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# **WATER TABLE FLUCTUATION ON DIFFERENT FOREST HABITAT TYPES IN SOUTHEASTERN MANITOBA**

Project MS-213

by

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**FOREST RESEARCH LABORATORY  
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# WATER-TABLE FLUCTUATION ON DIFFERENT FOREST HABITAT TYPES IN SOUTHEASTERN MANITOBA

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I. E. Bella<sup>1</sup> and M. Talmon<sup>2</sup>

## INTRODUCTION

Field observations made in southeastern Manitoba suggest that in sandy soils the most important edaphic factor influencing forest growth and distribution is depth to water table (Mueller-Dombois, 1964a).

In 1962 a project was begun to determine water table fluctuation during the growing season in the more important forest site types in southeastern Manitoba. Such information should be of considerable value in explaining differences in tree growth and lower vegetation distribution in that area. This report presents results obtained from 1962 to 1965.

## DESCRIPTION

The study area is located in the Rainy River Section, L. 12, of the Great Lakes-St. Lawrence Region (Rowe, 1959). Locations of water-table plots are shown on Figure 1. Detailed forest description of the area is given by Mueller-Dombois (1964).

The topography is flat to gently rolling. Soils vary from silicious colloid-poor sands to colloid rich loams. Large areas of organic soils are present in flat, poorly drained depressions. Sites vary from very dry on sandy ridges, to very wet on organic terrain.

## METHOD

Locations for water table measurements were chosen so that all the prominent habitat types in the area would be sampled. The "om"<sup>3</sup> and "of" habitats, which are probably the most important ones for forest management purposes, had the greatest number of measurements (6 to 8 replications), the less important habitats had fewer (2 or 3 replications). At each measurement location a 3/4 inch steel pipe was sunk vertically into the ground to a depth of the lowest anticipated water table level. Before installation, 5/16 inch holes were drilled at 6-inch intervals in these pipes to facilitate water movement from the surrounding soil into the pipe. During the study several of these pipes became plugged with soil and had to be removed and cleaned. This resulted in the loss of some measurements.

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2 Forest Technician

3 Full name of habitats is given in the Appendix.

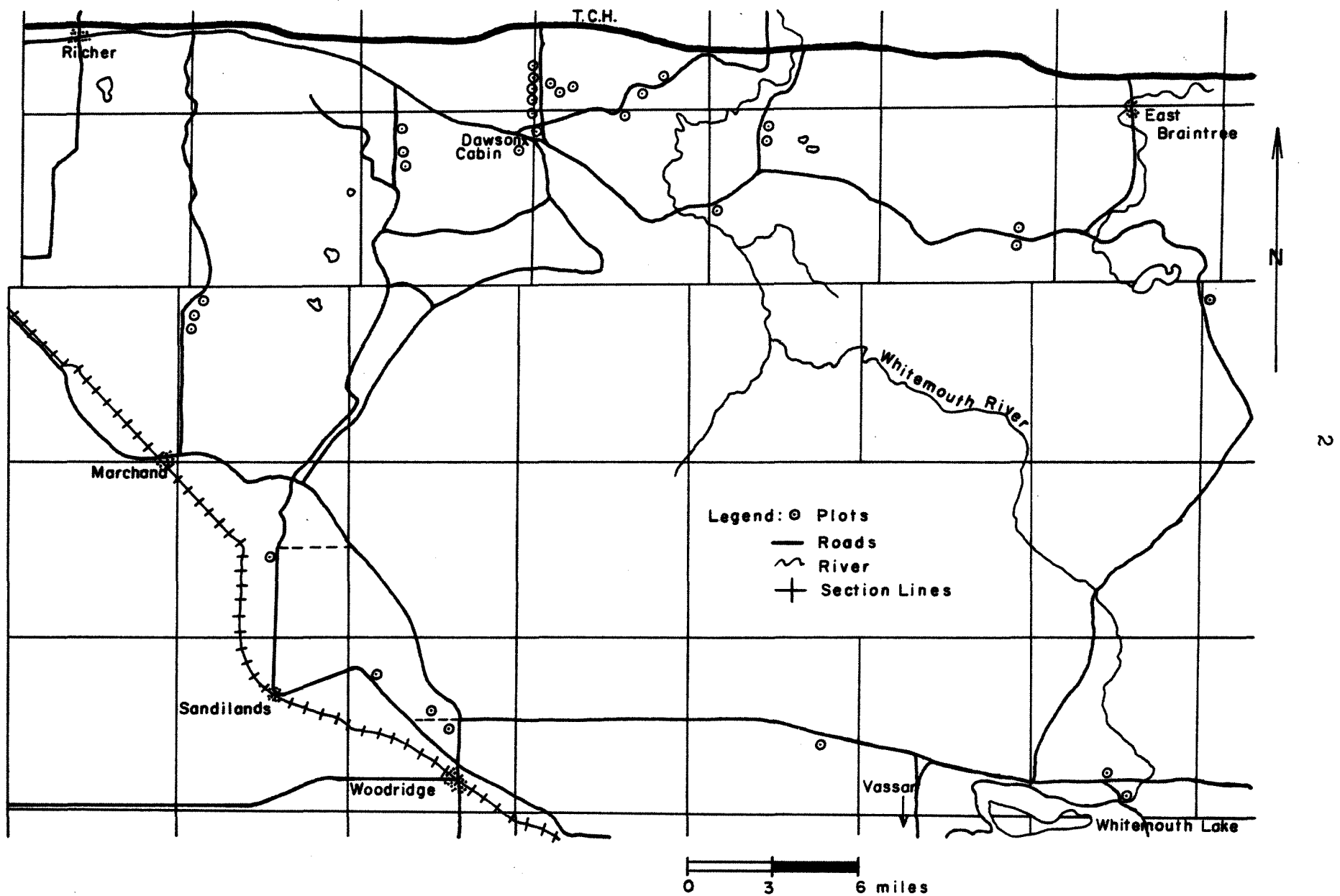


Figure 1. Location of water table plots in Southeastern Manitoba.

Results were summarized, averaged and plotted for each year by habitat types (Figures 2 to 5). Precipitation data based on daily weather observations at Sprague, Manitoba (Anon. 1962, 1963, 1964, 1965), were also included for the corresponding periods.

## RESULTS AND DISCUSSION

Figures 2, 3, 4 and 5 show fairly consistent trends of water table fluctuations on different habitat types during the four years of observations; dry sites had the lowest water table levels and moist and wet sites usually the highest. The year 1963 was exceptionally dry during late summer and autumn, which resulted in an atypical water table behaviour.

On the average, the water table level on dry (d) sites remained below 4 feet, sometimes dropping as low as 8 feet. On fresh (of) sites it stayed between 2 and 5 feet. On moist and wet sites, including organic soils, the water table usually remained within 2 - 3 feet of the surface, although in drier years a considerable drop was observed even on these sites (e.g. "mm" sites in 1963 and 1964).

Undoubtedly, a strong relationship exists between water table depth and the amount of precipitation. The present data, however, give only a rough indication of this relationship, because measurements of precipitation were carried out only at one location (Sprague, Manitoba), which probably does not provide an accurate picture of precipitation for the entire study area, and because of the study has been in progress for such a short time. Distribution of precipitation during the summer months is also an important factor influencing the movement of water table. In 1965, with an even distribution of precipitation throughout the summer months the average variation in water table depth was less than 2 feet on each habitat type. Substantial fluctuation was observed in 1963 and 1964 as a result of irregular precipitation pattern.

From these results the following general trend of annual water table movement seems to emerge: the highest level occurs during late spring or early summer due to melt-water and relatively high early summer precipitation; levels decline in July and a low point is reached in August or early September because of high evapo-transpiration and usually smaller amount of precipitation; levels remain constant or even increase in the following period (October, November), because of a decrease in evapo-transpiration rates.







Figure 3. Depth to water table and amount of precipitation during the growing season, 1963.

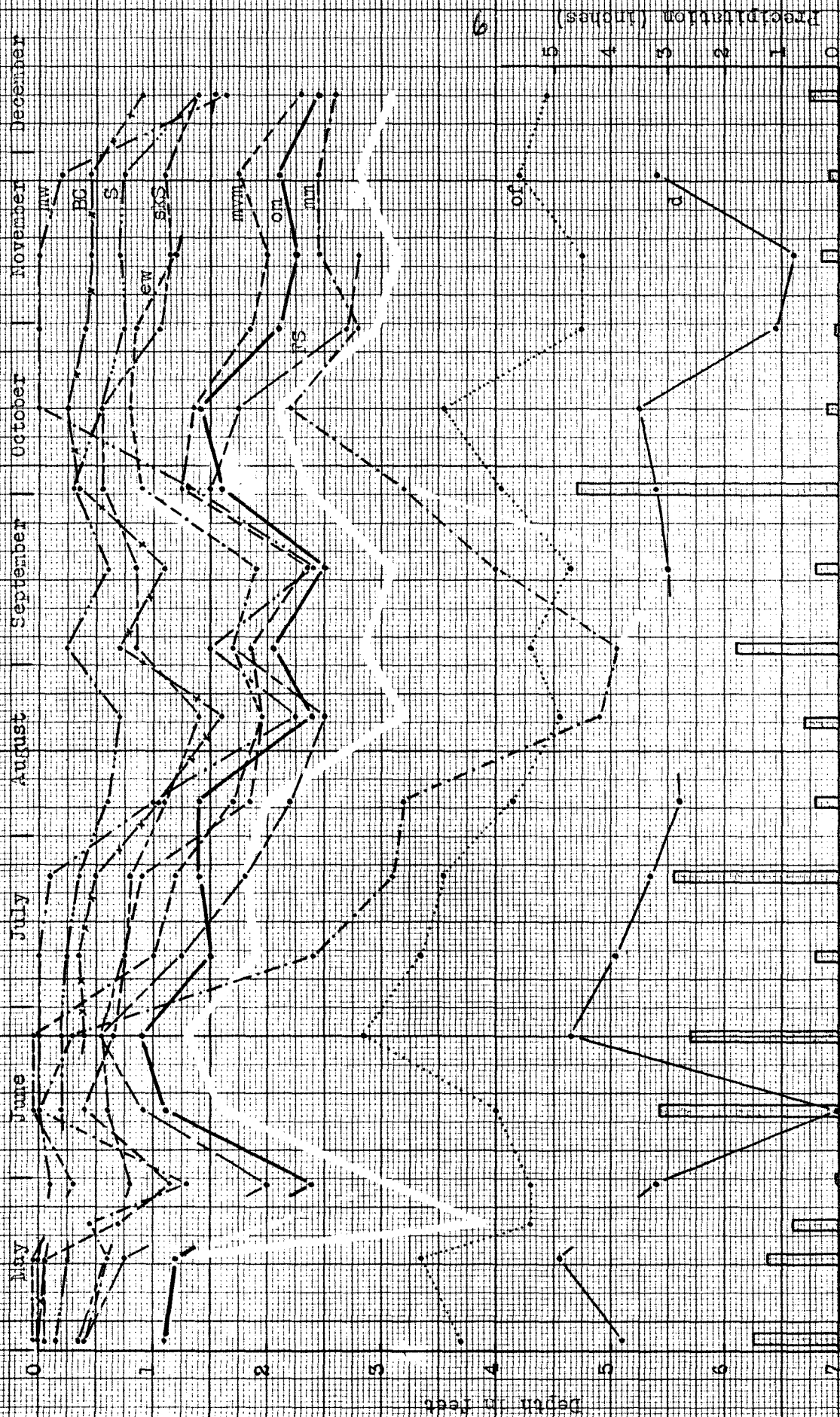


Figure 4. Depth to water table and amount of precipitation during the growing season, 1964.

## REFERENCES

- Anonymous. 1962 to 1965. Monthly Records, Meteorological Observations in Canada. Dept. of Transport, Met. Branch.
- Mueller-Dombois, D. 1964a. Effect of Depth of Water Table on Height Growth of Tree Seedlings in a Greenhouse. For. Sci., Vol. 10(3).
- Mueller-Dombois, D. 1964b. The Forest Habitat Types of Southeastern Manitoba and Their Application to Forest Management. Can. Journ. of Bot., Vol. 42(1417-1444).
- Rowe, J.S. 1959. Forest Regions of Canada. Can., Dept. of North. Aff. and Nat. Res., For. Br., Bull. 123.

## APPENDIX

Full Name of Habitat Types

dry (d)  
 oligotrophic fresh (of)  
 oligotrophic moist (om)  
 mesotrophic moist (mm)  
 mesotrophic very moist (mvm)  
 mesotrophic wet (mw)  
 eutrophic wet (ew)  
 feather moss - Sphagnum (FS)  
 sink hole - Sphagnum (skS)  
 Sphagnum (S)  
 Betule - Carex (BC)