

# Using GIS to visualize the relationships of natural limestone springs to geologic structure in the Valley and Ridge province of Pennsylvania

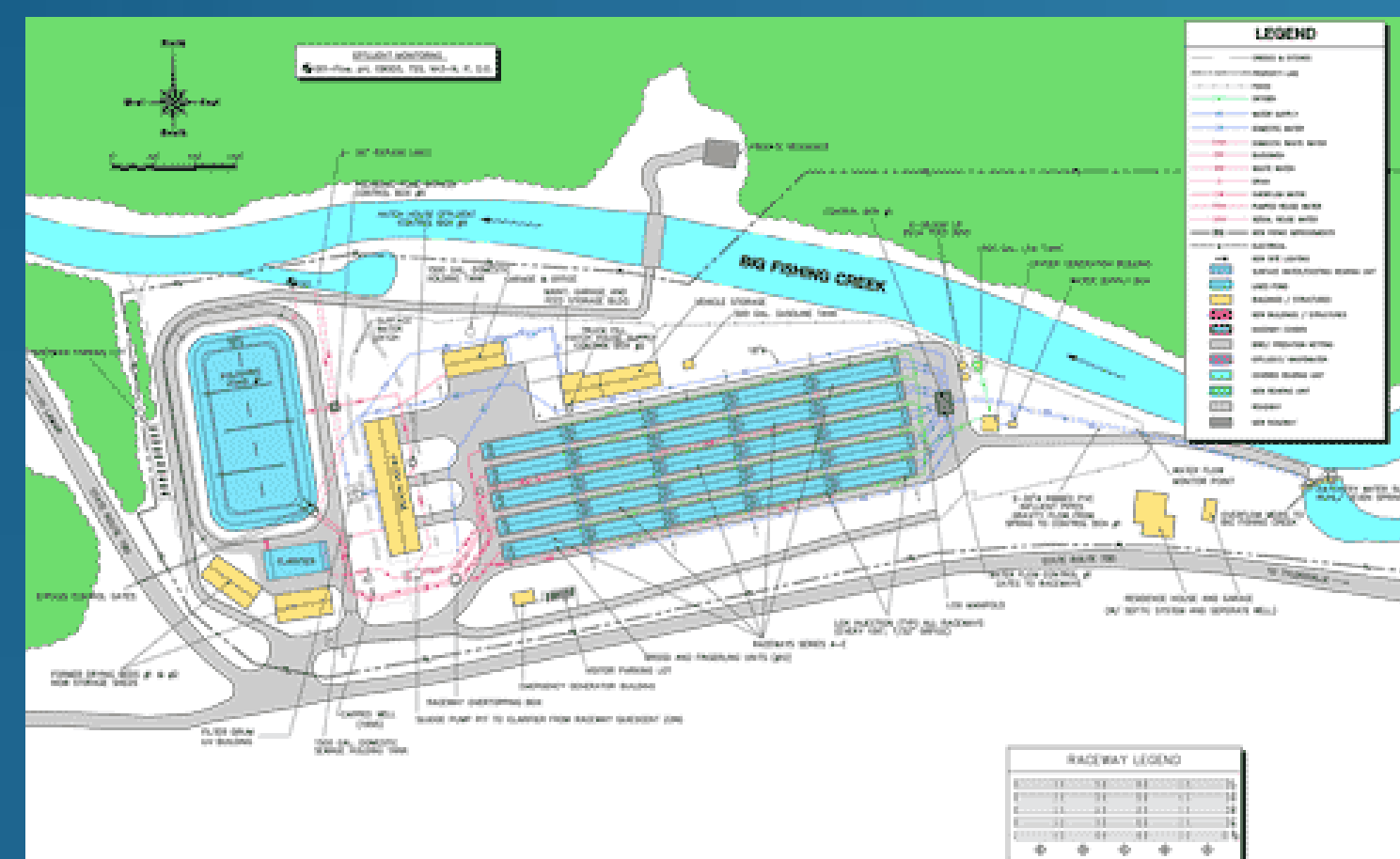
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Rare blue trout variant of brook trout (*Salvelinus fontinalis*)  
Family Salmonidae



Length view of trout raceways at  
Tylersville Hatchery



Site map of the Tylersville Fish Hatchery showing trout raceways and spring pool (east edge) just south of Fishing Creek in central Sugar Valley PA



Foot bridge over weirs at end of spring pool, releasing flow to Fishing Creek



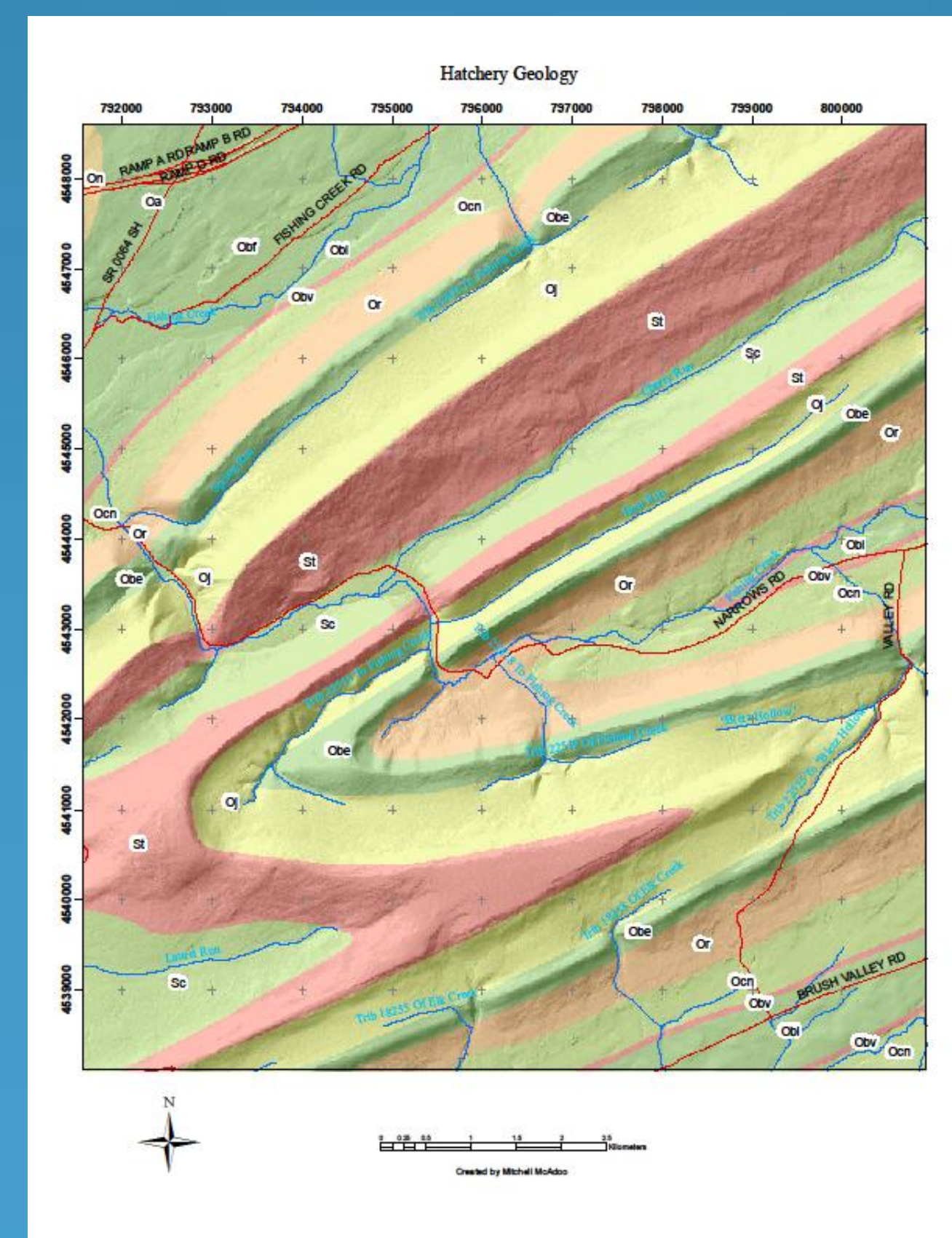
View eastward along length of spring pool. Eight individual springs lie beneath overhanging branches on right (south) side of pool



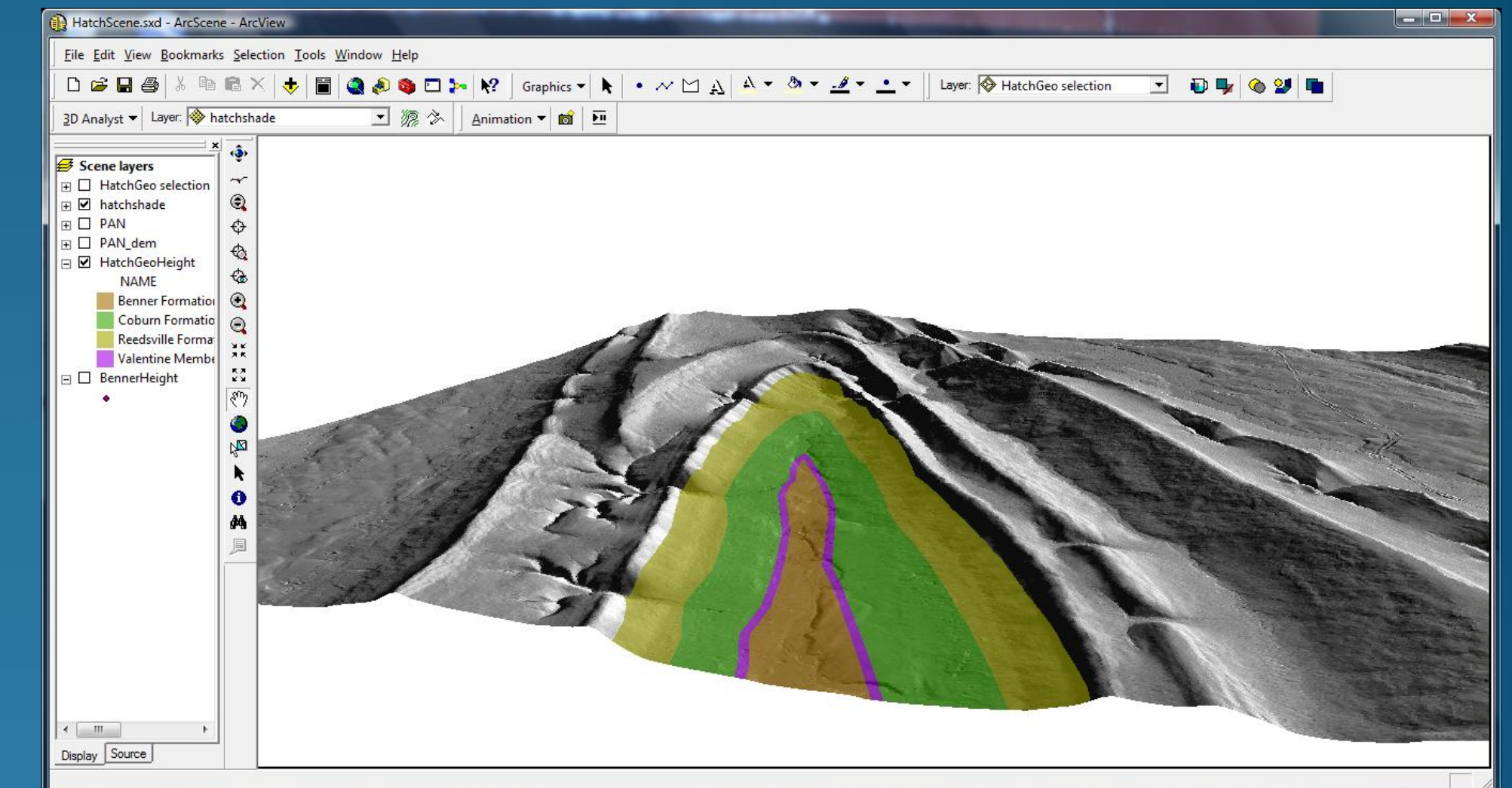
Spring source at south east end of spring pool

The Tylersville fish hatchery in central Pennsylvania (Clinton County) is an outstanding field trip locality to see the relationship of naturally occurring limestone springs to fold structure of the Sugar Valley anticline of the central Appalachians. Eight springs are aligned with the axial trace of the Sugar Valley anticline which plunges gently (15 degrees) to the west-southwest. The springs flow from fractures along the hinge line between the Coburn and Nealmont formations, and the entire spring pool is accessible at the east end of the hatchery immediately adjacent to Fishing Creek. Flow from the springs varies with climatic conditions from about 6000 gpm low flow to about 18000 gpm high flow (the largest single source spring output in Pennsylvania). The hatchery diverts less than 5000 gpm from the spring pool to the trout raceways, and the remainder is released into nearby Fishing Creek. The spring water has a chemical composition and temperature range which is ideal for raising trout.

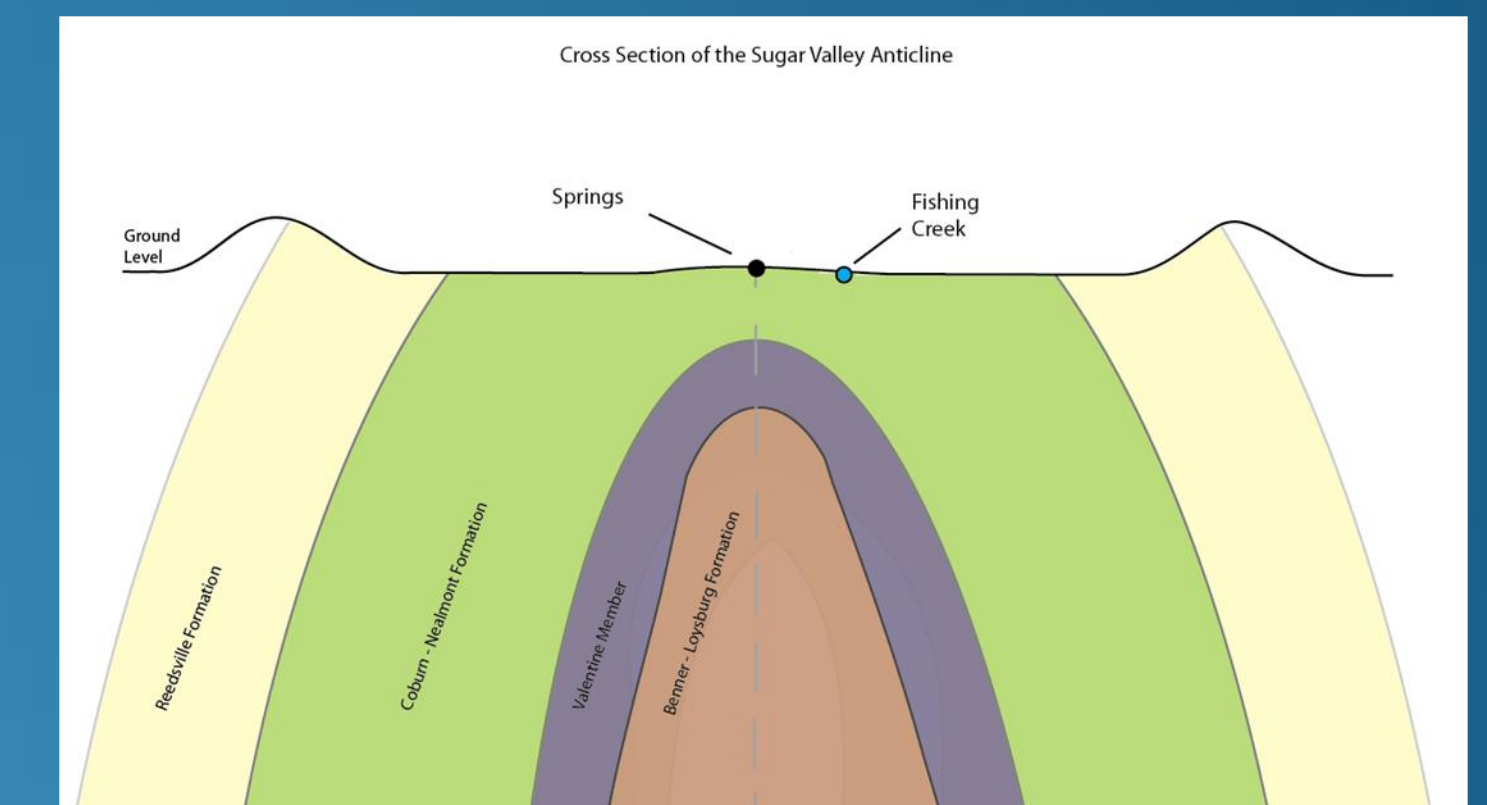
A small outcrop of the Nealmont Formation is exposed at the west end of the spring pool, but only the northwest flank of the anticlinal structure is visible here. However, the availability of digital geologic map databases and lidar-based digital elevation models can provide exceptional visualization of the regional topography and geologic structure of Sugar Valley. Students can now more easily grasp the interconnection of spring occurrence and alignment with the anticlinal structure beneath the valley. This site provides just one example of how important it is for students to develop a deeper understanding of the connections between geology and water resource development and use (in this case, the springs, and the site of the hatchery). Analysis of responses to a series of specific questions about the springs and their relationship to geologic structure can be used as an assessment tool.



Geologic map of part of Clinton County PA superimposed on digital elevation model



This hillshade was created using ArcGIS spatial analyst with a geology feature class draped on a LIDAR digital elevation model



Simplified geologic cross section oriented perpendicular to fold axis showing Sugar Valley anticline (not to scale)



View west – southwest of plunging anticline surface on bedding plane in the Coburn Formation



Outcrop of Nealmont Formation exposed at west end of spring pool.