COLORADO WATER CENTER
COLORADO STATE UNIVERSITY

Colorado Water 101

September 21, 2023

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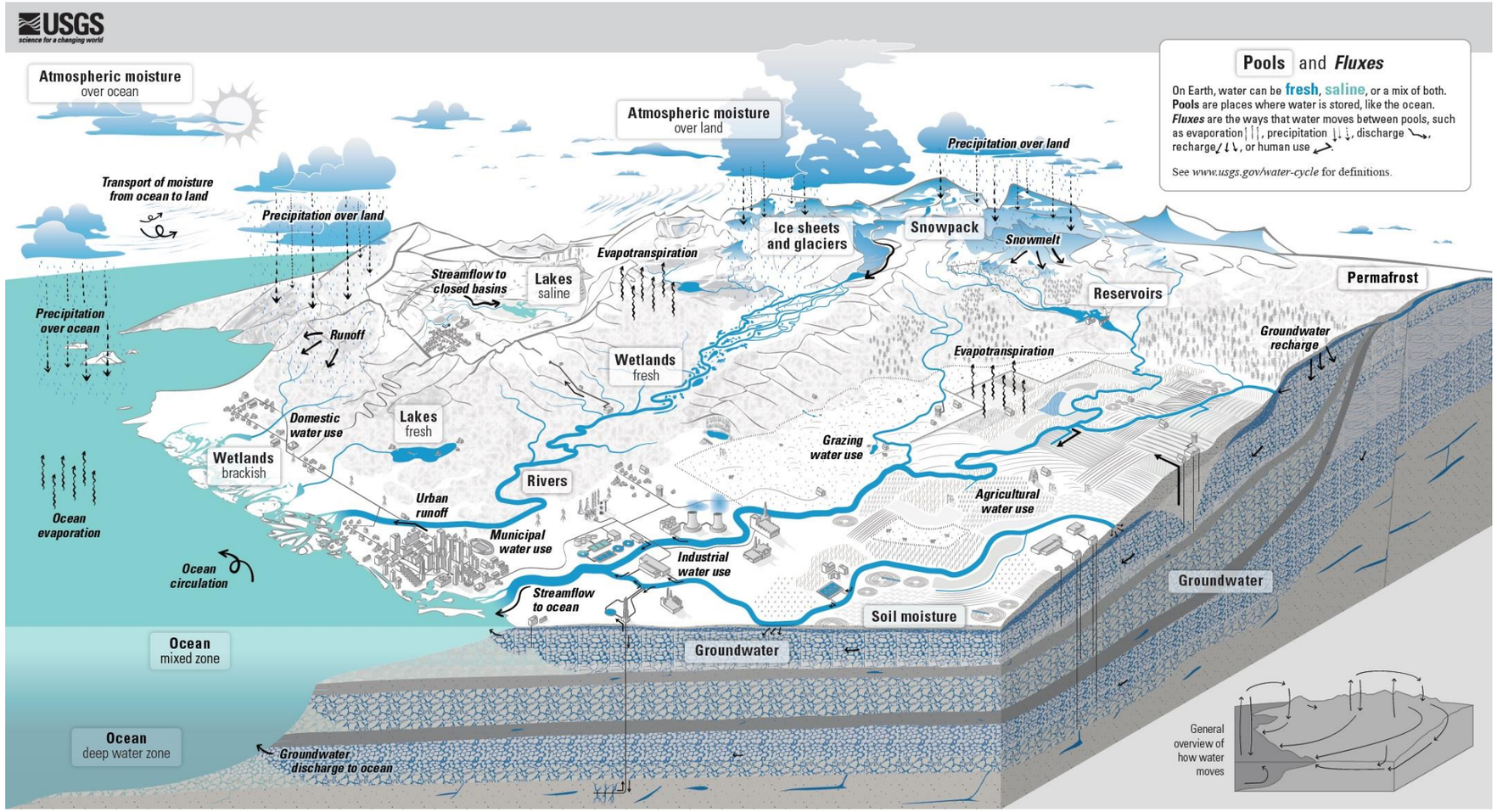
ENGAGEMENT AND EXTENSION
COLORADO STATE UNIVERSITY

Discussion Topics

- How does water move through the environment?
- Where does Colorado's water come from?
- How does Colorado manage its water?
- What is Colorado's water used for?

Water Movement through the Environment



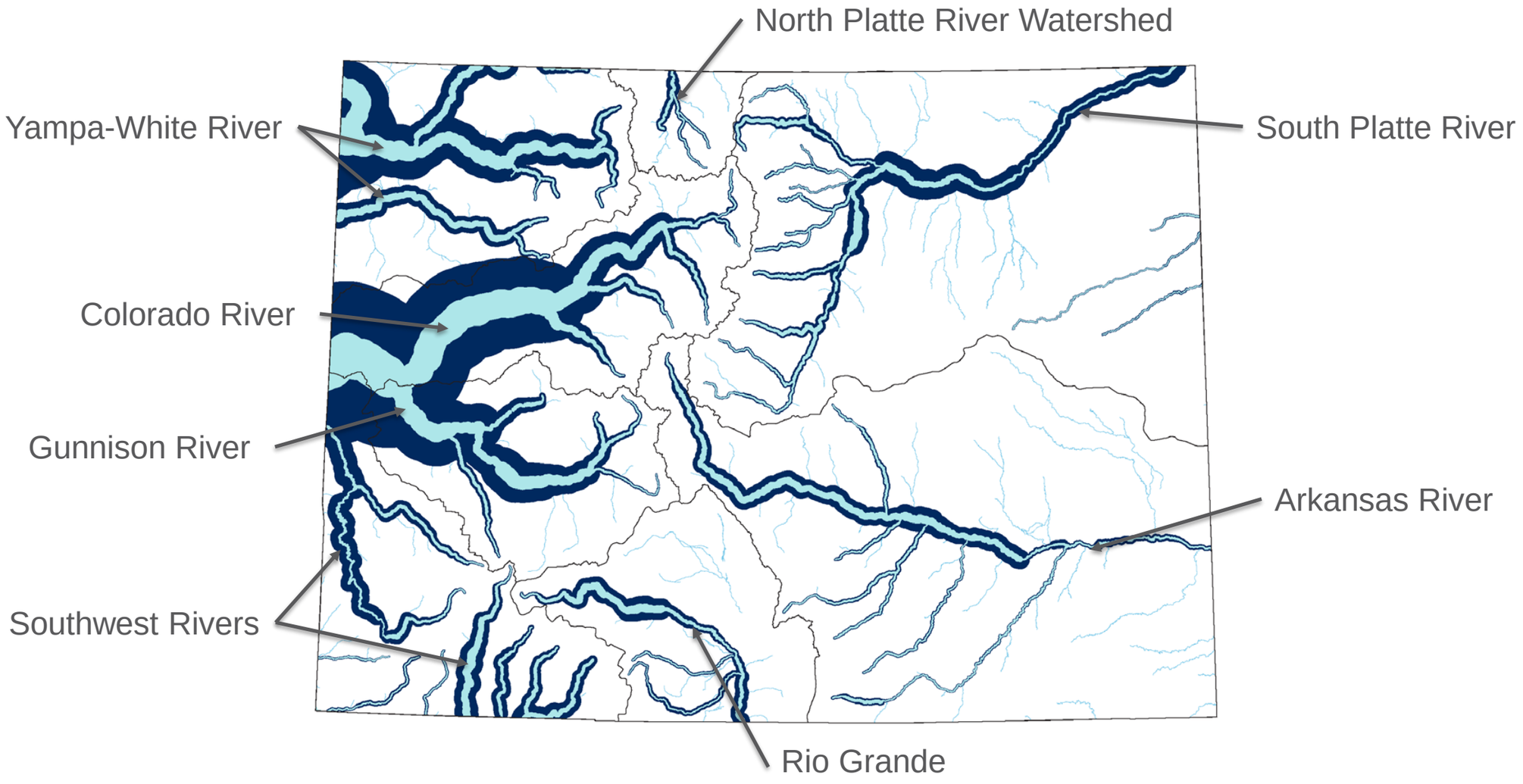
Water moves in a cycle and is never created or destroyed

Water Movement through the Environment

Where is all of the earth's water?

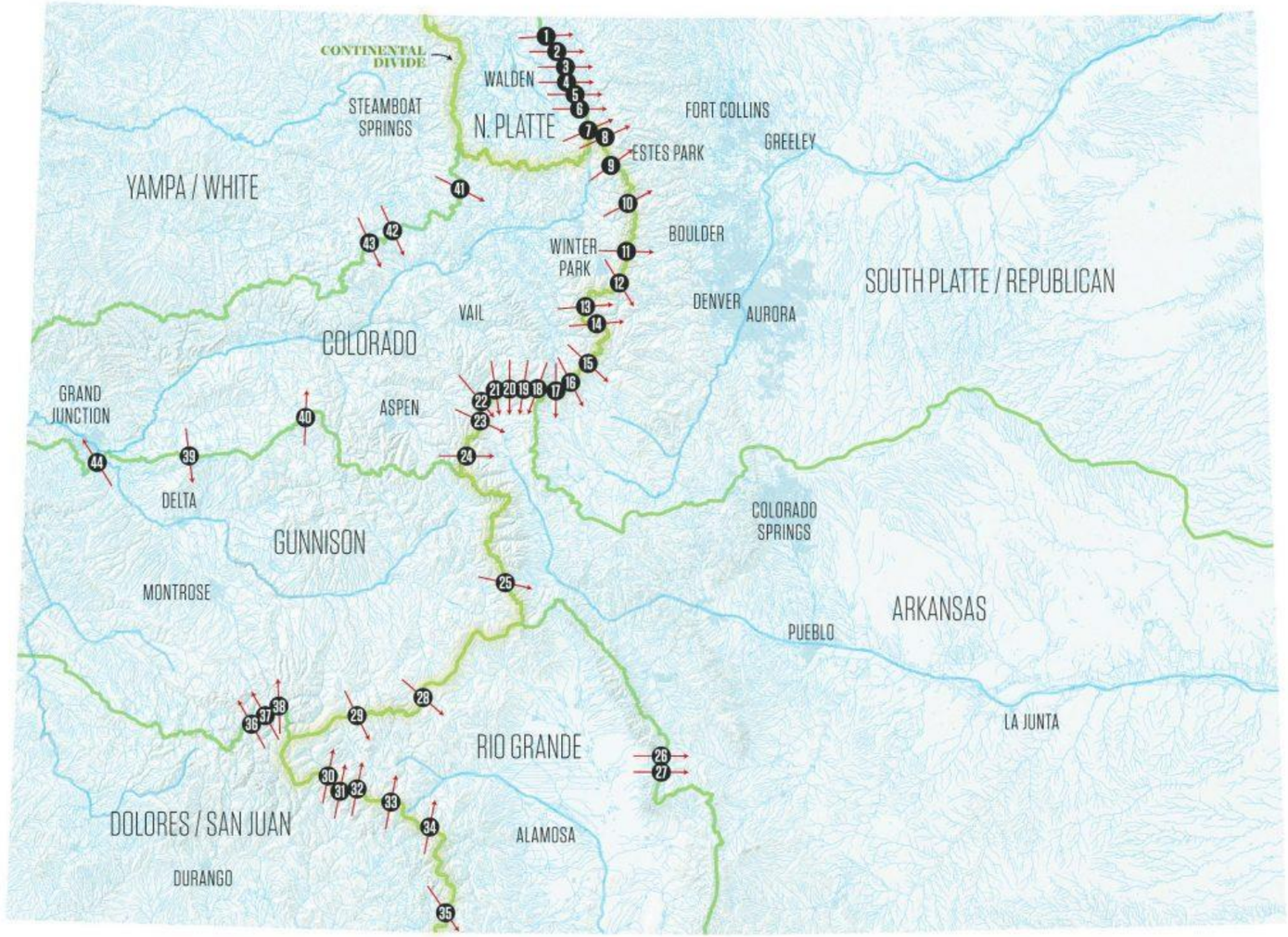
Form of Water	Percent of Total Water		
Saline Water	97.5%		
Oceans	96.6%		
Groundwater	0.9%		
Fresh Water	*2.5%*	*Percent of Freshwater*	*Residence Time*
Streams	0.0002%	0.006%	Hours to weeks
Lakes	0.008%	0.29%	Months to Years
Groundwater	0.8%	30.1%	Years to Millennia
Ice Caps and Glaciers	1.7%	68.7%	Centuries to Millennia
Atmosphere	0.001%	0.04%	Days to weeks

Colorado's Water Resources - Rivers



From 2023 Colorado Water Plan

Water Management in Colorado



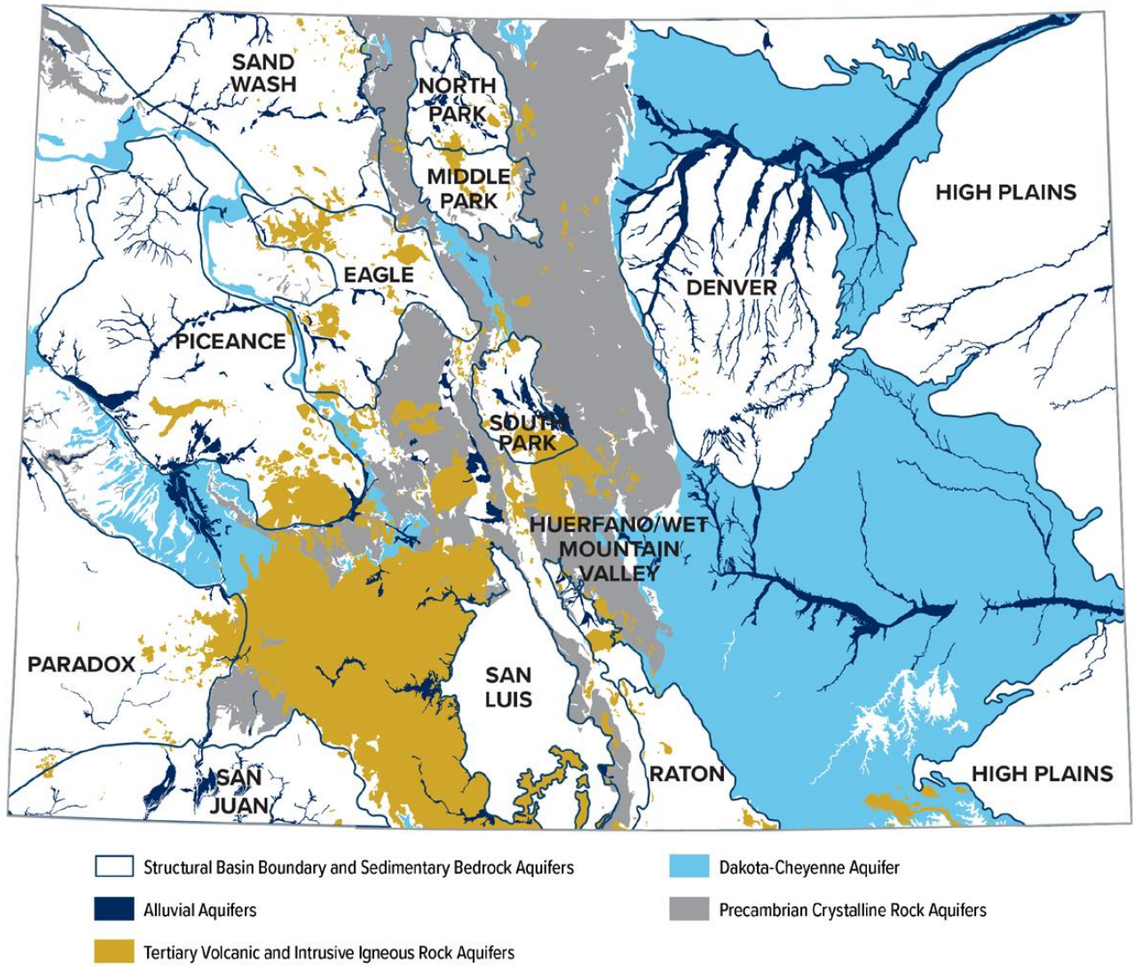
Colorado has a total of 44 structures that divert water from one watershed to another

The majority of these diversions divert water from the western watersheds of the Continental Divide to the eastern watersheds

The largest diversion is the Redlands Power Canal, which diverts over 500,000 acre-ft per year from the Gunnison to the Colorado River

The largest diversion to the Eastern Watersheds is the Adams Tunnel, which diverts over 200,000 acre-ft per year from the Colorado to South Platte River Watershed

Colorado's Water Resources - Groundwater



From 2023 Colorado Water Plan

Two Main Types of Groundwater Aquifers

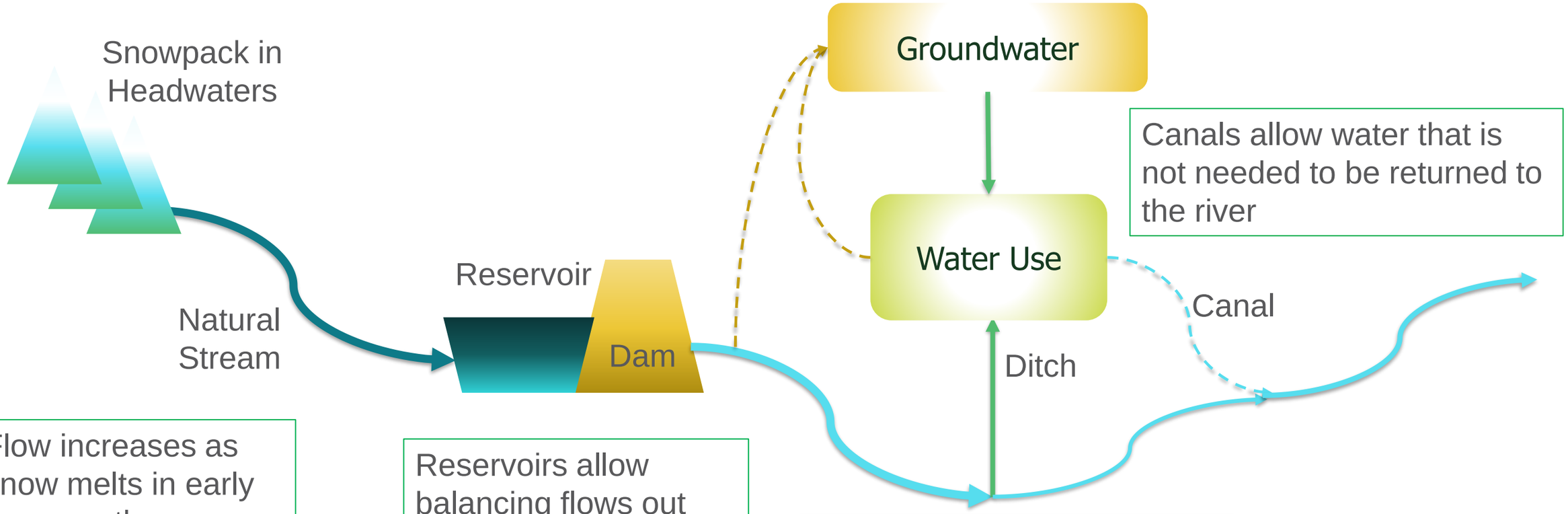
Alluvial Aquifers –
Tend to be near the ground surface and act as extensions of nearby streams

Bedrock Aquifers –
Tend to be well below the ground surface, are not well connected to streams, and are often non-renewable

- 85% of Colorado's groundwater is used for irrigated agriculture
- 18% of Colorado's population relies on groundwater for their home water supplies
- 60% of groundwater use is from non-renewable sources

Water Management in Colorado

Streams, Reservoirs, Canals, Ditches, and Groundwater



Canals allow water that is not needed to be returned to the river

Flow increases as snow melts in early summer, then decreases later in summer

Reservoirs allow balancing flows out over the summer when water is needed

Ditches allow water to be moved from natural stream to where it is needed

Water Management in Colorado

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Colorado Follows the Prior Appropriations Doctrine to Define Rights to Water Use

- All water in the state of Colorado is owned by the state
- The right to use the state's water is administered using the **Prior Appropriations Doctrine**
- Elements of the Prior Appropriation Doctrine are:
  - Water must be used for a beneficial purpose as defined by the state;
  - The earliest uses of water have the highest priorities for use;
  - The use of water is defined as a usufructuary right that consists of five characteristics:
    - Beneficial use of the water;
    - Point of diversion of the water;
    - Area of use of the water;
    - Rate at which water can be diverted;
    - Maximum amount of water that can be used.

Decisions on granting, rejecting, or modifying water rights is through Water Courts

Water Management in Colorado

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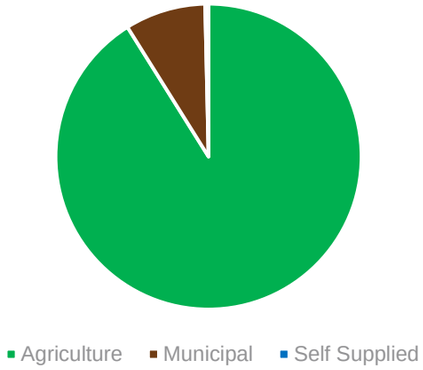
Agreements to share water with neighboring states through Compacts and Decree

Compact/Decree	Year	States	Notes
Colorado River	1922	Wyoming, Utah, New Mexico, Nevada, Arizona, California	In the news recently
Upper Colorado River	1948	Wyoming, Utah, New Mexico	
Animas-La Plata Project	1969	New Mexico	
La Plata River	1922	New Mexico	
Rio Grande	1938	New Mexico, Texas	May become a decree
Costilla Creek	1944	New Mexico	
Arkansas River	1948	Kansas	
South Platte River	1923	Nebraska	
Republican River	1942	Nebraska, Kansas	
Laramie River	1957	Wyoming	Decree
North Platte	2001	Wyoming, Nebraska	Decree

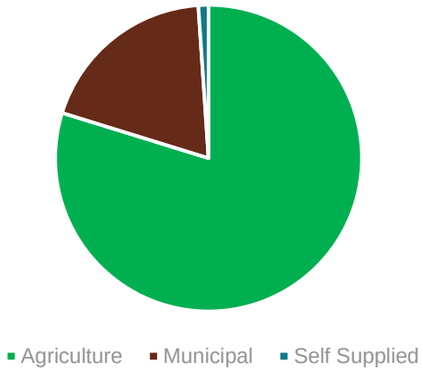
Colorado's Water Uses:

Colorado's largest uses are for Irrigated Agriculture and Municipal Purposes (2015 USGS)

Total Water Extracted ~ 11 Million Acre-ft



Total Water Consumed ~ 3.7 Million Acre-ft



Irrigated Agricultural Use:

- Extracted = 8999.64 Mgal/day
- Consumed = 2651.1 Mgal/day
- Irrigated area = 3,036,930 acres

Municipal Use:

- Extracted = 843.95 Mgal/day
- Consumed (billed) = 636.69 Mgal/day
- Population = 5170.1
- Per capita use = 163 gallons/person/day

Self-supplied Use:

- Extracted = 35.37 Mgal/day
- Consumed = 35.37 Mgal/day
- Population = 286.474
- Per capita use = 123 gallons/person/day

These are just the basics of Colorado Water and there are many details of how the entire systems works together which will be discussed in further sessions.

Questions?