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# Mountains to Plains

## The Story of Water in Colorado

### Colorado's Seasonal Clock

#### WINTER

Water accumulates in the mountains in the form of snow. Snow is used for skiing, and other outdoor activities such as snow-shoeing and sledding. Winter Park, a favorite ski resort, receives an average of 365 inches of snow each year. Snow accounts for 15 to 70 percent of Colorado's annual precipitation in any given year.

#### SPRING

Warm weather melts the snow, filling streams, lakes and reservoirs. When there is less snow in the mountains, the streams and reservoirs don't fill up, causing water shortages, which affect tourists, businesses, farmers, wildlife, homeowners — and you.

#### SUMMER

As the temperature of the air increases, large storm clouds form. These clouds usually produce thunderstorms. This welcomed moisture adds to the water in streams, lakes, and reservoirs. It also reduces the risk of wildfires.

#### FALL

Early snowfalls provide water in the spring in reservoirs and lakes, which store some of Colorado's water. Colorado's reservoirs store 6.5 million acre-feet of water, with an estimated retail value of \$991 million. Like any savings account, deposits that are made must be larger than expenditures. If the water isn't there, you can't withdraw it and use it.

### A Snowball's Chance

Coloradoans love snow, not only for skiing and sledding, but for the water it brings to our rivers and streams. Most of Colorado's water comes from snowfall on the west side of the mountains, known as the western slope. As the weather warms, snowmelt fills our river and streams. When there is a shortage

of snow, there may be less water in stream, lakes and reservoirs later in the year. These conditions are known as a drought and can last more than one year.

#### Where does the water go?

As snow melts, the water runs downhill and into rivers and streams. However, the water doesn't always stay in Colorado. Within three or four days from the time the snow melts, water running downstream may leave the state. If the water is not stored in reservoirs, it will flow to 18 downstream states, including New Mexico, Kansas and California. Colorado has entered into agreements to share approximately one-half of our water with nine of these downstream states.

#### Healthy forests and rivers

Colorado's forested landscape is very complex, with a diverse mix of trees shrubs and plants. As the density of a forest increases, less snow falls to the ground, water in streams evaporates faster, and moisture collected by plant roots and released into the atmosphere is severely reduced. Managing forests by thinning and prescribed burns increases the mix of trees, shrubs and plants, decreasing the risk of wildfires and increasing water run-off into rivers and streams.

#### Transmountain Snowballs?

Although 80 percent of the snowfall in forests is on the western slope, the majority of Colorado's population is in the eastern part of the state. To capture additional water, ten tunnels have been drilled through the mountains to deliver water from streams on the western slope to the eastern slope. Some of the more famous tunnels are the Roberts Tunnel, Adams Tunnel, and Moffat Tunnel.

### Water Holes—You can bank on them

Do you have a savings account? In Colorado, dams and reservoirs are our water savings account. Storing water from intermittent flow in the mountains in reservoirs creates year-round constant flow in Colorado's streams.

Even in years of heavy rain and snowfall, the moisture we get annually is not enough to meet our needs. Colorado has 1,838 reservoirs that store water during periods of drought. If the reservoirs are full, there may possibly be enough water for one year of additional use. Water storage will last longer if we use water efficiently.

Without dams and reservoirs, many of Colorado's streams and rivers would be completely dry during times of drought. Colorado needs additional reservoir storage to provide water in drought years. That additional water can come from repairing existing dams and building new ones.

#### Where does the water go?

Water from reservoirs is released into streams and rivers to maintain water flows for fish and wildlife habitat, and to meet the needs of downstream users like homeowners and farmers. Many of Colorado's state parks and recreation areas have reservoirs. Blue Mesa Reservoir is Colorado's largest. Its capacity is 941,000 acre-feet of water (one acre-foot is enough water to flood the infield at Coors Field to a depth of 5.4 feet).

### The Right Stuff

#### Water rights in Colorado

Water is distributed in Colorado to people who have water rights. A water right is a property right and entitles a water user to take water from natural streams and put it to specific use, such as cities (your water faucet), farms or businesses. Water rights are established on a first-come, first-served basis. When water is first put to use, the date of its use sets what is known as the "priority date" for permanent water rights. This way of managing Colorado's water is according to a legal principle known as the "Appropriation Doctrine" or "first in time, first in right." This concept originated in the 1859 Gold Rush when miners need a reliable and protected water supply for mining.

#### Who gets the water?

If there isn't enough water to go around, who gets the water? People with older, or senior, water rights take the water first, regardless of whether they live up-stream or downstream. When there isn't enough water to satisfy all water rights, the senior rights get water first and other rights may be left with no water. Additional water storage in Colorado would help both senior and junior water right holders.

#### City water-proofing

Towns and cities are entitled to the water that their rights provide them. Many cities have acquired very senior water rights, so that they can maintain an adequate supply of water for their citizens. Other cities may have to impose water restrictions if they don't have enough water.

#### Where is the oldest water right?

The San Luis People's Ditch has a priority date of April 10, 1852. That ditch is located on Culebra Creek, near the historic town of San Luis in south-central Colorado. Water is of major importance to all living things — even you! Two-thirds of your body is water. Your brain is 70 percent water, blood is 82 percent water, and lungs are nearly 90 percent water. Breathing alone expels approximately one cup of water per day from your body.

#### How is water distributed and used?

Water can be taken from rivers and streams in many ways:

- from ditches, canals, or pipelines
- by pumping out of underground aquifers

Once the water has been taken from the river or stream, it may travel many miles before it reaches its destination. The water taken from rivers and streams is used for a variety of purposes:

- electricity
- municipal water supply (homes and businesses)
- farming
- recreation
- wildlife and wetlands

## Water, Water Everywhere

The water that comes from your faucet at home has traveled a long way. As snow melts, the water flows into rivers and streams, filling reservoirs for use all year, called surface water.



Water that soaks into the ground fills underground reservoirs called aquifers. When the water is needed, it is pumped to the surface and taken through wells. This type of water storage is known as ground water.

### A River Runs Through It

When water leaves the mountains in Colorado, it flows into four major river basins – the Colorado, the Platte, the Arkansas, and the Rio Grande.

The Colorado River Basin consists of six sub-basins – the Animas, Gunnison, Yampa/White, Colorado, San Juan, and the Dolores.

### A Drop in the Bucket

Did you know that 80 percent of Colorado's population lives in a city or town? They get their water from capturing snowmelt and pumping ground water. Many cities and towns work hard to conserve water because it is such a precious resource.



We need to use water wisely and not waste it by letting faucets run unnecessarily or by over-watering lawns.

### Good to the Last Drop

The quality of our water matters as much as quantity. Colorado has more than 9,000 miles of streams and 2,000 natural lakes and reservoirs.



Polluted water hurts every living creature from a thirsty soccer player to a cutthroat trout. Pollutants get into our water supplies when fertilizers are used incorrectly and when toxic chemicals are flushed

## It's Our Bread and Water

With 30,000 farms and ranches in Colorado, agriculture is a way of life. As one of the state's top industries, agriculture provides food and fiber – everything from the cereal in your bowl to the clothes on your back.

The state's farms and ranches are home to a wide variety of wildlife, and fields offer valuable open spaces and picturesque landscapes. About 3.21 million acres of farmland is irrigated in Colorado.

Having enough water is extremely important to farmers since Colorado's dry climate forces them to irrigate their crops. Most crops need 18 to 30 inches of water in the summer to grow, but Mother Nature supplies only 6 to 18 inches of water annually.

Farmers are careful how they use chemicals on their crops to prevent soil contamination and pollution. Over-applying fertilizers harm farm land for future generations and wastes money because fertilizers are expensive.

Agriculture (supported by irrigation) has been an economic and environmental success in Colorado. Farms and ranches have transformed a "great American desert" into fertile and productive lands around the state.

### Did You Know...

Agriculture is one of the state's most important economic sectors, accounting for 47 percent of the state's land area.

- Agriculture employs 3.9 percent of the state's workforce.
- Agriculture accounts for 3.5 percent of the state's wages.
- Over 73 percent of the state's farm cash receipts are from livestock.
- Approximately 27 percent of Colorado's farm cash receipts are from crops.
- Irrigated agriculture produces over \$1 billion in exports from Colorado every year.
- Agriculture generates over \$16 billion in Colorado's economy annually.

## Nature's Way

### Wetlands

Whether natural or artificial, wetlands are important to improve habitat for fish and other wildlife. They improve the quality of our water by filtering pollution.

Wetlands provide food, protection from predators, and other vital habitat factors for many of Colorado's fish and wildlife species, including threatened and endangered species. Wetlands also serve as a filter by removing pollutants from overland flows before water reaches our streams, rivers, and reservoirs. Wetlands help prevent flooding by capturing storm runoff and gradually releasing floodwaters to downstream systems.

Irrigated agricultural land often creates wetlands that replenish ground water aquifers and benefit wildlife. Approximately 95 percent of the habitat for endangered species is on private land – much of which is agricultural land. Communities also benefit from wetlands by using them for recreation and open space.

### Wildlife Resorts

The Colorado Division of Wildlife manages a Wetlands Program. Its goal is to protect 100,000 acres of wetlands for wetland-dependant species by the year 2005. So far, they have managed to protect more than 13,900 acres of wetlands

### What are Wetlands?

Wetlands are areas inundated or saturated by surface or ground water, and generally include swamps, marshes, and bogs. Right next to wetlands are areas called riparian systems. They occur along rivers and streams and are distinguished by a diversity of plants and wildlife.

In Colorado, riparian systems represent less than one percent of the total acreage of public land, but are home to 72 percent of reptile species, 77 percent of amphibian species, 80 percent of mammals, and 90 percent of bird species.



## Still Waters Run Deep

### What is an Aquifer

An aquifer is a water-bearing formation under the earth's surface.

Worldwide, ground water makes up 4 percent of all fresh water that is not trapped in glacial ice. In Colorado, ground water is the only source of water for communities such as Castle Rock, Monument, Parker, Springfield, Yuma, Holyoke, and Akron.

### Water Use in Colorado

Some of the water we use is underground. This water is pumped to the surface for many uses in agriculture, households, and manufacturing. Colorado has many different types of aquifers and ground water; some are shallow and some deep. Ground water sources differ based on their depth and the type of geologic formations.

Colorado restricts the use of ground water depending on its location and type. Some ground water is being depleted rapidly due to over pumping. Ground water



is sometimes replenished through precipitation or recharged (water the soaks back into the ground) from irrigation.

About 25 percent of our water is obtained from ground water, so Coloradans greatly depend on it. Some of our rapidly growing areas rely on ground water as the sole source of water.

### Troubled Waters

Some areas in the Denver metro area may run out of ground water in the next 100 years, so it is important to find alternative water supplies and conserve for the future.