

Explanation for map of the United States
Showing four major regions with respect to ground water
And their subdivision into ground-water provinces

This map is reproduced from Figure ¹² ~~11~~ ^{7.162} of a report
entitled "Ground water in the United States, a summary of ground-
water conditions and resources, utilization of water from wells
and springs, methods of scientific investigation, and literature
relating to the subject," by O. E. Meinzer, published as U. S.
Geological Survey Water-Supply Paper 836-D, in 1939. The map and
a more complete discussion is contained in a report entitled "The
occurrence of ground water in the United States, with a discussion
of principles," by O. E. Meinzer, published as U. S. Geological
Survey Water-Supply Paper 489, in 1923.

The following explanation for the map is a modification
of the one by Meinzer, and relates to the occurrence of saline water.
It is based on information (published and unpublished) available in
the Geological Survey. The modification was prepared by V. T.
Stringfield and George D. DeBuchananne, U. S. Geological Survey, in
collaboration with other members of the Survey.

As proposed in the Water Resources Division of the
Geological Survey, for the purpose of discussion of saline water in
this explanation and in a manuscript in preparation in the Water
Resources Division of the Geological Survey, water which contains
more than 1,000 parts per million dissolved solids or more than 60

percent sodium is considered to be saline in the sense that it is well above concentrations normally used for public water supply and irrigation. Slightly saline water may be regarded as that containing from about 1,000 to 3,000 parts per million of dissolved solids, ^{saline} moderately solid from 3,000 to 10,000 and highly saline water between 10,000 parts per million and approximate concentration of sea water which is 35,000 parts per million. Brines contain more than 35,000 parts per million of dissolved solids.

In the past, investigations of the ground-water resources by the U. S. Geological Survey have related chiefly to fresh water. In these studies attention was given to occurrence of saline water and its relation to fresh water only where the saline water is likely to contaminate the fresh supply, as in some coastal areas. However, with the interest in the availability of saline water, the Geological Survey has commenced an investigation of that resource.

Large quantities of slightly to moderately saline water ^{is} present in many parts of the United States. At some depth saline water occurs throughout the country excepting a few areas--as provinces C, R, P, and that part of province A bordering C. A few of the springs and streams yield saline water.

East-Central of Paleozoic and other older rocks

Province C is underlain by igneous and metamorphic rock (chiefly pre-Cambrian) and Triassic sandstone. These rocks yield many small supplies of good water. Little or no saline water is present. Province D is mountainous and is underlain by folded and faulted

Paleozoic strata, pre-Cambrian metamorphic rocks, and associated igneous rocks. These rocks supply fresh water to numerous springs, streams, and shallow wells. In some places saline water may be obtained from the deeper rocks. In province B the bedrocks (chiefly metamorphic) are overlain by glacial drift. Excepting along the coast, where the rocks are exposed to sea water, little or no saline water may be expected in this province.

Provinces E, F, and G are underlain by Paleozoic rocks, overlain in the northern part by glacial drift which contains no saline water. The Paleozoic sandstones and limestones yield fresh water to shallow wells, but deep wells in much of the area yield saline water. Much of the provinces E and F are underlain by formations that contain saline water. Province H is underlain by granite or other pre-Cambrian rocks with little or no saline water.

Atlantic and Gulf Coastal Plain region

In region A Cretaceous, Tertiary, and younger strata of sand and limestone include not only some of the most productive fresh water aquifers in the United States, but also aquifers with large quantities of slightly to moderately saline water.

Excepting for a broad zone along the inner boundary bordering provinces B, C, D, and E, the entire region is underlain by formations that contain slightly to moderately saline water.

In some places along the coast all the aquifers contain slightly to moderately saline water, some of which is due to encroachment of sea water in recent years. A large part of the lower Mississippi

Valley, extending from west Tennessee to the Gulf of Mexico, including southeastern Arkansas, all of Louisiana, and a large part of Mississippi and southern Alabama, is underlain by formations that contain slightly to moderately saline water. Most, if not all, of the State of Florida is underlain by formations that contain slightly to moderately saline water.

The principal artesian aquifer in Florida and southeastern Georgia, which is the source of water for thousands of wells and the largest limestone springs in the world, contains slightly to moderately saline water in southern Florida and in a broad coastal belt extending from St. Johns County on the Atlantic coast to Pinellas County on the west coast, as shown in Plate 16 of U. S. Geological Survey Water-Supply Paper 773-C.

Great Plains region

Provinces I, J, K, N, O, and Q, are, in general, underlain by Cretaceous formations--chiefly unproductive shale with interbedded or underlying sandstone that yields slightly to moderately saline artesian water. Flowing wells are especially abundant in province I. In large areas in province Q and in most of province J, except in the Black Hills, thick Cretaceous shales occur at the surface and are barren of water or yield only meager supplies of slightly to moderately saline water.

In the Roswell artesian basin in province M, Permian limestone yields large supplies of hard water some of which is moderately saline. Elsewhere, the Carboniferous rocks underlying this province

generally yield only meager supplies of moderately saline water.

Western Mountain region

In the Rocky Mountains (provinces F and R) and Sierra Nevada (Part of province U) the water supplies are obtained chiefly from springs, from streams fed by springs or melted snow, or from very shallow wells near streams. Little or no saline water is present in this province.

In province Q more or less flat-lying Paleozoic, Mesozoic, and younger strata form dissected plateaus with generally meager water supplies, some of which are saline. In provinces T, U, V, W, and X, sand and gravel in the broad valleys between mountain ranges yield numerous supplies--at many places large quantities. In some places these fresh-water supplies are underlain by slightly saline to highly saline water. In some places along the coast some of the aquifers yield slightly to highly saline water, due to encroachment of sea water.