Eastern Deciduous Forest Biome
IBP Memo Report 72-65

LAKE GEORGE, N.Y. HYDROLOGY, 1971-1972

A final technical report for Union Carbide Subcontract No. 3639 for the Eastern Deciduous Forest Biome, IBP, Lake George Site.

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During the past year the hydrologic model of the Lake George Basin has undergone a number of changes and the data measurements have been expanded and made more continuous. This improved data set has resulted in a more refined and more accurate model of the lake basin.

In order to provide the data base needed for further testing and improvement of the model, a number of improvements were made to the data collection network. Perhaps most importantly all stream gages were winterized to provide more accurate 12 month streamflow data. This helped in providing the data necessary to check the critical snowmelt and accumulation period. Also during the winter months, snow surveys were taken much more extensively than in the past. In addition, there were improved measurements of net solar radiation and soil moisture to serve as checks on the model's predictions. Much of the work on improving the data collection system is documented in EDFB/IBP Memo Report 71-123.

The continuously recorded data obtained were reduced and put on punched cards on an hourly basis. Daily values were computed from these cards and were both punched and printed. In addition, portions of the data set are now being put on magnetic tape for storage.

The results of HYDRO 5 through HYDRO 7 provide estimates of major hydrologic parameters in the basin using both data from entirely within the basin and also from data largely taken outside the basin. A number of significant results

were obtained in the various runs. First, the relatively good correlation of results between those using data from within the basin as opposed to those using data from largely outside the basin demonstrates the adaptability of the program. Thus, it could be expected that reasonably accurate results could be obtained without an overly extensive monitoring system in a lake basin. The progression of models from HYDRO 5 to HYDRO 7 also adds to the understanding of the importance of certain factors in the hydrologic cycle not previously explored comprehensively in the HYDRO series. It was found, for instance, that the effect of advection on monthly evaporation from the lake surface was significant on a monthly time scale. Without considering advection, the evaporation over the lake surface for the period October 1971 to May 1972 was computed as 17.31 inches while considering advection it was 18.24. Although these results are quite close, as might be expected, the monthly lake evaporation values varied considerably, as can be seen from Table 1.

TABLE 1: LAKE EVAPORATION ESTIMATES
(Inches of Water)

	Advection Not Considered	Advection Considered
October, 1971	1.96	2.86
November	1.27	4.65
December	1.19	3.42
January, 1972	1.12	2.32
February	1.25	0.77
March	2.21	1.38
April	3.47	1.12
May	4.84	1.72

When advection was considered, more lake evaporation was predicted in the late fall and early winter and less in the late winter and early spring than without considering advection.

The snowpack portion of the model was also studied in more detail and it was found that a monthly time interval was not satisfactory for computing snowpack accumulation and melt. Hence a daily period was chosen and tested. The results for March, 1972 illustrate the differences clearly. While the monthly computation showed no snowmelt at all for the month, the daily computation showed a total of 6.44 inches of melt. The reason for this is the especially large fluctuations in temperature which occurred during this month. While the monthly average air temperature was -3.05°C (26.5°F), the individual daily averages ranged as high as 2.28°C (36.1°F), with 12 days above the freezing point. The daily snowpack calculation, being more reflective of the actual conditions, provides the necessary data to predict more accurately soil moisture and stream runoff. These then are the principal developments in the HYDRO series during the past year.

In coordination with other groups, the results of the hydrologic model studies have been made available for nutrient budget determinations. The modeling will also be utilized by the site modeling group in the interaction of site and Biome aquatic ecosystem models.

In further work on the hydrologic modeling, a continuation and expansion of the data set, especially for such

parameters are snowpack accumulation and melt, total and net solar radiation, and stream temperatures is required. Continued efforts to provide reliable year-round data for all parameters must be made. Refinements of the model could also be realized with the intensive study of selected smaller watersheds in the basin. Interactions and data exchange with the Lake Wingra group should be continued and expanded. Finally, all data collected and calculated values will be provided, as necessary, for use by other process groups.