

with the use of "bush" aircraft but, even so, the area a reconnaissance party could investigate in one season was discouragingly small compared with the area still to be mapped. In 1952, however, the Geological Survey tried using helicopters for reconnaissance geology in the barren lands west from Hudson Bay and the experiment was a complete success. Five geologists mapped in one season an area that would have taken them about 25 years to map by previous methods, and at a lower cost per square mile. From 1952 to 1959 helicopter parties mapped about 625,000 sq. miles, including areas in northern British Columbia, Yukon Territory, the Mackenzie River basin, the Arctic islands, the Canadian Shield of the Northwest Territories and New Quebec, and Nova Scotia (Fig. 1). As a result of data made available from such helicopter reconnaissance by the Geological Survey in 1955, several oil companies have contracted to spend large sums of money on the search for oil in the Arctic islands. In 1958 and 1959 an experiment in aerial reconnaissance in the Western Arctic was carried out by field parties using Super-Cub aircraft fitted with oversize tires which enabled geologists to be landed in unprepared localities where rock outcrops merited examination; about 125,000 sq. miles were thus mapped in the two seasons of reconnaissance. Altogether, therefore, the Geological Survey has mapped nearly as much of Canada in the past eight years as had been mapped in the previous 110 years (Fig. 1). It now appears that the initial geological reconnaissance mapping of Canada will be completed in the next ten or twelve years, and even though this mapping is intended as a preliminary to detailed studies of the more promising areas, its immediate value has been clearly shown.

Besides field studies of the bedrock geology, the Survey is investigating the character of the great volume of unconsolidated material left behind as the Pleistocene ice-sheets retreated northwards. Only in recent years have systematic studies been possible and very little is known about the surficial geology of great areas in Canada (Fig. 2). These studies are not only of great scientific importance but also have much economic significance. The understanding of soil needs for agriculture and forestry and correct planning for land utilization depend to a large extent on knowledge of these Pleistocene strata. The deposits of sand and gravel that form part of the Pleistocene material are widely used in engineering works of all kinds, and some of them hold important quantities of underground water.

The prairies are depending more and more on sources of underground water for industrial, domestic and agricultural use, and the distribution of this underground water depends on the distribution of various kinds of rocks and unconsolidated materials in the area. Thus, usable water is confined to porous strata that allow the water to flow through them and these strata may accumulate large quantities of water from the rainfall of a vast area. It is to such underground water that the oases in the desert regions owe their existence, and it is on such water that the development of the Canadian prairies will increasingly depend. The Geological Survey is actively engaged in making studies of groundwater potentials in several regions of Canada, but systematic studies began only recently and a tremendous amount of work must still be done before even a first assessment of the potential supply can be made.

Reconnaissance geological mapping serves mainly to show where more detailed studies are required in order to understand the basic geological problems and provide specific data in the search for minerals, fuels and underground waters. The Geological Survey, therefore, has a considerable portion of its staff engaged on such detailed studies. These include detailed mapping in a mining area in Manitoba, special studies of sub-surface geology related to petroleum and natural gas in the western plains and Eastern Canada, engineering geology for the St. Lawrence Seaway and in the selection of hydro-electric dam sites in Yukon Territory, investigations on underground supplies of water in British Columbia and Saskatchewan, and detailed studies of the unconsolidated glacial deposits in Alberta and Ontario. Thus is exemplified the diversity of field geology.