Hydrologic Monitoring in the North Campus Natural Area
North Seattle College 2016

Winter Quarter Field Monitoring Project
Hydrologic Studies: North Campus Natural Area

Meridian Avenue and 103rd Street Basins

These are being monitored just out of curiosity. They are ultimately controlled by city stormwater releases, and we don’t have quantitative measurements on that volume. None the less, it is worth monitoring for baseline data, and to see if anything interesting happens. I am assuming that these are isolated, impermeable basins which don’t receive water from the regional aquifer. Our data may give us a chance to test that hypothesis.
One advantage to the system of monitoring the wetland basins is that it allows us to establish elevation reference points throughout the natural area. When the system is full of water, the water level can be used as a known constant elevation. This will allow us to get precise elevations for our monitoring stations.
North Ridge Groundwater Station

The north ridge station taps the Esperance Sand, which has been uplifted in the core of the North Ridge Anticline. This anticline strikes broadly north-south, dips to the north, and rises to merge with the hill to the south. Most of the ridge was excavated for fill material in the 1930’s.

The winter water table here lies several feet above the surface water in the adjacent 103rd Street Basin, the two areas being separated by an impermeable layer of till. A small seasonal wetland appears about 100 feet east of the station, a reflection of a seasonally-shallow water table in this area. In the winter, some of this drains down and north to the drainage channel, which was cut in 1996.
Some of the water here drains north off the hill, which serves as a recharge area. Students boring on the south side of the hill hit groundwater at about 7 feet in the spring, which is well above the north ridge station. Some of the water in the hill area, however, probably flows west to the vernal pond. Once that is quantified, we will have a better idea of how much flows north. In the end however, I suspect that a good portion of the water here may come from the adjacent freeway.

Northwest Ridge Groundwater Station

The northwest ridge station taps the Esperance Sand, which has been uplifted in the core of the northwest ridge anticline. This anticline strikes northwest-southeast, and rises to meet the hill on the southeast end. The top of the ridge was graded off in the early 1900’s to make room for residential development, exposing the Esperance Sand in the center. As a result, the central part of the ridge serves as the recharge area for this uplifted section of sand.

It doesn’t appear that the graded sand exposure extends off campus, so it seems likely that this is the sole recharge area for the ridge. If this is the case, then rainfall volumes should translate directly into a rise in the water table, as a function of the size of the recharge area. We can estimate that area pretty accurately from past mappings.

The ridge is cut by the stormwater channel, constructed in 1996. This means that the aquifer above ~255 feet now drains into the channel, and that the water table to the east of the station probably drops several feet down to the channel. The team studying the geology across the channel cut will make note of the water table elevation, so that this axis can be mapped.

Vernal Pond

The vernal pond may provide some of the most interesting data, because it allows us to measure the outflow from the system. The stream which emanates from the pond can easily be channeled into a pipe, and the outflow measured. This, of course, also represents the rate of inflow into the pond.

The pond fills quickly in the winter, and appears to respond pretty rapidly to rainfall events. A quick estimate suggests that the grassy areas around the pond simply can’t provide enough water to support those conditions. This implies that a certain amount of the water has to be coming from the hill to the east. We don’t have any groundwater stations in the grassy area or on the hill, but we do know that the water table on the hill rises well above the vernal pond basin. We also suspect that a portion of the water on the hill drains north, toward the North Ridge station.

The grassy area is a pad of fill material, about 2 feet thick by the pond, increasing to at least 6 feet approaching 100th Street. This overlies dense medium silty sand. There is every reason to believe that the water table at the Vernal Pond extends into this layer of fill material. The hill to the east is mantled in a variable thickness of fill material, once again over dense sand. While the sand is somewhat permeable, I suspect that most of the water is held in the fill material, flowing to the pond.
Vernal Pond Hydrology: Cross Sections
By comparing rainfall to the resultant outflow from the pond, we can estimate the amount of area which must be draining to the pond. This will allow us to partition the hilltop aquifer between the pond and the north ridge.

**Summary**

The purpose of this study is to gather baseline hydrologic data which can be used to model groundwater flow in this area. This is important data because we hope to re-develop this area as an interpretive facility, a project which may involve some landscape changes (for example, a tall berm that would block the freeway noise, areas which would be filled or excavated to build trails, the construction of viewing platforms, etc). Because the local ecology is intimately tied to water availability, we wouldn’t want to do anything which adversely affected that system.

While we don’t have (utility) inflow data for the Meridian Avenue (and ultimately 103rd street) Basin, this study will provide some initial baseline figures for further study. By next year we hope to have inflow data, so we can evaluate this storm-water management system. By that time, we should be well-positioned to do the necessary water-quality assessment. Preliminary work this winter and spring positions us to do a full-scale evaluation over the next hydrologic year.

This study benefits from two “clean” hydrologic settings which can be used for reference. These include the northwest ridge, which has a well-defined recharge area, and the vernal pond, which is fed by local groundwater. Because we can measure the out-flow from the vernal pond, we should be able to determine how much surface area is draining into it.

The north ridge station is a more complex setting, receiving water off the hill, and probably from the freeway. We can partition the flow off the hill between the pond and the ridge, and estimate the freeway input, using the Northwest Ridge as reference data.

Concurrent work on soil permeability will contribute substantially to the modeling of ground-water flow in this area, as will other studies scheduled over the course of the ensuing year. The data gathered this quarter will illustrate how the system behaves from the seasonal groundwater maximum through its decline into spring. This is some of the most important data for modeling purposes, and for determining the course of subsequent studies.