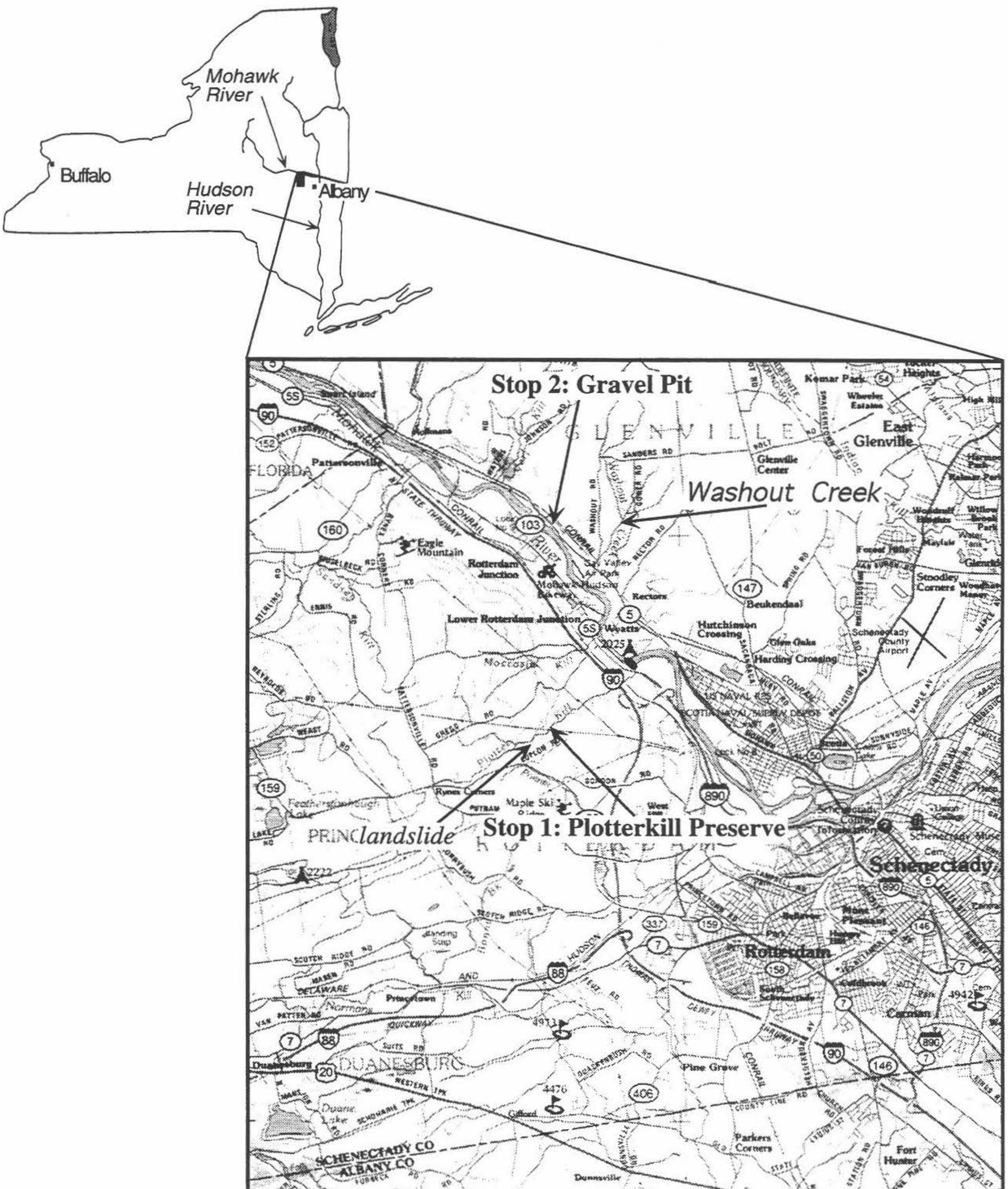

Figure 1. Location of Stops 1 and 2 in Schenectady County, New York.

Fluvial Geomorphology of the Plotterkill Preserve

The valley floor along the Plotterkill reveals up to three prominent fluvial terraces, which are underlain by very poorly sorted deposits of sand, gravel, and angular boulders up to 70 cm long. Clasts in these deposits are angular and were derived locally from the sandstone units of the Schenectady Formation. These clasts show a pronounced imbrication in which their a-b planes are inclined upstream, suggesting deposition by fluvial processes.

The presence of terraces along the Plotterkill indicates that the rate of incision of the Plotterkill has not been constant since deglaciation of the region ca. 13 ka. Fluvial terraces represent remnants of paleofloodplains and the development of floodplains requires a period of equilibrium between sediment yield to a stream and stream power (Ritter et al., 1995). During such a period of equilibrium, channels neither aggrade nor degrade and fluvial erosion is dominantly lateral, which produces broad flat valley floors beveled on bedrock or alluvium. A subsequent increase in stream power or a decrease in sediment yield, or both will cause a river to incise into its floodplain. This paleofloodplain may thus be preserved as the tread of a terrace along the margins of the modern stream; the older the terrace, the higher it is above the modern stream (Fig. 2).

In several localities along the Plotterkill the boulder lag of angular sandstone that underlies terrace treads is less than 2 m thick and and rests directly on a horizontally beveled planar surface of Schenectady Formation shale. This indicates that at least some of the Plotterkill terraces are erosional (strath) terraces rather than depositional terraces. An erosional origin for the terraces along the Plotterkill is supported by the observation that the Plotterkill terrraces are unpaired; that is, terrace elevations differ from one side of the Plotterkill to the other (Fig. 2). Unpaired terraces are commonly associated with lateral and vertical erosion rather than deposition (Ritter et al., 1995). The distinction between erosional and depositional terraces is significant in that depositional terraces require a period of aggradation followed by fluvial incision whereas strath terraces reflect progressive fluvial incision punctuated by periods of equilibrium during which the stream neither aggraded nor degraded its channel.

Progressive incision by the Plotterkill may have been caused by a progressive decrease in local baselevel, a decrease in sediment yield, and/or an increase in stream power. Progressive drainage of Glacial Lake Albany ca. 13-12 ka (see Wall and LaFleur, this volume) and subsequent incision of the Mohawk and Hudson Rivers into deposits of Glacial Lake Albany would have lowered local baselevel progressively. Tributary streams affected by this decreasing baselevel would be forced to incise their channels. The observation of 3 prominent fluvial terraces along Washout Creek, which joins the Mohawk River directly north of the Plotterkill- Mohawk River juncture (Fig. 1), suggests that fluvial incision in the eastern Mohawk Valley was a regional phenomenon and may have been caused by a lowering of local baselevel in response to a step-wise drainage of Glacial Lake Albany. This hypothesis is consistent with the observation of multiple levels of Glacial Lake Albany (e.g., Clark and Krakow, 1984; Pair and Rodrigues, 1993; Wall and LaFleur, this volume). If correct, this hypothesis would imply that drainages that did *not* drain directly into Glacial Lake Albany did not incise their channels to the same degree as did drainages that drained directly into the Lake.

Geomorphology of an Active Landslide in the Plotterkill Preserve

Simultaneous downcutting and lateral erosion by the Plotterkill has eroded the toes from many hillslope reaches within the Preserve and this, in turn, proabably caused one large complex landslide (Fig. 1). The lower part of the slide is devoid of vegetation and is actively eroding into the Plotterkill. In contrast the upper half of the slide is characterized by immature trees, numerous transverse cracks, and minor scarps (Fig.3). The top of the slide comprises the main scarp, a ca. 2 m nearly vertical slope. The presence of a prominent scarp, several back-tilted surfaces, numerous transverse cracks and scarplets suggests a rotational slide (slump) origin for the upper part of the slide. Active and continuous erosion of the lower part of the slide suggests that earthflow is the dominant process. Springs at the approximate boundary between the slump-dominated and flow-dominated parts of the slide have been noted on several occasions and probably reflect groundwater flow along a shear surface beneath the slump-dominated part of the slide (Fig. 3). It is likely that the flow dominated part of the slide is caused by high pore water pressures in the foot and toe slopes.

The obvious instability of this landslide contrasts markedly with the more stable hillslopes in other parts of the Plotterkill Preserve and reflects the influence of lithology on hillslope stability. The location of this slide within the Preserve corresponds precisely with a change in the lithology of the

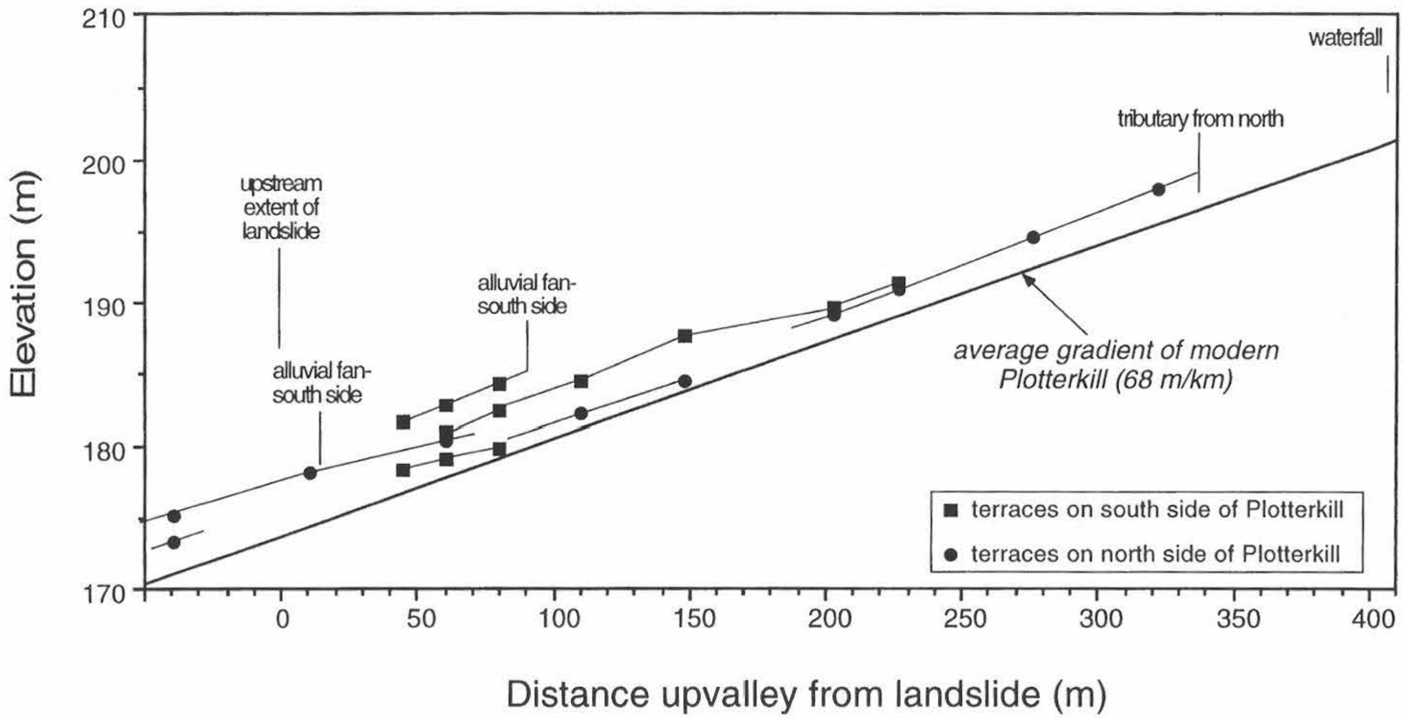

Figure 2. Longitudinal profile of fluvial terraces along the Plotterkill upstream from the landslide (see Fig. 4).

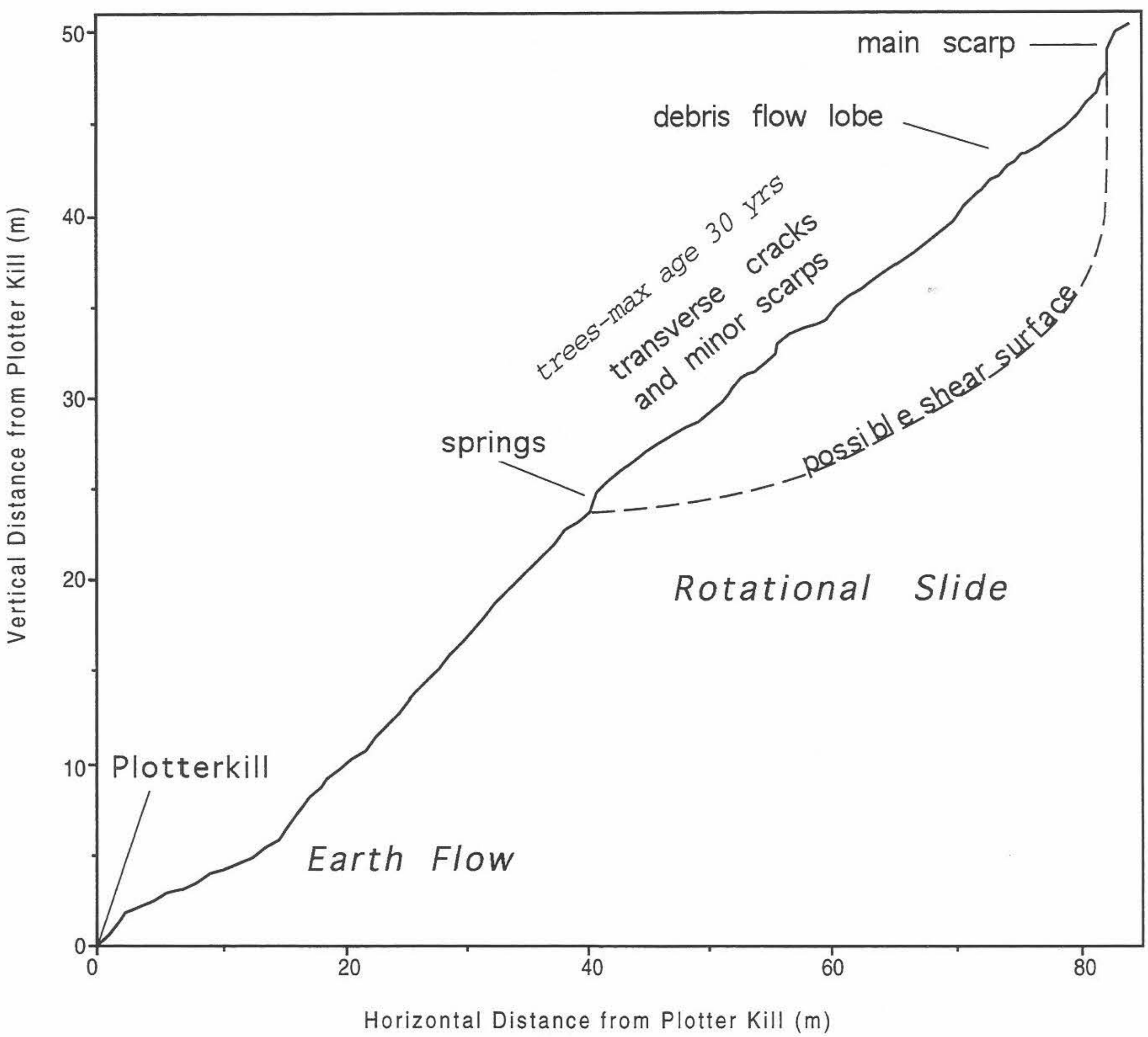

Figure 3. Profile of landslide on the south side of the Plotterkill Preserve as of May, 1995

material composing the hillslopes. Whereas most of the hillslopes in the Preserve are underlain by the Schenectady Formation or colluvium derived from the Schenectady Formation, the slide is composed of numerous exotic lithologies such as granite, gneiss, quartz sandstone, and volcanic rocks. Pebble counts of exotic lithologies (non-Schenectady formation) in the stream bed upstream and downstream from the slide and from the slide surface itself reveal clearly that the slide is composed of material that is anomalous to much of the rest of the Preserve (Table 2). The material composing the landslide is dominated by exotic lithologies and was probably derived from till, which either thickly mantles the south side of this part of the valley or infills a paleochannel that runs obliquely to the modern course of the Plotterkill.

TABLE 2. Number of Exotic Clasts >2 cm found during 3 Minute Pebble Counts

Upstream from the Slide	On the Slide Surface	Downstream from the Slide
28	163	75

The distribution and age of trees on the slide surface suggest several periods of landslide activity. Isolated tree islands on the lower part of the slide which are actively being eroded or buried by earthflow activity may be relicts of a vegetated surface which once extended across the entire surface of the slide/flow. The numerous trees on the upper part of the slide may be remnants of this same surface. Tree cores indicate that stabilization of this surface began more than ca. 30 years ago. Initial movement of the slide, which may have occurred anytime from 10^2-10^4 years ago, altered the course of the Plotterkill and produced an abandoned channel immediately downstream from the slide (Fig. 4). This was followed by at least one period of hillslope stability in which the slide surface became revegetated. In order to monitor the activity of the landslide, an array of stakes have been placed on the slide surface and these have been surveyed precisely with an electronic distance meter from the base of the slide (Hays, 1995).

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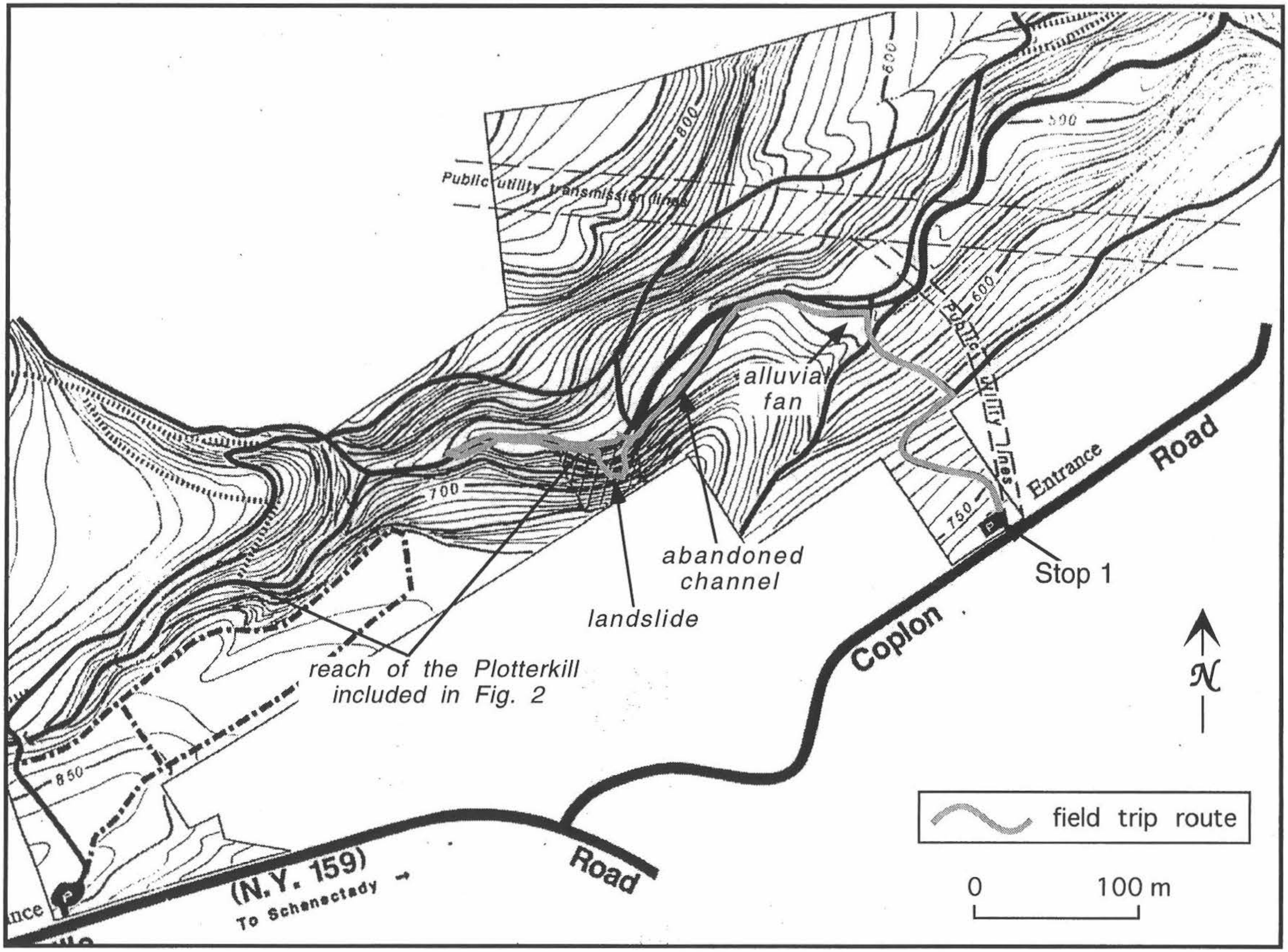

Figure 4. Topographic Map of a part of the Plotterkill Preserve, Schenectady County, New York (see Fig. 1).

Fluvial and hillslope geomorphology of the Plotterkill Preserve, Rotterdam, New York

Road Log

Miles from start	Miles from last point	Description
0.0		Start at Union College Nott Street Gate; turn left onto Nott Street, proceed west
0.5	0.5	Turn left onto Erie Blvd.; proceed southwest, cross State Street
1.4	0.9	enter 890
1.6	0.2	enter 890W
3.2	1.6	exit 890W at Campbell Road; stay on Campbell Road and pass first entrance to the Rotterdam Square Mall
4.1	0.9	take right onto Putnam Road, drive west up steep hill
6.0	1.9	take right onto Rt. 159; pass Maple Ski Ridge on left
7.9	1.9	take right onto Coplon road
8.3	0.4	take left into Plotterkill Preserve parking lot

From here we will spend several hours walking along the Plotterkill; the trails are well marked but some are quite steep.

We will begin by walking down the trail to the Plotterkill (Fig. 4). As you approach the valley floor (ca. 8 minutes) and before you reach the alluvial fan (Fig. 4) you will notice the curved trunks of some trees on the hillside to your left. Tilted trunks are a good indication that soil creep is active on the hillside

When you reach the relatively flat valley floor, you will be standing on an alluvial fan (Fig. 4) which is graded to a level that is much higher than the modern Plotterkill. As you continue down the axis of the fan you will cross two scarps, which demarcate distinct terrace levels cut onto the toe of the alluvial fan by the Plotterkill.

The trail turns to follow the south side of the Plotterkill and enters the downvalley end of an abandoned channel of the Plotterkill. Well preserved terraces can be seen on either side of this paleochannel. At the downvalley end of the abandoned channel, there is a good exposure into one of the prominent terraces in this part of the valley. This exposure reveals ca. 1-2 m of a very poorly sorted deposit of sand, gravel, and angular boulders up to 70 cm long. Clasts in these deposits are angular and were derived locally from the sandstone units of the Schenectady Formation. These clasts show a pronounced imbrication in which their a-b planes are inclined upstream, reflecting fluvial transport. In addition, one can observe that the modern Plotterkill flows on a beveled surface of Schenectady Formation shale. In places this surface is mantled by ca. 1 m or more of coarse and poorly sorted alluvium, which is very similar to the material that makes up the deposits that underlie the terrace surface.

Follow the paleochannel until the trail crosses the Plotterkill. You will see the large landslide to your left (south). The upvalley end of the paleochannel corresponds precisely with the downvalley end of the landslide. It is likely that initial movement of the slide forced the course of the Plotterkill to the north until it avulsed its channel, thus forming the paleochannel. Subsequent fluvial incision into the slide material and southward migration of the cut bank of the Plotterkill has isolated the inlet to the paleochannel.

Continue up the bed of the Plotterkill. Watch your step! On the south side of the Plotterkill, approximately 75 m upstream from the landslide is an excellent example of a flight of fluvial terraces (Fig. 2). Here, three distinct terraces can differentiated on the basis of elevation. In addition, exposures into the alluvium that underlies the terrace surface can be seen. In several locations one can see clearly that the alluvium rests unconformably on a beveled surface which has been cut onto the shales of the Schenectady Formation. This surface is a rock cut terrace or a strath (Ritter et al., 1995) and is overlain by alluvium. The observation of a planar erosional surface that mirrors the terrace tread and which is overlain by alluvium the thickness of which does not exceed the normal scouring depth of the river meets the criteria for designating a terrace an erosional or strath terrace (Mackin, 1937). The presence of strath terraces suggests that the Plotterkill has been incising its channel progressively and that this incision was punctuated by periods of stream equilibrium during which time the Plotterkill laterally eroded the underlying Schenectady Formation. Step-wise incision may have been caused by episodic increases in stream power, decreases in sediment yield to the stream, decreases in local base level, or a combination of these three factors.

Return to the base of the landslide. Standing here, one can clearly see the abundance exotic lithologies that make up the material composing the landslide (Table 2). This material is till and its prevalence in this part of the valley suggests that hillslope instability at this particular point in the valley is due, in part, to the influence of lithology on hillslope stability.

Walk up the slide. The slide surface can be divided into an upper and lower half (Fig. 3). The lower part of the slide is devoid of vegetation except for several small tree islands; these may be remnants of a continuous vegetated surface. Tree ring studies suggest that this surface is more than 30 years old. This part of the slide is continuously eroding into the Plotterkill and during times of high water tables, springs develop in the uppermost part of the lower half of the slide. These springs probably reflect ground water flow along shear planes that underlie the upper half of the slide. Saturation of the lower half of the slide is responsible for this nearly continuous earth flow. The upper half of the slide is probably dominated by rotational slide (slump) activity as is evidenced by transverse tensional cracks, minor scarps and rotated segments. The uppermost part of this part of the slide is characterized by a prominent near-vertical scarp.

An array of stakes (steel rebars) have been placed on the surface of the landslide and surveyed precisely using an electronic distance meter in April, 1995. We plan to monitor the movement of the landslide annually.

Return to vehicle

8.8 0.5 turn right on Rt.159

10.2 1.4 turn right on Rynex Corners road

15.5 5.3 turn right on Rt. 5S

17.4 1.9 turn left on Rt. 103

17.7 0.3 cross the Mohawk River on Erie Canal Lock 9

17.9 0.2 right on Rt. 5N

18.4 0.5 gravel pit on north side of road (pit is owned by Scotia Sand and Stone Company- 518-346-5749)

This gravel pit provides excellent exposures of the Scotia Delta (see Wall and LaFleur, this volume) that prograded eastward into Glacial Lake Albany. We are stopping here to briefly see the unequivocal evidence that these exposures reveal for higher local base levels ca. 12-13 ka. The elevation of the foreset-topset transition here (88 m) can be used to estimate of the surface of Glacial Lake Albany ca. 12.5 ka (see Wall and LaFleur, this volume) and hence of local baselevel at that time. Progressive and step-wise lowering of local base level to the modern elevation of the Mohawk River at this point of the Mohawk Valley (67 m) may have been responsible for episodic incision by the Plotterkill and other creeks in the region (e.g., Washout Creek, Fig. 1).

22.3 3.9 here we can see a lower level of the Scotia delta to the right (south) of Rt. 5N. There are at least 3 levels of the Scotia delta in this part of the Mohawk Valley. The elevations of these levels are 90 m, 85 m, and 70 m.

To return to Union College, continue southeast on Rt. 5N

24.5 2.2 left onto S. Church Street
24.6 0.1 right onto Union Street
24.9 0.3 left onto Erie Blvd.
25.4 0.5 right onto Nott St.
25.8 0.4 right into Union College Nott Street entrance