



Northern Water

Northern Colorado Water Conservancy District



The Colorado - Big Thompson Project

*historical, logistical
and political aspects of this
pioneering water-delivery system*



C-BT fact

The Colorado-Big Thompson Project delivers much-needed supplemental water supplies to about 860,000 people and 650,000 acres of irrigated farmland in Northern Colorado.

The Colorado - Big Thompson Project



The Colorado-Big Thompson Project
is a vital part of Northeastern Colorado –
its heritage, its economy, its scenic beauty.

When a group of visionaries in the early
20th century proposed the transmountain diversion project that
would collect water on the West Slope and deliver it hundreds of
miles away to the East Slope through an underground tunnel, many
people scoffed at what they believed was a crazy idea.

It is in part because of perseverance and commitment to delivering
water to the thirsty plains that Northeastern Colorado
has its renowned farmland and surface water recreation.

Inside is a look at the historical, logistical and political
aspects of this pioneering water-delivery system.

Inside is the story of the
Colorado-Big Thompson Project.


Northern Colorado Water Conservancy District

History

Vehicles traverse the West during the drought of the 1930s



The early 1930s brought great hardship to the state of Colorado. The economy was struggling as a result of the nation's 1929 stock market crash and the Great Depression. Scores of Colorado workers were out of jobs and finding it difficult to make ends meet.

At the same time, a devastating, years-long drought was gripping the West. Colorado farming operations were going out of business as fields dried out and crops withered without the water they needed to grow and thrive.

Help for the Centennial State

Then came plans for the Colorado-Big Thompson Project. The idea was to divert water from the headwaters of the Colorado River on the west side of the Continental Divide. That water would travel through a lengthy tunnel underneath Rocky Mountain National Park to Northeastern Colorado where farmers desperately needed water to supplement their agricultural operations.

The project would create hundreds of jobs and make available vast quantities of supplemental water to the parched plains.

Much-needed support on the way

The idea to bring Colorado River water to the East Slope was not a new one; the state had been exploring that possibility since the 1880s when Colorado commissioned studies to determine if such an endeavor was feasible.

The Colorado-Big Thompson Project

Signing of the repayment contract in 1938



But it was a group formed in 1935 called the Northern Colorado Water Users Association that pushed the C-BT Project plan forward.

The NCWUA was composed of civic leaders who recognized the need for a project like the “Big Tom” as it would come to be known. An outgrowth of the Greeley Chamber of Commerce’s Grand Lake Committee, the NCWUA was officially established in 1935. This organization was charged with getting the C-BT Project built.

After discussions with the U.S. Bureau of Reclamation, the NCWUA determined the need for an organization with taxing authority and the ability to contract with the federal government to build the project. In 1937, after months of discussion, the state legislature passed the Water Conservancy Act. It established the framework under which the Northern Colorado Water Conservancy District would be created later the same year.

Northern Water and its newly created board of directors had much work to do before construction could begin. They had to obtain congressional authorization and necessary appropriations. They needed to negotiate a repayment contract with the U.S. Department of the Interior.

They also had to guarantee that water users would repay a portion of project costs. To meet this requirement, Northern Water sought and secured residents’ approval on a property tax.

Construction

Beginning of Green Mountain Dam work in 1938



Reclamation oversaw construction on the more than 100 features of the Colorado-Big Thompson Project. Work began in 1938 and would take nearly 20 years to complete. Before construction commenced, Reclamation engineers estimated the cost to build the project would be approximately \$44 million.

On July 5, 1938, Northern Water signed a repayment contract with the United States, agreeing to pay up to \$25 million during a 40-year repayment period.

While the final price tag for project construction was nearly \$162 million, it is regarded by many as a great bargain for Northern Colorado residents.

Crews began work in 1938 on Green Mountain Reservoir, which would store water that could compensate the West Slope for the water that would be diverted to the East Slope. During the next two decades, C-BT Project construction yielded several significant historical moments and plenty of challenges.

The first water deliveries from the C-BT Project began in 1947. For a decade, Northern Water made interim deliveries. Reclamation declared the project to be substantially complete in 1957, the first year of full water deliveries.

The Colorado-Big Thompson Project

Granby intake and pumping plant construction in 1948

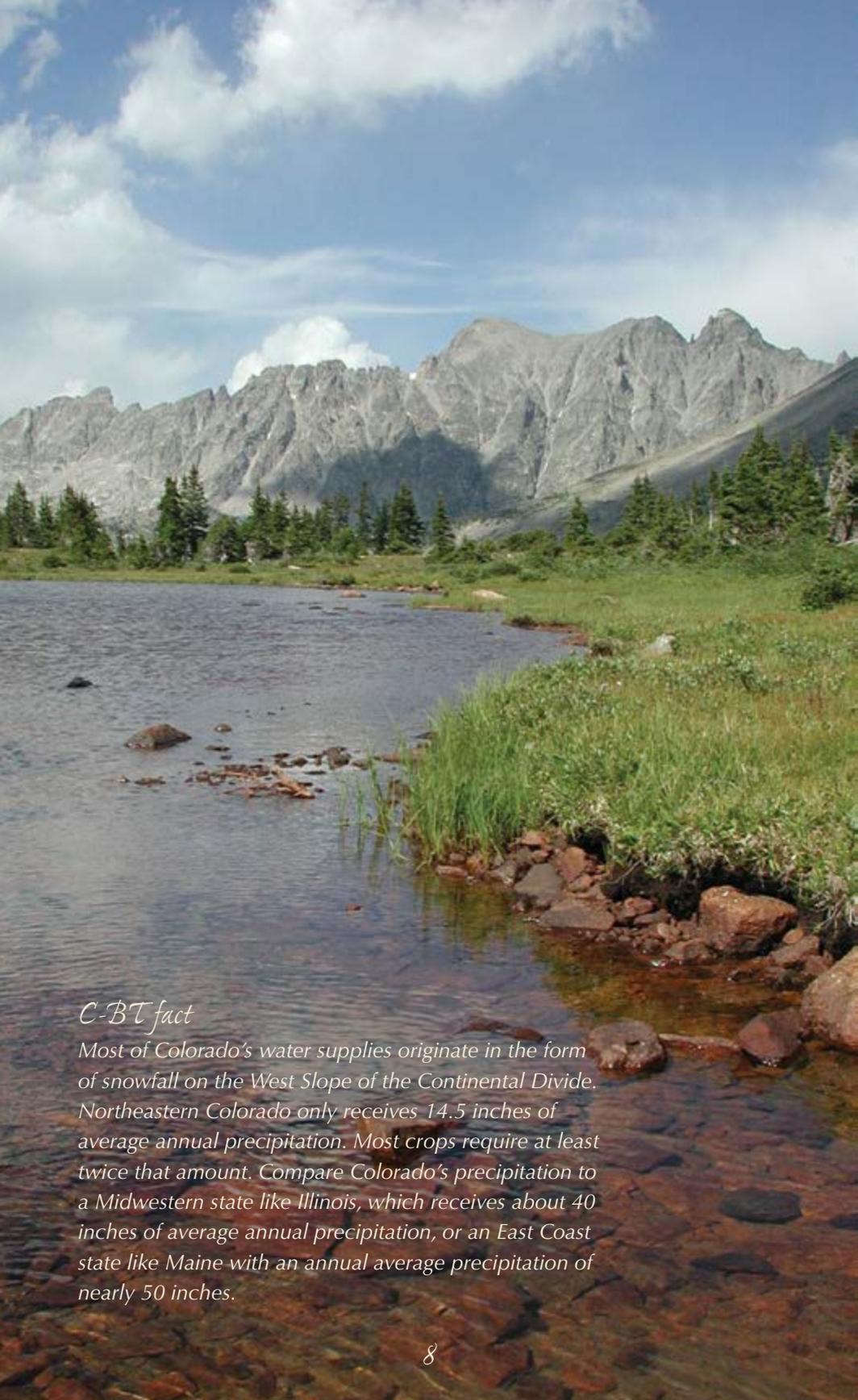


Notable construction events

1939 Members of the Mine, Mill, and Smelters Workers Union went on strike and picketed the construction site of Green Mountain Reservoir claiming that state mining laws were being violated regarding internal combustion machinery in the Green Mountain outlet tunnel. The labor dispute lasted for months and threatened to turn violent. Then-Gov. Ralph Carr called out the National Guard to enforce martial law in Grand and Summit counties in August 1939. The dispute was settled by the end of that summer.

1942 The federal War Production Board ordered C-BT Project construction to cease as a result of World War II. Work resumed in July 1943 when the WPB authorized Northern Water and Reclamation to resume work as long as it would not utilize manpower needed elsewhere for the war. The WPB deemed the project an important part of the war effort.

1944 Crews working from the west and east ends of the Alva B. Adams Tunnel, which runs underneath Rocky Mountain National Park, met on June 10, 1944. The two sides of the tunnel were askew by just a sixteenth of an inch – an extraordinary accomplishment considering the crews lacked sophisticated equipment to aid them with the construction. The holing-through ceremony was broadcast across the nation on NBC Radio.



C-BT fact

Most of Colorado's water supplies originate in the form of snowfall on the West Slope of the Continental Divide. Northeastern Colorado only receives 14.5 inches of average annual precipitation. Most crops require at least twice that amount. Compare Colorado's precipitation to a Midwestern state like Illinois, which receives about 40 inches of average annual precipitation, or an East Coast state like Maine with an annual average precipitation of nearly 50 inches.

Project logistics

Continental Divide above the C-BT collection system



The C-BT Project collects and delivers more than 200,000 acre feet of water annually, most of which is produced when snow melts in the upper reaches of the Colorado River basin west of the Continental Divide. It transports this water to the East Slope through the 13.1-mile Alva B. Adams Tunnel, which runs beneath Rocky Mountain National Park.

The project consists of:

12 reservoirs

35 miles of tunnels

95 miles of canals

700 miles of transmission lines

The project provides supplemental water to about 650,000 irrigated acres and 860,000 people in the South Platte River basin.

West Slope Collection System

Grand Lake, Shadow Mountain Reservoir & Lake Granby



The West Slope Collection System collects runoff from the Upper Colorado River watershed and stores it in reservoirs before transporting it to the East Slope through the Adams Tunnel. The collection system comprises four reservoirs, a natural lake, two pump plants and associated canals as well as the necessary control and measurement facilities.

Lake Granby is the largest reservoir in the C-BT Project. Completed in the 1940s, Lake Granby began storing water in fall 1949. From Lake Granby, water is pumped via the Farr Pump Plant to the Granby Pump Canal, where it flows into Shadow Mountain Reservoir and through a connecting channel to Grand Lake.

Green Mountain Reservoir, the first constructed



The Colorado-Big Thompson Project

An aerial view of Willow Creek Reservoir



Shadow Mountain Reservoir is located between Lake Granby and Grand Lake and receives water from the North Fork of the Colorado River and water pumped from Lake Granby. Built between 1944 and 1946, Shadow Mountain acts as a regulating reservoir to help maintain a constant surface elevation in Grand Lake and as a conduit between Lake Granby and Grand Lake.

Grand Lake is the largest natural water body in Colorado. C-BT Project operations minimize fluctuations in Grand Lake's level to one vertical foot. At Grand Lake's east shore, water enters the West Portal of the Adams Tunnel on its way to the East Slope.

Willow Creek Reservoir is located two miles west of Lake Granby and captures snowmelt runoff within the Willow Creek basin. The Willow Creek Pump Plant lifts water 175 feet to the Willow Creek Supply Canal where it flows a quarter-mile into Lake Granby. The reservoir, dam, pump plant and supply canal were built between 1951 and 1953.

Green Mountain Reservoir is located on the Blue River approximately 12 miles southeast of Kremmling. Green Mountain Reservoir and its dam and power plant were the first C-BT Project features to be constructed. Green Mountain was built to compensate the West Slope for some of the water the C-BT Project would transfer to the East Slope.

The Colorado- Big Thompson Project location map

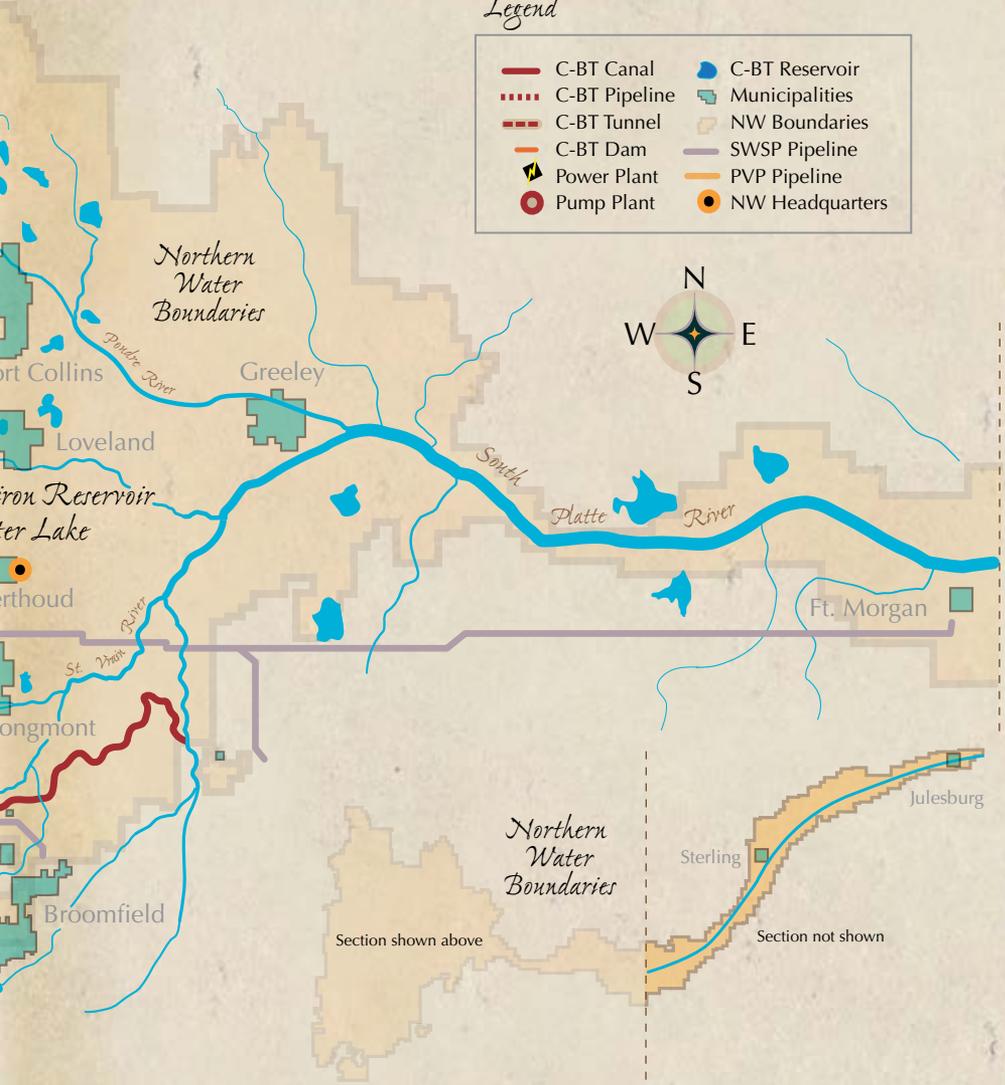



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Legend

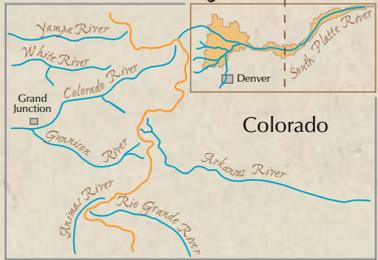
- C-BT Canal
- C-BT Pipeline
- C-BT Tunnel
- C-BT Dam
- Power Plant
- Pump Plant
- C-BT Reservoir
- Municipalities
- NW Boundaries
- SWSP Pipeline
- PVP Pipeline
- NW Headquarters



US Index Map



Colorado Index Map





C-BT fact

The Adams Tunnel (the East Portal of which is pictured here) initially was named the Continental Divide Tunnel. It later was renamed for Alva B. Adams, a U.S. senator from Colorado who played a major role in convincing Congress in the 1930s to provide funding for the project.

Abra B. Adams Tunnel

The first water out of the Adams Tunnel East Portal in 1947



The Adams Tunnel connects the East and West slopes. It is 9'9" in diameter and 13.1 miles long. It cuts through the Continental Divide as much as 3,800 feet beneath the surface. The tunnel can carry up to 550 cubic feet per second. It takes water approximately two hours to travel through the tunnel.

The first water passed through the Adams Tunnel on June 23, 1947. At 11:16 a.m., then-Gov. Lee Knous flipped a switch to open the gates of the West Portal. A crowd of nearly 1,000 people gathered near Estes Park to witness the first C-BT water arrive on the East Slope.

Some interesting facts about the Adams Tunnel:

Women were not allowed at the holing-through ceremony in June 1944 because of a long-standing superstition warning against women in tunnels.

A nitrogen-filled conduit is suspended from the tunnel ceiling to insulate and keep electrical transmission lines dry.

The tunnel drops 109 feet in elevation between the two portals so the water may flow through by gravity without the need to pump it.

East Slope Distribution System

Horsetooth Reservoir, the largest in Northern Colorado



Once water travels through the Adams Tunnel and exits the tunnel's east side, it passes through the distribution system before it is released to farmers, industries and municipalities. Water is stored in the distribution system in three terminal reservoirs.

Horsetooth Reservoir is the C-BT Project's largest East Slope storage facility and the largest reservoir in Northeastern Colorado. Located west of Fort Collins, it supplies water to municipal, domestic, industrial and agricultural water users in the Cache la Poudre River basin. The reservoir was constructed between 1946 and 1949. Water is delivered to Horsetooth through the 13-mile Hansen Feeder Canal from Flatiron Reservoir.

Carter Lake is the second largest reservoir in Northeastern Colorado and supplies C-BT water to cities, towns, water districts, industries and irrigated crop land in the St. Vrain, Boulder Creek and South Platte River basins. Carter Lake was constructed between 1950 and 1952. Water is pumped to Carter Lake from Flatiron Reservoir through the 300-foot Carter Lake Pressure Tunnel.

The Colorado-Big Thompson Project

Carter Lake with Flatiron Reservoir in the foreground



Boulder Reservoir was not included in the original plans for the C-BT Project. In the 1950s, Northern Water, Reclamation and Boulder city officials decided to build the reservoir because of a drought and post-World War II growth. Boulder was included in Northern Water's boundaries in January 1953, and Boulder Reservoir was completed in 1955.

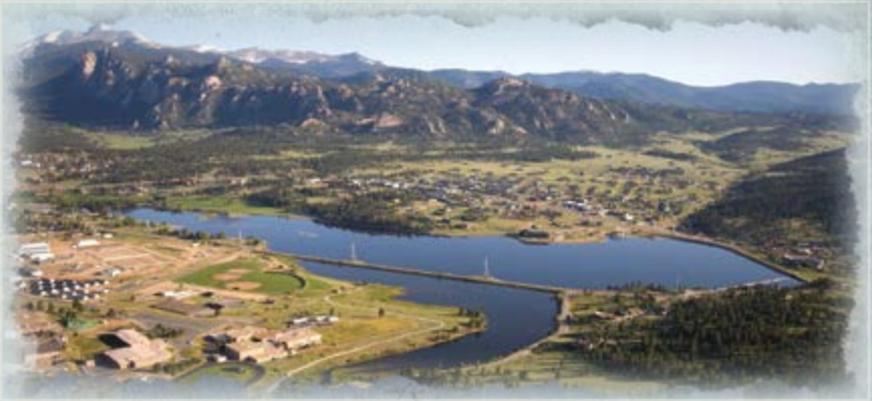
The C-BT Project's East Slope system also includes Mary's Lake, Lake Estes, and Pinewood and Flatiron reservoirs, which play an important role in the project's power-generating capabilities.

Boulder Reservoir with the Flatirons in the background



Hydroelectric power

A view of Lake Estes and its power plant on the far left



While the primary purpose of the C-BT Project is to deliver water, it also generates hydroelectric power as water passes through several power facilities on its way to Horsetooth, Carter Lake and Boulder reservoirs. Through the U.S. Department of Energy, the Western Area Power Administration markets more than 670 million kilowatt hours on average each year. A portion of the power revenues helps repay the federal government much of the costs of building and operating the C-BT Project.

When water exits the East Portal of the Adams Tunnel, it drops 205 feet through a large above-ground pipe, or penstock, to Mary's Lake Power Plant. Mary's Lake, at the foot of the power plant, serves both as an afterbay

C-BT fact

From the Adams Tunnel's East Portal, water descends approximately 2,900 feet to the foothills. Nearly every foot of vertical head is used to generate "clean" hydroelectric power.

The Colorado-Big Thompson Project

Mary's Lake with Longs Peak on the horizon



for the power plant and as a forebay from which the water drops 482 feet to Estes Power Plant. Lake Estes, located below Estes Power Plant, is formed by Olympus Dam. The Estes Power Plant helps meet regional power needs.

The water then drops another 815 feet through a penstock to Pole Hill Power Plant and then into Pinewood Reservoir. Finally the water drops more than 1,000 feet through twin penstocks to Flatiron Power Plant, which discharges into Flatiron Reservoir. Flatiron Power Plant provides daily peaking power.

Estes Hydroelectric Power Plant





C-BT fact

While recreation is a much-valued benefit of the project, its primary purpose is still to deliver water.

Recreation

Boats docked at Lake Granby



Approximately 2 million people visit the C-BT Project's man-made lakes each year to enjoy fishing, boating, water skiing, camping, hiking and picnicking.

Recreation on Horsetooth, Carter Lake, Pinewood and Flatiron reservoirs is managed by Larimer County Parks and Open Lands. Boulder Reservoir recreation is overseen by the City of Boulder, and recreation on the C-BT Project's West Slope reservoirs is managed by the U.S. Forest Service.

The recreation opportunities the C-BT Project provides are an important part of the economies of Grand County and the Northern Front Range and of the lifestyles of their residents.

Boating on Horsetooth Reservoir



Changing region, water users

The St. Vrain Supply Canal delivers supplemental water



The Colorado-Big Thompson Project became fully operational in 1957. At that time, nearly all C-BT units were owned by and delivered to the agricultural sector; the project had been conceived to help farmers whose crops and livelihoods were withering as a relentless drought parched Northeastern Colorado in the 1930s.

C-BT water continues to supplement the irrigation supply of farms within the boundaries of Northern Water. But as the region becomes more urban, an increasing amount of C-BT water is used by the municipal and industrial sectors.

When the C-BT Project was completed in 1957, 97 percent of its water deliveries were for agricultural purposes. Today, about one-third to one-half of the C-BT water delivered annually goes to towns, cities and rural domestic suppliers, which provide water to smaller towns and rural residents.

The ownership of C-BT Project water has changed even more dramatically. In 1957, 85 percent of the C-BT allottees – those who own units of project water – represented irrigated agriculture. Today the agricultural sector owns approximately one-third of C-BT units, and that number continues to decrease each year.

How is it that farmers use the majority of the C-BT water but only own approximately a third of it? In most years, cities and towns lease some of the

The Colorado-Big Thompson Project

Colorado's Northern Front Range continues to grow



C-BT water they own to farmers. But after especially dry years, like 2002 and 2012, municipal water providers have very little water to lease.

As more C-BT Project water is used in homes, schools and businesses, Northern Water continues evolving to meet Northeastern Colorado's changing needs.

For more information about Northern Water please contact or visit us at:

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Historic photo of a farmer irrigating near Berthoud, Colorado





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