations and augmentation elements will be the first lines of defense. The demand management element is only a concept at this point. None of the four Upper Division (WY, UT, CO and NM) states has agreed to implement demand management. There are currently no management mechanisms in place to actually implement demand management. The CRWCD and others are studying "water banking" as a demand management mechanism.

An informal group including the CRWCD, CWCB, FRWS, SWCD, and The Nature Conservancy (collectively, the Water Bank Group) is investigating the development of a "Water Bank". The Water Bank would seek to provide a means for pre-Compact water rights (pre-1929 water rights not subject to curtailment) and certain reservoir storage to meet critical uses that depend on water supplies from rights that would probably be curtailed under a "compact call."

At a conceptual level, the Water Bank could operate as follows:

- Willing agricultural participants in the Water Bank could temporarily fallow or deficit irrigate certain lands that are irrigated by pre-Compact water rights. These willing participants would be compensated while normal irrigation is reduced, and the saved consumptive use would be available to a Water Bank.
- Post-Compact water users would "subscribe" to the bank, and thereby gain access to pre-Compact water that would offset or replace water use that might otherwise be curtailed.
- It is anticipated that any land that is fallowed or deficit irrigated may be done so on a rotational basis, in conjunction with other irrigated lands. This approach may avoid permanent irrigation dry-up, and minimize the economic and environmental impacts that can occur in surrounding communities and economies[4].

Data Source(s): [1]www.coloradoriverdistrict.org/wp-content/uploads/2014/11/Kuhn_paper_Quest_for-Certainty_Diminishing_River.pdf; [2]www.coloradoriverdistrict.org/wp-content/uploads/2014/11/Kuhn_paper_Managing_Uncertainties_on_Colorado_River.pdf; [3]www.coloradoriverdistrict.org/supply-planning/colorado-river-planning/; and, [4]www.coloradoriverdistrict.org/wp-content/uploads/2015/10/Water-Bank-Phase-1-Report_Final-DRAFT_June-2012.pdf

B. WATER SUPPLIES IN UNINCORPORATED GARFIELD COUNTY AND DROUGHT

Droughts may affect site-specific hydrogeology and groundwater well supplies resulting in decreased water well yields, water wells "drying-up", and diminishment of water quality. Since most of the domestic water in unincorporated Garfield County is sourced from groundwater wells, droughts will test the groundwater supply's resiliency. In certain areas where groundwater supplies are in part irrigation water infiltration, droughts are likely to exacerbate seasonal water table fluctuations because less irrigation water is being applied. In periods of drought, water wells may have reduced yields and physical water availability becomes a more widespread problem for domestic well water users.

Conservancy district and all other augmentation plans account for drought conditions. The DWR requires augmentation plans to prove that there are adequate supplies considering drought conditions. Therefore, if a water use has dry-year physical supplies and is included in a water district or other approved augmentation plan, then the general understanding is that the water supplies are fairly drought resilient and reliable.

The CRWCD and others are working to develop strategies to reduce the risks associated with growing demands and drier hydrology (refer to Water Bank, Risk Study). The actions studied in those efforts go to improving the reliability of reservoir supplies relative to droughts and interstate administration of the Colorado River.

C. SPECIAL DISTRICT WATER CONSERVATION MEASURES

Table 18 presents a summary of water conservation measures being implemented or explored by the select special districts in Garfield County.

Table 18: Summary of Special District Water Conservation Measures

Special District	Water Conservation Measure(s)
1. Mid-Valley Metropolitan District (MVMD)[1]	• Tiered rate structure • Ability to enact watering restrictions when necessary • District requires new growth/development to have a raw water system for irrigation • Monitoring monthly usage pattern in order to identify extreme water use and/or leak detection • Active leak detection and water loss programs
2. Roaring Fork Water & Sanitation District (RFWSD)[2]	• Tiered/block rate structure • As of 2005, all new customers are required to install rain sensors as part of outdoor irrigation systems • Ability to impose voluntary and/or mandatory water use restrictions when necessary • District discourages the use of potable water for irrigation and can require new growth/development to have a raw water irrigation system
3. Battlement Mesa Metropolitan District (BMMD)[3]	• Tiered rate structure

Data Source(s): [1] Mid Valley Metropolitan District; [2] Roaring Fork Water & Sanitation District; and, [3] Battlement Mesa Metropolitan District

D. MUNICIPAL WATER CONSERVATION MEASURES

Water conservation measures vary widely among the towns and cities in Garfield County. Table 19 provides a summary of the water conservation measures being implemented or explored by the municipalities in the county.

Table 19: Summary of Municipal Conservation Measures

Municipality	Water Conservation Measure(s)
1. Town of Carbondale[1]	• Automatic/remote meter reading installation and operation • Enhanced water loss control • Conservation-oriented rates • Fixtures, appliances, (natural replacement and Incentives) • Outdoor water efficiency • Commercial, Institutional, and Industrial water efficiency • Regulatory measures • Raw water use in place of potable • Waste of water ordinance and future update • Update landscape development regulations for new construction to place emphasis on water efficiency in residential development • Public information and education • K-12 education
2. City of Glenwood Springs[2]	• Automatic/remote meter reading installation and operation • Enhanced water loss control • Conservation-oriented rates • Fixtures, appliances, (natural replacement and Incentives) • Outdoor water efficiency • Regulatory measures • Water reuse and recycling • Waste of water ordinance and future update • Update landscape development regulations for new construction to place emphasis on water efficiency in residential development • Public information and education • K-12 education

Table 19: Summary of Municipal Conservation Measures (continued)

Municipality	Water Conservation Measure(s)
3. Town of New Castle[3]	• Waste of water ordinance • Summer water use restrictions • Tiered water rate structure
4. Town of Silt[3]	• Limits on irrigable space on lots in Silt developed after 2006 • On-going audit of Irrigation water • Town is actively pursuing citizen compliance with the town's irrigable space requirements for lots developed after 2006 • Town relies on its citizens to abstain from utilizing potable water on landscaped areas, unless permission is specifically granted
5. City of Rifle[3]	• Inclining/tiered rates • Water rate adjustments • Tap fees with water use efficiency incentives • Meter for non-potable irrigation to city properties • Meter accuracy check program • System wide water audits • Water line replacement program • Asset management of water system pipelines • Capital Improvement Plans (CIPs) • Drought Management Plan (DMP) • Designate existing staff as Efficiency Coordinator • Planning group/committee dedicated to water efficiency • Assure that consumers maintain service lines • Removal of Phreatophytes in city managed ditches for raw water irrigation of city parks • Outdoor irrigation controllers - Targeted giveaways of smart irrigation controller or system timers, especially for large customers. Target 5 of largest customers with irrigation, evaluate participation and success. - On city managed parks/green spaces that are on potable water. - Targeted giveaways of rain sensors, especially for large customers. Start with 50, evaluate participation. - Implement on city managed parks/green spaces. • Xeriscape - Xeriscape demonstration gardens on city managed parks/green spaces. - General landscape requirements for commercial, industrial, civic, and multi-family uses must have at least 50% xeric plants (Sec. 16-13-80 (c)). • Specialized nonresidential surveys, audits and equipment efficiency improvements - commercial & industrial self-audit assistance & incentive: provide WaterSense C&I self-audit checklist, with incentive for completion (such as giveaways, website recognition, free cross connection test, etc.) • Give-aways: Give away irrigation system timers. Start with 50, evaluate participation. • Rules and regulations for landscape design and installation. • Soil amendment requirements • Turf restrictions - General landscape requirements for commercial, industrial, civic, and multi-family uses- may have a maximum of 50% area with turf. - EQR defined as up to 5,000 sq. ft. Irrigated area above that is allowed but charged a higher tap fee (Sec. 13-4-60). Update code to include regulations limiting area of turf for single-family residential development. • Waste water ordinance • Time of day and day of week watering restrictions • Water overspray limitation • Landscaper training and certification • Irrigation system installer training and certification. • Improved and additional webpages • Electronic and paper bill stuffers • K-12 teacher and classroom education programs • Links to useful websites created by the EPA, Water Wise, etc. • Provide specific information regarding gray water and rainwater

Table 19: Summary of Municipal Conservation Measures (continued)

Municipality	Water Conservation Measure(s)
6. Town of Parachute[3]	• The town has no formal policies for water conservation • Each year the town provides a suggested watering schedule for residents, but it is not enforced

Data Source(s): [1] 2015 Town of Carbondale Municipal Water Efficiency Plan; [2] 2015 City of Glenwood Springs Municipal Water Efficiency Plan; [3] Town of New Castle; [4] Town of Silt and 2019 Town of Silt Water-Wastewater-Irrigation Master Plan; and, [5] Draft 2019 City of Rifle Water Efficiency Plan

6. WATER RESOURCE DATA & INFORMATION

1. MID VALLEY METROPOLITAN DISTRICT (MVMD)

Data source(s): Mid Valley Metropolitan District

I. Overview of the MVMD's water supply system.

The MVMD has an extensive water rights portfolio as a result of water rights dedicated by new development over the years. Dedication of water rights are a requirement of new development to ensure that the development provides water rights necessary to provide domestic service for the new growth.

The MVMD sources its water from wells. The district presently has eight (8) production wells (two (2) of which are seasonal wells) in place and the ability/rights to install an additional eight (8) wells around the district. MVMD's existing production wells are capable of producing 2,000 gallons per minute.

MVMD's water system has a capacity of 3,500 EQRs. The current summer peak demand for water is 2,300 EQRs. Presently, MVMD provides water service to 2,193 customers.

MVMD has a total water storage capacity of 2.3 million gallons. MVMD's water storage system comprises:

- Two 750,000-gallon tanks
- One 500,000-gallon tank
- One 350,000 gallon tank (which is currently mothballed)

MVMD has a water augmentation plan in place and also has an augmentation plan update that is currently in the late review process. In addition, the district holds a significant amount of ditch and Ruedi Reservoir water for augmentation purposes. As of 2019, the MVMD is at approximately 45% of water augmentation plan capabilities.

II. MVMD's capacity for future growth.

The MVMD currently provides water service to 2,300 EQRs but has the capacity to provide service to a total of 3,500 EQRs. Therefore, the MVMD has the ability to accommodate an additional 1,200 EQRs with its existing water system. This equates to roughly 1,200 additional single-family homes.

While the MVMD does not actively pursue expansion, the District Board sees the role of the district to provide a needed service when approached.

Over the years, the MVMD has engaged in conversations outside of the original District Service Plan Area to the benefit of the watershed (i.e. Cerise Ranch). Through consolidation of water and sewer services the MVMD has identified potential value in reduction in package plants, ISDS or septic systems. The MVMD believes that this would be to the benefit of the greater watershed and the community.

III. MVMD's water conservation efforts.

The MVMD has policies and procedures in place to encourage water conservation. These include:

- A tiered rate structure.
- Ability to enact watering restrictions when necessary.
- Requiring new growth/development to have raw water irrigation.

- Monitoring monthly usage patterns for in order to identify extreme use and leak detection.
- Active leak detection and water loss programs.

IV. MVMD's watershed protection efforts.
The MVMD does not have a specific watershed protection plan. However, the MVMD considers watershed protection their primary daily function.

2. ROARING FORK WATER AND SANITATION DISTRICT (RFWSD)
Data source(s): Roaring Fork Water and Sanitation District; and, 2016 Roaring Fork Water & Sanitation District Service Plan Amendment

I. Overview of the RFWSD's water supply system.
The RFWSD currently sources its potable water from five (5) wells- three (3) wells within Aspen Glen and two (2) wells within Coryell Ranch. All wells are drilled into the Roaring Fork alluvium. The Aspen Glen and Coryell Ranch Well Fields can act independently of each other and have full treatment facilities in each location. The two systems are linked together with two river crossings so that both systems can supply water to the entire district. The district has four (4) additional locations within Aspen Glen for future wells, and eleven (11) additional locations within Coryell Ranch for future water supplies.

The existing capacity of the RFWSD's five (5) wells is 1,820 gallons per minute (GPM). The full capacity of these wells (full capacity is the actual capacity of the well based on pump test reports, water rights, and well permits) is 3,340 GPM. The installation of larger pumps in each well would enable the RFWSD to achieve full capacity, which would significantly increase future water supplies.

From the wells, the water is then pumped to one of the RFWSD's two water plants where the water is treated. This water is then transmitted to the RFWSD's tanks where it is stored for distribution to customer. Special care is taken in monitoring the levels of these tanks to assure adequate water for fire protection.

The RFWSD has a total water storage capacity of 1.5 million gallons. The RFWSD water storage system comprises:

- One 700,000-gallon tank
- Two 300,000-gallon tanks
- One 200,000-gallon tank

As of 2016, the RFWSD is provided water services to approximately 585 EQR's within Aspen Glen, Coryell Ranch and Ironbridge.

The RFWSD's water source (i.e. Roaring Fork River alluvial gravel deposits) is an excellent water supply which relies upon the sand and gravel deposits to naturally filter water that feeds the wells. The water quality is excellent and the only treatment required to meet all the mandated health standards is disinfection through chlorination. Alluvial ground water does contain dissolved minerals that cause moderate hardness in the water. Dissolved minerals are considered beneficial for health, however hardness can cause aesthetic concerns however. The dissolved minerals can evaporate out on plumbing fixtures and on dishes cleaned with a dishwasher.

II. RFWSD's capacity for future growth.
If full capacity of the existing wells was installed, the 3,340 GPM capacity could service approximately 5600 EQR's at maximum day demand. Given that the RFWSD provided service to around 585 EQRs, as of 2016, it is estimated that the district could accommodate an additional 5,015 EQRs. In other words, an additional 5,015 single-family homes.

In addition, the RFWSD has the ability to construct a number of additional wells in Aspen Glen and Coryell Ranch. It is unknown what additional EQRs these wells would provide. Based on the capacity of the RFWSD's

existing wells, one could speculate that these additional wells could provide a substantial number of additional EQRs.

III. RFWSD's water conservation efforts.
The RFWSD has policies and regulations in place to encourage water conservation. These include:

- Tiered/block rate structure.
- As of 2005, all new customers are required to install rain sensors as part of outdoor irrigation systems.
- The ability to impose voluntary and/or mandatory water use restrictions when necessary.
- The district discourages the use of potable water for irrigation and can require new growth/development to have a raw water irrigation system.

IV. RFWSD's watershed protection efforts.
Information not available.

3. BATTLEMENT MESA METROPOLITAN DISTRICT (BMMD)
Data source(s): Battlement Mesa Metropolitan District

I. Overview of the BMMD's water supply system.

The BMMD owns, operates and maintains water utilities for the Battlement Mesa Planned Unit Development (PUD). Battlement Mesa's water is sourced from the Colorado River. The BMMD provides water service to eligible properties but has limited authority beyond the ability to provide this service to new residential units within the Battlement Mesa PUD.
The BMMD's has an intake station on the Colorado River that pumps water from the river to the BMMD's raw water reservoir. The intake station is capable of pumping 9,000,000 gallons per day.

The BMMD's raw water reservoir stores the untreated water, allowing silt and mud to settle out before the water is treated. The reservoir's capacity is approximately 13,000,000 gallons. If there are issues with water quality in the Colorado River, the reservoir allows the BMMD to shut off the river pumps and continue to treat water to supply to customers.

Water from the reservoir is than processed through the BMMD's treatment system. The treated water is than stored in a water tank for distribution to the BMMD's water customers. The storage tank's capacity is 1,000,000 gallons.

II. BMMD's capacity for future growth.
Battlement Mesa's water facilities are at approximately 50% capacity. The community's current population is approximately 5,000 which would indicate an ability to provide water service to a population of roughly 10,000.

III. BMMD's water conservation efforts.
The BMMD provides metered water service to the residents at a minimum monthly rate of $17.00 per month for use up to 5,000 gallons. Residents exceeding the 5,000 gallons of use during the month are charged a rate of $3.40 per 1,000 gallons. There are no incremental increases in water rates for higher water use. The $3.40 per 1,000 gallons is the same rate as the $17.00 fee for 5,000 gallons.

IV. BMMD's watershed protection efforts.
Information not available.

4. TOWN OF CARBONDALE

Data source(s): Town of Carbondale; 2015 Town of Carbondale Springs Municipal Water Efficiency Plan; and, 2014 Town of Carbondale Source Water Protection Plan

I. Overview of Carbondale's water supply system.

Carbondale owns, operates and maintains its own water utilities. Carbondale obtains its potable water supply from surface water sources in the Nettle Creek drainage, a tributary to the Crystal River, and from groundwater sources along the Crystal and Roaring Fork Rivers.

The potable supply is supplemented by raw water diversions through various irrigation ditches under the town's water rights, and the Town provides raw water for irrigation purposes to a subset of its customers.

The town has three (3) water production facilities along with an extensive ditch system that is used for outdoor irrigation.

Carbondale's Water Department monitors and maintains the town's water production facilities, approximately 28-miles of pipeline, two storage reservoirs, and the town's raw water irrigation ditch system.

i. Potable water supply.

Carbondale obtains its potable water supply from surface water sources in the Nettle Creek drainage, a tributary to the Crystal River, and from groundwater sources along the Crystal and Roaring Fork Rivers. The Town has a total of four (4) wells, with three (3) located in the Roaring Fork River alluvial aquifer and one (1) located in the Crystal River alluvial aquifer.

The town's three (3) water treatment facilities provide treated well water and surface water to the Carbondale service area. The total capacity of the water treatment plants is 4.0 million gallons per day (MGD). As of 2015, production from the town's water treatment plants ranged from approximately 2.5 to 3.0 MGD depending on the season. Augmentation water is available under a contract from Ruedi Reservoir, which is deliverable through release from the reservoir and then pumping of the well system along the Roaring Fork River as a drought reserve.

Table 20: Summary of the Town of Carbondale's Water Sources

Water Source	Description
1. Nettle Creek	• The town's principal source of drinking water. • A series of collection boxes capture flows from Nettle Creek and convey those to the town's water treatment plant. • Flows from Nettle Creek range seasonally from 400 gallons per minute (gpm)/0.58 MGD (approximate baseline) to 900 gpm/1.30 MGD (representative runoff in a non-drought year). • Flows in Nettle Creek are sourced from high altitude glacial and snowmelt fed lakes. Town staff reports that water from Nettle Creek is of high quality.
2. Crystal River Well	• Diversions from the Crystal River Well are used to supplement the water supply from Nettle Creek. • The well can withdraw up to 1.0 MGD. • There is additional capacity which can be utilized, if necessary, by expanding the Crystal River well field and treatment plant.
3. Roaring Fork River Well Field	• The Roaring Fork River Well Field is used as a tertiary backup supply. • The well field consists of three (3) developed shallow wells. • As of 2015, the capacity of the treatment plant was 1.0 MGD. • A total of ten (10) municipal Roaring Fork Wells have been decreed. As of 2015, the remaining seven (7) wells were not completed. The town will install additional wells downstream of the existing wells as dictated by the need for additional supplies. The Roaring Fork River well field treatment facility has a foundation for an additional 1.0 MGD of capacity.

Data Source(s): 2015 Town of Carbondale Municipal Water Efficiency Plan

ii. Irrigation water supply.
Carbondale's potable water system is supplemented heavily during the irrigation season by a network of irrigation ditches which are fed by a series of headgates located along the Crystal River. The town's ditch system delivers raw water to open spaces, parks, schools, sports field areas, golf courses and an estimated 15% to 20% of residential users (as of 2015).

The primary ditches which the town is solely responsible for operating include the:

- Carbondale Ditch (Town Ditch)
- Bowels and Holland Ditch
- Weaver Leonardy Ditch

The town is also vested in water delivery from the Ella Ditch, Lowline Ditch, and Rockford Ditch. Water rights associated with the ditch system allow the town to limit the effects of irrigation demands on the treatment plants and storage facilities during the irrigation season.

II. Carbondale's capacity for future growth.
Based on projections from Carbondale's 2015 Municipal Water Efficiency Plan, it is estimated that the population of the town's service area will increase by 2.5% annually. Therefore, by 2035 the population of the service area will be approximately 11,100 and by 2050 the population will be approximately 16,100.

According to the 2015 Municipal Water Efficiency Plan, Carbondale's water rights are sufficient to meet the supply needs of the community beyond 2050, as is the water supply infrastructure including the water treatment plants, transmission mains, and storage facilities.

III. Carbondale's water conservation efforts.
Carbondale is committed to the efficient use of its water resources. Since 2011, it is estimated that Carbondale has conserved 48 acre-feet of water (1.3% per year). The town has established a water efficiency goal of 24 acre-feet (2.0%) savings per year compared with a continuation of current demand. The table below presents new and updated water efficiency activities selected by the town for inclusion in their 2015 Municipal Water Efficiency Plan.

Table 21: New and Updated Water Efficiency Activities and Water Savings Estimates

Water Efficiency Activities		Sectors Impacted	Ongoing Activity?	Implementation Period of New Activities	Projected Water Savings 2015-2050 (acre-feet/year)
FOUNDATIONAL ACTIVITIES					
1.	Automatic/Remote Meter Reading Installation and Operation	All	Yes	2015-2018	50
2.	Enhanced Water Loss Control	All	Yes	Annual	264
3.	Conservation-Oriented Rates	All	Yes	Ongoing	100
TARGETED TECHNICAL ASSISTANCE & INCENTIVES AND NATURAL REPLACEMENT OF FIXTURES & APPLIANCES					
1.	Fixtures, Appliances, (natural replacement and Incentives)	All, Indoor	Yes	Ongoing/As Needed	143
2.	Outdoor Water Efficiency	All, Outdoor	Yes	Ongoing	50
3.	Commercial, Institutional, and Industrial Water Efficiency	All	Yes	2015-2020	25
ORDINANCES AND REGULATIONS					
1.	Regulatory Measures	All	Yes		75
2.	Raw Water Use in Place of Potable	Irrigation	Yes	Ongoing	33
3.	Waste of Water Ordinance and Future Update	All	Yes	Ongoing	10

Table 21: New and Updated Water Efficiency Activities and Water Savings Estimates (continued)

Water Efficiency Activities		Sectors Impacted	Ongoing Activity?	Implementation Period of New Activities	Projected Water Savings 2015-2050 (acre-feet/year)
ORDINANCES AND REGULATIONS (continued)					
4.	Update landscape development regulations for new construction to place emphasis on water efficiency in residential development	Single-family and Multi-family Residential	Yes	Ongoing	50
EDUCATIONAL ACTIVITIES					
1.	Public Information and Education	All	Yes	Ongoing/As Needed	30
2.	K-12 Education	All	Yes	Ongoing/As Needed	10
			TOTAL SAVINGS THROUGH 2050 (acre-feet/year)		**840**

Data Source(s): 2015 Town of Carbondale Municipal Water Efficiency Plan

IV. Carbondale's potential water quality concerns.

The 2015 Town of Carbondale Source Water Protection Plan includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The contaminate sources and associated priority rankings for the Town of Carbondale's water supplies are provided in Table 22.

Table 22: Priority Strategies for Nettle Creek, Crystal River Wells and Roaring Fork River Wells

Issue of Concern		Nettle Creek	Crystal River	Roaring Fork River
1.	Above/Below Ground Fuel Storage Tanks	-	Low	Low
2.	Agricultural Practices	Medium	Medium	Medium
3.	Camps, Campgrounds & Outdoor Recreation	Low	Low	-
4.	Developed and/or Degraded Riparian Areas	Medium	Medium	Medium
5.	Dry Wells	-	Low	-
6.	Existing/Abandoned Mine Sites & Gravel Pits	-	Low	Low
7.	Golf Courses	-	-	Low
8.	Industrial & Commercial Areas/Operations	-	Low	Low
9.	Landfills, Solid/Hazardous Waste Sites	-	-	Medium
10.	Land Use Changes/Future Land Development	Medium	High	Medium
11.	Oil & Gas Operations	-	Medium	Low
12.	Permitted Wastewater Discharge Sites	-	-	Low
13.	Plane Crashes	Low	Low	-
14.	Residential Practices/Issues	Medium	Medium	Low
15.	Septic Systems	-	Medium	Medium
16.	Sludge Spray Disposal	-	-	Low
17.	Stormwater Runoff	Medium	Low	Medium
18.	Transportation, Roadways, Surfaces, Spills & Landslides	-	Medium	Medium
19.	Wildland & Structural Fires	High	Low	-

Data Source(s): 2015 Town of Carbondale Source Water Protection Plan

V. Carbondale's source water protection areas.

Table 23: Description of Protection Areas for Nettle Creek, Crystal River Wells and Roaring Fork River Wells

Water Source	Zone 1	Zone 2
1. Nettle Creek Drainage	Defined as a 1,000 foot wide perimeter on both sides of Nettle Creek	Represents the watershed boundary for the Nettle Creek
2. Crystal River Wells near Carbondale	Defined as a 1,000 foot wide perimeter on both sides of the Crystal River and its tributaries.	Represents a 156 square mile area that includes the Crystal River and its tributaries 15 stream miles upstream from the Crystal River Well.
3. Roaring Fork River Wells near Carbondale	Represents the parcel ownership outline, a 4.8 square mile area.	A 55 square mile area to the north and west of the wells.

Data Source(s): 2015 Town of Carbondale Source Water Protection Plan

Table 24: Protection Area Maps for Nettle Creek, Crystal River Wells and Roaring Fork River Wells

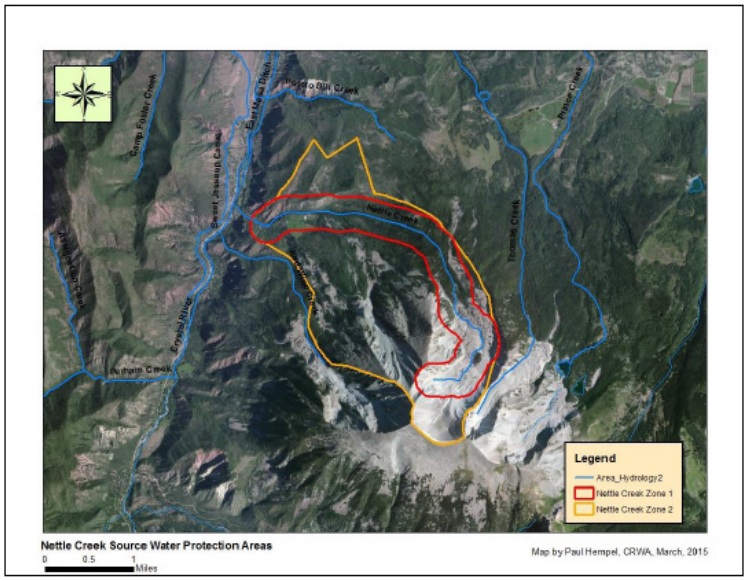
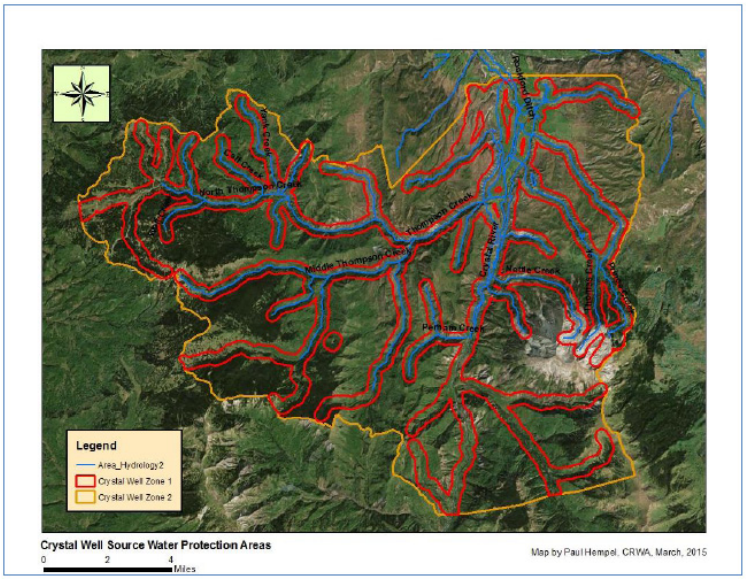
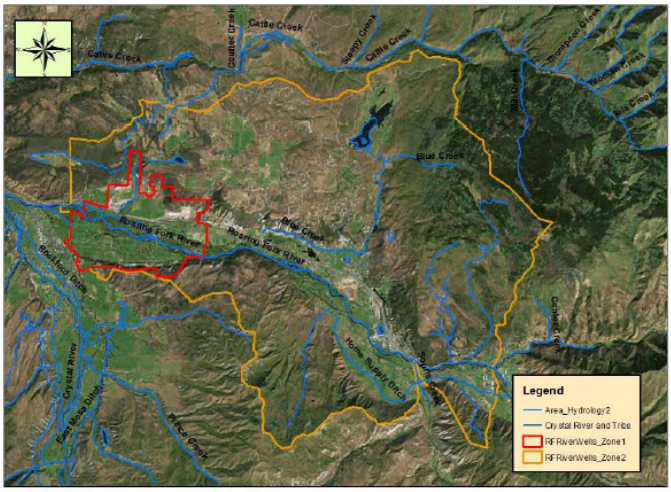
Water Source	
1. Nettle Creek Drainage	
2. Crystal River Wells near Carbondale	

Table 24: Protection Area Maps for Nettle Creek, Crystal River Wells and Roaring Fork River Wells (continued)

Water Source	
3. Roaring Fork River Wells near Carbondale	

Data Source(s): 2015 Town of Carbondale Source Water Protection Plan

5. CITY OF GLENWOOD SPRINGS

Data source(s): City of Glenwood Springs; 2015 City of Glenwood Springs Municipal Water Efficiency Plan; 2014 City of Glenwood Springs Source Water Protection Plan; and, 2011 City of Glenwood Springs Comprehensive Plan

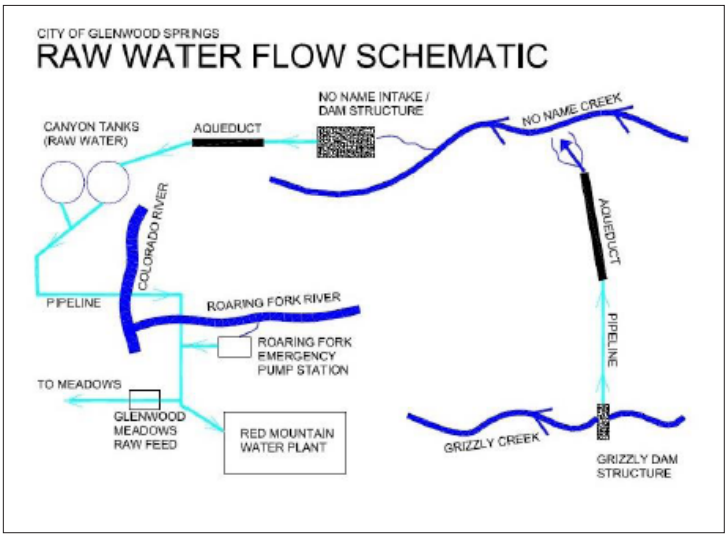
I. Overview of Glenwood Springs' water supply system.

The City of Glenwood Springs owns, operates and maintains its own water utilities. The city obtains potable water through senior water rights on Grizzly and No Name Creeks in the Flat Tops Wilderness Area. The city also holds the rights to water in Ruedi Reservoir.

The city provides potable water to all customers in the service area and raw water for irrigation to a small subset of customers.

The city's raw water system is largely gravity fed, which reduces the need for costly pumping. There are two (2) areas of the city that require pumping for treated water service. The city has established a "blue line" that reflects the upper most topographic limit of the city's ability to provide gravity fed water (generally 6,000 feet in elevation).

A general schematic of the city's water supply system is shown below.



i. Potable water supply.
The City of Glenwood Springs obtains its potable water supply from diversions on Grizzly and No Name Creeks. These tributaries are located to the north of the Colorado River, and their headwaters are located on the south side of the Flat Tops Wilderness Area. City staff reports that raw water from these watersheds is of excellent quality.

Water from Grizzly and No Name Creeks is conveyed to the city's Canyon Tanks. The Canyon Tanks are two (2) raw water tanks, each with a capacity of 250,000 gallons. The tanks provide a total raw water storage of 0.5 million gallons (1.5 acre-feet). The tanks provide flow regulation for the pipeline rather than long-term raw water storage. From the Canyon Tanks, the city's raw water flows in a pipeline across the Colorado River and under the Roaring Fork River and up to the Red Mountain Water Treatment Plant.

The capacity of the Red Mountain Water Treatment Plant is 8.65 MGD. Between 2009 and 2013, the average day water production averaged 2.23 MGD and the peak day production averaged 4.14 MGD. Therefore, the city has an excess capacity of 4.51 MGD on the peak day and consequently has no problem meeting peak production demands for water.

In addition to water from Grizzly and No Name Creeks, the city has rights to water in Ruedi Reservoir. This water can be used as a backup supply in the event that their are issues with the Grizzly and No Name Creek water supplies. Where the city's pipeline crosses the Roaring Fork River, there is a pump station and inlet, which allows water from the Roaring Fork River (released from Ruedi Reservoir) to be delivered to the Red Mountain Water Treatment Plant. The pump house on the Roaring Fork has a capacity of 5 million gallons per day (7.75 cubic feet per second).

Table 25: Summary of the City of Glenwood Springs' Water Sources

Water Source	Description
1. Grizzly Creek and No Name Creek	• Grizzly Creek and No Name Creek are the city's primary sources of water. • The city's 2009 Municipal Water Efficiency Plan found that the likely yield of the city's two direct flow water rights on Grizzly Creek and No Name Creek plus its contract water in Ruedi Reservoir equal 10,026 acre-feet in an average year and 7,525 acre-feet in a dry year.
2. Ruedi Reservoir via the Roaring Fork River	• The city holds rights to 500 acre-feet per year of water in Ruedi Reservoir. • The city can divert this water as a backup supply should water not be available from the Grizzly-No Name system. • Water released from Ruedi Reservoir is pumped from the Roaring Fork river to the city's Red Mountain Water Treatment Plant. • According to the 2015 Municipal Water Efficiency Plan, the city cannot concurrently operate the Grizzly-No Name system with the Roaring Fork pump station. Therefore, water from Ruedi Reservoir can be used as an alternate supply but cannot be used as a supplemental supply to the Grizzly-No Name system.

Data Source(s): 2015 City of Glenwood Springs Municipal Water Efficiency Plan; and, 2014 City of Glenwood Springs Source Water Protection Plan

II. Glenwood Springs' capacity for future growth.
Based on projections from Glenwood Springs' 2015 Municipal Water Efficiency Plan, it is estimated that the population of the city's service area will increase by 1.6% annually. Therefore, by 2050 the population of the service area will be approximately 18,771.

According to the 2015 Municipal Water Efficiency Plan, the City of Glenwood Springs has an ample raw water supply and excess water treatment capacity to meet current demands and the supply needs of the community beyond the 2050 planning horizon, even if minimal or no additional conservation measures are implemented.

III. Glenwood Springs' water conservation efforts.
Glenwood Springs has implemented a variety of water efficiency activities since 2009 (when the city's last water conservation plan was prepared). The 2009 plan called for a total savings of 130 acre-feet by 2030. As of 2015,

the city estimated that the passive and active efficiencies achieved had conserved more than 200 acre-feet.

The city has established a water efficiency goal of (0.5%) savings per year compared with a continuation of current demand. The table below presents new and updated water efficiency activities selected by the city for inclusion in their 2015 Municipal Water Efficiency Plan.

Table 26: New and Updated Water Efficiency Activities and Water Savings Estimates

Water Efficiency Activities		Sectors Impacted	Ongoing Activity?	Implementation Period of New Activities	Projected Water Savings 2015-2050 (acre-feet/year)
FOUNDATIONAL ACTIVITIES					
1.	Automatic/Remote Meter Reading Installation and Operation	All	Yes	2014-2018 for existing customers Ongoing for new customers	50
2.	Enhanced Water Loss Control	All	-	Annual	50
3.	Conservation-Oriented Rates	All	Yes	-	100
TARGETED TECHNICAL ASSISTANCE & INCENTIVES AND NATURAL REPLACEMENT OF FIXTURES & APPLIANCES					
1.	Fixtures, Appliances, (natural replacement and Incentives)	All, Indoor	Yes	-	108
2.	Outdoor Water Efficiency	All, Outdoor	Yes	-	150
3.	Commercial, Institutional, and Industrial Water Efficiency	All	Yes	-	120
ORDINANCES AND REGULATIONS					
1.	Regulatory Measures	All	Yes	-	-
2.	Raw Water Use in Place of Potable	Irrigation	Considering	Ongoing	Savings depend on size and scope of reuse project.
3.	Waste of Water Ordinance and Future Update	All	Yes	2015	-
4.	Update landscape development regulations for new construction to place emphasis on water efficiency in residential development	Single-family and Multi-family Residential	-	Potentially 2018 under Regional Plan Collaboration	100
EDUCATIONAL ACTIVITIES					
1.	Public Information and Education	All	Yes	-	30
2.	K-12 Education	All	Yes	-	-
			TOTAL SAVINGS THROUGH 2050 (acre-feet/year)		**708**

Data Source(s): 2015 City of Glenwood Springs Municipal Water Efficiency Plan

IV. Glenwood Springs' potential water quality concerns.

The 2014 City of Glenwood Springs Source Water Protection Plan includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The contaminate sources and associated priority rankings for the City of Glenwood Springs' water supplies are provided in Table 27.

Table 27: Priority Strategies for the No Name Creek, Grizzly Creek and Roaring Fork River Intakes

Issue of Concern		Grizzly & No Name Creeks	Roaring Fork River
1.	Above/Below Ground Fuel Storage Tanks	-	Medium
2.	Agricultural Practices	-	Medium- (education/enforced)
3.	Camps, Campgrounds & Outdoor Recreation	Medium	-
4.	Existing/Abandoned Mine Sites & Gravel Pits	-	Low (regulated)

Table 27: Priority Strategies for the No Name Creek, Grizzly Creek and Roaring Fork River Intakes (continued)

Issue of Concern		Grizzly & No Name Creeks	Roaring Fork River
5.	Golf Courses	-	Low
6.	Industrial & Commercial Areas/Operations	-	High (education/enforced)
7.	Livestock Grazing	Low	-
8.	Oil & Gas Operations	Low	Medium
9.	Permitted Wastewater Discharge Sites (via EPC, El Rocco MHP a potential concern)	-	Low
10.	Plane Crashes	Medium (mitigation as occurs)	-
11.	Residential Practices/Issues	-	Medium (education)
12.	Septic Systems	-	Medium
13.	Stormwater Runoff	-	Medium
14.	Tampering with Infrastructure/Source Water	Medium (daily protocol/inspection)	Medium (daily protocol/inspection)
15.	Transportation, Roadways, Surfaces, Spills & Landslides	-	High
16.	Urban Recreational Grasses	-	Low
17.	Wildland & Structural Fires	Medium	Medium +

Data Source(s): 2014 City of Glenwood Springs Source Water Protection Plan

V. Glenwood Springs' source water protection areas.

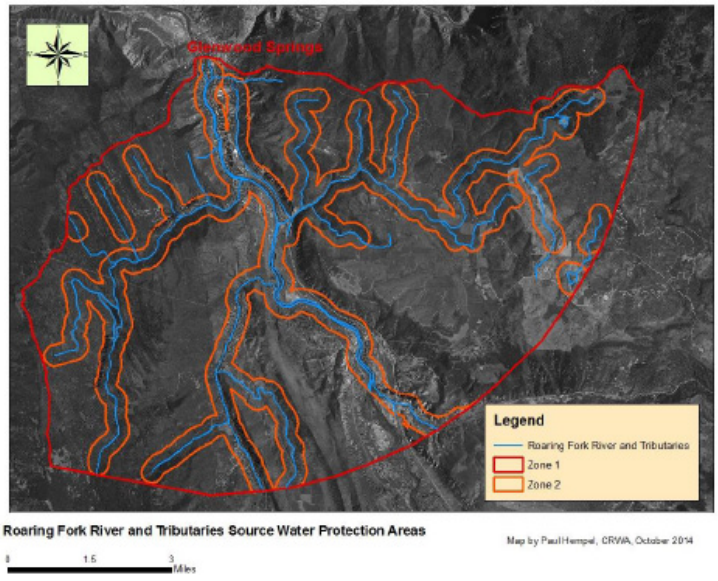
Table 28: Description of Protection Areas for Grizzly Creek, No Name Creek and Lower Roaring Fork River Watersheds

Water Source		Zone 1	Zone 2
1.	Grizzly Creek and No Name Creek Watershed	Represents the watershed boundary for both creeks.	Defined as a 1,000 foot-wide band on either side of the creeks.
2.	Lower Roaring Fork River Watershed	Represents the watershed boundary and includes: (1) the 3-Mile Creek and Landis Creek drainages; and, (2) portions of 4-Mile Creek and Cattle Creek.	Defined as a 1,000 foot-wide band on either side of the Roaring Fork River and the aforementioned creeks.

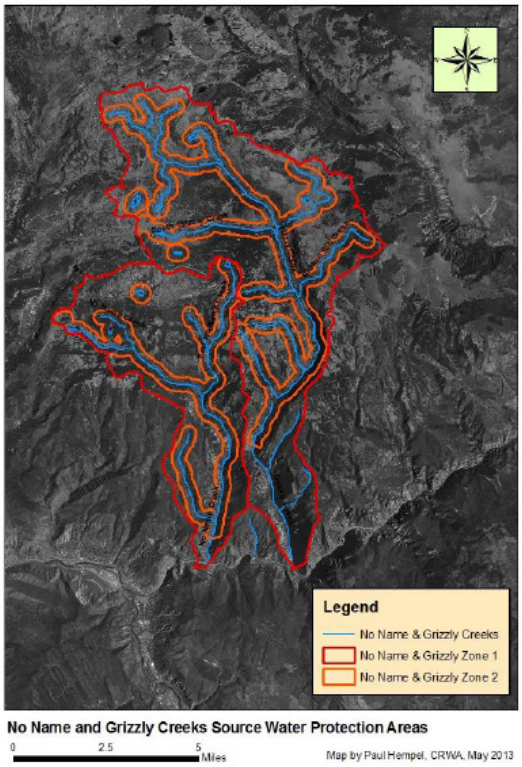
Data Source(s): 2014 City of Glenwood Springs Source Water Protection Plan

Table 29: Protection Area Maps for Nettle Creek, Crystal River Wells and Roaring Fork River Wells

Water Source	
1.	Roaring Fork River and Tributaries



2. No Name Creek and Grizzly Creek



Data Source(s): 2014 City of Glenwood Springs Source Water Protection Plan

6. TOWN OF NEW CASTLE

Data source(s): Town of New Castle; 2009 Town of New Castle Comprehensive Plan; 2013 Source Water Protection Plan for the Colorado River Partnership

I. Overview of New Castle's water supply system.

The Town of New Castle owns, operates and maintains its own water utilities. The Town of New Castle's water is sourced from East Elk Creek. The town holds rights to water from the Colorado River that are augmented by releases from Ruedi Reservoir. Due to the costs associated with treating and transporting from the Colorado River, the town refrains from using this water source unless demand or drought necessitates it.

The Castle Valley Ranch Planned Unit Development (PUD) is obligated to dedicate an additional 2.8 CFS from the Coryell and Red Rock Ditch to the Town of New Castle at development build-out.

The Town of New Castle delivers raw water through the Red Rock Ditch to irrigate portions of the Castle Valley Ranch and Lakota Canyon Ranch PUDs.

i. Potable water supply.

The town owns rights to 2.67 cubic feet per second (CFS) from East Elk Creek. New Castle's water delivery system starts at a sedimentation pond in the East Elk Creek Drainage. The pond is fed from a diversion structure on East Elk Creek. Since 2000, the town has made improvements to the delivery system that has increased capacity to 2,700 gallons per minute (GPM). In order to increase deliveries beyond 2,700 GPM, a pipeline from the sedimentation pond would need to be pressurized and additional or larger pumps would need to be installed. Such improvements would allow New Castle to deliver all of the town's Colorado River rights. As of 2013, East Elk Creek served as an adequate water supply for the 1,604 taps and 3,400 people in New Castle that it services.

In addition the Elk Creek intake, the town also has an intake on the Colorado River that was constructed in 1993. The town holds rights to 4.0 CFS from the Colorado River that are augmented by releases from Ruedi Reservoir. The town typically refrains from sourcing water from the Colorado River due to the higher costs associated with treating and transporting water from the river.

In 2017, the New Castle's Water Treatment Facility underwent a $1.8 million expansion. This expansion increased daily production capacity from 1.9 MGD to 3.6 MGD.

Water from the town's water treatment facility is piped to four (4) different storage tanks. Information regarding this tanks is provided in Table 30.

Table 30: Summary of the Town of New Castle Water Storage Tanks

Storage Tank	Description
1. Elk Tank	The Elk Tank's capacity is 200,000 gallons. According to the 2013 Source Water Protection Plan, the Elk Tank serviced 900 customers located out of town limits, constituting 5% of the town's water sales.
2. City Tank	The City Tank's capacity is 1,000,000 gallons.
3. Castle Valley Tank	The Castle Valley Tank's capacity is 800,000 gallons. This tank services the Castle Valley Ranch subdivision.
4. Lakota Tank	The Lakota Tank's capacity is 1,700,000 gallons. This tank services the Lakota Canyon Ranch golf course and subdivision.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

As of 2013, the town's potable water storage capacity was 3,700,000 gallons. In addition, as of 2013, the average daily demand was 346,500 gallons per day (GPD) in the winter and 1,000,000 GPD in the summer. Peak demand is between May and June with a range of 1.5 MGD to 1.8 MGD.

ii. Irrigation water supply.
New Castle delivers raw water through the Red Rock Ditch to irrigate portions of the Castle Valley Ranch and Lakota Canyon Ranch PUDs. Untreated water can be delivered to the Red Rock Ditch by gravity flow either from East Elk Creek or by way of a pump from the Colorado River. The ditch delivers up to 185,000 GPD of irrigation water to a pipeline that parallels Castle Valley Boulevard ending at the Faas Ranch property. The Lakota Canyon PUD pumps up to 600 gallons per minute (GPM) from this pipeline on an as needed basis. According to the 2009 New Castle Comprehensive Plan, it is anticipated that raw water will be made available through this system to future development in the Castle Valley Ranch and Lakota Canyon Ranch PUDs.

New Castle's 2009 Comprehensive Plan notes that the town installed a new well in the River Park area on the south side of the Colorado River. This well was installed to provide untreated irrigation water to the new park and to the common areas of the River Park PUD.

II. New Castle's capacity for future growth.
As of 2019, it is expected that the expansion of the town's water treatment facility, to 3.6 MGD, is enough capacity to accommodate the build out of all properties currently within the town's boundaries.

III. New Castle's water conservation efforts.
The town of New Castle has several water conservation policies that include:

- Prohibiting the wasting of water.
- Summer water use restrictions.
- A tiered water rate structure.

Additional information regarding the Town of New Castle's water conservation measures can be found in the town's Municipal Code.

Between 2000 and 2009, annual per capita usage levels in New Castle decreased, from a high of 88,254 in 2001 to a low of 70,902 in 2007. The trend towards lower per capita usage reflects the increasing block rate fee structure that imposes increased costs for usage beyond 15,000 gallons. In addition, there are higher water use and tap fee rates for out-of-town users.

IV. New Castle's potential water quality concerns.

The 2013 Source Water Protection Plan for the Colorado River Partnership includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The potential contaminate sources and associated priority rankings for the Town of New Castle's water supplies is provided in Table 31.

Table 31: Prioritized Potential Sources of Contamination

Issue of Concern		New Castle
1.	Above/Below Ground Fuel Storage Tanks	Low
2.	Agricultural Practices	Medium
3.	Application of Pesticides by the County, CDOT and the Railroad	Medium
4.	Camps, Campgrounds & Outdoor Recreation	Medium
5.	Landfills	Low
6.	Land Use Change	Medium
7.	Municipal & Residential Water Resources (Private Water Supply Wells, Groundwater/Surface Water Interactions, Raw Water Customers (cross contamination), Water & Sewage Companies)	Low
8.	Oil & Gas Operations	Low
9.	Railroads	Low
10.	Residential Practices/Issues (Urban Runoff, Pesticides, Fertilizers, Pharmaceuticals, Hazardous Waste Disposal, Solid Waste Management)	Medium
11.	Septic Systems	Low
12.	Timber Harvesting	Low
13.	Transportation, Roadways, Surfaces, Spills & Landslides	High
14.	Uniform Municipal Water Operations Sampling & Monitoring	Medium
15.	Wildland & Structural Fires	High

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

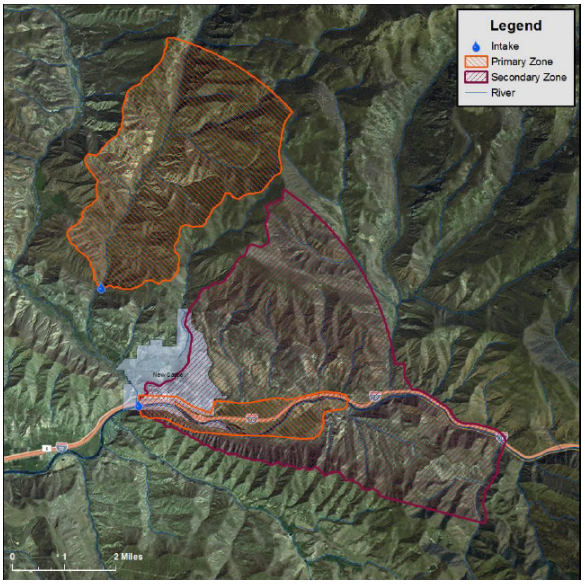
V. New Castle's source water protection areas.

Table 32: Description of Protection Areas for the Elk Creek and Colorado River Intakes

Water Source	Primary Zone	Secondary Zone
1. Elk Creek & Colorado River	In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year time of travel boundaries. The primary zone for the Town of New Castle's East Elk Creek intake was determined by creating a five mile upstream buffer zone within the 12 digit watershed boundary for the East Elk Creek watershed.	In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12-digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year time of travel boundaries. The secondary zone for the Town of New Castle was extended to incorporate two potential contaminant sources: 1. The first is the South Canyon Landfill, as this operation receives and stores contaminants that could enter the water supply. The boundary was extended approximately two miles further upstream of the New Castle Colorado River intake. 2. Along with adding the landfill, the Canyon Creek subdivision was also included as there are a number of residences there that could pose a threat to New Castle's drinking water.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

Table 33: Protection Area Map for the Elk Creek and Colorado River Intakes

Water Source	
1. Elk Creek & Colorado River	

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

7. TOWN OF SILT

Data source(s): Town of Silt; 2019 Town of Silt Water-Wastewater-Irrigation Master Plan; 2013 Source Water Protection Plan for the Colorado River Partnership

I. Overview of Silt's water supply system.

The Town of Silt owns, operates and maintains its own water utilities. The town provides water services to a population of over 3,100 within the town limits. The town is committed to efficiently delivering to the citizens high quality domestic water at a reasonable rate.

The town relies on its Colorado River intake system and its alluvial well system for its raw water supply. Due to the high turbidity in the Colorado River, the town utilizes the alluvial wells system during run-off and other events that would require the town to pre-screen the raw water before delivery to the water treatment plant. The town maintains and utilizes a settling/backwash pond, located to the east of the water treatment plant, and a plate settler to screen the raw water supply, when necessary.

The town's potable water system is currently at about 50% capacity (1,685 EQRs).

i. Potable water supply.

The Town of Silt has a number of Post-Compact (1922) domestic water rights that are listed in Table 34.

Table 34: Summary of the Town of Silt's Domestic Water Rights

Structure	Amount	Use	Appropriation Date	Adjudication Date
1. Silt Pipeline	1.43 CFS A 0.07 CFS C DD Oct. 2014	D, F, I, M	2/10/1939	3/28/1940
2. Silt Pipeline (First Enlargement)	8.5 CFS C DD Nov. 2015	M	9/20/2001	10/18/2002
3. Silt Well No. 1	0.35 CFS A 0.033 CFS C DD Oct. 2014	M, I, C	07/05/1977	08/11/1979

Table 34: Summary of the Town of Silt's Domestic Water Rights (continued)

Structure	Amount	Use	Appropriation Date	Adjudication Date
4. Silt Well No. 2, 3, 4	1.0 CFS C (each well) DD Oct. 2016	I, M	12/1/2007	10/11/2010

Data Source(s): 2019 Town of Silt Water-Wastewater-Irrigation Master Plan

When the town's water rights are out of priority, Silt has an adjudicated augmentation plan that allows the town to continue diverting water from the Colorado River, utilizing 130 acre-feet of historic consumptive use associated with the Last Chance Ditch (1888) and 300 acre-feet of U.S. Bureau of Reclamation release from Ruedi Reservoir.

The components of the Town of Silt's potable water supply system are outlined in Table 35.

Table 35: Summary of Town of Silt Potable Water Supply System Components

Component	Description
1. Water Supply	• Two (2) domestic wells adjacent to the Colorado River that are influenced by flows in the river.
2. Water Treatment	• A 1,000,000 gallon per day (1 MGD) microfiltration water treatment plant. • One (1) ½-acre backwash settling pond. • One (1) plate settler.
3. Water Distribution	• Two (2) domestic water pump stations. • Two (2) transmission mains under the railroad and I-70 that send water to the town's storage tanks. • 131,255 lineal feet of water main. • One (1) pressure reducing vault. • 174 fire hydrants. • 376 separate service connections and curb stops (including empty lots). • 645 water valves. • 597 water meters.
4. Water Storage	• Four (4) water tanks with a total storage capacity of 1,800,000 gallons: - A 800,000 gallon Eagle's View Tank. - A 600,000 gallon Sunrise Tank. - A 150,000 gallon Sunrise Tank (to be decommissioned). - A 250,000 gallon Mesa View Tank.

Data Source(s): 2019 Town of Silt Water-Wastewater-Irrigation Master Plan

In 2017, the town's water treatment plant treated and delivered almost 90 million gallons of water. This resulted in a peak daily demand of 479,371 gallons and an average daily demand of 240,847 gallons. These amounts did not include bulk water, which accounted for an average of 21,918 gallons per day.

ii. Bulk potable water supply.

In 2017, the town served over eight (8) million gallons of treated water to residents and businesses in the unincorporated areas of Garfield County around Silt. This is a result of groundwater wells in the Silt area having poor yields and/or inconsistent production. Historically, the Town of Silt has charged very little for county residents and businesses to purchase water, but with recent upgrades to the town's bulk potable water system, fees have doubled to $10.00 per 1,000 gallons.

The town has three (3) bulk water facilities:

- One facility is located on South 7th Street. This facility is for residential out-of-town customers only. In 2018, the town upgraded this facility with a new sanitary arm, bulk water building, and money machine.
- The town's other facilities are located on Front Street. These facilities are for commercial vehicles or those residential customers that fill tanks exceeding 500 gallons.

iii. Irrigation water supply.

The Town of Silt has a non-metered irrigation system. The town relies on its citizens to be good conservators of this valuable resource by watering only when permitted to do so. The town moves water through the pump stations to tanks that need water depending on de-mossing of certain ditches, poor delivery of water, and maintenance on the system. The components of the Town of Silt's irrigation system are described in Table 37.

The Town of Silt has irrigation water rights (each with varying amounts of water) that include:

Table 36: Summary of the Town of Silt's Irrigation Water Rights

Ditch/Diversion	Number of Shares	Calculated Amount of Water	Irrigation Tank/Area Irrigated
1. Farmer's Irrigation (Harvey Gap via Ditch 19)	13	3.5 gallons/minute/share	North Eagle's View
2. Giacinta Ditch	1.5	50 gallons/minute (when available)	Mesa View
3. Grand River (Cactus Valley) Ditch	24.56	88 gallons/minute/share	All Tanks
4. Last Chance Ditch	201	-	Iron Horse Mesa (Potable Irrigation)
5. Ware and Hinds Ditch	58.5	150-480 gallons/minute	All Tanks
6. Silt Pump Canal (Silt Project Water)	15	3.5 gallons/minute/share	North Eagle's View
7. Rising Sun Ditch Priority 16	-	0.69 CFS	-
8. Rising Sun Ditch First Enlargement Priority 64	-	1.75 CFS	-
9. Rising Sun Ditch Second Enlargement Priority 226	-	1.86 CFS	-

Data Source(s): 2019 Town of Silt Water-Wastewater-Irrigation Master Plan

Table 37: Summary of Town of Silt Irrigation System Components

Component	Description
1. Water Supply	• Refer to Table 36.
2. Water Storage	• Four (4) irrigation tanks (two (2) uncovered concrete reservoirs) with a total capacity of 505,000 gallons. • One (1) 300,000 gallon pond.
3. Water Distribution	• Eight (8) pump stations. • Two (2) booster stations. • 94,335 lineal feet of irrigation mains. • 1,075 separate service connections. • 236 irrigation valves. • 111 irrigation drains.

Data Source(s): 2019 Town of Silt Water-Wastewater-Irrigation Master Plan

II. Silt's capacity for future growth.

The town's potable water system is currently at about 50% capacity (1,685 EQRs). According to the town's 2019 Water-Wastewater-Irrigation Master Plan, the Town of Silt should be able to serve up to 2,590 EQRs, possibly more. That equates to roughly 905 additional single-family residential units, assuming no commercial or industrial uses consume the additional EQRs that the town has available.

The town's 2019 Water-Wastewater-Irrigation Master Plan recommends that Silt begin planning for augmentation of its water rights and current domestic water source. The plan identifies the following as potential options for augmentation:

- Drilling additional wells along the Colorado River and throughout town.
- Negotiations with water rights owners (such as Harvey Gap and/or Ware and Hinds) to provide an emergency source of water, in the event of a catastrophic event on or affecting the Colorado River.

III. Silt's water conservation efforts.
The Town of Silt has implemented the following water conservation measures:

- Lots developed after 2006 are limited to 3,500 square feet of irrigable space, plus up to fifty (50) trees and shrubs. In 2006, the town did allow a one-time amnesty for lots exceeding 3,500 square feet of irrigable space but has not allowed any other lots developed after 2006 to exceed this limit.
- In 2018, the town began auditing its irrigation system. This work has indicated that there are numerous lots in Silt that have unlawfully added irrigable space since 2006. As this is unsustainable (i.e. the town will run out of irrigation water) the town is actively pursuing citizen compliance with this irrigable space requirements.
- The town relies on its citizens to abstain from utilizing potable water on landscaped areas, unless permission is specifically granted.

V. Silt's potential water quality concerns.
According to the town's 2019 Water-Wastewater-Irrigation Master Plan, Silt has experienced and worked to address the following water quality issues:

- In 2010, the town experienced higher than usual amount of Total Trihalomethanes (TTHM). In 2018, the town installed an agitator in the Mesa View Tank to decrease the potential for TTHM. In addition, the town's installation and use of alluvial wells will help to decrease the likelihood of TTHM levels that exceed state standards.
- The town has also experienced a build-up of manganese (Mn) from the historical use of potassium permanganate, a coagulant used to remove iron, manganese, and bacteria from the town's raw water supply. Use of Mn resulted in a build-up in the town's water transmission and distribution water mains. Consequently, the town has utilized an aggressive hydrant flushing program to address this issue. In addition, the town now uses a food-grade alum coagulant and there has been no further build-up within the water mains.

The 2013 Source Water Protection Plan for the Colorado River Partnership includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The potential contaminate sources and associated priority rankings for the Town of Silt's water supply is provided in Table 38.

Table 38: Prioritized Potential Sources of Contamination

Issue of Concern		Colorado River
1.	Above/Below Ground Fuel Storage Tanks	Medium
2.	Agricultural Practices	Low
3.	Application of Pesticides by the County, CDOT and the Railroad	Low
4.	Industrial & Commercial Areas (Service Stations, Asphalt/Concrete/Sand/Gravel Plants & Operations, Auto Body & Repair Shops, Golf Courses, Recycling Centers, Machine/Welding/Equipment, Airport, Aircraft Servicing & Maintenance)	Medium
5.	Municipal & Residential Water Resources (Private Water Supply Wells, Groundwater/Surface Water Interactions, Raw Water Customers (cross contamination), Water & Sewage Companies)	Low
6.	Oil & Gas Operations	High
7.	Pipelines	Low
8.	Railroads	High

Table 38: Prioritized Potential Sources of Contamination (continued)

Issue of Concern	Colorado River
9. Septic Systems	Medium
10. Transportation, Roadways, Surfaces, Spills & Landslides	High
11. Uniform Municipal Water Operations Sampling & Monitoring	Medium
12. Wildland & Structural Fires	Medium

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

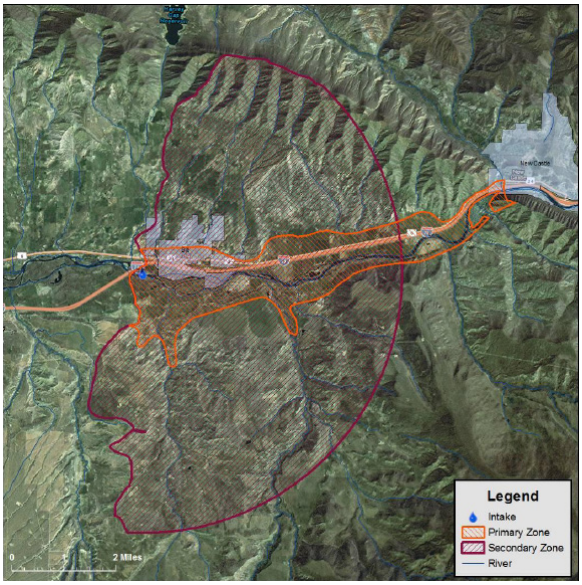
V. Silt's source water protection areas.

Table 39: Description of Protection Areas for the Colorado River Intake

Water Source	Primary Zone	Secondary Zone
1. Colorado River	In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year time of travel boundaries. The primary zone for the Town of Silt was extended upstream of the secondary zone along the Colorado River alluvium because of the Town of Silt's close proximity to the Town of New Castle and various commercial operations which pose a potential threat of contamination. In addition, the primary zone for the Town of Silt was expanded to include US Highway 6 & 24 and the railroad tracks where they weren't already included.	In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12-digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year time of travel boundaries.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

Table 40: Protection Area Map for the Colorado River Intake

Water Source	
1. Colorado River	

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

8. CITY OF RIFLE

Data source(s): City of Rifle; Draft 2019 City of Rifle Water Efficiency Plan; and, 2013 Source Water Protection Plan for the Colorado River Partnership

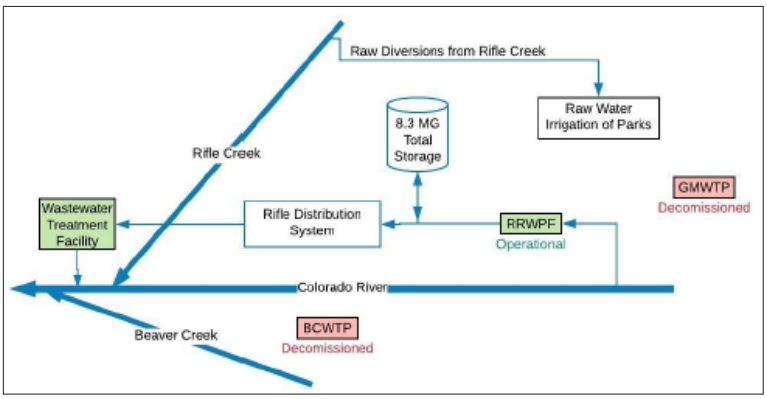
I. Overview of Rifle's water supply system.

The City of Rifle owns, operates and maintains its own water utilities. The city provides potable water service to approximately 9,600 to 9,700 people (or 3,345 customer accounts). Approximately 100 of these accounts are located outside of city limits. The majority of water (68% of total water delivered) is delivered to residential customers (mostly single-family residences), followed by commercial and industrial accounts (27% of total water delivered). This number fluctuates monthly, due in part to the high percentage of rental properties.

The city sources its water from the Colorado River. The city's water rights portfolio includes senior water rights on the Colorado River, some of which are protected by the Green Mountain Historic User's Pool (HUP). The reliability of the Colorado River supply is enhanced by an augmentation plan created in 1986 that relies on waters from Rifle Creek and Ruedi Reservoir.

The city's intake on the Colorado River is located east of Rifle in the valley floor floodplain. Water from the river is pumped to and treated at the Rifle Regional Water Purification Facility (RRWPF). The RRWPF is a new asset for the City of Rifle as it came online in 2017. Water from the RRWPF is stored in the tanks that are strategically located throughout the city and serve multiple pressure zones.

A general schematic of the city's water supply system is shown below.



Construction of the RRWPF resulted in the city decommissioning the Graham Mesa Water Treatment Plant (GMWTP) and the Beaver Creek Water Treatment Plant (BCWTP). The GMWTP had sourced water from the Colorado River and the BCWTP had sourced water from Beaver Creek.

i. Potable water supply.

The City of Rifle sources its water from the Colorado River. Raw river water is conveyed to a pre-sedimentation pond where it is then pumped to and treated at the RRWPF. The RRWPF's current capacity is 6 MGD with the option to expand to 8 MGD. The city does have a parallel treatment train in place that could enable the city to process approximately 18 MGD. The RRWPF is expected to be sufficient to meet the foreseeable future water demands in Rifle, including peak day water demands.

All finished water (i.e. treated water) produced by the RRWPF is pumped to the city's tank complex, which is made up of five (5) water tanks. These tanks are located in different parts of the city's service area and have total storage capacity of 8.3 million gallons (MG).

The treated water stored in the city's tank complex is distributed to the city's water customers via a potable water distribution system. The city's potable water distribution system comprises:

- Roughly 73-miles of transmission and distribution mains. The distribution mains cover four pressure zones (northeast, intermediate, city, and airport), which are separated by two booster pump stations (BPSs) and multiple pressure reducing valves (PRVs).

- Roughly 20% of the city's current water use requires pumping from its booster stations. The percentage of booster pumping could rise significantly with future development in higher-elevation areas.

ii. Irrigation water supply.
The city is a shareholder in various ditch companies and owns several groundwater wells that it does not use for potable purposes. The city owns and operates raw water delivery facilities that pull water from Rifle Creek and provide irrigation water for:

- Rose Hill Cemetery
- Deerfield Regional Park
- Centennial Park
- Davidson Park
- McIntosh Park

According to the 2019 Water Efficiency Plan, the city's raw water irrigation deliveries are not currently metered.

II. Rifle's capacity for future growth.
The 2019 City of Rifle Water Efficiency Plan states that estimates project that the city's water supplies are expected to serve a population greater than 20,000, which would carry the city to 2042, assuming a 3% growth rate.

Under the city's current water source supply, drastic water efficiency efforts are not necessary. However, to prepare for future unforeseen population growth and/or increased pressure on the Colorado River supply source, the city is exploring implementation of selected efficiency activities to reduce strain on the current supply and to promote continued growth with the current supply.

The city does not have immediate concerns about the water treatment facility capacity. Annual average day demand and max month average day demands are well within the plants current capacity. However, peak day demands are closer to meeting the current plant capacity. As such, the city is exploring ways to reduce or shift peak demands.

III. Rifle's water conservation efforts.
Table 41 presents new and updated water efficiency activities selected by the city for inclusion in their 2019 Water Efficiency Plan.

Table 41: Selected Historical, Updated and New Water Efficiency Activities and Water Savings Estimates

Selected Water Efficiency Activities		Implementation Period of Historical Activities	Historical Water Savings (acre-feet)	Implementation Period of New Activities	Projected Water Savings (acre-feet/year)	
					Total	Annual Average
FOUNDATIONAL ACTIVITIES						
1.	Inclining/Tiered Rates *The city already has inclining tiered rates, and is planning another water rate basis evaluation in 2019.*	2013-2014	210	-	-	-
2.	Water Rate Adjustments *Water rate basis evaluation planned for 2019.*	2014-2017	30	2020-2025	200	40
3.	Tap Fees with Water Use Efficiency Incentives *Tap fee evaluation.*	-	-	2020-2025	35	7
4.	Meters for Non-potable Irrigation to City Properties	-	-	2019-2025	24	4
5.	Meter Accuracy Check Program	-	-	2019-2020	3	3
6.	System Wide Water Audits *Annual audits using AWWA water audit software.*	2019	-	2020-2025	Unknown	Unknown

Table 41: Selected Historical, Updated and New Water Efficiency Activities and Water Savings Estimates (continued)

Selected Water Efficiency Activities		Implementation Period of Historical Activities	Historical Water Savings (acre-feet)	Implementation Period of New Activities	Projected Water Savings (acre-feet/year)	
					Total	Annual Average
FOUNDATIONAL ACTIVITIES (continued)						
7.	Water Line Replacement Program *Develop formal replacement program.*	-	-	2020-2025	20	4
8.	Asset Management of Water System Pipelines	-	-	2019-2025	Unknown	Unknown
9.	Capital Improvement Plans (CIPs) *Currently in progress.*	-	-	2016-2025	Unknown	Unknown
10.	Drought Management Plan (DMP) *Currently in progress.*	-	-	2019-2025	Unknown	Unknown
11.	Designate Existing Staff as Efficiency Coordinator	-	-	2018-2025	Unknown	Unknown
12.	Planning Group/Committee Dedicated to Efficiency *Coordinate with Planning Commission on efficiency plan & activities.*	-	-	2018-2025	Unknown	Unknown
13.	Assure Consumers Maintain Service Lines	-	-	2018-2025	14	2
TARGETED TECHNICAL ASSISTANCE & INCENTIVES						
1.	Removal of Phreatophytes: In city managed ditches for raw water irrigation of City Parks.	-	-	2019-2025	6	1
2.	Outdoor Irrigation Controllers: Targeted giveaways of smart irrigation controller or system timers, especially for large customers. Target 5 of largest customers with irrigation, evaluate participation and success.	-	-	2019-2025	6	1
3.	Outdoor Irrigation Controllers: On city managed parks/green spaces that are on potable water.	-	-	2019-2025	12	2
4.	Rain Sensors: Targeted giveaways of rain sensors, especially for large customers. Start with 50, evaluate participation.	-	-	2019-2025	36	6
5.	Rain Sensors: Implement on city managed parks/green spaces.	-	-	2019-2025	6	1
6.	Xeriscape: Xeriscape demonstration gardens on city managed parks/green spaces.	-	-	2019-2025	12	2
7.	Specialized Nonresidential Surveys, Audits and Equipment Efficiency Improvements- Commercial & Industrial Self-Audit Assistance & Incentive: Provide WaterSense C&I self-audit checklist, with incentive for completion (such as giveaways, website recognition, free cross connection test, etc.).	-	-	2020-2025	24	4
8.	Give-aways: Give away irrigation system timers. Start with 50, evaluate participation.	-	-	2019-2025	18	3

Table 41: Selected Historical, Updated and New Water Efficiency Activities and Water Savings Estimates (continued)

	Selected Water Efficiency Activities	Implementation Period of Historical Activities	Historical Water Savings (acre-feet)	Implementation Period of New Activities	Projected Water Savings (acre-feet/year)	
					Total	Annual Average
ORDINANCES AND REGULATIONS						
1.	Rules and Regulations for Landscape Design & Installation *Municipal Code Sec. 16-13-20 outlines the seven basic principles and key considerations for water efficient landscape design from CO Water Wise Best Practices Guide (pg. 127).*	2014-2018	20	2019-2025	6	1
2.	Soil Amendment Requirements *Included in Municipal Code Sec. 16-13-20.*	2014-2018	-	2019-2025	Unknown	Unknown
3.	Turf Restrictions: General landscape requirements for commercial, industrial, civic, and multi-family uses may have a maximum of 50% area with Turf (Sec. 16-13-80 (c)).	2014-2018	40	2019-2025	21	3
4.	Turf Restrictions: EQR defined as up to 5,000 sq. ft. Irrigated area above that is allowed but charged a higher tap fee (Sec. 13-4-60). Update code to include regulations limiting area of turf for single-family residential development.	2012-2018	Unknown	2019-2025	Unknown	Unknown
5.	Xeriscape Requirement: General landscape requirements for commercial, industrial, civic, and multi-family uses must have at least 50% xeric plants (Sec. 16-13-80 (c)).	2014-2018	40	2019-2025	7	1
6.	Water Waste Ordinance	-	-	2019-2025	30	5
7.	Time of Day Watering Restriction	-	-	2019-2025	0	0
8.	Day of Week Watering Restriction	-	-	2019-2025	0	0
9.	Water Overspray Limitations	-	-	2019-2025	30	5
10.	Landscaper Training and Certification	-	-	2019-2025	Unknown	Unknown
11.	Irrigation System Installer Training and Certification	-	-	2019-2025	Unknown	Unknown
EDUCATIONAL ACTIVITIES						
1.	Web Pages *Improve & add to existing web pages.*	-	-	2019-2025	18	3
2.	Bill Stuffers *Electronic and paper.*	-	-	2019-2025	18	3
3.	K-12 Teacher and Classroom Education Programs	-	-	2019-2025	18	3
4.	Interactive Websites *Provide links to useful webpages created by EPA, Water Wise, etc.*	-	-	2019-2025	18	3
5.	Provide specific information regarding gray water and rainwater.	-	-	2019-2025	6	1

TOTAL ESTIMATED SAVINGS (acre-feet/year)	**108**
TOTAL ESTIMATED RAW WATER SAVINGS (acre-feet/year)	5
TOTAL ESTIMATED POTABLE WATER SAVINGS (acre-feet/year)	103

Data Source(s): Draft 2019 City of Rifle Water Efficiency Plan

IV. Rifle's potential water quality concerns.

The 2013 Source Water Protection Plan for the Colorado River Partnership includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The potential contaminate sources and associated priority rankings for the City of Rifle's water supply is provided in Table 42.

Table 42: Prioritized Potential Sources of Contamination

Issue of Concern		Colorado River
1.	Above/Below Ground Fuel Storage Tanks	Low
2.	Agricultural Practices	Low
3.	Application of Pesticides by the County, CDOT and the Railroad	Low
4.	Industrial & Commercial Areas (Service Stations, Asphalt/Concrete/Sand/Gravel Plants & Operations, Auto Body & Repair Shops, Golf Courses, Recycling Centers, Machine/Welding/Equipment, Airport, Aircraft Servicing & Maintenance)	Medium
5.	Land Use Change	Low
6.	Municipal & Residential Water Resources (Private Water Supply Wells, Groundwater/Surface Water Interactions, Raw Water Customers (cross contamination), Water & Sewage Companies)	Low
7.	Oil & Gas Operations	Medium
8.	Pipelines	Medium
9.	Railroads	Medium
10.	Residential Practices/Issues (Urban Runoff, Pesticides, Fertilizers, Pharmaceuticals, Hazardous Waste Disposal, Solid Waste Management)	Low
11.	Septic Systems	Low
12.	Transportation, Roadways, Surfaces, Spills & Landslides	High
13.	Uniform Municipal Water Operations Sampling & Monitoring	Medium
14.	Wildland & Structural Fires	Low

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

V. Rifle's source water protection areas.

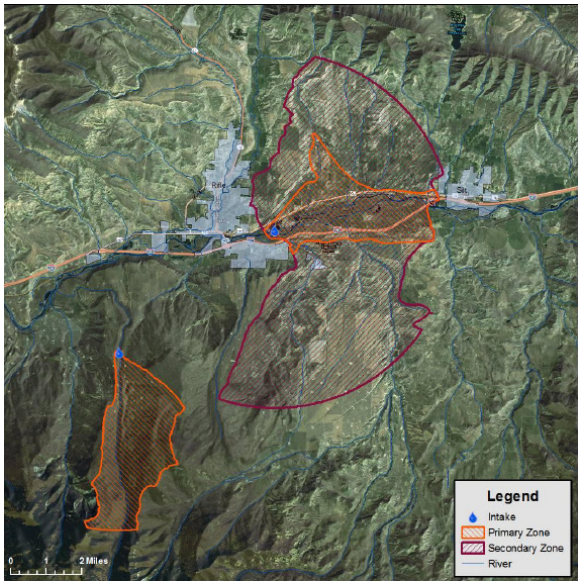
Table 43: Description of Protection Areas for the Colorado River Intake

Water Source	Primary Zone	Secondary Zone
1. Colorado River	In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year time of travel boundaries. The primary zone for the City of Rifle was expanded to include US Highway 6 & 24 and the railroad tracks where they weren't already included.	In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12-digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year time of travel boundaries.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

Table 44 presents the protection area map for the City of Rifle's water sources. This map was prepared as part of the 2013 Source Water Protection Plan for the Colorado River Partnership and prior to the construction of the RRWPF. As a result this map depicts the Colorado River and Beaver Creek as being water sources for the City of Rifle. It is important to note that the city's BCWTP was decommissioned with the construction of the RRWPF so Beaver Creek is no longer serves as a source water for the city.

Table 44: Protection Area Map for the Colorado River Intake

Water Source	
1. Colorado River	

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

9. TOWN OF PARACHUTE

Data source(s): Town of Parachute; 2015 Town of Parachute Comprehensive Plan; 2013 Source Water Protection Plan for the Colorado River Partnership

I. Overview of Parachute's water supply system.

The Town of Parachute owns, operates and maintains its own water utilities. The town's drinking water is sourced from the Colorado River and Revelle Springs. Table 45 provides additional information about the town's water sources.

Table 45: Summary of the Town of Parachute's Water Sources

Water Source	Description
1. Revelle Springs	• Revelle Springs is located on a hillside southeast of Parachute. Spring flows can cause some hillslope erosion and poses a threat to this water source as it reduces hydraulic head. Water diverted from the Revelle Springs is gravity fed to a storage facility. At the storage facility, there are two side-by-side reservoirs each at 43,500 gallons and totaling 87,000 gallons. Solids are settled out before the water is gravity-fed down to the town's ultra-membrane filtration water treatment plant. • The Revelle Springs consistently produce 200,000 gpd each year on average. • As of 2013, the geologic source of Revelle Springs was unknown. Water operators for the Town of Parachute have expressed strong interest in studying the geologic sources of the groundwater and its migration through the formation.
2. Colorado River	• The Colorado River supplies a portion of the town's water supply, particularly in the summer when water demand is greater. The town's intake is located in the river bed, beneath a bridge that crosses between Parachute and Battlement Mesa. Water from the intake is pumped and stored in a 153,000 gallon raw water tank. This tank is adjacent to the town's microfiltration water treatment facility.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

Treated water from the Colorado River and Revelle Springs facilities is stored in one of three 100,000, 400,000 and 500,000 gallon tanks.

According to the 2013 Source Water Protection Plan for the Colorado River Partnership, the average daily demand in Parachute during the summer is 325,000- 375,000 gallons per day (GPD). During the winter, the average demand drops to 200,000- 250,000 GPD.

As of 2015, there were approximately 376 active water accounts served by the town.

II. Parachute's capacity for future growth.
Data not available.

III. Parachute's water conservation efforts.
The town has no formal policies for water conservation. Each year the town provides a suggested watering schedule for residents, but it is not enforced.

IV. Parachute's potential water quality concerns.
The 2013 Source Water Protection Plan for the Colorado River Partnership includes information regarding potential sources of water contamination. The plan also includes a priority ranking of "High," "Medium," or "Low" for each contaminant source identified. The potential contaminate sources and associated priority rankings for the Town of Parachute's water supplies is provided in Table 46.

Table 46: Prioritized Potential Sources of Contamination

Issue of Concern		Parachute
1.	Above/Below Ground Fuel Storage Tanks	Low
2.	Agricultural Practices	Low
3.	Application of Pesticides by the County, CDOT and the Railroad	Low
4.	Industrial & Commercial Areas (Service Stations, Asphalt/Concrete/Sand/Gravel Plants & Operations, Auto Body & Repair Shops, Golf Courses, Recycling Centers, Machine/Welding/Equipment, Airport, Aircraft Servicing & Maintenance)	Low
5.	Land Use Change	Low
6.	Municipal & Residential Water Resources (Private Water Supply Wells, Groundwater/Surface Water Interactions, Raw Water Customers (cross contamination), Water & Sewage Companies)	Low
7.	Oil & Gas Operations	Medium
8.	Pipelines	Low
9.	Railroads	Medium
10.	Residential Practices/Issues (Urban Runoff, Pesticides, Fertilizers, Pharmaceuticals, Hazardous Waste Disposal, Solid Waste Management)	Medium
11.	Rulison Blast Site	Low
12.	Septic Systems	Medium
13.	Transportation, Roadways, Surfaces, Spills & Landslides	High
14.	Uniform Municipal Water Operations Sampling & Monitoring	Medium
15.	Unknown Source of Town of Parachute's Spring Water	High

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

V. Parachute's source water protection areas.

Table 47: Description of Protection Areas for the Colorado River and Revelle Springs Intakes

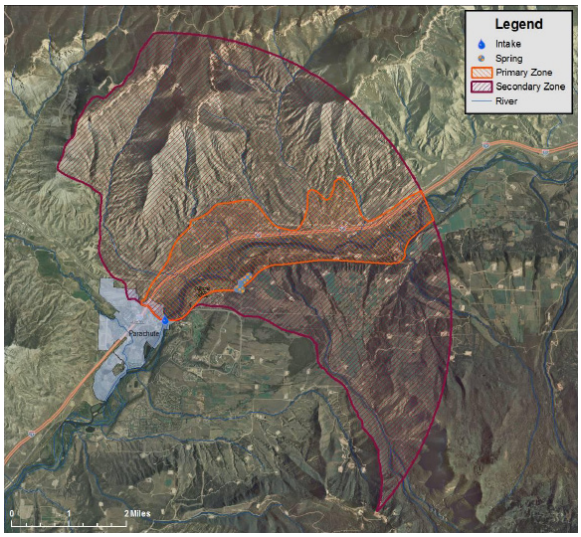
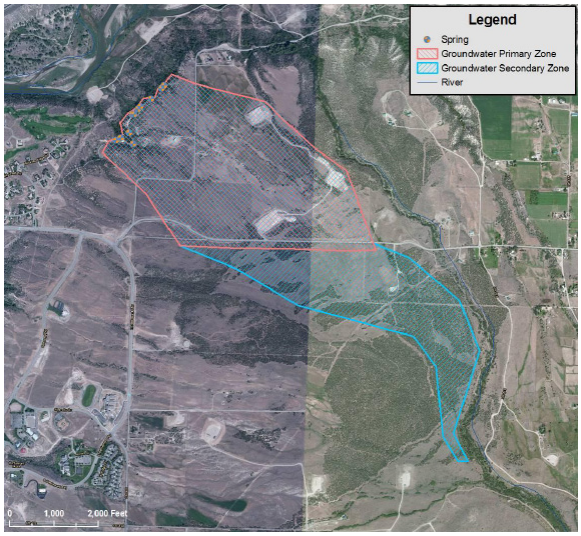
Water Source	Primary Zone	Secondary Zone
1. Colorado River	In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year time of travel boundaries.	In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12-digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year time of travel boundaries.

Table 47: Description of Protection Areas for the Colorado River and Revelle Springs Intakes (continued)

Water Source	Primary Zone	Secondary Zone
2. Revelle Springs	In surface water systems, the primary zone is the area within the boundaries of the Colorado River alluvium as determined by the USGS. For groundwater systems, the primary zones follow the 2 year time of travel boundaries. The primary zone for the Town of Parachute's springs was expanded to include several oil and gas well pads and segments of County Roads 301 and 309. In addition, the primary zone of Parachute's springs was truncated short of the 2 year time of travel delineations and redrawn just beyond County Road 301.	In surface water systems, the secondary zone is the area within a five mile buffer zone upstream of each intake, within each 12-digit Hydrologic Unit Code as determined by the USDA/NRCS National Cartography & Geospatial Center. In groundwater systems, the secondary zones follow the 5 year time of travel boundaries.

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

Table 48: Protection Area Maps for the Colorado River and Revelle Springs Intakes

Water Source	
1. Colorado River	
2. Revelle Springs	

Data Source(s): 2013 Source Water Protection Plan for the Colorado River Partnership

10. COMMUNITY WATER SYSTEMS

Data source(s): Colorado Department of Public Health and Environment

Table 49 presents a summary of information regarding community water systems located in both the incorporated and unincorporated areas of Garfield County.

Table 49: Summary of Community Water Systems in Garfield County

Name		Population	Service Connections	State Source Type	Federal Type
1.	Amis Acres	125	52	Groundwater	Transient, Non-Community
2.	Asgard Subdivision WA	80	21	Groundwater	Community
3.	Aspen Equestrian Blue Creek Ranch	210	77	Groundwater	Community
4.	Battlement Mesa Metropolitan District	4,100	1,450	Surface Water	Community
5.	Bear Lake Campground	50	4	Groundwater	Transient, Non-Community
6.	Brettleberg Condos at Sunlight	84	1	Groundwater	Transient, Non-Community
7.	Camp Christian	100	1	Groundwater	Transient, Non-Community
8.	Canyon Creek Estates	140	65	Groundwater	Community
9.	Town of Carbondale	6,700	1,960	Surface Water	Community
10.	Catherine Store	33	2	Groundwater	Transient, Non-Community
11.	Cattle Creek WUA	47	16	Groundwater UDI Surface Water	Community
12.	CDOT Bair Ranch Rest Area	1,407	1	Groundwater	Transient, Non-Community
13.	CDOT Grizzly Creek Rest Area	1,001	1	Groundwater	Transient, Non-Community
14.	CDOT Hanging Lake Rest Area	1,829	1	Groundwater	Transient, Non-Community
15.	CDOT No Name Rest Area	2,058	1	Groundwater	Transient, Non-Community
16.	Colorado Mountain College SVC	715	10	Groundwater	Community
17.	Cottonwood Springs Mobile Home Park	750	298	Surface Water	Community
18.	Crystal Valley	100	40	Groundwater	Community
19.	El Rocko Mobile Home Park	80	34	Groundwater	Community
20.	Elk Creek RV LLC	140	25	Groundwater	Transient, Non-Community
21.	Elk Springs Homeowners Association	186	82	Groundwater	Community
22.	Fedex Glenwood Springs	64	1	Groundwater	Transient, Non-Community
23.	Four Mile Ranch Homeowners Association	63	24	Groundwater	Community
24.	The Gateway River Park	77	32	Groundwater	Transient, Non-Community
25.	Glenwood Canyon Resort	66	141	Groundwater	Transient, Non-Community
26.	City of Glenwood Springs	9,428	3,500	Surface Water	Community
27.	H Lazy F Mobile Home Park	300	96	Groundwater	Community
28.	Habitat for Humanity Restore	70	1	Groundwater	Transient, Non-Community
29.	Hawkridge Homeowners Association	15	16	Groundwater	Community
30.	Herons Nest RV Park	42	65	Groundwater	Transient, Non-Community

Table 49: Summary of Community Water Systems in Garfield County (continued)

Name		Population	Service Connections	State Source Type	Federal Type
31.	Hideout Cabins and CG	91	38	Groundwater	Community
32.	Kings Row Homeowners Association	100	48	Groundwater	Community
33.	Lazy Diamond A Subdivision	25	12	Groundwater	Community
34.	Lions Ridge Estates	63	23	Groundwater	Community
35.	Mamm Creek Commons	29	5	Groundwater	Transient, Non-Community
36.	Mind Springs Health	37	1	Groundwater	Transient, Non-Community
37.	Mineota Estates	105	35	Groundwater	Community
38.	Mitchell Cooper Ditch Pipeline	1,200	60	Groundwater UDI Surface Water	Community
39.	Mountain Meadows	115	31	Groundwater	Community
40.	Mountain Valley Mobile Home Park	338	68	Groundwater	Community
41.	Town of New Castle	3,400	1,100	Surface Water	Community
42.	New Creation Church of Glenwood Springs	499	1	Groundwater	Non-Transient, Non-Community
43.	No Name Creek WS	160	65	Groundwater	Community
44.	Oak Meadows Service Company	180	75	Groundwater	Community
45.	Oak Meadows Subdivision II	50	31	Purchased Groundwater	Community
46.	Panorama Ranches Homeowners Association	118	47	Groundwater	Community
47.	Panoramic Mesa Subdivision	45	19	Groundwater	Community
48.	Town of Parachute	1,320	575	Surface Water	Community
49.	Peach Valley Orchard Subdivision	27	13	Groundwater	Community
50.	Ranch at Roaring Fork	300	126	Groundwater	Community
51.	City of Rifle	9,489	3,795	Surface Water	Community
52.	Rifle Correctional Center	287	16	Groundwater	Community
53.	Rifle Creek Estates Homeowners Association	90	31	Groundwater	Community
54.	Rifle Creek Golf Course	250	1	Groundwater	Transient, Non-Community
55.	Rifle Creek Pure Water LLC	25	3	Purchased Surface Water	Transient, Non-Community
56.	Rifle Falls State Park	258	12	Groundwater	Transient, Non-Community
57.	Rifle Fireside Lanes	50	1	Groundwater	Transient, Non-Community
58.	Rifle Gap State Park	356	73	Groundwater	Transient, Non-Community
59.	Rio Blanco Ranch Company	75	16	Groundwater	Transient, Non-Community
60.	Riverbend Water and Sewer Company	156	65	Groundwater	Community
61.	Riverside Cottages	57	11	Groundwater	Community
62.	Riverview Subdivision	55	19	Groundwater	Community
63.	Roaring Fork Water and Sanitation District	1,912	568	Groundwater	Community
64.	Satank WA	80	40	Purchased Surface Water	Community
65.	Town of Silt	2,400	900	Surface Water	Community
66.	Springridge Subdivision	110	51	Groundwater	Community
67.	Stallion Oil Field Services	25	1	Purchased Surface Water	Transient, Non-Community

Table 49: Summary of Community Water Systems in Garfield County (continued)

Name	Population	Service Connections	State Source Type	Federal Type
68. Sun Meadow Estates	50	23	Groundwater	Community
69. Sunlight Mountain Inn	58	2	Groundwater	Transient, Non-Community
70. Sunlight Mountain Resort	491	1	Groundwater	Transient, Non-Community
71. Sunlight View WWW Company	234	78	Groundwater	Community
72. Talbott Enterprises Inc.	1,160	375	Groundwater	Community
73. Teller Springs Homeowners Association	84	21	Groundwater	Community
74. Tepee Bible Camp	88	1	Groundwater UDI Surface Water	Transient, Non-Community
75. Thirsty Corp.	100	1	Purchased Groundwater	Community
76. Three Mile TP	50	20	Groundwater	Community
77. Trappers Lake CG	95	19	Groundwater	Transient, Non-Community
78. Trappers Lake Lodge	75	6	Groundwater UDI Surface Water	Transient, Non-Community
79. United Site Services	25	5	Purchased Surface Water	Transient, Non-Community
80. Valley Investment Properties	320	1	Groundwater	Transient, Non-Community
81. Waldorf School	218	3	Groundwater	Non-Transient, Non-Community
82. Westbank Mesa Homeowners Association	93	55	Groundwater	Community
83. Westbank Ranch Homeowners Association	400	100	Groundwater	Community
84. Williams Creek Water	30	10	Purchased Surface Water	Community
85. Wooden Deer Homeowners Association	38	15	Groundwater	Community

Data Source(s): Colorado Department of Public Health and Environment