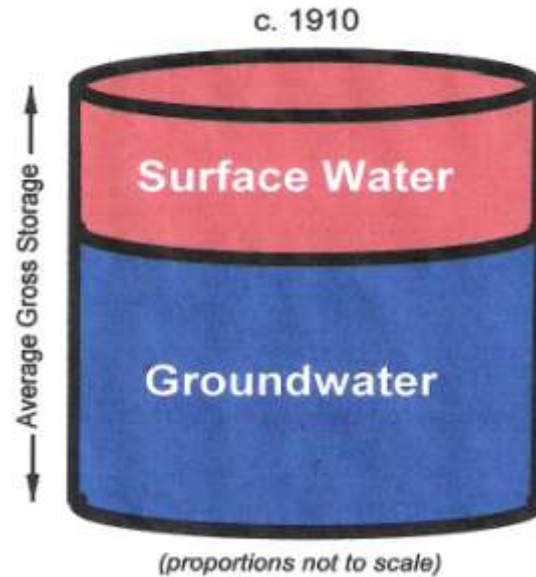


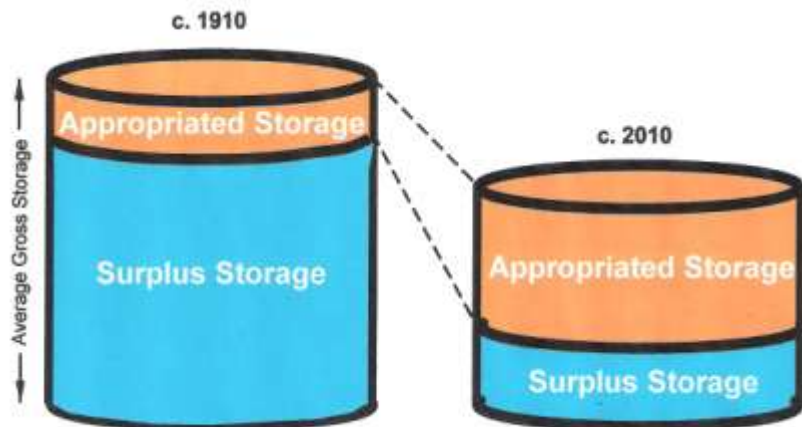
WHEN THE WELL RUNS DRY

The Coming of a Diversified and Sustainable Supply

The traditional freshwater supply of Virginia has been composed of two sources: **surface water** withdrawals, from rivers, lakes, and reservoirs, and **groundwater** withdrawals, chiefly from deep, artesian aquifers. The historical growth of surface water withdrawals has been **sustained chiefly by a long period of dam and reservoir construction**, which has increased the local capture and storage of stream runoff. The historical growth of groundwater withdrawals has been **sustained by a steady and long term depletion of artesian aquifers** — evidenced by the decline of artesian water levels. Unfortunately, the cheap and easy-to-get water has already been captured. New reservoirs, for example, are more and more expensive and contentious, and the vast artesian-groundwater supply of the Coastal Plain is in stubborn overdraft, with the supply steadily shrinking



For the purposes of water supply planning, picture the traditional water supply as a reservoir composed of two parts: **appropriated storage** and **surplus storage**. Appropriated storage represents the portion of the total supply from which water is currently withdrawn. Surplus storage represents the portion of the supply from which additional water can be withdrawn in the future. Increases in appropriated storage reduce the quantity of water in surplus storage. **Average gross storage** is the sum of appropriated storage and surplus storage and, for practical purposes, represents the total water furnished by the water cycle and available for human use.¹



The historical trend in Virginia water supply has been characterized by 1) a reduction of total water storage—caused by the depletion of artesian groundwater and 2) a reduction of surplus storage—caused by both shrinkage of the average gross storage and growth of the appropriated storage. **In the future, additional groundwater withdrawals from the artesian-aquifer fraction of appropriated storage will reduce both surplus storage and gross storage even further. Moreover, although the construction of new reservoirs will permit increased surface water withdrawals (additional appropriated storage), the gain will come at the expense of surplus storage, which is reduced by the appropriation of future reservoir sites. Hence, future demand for freshwater will have to be met increasingly by dependence on desalination and especially water reuse/reclamation.**

1. The average gross storage is the volume of water stored in the surface water bodies and aquifers of a region at annual average stream flow and average aquifer storage measures. The volume of surface water storage varies with changes in climatic conditions, artificial reservoir capacity, and withdrawals. The volume of groundwater storage varies with changes in climatic conditions and withdrawals. If the rate of withdrawal exceeds the rate of aquifer recharge over time, then the volume of groundwater storage steadily shrinks.