Reservoir Administration Guidelines

Irrigationists Symposium

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Photo: Spinney Mountain Reservoir

General Administration Guidelines for Reservoirs

Purpose:

- Basic Practical Guide for DWR Staff
- Institutional Knowledge
- General Statewide Principles
- Starting Point for Decision Making
- Provide Water Users (Consultants & Attorneys) with an understanding of General Reservoir Operations

General Administration Principles

- One Fill Rule
- Fill Year
- Carryover
- Capacity
- Storable Inflow
- Refill Rights
- Paper Fill / Bookover
- Out of Priority Storage
- Evaporation
- Seepage
- Volumetric / Gage Height
- 72 Hour Rule
- Surcharge
- Adequate Measurements
- Administrative Accounts
- Enforcement

One Fill Rule

- A water user may store water whenever water is physically available, its water right is in priority, and the decree for the water right has not been filled.
- A user is entitled to only one filling of a reservoir water right in any one year unless a refill right exists.
- A user cannot place a call for water once the single fill has been satisfied until the next seasonal year.
- The user can store other water in the reservoir, such as foreign water or under a junior priority or free river conditions.

Fill Year

- A seasonal fill year of November 1 to October 31 is presumed to be the fill year unless otherwise decreed or adopted by the water user.
- Some municipal reservoirs have adopted an alternate fill year, typically, April 1 to March 31.
- Once established, the fill year cannot be changed.

Carryover Water

- Any water remaining in the reservoir at the end of the fill year is called “carryover” and is credited to the next year’s fill.
- This will limit the amount of new water that can be stored during the next year’s fill year.
- In general, a principle of “first in, first out” is applied when the uses for a senior and junior storage right are the same and owned by the same water user.
- In more complex situations, separate accounts for the various water rights can be tracked and carried over in those separate accounts.
- A reservoir owner must keep track of different water types in the reservoir or all carryover will count against the senior water right.

Decreed versus Physical Capacity

- A conditional water right is typically obtained prior to investment into construction of a new reservoir.
- Once constructed, the actual physical capacity may differ from the decreed capacity.
- If the physical capacity is less than the decreed capacity, then the allowed amount of fill will be based upon the physical capacity rather than the decreed capacity.
- When physical capacity is greater than decreed capacity, a fill is based upon the decreed capacity.

Storable Inflow

- Storable inflow is the amount of water that is physically and legally available for storage in a reservoir under a water right.
- If a reservoir operator chooses to bypass water that they would otherwise have been able to store in priority, the bypassed water is credited to the storage right and the right is considered satisfied at the time it would have been had the water not been bypassed.
- Storable inflow also includes any out-of-priority storage by upstream junior storage rights.
- The water level in a reservoir does not have to be rising or volume increasing in order for storage to occur and new water can be placed into storage in a reservoir at the same time as previously stored water is being released.

Refill Rights

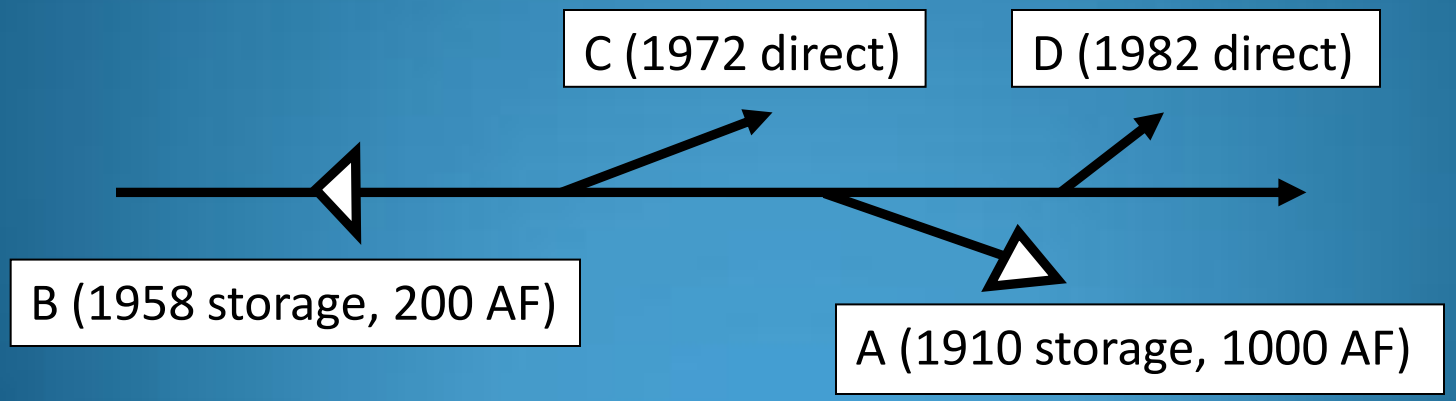
- Some reservoirs operate under decrees that provide for refill rights.
- Refill rights are used to replace water from the original fill that was lost through evaporation and seepage or released for beneficial use from the reservoir during the same fill year.
- The volume of the refill right (decreed or physical, whichever is smaller) and the volume of space made available by all outflows of the original fill water are both limiting factors of a refill right.

Paper Fill including Bookover

- A paper fill is an accounting mechanism whereby storable inflow is charged against a storage water right either because the reservoir owner elected not to physically divert or store water under that right or a junior upstream reservoir diverted the storable inflow out of priority.
- Typical examples:
  - Owner chooses to take junior vs. senior right
  - Sedimentation or storage restrictions limit capacity
  - Foreign water limits the fill of the reservoir (unless owner chooses to book over foreign water for priority water)
- Exceptions may be granted upon approval of the Division Engineer for situations involving safety concerns or none injury.

Out of Priority Storage Statute
allowed under CRS 37-80-120(1)

- Out of Priority Storage may be permitted in an upstream reservoir as long as it can be promptly made available to downstream senior storage rights that were unable to fill.
- Presently, out of priority upstream storage may only occur against a storage water right within the South Platte Basin in accordance with a plan approved by the Division Engineer that assures none injury.



Evaporation

- When an on-channel reservoir is not in priority, the operator is required to release stored water to offset the amount of increased losses due to the increase in free water surface area of the stream to assure that the total natural flow is passed through the reservoir as if the reservoir did not exist.
- The gross amount of evaporation can be offset for on-stream reservoirs by any evaporation from previously existing free water surfaces, effective precipitation that would have been consumed by any native vegetation, and/or groundwater consumption due to any native phreatophytes.
- When determining the actual evaporation based on the actual surface area of the reservoir, more site-specific information may be required depending upon decree conditions, size of reservoir, impact of reservoir evaporation on other users, and/or availability of data.

Seepage

- As soon as water stored in a reservoir or in the process of being delivered by a ditch seeps through the bottom or sides of the structure, it is considered waters of the state subject to the prior appropriation doctrine.

- Absent a specific decreed appropriation to the contrary, water flowing from the toe drain of a dam associated with a reservoir is considered seepage and cannot be considered a release or be used.

- A reservoir owner may not recapture seepage water from a reservoir as part of the original storage right unless specifically allowed by decree and may not recapture fully consumable water without dominion and control accounting approved by the division engineer.

Volumetric versus Gage Height Decrees

- The amount of storage water could be defined in a decree as a specific volume or up to a specific gage height in the reservoir.
- A “volumetric” decree is filled once the total volume of water as measured into the reservoir (plus any carryover and paper fill volume) reaches the decreed amount or physical amount, whichever is less.
- A “gage height” decree is filled once the level in the reservoir (plus any paper fill amount) reaches the decreed gage height.
- The difference is that while filling under these two types of rights, evaporation and seepage does not count against the gage height decree but does count against the volumetric decree.

Temporary Detention (72 Hr Storage)

- Direct water rights may be temporarily detained for up to 72 hours in order to allow more efficient or effective beneficial use of the water.

- If storm water is not diverted or captured in priority, by exchange or under a substitute water supply plan or decreed plan for augmentation, Colorado Water Law requires it to be released. The State Engineer's current policy requires that all water stored out of priority be released to the stream system within a maximum of 72 hours after detainment.

Surcharge

- Surcharge is the volume of water that may be impounded but not retained within a reservoir between the normal spillway and the crest of the dam. It is not considered part of the reservoir fill under the water right as it does not meet the statutory definition of storage (CRS 37-92-103(10.8)).
- Unless free river conditions exist or an exchange is made to "recolor" (or change the character of) this water, water impounded in surcharge must be released within 72 hours, which may require operation of the reservoir outlet works.

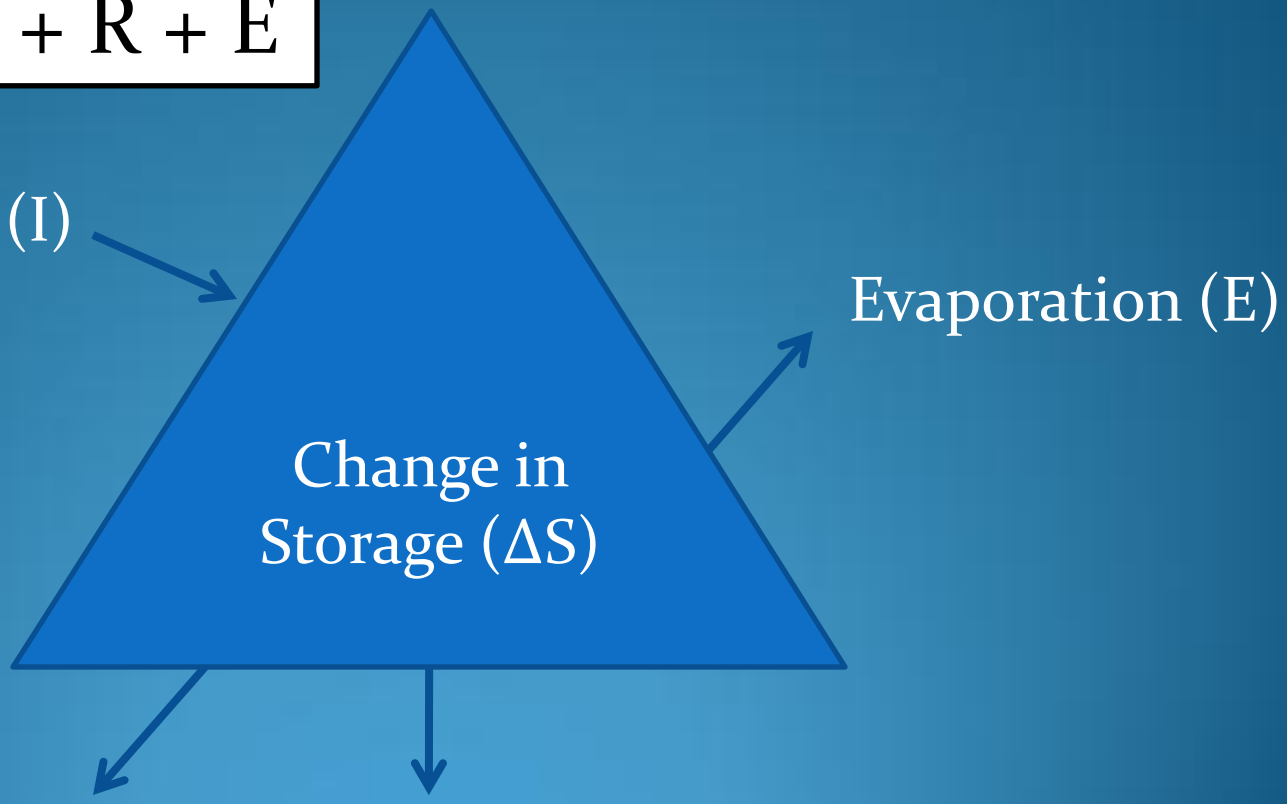
Strontia Springs Reservoir

Adequate Measurements

- Staff Gage
- Stage/Area-Capacity Tables
- Flumes, Weirs or Stream Gages to measure Inflow and Outflow
- Rain Gage and Evaporation Pan

Simplified Water Balance Accounting for On-stream Reservoirs

$$I = \Delta S + O + R + E$$



Administrative Accounts
(Owe-The-River Account)

- It is sometimes necessary to use water balance type accounting when it is difficult to directly measure all of the inflow into an on-stream reservoir.

- The determination of inflow is a day in arrears because of the dependence on change in storage information. An administrative account is used to keep track of "errors" in release amounts because of not knowing the inflow until a day late.

- Steps must be taken each day to adjust for either too high or too low an estimate of the actual inflow each day and to keep the administrative account as near to zero over time as possible.

Enforcement Principles

- Orders to Install Adequate Measurement Devices
- Orders to Report Readings
- Orders to Release Out-of-Priority Storage
- Orders to Remove Unnecessary Obstructions in the River
- Dam Safety Restrictions and Breach Orders


Questions?
Photo: Horsetooth Reservoir