COLORADO

Division of Water Resources

Department of Natural Resources

Wenli Dickinson, P.E., wenli.dickinson@state.co.us

Education & DWR

- Grew up in Lafayette, CO
- Colorado School of Mines
  - B.S. Environmental Engineering (2018)
    - Minor in Creative Writing
  - M.S. Hydrology (2019)
- I applied to ~30 jobs, interviewed at ~5, accepted a position at DWR right out of college in 2019 as an Engineer-In-Training
- Passed the PE Exam in Environmental Engineering 2023 and was promoted to a Professional Engineer
- President of the Colorado Ground Water Association
- Rock climb, hike, bake, and tutor math in my free time

Water Resources Engineer with DWR

- Reviewing Water Court applications / participating in court
- Approving water supply plans
  - For new subdivisions
  - For water projects / mining operations which require water replacement
- Issuing well permits
- Working for the Ground Water Commission
  - Approving water rights / replacement plans
- Providing information to the public, consultants, attorneys, and realtors

Colorado Department of Natural Resources

Avalanche Info

Forestry

Mining

Energy & Carbon

Parks & Wildlife

State Trust Lands

Water Conservation

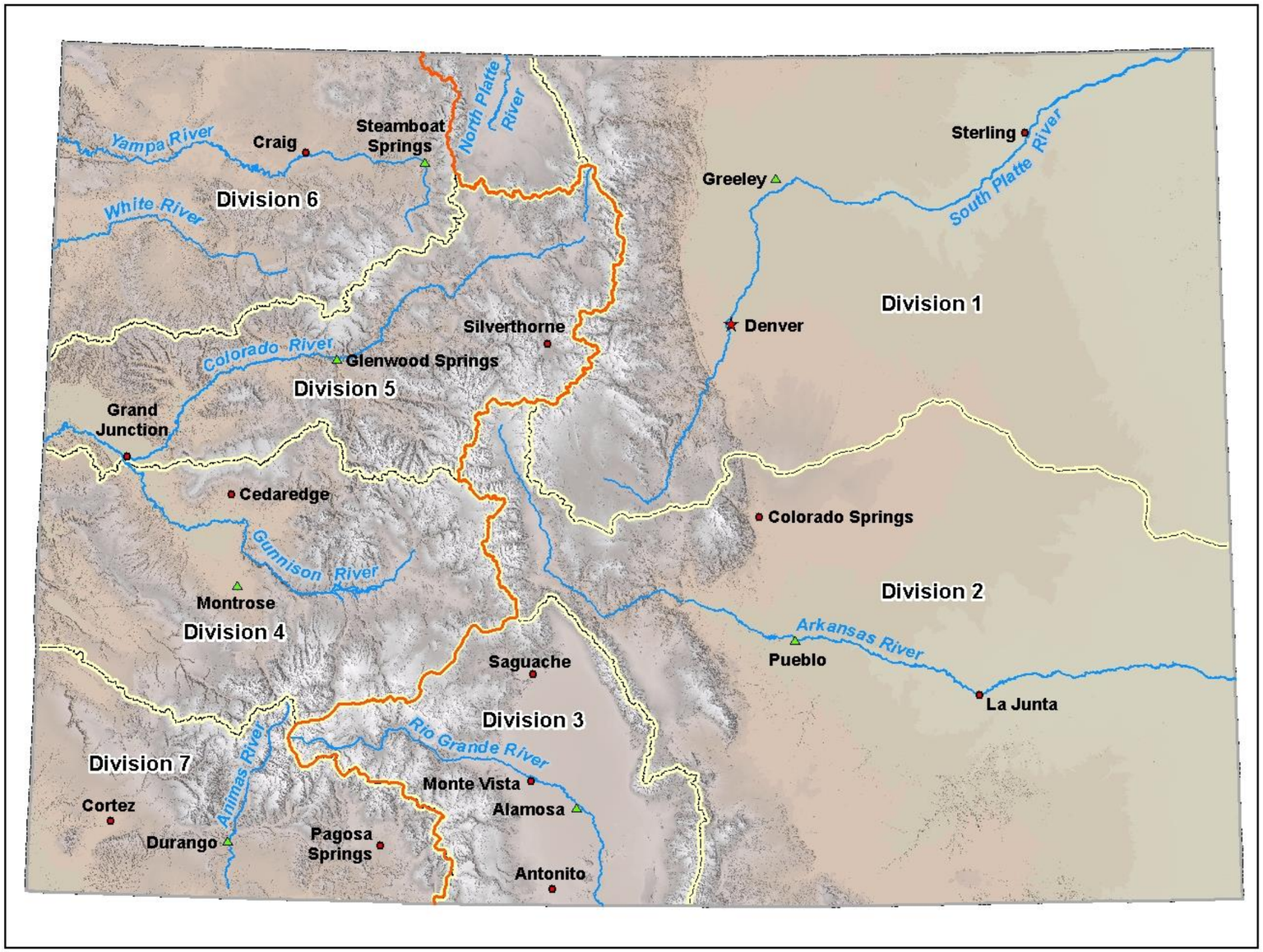
Water Resources

Major Responsibilities of the Division of Water Resources

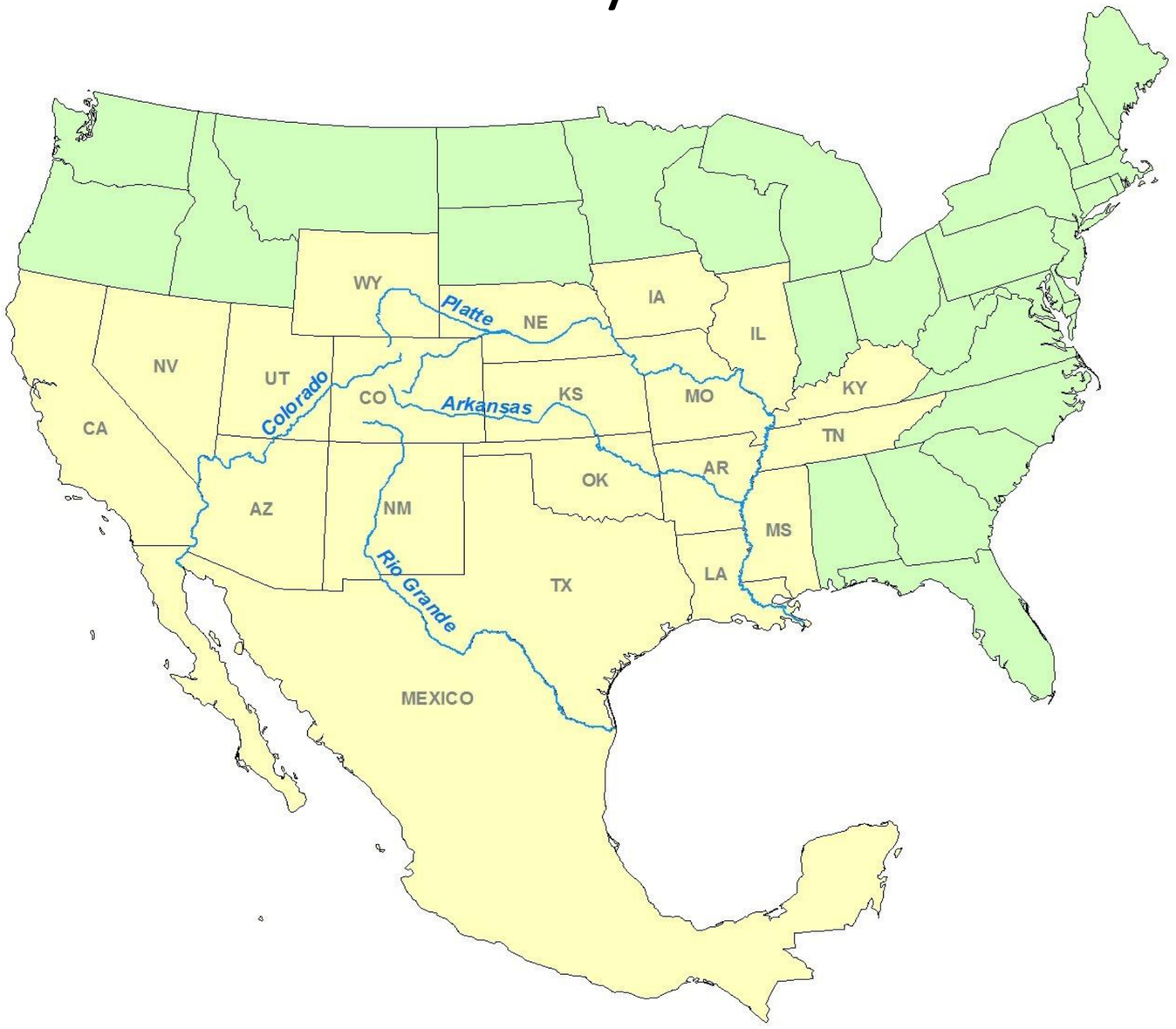
- Water Administration
- Public Safety – Well & Dam Construction Oversight
- Water Well Permitting
- Interstate compact compliance
- Hydrographic program (flow measurement)
- Administrative approvals
- Public information service

Approximately 250 employees

Colorado's Major Basins and Subbasins



19 States & Mexico Rely on Colorado Water



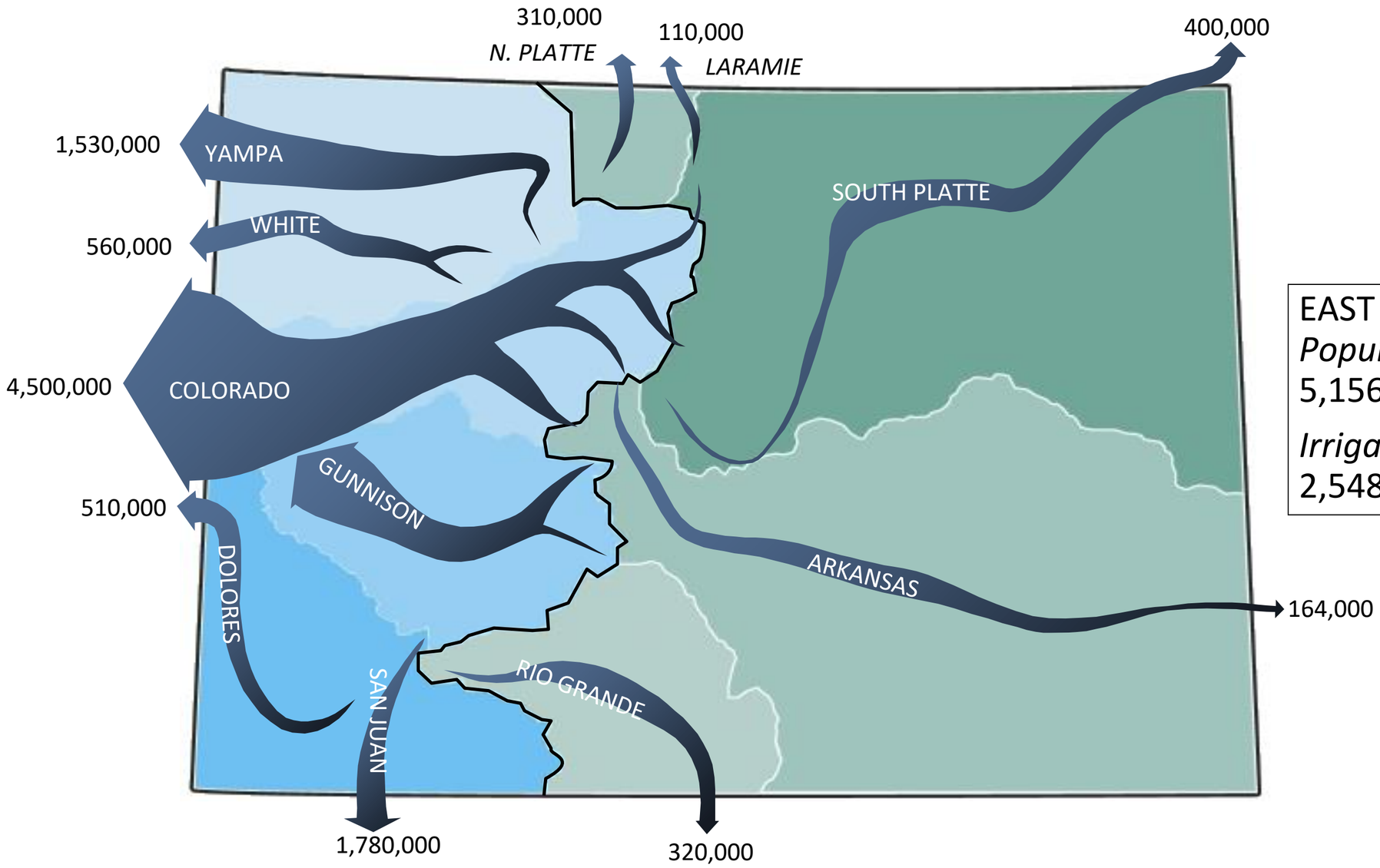
Colorado's Treaty & Compact Obligations

- **National Treaty**
  - Mexican Treaty on Rio Grand, Tijuana, and Colorado Rivers – 1945
- **Interstate Compacts**
  - Colorado River Compact – 1922
  - La Plata River Compact – 1922
  - South Platte River Compact – 1923
  - Rio Grande River Compact – 1938
  - Republican River Compact – 1942
  - Costilla Creek Compact – 1944 (Rev. 1963)
  - Upper Colorado River Compact – 1948
  - Arkansas River Compact – 1948
  - Animas-La Plata Project Compact – 1969
- **U.S. Supreme Court Decrees**
  - Nebraska v. Wyoming – 1945, 2001 (North Platte River)
  - Wyoming v. Colorado – 1957 (Laramie River)
- **Agreements/Understandings**
  - Pot Creek Memorandum of Understanding—2005 (1958)
  - Sand Creek Memorandum of Agreement—1997

2020 Population, Irrigated Acres, Average Annual Flows (acre-feet) Leaving Colorado

WEST SLOPE
Population:
618,000

Irrigated Acres:
918,000

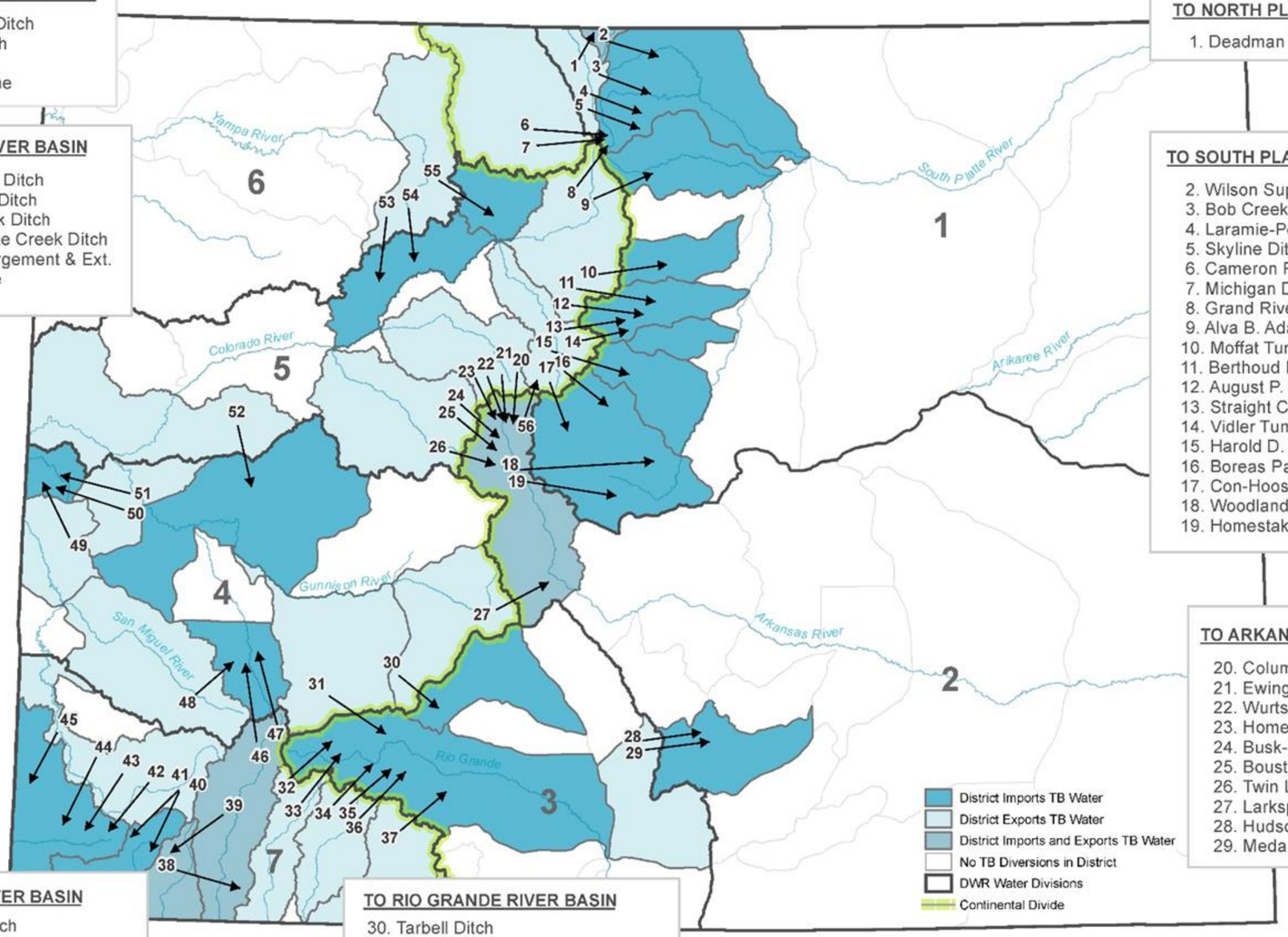


EAST SLOPE
Population:
5,156,000

Irrigated Acres:
2,548,000

COLORADO TRANSBASIN DIVERSIONS

Office of the State Engineer



TO COLORADO RIVER BASIN

53. Dome Creek Ditch
54. Stillwater Ditch
55. Sarvis Ditch
56. Climax Pipeline

TO GUNNISON RIVER BASIN

46. Red Mountain Ditch
47. Mineral Point Ditch
48. Leopard Creek Ditch
49. Gordon Granite Creek Ditch
50. Nellie S. Enlargement & Ext.
51. Fruita Pipeline
52. Leon Tunnel

TO NORTH PLATTE RIVER BASIN

1. Deadman Ditch

TO SOUTH PLATTE RIVER BASIN

2. Wilson Supply Ditch
3. Bob Creek Ditch
4. Laramie-Poudre Tunnel
5. Skyline Ditch
6. Cameron Pass Ditch
7. Michigan Ditch
8. Grand River Ditch
9. Alva B. Adams Tunnel
10. Moffat Tunnel
11. Berthoud Pass Ditch
12. August P. Gumlick Tunnel
13. Straight Creek Tunnel
14. Vidler Tunnel
15. Harold D. Roberts Tunnel
16. Boreas Pass Ditch
17. Con-Hoosier Tunnel
18. Woodland Park Pipeline
19. Homestake Joint Pipeline

TO ARKANSAS RIVER BASIN

20. Columbine Ditch
21. Ewing Ditch
22. Wurts Ditch
23. Homestake Tunnel
24. Busk-Ivanhoe Tunnel
25. Boustead Tunnel
26. Twin Lakes Tunnel
27. Larkspur Ditch
28. Hudson Ditch
29. Medano Ditch

TO SAN JUAN RIVER BASIN

38. Pine Ridge Ditch
39. Lightner Canal
40. Sellars & McClane Supply Ditch
41. Turkey Creek Ditch
42. Summit Reservoir Outlet
43. Dolores Tunnel
44. Great Cut Dike
45. Dove Creek Pipeline

TO RIO GRANDE RIVER BASIN

30. Tarbell Ditch
31. Tabor Ditch
32. Weminuche Pass
33. Pine River Weminuche Pass Ditch
34. Williams Creek-Squaw Pass Ditch
35. Don La Font Ditch No. 1
36. Don La Font Ditch No. 2
37. Treasure Pass Ditch

Note: DWR defines transbasin export as the release from one basin to another basin, the drainage from which does not combine with drainage from the releasing basin within the State of Colorado.

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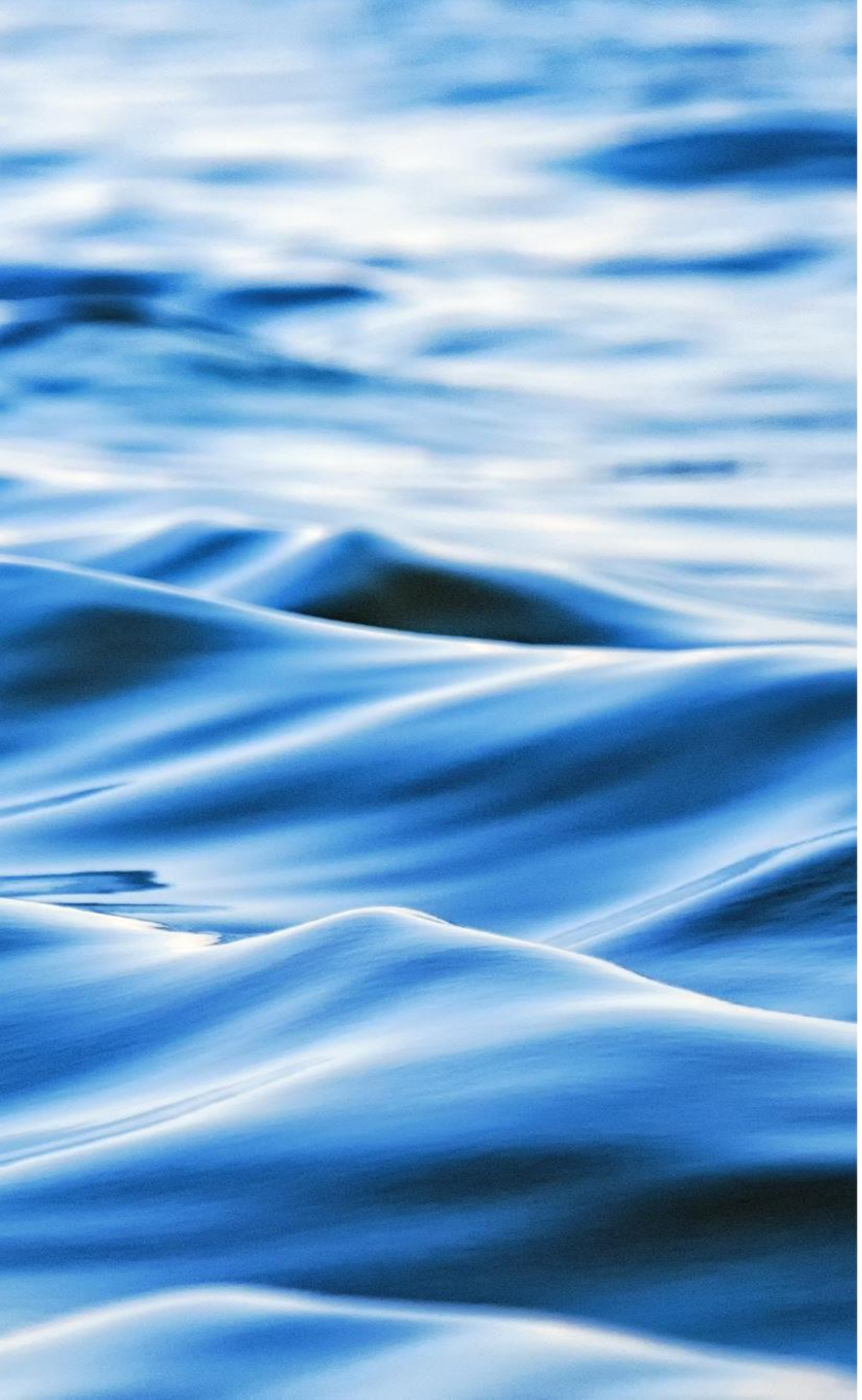
Updated June 2021



Basic Vocabulary

- Adjudication: judicial confirmation of a water right
  - If a well is adjudicated, may still need augmentation plan to operate!
- Appropriation: specific action under the proper procedures of law to create a water right by placing waters of the state to a beneficial use
- Acre-foot: a volume of water equivalent to 325,851 gallons (or one acre, i.e., a football field, covered in 1 foot of standing water)
- Curtail: ordering a water right, diversion, or structure to cease & desist using waters of the state
- Decree or Ruling: judgment issued by the water court
- Headgate: gate for controlling water flowing from a river/creek to another channel (i.e. a ditch)

Initial Water Development

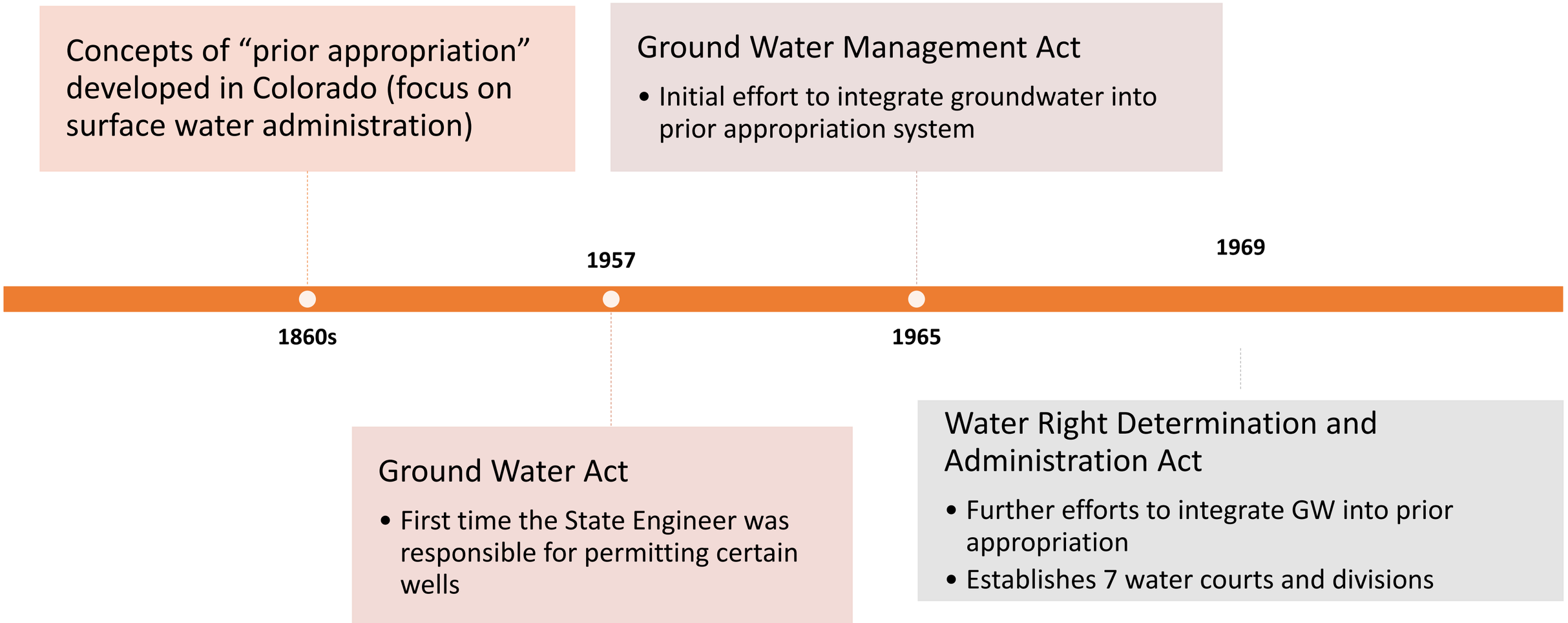
- Surface water use (rivers / streams)
- Mining and domestic uses
- Predated creation of Colorado (no constitution)
- Increasing demand for finite resource led to competition.

Colorado Water Doctrine

Set of laws regarding water usage in Colorado. General concepts:

1. Water is a public resource which can transported from the natural waterways (e.g. through ditches).
2. A water right grants the right to put the water to beneficial use. Restrictions include: quantity, point of diversion, allowed uses, and more.
3. Water rights are granted in priority, meaning older water rights are senior to junior water rights.

Administration Highlights



Water Administration Development

- Territorial Law – 1860's
- State Constitution - 1876
- Adjudication act of 1879 establishes Water Commissioners (field staff)
- Adjudication Act of 1881, Office of the State Hydraulic Engineer – now State Engineer
- 1887 Superintendent of Irrigation created – now Division Engineers
- Section 37-92-501(1), C.R.S.: "The state engineer and the division engineers shall administer, distribute, and regulate the waters of the state in accordance with the constitution of the state of Colorado…"

Article XVI, Section 6, State Constitution (1876)

"The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied.

Priority of appropriation shall give the better right as between those using the water for the same purpose…"

Prior Appropriation System

Prior Appropriation Doctrine means those that put the water to use first are entitled to get their water first during periods of water shortage.

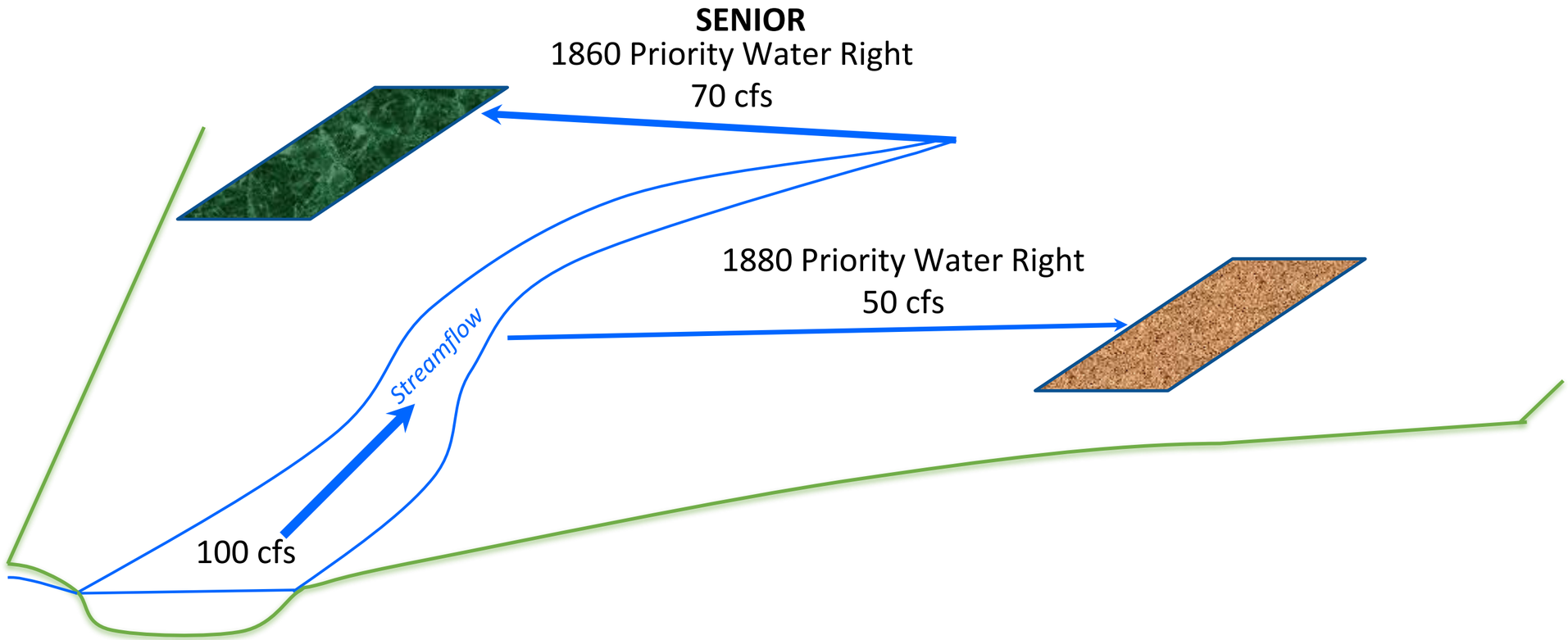
- “First in time, first in right”
- Water administration system often used in arid regions for allocation of a scarce resource.

Prior – First in Time/First in Right; Senior rights have better rights

Appropriation – The act of diverting, storing, or otherwise capturing, possessing, and controlling water for a beneficial use.

System – A legal framework of procedures by which the water user may obtain a decree from the water court for their right to use the water. This is called adjudication.

Prior Appropriation in Practice



What Happens?

After the “senior” 70 cubic feet/second (cfs) right is fulfilled, there is only 30 cfs available for the “junior” water right.

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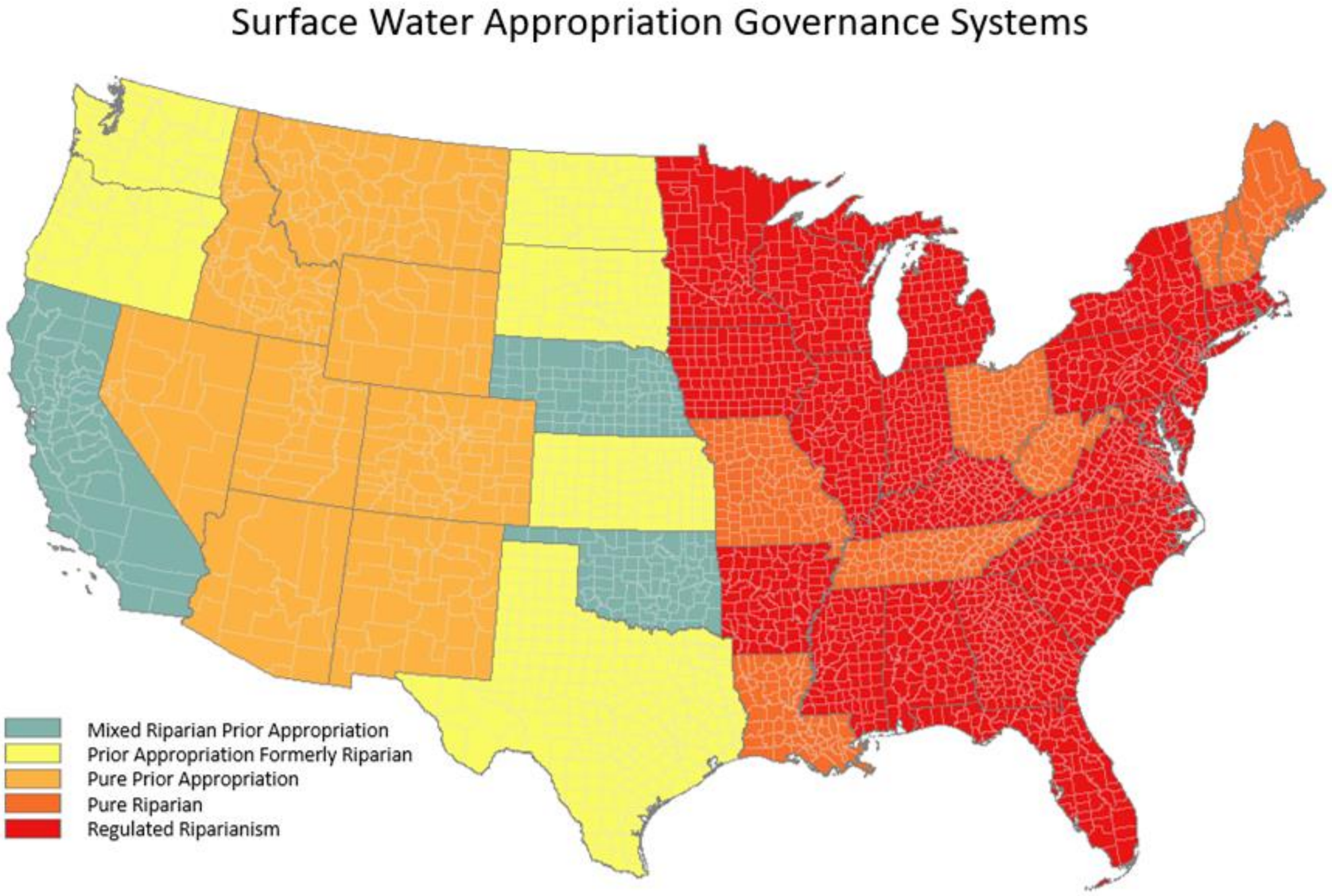
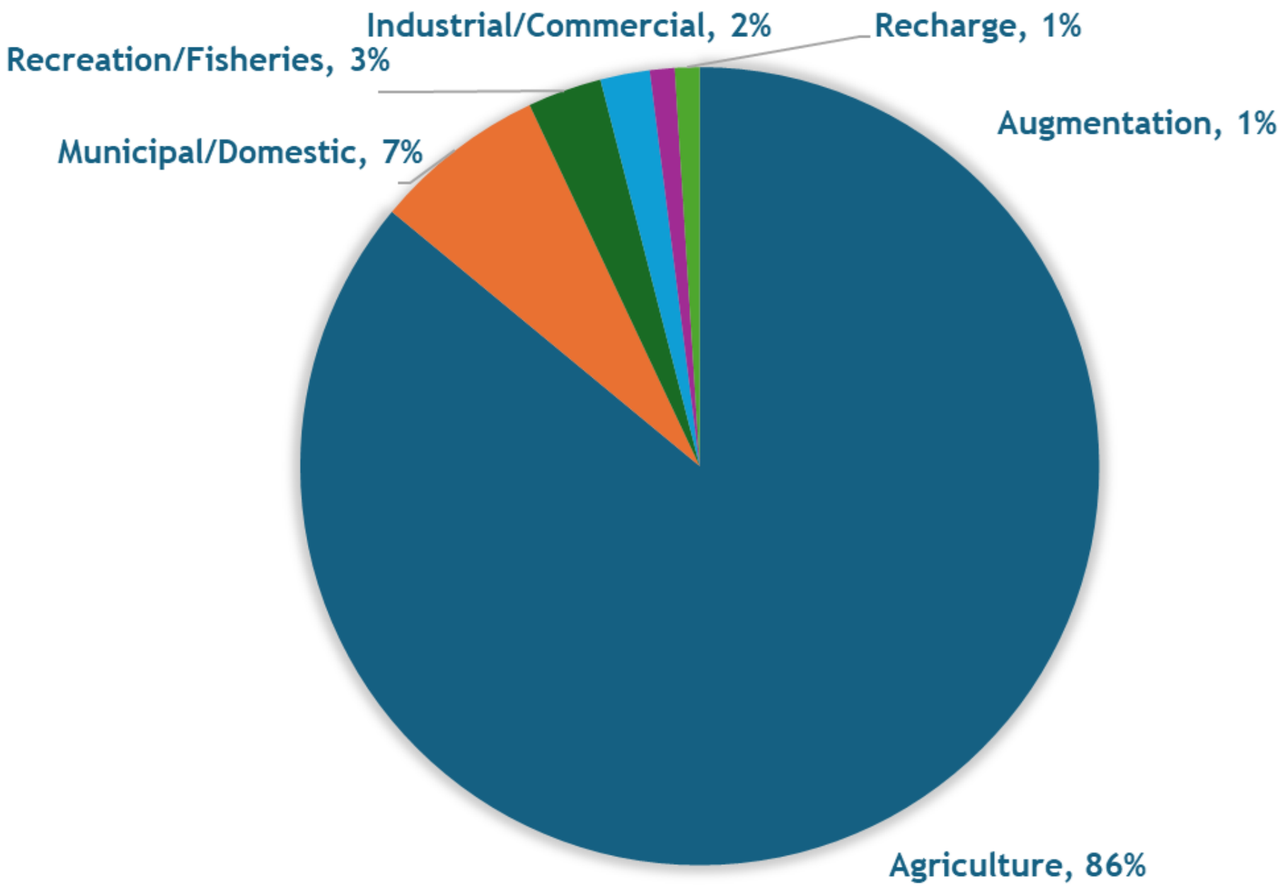
Riparian Doctrine: water rights are attached to lands adjacent to streams.
Prior Appropriation Doctrine: first in time, first in right.



Water Administration in Colorado

Over 173,000 water rights
Over 105,000 structures
Over 250,000 wells



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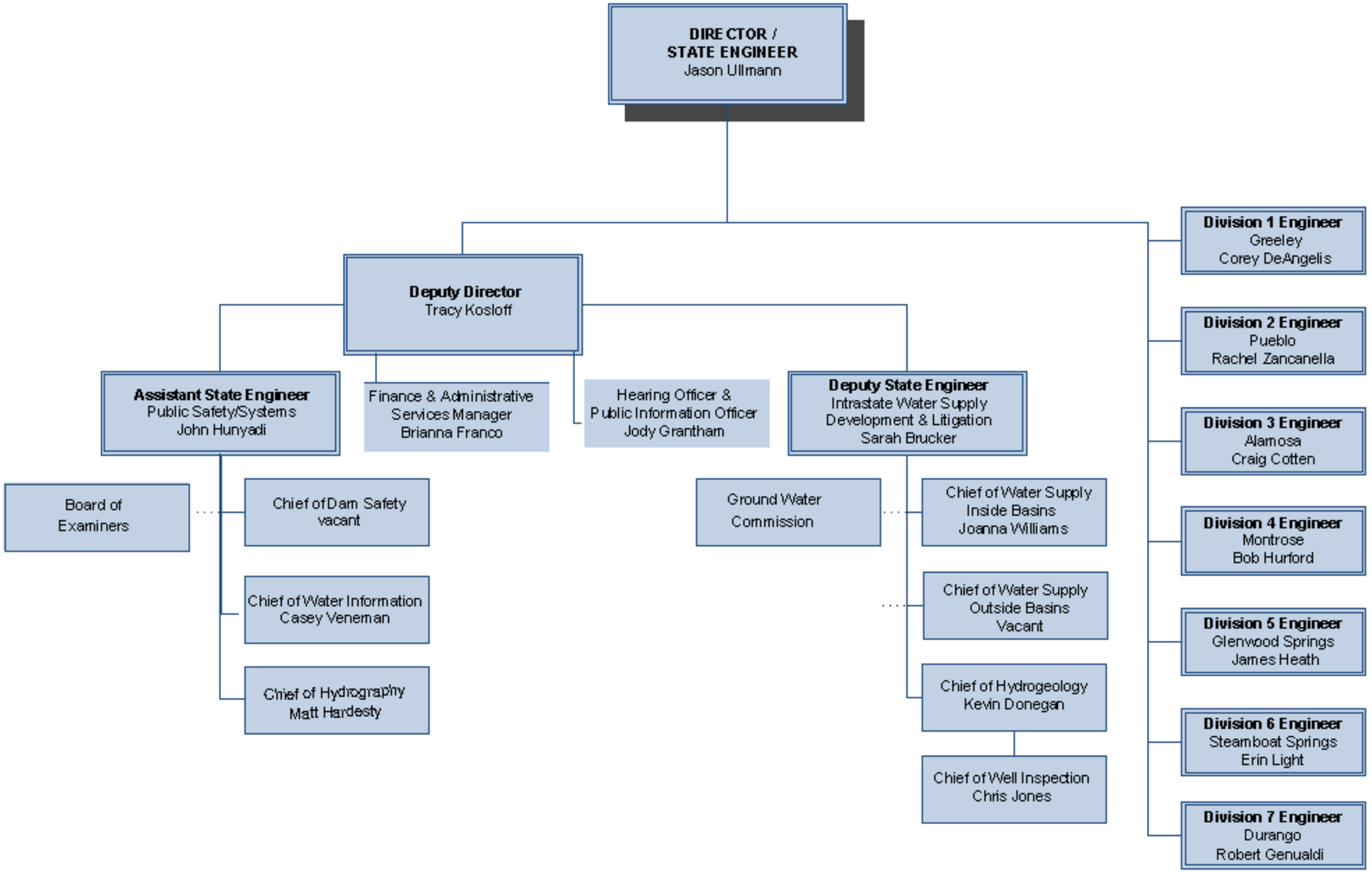
COLORADO DIVISION OF WATER RESOURCES
ORGANIZATIONAL CHART



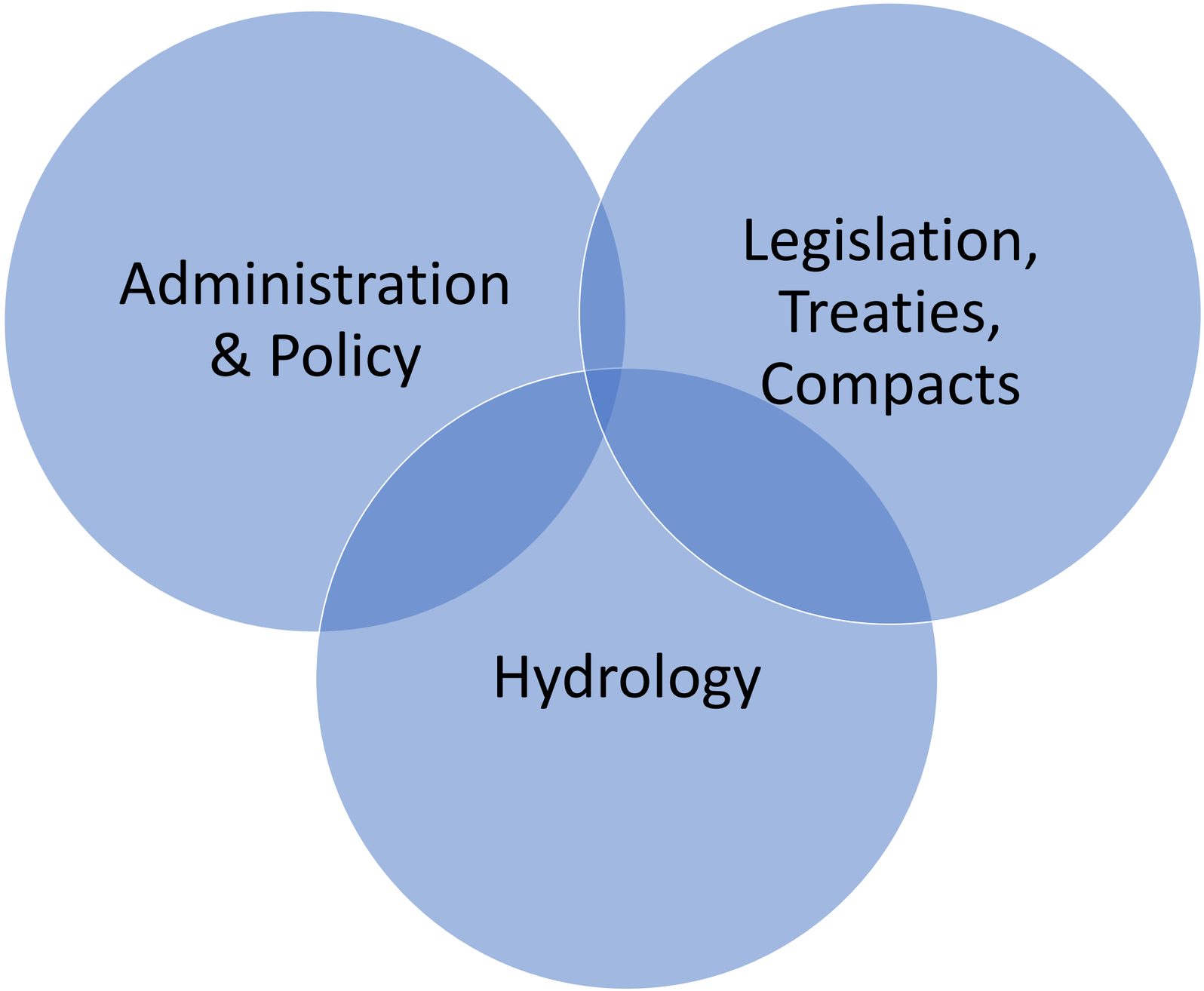
Updated June 11, 2024

Water Commissioner Responsibilities (WC are ~2/3 of DWR staff)

- Setting the Call on the Stream Based on Supply and Demand
  - A water right “Call” may be placed when the demand for water by a water right exceeds the physical supply in the stream.
- Assuring diversions in priority for decreed uses without waste.
- Assuring diversions are measured.
- Operating exchanges and delivery of releases from reservoirs after assessing transit losses.
- Assuring other decree requirements are met.
- Reviewing accounting and maintenance of diversion records

Challenges of Water Administration

- As competition for scarce water supplies increases, court decrees and operation of water rights become more complex.
- As water providers grow into their existing supplies and divert new supplies, the periods when demand exceeds supply will increase.
- Increasing administration workloads being addressed by increasing applications of technology, such as metering, telemetry, and near real time data collection.


Administration
& Policy
Legislation,
Treaties,
Compacts
Hydrology

How did I get into this career?

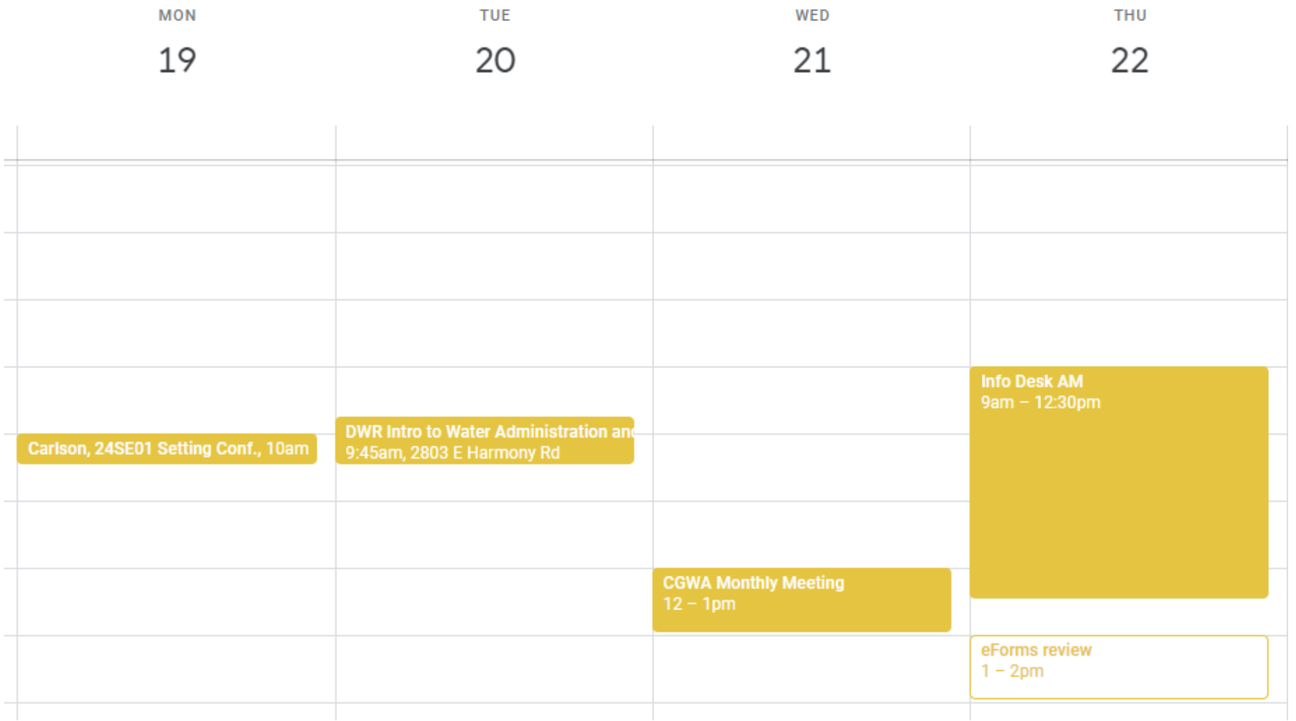
- Probably should have thought it through more, but I picked environment/hydrology because…
  - Water sounded cool / poetic.
  - One of my friends had taken Intro to Hydrology and highly recommended it to me.
- Why did I pick DWR?
  - They were the most responsive when it came to responding to my application and following up after my interview.
  - Everyone seemed nice and the work seemed interesting (I didn't actually know what DWR did when I started)
  - Great benefits → vacation, work from home, flex time, etc.

Who do I work with?

- The public – water users who own water rights, operate wells, or want more information about water in their area.
- Realtors / brokers – looking for well permit information when a property is being sold.
- Developers – reviewing water supply plans for new developments.
- Water Rights Attorneys
- Consultants – engineers, geologists, hydrogeologists, etc. helping clients with water projects
- Well Drillers / Contractors
- Other Government: county, other state departments, Army Corps

What does my day to day look like?

- M-F 8am – 5:30pm and every other Friday off
- Remote work – mostly communicate via email, phone, google meet, chat
- ~70% time on assigned tasks, ~30% time on inquiries from public
- My team has 1 supervisor, 3 engineers, and 1 tech
- Most of our work is individual work that requires supervisor review/approval
  - Small amount of work is team-oriented (special projects, working together on a court case)



Working as a Water Resources Engineer with the State

Advantages

- Excellent work-life balance.
- Connection with the broader public and helping people.
- Field trips / conferences / training highly encouraged.

Considerations

- Our division has no design work.
- Turnover in government can be slow.
- Not all of our decisions are popular.

2024_Wenli_Applications

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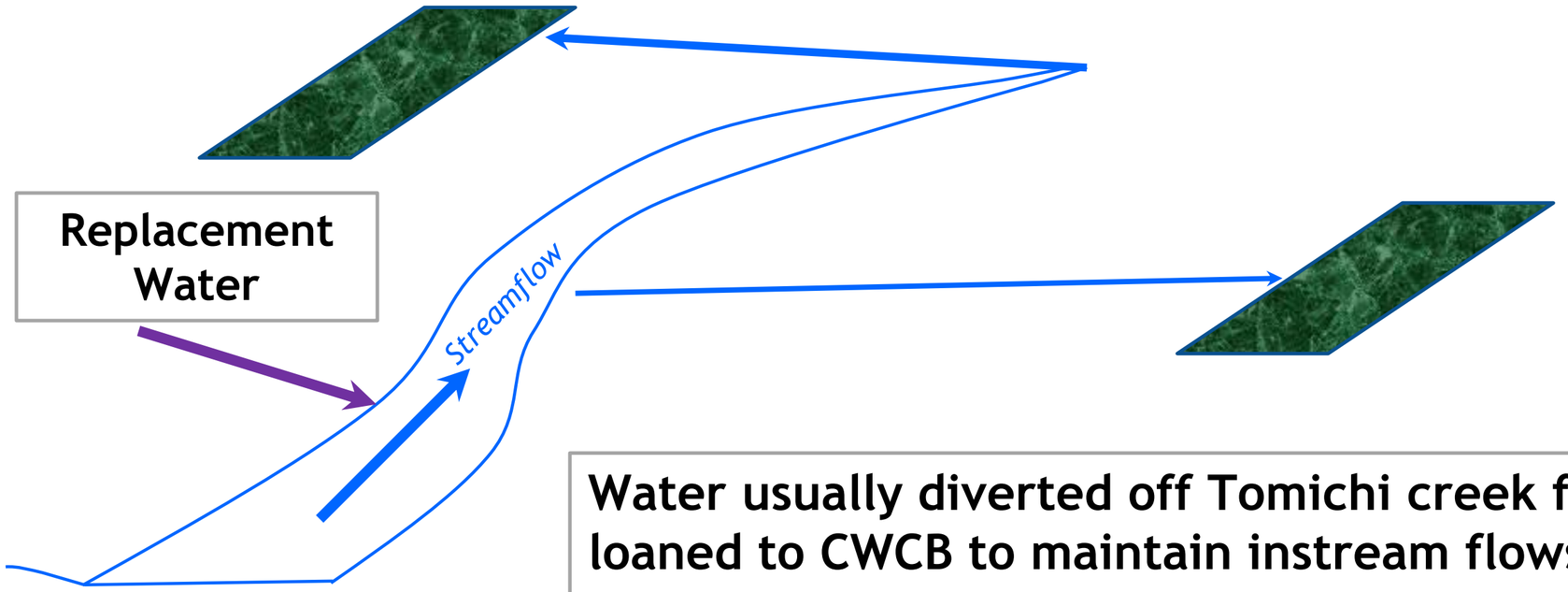
R67 24-PUB-82

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Receipt No.	Received	Applicant Name	County	Basin	GWMD	Aq.	Status	Pre-213 & small capacity	Re-permit	Area	ST	AF/yr	Paper	1st Pub Date	2nd Pub Date	Obj Deadline	Invoice No
2	~~10016526~~	~~10/29/21~~	~~Mid Colorado Investment (~~	~~El Paso~~	~~UBSC~~	~~UBSC~~	~~KLF~~	~~NT~~	~~27746-F~~	~~215~~	~~1160.0~~	~~215~~	~~374.1~~					
3	~~10017839~~	~~12/30/21~~	~~Lasater Grassland Beef, LLC~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KLF~~	~~NNT Actual/NNT 4%~~	~~157085 (1af)~~	~~No~~	~~608~~	~~140~~	~~127~~	~~Ranchland~~				
4	~~10017840~~	~~12/30/21~~	~~Lasater Grassland Beef, LLC~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KA~~	~~NNT 4%~~					~~0~~	~~Ranchland~~				
5	~~10017841~~	~~12/30/21~~	~~Thomas Lasater~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KLF~~	~~NNT 4%~~			~~511~~		~~0~~	~~Ranchland~~				
6	~~10017842~~	~~12/30/21~~	~~Thomas Lasater~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KA~~	~~NNT 4%~~			~~511~~		~~0~~	~~Ranchland~~				
7	~~10017843~~	~~12/30/21~~	~~Resolis Ranch, LLC~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KLF~~	~~NNT Actual/NNT 4%~~			~~4365.62~~		~~0~~	~~Ranchland~~				
8	~~10017844~~	~~12/30/21~~	~~Resolis Ranch, LLC~~	~~Elbert~~	~~UBS~~	~~UBS~~	~~KA~~	~~NNT 4%~~	~~70135, 173611, 160176, 8~~		~~4365.62~~		~~0~~	~~Ranchland~~				
9	~~10020046~~	~~3/26/22~~	~~Luis Solis Garcia~~	~~Adams~~	~~Lost Creek~~	~~Lost Creek~~	~~UKA~~	~~NNT 4%~~			~~39.87~~	~~135~~	~~9.15~~	~~Eastern~~	~~10/6/23~~	~~10/13/23~~	~~11/12/23~~	~~23-PUB-52~~
10	10021946	6/7/22	Paint Brush Hills Metropoli	El Paso	UBSC	UBSC	TKD	NNT-4%			480	295	240.72	Ranchland	2/23/23	3/2/23	4/1/23	23-PUB-51
11	~~10028510~~	~~4/14/23~~	~~Julio Cesar Rodriguez Loya~~	~~Adams~~	~~Lost Creek~~	~~Lost Creek~~	~~KLF~~	~~NT~~			~~35.38~~	~~140~~	~~7.43~~	~~Eastern~~				
12	~~10028511~~	~~4/14/23~~	~~Julio Cesar Rodriguez Loya~~	~~Adams~~	~~Lost Creek~~	~~Lost Creek~~	~~LKA~~	~~NT~~			~~35.38~~	~~95~~	~~5.71~~	~~Eastern~~				
13	~~10028512~~	~~4/14/23~~	~~Julio Cesar Rodriguez Loya~~	~~Adams~~	~~Lost Creek~~	~~Lost Creek~~	~~UKA~~	~~NT~~	~~304167 (0.8af)~~	~~?~~	~~35.38~~	~~95~~	~~5.71~~	~~Eastern~~				
14	~~10028513~~	~~4/14/23~~	~~Julio Cesar Rodriguez Loya~~	~~Adams~~	~~Lost Creek~~	~~Lost Creek~~	~~TKD~~	~~NNT Actual~~			~~35.38~~	~~125~~	~~7.52~~	~~Eastern~~				
15	10028980	5/4/23	Longhorn Acres Land and C	El Paso	UBSC	UBSC	KLF	NT			36.24	205	11.1438	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-43
16	10028981	5/4/23	Longhorn Acres Land and C	El Paso	UBSC	UBSC	KA	NT			36.24	175	10.7814	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-43
17	10028982	5/4/23	Longhorn Acres Land and C	El Paso	UBSC	UBSC	TKD	NNT-4%			36.24	210	12.93768	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-43
18	10028983	5/4/23	Longhorn Acres Land and C	El Paso	UBSC	UBSC	TDW	NT	324747 (1af)	Abandor	36.24	50	3.094	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-43
19	10030916	8/7/23	Mickey J. Davis and Tammy	El Paso	UBSC	UBSC	KLF	NT			40.00	200	12.0	Ranchland	5/9/24	5/16/24	6/15/24	24-PUB-75
20	10030917	8/7/23	Mickey J. Davis and Tammy	El Paso	UBSC	UBSC	KA	NT			40.00	210	14.3	Ranchland	5/9/24	5/16/24	6/15/24	24-PUB-75
21	10030918	8/7/23	Mickey J. Davis and Tammy	El Paso	UBSC	UBSC	TKD	NNT-4%			40.00	195	13.3	Ranchland	5/9/24	5/16/24	6/15/24	24-PUB-75
22	10031276	8/25/23	PT Overlook LLC	El Paso	UBSC/Kiow	UBSC	KLF	NT			350.811	205	108	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-42
23	10031277	8/25/23	PT Overlook LLC	El Paso	UBSC/Kiow	UBSC	KA	NT			350.811	210	125	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-42
24	10031278	8/25/23	PT Overlook LLC	El Paso	UBSC/Kiow	UBSC	TKD	NT			350.811	300	179	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-42
25	10031279	8/25/23	PT Overlook LLC	El Paso	UBSC/Kiow	UBSC	TDW	NNT-Actual	157064-A	Yes	350.811	350	245.18	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-42
26	10031280	8/25/23	PT Overlook LLC	El Paso	UBSC/Kiow	UBSC	TDW	Replacement	115.05ac in Sec. 22, 231.5		350.81		31	Ranchland	12/7/23	12/14/23	1/13/24	24-PUB-42

Project: Tomichi Creek ISF



Water usually diverted off Tomichi creek for irrigation is instead loaned to CWCB to maintain instream flows for stream/fish health.

Challenges:

- Quantifying amount of water that can be changed from “irrigation” use to “instream flow” use
- Calculating return flows owed to the stream should a junior call be placed

Requirements for an EIT position at DWR

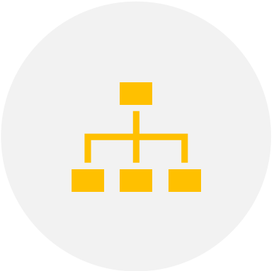
- 4-year engineering degree
  - Any degree acceptable, but preferred: civil, environmental, geology. (Otherwise, you need to work for 12 years under a licensed PE and pass the PE exam to work as an engineer for the state with no engineering degree)
- Pass FE exam and register as EIT in Colorado
- Communication skills
  - Necessary to explain complex concepts to the public
  - Maintain professionalism
- Bonus: history of public service / community service, basic knowledge of water administration / water law

Advice for students?

Pick something and you might just like it.

Keep your resume to 1 page please. Don’t be afraid to email managers about jobs!

Have time for a minor, honors society, engineering/science club? Do it!!!



Stay organized.

Contact me with water questions or to connect about your career goals!

wenli.dickinson
@state.co.us

(303) 866-3581
x8206

info@cgwa.co

Additional Information

Basic Elements of a Water Right

Water Rights are granted by the Water Court in a decree or ruling:

1. Description of the water (surface water diversion, spring, well, seepage, pond, reservoir, etc.)
2. The source (e.g. whether it is surface water from a tributary to a major river or if it is groundwater)
3. The date of appropriation
4. The point of diversion
5. Quantity of water that can be diverted
6. The specific beneficial use(s) of the water

Basic Elements of an Augmentation Plan

1. A description of the structure to be augmented.
2. The replacement source, including the method, timing, and amount of replacement water provided.
3. How the plan will be operated/administered.
4. Measurement, accounting, and reporting requirements.
5. Other conditions to protect existing water rights.

Can decrees be changed? Yes!

- Application must be filed with Water Court (could be expensive + time consuming)
- Correct or amend a location
- Changes to augmentation plans
  - Add additional structures or wells to an augmentation plan
  - Change replacement sources
- Change in use. Example: from irrigation to municipal.

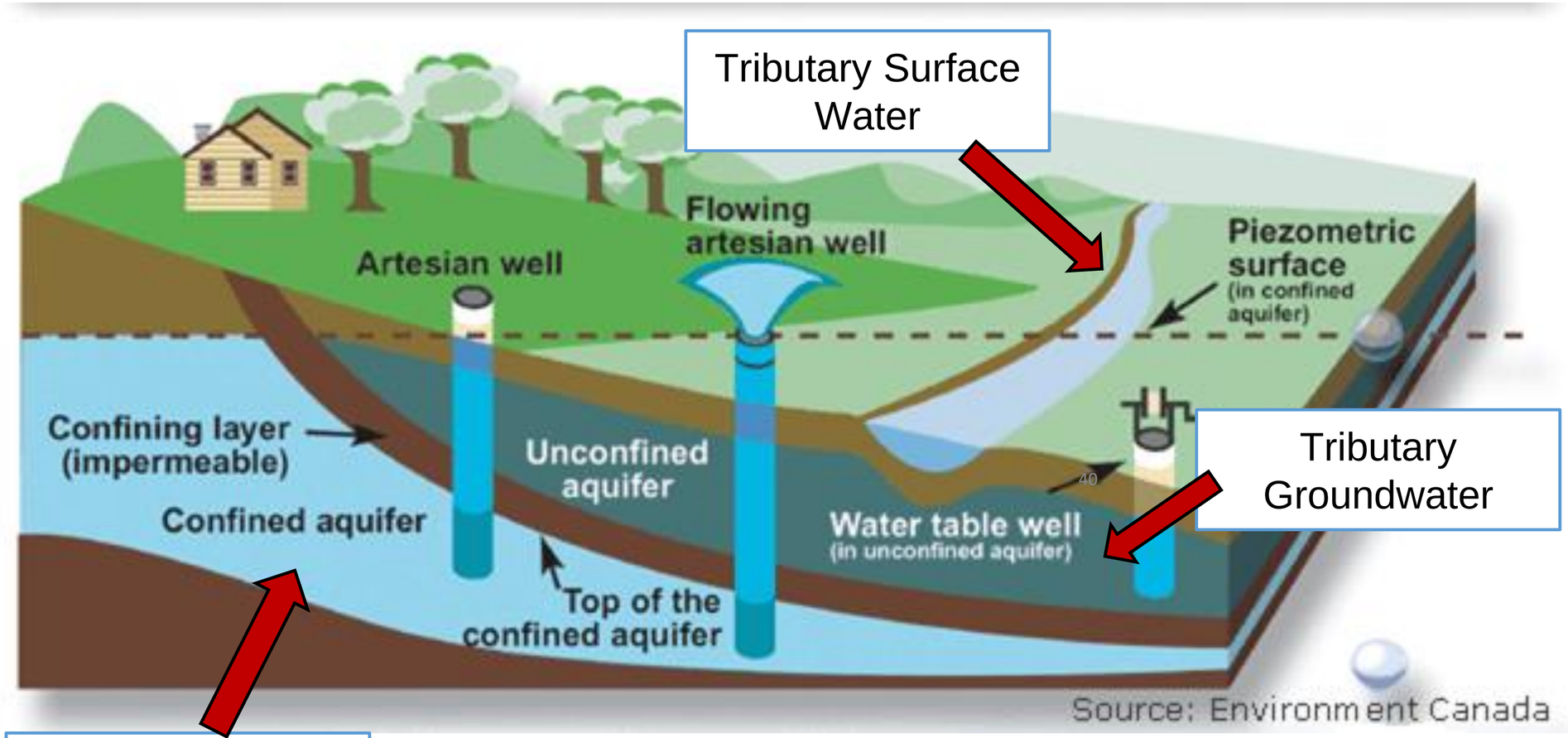
Water Right vs. Well Permit vs. Augmentation Plan

Water Right	Well Permit	Augmentation Plan
• Approved by Water Court • Grants priority • Water Rights conveyed by deed • WILL require a well permit to use the groundwater	• Issued by DWR • Permit to construct/use well • Does NOT grant or convey a water right • Does not require a water right	• Approved by Water Court • Allows water to be diverted out-of-priority by providing replacement water

None of the above guarantees wet water!

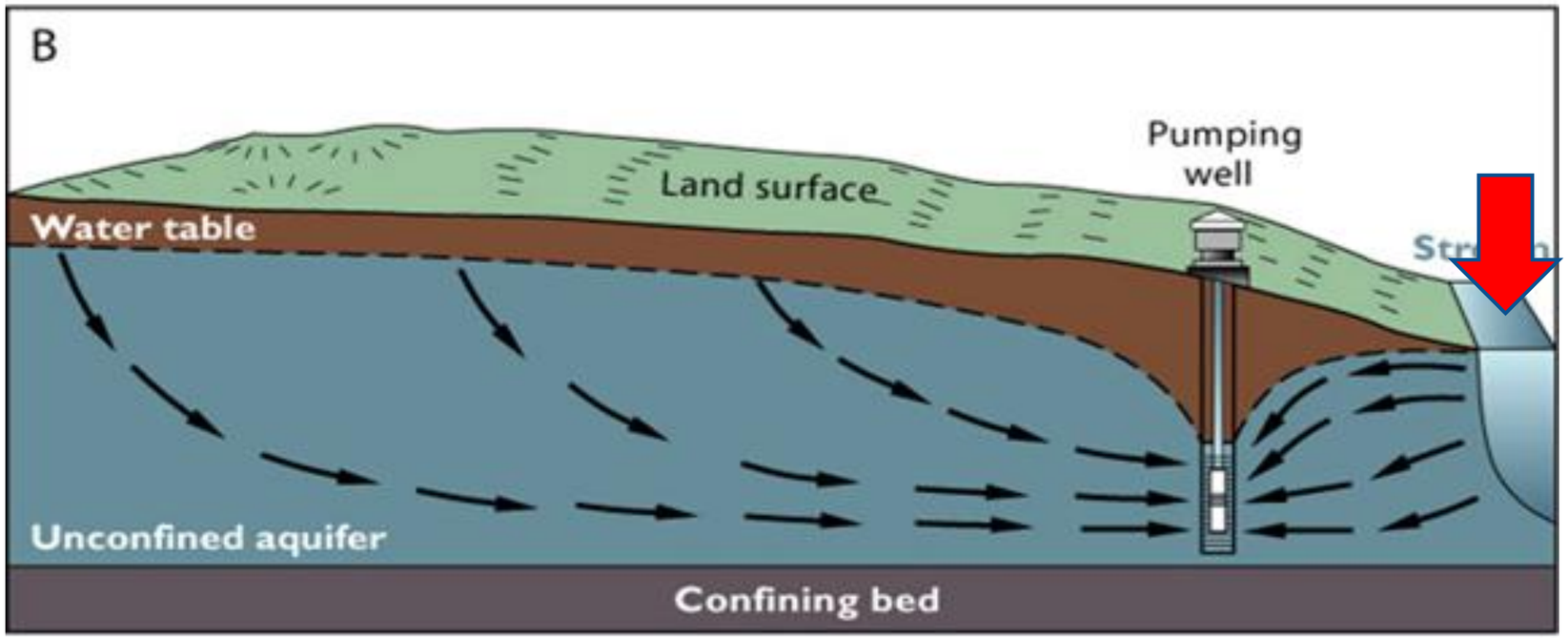
Statutory Types of Groundwater

Administered based on location and connection to surface water



Tributary Water

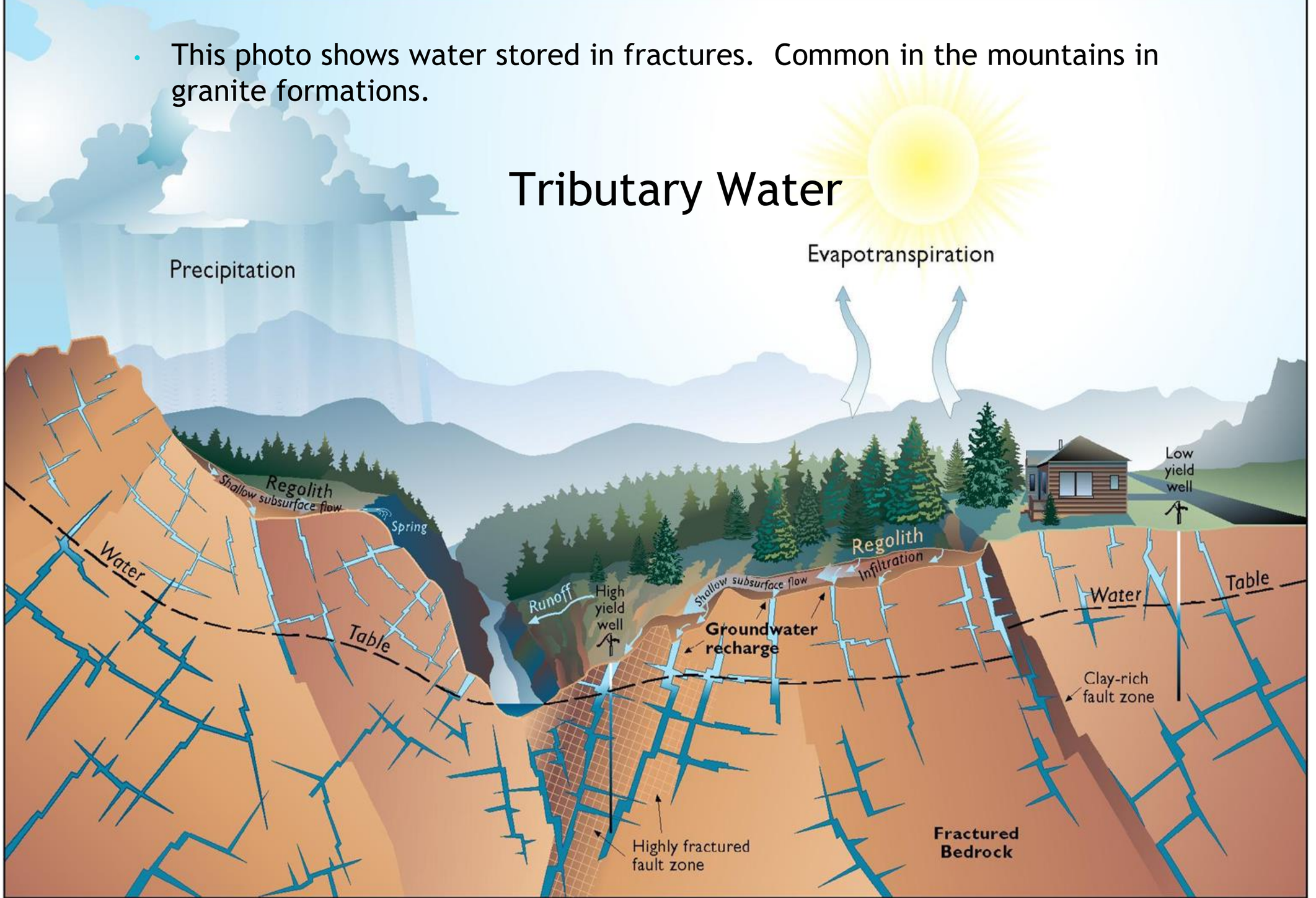
- Impact of wells on Colorado's Rivers: wells reduce the flow in local streams.
- This photo shows water stored in pores (like a sponge).



Pumping well intercepting discharge to a stream

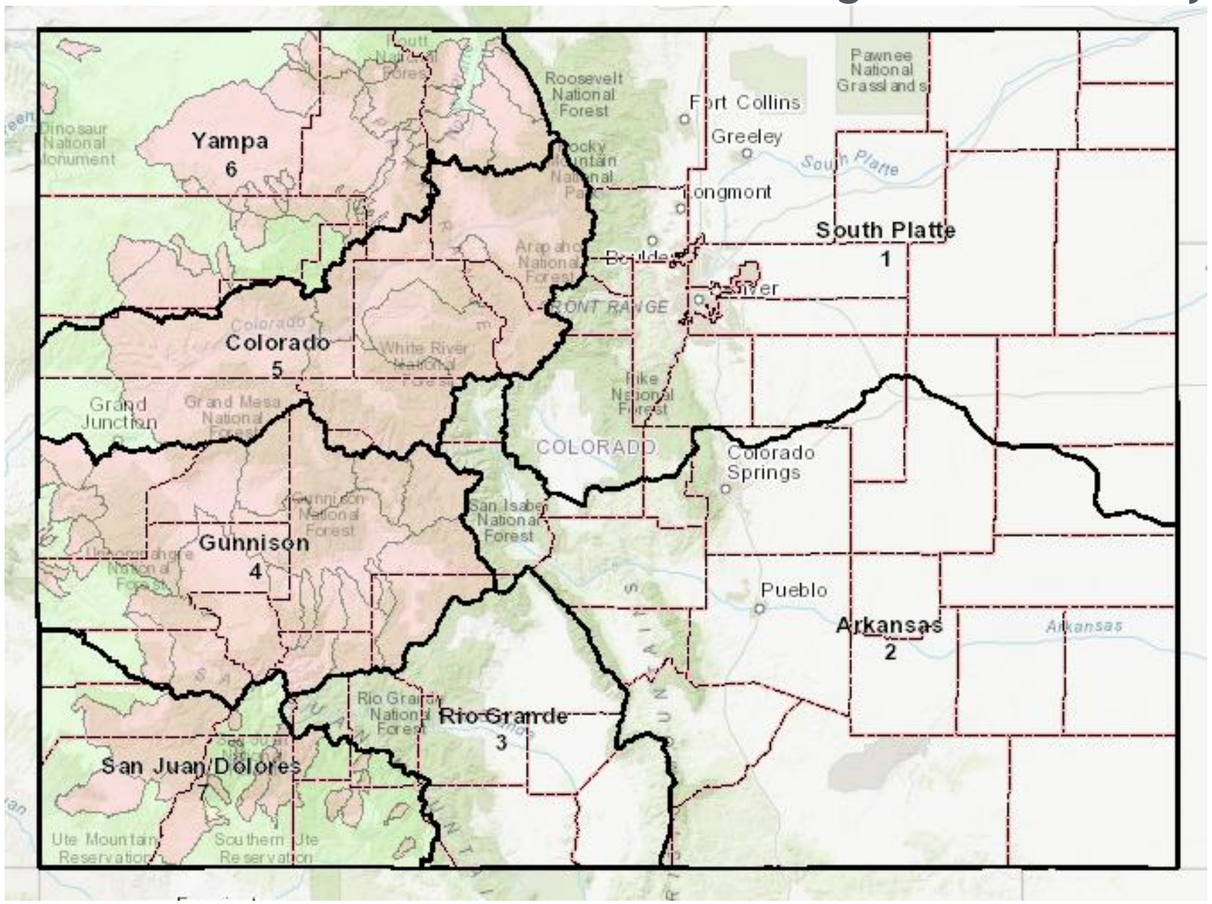
From Winter and others, 1999

- This photo shows water stored in fractures. Common in the mountains in granite formations.

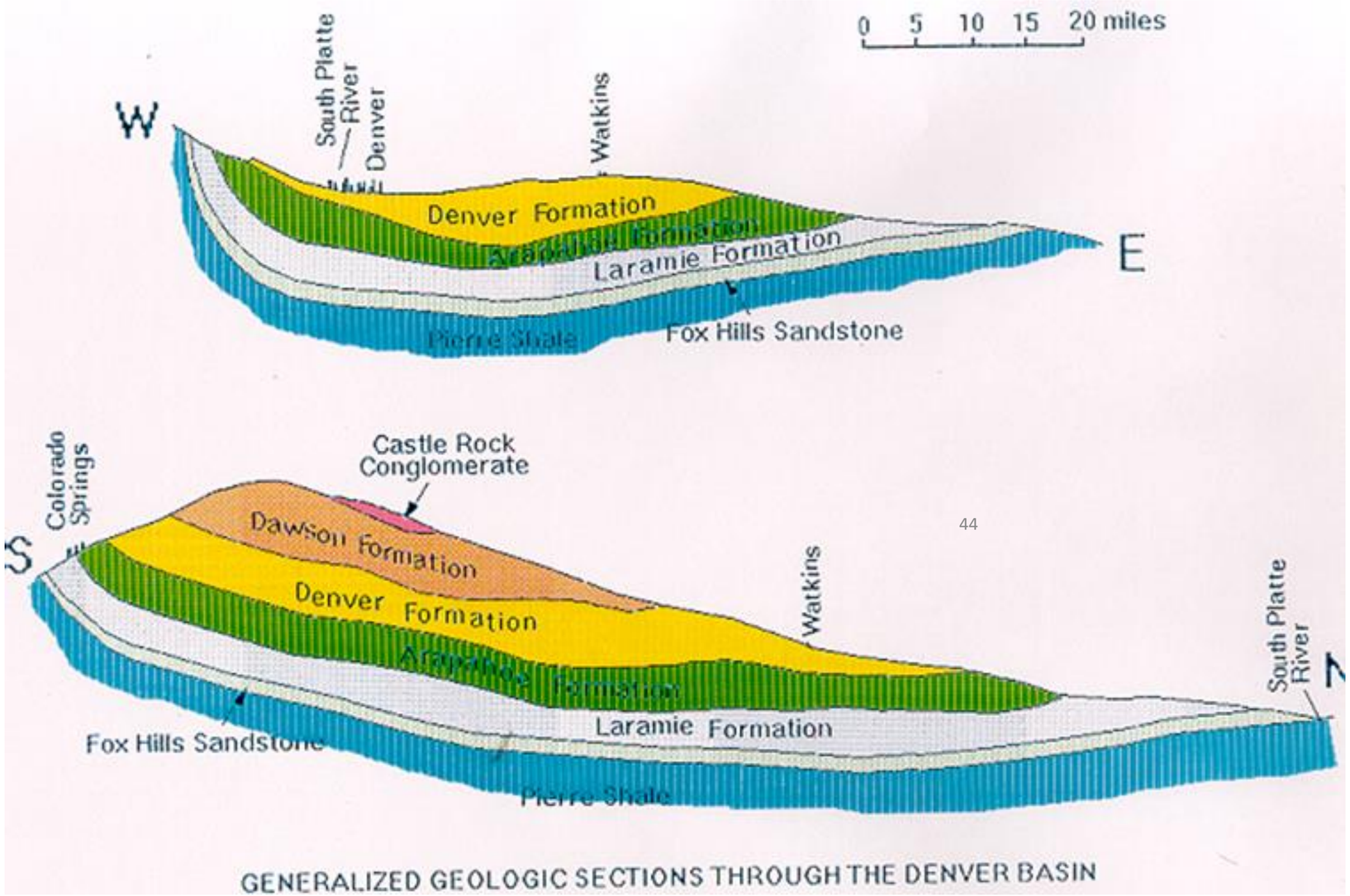


Over-Appropriated/Critical Areas

- Augmentation plans are required in over-appropriated areas
- Divisions 1, 2, and 3 are entirely over-appropriated. ▫ Aug plans often required.
- Divisions 4-7 have some areas where water right calls do not yet occur.



Denver Basin



GENERALIZED GEOLOGIC SECTIONS THROUGH THE DENVER BASIN

Statutory Types of Groundwater

Tributary: connected with surface water

- Administered in priority (senior and junior water rights)
- Non-exempt permits in overappropraited areas require an augmentation plan
- Renewable

Nontributary: limited connection with surface water

- Nonrenewable
- Denver Basin – system of aquifers with limited connection to surface water and are not administered in priority
  - Nontributary (NT) - no augmentation plan required for non-exempt permits
  - Not-nontributary (NNT) - augmentation plan required for non-exempt permits

Designated Groundwater: Area on eastern plains with limited surface water, has tributary, NT, and NNT water

- Administered under Designated Basin Rules by Ground Water Commission
- Subject to Ground Water Management District Rules
- Large capacity permits may require a replacement plan

Does the prior appropriation doctrine apply to all water in the state?

- All surface water and groundwater are presumed to be "**tributary**"
  - Tributary = there is a connection between it and rivers, and will be administered under priority system

- What is <u>not</u> administered under the priority system?
  - Nontributary groundwater (Denver Basin aquifers)
  - Exempt Wells (statutory exemption)

- What about <u>nonexempt</u> wells? Next slide…

Nonexempt **Well Administration**

Non-exempt wells are required to be administered in the priority system similar to surface water rights.

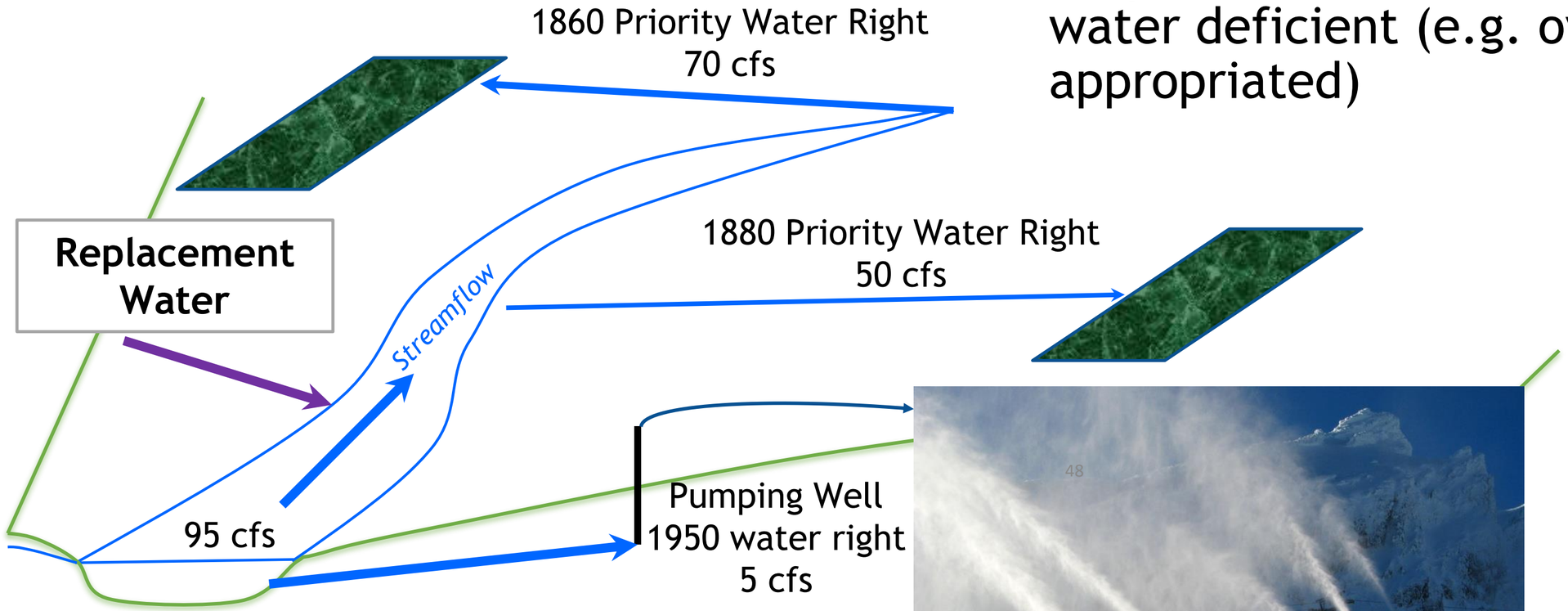
Must wells be augmented? Why not curtail pumping similar to junior surface water rights?

Can curtail pumping, though **depletions may continue to affect the stream for days, months, or years**. Injury to senior right would continue to occur...

Result: Augmentation Plan required

Augmentation Plans

- Approved by the water court
- Replacement water must be provided in like ***time***, ***location***, ***and amount***
- Required in areas that are water deficient (e.g. over-appropriated)



Augmentation Plans
Allow water use “out of priority”
Provide alternate water to the “Seniors”

Additional Vocabulary

- Conditional Water Right: a new appropriation that has not yet been perfected (e.g. work has not been completed, full amount has not yet been diverted or put to use).
  - Diligence: report of progress toward "perfecting" the water right filed with the court every 7 years, required for conditional water rights to avoid abandonment.
- Absolute Water Right: an appropriation with has been "perfected" as recognized by the court by diverting the water in priority and putting it to beneficial use.
- Abandonment: when water rights are not exercised for 10 or more years and are abandoned through the court
  - **Abandoned water rights cannot be reinstated. A new water right must be applied for.**

*The above concepts do not apply to nontributary water rights, Denver Basin water rights, or to the Designated Basins.