Colorado Ground Water Management

Integrating Ground Water and Surface Water Administration

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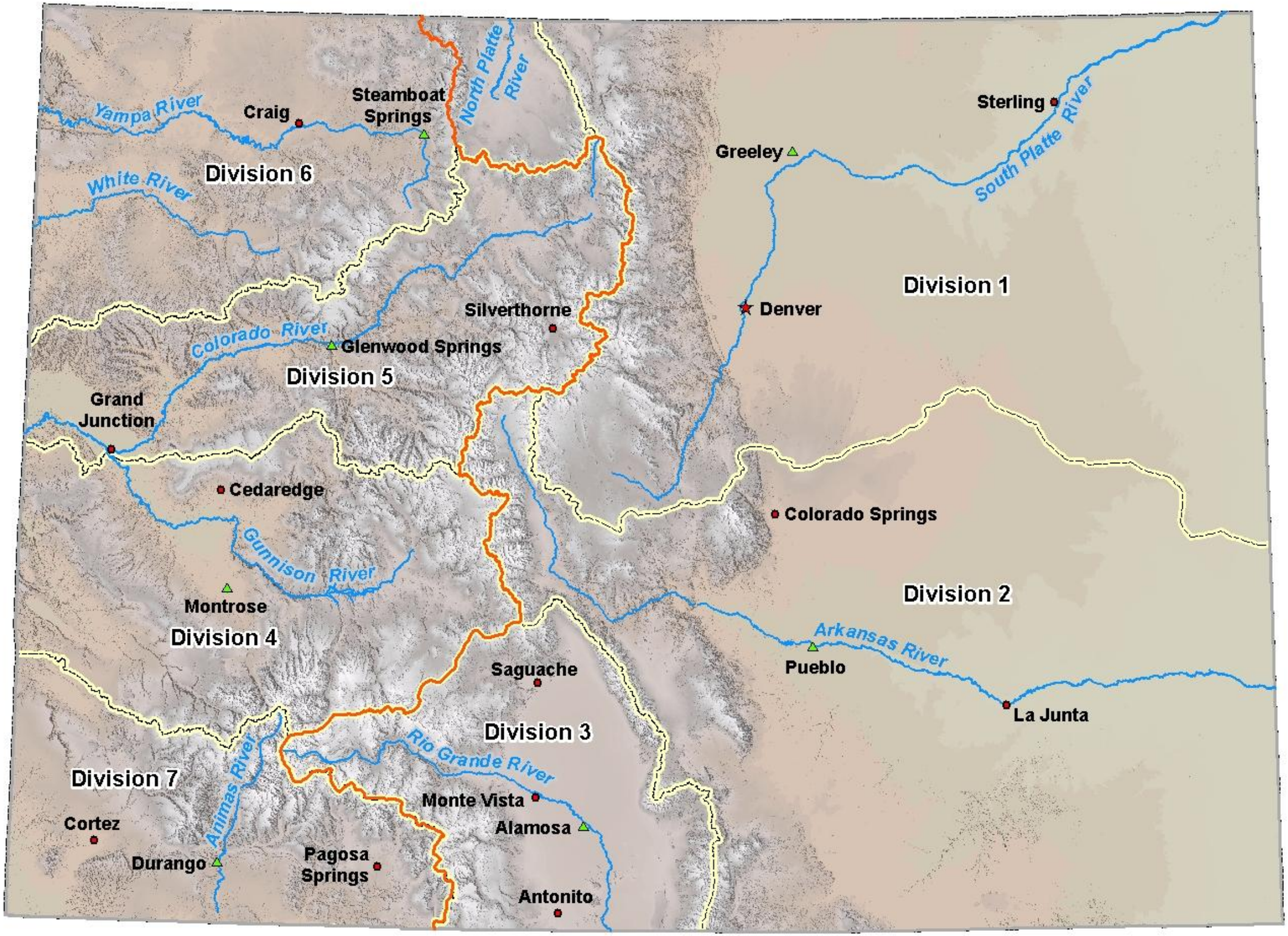
COLORADO
Department of Natural Resources


Yampa River
Craig
Steamboat Springs
North Platte River
Sterling
South Platte River
Greeley
White River
Division 6
Division 1
Silverthorne
Denver
Colorado River
Glenwood Springs
Division 5
Grand Junction
Cedaredge
Colorado Springs
Gunnison River
Montrose
Division 4
Division 2
Arkansas River
Pueblo
Saguache
La Junta
Division 3
Rio Grande River
Division 7
Animas River
Monte Vista
Alamosa
Cortez
Durango
Pagosa Springs
Antonito

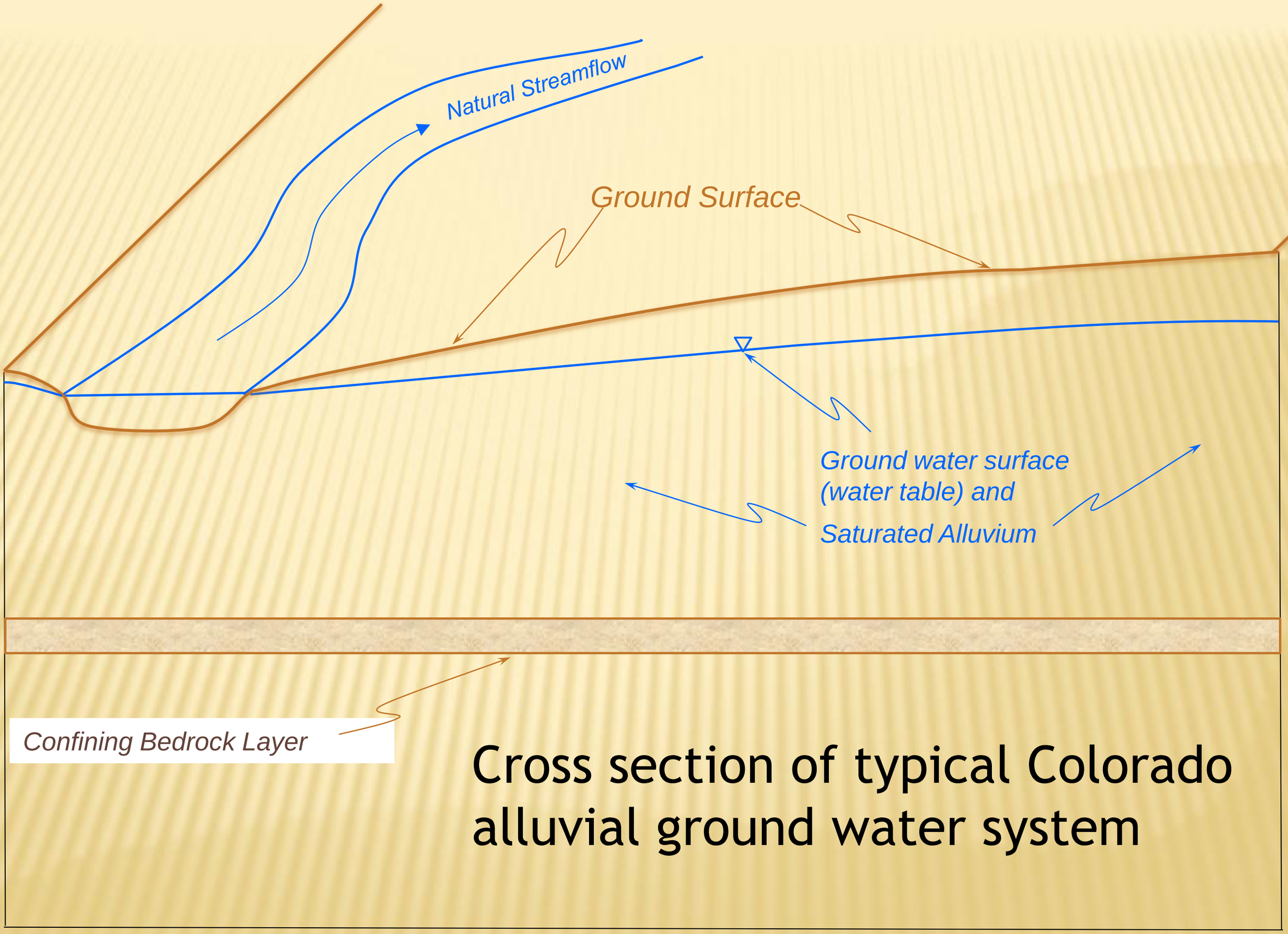
Summary

- Colorado case law recognizes that pumping ground water impacts surface water,
- When that impact occurs in an over-appropriated basin the depletion to the surface water is legally presumed to injure surface water rights,
- Colorado case law and statutory law require that pumping depletion be replaced by a substitute supply through a *plan for augmentation*.

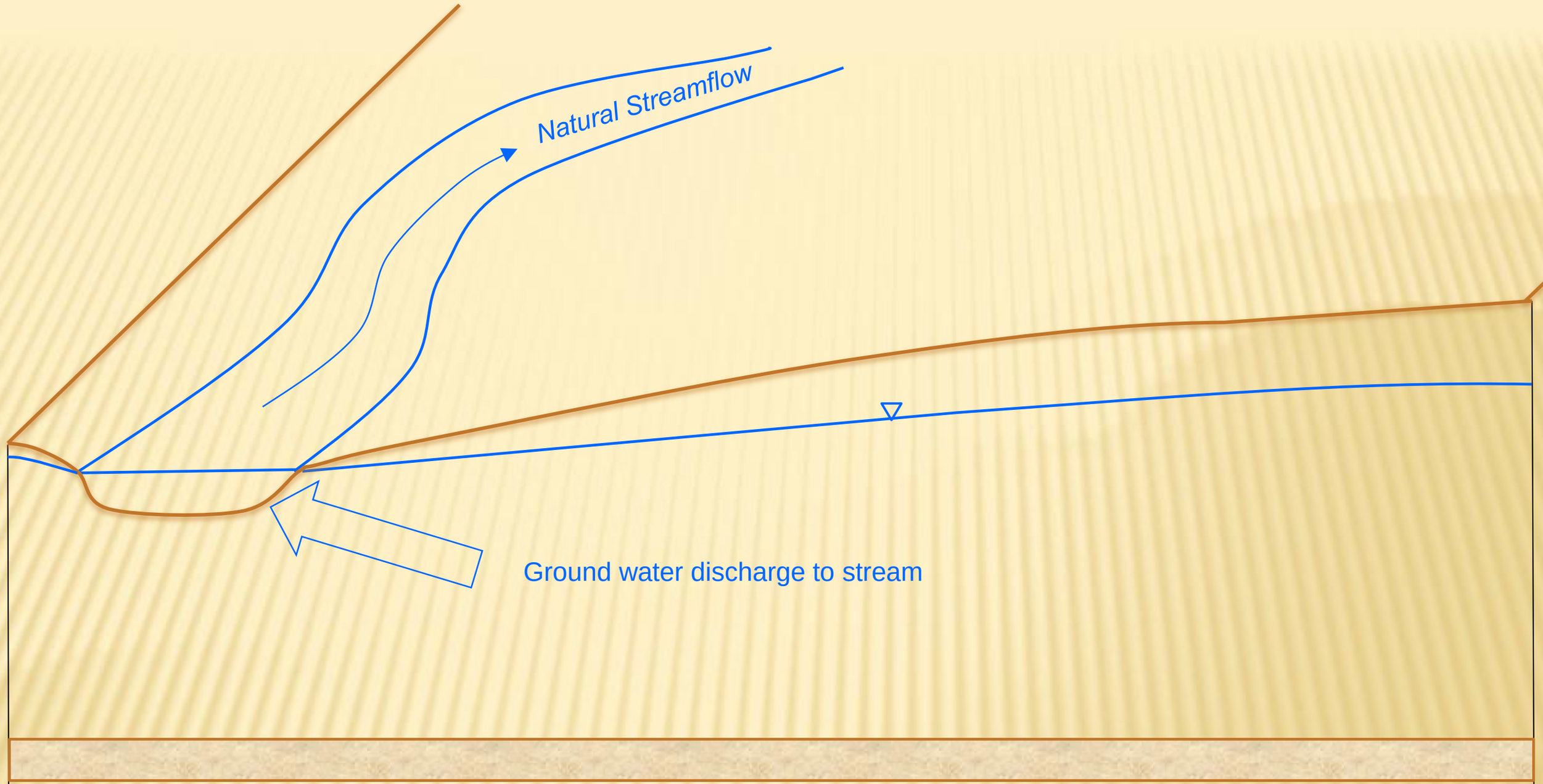
Ground Water Pumping, Depletion of Surface Water

- Major rivers and streams are gaining
- Pumping impacts the ground water level, reduces stream flow

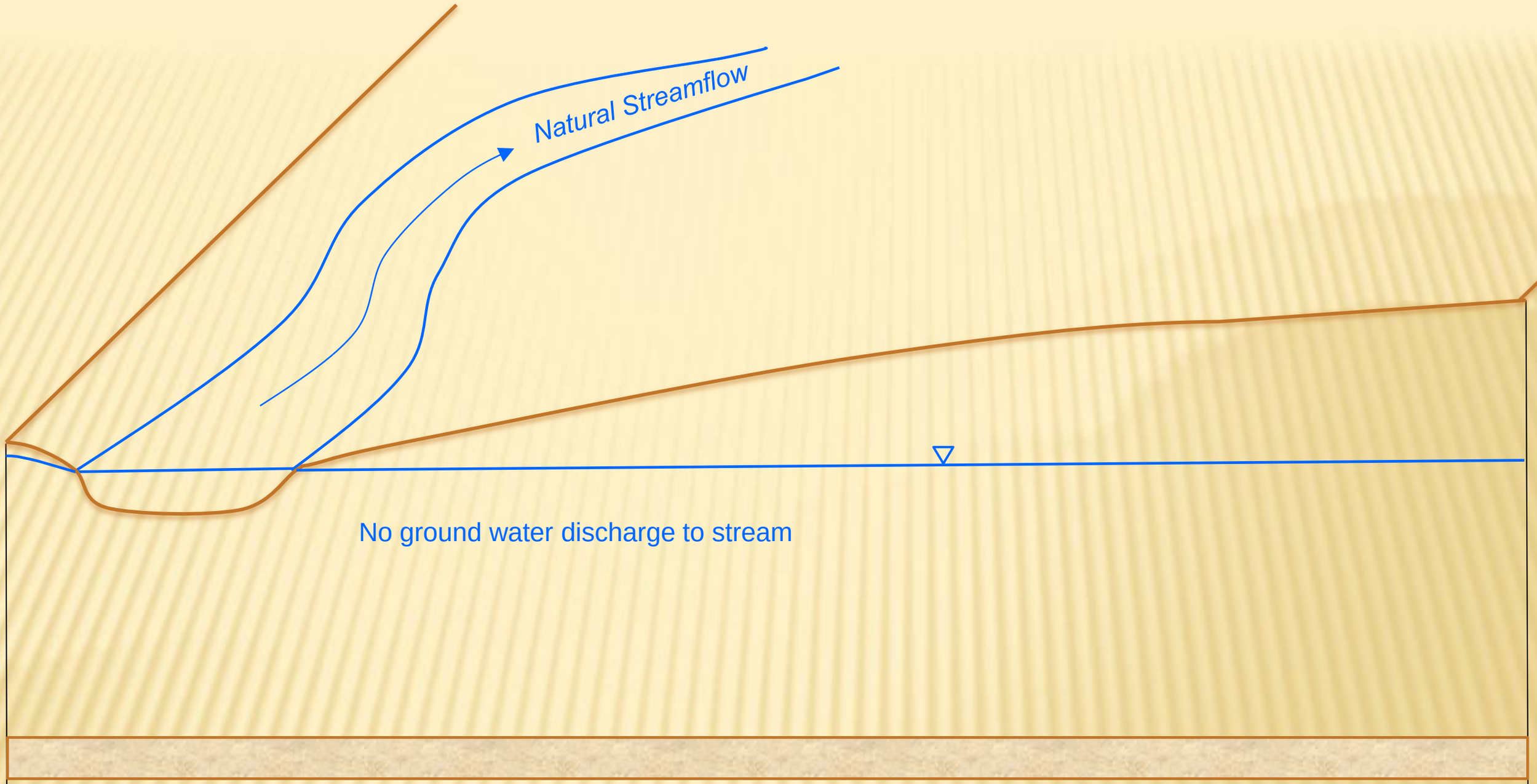
Look at idealized example…



Cross section of typical Colorado alluvial ground water system



- Constant discharge to the stream
- Increases and decreases with hydraulic gradient



- Ground water/surface water equilibrium
- Discharge to stream would diminish and finally stop.

Brief Administration History

- Ground water management formally became an Administrative issue in Colorado in the 1960's, but
- First consider early development in river basins
  - Surface water use developed pre-20th century, quickly causing over-appropriation
  - Ground water use developed mostly in 1930's through 1950's

Brief Administration History

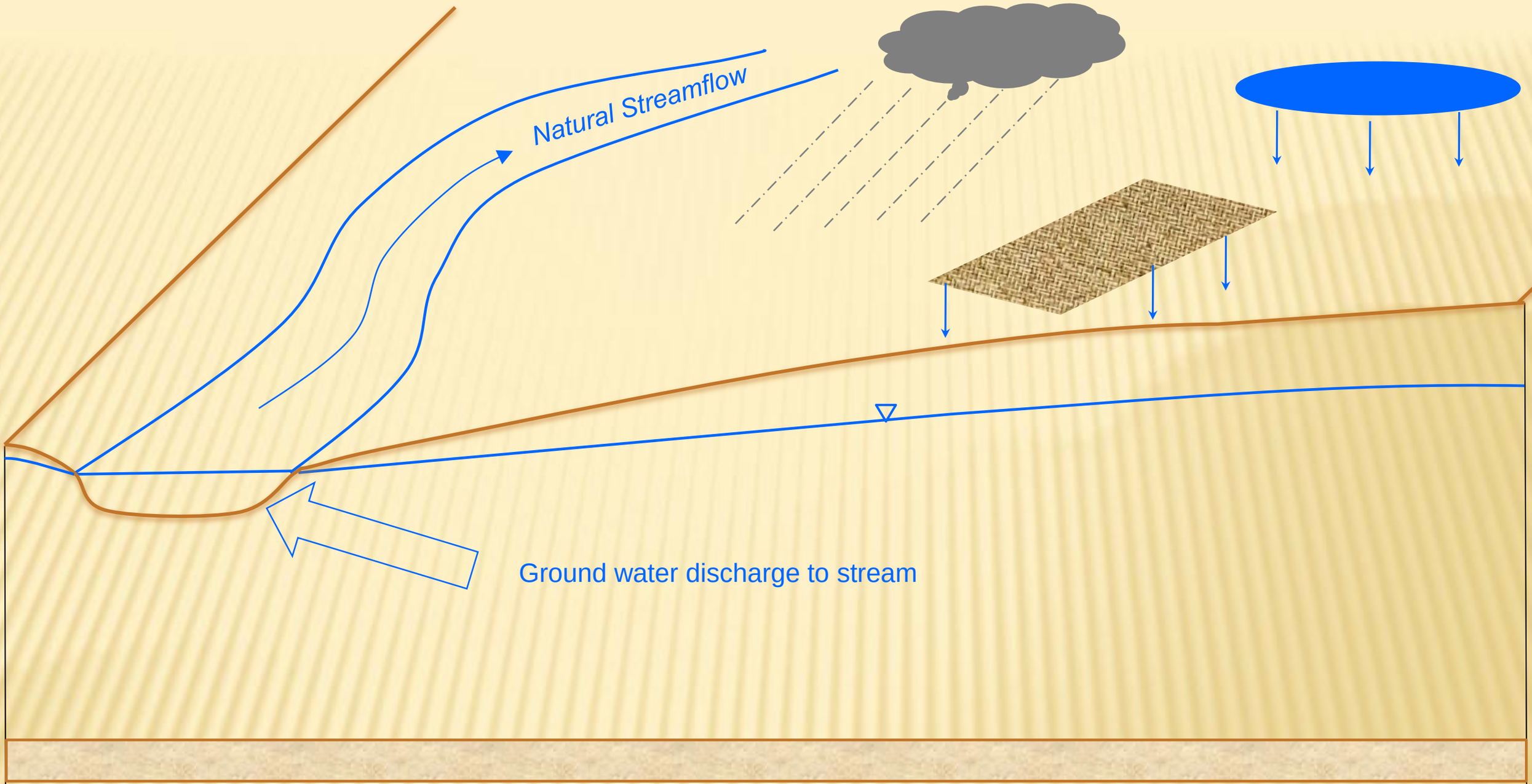
- Surface water/ground water
  - Early 1900's court recognition of ground water interaction with surface water,
  - 1929, and then 1951, Colorado Supreme Court stated clearly that all ground water was assumed to be tributary to natural streams, absent proof to the contrary.

Brief Administration History

- Surface water/ground water
  - In 1965, the Colorado General Assembly passed House Bill 1066 and enacted the Colorado Ground Water Management Act (**“1965 Act”**),
  - Gave the State Engineer the authority to evaluate the use of ground water and deny a well permit if it would result in injury.

Brief Administration History

- Surface water/ground water
  - In 1969, the Colorado General Assembly enacted the Water Rights Determination and Administration Act (**“1969 Act”**),
  - Reinforced recognition of the connection between ground water and surface water,
  - Integrated ground water into the priority system – introduced the concept of **plans for augmentation**.

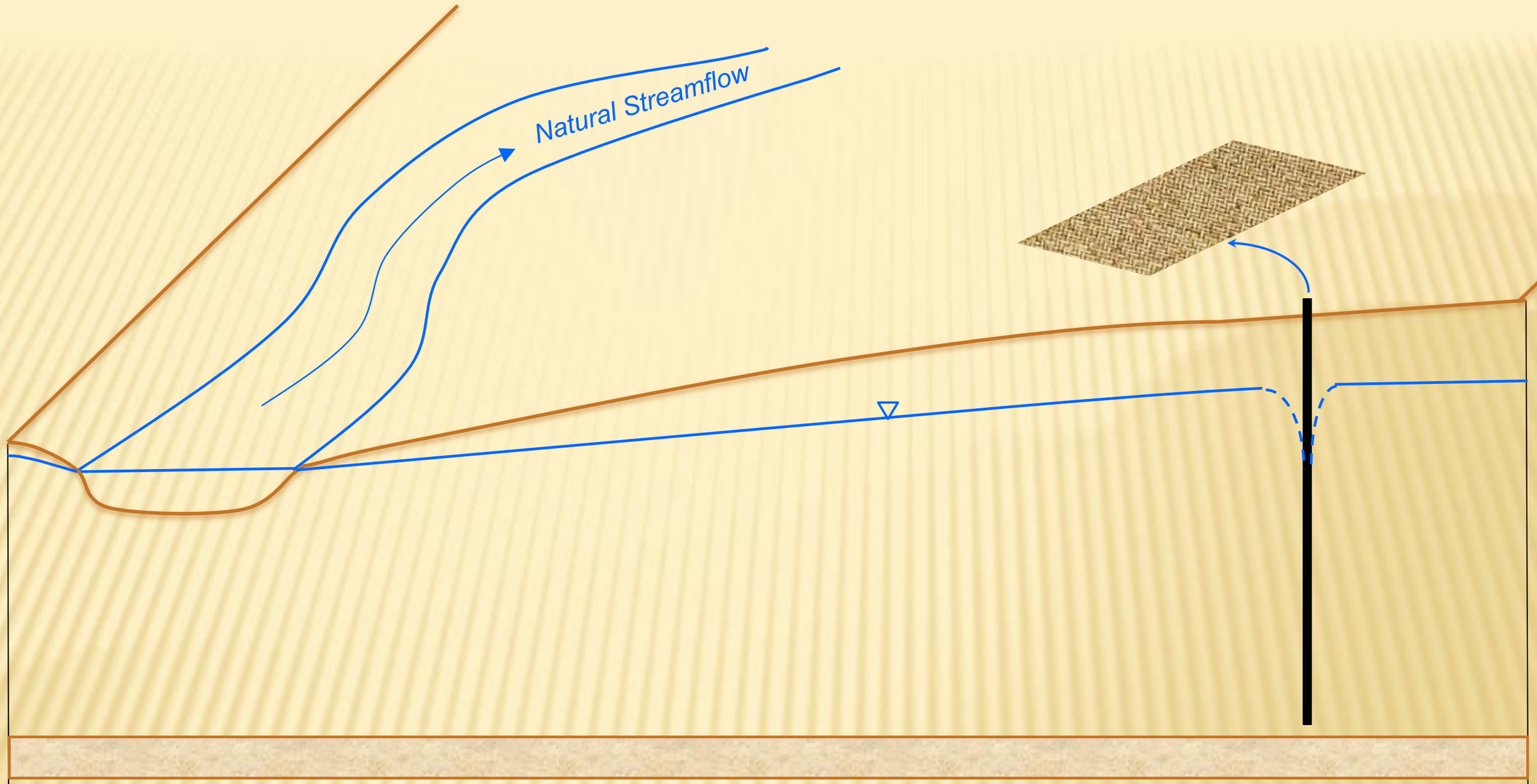


Constant discharge depleted the aquifer, however, due to influences like:

- Recharge from precipitation,
- ditch, pond, and reservoir seepage,
- and deep percolation from irrigation,

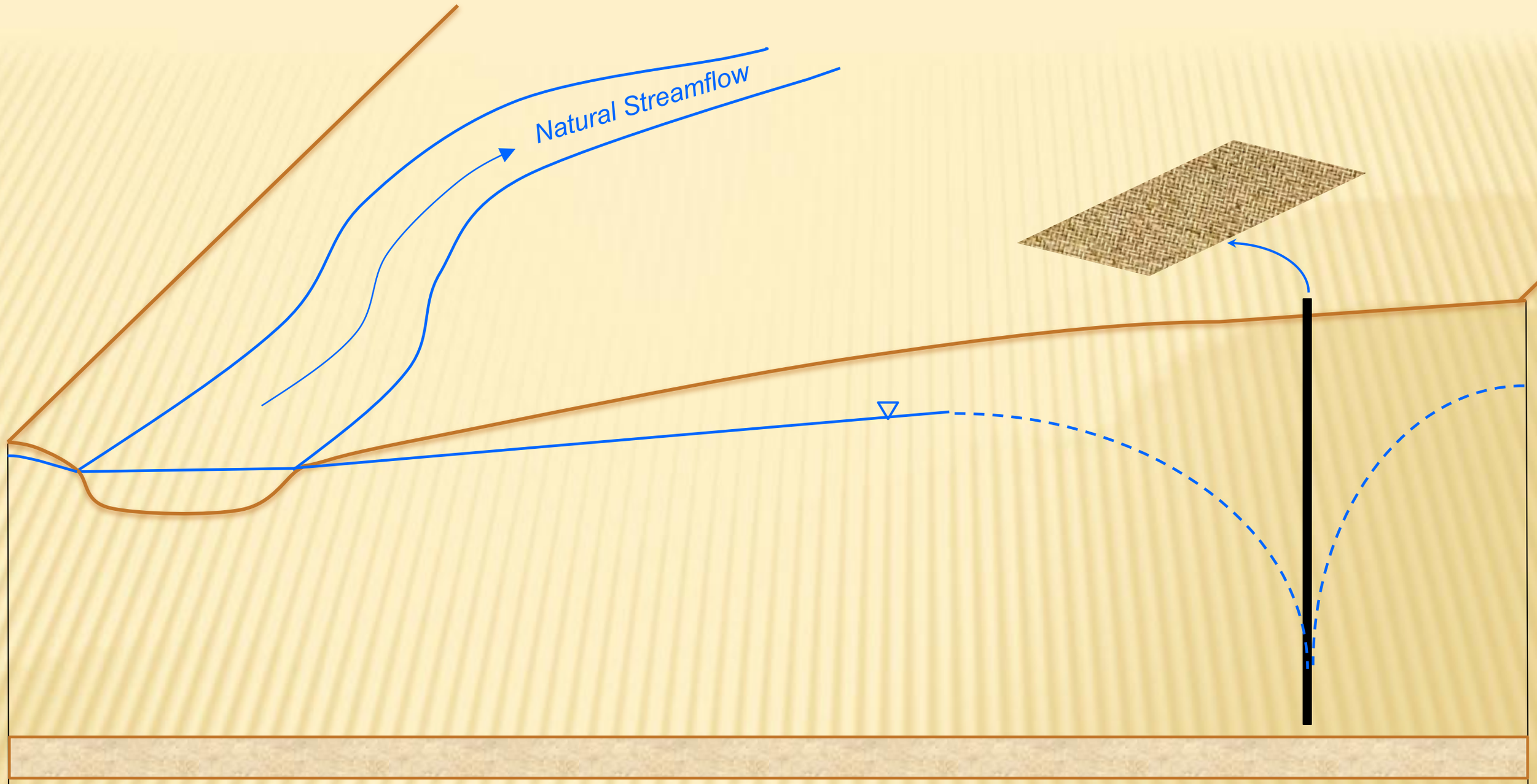
the water table remains,

Ground Water Administration

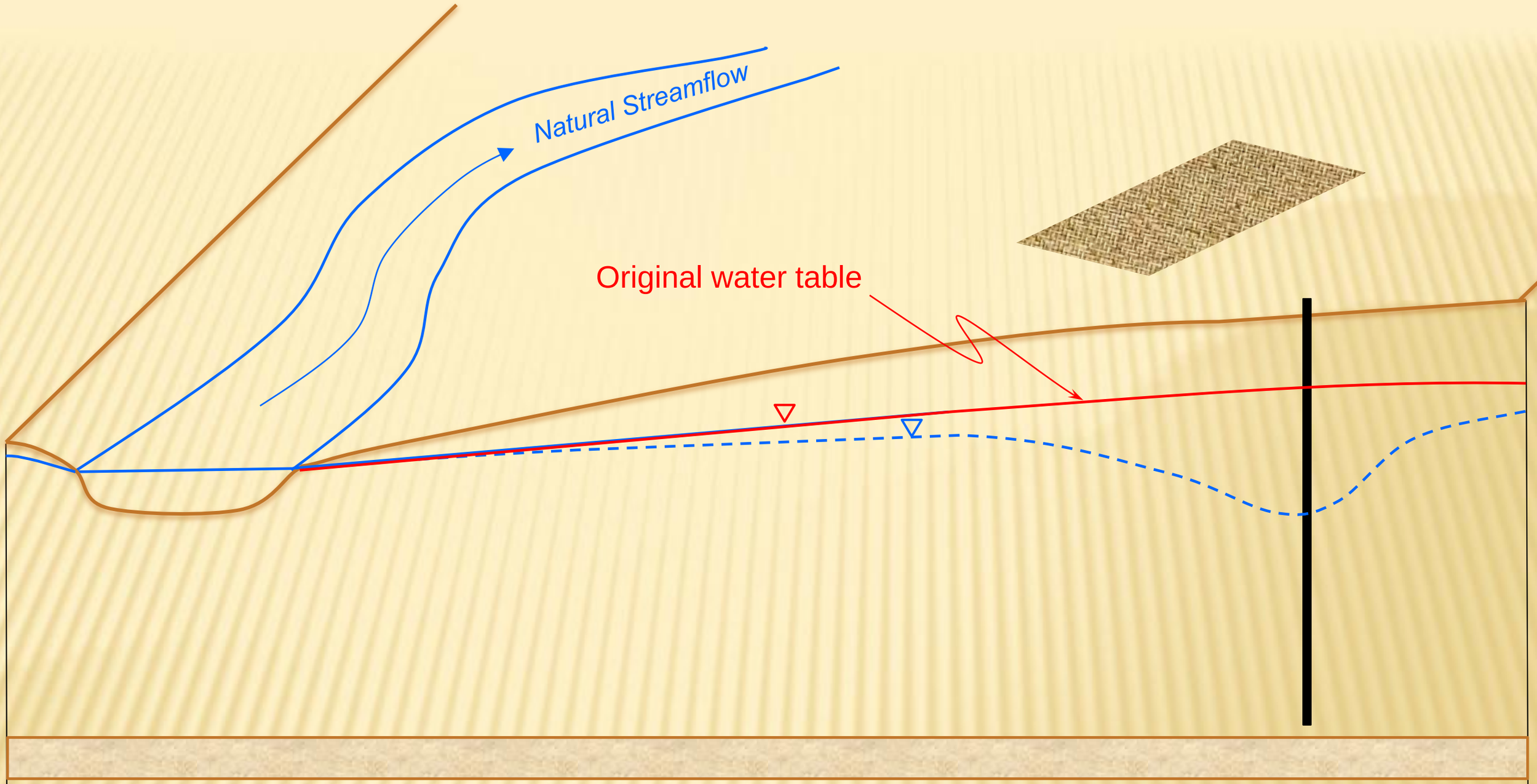


Now, consider an irrigation well at a distance from the stream.

- Pumping begins

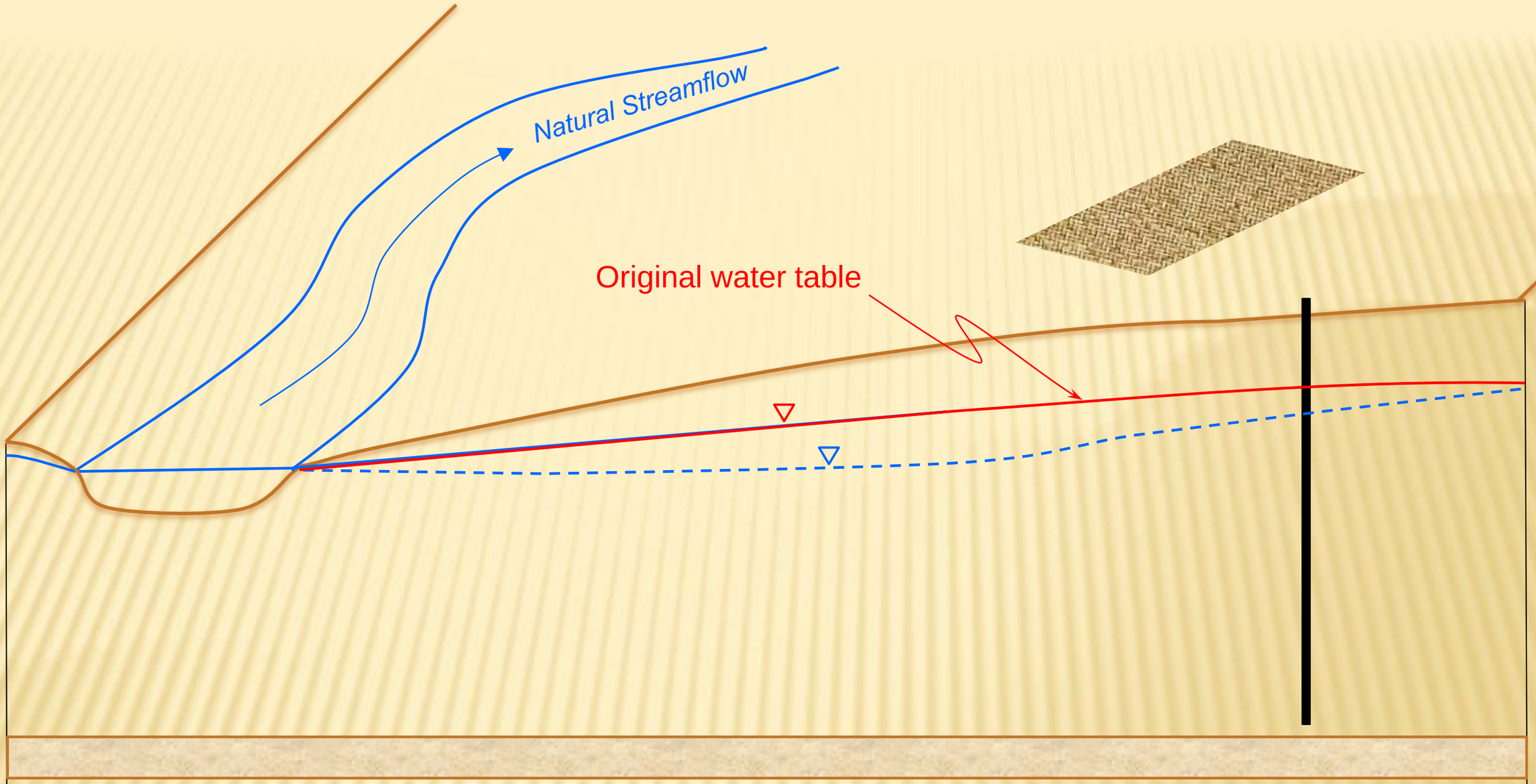


- Pumping continues

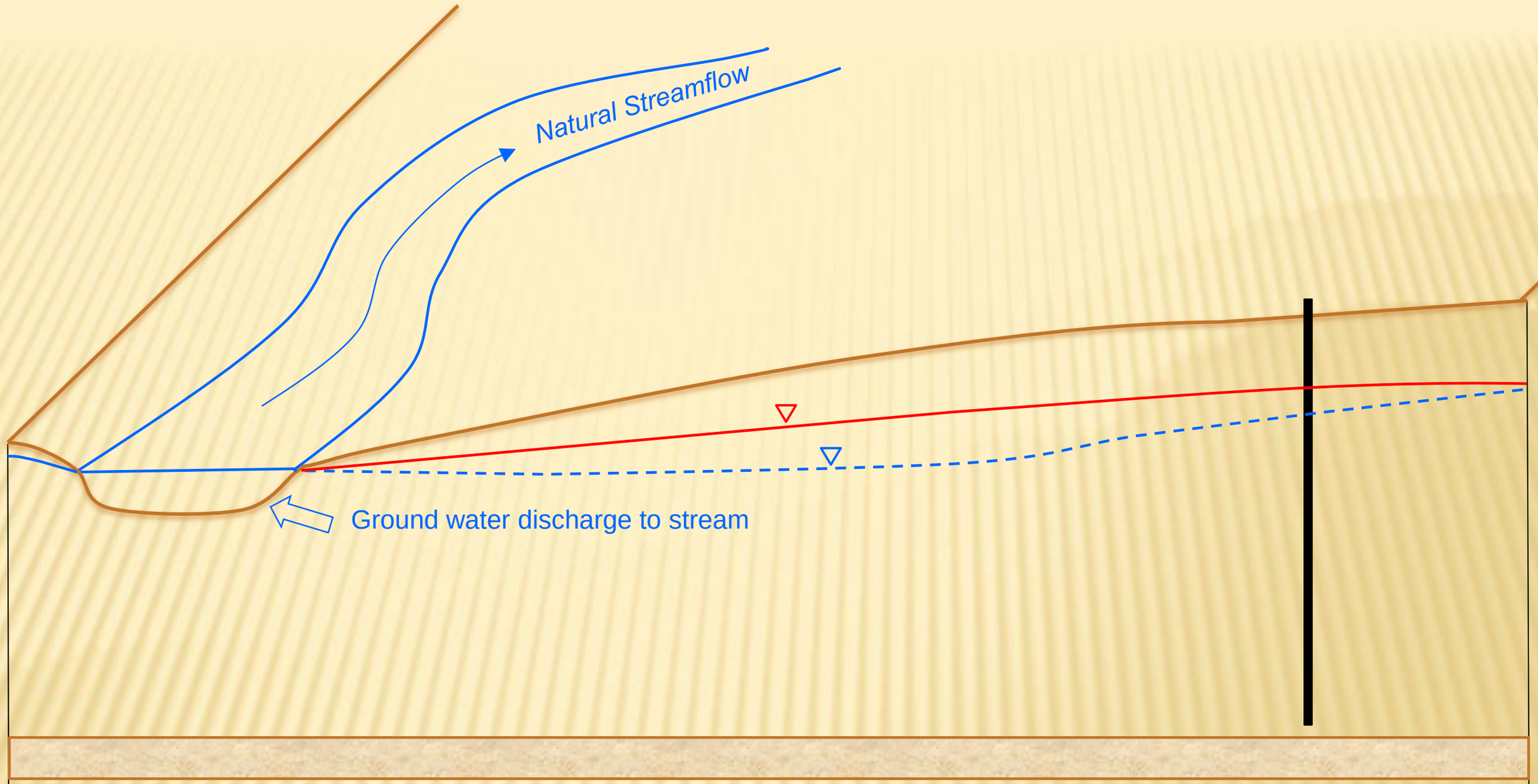


Pumping ceases.

- the aquifer begins to recover near the well,
- but total depletive effect on the aquifer remains,

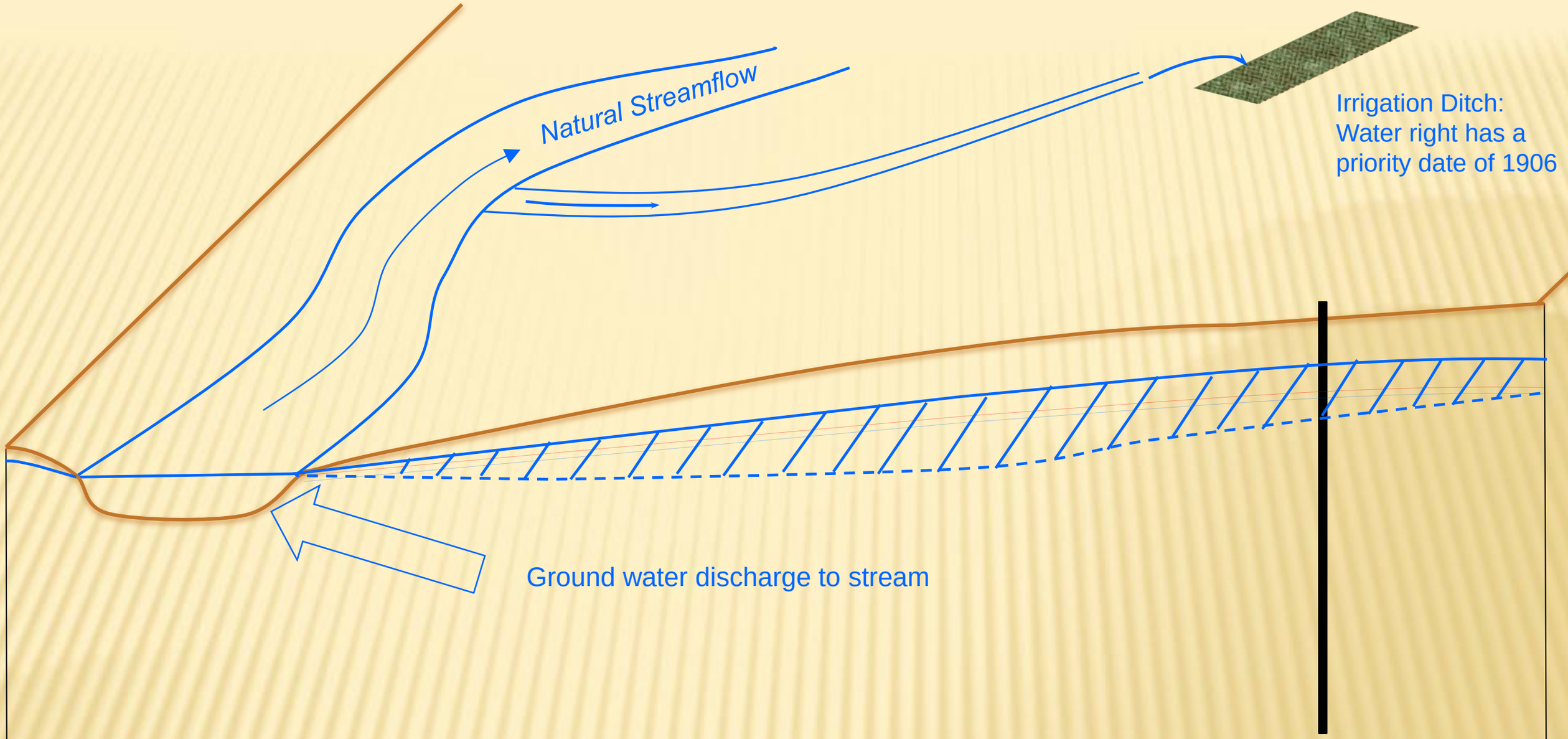


The aquifer is depleted compared to its state had there been no pumping.



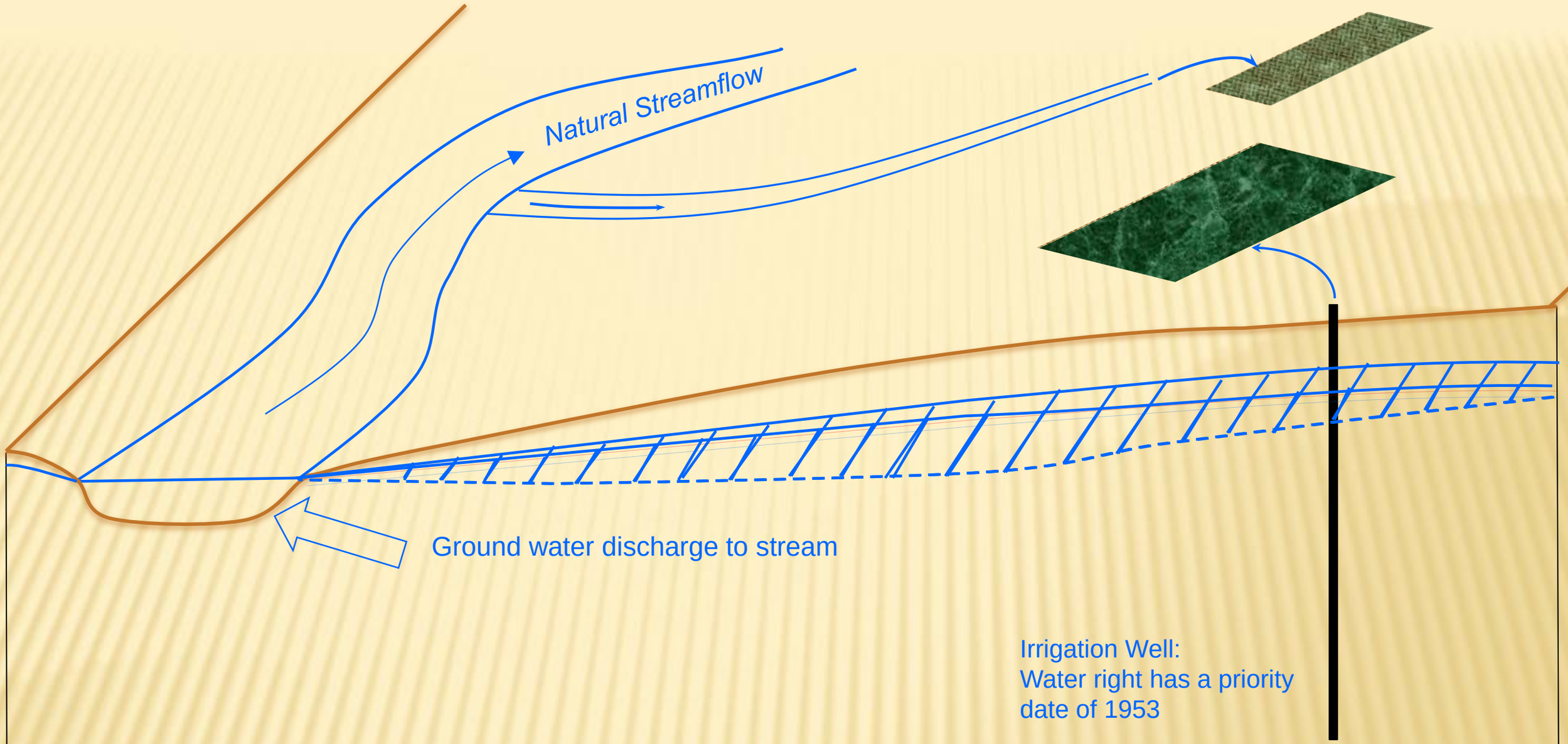
Material injury to surface water rights.

Importance of Augmentation



Since the stream is severely over-appropriated, most years there is not enough streamflow to satisfy all water rights. Example: irrigation ditch with a 1906 priority.

The ditch's water right is satisfied. It benefits from both the natural stream flow and the ground water contribution.



The well with a 1953 priority also diverts water.

Water table is lowered, ground water discharge is reduced.

The ditch with the 1906 water right sees the reduction. Material injury.

We could simply say that the well cannot divert.

Surface Water Depletion

- Determining the effect
  - Time; when does the depletive effect occur at the stream,
  - Location; where on the stream, relative to vested water rights, does the depletive effect occur,
  - Amount; for the time increment, at the location, what is the volume (or rate) of the depletion.

…what about the timing of impacts

Findings of Fact, Case Nos. W-7209, et al (South Platte Rules), March 15, 1974

(Paragraph 11) "Because of the time lag between a ground water diversion and its impact on surface water users, conditions may arise such that a potential injury to surface diverts (sic) may not actually occur, but the burden of assuring that there will be no injury to the senior appropriator must fall on the junior appropriator."

Replacing Depletions

- Statutory definition of "Plan for augmentation:" (1969 Act)

  "…increase the supply of water available for beneficial use…by the development of new or alternate means or points of diversion, by a pooling of water resources, by water exchange projects, by providing substitute supplies of water, by the development of new sources of water, or by any other appropriate means…"

Replacing Depletions

- In plain language

  Augmentation Plan is a plan to replace induced stream depletions using a substitute supply of water

Replacing Depletions

- Actual objectives of augmentation:
  - Statewide; replace stream depletions caused by well pumping

Replacing Depletions

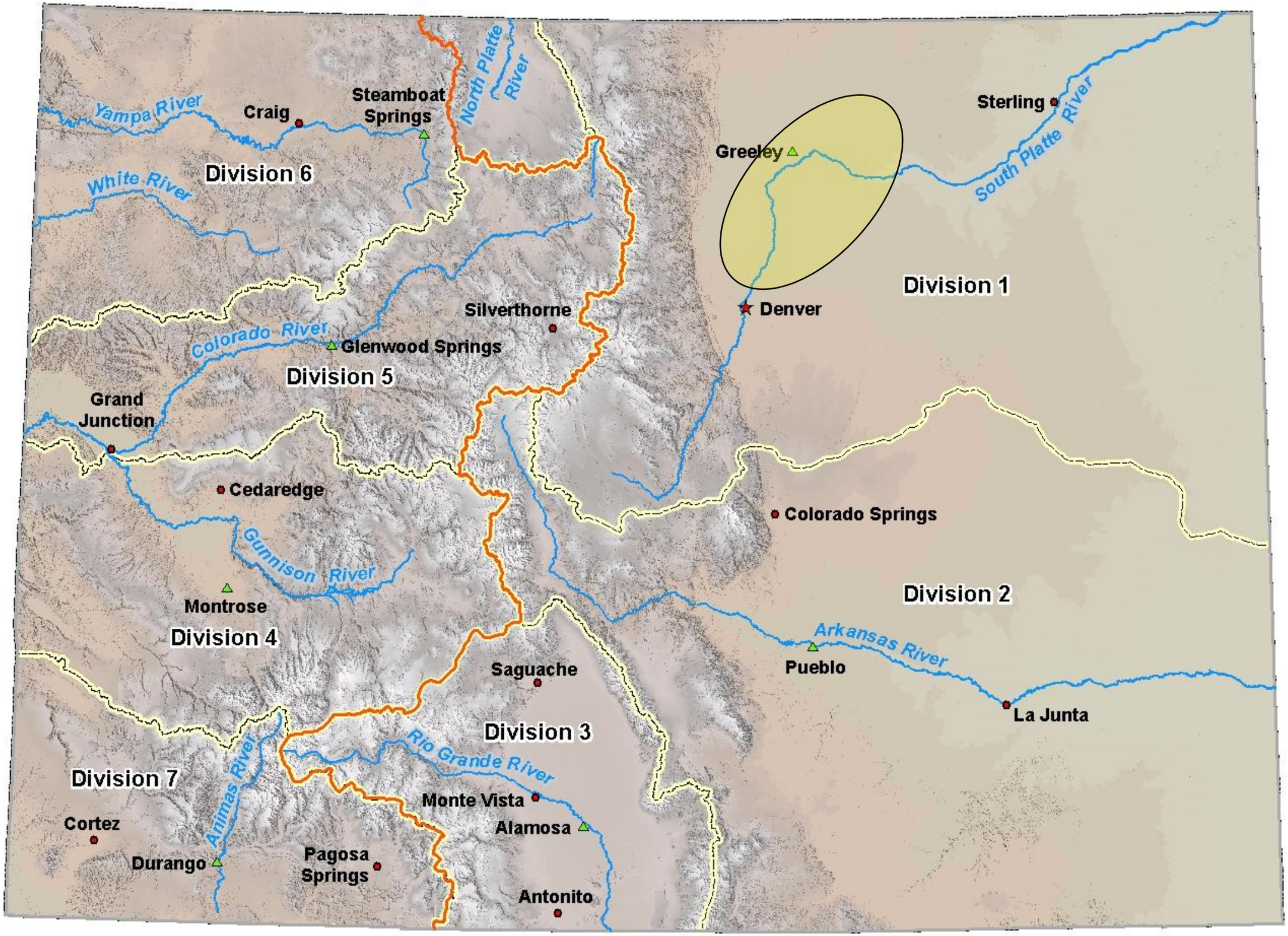
- Potential Sources [stored or direct]
  - Leased or purchased irrigation water (surface water)
    - Must be changed, public process
  - Municipal lease/purchase (industrial uses)
    - Raw or treated water
    - Effluent
  - New diversion, in priority
  - Tributary ground water (inherent obligation)
  - Nontributary ground water

Augmentation Plan Variables/Issues

- Hydrogeology
  - Alluvial aquifers with some homogeneity – more straightforward
  - Bedrock systems – greater effort
  - Fractured granite, other geologic formations – more complex, often cannot be modeled

Augmentation Plan Variables/Issues

- Approach
  - Individual plans – large entities, municipalities
  - Special districts – cooperative effort between well owners, economies of scale
  - Homeowner's associations, umbrella augmentation plans – covers large groups, provides for future wells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Effects on Wells

South Platte River Basin

- Operated in a working plan for augmentation
- Dependent on limited call
- Change to call regime on the river
- Faced with presumption of year-round call
- This increased augmentation requirement