

# PHYSICAL AND LEGAL INFLUENCES ON TRIBUTARY GROUNDWATER

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Water division 1

# THE PROBLEM:

Ground water has been a hot item in the news.

A rising water table is being blamed for water in basements and boggy conditions in fields. Legislation has even been proposed to try to deal with it.

Has this happened before?

Why is it rising?

# SUMMARY OF THE PRESENTATION

In this presentation we will look at influences on the ground water levels (also known as the water table) from the time settlers and miners arrived in Colorado to the present.

We will see that: (1) physical, and (2) legal events have played a part in the rise and fall of ground water levels.

# The Geologic Setting

As described by the Colorado Supreme Court in Fellhauer v. People, 447 P.2d 986 (Colo. 1968)

During the millions of years of its history the river has cut into and eroded away the formations, principally shales, over which it has flowed. Through long passages of time its course has changed back and forth. The result has been the creation of a trough filled with sand and gravel over a portion of which the river flows. With some simplification, it may be said that this body of sand and gravel, filled with slowly moving water, is the alluvium. . . .

## The Geologic Setting (cont.)

. . . The alluvium is of varying widths and depths. At one point it was shown to be 3.4 miles wide, and at another 1.84 miles. In one area the depth of this sand and gravel is 34 feet, and in another 20 feet. The testimony was that between Pueblo and the Kansas line, a distance of 150 miles, it contains around 1,900,000 acre-feet of ground water. This water moves at the rate of 3 to 5 feet each 24 hours. As is the case of the surface water, it flows downstream. However, it also tends to flow toward the stream from each side, the extent of this being dependent upon proximity to the river, grade, geological conditions and other factors.

Colorado Supreme Court in Fellhauer v. People, 447 P.2d 986 (Colo. 1968)

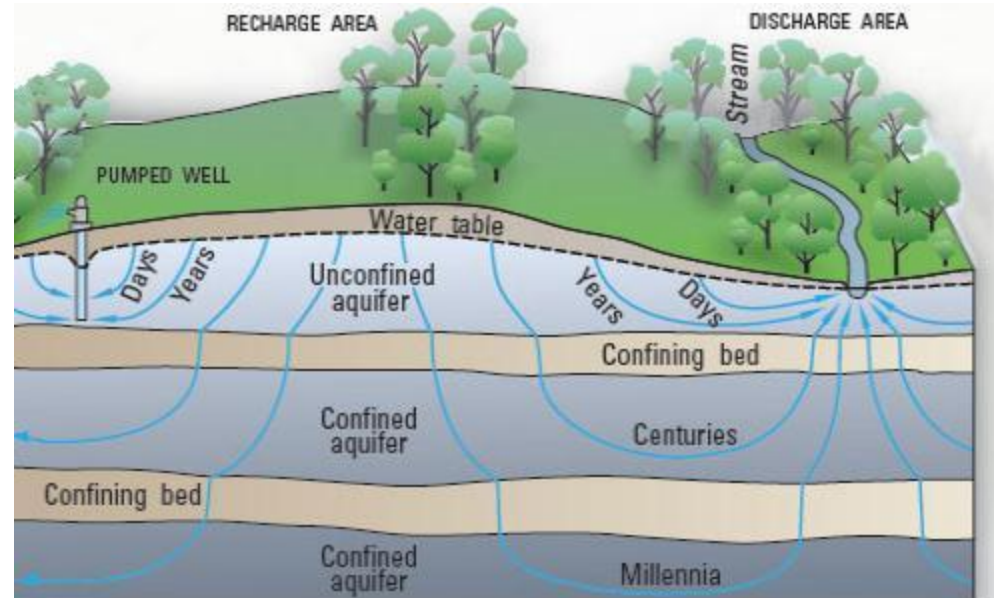
# An example of ground water movement

Assume that an irrigated field is located  $\frac{1}{4}$  mile (or 1320 feet) from the river, and that water moves through the alluvium at 3 feet per day.

$1320 \text{ feet} \div 3 \text{ feet per day} = 440 \text{ days}$ . In other words it will take 1 year and 75 days for the water to travel the distance from the field to the river

Therefore, return flow from May irrigation will reach the river in mid July of the following year.

This “*re-timing*” of flow contributes to increased flow in the river in the dry months.



# Irrigation causes the water table to rise

Placing water on the ground faster than the water can travel through the soil raises the water table.

**This includes:**

Seepage from ditches, canals, and reservoirs,  
Irrigation return flows, large  
precipitation events and cyclical wet  
patterns.



Our time line begins before the arrival of settlers. . .

The flow in the river during this period was determined by spring runoff, precipitation, and groundwater when the gradient is toward the river.





## With the arrival of settlers and irrigation . . .

The water table rose in response to irrigation, ditch, and reservoir seepage.

**Irrigation return flows** altered the timing of flow in the river, making water available for irrigation all summer. This resulted in reliable flow further down stream available for agricultural development.

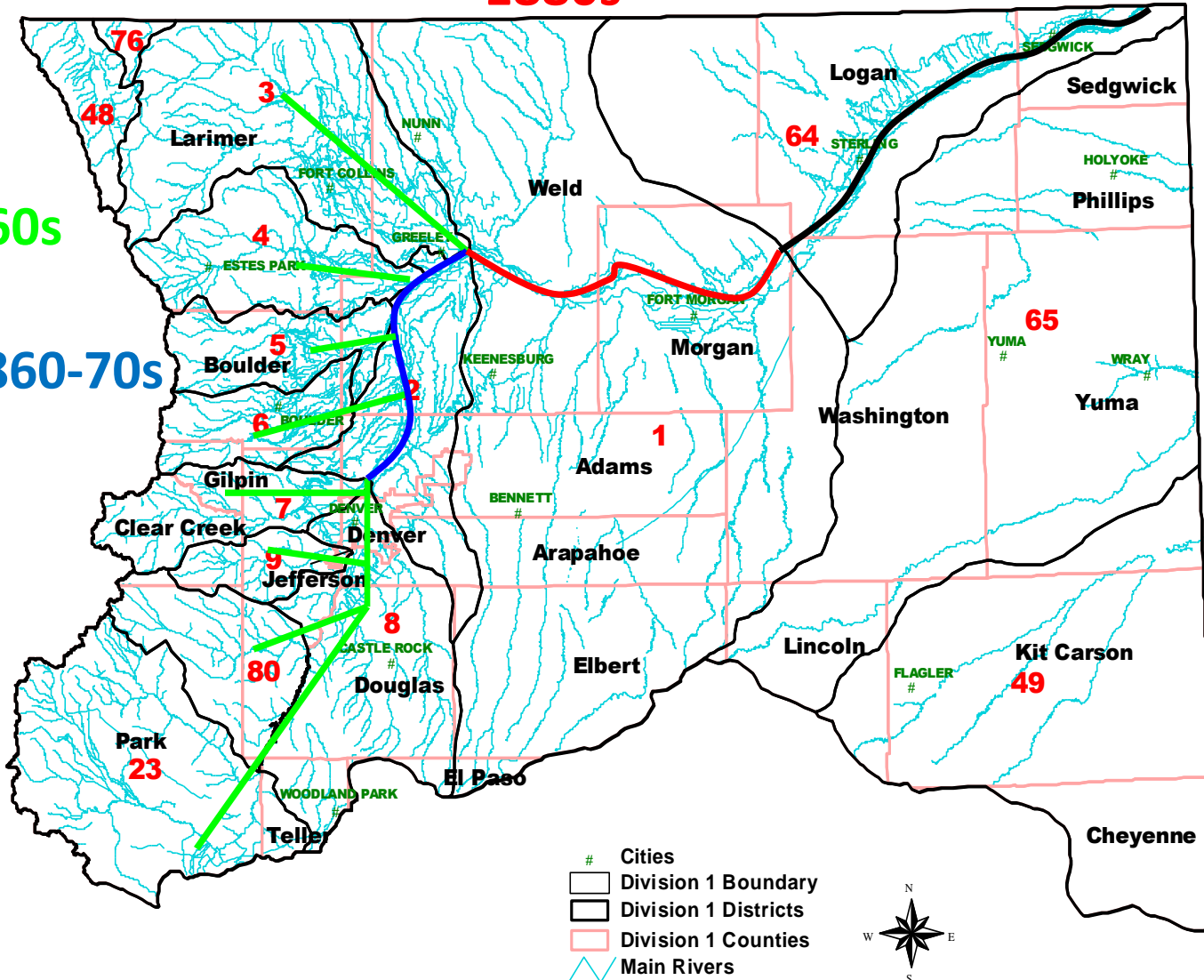
Before well use began, the water table was generally much higher than it was under natural conditions.

1880s

1880- 90s

1860s

1860-70s



SENIOR



JUNIOR

## The prior appropriation doctrine is adopted in Colorado

Colorado Constitution, 1876, recognizes prior appropriation doctrine.

Article XVI, Section 6. Priority of appropriation shall give the better right as between those using the water for the same purpose

Coffin v. Left Hand Ditch

Coffin v. Left Hand Ditch Co., 6 Colo. 443 (1882). The first appropriator of water from a natural stream for a beneficial purpose has, with the qualifications contained in the constitution, a prior right thereto, to the extent of appropriation. . . . The territorial legislature in 1864 recognized the doctrine of prior appropriation.

# Wells

A description of how the groundwater responds to well pumping.  
(from *Fellhauer v. People*, 447 P.2d 986 (1968))

When water is pumped from a well a **cone of depression** is formed. This causes surrounding water in the aquifer to flow into the cone from all sides. The effect of this diversion upon the visible stream is usually not immediate.

The time that the stream begins to be affected and the extent of the effect depends upon a number of factors, including

- (a) distance of the well from the stream,
- (b)** transmissibility of the aquifer,
- (c)** depth of the well,
- (d)** time and volume of pumping, and
- (e)** return flow characteristics.

## Ground water is presumed to be tributary to the stream system

Safranek v. Town of Limon, 228 P.2d 975 (Colo. 1951).

Under our Colorado law, it is the presumption that all ground water so situated finds its way to the stream in the watershed of which it lies, is tributary thereto, and subject to appropriation as part of the waters of the stream.. . . And as to all such waters the law is definitely settled that the doctrine of priority of appropriation as established by the Colorado Constitution and the subsequent statutes enacted in aid thereof, applied to such waters to the same extent and with the same force and affect as it did to the surface water of the stream: that is, first in time, first in right.

# Why is prior appropriation different when comparing the priority of a well to a priority of a surface diversion?

A diversion of water can occur when the water right is in priority or under free river conditions. **For surface water rights, the effect of a diversion is immediate.** The depletion to the river occurs at the time the diversion is made.

But **for wells, the depletion seen by surface rights is delayed by the number of days it takes for the depletion to reach the river.** So, well user must be able to predict the future to know whether the well depletion is in priority when it reaches the river. Hence, the requirement that wells must be in augmentation plans or SWSPs before being allowed to pump.

## Large scale well use begins

Felhauer v. People, 447 P.2d 986 (1968)

In 1940 only 2,000 acre feet were being pumped from wells in the Arkansas Valley. Then came the drilling of wells on a vastly larger scale, being possible because electricity had been made available. By 1964 between 230,000 and 240,000 acre feet of water were being pumped annually from wells in this valley between Pueblo and the state line. By 1966 there were between 1,600 and 1,900 wells in the Arkansas Valley.

# DEVELOPMENT OF WELLS IN THE PLATTE VALLEY

As early as the 1890's, farmers began to use groundwater to supplement diversions.

There were about 250 wells in the Platte Valley by 1933

There were about 3200 wells in the Platte Valley by 1970.

Of the 1.4 million a-f diverted annually for irrigation twixt 1947 and 1970, groundwater supplied about 420,000 a-f, about 30%.

By 2002, there were about 8,200 high capacity wells in the Valley, pumping about 500,000 a-f annually

Groundwater development proceeded without control until the mid 1960's



## Large scale well use increases to the point that the holders of senior surface rights are injured

While irrigation above the peripheral alluvium has increased substantially the amount of ground water, it is implicit in the trial court's findings and supported by evidence that the removal of ground water through wells, mostly unadjudicated, has materially and injuriously affected senior decreed rights. It certainly must follow that, if the amount of water pumped increases three or fourfold, further injury will result to senior users.

## Fellhauer v. People confirms the authority of the State Engineer to curtail out of priority diversions by wells

The Fellhauer well was drilled in 1935. At the time it was drilled, it was about ¼ mile from the bank of the Arkansas. On June 24, 1966 there was not sufficient water in the river to fill the adjudicated rights of downstream users having priority dates as early as 1887; and they desired more water. On that date the division engineer notified the defendant to cease pumping until further notice. The defendant, asserting that the 1965 act was unconstitutional, refused to comply with the order. The SEO sued to enforce the curtailment order.

The Supreme Court confirmed the authority of the SEO to administer wells.

# The 1969 Water Rights Determination Act

## Plans for augmentation

In Fellhauer, Justice Groves coined the phrase ***“maximum utilization”*** in connection with the tension between well users and the owners of senior surface water rights.

It is implicit in these constitutional provisions that, along with Vested rights, there shall be Maximum utilization of the water of this state. As administration of water approaches its second century the curtain is opening upon the new drama of Maximum utilization and how constitutionally that doctrine can be integrated into the law of Vested rights.

The legislature created in the 1969 Act the plan for augmentation as a method of implementing the mandate of maximum utilization.

# Augmentation plans operating under State Engineer approval

Organizations such as the Groundwater Appropriators of the South Platte (GASP) operated unadjudicated plans for augmentation. By 1972, 4,000 wells in the South Platte River Basin had come under GASP's umbrella.

GASP operated through a mechanism often referred to as “call management.” The SEO would anticipate which senior appropriators were most likely to put a call on the river. The SEO would then request that GASP provide replacement water in the amount of the anticipated call. This would remove the call from the river, thereby enabling junior appropriators, like GASP's members, to continue using their out-of-priority wells.

GASP describes these wells as “retiming wells”, where the water from the retiming wells is supposed to “beat” the depletions caused by the other wells in the race to impact the river in some way.

## Empire Lodge v. Moyer. No more SWSPs without a pending plan for augmentation in Water Court

Empire Lodge HOA v. Moyer, 39 P. 3d 1139 (Colo. 2001). Empire was diverting water out of priority from Empire Creek to fill ponds. The SSP delivered water from Twin Lakes into the Arkansas River, but Moyer took water out of Empire Creek above the point of replacement. Moyer sued to enjoin Empire's diversions without an adjudicated aug plan.

This case marked the end of SEO approval of SSPs without a pending aug plan. This case also signaled the end of GASP and other unadjudicated well user organizations.

## Curtailment of wells

After Empire Lodge, the legislature enacted §37-92-308(4), requiring that an application for approval of a plan for augmentation must be filed in court before a substitute water supply plan (“SWSP”) can be approved by the SEO.

1. Curtailment of un or under augmented wells increased.
2. Restoration of the water table to pre-well elevation begins.
3. Water table elevations are now probably higher than they have been since the 1940's.

# CONCLUSION

- Colorado's ground water resources have changed over time in response to irrigation and well pumping
- It is easy to look at the current "high" ground water table as a "new" problem. Curtailment of un or under augmented wells and a cyclical wet pattern is restoring ground water to its pre-pumping levels.
- Ground water is a public resource. It is subject to prior appropriation. Action taken with respect to ground water must respect the doctrine of prior appropriation.

# RESOURCES

- Colorado Constitution
- *Fellhauer v. People*, 447 P.2d 986 (Colo. 1968)
- *Empire Lodge v. Moyer*, 39 P.3d 1139 (Colo. 2001)
- *Safranek v. Town of Limon*, 228 P.2d 975 (Colo. 1951)
- Colorado's Law of Underground Water: A Look at the South Platte Basin and Beyond, 59 U. Colo. L. Rev. 579
- The Last GASP: The Conflict Over Management of Replacement Water in the South Platte River Basin, 75 U. Colo. L. Rev. 597
- *Kobobel v. State of Colorado*, 10SA92, (Colo. 2011)



## SOME ADDITIONAL FACTS

- As of August, 2010, 3,700 out of 8,200 wells that were permitted to withdraw water from the South Platte alluvium in 2002 were not enrolled in any court augmentation plan and have been completely curtailed. Kobobel v. State of Colorado, 10SA92, (Colo. 2011)
- Legislation in 1957 required that new wells be permitted
- In 1957 the legislature directed the SEO to “execute and administer the laws of the state relative to the distribution of the surface waters of the state including the underground water tributary thereto in accordance with the right of priority of appropriation