United States Department of Agriculture
Soil Conservation Service
Northeast NTC
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Chester, PA 19013
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Subject: Ground-penetrating radar technical assistance; Maine, 24-29 September 1990

Date: October 8, 1990

To: Charles Whitmore
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File code: 430

Purpose:
To use ground-penetrating radar (GPR) field techniques to estimate the depth to bedrock in several upland map units in Washington and Piscataquis Counties.

Participants:
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Activities:
Sites for bedrock studies were selected prior to the arrival of the GPR. The unit arrived in Bangor during the evening of 23 September 1990. On 24 to 26 September, field studies were conducted in the vicinity of Perry, Washington County. During the afternoon of 26 September the GPR unit was relocated to Bangor. Bedrock investigations were conducted near Bingham in Somerset County on 27 September. Bedrock investigations were conducted near Dover-Foxcroft in Piscataquis County on 28 September. On the afternoon of 28 September a field demonstration site was selected for the GPR near Howland, Penobscot County. A demonstration of the GPR was presented to MAPSS on the morning of 29 September. On the afternoon of 29 September, the unit departed Maine for Chester, Pennsylvania.

Equipment:
The unit is the SIR System-8 which consists of the model 4800 control unit, the ADTEK SR-8004H graphic recorder, and the ADTEK DT-6000 tape recorder. The 120 MHz antenna was used.

Results:
WASHINGTON COUNTY
Fourteen transects were completed in areas of map unit 249B, Creasey silt loam, 3-8% slopes (8) and map unit 249C, Creasey silt loam, 8-15% slopes (6), near Perry in Washington County. The Creasey series is a member of the loamy, mixed, frigid Lithic

Haplorthods soil family and is shallow over sandstone or sandstone-conglomerate bedrock. Information was needed on the distribution of depths to bedrock in map units 249B and 249C to determine whether to treat these map units as consociations or complexes.

Table 1 shows the distribution of soils by soil depth classes. A total of 81 observations were collected in map unit 249B and 70 observations collected in map unit 249C. Assuming that areas of moderately deep soils represent nonlimiting inclusions, both map units are consociations. The average depths to bedrock are 13.7 inches and 16.4 inches for map units 249B and 249C, respectively. However, in map unit 249B, 75 percent of the moderately deep soils have depths to bedrock that are less than 24 inches(see Figure 1). In map unit 249C, 57 percent of the moderately deep soils have depths to bedrock less than 25 inches and 70 percent of the moderately deep soils have depths to bedrock less than 28 inches.

TABLE 1

Taxonomic Composition of Selected Areas

of Map Units 249B and 249C

in Washington County

	MAP UNITS	
DEPTH CLASS	249B	249C
shallow	94%	79%
mod. deep	6%	19%
deep	--	2%
very deep	--	--

A grid was established in an area of Hermon-Colton-Abram complex, strongly sloping, as part of the continuing bedrock study in Maine. The taxonomic classifications of the soils are: Hermon, sandy-skeletal, mixed, frigid Typic Haplorthods; Colton, sandy-skeletal, mixed, frigid Typic Haplorthods; and Abram, loamy, mixed, acid, frigid Lithic Udorthents. Hermon and Colton soils are very deep (> 60 inches) to bedrock.

The grid was 200 by 80 feet with grid intervals of 20 and 10 feet along the Y and X axes, respectively. The lowest surface elevation within the grid was established as the 0.0 datum.

The composition, based on soil depth classes, within the gridded area of Hermon-Colton-Abram complex, strongly sloping, was 10 percent shallow, 83 percent moderately deep, and 7 percent deep soils.

In Figure 2, two-dimensional contour plots of the relative elevations of the soil surface and the bedrock surface are displayed. In this figure, all measurements are in feet. Within the grid, the surface was punctuated by mounds and depressions believed to have been produced by trees blown down during violent windstorms. Some of this "cradle knoll" topography has been captured by the computer simulations (see figures 2 and 3).

Differences in depth to bedrock and taxonomic composition appear to vary with slope position. The shallowest soils are in the upper left corners of Figure 2. This area represents the convex crest of a ridge line. In Figure 2, the depth to bedrock is deeper in a slight depression (upper right corners) and on plane sideslopes (lower left corners).

PISCATAQUIS COUNTY
Two transects were completed in an area of Monson-Elliotsville-Abrams complex, 3 to 8 percent slopes. The taxonomic classifications of the soils are: Monson, loamy, mixed, frigid Lithic Haplorthods; Elliotsville, coarse-loamy, mixed, frigid Typic Haplorthods; and Abram, loamy, mixed, acid, frigid Lithic Udorthents.

The composition, based on soil depth classes, for the transected areas of Monson-Elliotsville-Abrams complex, 3 to 8 percent slopes, was 4 percent very shallow, 64 percent shallow, and 22 percent moderately deep soils. Within the transected areas, the average depth to bedrock was 19 inches with a range of 9 to 32 inches.

As always, I enjoyed the opportunity to work with members of your fine soil staff. With kind regards.

James A. Doolittle
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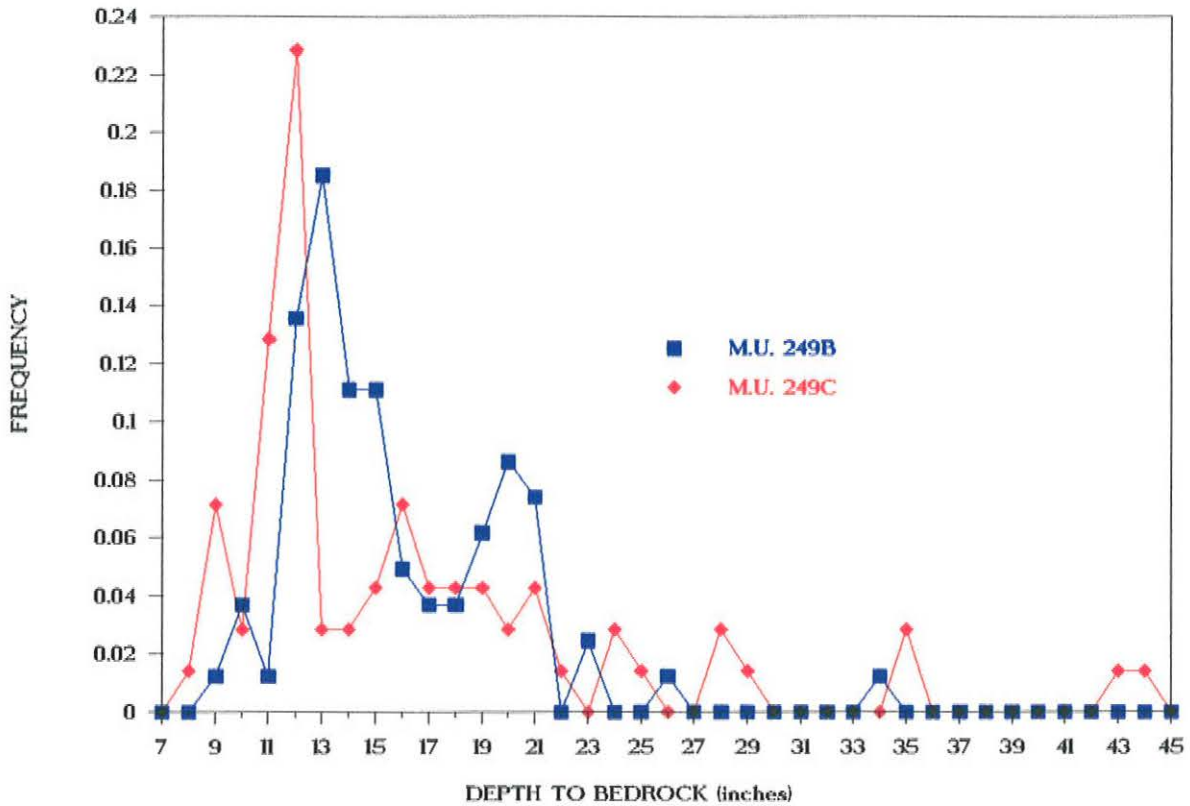
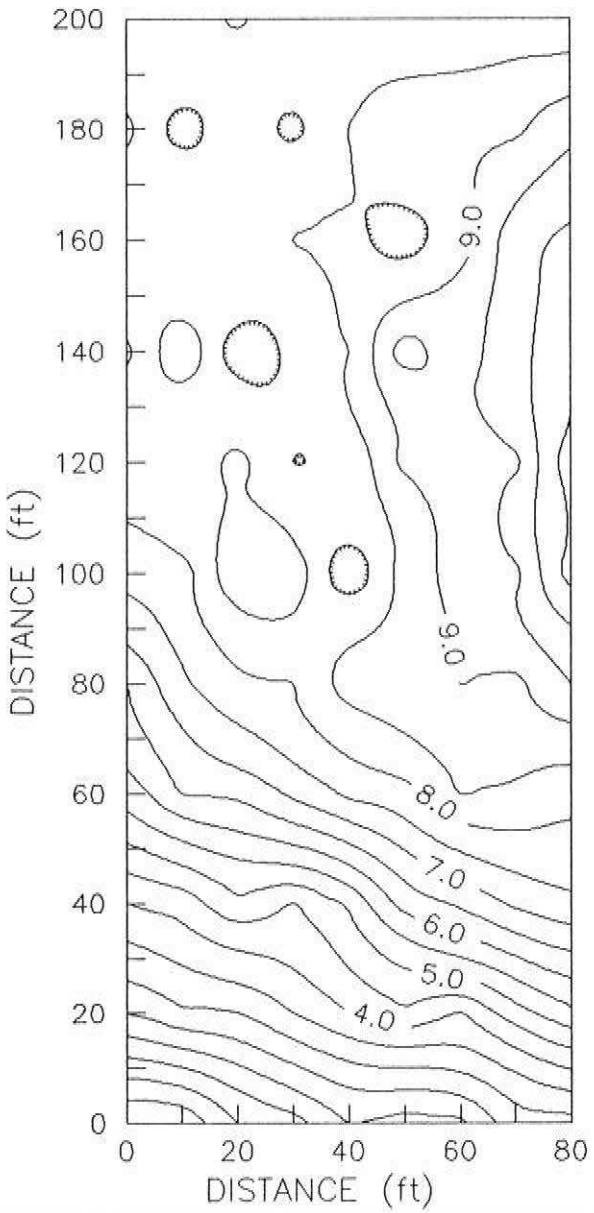
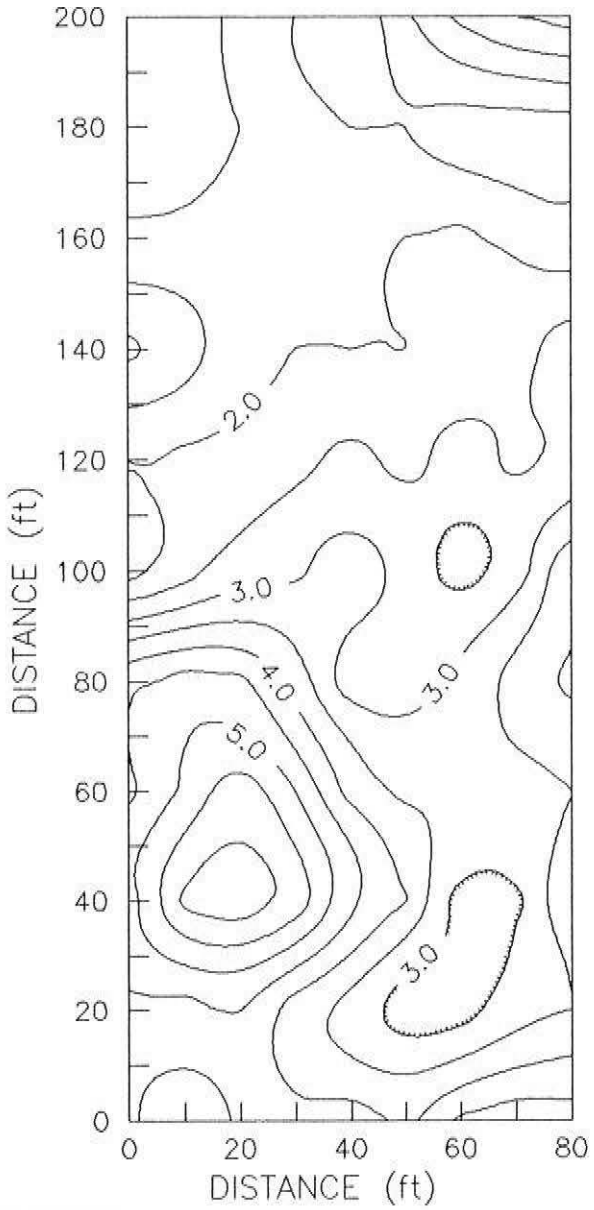
DISTRIBUTION OF DEPTHS TO BEDROCK



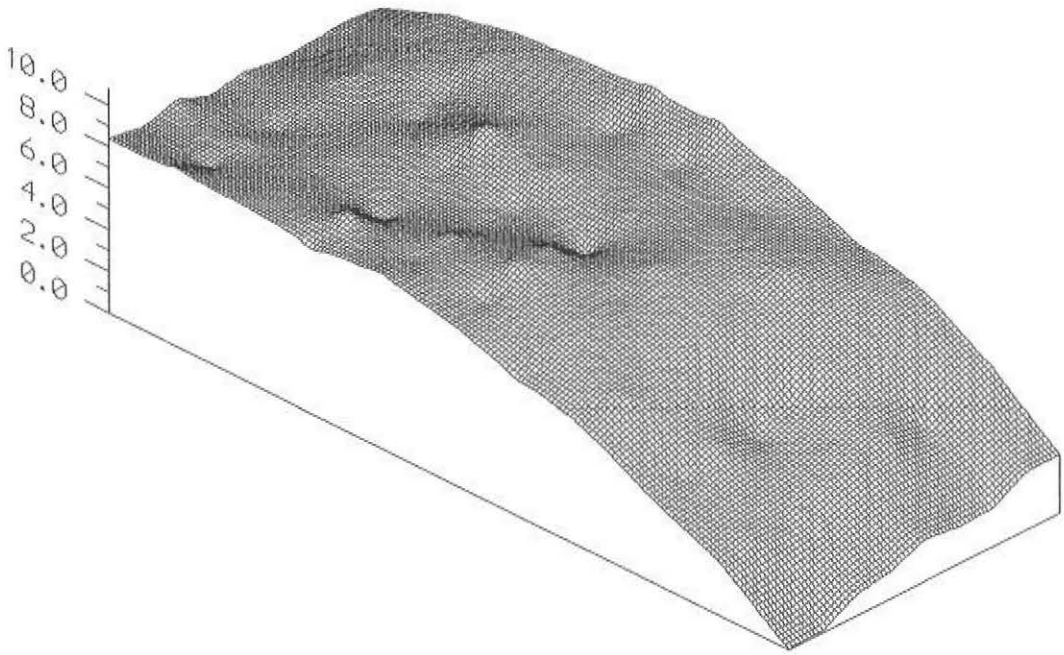
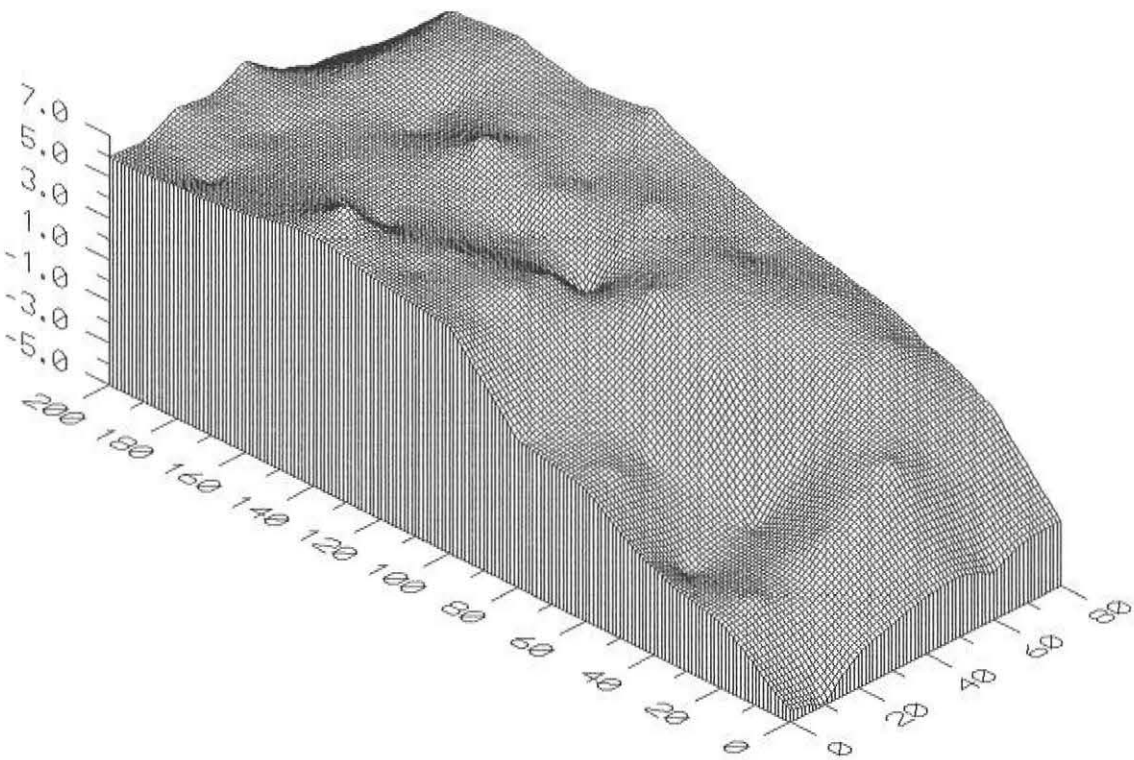
TOPOGRAPHY OF SOIL SURFACE



TOPOGRAPHY OF BEDROCK SURFACE



TOPOGRAPHY OF SOIL SURFACE



TOPOGRAPHY OF BEDROCK SURFACE