A WATER BUDGET FOR THE CANDLEWOOD LAKE DRAINAGE BASIN

AN ABSTRACT OF A THESIS
PRESENTED TO THE GRADUATE FACULTY
OF WESTERN CONNECTICUT STATE COLLEGE

by

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IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE
MASTER OF SCIENCE

There are many branches of research which tract the coalescence of a drop of water in the air to its passage through animals, plants, the ground and back to the atmosphere. Because the Candlewood Lake Basin has not had any major research done on its soil, vegetation, game, chemical or physical makeup in the last few decades, a plan for the study of the area known as Candlewood Lake was attempted.

Information about the topography of the lake before flooding would show major influences on the existing currents and the storage capacity of the lake. Because the lake region and its surrounding basin covers over 20,000 acres, the whole area was subdivided into eleven smaller and more workable water sheds by using topographical maps. Some currents were studied by releasing drogues or current markers during each of the seasons over a two year period. During the first winter, current meters were dropped through the ice, followed by balasted drogues the second winter. During the spring, summer and fall, self-constructed window-shade drogues were released and tracked. All of the data collected were used in the initial planning of the thesis.

The factors involved in tracing water through a lake basin are very complex. Precipitation falling directly on the lake surface has an immediate effect, while precipitation falling on the land areas has a less direct but still very

important effect on the water balance of the system. Much of the overland precipitation is lost in evaporation and evapotranspiration, some becomes runoff, and the remainder ground water. The relative contribution of each depends on the type of vegetation and the geological characteristics of the land, along with the degree of wetness of the soil at the time and meteorological conditions such as wind and relative humidity. The storage capacity of the lake is extremely large (7.1 billion cubic feet), and this tends to damp out the effect of minor variations in precipitation causing a further lag in the response of lake levels to precipitation. Therefore, long-term variations are basically a reflection of precipitation on the basin and evaporation from the lake. The extent of major cover, hydrologic soil cover complex, geologic region, infiltration rate, and mean base flow, mean annual runoff have an equal part in altering the return of precipitation to the air.

By computing all of the above on a mean annual basis, most of the previously mentioned variables will arithmetically go to zero since precipitation will flow into and out of any upper lake storage, and time factors such as lag and antecedent conditions will be zero for the full cycle of the seasons.

When tracing the flow of water in the Candlewood Lake Basin, annual runoff from the land was added to precipitation falling directly onto the lake surface. By adding these two, the total amount of water will be the combination of ground

water and direct infiltration going into the reservoir. Water loss from this system is due to evaporation from the land and water surfaces and evapotranspiration from vegetation around the lake. The computation on an annual basis of the precipitation on the lake and lake basin was made by first determining the area of the watershed. Then, soil types and runoff were calculated and the hydrologic soil complex index was determined. By using precipitation data from the National Weather Bureau Service for this area, annual precipitation data were used to compute the flow of water into the system. Finally, evaporation and evapotranspiration were subtracted from the net amount of water in the reservoir and storage capabilities were derived.

Explanation of methods of analysis followed theoretical calculations resulting in findings of 1.476 inches of storage for every inch of rain over the lake region.