

Regional and Local Bed Shortening and Thickening in Central Virginia

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Introduction:

The structures found in Panther Gap, Goshen Pass, and the surrounding areas are the result of a post-Early Devonian deformation event that is characterized by intense folding, faulting and deformation. The widespread, local scale "wedging," mirrors the regional trends of faulting and folding, both the result of compressional stress.

Tremendous bed shortening and thickening has occurred due to deformation. This is seen not only in the thrust faults found in Goshen Pass, but also the overturned fold at Panther Gap, and the numerous areas of disharmonic folding, and wedging.

Location:

Goshen Pass is located in the Valley and Ridge Province of central Virginia, approximately 15 miles northwest of Lexington, VA, in the Goshen Quadrangle. Panther Gap is another 10 miles northwest of Goshen Pass, located in the southeast corner of the Green Valley Quadrangle (see fig. 1).

Stratigraphy:

The strata consists of alternating beds of quartz sandstone, shale, and limestone, deposited during the Ordovician, Silurian, and Early Devonian (see fig. 2).

Deformation:

The sandstone beds of the Tuscarora Formation and the Keefer have behaved similarly under stress. "Wedging," or minor faulting along bedding planes, occurred along planes of weakness in the beds, often the cross-beds. Wedging can be seen in virtually every outcrop of Keefer or Tuscarora in both Goshen Pass and Panther Gap. Often the beds can be traced along the outcrop, where it becomes apparent that although the amount of displacement along individual beds is minor, the combined effect is significant.

In areas such as Panther Gap, the beds of the Tuscarora Formation are folded disharmonically. This also contributes to shortening and thickening of section. At Panther Gap, a single bed within the Tuscarora Formation was traced and measured, revealing 56 % shortening.

The shale beds of the Rose Hill Formation behaved differently than the resistant beds of sandstone. The thin beds of shale have been concentrated into the hinges of folds, and pinched completely out of many other areas. Often a cleavage has developed in the shales due to the stress.

Both wedging and disharmonic folding have contributed to bed shortening and thickening. These local scale deformations mirror the faulting and folding found on the regional scale. The overturned fold at Panther Gap has doubled up section shortening the Tuscarora Formation by 46 % (see figs. 3, 4). Bed thickness is not maintained, since both bed thinning and thickening have occurred in various areas due to the displacement of the shale beds, and the doubling up of sandstone beds.

Two thrust faults were mapped in Goshen Pass, the more northern one placing the Tuscarora above the Keefer, the other thrusting the Tuscarora above the Rose Hill (see map). Each of these faults doubled part of the section, resulting in an overall shortening of the beds.

Conclusion:

A deformation event, occurring after the deposition of the Lower Devonian sediments, has resulted in the compressional structures found throughout the area surrounding Panther Gap and Goshen Pass, in central Virginia. Bed thickening and shortening has occurred via large scale folding and thrust faults as well as local scale "wedging" and disharmonic folding.

References:

Spencer, E. W., Bell, J. D., and Kozak, S. J. Valley and Ridge and Blue Ridges Traverse, Central Virginia. Field Trip Guidebook T 157. American Geophysical Union. Washington, D.C. 1989. 23(3), 68(2).

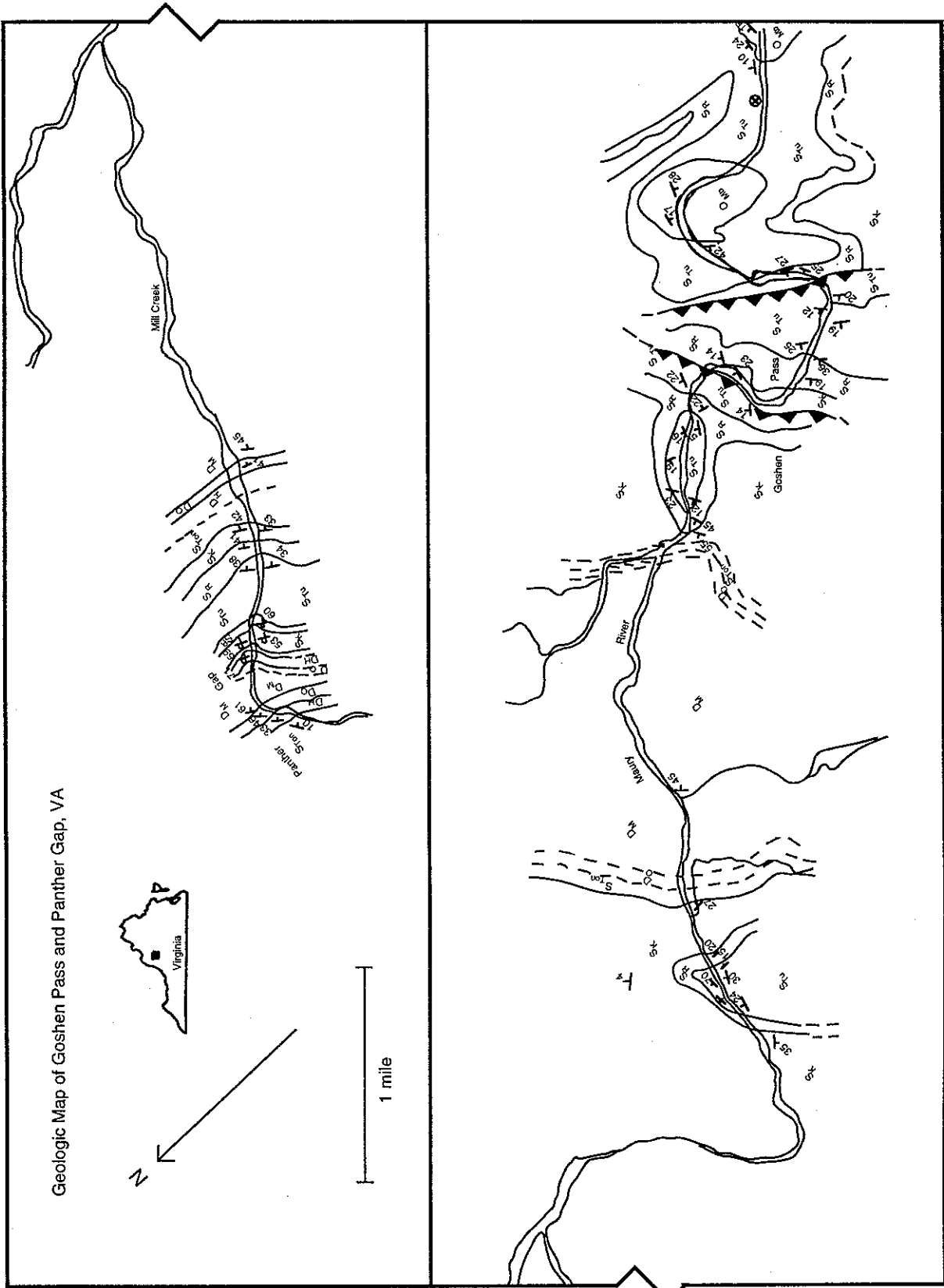
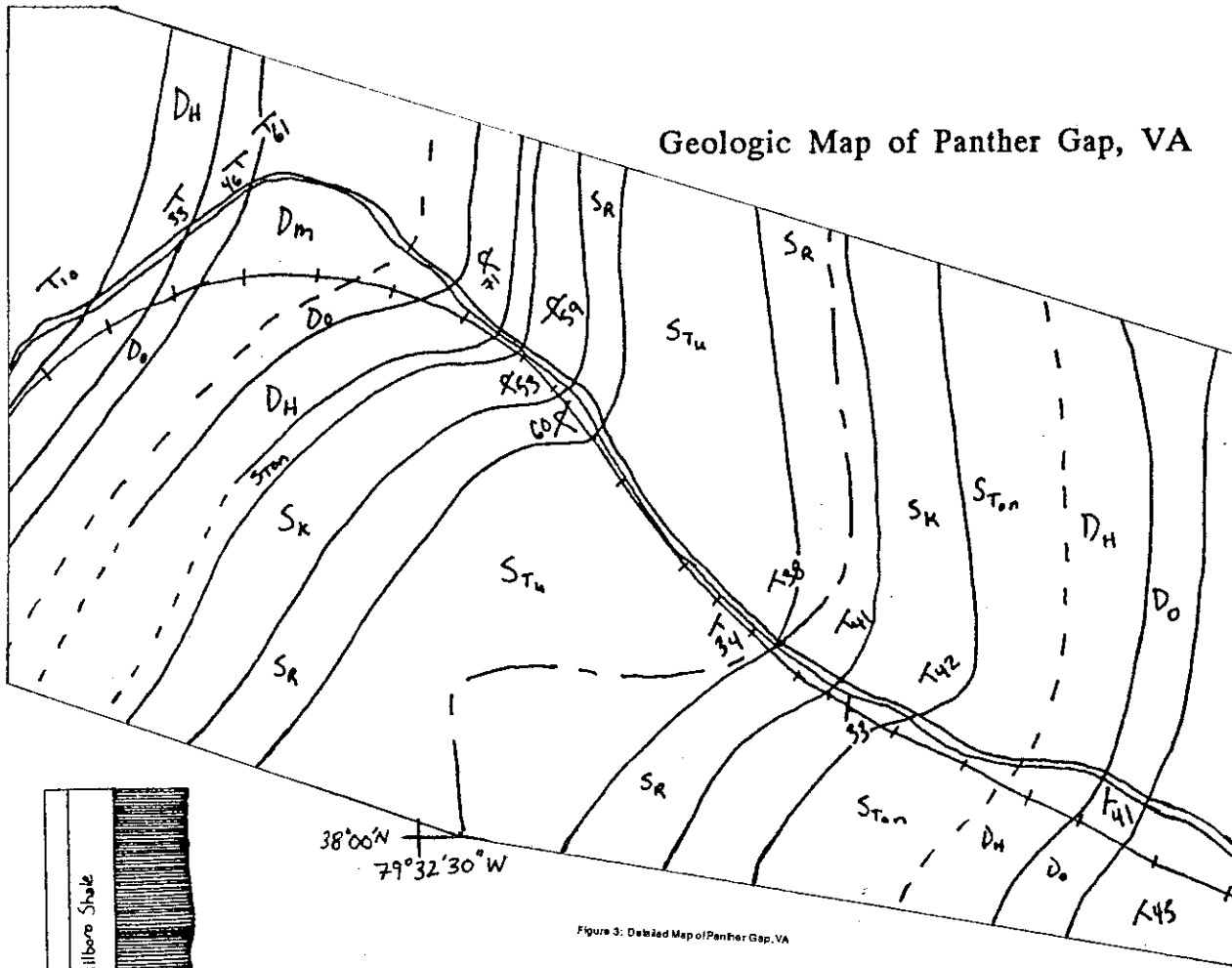


Figure 1: Regional geologic map of Goshen Pass and Panther Gap, Virginia

Geologic Map of Panther Gap, VA



38°00'N
79°32'30"W

Figure 3: Detailed Map of Panther Gap, VA

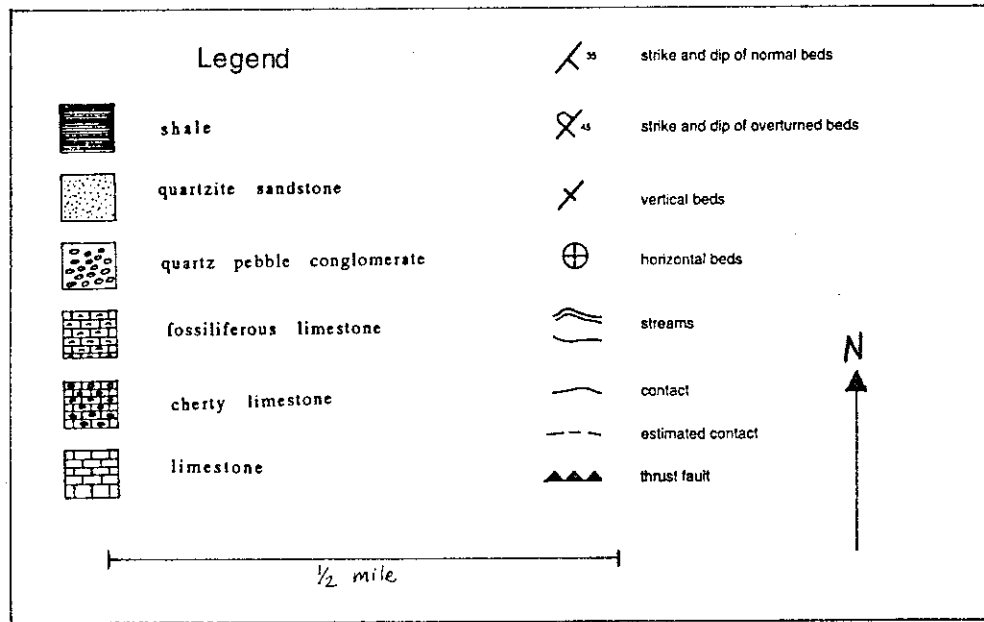
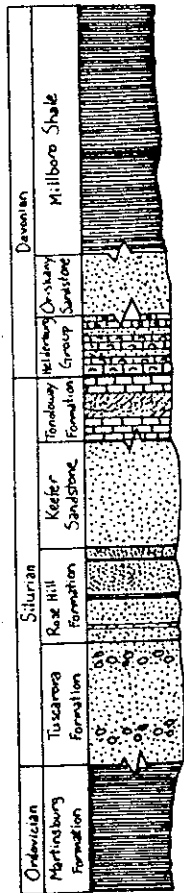


Figure 2: Stratigraphic Column by Panther Gap and Goshen Pass, VA

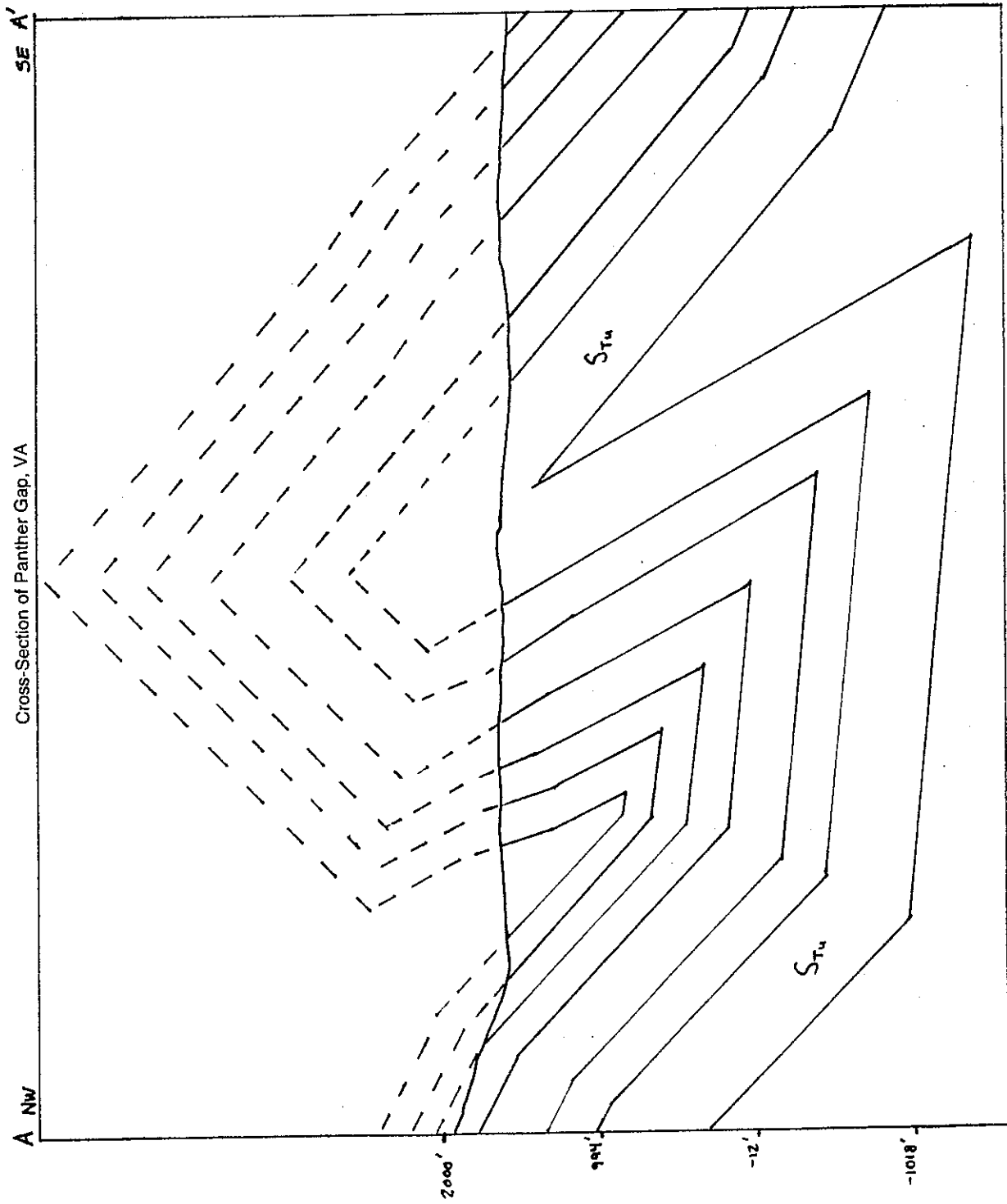


Figure 1. Cross-section A-A', Panther Gap, VA. Line of Section = NSBW