THE SILVAN FLORA OF THE WHITE ROCK LAKE REGION WITH REFERENCE TO SOIL TYPES

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White Rock Lake, lying at the east border of the City of Dallas, has been the focus of considerable biological study during the past few years, and the writer has been especially interested in the trees growing in the region.

In this connection the question arose as to whether or not a correlation might exist between the species of woody plants found in the locality, and the physical and chemical structure of the various soils of the vicinity.

The recently completed Soil Survey of Dallas County[1] offers data upon the origin and nature of these soils, and these have been studied in connection with the woody vegetation growing upon them, this paper being the summation of the work. Because of the smallness of the area studied, such conclusions as are drawn should be considered indicative rather than demonstrative.

Topography

In 1913, the City of Dallas constructed a reservoir to form a reserve supply of water by placing a dam across White Rock Creek at a distance of five and a half miles from the center of the city. The lake thus formed has a length of slightly over three miles and at its greatest width measures about one and a half miles, the average being slightly less than a mile. At the upper end of the lake, White Rock Creek enters through a low, level flood plain,

[1] **Carter, William T.; Bauer, A. H.; Stroud, J. F.; Francis, W. B., and Bushnell, T. M.** (1924). "Field Operations of the Bureau of Soils" (1920). **U. S. Dept. of Agriculture, Bureau of Soils.**

which is densely timbered. At the extreme northern end the soil is high and practically bare of silvan growth, except for a fringe at the water's edge. This same scarcity of vegetation persists on the eastern side of the lake to the entrance of Dixon's Branch, where there is a considerable growth of trees and shrubs. From this point to the dam there is an alternation of wooded and bare areas. Back from the lake to the southeast, at a distance of about three-fourths of a mile, a heavily wooded area begins, which continues to the southern boundary of the region under consideration. The entire western side of the lake is devoid of large plats of timbered growth, occasional fringes or scattered copses occurring, the latter following influent streams. The elevation of the west side is greater than that of the east, varying from a smooth slope at the lower end to a more abrupt rise from the center to the north end.

On the basis of origin, two classes of soil are found in the region. The first of these is a residual soil, the nature of which is largely that of the parent rocks. The second class is an alluvium, which has been washed in from a variety of sources.

According to Carter and others, seven types of soil have been found in the region, of which four make up the Houston series, which have been derived from the underlying rock. The remaining three, Bell clay, Lewisville clay, and Trinity clay, are alluvial, but of different origins.

The Houston clay, shallow phase, is found principally along the larger drainage ways, and occurs in considerable areas along the eastern and northern shores of the lake. Its surface is usually sloping, with outcroppings of chalk on the steepest slopes.

The soils of the Lewisville series are found in old high stream terraces, and also in more recent terraces. The material has been washed from the limy soils of the Cretaceous coastal plains, the Houston clay, and associated soils. The Lewisville clay, brown in color, overlies a light brown clay subsoil. It is so similar to Houston clay that distinction is made only with difficulty. The surface is usually gently rolling, with good drainage.

The soils of the Bell series are composed of sediments washed from the calcareous Black Prairie and Fort Worth Prairie. They occupy high old stream terraces. Bell clay consists of a black or dark gray clay, overlying a dark subsoil, which in turn is subtended by gravel deposits at varying depths.

The Trinity clay, found in the present stream valleys, includes much overflow land, with little difference between surface soil and subsoil.

Methods, Results, and Discussion

Since the primary purpose of this study has been to determine whether or not a correlation exists between the silvan growth and the different soil types, there has been no attempt to include other ecological factors in the work.

The location of the soil types was determined from the map issued by the United States Bureau of Soils, and sixty-seven quadrats, each measuring fifty feet square, were laid off about the lake. Of these, twenty-seven were in Trinity clay, sixteen in Houston clay, shallow phase, ten in Lewisville clay, and fourteen in Bell clay. In each of these, counts were made of the woody vegetation, both primary and secondary growth being considered. Density, structure, and general appearance of secondary growth were noted.

Records of widely separated quadrats of one soil type were studied, first individually, and then in groups. Tables for the four soils were made and compared.

Seventy-one species of trees and shrubs grow in the area. Of these, thirty-three occur in all four soil types, although with varying frequencies. Others occur in three or less of the types. Trinity clay shows the greatest number of forms, with fifty-five species, Lewisville and Houston clay have fifty each, while Bell clay has forty-eight.

At first glance, a positive, but slight correlation between soil type and silva seems apparent. On closer scrutiny, however, the operation of ecological factors other than soil character explains the seeming parallel in large part. For

instance, of the six species found in three soil types, *Juniperus sp., Quercus macrocarpa, Schrankia uncinata, Smilax rotundifolia, Populus deltoides* and *Salix nigra,* the last two are missing from Bell clay. This soil is farthest removed from the water, and it appears that poor water supply, rather than the specific nature of the Bell clay, is the limiting factor.

On the other hand, *Cephalanthus occidentalis,* which grows only in low, damp soils, is absent from the Houston clay immediately around the lake. *Yucca sp.,* occurring commonly in relatively dry soils, is absent from Bell clay, which is far removed from the lake or any of its tributaries. A correlation with soil type would appear to be indicated in these instances.

Of the ten species occurring in a single soil type, one, *Salix babylonica,* is not indigenous, but is an escape from cultivation, and is found in a restricted area. Two more, *Salix amygdaloides* and *S. fluviatilis,* are represented by only one specimen each, and none of the others occurs in sufficient abundance to indicate that soil alone is the limiting factor.

The fact that the silva of the Trinity clay is somewhat richer than that of the other soils studied suggests a favorable substrate, but when one considers that this soil lies closest to the water table, it seems more probable that the explanation is the abundant water supply, and doubt arises as to the presence of any real correlation.

Conclusion

Except for certain isolated cases, it is concluded that the physical and chemical structure of the various soils studied is not the limiting factor which has determined the distribution of trees and shrubs in the White Rock Lake region, but that other factors account sufficiently for slight variations.