1980 TURKEY LAKES WATERSHED

IN SUPPORT OF R.G. SEMKIN/E.B. BENNETT
AQUATIC PHYSICS & SYSTEMS DIVISION

E.H. Walker
Technical Operations Group
National Water Research Institute

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INTRODUCTION

It has been recognized for many years, in Canada, that the long range transport of pollutants, even at low level loadings, may cause serious environmental and health problems. For several years, scientists have been convinced that a more holistic approach must be taken towards airborne pollution because of its diverse interactions on the echo-system.

Federal activities toward the "acid rain" problem have been organized under the Long Range Transport of Air Pollutants program (LRTAP). LRTAP includes such Federal Agencies as the Department of Environment (DOE), Department of Fisheries & Oceans (DFO), Atmospheric Environment Service (AES) and the Canadian Forestry Service (CFS). The Algoma study site also had Ontario Ministry of Natural Resources involvement.

The Algoma site was chosen to be an intensively studied watershed that would bring together fisheries, atmospheric, forestry and water programs for a better overall understanding of the acid rain problem. After looking at many sites throughout Ontario, the Turkey Lakes Watershed was chosen as having met the necessary criteria best:

- the area has been identified as having sensitive geology and lakes
- the area is essentially unaffected by any pollution factors except atmospheric

- the watershed is an area of moderate atmospheric loading as opposed to the high load levels of the Dorset area and low loading levels of the experimental lakes in Northwest Ontario

- the watershed falls in the Great Lakes-St. Lawrence forest area which is the forest area most affected by "acid rain" in Canada

- the access to the study area is relatively good and only 88 km from a major research institute (Great Lakes Forestry Research Centre)

TURKEY LAKES WATERSHED

The Turkey Lakes Watershed consists of a small chain of five lakes located 50 km due North of Sault Ste. Marie and 25 km due East of Copper Mine Point on Lake Superior. This remote location places the watershed away from any strong point source emitters of atmospheric contamination.

The five small lakes vary from 5 to 54 ha in size and total 115.4 ha. Surrounding these lakes is 1279.7 ha of Great Lakes-St. Lawrence forest, consisting of predominately old growth hard maples and yellow birch.

The watershed is situated on Precambrian bedrock which was scoured clean by the last glaciers which passed over the area. The soils are made up of glacial tills which vary in thickness from none on the hilltops to relatively thick in the valleys (60 feet).

The topography of the area is dominated by Batchawana Mt. which rises to an elevation of 640 metres and forms most of the Northern boundary for the watershed. The fact that the watershed is 466 metres higher than Lake Superior and only 25 km downwind causes the area to have considerable amounts of snow and rain.

WORK OUTLINE

Aquatic Physics & Systems Division (NWRI) requested one technician for the 1980 field program at the Turkey Lake Watershed study area. The objective of this group, headed by R.G. Semkin, was to quantify the affects of atmospheric precipitation on the hydrogeochemistry of the Turkey Lakes.

The basic premise of the study was to record all forms of precipitation that fell on the watershed and then record the chemical changes as the water moved through the streams and lakes and finally out of the system. Precipitation was recorded at two rain gauge sites and collected at the trailer site while snow was collected at ten locations throughout the watershed.

The air was sampled by an AES site on a continuous basis.

Two meteorological stations recorded the weather conditions on a continuous basis.

Stream flows were monitored on a weekly basis at five different locations, using stream measurement equipment from Water Survey of Canada. pH, conductivity, D.O. and temperatures were taken as well as water samples and returned to the Great Lakes Forestry Research Centre lab in Sault Ste. Marie for chemical analysis.

The five lakes were monitored on a weekly basis for pH, conductivity, D.O. and temperature (using an EBT) and water samples collected and returned to the lab for analysis.

Samples were taken from streams, lakes and lake bottom sediment on a bi-weekly schedule for microbiology work by Dr. S.S. Rao, Analytical Methods Division, NWRI.

The upkeep of scientific and operational gear took a great deal of working time.

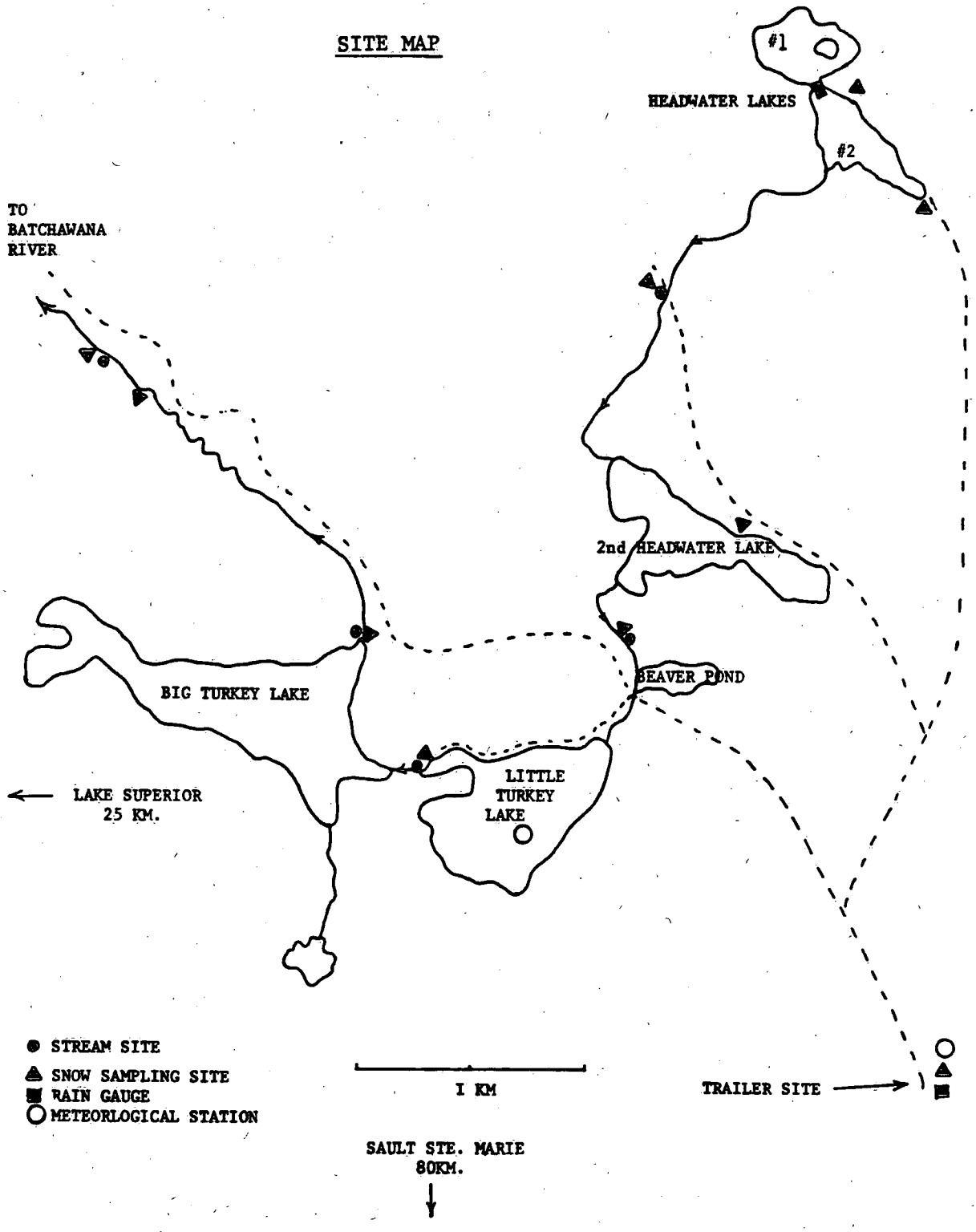
SUMMARY

The project was in its initial year in 1980 and had the normal startup problems usually associated with this size of project. The completion of a garage to store and repair field equipment at the site allowed us more working time in the field. Roads were improved by a construction firm in late Fall which allowed greater access to the lakes and cut down on travel time. The generators supplying electricity were in full operation by late Fall and made work easier.

The greatest problem was travelling time which took at least 3 1/2 hours a day from Sault Ste. Marie to the lakes and back. This seriously reduced the work time in the field and required long work-days to complete the scientific sampling at least two days a week.

The 1980 field season did accomplish most objectives and produced a good set of basic scientific data which can be built on in future years. The improvements mentioned above and the experience gained should allow more time to be spent on scientific work and attention to the small details which will make a smoother-running operation in 1981.

SITE MAP


#1
HEADWATER LAKES
#2
TO
BATCHAWANA
RIVER
2nd HEADWATER LAKE
BEAVER POND
BIG TURKEY LAKE
LITTLE
TURKEY
LAKE
LAKE SUPERIOR
25 KM.
STREAM SITE
SNOW SAMPLING SITE
RAIN GAUGE
METEORLOGICAL STATION
1 KM
TRAILER SITE
SAULT STE. MARIE
80KM.