

Surviving the Worst Drought in 300 Years

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Abstract

1954 had been the driest year in recent Denver Water history. The runoff in Spring 2002 was 1/3 less than 1954. This was a major wake-up call for Denver Water and the Green Industry. 2003's runoff was a little better than 2002. But, it looks like the 2004 runoff season will be about the same 2002. This paper will explain the ins and outs of what the Denver metro area has been through in the past three + years. The Green Industry played a major role in developing Denver Water's drought rules. The paper will explain how this worked. What were some of the problems created? What was the driving force that changed customer's habits? What are we looking at in the future if this drought continues? What are things that Denver Water would do differently? This paper will detail all the ramifications that drove different decisions.

History of Water Restrictions in Denver

Water restrictions in Denver date back to 1922. From 1922 to 1936 the Denver Water Board imposed mandatory lawn watering restrictions basically due to lack supply/infrastructure. The construction of Eleven Mile Dam and the start of the Fraser Basin collection system allowed Denver Water to lift the restrictions.

Water restrictions were again put into place in 1954 due to drought conditions. The drought lasted through 1956. In 1957 the mandatory restrictions were lifted.

Denver customers again faced restricted water use in 1977 from lack of supply in the Northern collection system. The restrictions lasted through 1981 which also resulted in limiting the number of taps sold over four year.

The drought that started in 2002 was ramping up prior to 2002. In 2001 the Denver area experienced warm/dry fall which turned into a dry winter. March of 2002 the snow pack readings in our collection basin were 40% below normal. The state of Colorado experienced above normal temperatures in March which prematurely melted the snow pack. The month of April continued with warm/dry weather. April 29, 2002, Denver Water hit a record of 370 million gallons treated water used by our customers in one day.

2002 – One Tough Year

The hot/dry weather continues through May. On May 22, 2002 the Schoonover fire starts. The fire was started from lightning and burned to 4000 acres in size.

The Denver Water Board adopts voluntary watering restrictions the beginning of June. The Hayman fire starts on June 8, 2002 from arson. In one day this fire grew to 60,000 acres in size. The combination of fuels, weather, and topography positioned the fire for a major run lasting the entire day and burning 60,000 acres along the South Platte River corridor for 16 to 19 miles. (Figure 1)

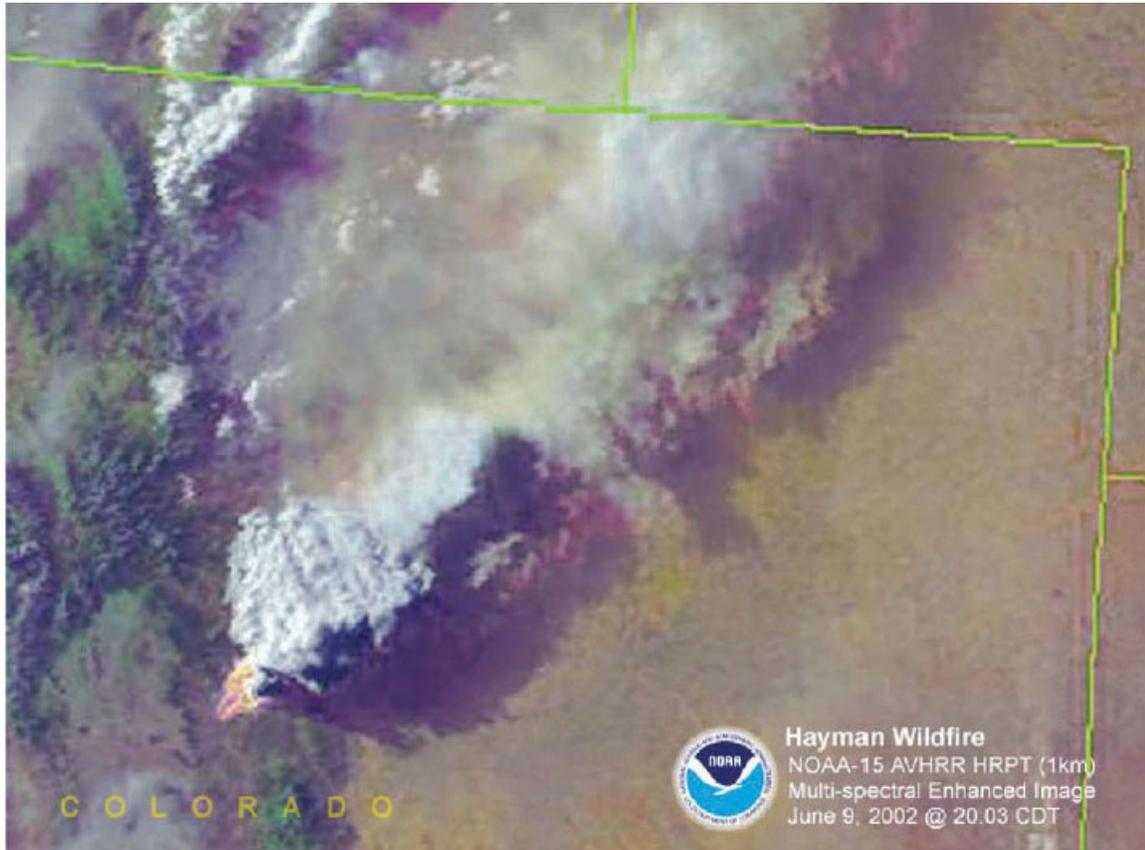


Figure 1

Twenty days later the fire had grown to 138,000 acres and was under control.

The fire was located in one of Denver Water's largest water sheds almost causing the shut down of their largest, most modern water treatment plant (Figure 2). This fire ended up being the largest fire in Colorado's History causing numerous social and economic impacts.

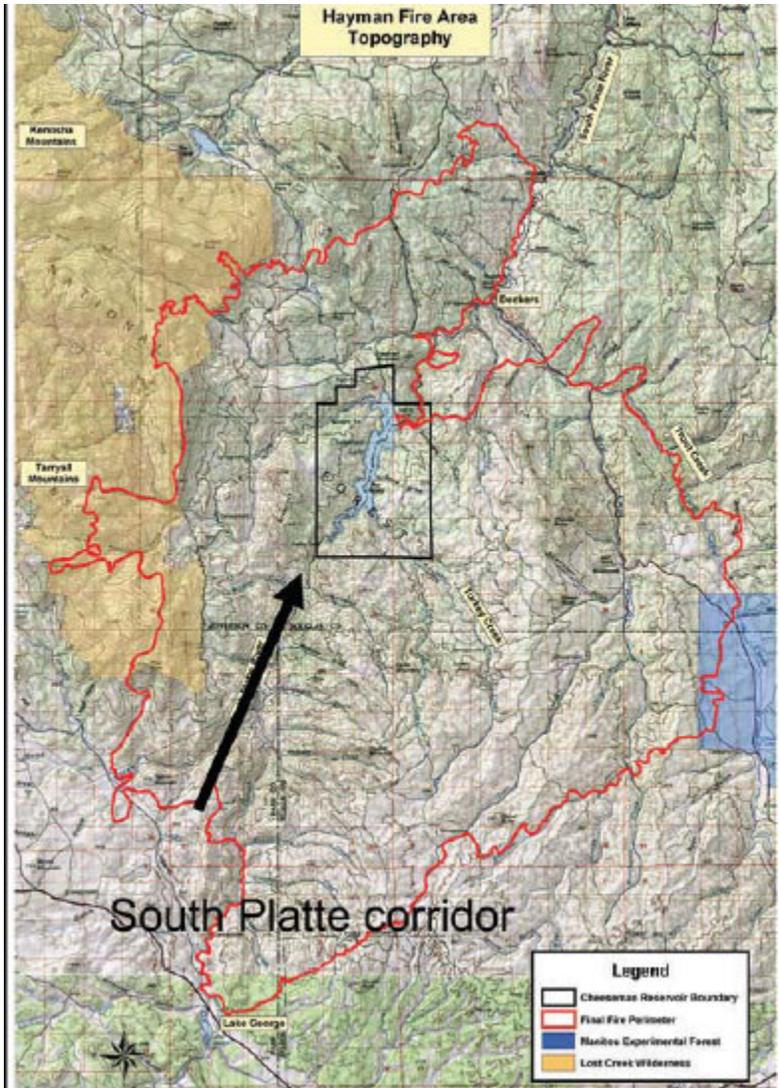


Figure 2

Due to continuing dry/hot weather and the devastation to one of their major water sheds, the Board decides to go to mandatory water restriction the beginning of July.

2002 Drought Program Details

Watering Restrictions

The mandatory water restrictions consisted of every 3rd day watering and a three-hour water window per watering day. Other basic rules were no watering between 10 a.m. and 6 p.m and no water waste can occur. Denver Water created a rule for almost everything and it was too lengthy to list.

September 1, 2002 – water restrictions tightened. Each customer gets 2-days per week to water and a 2 hour time limit per watering day. No watering on Sundays. No exemption for permits.

October 1, 2002 – ban on outdoor watering

Exemption Permits

July 1, 2002 launches the permit process for getting exemptions from drought restrictions.

- Sod and seed permits = 1432
- Large landscape permits = 3821
- Total permits = 5253

Large landscape permits allowed customers with larger landscaped areas to receive more water. Most of these permits were issued to commercial properties and large residential. Some customers thought permits were unfair. Permits were perceived by some customers as the rich buying their way out of a drought. 66% of the permitted customers used less water than their historical use. 44% of the permitted customers used more water than their historical use.

Drought Monitors

23 people were hired to canvas the city looking for water waste

Penalties for water waste were as follows:

- 1st time a warning. (9,600 warning notices issued in 2002)
- 2nd \$250 fine
- 3rd \$500 fine
- 4th \$1000
(A total of \$136,550 collected in violations in 2002)
- 5th install flow restrictor. (Sixteen flow restrictors installed in 2002)

Getting the Word Out

Denver Water used the typical marketing tools to get the word out, such as:

- Paid ads in newspapers and radio
- Billboards through out service area
- Sandwich boards on people walking down busy streets
- Bus placards
- Direct mailings to customers
- Media coverage
- Public presentations

Winter Rebate Program

Denver Water launched November 1, 2002 a residential/commercial rebate program to accelerate the replacement of high water using toilets and clothes washers.

Residential

- ULV toilets \$100, limit 2 per household within our service area
- Clothes washers, horizontal axes \$125, limit 1 per household

Commercial/Industrial

- ULVs \$150

2003 Drought Program Details

Drought Conditions Continue to Decline

January 2003– Reservoirs are 44% full. In January 2002 reservoirs were 79% full. A normal year reservoirs are normally 82% full.

Mother Nature Intervenes

March 19, 2003 a snow storm in Metro area dumped more than 3 feet of snow (Figure 3).



Figure 3

Customers thought the drought was over. Denver Water had to regroup with their advertising to get the word out that the drought is not over.

Changes from 2002

- Denver water started a summer rebate program for customers for landscape/irrigation materials.
- Board approved surcharges to get customers attention.
- Developed water budgets for Commercial/Industrial irrigation only accounts.
- No permits were issued.
- Water utilities working together in the metro area agreed on a watering calendar

2003 Watering Restrictions

May 1: Start of irrigation season and mandatory restrictions.

- Can only water 15 min/zone
- Maximum of 8 zones
- Common Front Range watering calendar
 - Two days per week
 - No watering between 10 AM and 6 PM

June 11: Board allows unlimited zones at an average of 15 min/zone.

July 14: Board adds one watering day per week to watering calendar.

2004 Drought Program Details

Basically the same as 2003

- Exceptions
 - **average** of 15 minutes per zone
 - decreased number of drought monitors
 - increased surcharges from 2003
 - different rebate program

Green Industries of Colorado (GreenCO) Involvement

The relationship between Denver Water and GreenCo was a good “partnership” before the drought.

The major conflicting issues are outlined below:

GreenCO feels

Denver Water is singling out the Green Industry with the rules – not being equal to all businesses.
15 minutes per zone is not enough time for rotor type heads and can't understand why Denver Water would impose such a rule
Denver Water is driving the Green Industry out of business
Denver Water doesn't understand all the situations that GreenCO deals with and they don't listen to GreenCO's concerns
Denver Water needs to develop individual water budgets for each customer
Denver Water doesn't have a long-term conservation strategy
The general public is outraged at Denver Water for not having an established plan
Denver Water's financial arguments are hollow
Denver Water in general has no long-term plan

The battles between the two agencies have been ugly. Unfortunately, GreenCO developed a letter of accusations and sent the letter to numerous individuals in the metro area, including the Mayor and media.

Financial Ramifications

Drought can be a financial nightmare for a community. The green industry companies depend on water to keep in business. Water utilities get a double whammy with having to spend more money on advertising, hiring additional employees and offering incentive programs, but the utility also receives less revenue from the restricted water use. Homeowners have to live with ugly, dry yards, and surcharges on their water bills. Then the homeowner has to face the expenditure of landscaping when the drought is over. Drought is a natural disaster for a community, and in Colorado, its not going away.

Each group that is deeply affected by drought needs to develop a plan on how to minimize the financial effects. Denver Water has been working on developing individual water budgets. This is not an easy process for a utility the size of Denver Water. In the interim, Denver Water is encouraging customers to take action and make changes to be more water efficient. For example: Homeowners can install Xeriscapes and very efficient irrigation systems to eliminate losing their entire landscape. The green industry companies must start promoting and installing more water efficient landscapes and irrigation. A small percentage of the green industries in Colorado promote this concept and they need to expand their efforts.

Denver Water is constantly readjusting their business plan to compensate for new challenges. In drought conditions, water surcharges will always be one of a water utilities tools to keep consumption down. The vary nature of surcharges is to encourage customers to do something they would not do otherwise or to penalize those that do not do what is needed. From the customer’s viewpoint surcharges are not fair. The issue of fair surcharges during a drought is not the point. They helped develop awareness of the importance of the drought in our community. Another benefit of surcharges is centered on enforcement. Water copes can not be everywhere at all time, but surcharges can.

A drought to a water utility is very expensive. As a drought worsens, a utility will make a request to their customers to drop their consumption. The majority of customers will honor this request. This decrease in consumption directly decreases the revenue the utility receives. Most water utilities operate off the revenue they receive and are not tax supported. In an attempt to balance the budget, utilities start cutting their operating cost and the hardest hit is usually improvements and maintenance to the operating system.

When maintenance and replacement projects are delayed during a drought they must eventually be brought back into schedule. There is not way to catch up on needed work and not spend money that is above “normal” levels. While Denver Water can do things to help shelter their customers from the full financial blow, the customer will ultimately have to pay. Rate increases after a drought is normal procedure to bring the budget back into balance.

A water utility also has many additional expenses during a drought. The table below summarizes some of the additional expenses.

Type of Expense	Year-End Cost/2003
Drought Monitors	\$360,000
Landscape/Indoor Rebate Program	\$1,800,000
Advertising/Marketing	\$700,000
Temporary Staffing costs	\$160,000
Total Additional Costs for One Year	\$3,020,000

Denver Water is proposing a rate increase for 2005. Denver Water compared their rates to other water utilities in the metro area and found that their rates fell into the lower 1/4 of the range. The rates group is proposing an increase to the Board that would bring

Denver Water into the lower 1/3 of the price range. The increase would range from 4.6% inside, to 9.6% outside the city of Denver.

Because Denver Water customers are now using less water than they did in 2001 before the drought, 56% of average customers pay less now for water bills. Some customers may continue to pay less, even with the rate increase.

Cloud Seeding

Denver Water started cloud seeding the winter of 2002 in their Summit County watersheds. Winter cloud seeding is performed to produce more snow which would melt in the spring and fill Denver Water reservoirs. Cloud seeding has been widely used by ski resort in Utah and Colorado for last past few years. Cloud seeding involves the introduction of silver iodide which causes more water drops to condense within the cloud and then fall to earth. In cold cloud seeding, silver iodide is used which causes the super cooled liquid water droplet to freeze. This produces precipitation which falls to the ground as snowflakes if the air temperatures are below freezing.

Vail ski resort in Colorado is in their 16th year of cloud seeding. Vail is attributing a 15 percent increase in the amount of snowfall over historical averages.

However, scientists are not in agreement on the effectiveness of cloud seeding. The main problem with proving the effectiveness is that it is difficult to determine if the seeding was the contributing factor or nature alone.

Denver Water knows that three months after starting cloud seeding, the Denver area experienced a three foot dump of well needed wet snow (Figure 3).

Challenges

This drought has allowed Denver Water to analyze and readjust their approach to the current drought or droughts in the future. Some of the decisions that were made and created challenges for Denver Water's staff are detailed below.

Permits for extra watering – This was not a repeater. The initial problem was Denver Water developed its drought rules without considering all of their customers that use water for landscapes. The “Drought Committee” did not address commercial and large residential site with the rules. This is a small percentage of the customers, but still shouldn't have been over looked. To compensate for this, Denver Water issued permits. Too much time was spent in this process and it opened the door for people to take advantage of the situation. In future droughts, Denver Water will craft the drought rules to encompass all the customers.

“Voluntary” reductions – When Denver Water customers were asked to reduce their water use, and a large percentage of customers did not comply. Denver Water observed less than a 10 percent reduction.

Small surcharges – Denver Water did not have steep enough steps to get the customers attention. Surcharges need to be enough of a sting to make people want to conserve.

Cute, fun advertising – Following the advice of an advertising agency, Denver Water launched an advertising campaign to get our customers attention. A sizeable percentage of people hated the campaign which just added more fuel to existing problem.

Trying to enforce all those rules – Keep it simple. More rules just breed more rules. Don't try to address all the possible problems that will surface.

One-size-fits-all watering times – Staff was divided on this issue. Some of Denver Water's staff tried to convince the Drought Committee that the 15 minutes per zone rule was wrong. While other staff members (on the committee) felt that the public wouldn't understand anything different. The committee members were successful in their lobbying efforts to the Manager's staff and the Board. This issue ended up being one of the black eyes that Denver Water received during the whole drought process.

Can't please all the people all the time – When drought rules are developed and decisions are made, it is so true that not all customers will be pleased. There is no way to avoid this.

Summing Things Up

Drought cycles are hard to predict and even harder to manage all the ramifications. A water utilities response to a drought needs to be consistent and consumption driven. The public hated surcharges, but it did get the results Denver Water needed. Denver Water should have kept the public informed from the beginning on the financial implications facing the utility.

Denver Water's rate structure needs to be overhauled to support their long-term conservation objectives. Rates need to be a component of conservation to capture additional savings in non-drought years. Drought measures and Conservation measures need to be separate, and this difference needs to be better defined.

The success of conservation is a function of education, marketing, water rates and people taking actions to change their habits. Conservation is a community wide effort, we all need to work together to insure enough supply for the future. Growth is going to happen in Denver, that's a given. It's critical to get customers on board with Conservation so supply can continue to meet demand.

Denver Water needs to continue to educate it's customers on all the benefits of conservation. Conservation helps postpone the costs of developing more storage, which decreases the costs of environmental the impacts. Conservation also allows a community the option of future growth, which is good for the economy. Without conservation, most water utilities in the West would be forced to put a moratorium on growth.

Denver Water is aware of numerous mistakes that were made in the last few years of drought. It is easy for others to find fault when they don't have to walk down the path. It's important to learn from previous problems and design future responses to mitigate negative outcomes.