

Deerwood Service Company, Then and Now

Introduction DSC is a water-providing nonprofit LLC overseen by a volunteer Board of Managers and owned by three subdivisions: Creek Ranch, Deerwood Ranches, and the Wilkerson Subdivision. Our website is deerwoodservice.com.

History

The developers of Deerwood Ranches created Deerwood Service Company LLC in 1994. Three wells (DP1-3) were drilled at different sites, none of which encountered adequate water to supply anticipated needs. The fourth attempt (DP4) struck an aquifer with a good water supply, and we continue to tap this aquifer. The pipes for Deerwood Ranches were laid in 1994, and Creek Ranch pipes were laid and connected to the system in 1999. The four Wilkerson Subdivision lots were added to the system in 2001.

The developers included a clause in the lot sale contracts that the water system could be given to the developments at his discretion. It was thus in his best financial interest to minimize spending on the system, and he charged users \$50/month for water, regardless of the amount used, which appealed to buyers.

Rather than dedicate the lot occupied by the well to the DSC system, the developer sold it to a person outside of DSC, restricting the DSC base of operations to a 100 x 100 ft easement within this lot.

In 2008, the developers officially "donated" the system to the three developments it serves: Deerwood Ranches (24 lots), and Creek Ranch (39 lots) and the Wilkerson Subdivision (4 lots). At that time, resident volunteers Donna Meitus, Gerry Audesirk and Chris Reitz (a former Deerwood resident) worked extensively with a water lawyer to transfer ownership of the system.

DSC is bound by an Operating Agreement, and our customers by a Water Service Agreement (both available on our website). DSC is overseen by a Board of Managers, legally defined as having 5 members: two representatives each from Deerwood Ranches and Creek Ranch, and one from the Wilkerson Subdivision.

The DSC system is maintained by Bruce Thompson (our System Manager), who has been overseeing the system since 1995. Bruce is a Class A Water Operator and a Class 4 Distribution Operator; both are the highest level of these categories.

In 2018, when damage to the DP4 well casing necessitated drilling a new well, DSC hired the engineering firm Civil Design Consultants (CDC) to oversee the permitting and construction of the new well. CDC is currently in the process of evaluating the entire system to provide DSC with a reserve study, which we have not had before. In consultation with Bruce Thompson, CDC will continue to help us plan, prioritize, and hire contractors to maintain and upgrade the water system in coming years.

The DSC Water System: Infrastructure and Challenges

DSC infrastructure includes one developed well (with a second currently in progress) with a submerged pump at a depth between 300 and 400 feet, a pumphouse with various control systems, booster pumps, and a chlorination system where water is chlorinated in a tank below the pumphouse.

From the pumphouse, booster pumps propel the water into two storage tanks in Deerwood Ranches (each 10,000 gal, providing 20,000 gal of stored water). Creek Ranch is also served by two storage tanks (each 20,000 gal, providing 40,000 gal of stored water). Both Deerwood Ranches and Creek Ranch houses are gravity-fed from these storage tanks.

When the members were given the system by the developers, the pump for the Deerwood Ranches storage tanks was set to run for a specified time each day, which usually kept the tanks adequately full. But if the tanks got too low, a light bulb mounted on top of a power pole along Rt. 179 lit up. Generally, nobody noticed this, so the problem was only detected when homes at higher elevations in Deerwood Ranches ran out of water. The owners would call Deerwood resident Terry Silva, who would call Bruce Thompson, who would come out even late at night to correct the problem. Multiple tanker trucks of water needed to be purchased at one point when the tanks drained completely.

DSC serves 67 lots. Because these are widely spaced, we have 8.7 miles of buried pipeline. Our total service area is approximately 3.6 square miles. This is an enormous service area for a small number of customers, who must bear the costs of maintaining this extensive system.

The pipelines are made of ductile iron (https://en.wikipedia.org/wiki/Ductile_iron_pipe) consisting of iron casing, concrete lining, and textured polymer protective coatings on the inner and outer surfaces. The pipes are buried about 7 feet underground. If the protective coating wears away or is nicked, the iron may corrode. There appear to be some areas where the soil in the region served by DSC is especially corrosive. Corrosive soils result from extremely complex factors (see <https://www.corrosionpedia.com/definition/1465/soil-corrosion>). The bottom line is that when groundwater in corrosive soils contacts exposed iron pipes, it eats away at them, eventually causing the pipe to rupture. This has occasionally occurred in our system when machinery has nicked the protective outer covering of the pipe. Other leaks have been caused by corrosion with no known cause.

The system has an inadequate number of pressure relief vaults, a cost-saving measure by the developers. In some parts of the system, when a hydrant is opened for needed testing, the abrupt surge in water pressure causes a "water hammer" effect that can potentially (and has at least once) caused a leak in the pipeline.

Until recently, the booster pumps turned on and off abruptly, which produced water hammers with each event. Since this happens very frequently to keep the storage tanks adequately filled, last year the pipes leaving the pumphouse suffered major damage as a result.

The DSC pumphouse, wells, and chlorination system are located on a small (100 x 100 ft) easement within a lot not served by DSC and not included in any of the three DSC developments. A driveway is shared by DSC and the lot owner. This entire situation is far from ideal for either party and has made the DSC Board's job more difficult.

System Improvements to Date:

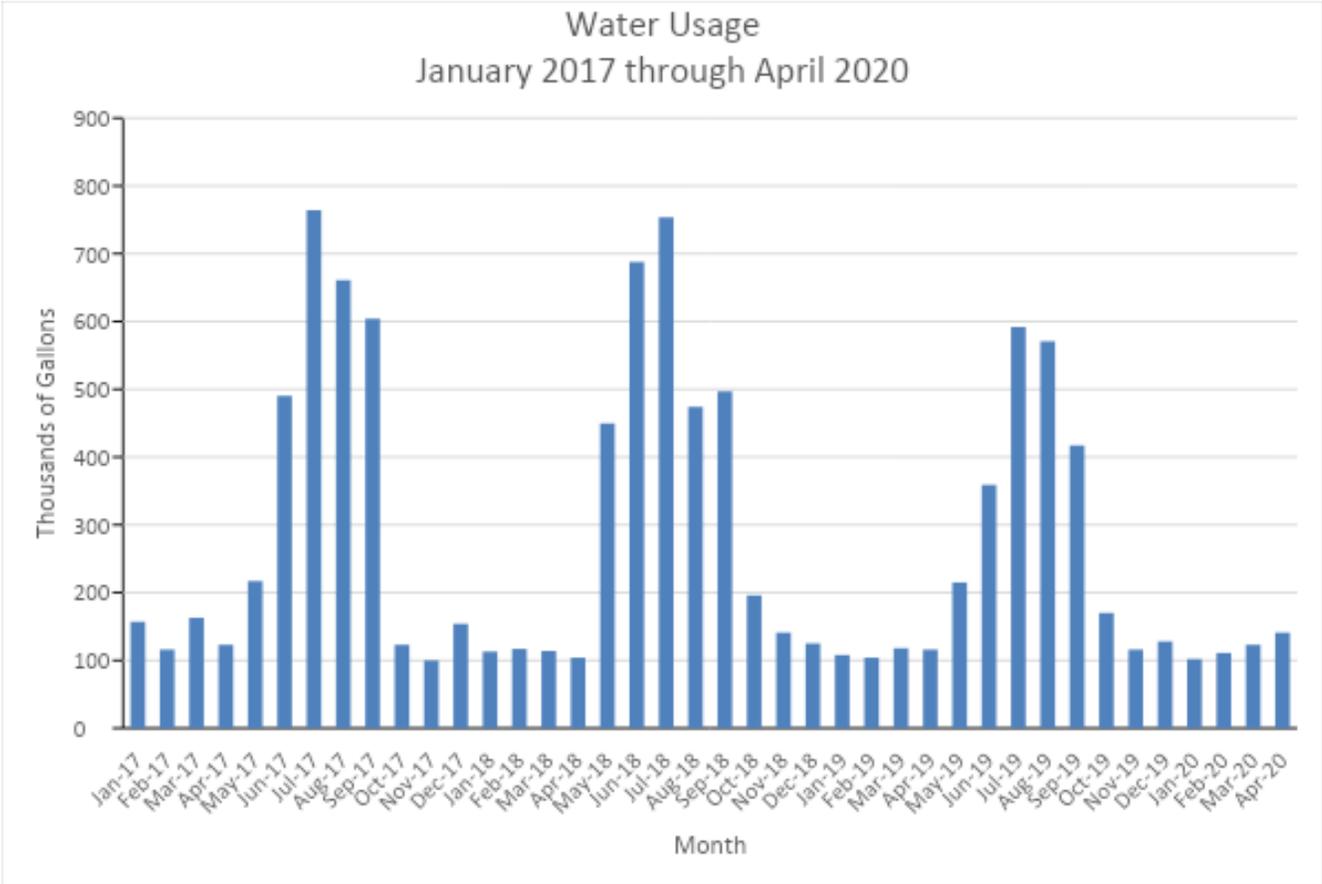
Since the system was given to the members:

- Galvanized steel water pipe in our well has been replaced with non-corroding PVC (started 2015; completed 2018).
- When underground ductile iron supply pipes leak, we are replacing those sections with PVC pipe, which will not corrode.

- The light bulb on a pole has been replaced with a sophisticated sensing system that alerts our Water Manager by cell phone if water in the Deerwood storage tanks gets low.
- We are adding two VFDs (variable frequency drives), one for the new well pump and one for the booster pump. When the pumps are turned on, these drives ramp up the speed of pumping gradually to prevent destructive “water hammering” (sudden surges in water pressure) which can damage pipes.
- The new well will include a system that will allow easy monitoring of the water level in the well. This will help us determine if we are depleting our aquifer over time.
- A new meter will pace the chlorine pump with the actual flow of water, keeping chlorination at a constant level.
- A new well (DP4b) has been drilled and is being hooked to the pumphouse and chlorination tanks. Water testing for state approval is the next step.

How Much Water Do We Use Each Month?

The graph below (provided by Ken Clark) shows water use per month over the past three years.



How Much Water Is Enough?

There is no simple answer for this.

The average amount of water used by DSC customers per month during the warm months from May through September is roughly four times the average amount used per month during colder months from October through April. Although we cannot measure irrigation water separately from other uses, it is reasonable to assume that much of this extra is used to maintain landscaping. The total precipitation per year in Steamboat Springs (including snow) is only about 25 inches (<https://www.weather-us.com/en/colorado-usa/steamboat-springs-climate>), and only about 9 inches total falls as rain during the months of May through September (<https://cmg.extension.colostate.edu/Gardennotes/749.pdf>). Our sunlight is intense because air is thinner at 7000 feet, and our summer humidity can occasionally be as low as 10%. For these reasons, we encourage our customers to landscape using plants that are adapted to our hot, dry summer conditions.

For informational purposes, the Federal Government (see https://www.energy.gov/sites/prod/files/2013/10/f3/est_unmetered_landscape_wtr.pdf) has determined that high density landscaping using plants with moderate water requirements growing in areas exposed to intense sunlight should require no more than 14.3 inches of water/ft² for the entire year in Denver, CO or 12.3 in./ft² per year in Laramie, WY (Table 5 in the link above). Steamboat Springs is between these in elevation, so the Denver number, which assumes high-density landscaping in a sunny area, provides a high-side estimate of maximum water needs in our region. Creek Ranch limits irrigated landscaping to 4000 ft², so this much landscaped area should require a maximum of about 57,000 gallons total during the entire irrigating season of May through September. (New landscaping will take more water as plants are becoming established). Deerwood Ranches are allowed by covenant to irrigate 10,000 ft². If you rely on a landscape service to adjust your watering system, please ask that they keep your plants adequately hydrated but not swamped.

The need for water conservation is a growing issue here in the west, and Colorado is not being spared, having been in a drought situation for most of the past 20 years. For more information, and to understand the urgency of our situation, an excellent and up-to-date resource is: <https://www.drought.gov/drought/states/colorado>.

Colorado State University Extension Services offers extensive drought-related information, see: <https://drought.extension.colostate.edu/>

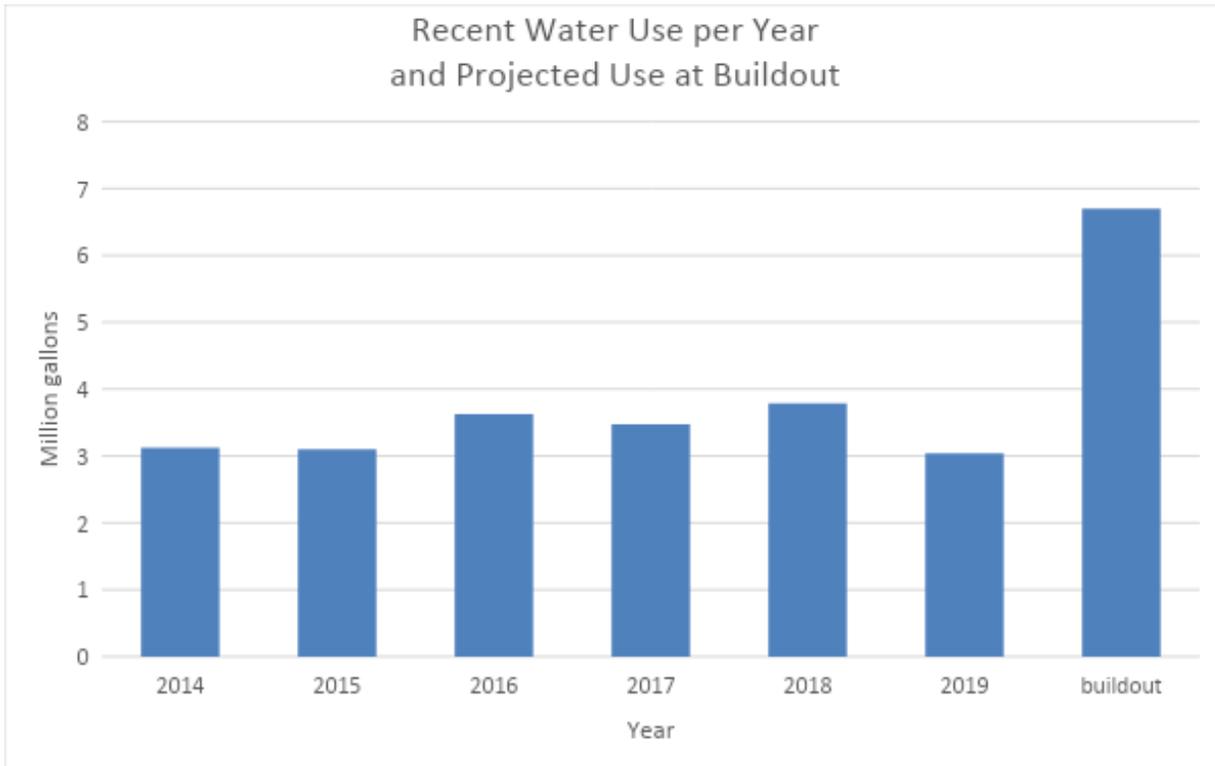
The Mount Werner Water District, which provides water to Steamboat Springs is promoting water conservation through advice in this link: <https://www.mwwater.com/resources/conservation/>

How Much Water Have DSC Customers Been Extracting Annually and How Much Might We Extract at Buildout?

DSC customers have extracted over 3 million gallons per year since 2014, with a high of 3.78 million in 2018 and a low of 3.04 in 2019.

To project water demand at buildout, I have used 2018, a summer of high temperatures and very little rain. In 2018, irrigation demand was high and the average water use per house was roughly 95,000 gal/year. To create a high-end projection of water use at buildout, I've assumed 100,000 gal/lot/yr,

producing a total demand of 6.7 million gals/yr. This projection hopefully accommodates both continuing drought conditions and more full-time residents.



Do we need more storage tank capacity?

Additional storage tanks will not be a high priority as we upgrade the DSC system.

In July, 2018, a year with low rainfall and high temperatures, the storage tanks were not filling fast enough to keep up with demand, a situation which caused residents to question our storage capacity. In fact, this failure was the result of a pump malfunction, not from a lack of storage capacity.

In an unlikely future scenario where both wells were not working, in summer if we restricted water use to September levels (based on 2017-2020 usage of ~16,500 gals/day), our full storage tanks would last us for about 3.5 days while a well was being repaired. During the winter, our full storage tanks would last us over 2 weeks at about 6,000 gals/day. But with our current well being rehabilitated for use as an immediate backup when the new well needs work, we hope that we will not need to restrict water use for the foreseeable future.

Will DSC Ever Limit Water Use?

Although we are making efforts to avoid this, we cannot completely rule out the possibility of future water restrictions.

To date, DSC has never imposed restrictions on water use except in cases of equipment malfunction that caused our residents to rely on stored water (examples are listed below).

July, 2007: A power surge interrupted electrical transmission

Feb., 2009: A lightning strike destroyed the submerged pump motor.

July, 2015: Holes in the galvanized steel water pipe which conducts water from the submerged pump up to the surface allowed much of the pumped water to escape.

July, 2018: Loss of pumping capacity occurred because of a broken O-ring that allowed water to leak from a point near the surface back down between the top of the pipe into the surrounding space between the pipe and the well casing.

July, 2018, (4 days later): A break in the electrical line supplying the submerged pump caused the pump to stop.

July, 2019: The submerged pump failed. Approximately 5 tanker loads of water were purchased and pumped to the storage tanks. The pump was replaced with a used but functional spare.

May, 2020: The submerged pump became clogged with gravel which had entered through holes in the steel casing. The pump was replaced with a new spare. This was a sudden failure and the tanks were not filled to capacity at the time. With no backup well, tanker loads of water had to be brought in.

With the new well online and our current well rehabilitated to serve as an immediate backup, we are unlikely to be forced to rely solely on stored water for the foreseeable future. However, both wells tap the same aquifer, and at some future time we may discover that irrigation demands are becoming unsustainable, for example due to increasing drought and/or additional permanent residents. Unsustainable water use would cause the water level in our well to drop further each year. Fortunately, our new water level monitoring system will allow us to keep careful track of this. If the level falls consistently, DSC would have only two options, both undesirable: limit water consumption or seek an additional water source.

The monetary, logistic, and legal consequences of exploring for a new water source are enormous and impossible to predict. In addition, there is no guarantee that drilling for a new well would be successful; note that DP4 was the fourth attempt on the part of DSC developers to find water.

The augmentation plan summary section below provides a sample of the complexity of obtaining and retaining water rights in Colorado. Water allocation here is regulated by a convoluted, archaic, and arcane system that was never designed to serve our present population and our ongoing drought conditions. The website: https://www.colorado.gov/pacific/sites/default/files/wellpermitguide_1.pdf provides the best explanation of Colorado water rights for the lay person that I have found. It describes augmentation plans on pg. 12.

Thus, maintaining the water supply in our current aquifer is extremely important. The DSC Board has worked diligently to produce a sliding fee for water consumption whose purpose is to encourage water conservation in order to protect our aquifer and avoid future restrictions or the need to find another water source.

What is the Augmentation Plan Negotiated by DSC?

After years of negotiation between our water lawyer and the District Water Court, DSC now has a legal augmentation plan in place (available on our website). This augmentation plan is based on the assumption that DSC's well (DP4) depletes Trout Creek. A detailed hydrological survey revealed that this is a possibility. This augmentation plan describes DSC's legal obligation to augment Trout Creek with water from our storage structures if a "call" is made by a downstream user with senior water rights (DSC's water rights for DP4 are from 1994, and thus very junior).

The plan addresses the objections to DSC being granted absolute water rights to specific sources, primarily DP4. These objections were filed by Twentymile Coal, LLC, which has senior water rights in Trout Creek downstream of DP4, and also by the Colorado Water Conservation Board (CWCB) which has senior rights to a 5 cubic foot per second (CFS) instream flow in Trout Creek to protect fish and wildlife.

Our storage structures for augmentation water are Deerwood Pond and Whetstone Reservoir. In the case of a call on Trout Creek from a senior downstream user, DSC will release water from storage into Trout Creek (*via* Whetstone Creek) in an amount equal to the amount that DSC is withdrawing from DP4 at that time. This release of water from storage will continue until the call ends.

This Augmentation Plan Court Decree legally protects us from being required to curtail domestic plus horse water use in the event of a call on the water in Trout Creek made by any downstream entity with senior water rights. However, in extreme circumstances, such as a multiyear severe drought, we may need to reduce, or possibly even forbid, outdoor irrigation of lawns and other landscaping.

A "call" can be placed by downstream entities with senior water rights if the amount of water reaching them is below the amount to which they have a legal right. When a call is placed, the stream/river is described as "under administration" by the Division Water Engineer. This requires upstream users with more junior water rights to compensate for any water that their wells or irrigation ditches might be diverting from Trout Creek. In 2018, we completely drained Whetstone Reservoir in response to a call on Trout Creek from landowners with rights senior to ours.

Our mitigation agreement with the Colorado Water Conservation Board (CWCB) stipulates that domestic (in house) use not exceed 80 gal/person/day; this is described as "capped demand". In practice, this will be averaged over all households, some of which are empty for part of the year. However, this is useful information because it tells us that a household of 3 (with no horses) is using excessive quantities of water if it exceeds 7200 gal/month during non-irrigating months.

As part of the Augmentation Plan, the CWCB has agreed to an "Injury with Mitigation" plan, instead of direct water release. This is because DSC can release water into Trout Creek only *via* Whetstone Creek, which is downstream of the point at which the geological engineers determined that depletion might occur. Therefore, DSC cannot compensate for reduced flows in Trout Creek between these two points. "Mitigation" refers to an improvement of the wildlife habitat in and along Trout Creek that is done to compensate for a possible decreased flow ("injury") caused by our use of DP4. This plan stipulated two projects along Trout Creek in Creek Ranch which were completed late in 2011 by Billy Chase. The plan requires that these improvements be maintained by Creek Ranch, which derives recreational benefits from Trout Creek.

Why Do Owners of Lots without Houses Need to Pay Assessment Fees?

Assessments by DSC have covered unanticipated expenditures necessary to keep the system running. A functioning water system is essential to maintain the property value of empty lots which would be essentially unsalable without this amenity. The total assessments charged by DSC have been lower than tap fees levied by some other developments with their own water systems. For example, when a new home is hooked to its water system and Sidney Peak Ranch charges \$7800. DSC does not charge any tap fees.

What is the Quality of our Well Water?

Our well produces very safe but "hard" water. To reach our aquifer, our well water has percolated through hundreds of feet of rock, dissolving minerals from this rock as it travels. DSC well water is classified by the EPA as "very hard". (Steamboat Springs, in contrast gets most of its water from Fish Creek, which has far lower levels of minerals). "Hardness" refers to two minerals: calcium and magnesium, dissolved in the water. These natural minerals are not harmful to health, but leave almost insoluble deposits (scale) inside pipes and on water fixtures (or kitchen pans). It is not feasible for DSC to soften well water before it is distributed to homes.

To protect plumbing and avoid these deposits, most residences served by DSC have water softeners for indoor water (but not for outdoor irrigation). "Softening" replaces the calcium and magnesium in the well water with sodium or potassium (depending on which type of salt you purchase). These salts are far more soluble and do not form scale in pipes. Softened water will still leave white deposits wherever it evaporates (kitchenware, counters, faucets, etc.) but these deposits are far more soluble than those left by hard water.

After travelling through your home water softener, the water may not taste as good as purified water. To produce better tasting water for drinking or salt-free water for use in humidifiers, people may install a "reverse osmosis (RO)" system that produces extremely pure water from the pre-softened water flowing into it. However, this level of purification is not important for most uses, and each gallon of water purified by typical home reverse osmosis units consumes 3-10 gallons of softened well water.

Two excellent sources of information on hard water are:

<https://water-research.net/index.php/water-treatment/tools/hard-water-hardness>
and <https://water-research.net/index.php/water-treatment/tools/hard-water-hardness>.

Our well water is evaluated regularly in accordance with State and Federal regulations. The Water Quality Report and a list of substances tested is available on our website. Simple test kits for hardness are readily available online.

Terry Audesirk, Chair
DSC Board of Managers
June 11th, 2020