

# Surficial Geology of Waterfall Glen in DuPage County, Illinois

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Written By: *Steven D.J. Baumann*



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*NOTES:*

## Background

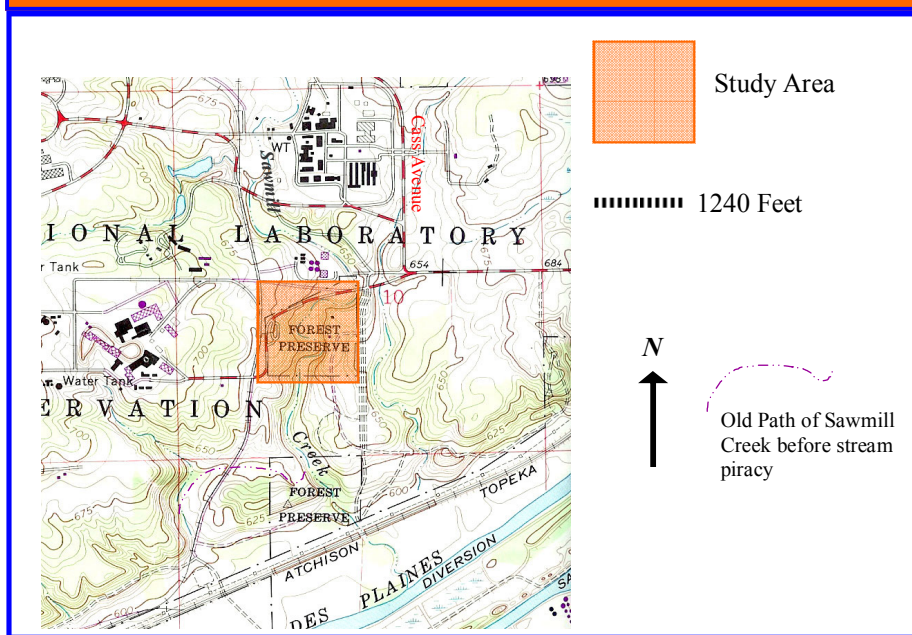
Waterfall Glen is a large forest preserve that surrounds Argonne National Laboratory in southern DuPage County. This report only deals with a small portion of the preserve, specifically the NE1/4 of the SE1/4 of Section 10 of T37N R11E.

This is an area with great Quaternary exposures. It is also the only easily accessible place where the Silurian *Sugar Run Formation* crops out. Sawmill Creek is the name of the creek that runs thru the section in a roughly north-south direction. It empties into the Des Plaines Diversion Channel to the south of the study area.

The waterfall is a manmade feature created from the quarrying of local dolostone. The occasional blast hole can be seen in the rock that makes up the waterfall. When the rock is quarried, holes will be drilled into it. Then an explosive charge will be placed and detonated. This will separate the desired rock chunk from the surrounding rock yet to be quarried.

Figure 1 shows the general area that was studied. Figure 2 shows the specific locations studied.

**Figure 1: Site Map**





## Introduction

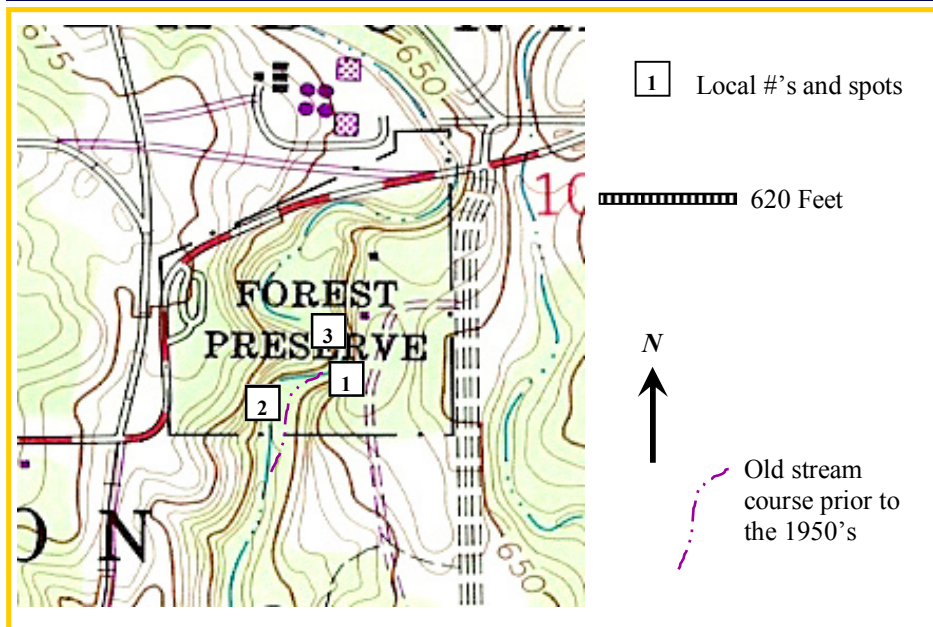
If you'll notice in Figure 1, there is a small purple dotted stream that says "Old Path of Sawmill Creek" in the legend. This is the course of Sawmill Creek circa; 8000 years ago, before it "stole" its modern path from a now extinct creek in a feat of **stream piracy**. The old course followed the purple line from east to west.

The 3 locations (Locals) studied are unique outcrops in the area. Local 1 is in the cut bank of Sawmill Creek and provides an excellent glacial outcrop.

Local 2 is just a little further west and slightly south. This is also a cut bank where the lower half of what is visible in Local 1 is exposed. The **cut bank** in Local 2 is a 20th century phenomenon. It does not appear in topographic maps before the 1950's. In ISGS Bulletin 64 Part I (now out of print) the sharp meander is not present and the creek is about 150 feet further east near the 600 foot contour interval. This is also the only place where the Silurian bedrock is exposed.

Local 3 is the general area of the manmade waterfall. The area is surrounded by quarried Silurian Dolostone placed along the river banks. It isn't of much interest to geologists but it is beautiful scenery.

**Figure 2: Locations Studied**



### Field Observations and Interpretations

Figure 3 shows the glacial stratigraphy of Local 1. Several formations were noted. The *Peoria Silt*, the *Henry Formation*, *Wadsworth Formation*, and the *Lemont Formation* are all present. These are the three dominant formations in the park. The *Peoria Silt* is thin in the outcrop but caps most of the hills and can be two feet thick. It is younger than 13,000 years, but older than Sawmill Creek (which is probably about 9000 years old). The *Wadsworth Formation* is about 16 feet thick and is about 13,000 to 15,000 years old. The *Beverly Tongue* of the *Henry Formation* varies in thickness but is generally 5 to 7 feet thick and between 15,000 and 15,500 years old. The *Lemont Formation* is the thickest, being over 20 feet thick and about 16,000 to 18,000 years old. The *Cahokia Formation* is present only at the bottom of the creek in abandoned **meander channels**, but can be up to three feet thick.

At Local 1, Unit 9 is typical of **lodgment till**. Unit 8 seems to be altered and slightly oxidized. It is possible that it was very close to the surface under the glacier, and represents the basal zone of **ablation till** or **melt-out till** from the interior of the glacier. Unit 7 contains the flat angular slabs of dolostone boulders that are in line with other boulders at the same height. Unit 7 is ablation till, but is from the surface of the glacier due to the lack of fines (compared with Unit 8) and the angularity of the particles. Unit 6 is **stratified drift** which formed as outwash from the front of an end moraine. Whether or not it is lense shaped or linear cannot be determined from local 1 & 2. Unit 6 was probably thicker at one time and eroded when the glaciers readvanced. Unit 5 is probably melt-out till deposited when the glacier was stagnant. Unit 3 and 4 are probably represent a small subglacial **esker**. Unit 2 is ablation till from the interior and front of the glacier.

Both unconformities and disconformities were observed with only a couple of conformable contacts.

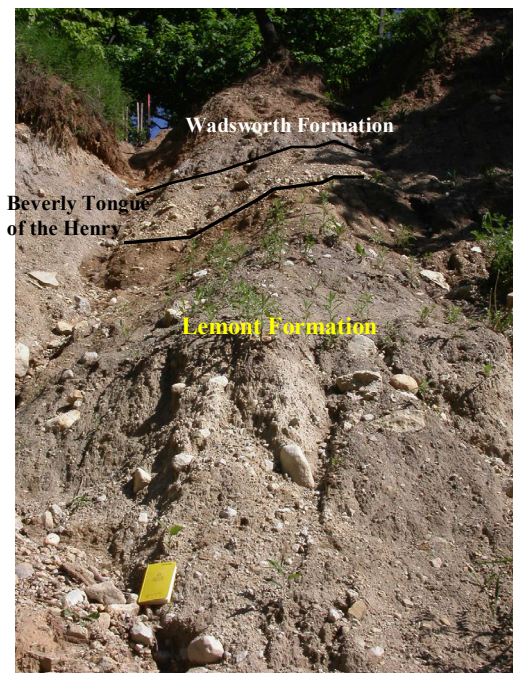
No stratigraphic column is given for Local 2. However, it is similar to Local 1 in lithology. The outcrop is not as large as in Local 1, and only the *Lemont Formation* and most of the *Beverly Tongue* of the *Henry* are present. At the bottom of the outcrop, the Silurian *Sugar Run Formation* is present with glacial striations on its surface showing that the ice that deposited the *Lemont* came from the northeast to the southwest (they trend N60E to S60W). Two sets of joints were also observed dominantly trending about N45W and N35E. The bedrock exposure has subsequently been covered with downed trees, driftwood, and rubble due to heavy rains in late May and early June of 2004.

No naturally occurring bedrock is presently exposed north of Local 1. Local 3 shows how man has attempted to change the local scenery. The waterfall that the park gets its name from is actually a manmade feature put in place from the quarrying of local dolostones.





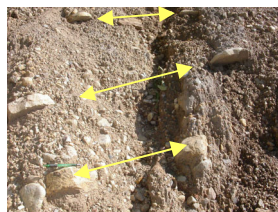
## Figure 4: Local 1 Pictures



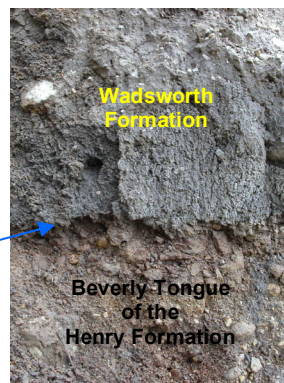
This picture is of the outcrop described in Figure 3, facing south. Yellow notebook for a rough scale.



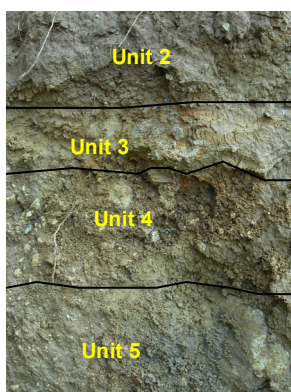
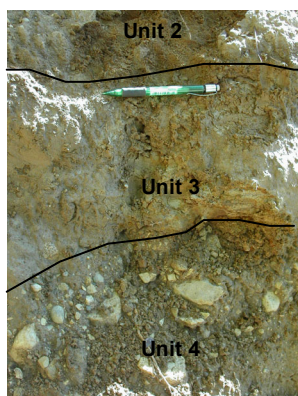
Igneous boulder located just to the east of the picture to the left at the base of the *Lemont Formation (undivided)*.



Pseudo-stratification caused the alignment of boulders in this ablation till. This is due to ice melting in Unit 7.



Unconformity between Unit 5 (*Wadsworth*) and Unit 6 (*Henry*).



The upper and lower contacts of Unit 3 taken at two different times. Notice the mottled color of Unit 3 in the picture on the right.



Shows the brown, blocky weathering pattern of Unit 8

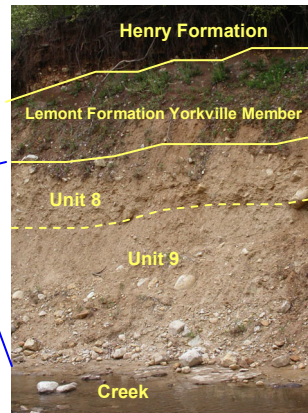


## Figure 5: Local 2 Pictures

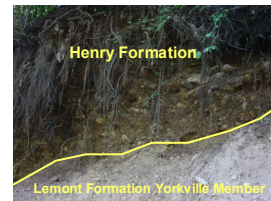


Local 2 showing the surface of the bedrock (Sugar Run Formation) as it was exposed on April 30th, 2004 on the west cut bank looking south.

Lemont Formation (Undivided)



This picture was taken just to the north of the exposure in the picture on the left. Notice the plant growth at the top of the Henry (small picture to the right). Creek flows from right to left in both photos.



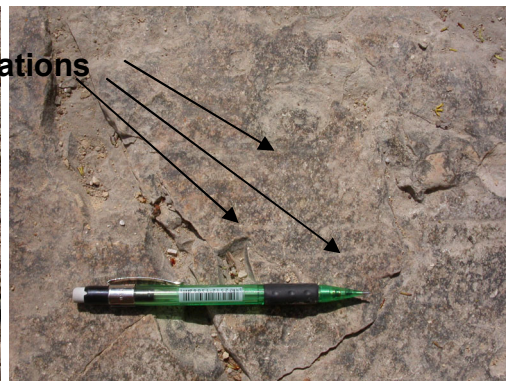
Bedrock surface (~623 ft above MSL). The pencil is along a joint trending N44W. The perpendicular joint, just to the right of the pencil is trending N34E.



The point of the pencil is on the contact between Unit 8 and 9. Here Unit 8 has orange "blotches" on it left behind as cobbles and boulders eroded away. Here the lamination is clearly visible as is the blocky weathering.



Glacial Striations



The picture on the right is a close-up of the pencil area of the picture on the left. On the left picture in the upper right quarter, the glacial striations appear as light roughly parallel lines. The picture on the right shows those striations up close. Due to the constant action of the creek, the lines are less prominent then they once were. Little shallow, curvy, random, scratches can be seen due to pebbles scraping the surface as Sawmill Creek transports them downstream. The pencil points in the direction of ice flow, from N60E to S60W.

### Figure 6: Local 3 Pictures



A man made retaining wall along the west side of the creek facing south. About 300 feet north of the waterfall.



A small cove formed by leaning the slabs of rock out over the edge as they were stacked by man.



Two different views taken of the waterfall. All of the rock here was placed by man. You can tell by the large, flat, “stacked” appearance, with sharp edges on the thin sides, the rocks have no preferred orientation. If you took joint measurements the numbers would be random and trend every direction. Also quarrying marks such as blasting holes can be seen.

### Summary

The landscape seen at Waterfall Glen is the end product of glacial activity over the past 17,000 years. Sawmill Creek is a young feature formed as a drainage system attempts to establish itself in a post glacial era. As seen, that **drainage pattern** is still forming, and stream piracy in the area will probably continue as neighboring streams meander and connect with others in the area. There is nothing anyone can do to stop it. Erosion in the area is fast and extensive.

There are 2 major glacial advances and retreats recorded in Local 1, and are separated by Unit 6 (*Henry Formation*) which separates the *Wadsworth Formation* (above) from the *Lemont Formation* (below). Unit 8 is interpreted as melt-out or ablation till, but could possibly represent subglacial lake or stream deposits.

The bedrock in the area bares the battle scars of the ice that once stood upon it and smoothed it. The *Sugar Run* is the most likely bed rock formation exposed (based on elevation). However, on June 20th, 2004, I had a personal conversation with Don Mikulic of the Illinois State Geological Survey. He stated that the bedrock could possibly be of the lower part of the *Racine Formation* (which is extensively exposed at Thornton Quarry). It is hard to tell due to the fact that there is no vertical bedrock exposure. The *Sugar Run* is present along the Des Planes Diversion Channel to the south. The rock is characteristic of the *Sugar Run*.

One thing about Waterfall Glen is for sure. The landscape is still dynamic and will continue to change for a long time to come.

## Glossary

*ablation till:* Till derived from drift either in (basal zone) or on the surface (upper zone) of a glacier.

*cut bank:* Area along a stream where erosion is actively taking place, the water usually comes right up to a cut bank.

*drainage pattern:* The pattern formed by streams and rivers as they interact with each other.

*esker:* A subglacial, narrow deposit of coarse sediments along a melt water channel on the bottom of a stagnant glacier.

*lodgment till:* Drift from the basal part of the glacier that was in transport, usually fine grained with a large number of rounded erratics.

*meander channels:* The stream exists in a channel as it flows along, as time goes on these channels will tend to move laterally as water volume and load changes with time.

*melt-out till:* Deposited from the top or bottom of a stagnant or melting glacier.

*stratified drift:* Sediments deposited by a glacier (but not necessarily directly) where the sediment is layered.

*stream piracy:* Occurs when one stream captures an independent stream and uses its course as its own as it meanders, establishing a new drainage pattern.

### References

ISGS Bulletin 65, 1964 (out of print)

ISGS Bulletin 104, 1996

ISGS Guide Leaflet 1971-G

ISS field notes taken from March to June 2004

USGS topographic map, Sag Bridge, IL 1963, photo revised 1973, photo inspected 1978



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