Natural History, Geology and Geography of the Federal Way Area

by

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Introduction

This paper is intended to provide information relating to the formation and present condition of the landforms and water resources of the Federal Way area. Primarily this involves an overview of the last ice age, which dramatically affected the soil and water of the Federal Way area. A discussion is made concerning the presence of peat in the area, the present soil consistency, the water table and drainage. The past and present presence of timber and climatic condition is also discussed.

Area Covered

The area covered by the Historical Society of Federal Way is the area defined by the Federal Way School District which is designated District #210.[1] This area can loosely be described as southwest King County. It is adjacent to the Pierce County line on the south, with Puget Sound on the west and the Green River Valley on the east. The northern boundary is approximately formed by the northern edge of Saltwater State Park and South 252nd Street west of I-5, and the Kent Des Moines Road east of I-5. In addition to the Pierce County Line, the southern boundary is contiguous with the city limits of Tacoma and the town of Milton. The Green River Valley on the eastern edge just outside the school district boundaries includes the towns of Pacific, Algona, and Auburn and the

[1] Federal Way School District maps are available through the Federal Way School District or the Historical Society of Federal Way.

West Valley Highway. The area is roughly triangular in shape and contains approximately 40 square miles.[2]

Topography

Topography refers to the general shape and patterns of land surface elevation or the bottom surface and shape of large bodies of water.[3] The topography of the Federal Way area is the result of past glacial action that created an upland gently rolling surface elevation of between 300 and 500 feet above sea level.[4] The plateau is mostly at the lower level; averaging just over 300 feet elevation.[5] The highest point, 508 feet, is just east of Lake Dolloff.[6] The overall area is on a bench of glacial till deposited as the Vashon Glacier receded during the Pleistocene epoch.[7] The rolling terrain of the plateau gives way to steep, rugged slopes down to Puget Sound on the west, and to the Green River Valley on the east. The majority of the slopes occurring along the east and west edges of the plateau have a slope of 40 degrees or greater.[8] Much erosion has occurred along the many streams and in the beach areas.

Definitions

Pleistocene is defined as the geologic period between 10,000 years ago and 2 million years ago. *Recent* is defined as less than 10,000 years ago.[9]

Ice Age Geology

Only the geology from the most recent ice age will be discussed here in detail. For discussions of the original formation of the Northwest mountains and Puget Sound area the following are recommended:

1. Robert Burns, *The Shape and Form of Puget Sound.*[10]
2. Bates McKee, *Cascadia: The Geologic Evolution of the Pacific Northwest.*[11]
3. David Alt and Donald W. Hyndman, *Northwest Exposures: A Geologic Story of the Northwest.*[12]

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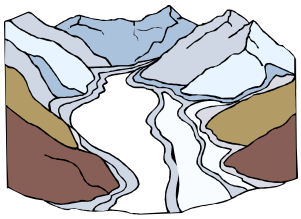
[2] "*Federal Way Community Plan,"* (Seattle: King County Department of Community and Environment Division of Land Development, June 1975), p. 5.
[3] Robert Burns, *The Shape and Form of Puget Sound,* (Seattle: Washington Sea Grant Program University of Washington, 1985), p.92. This book provides a basic introduction to geological processes and how they formed western North America and includes a detailed discussion of the formation of Puget Sound.
[4] Howard H. Waldron, *Geology of the Poverty Bay Quadrangle, Washington*, (Washington, D. C.: U. S. Geological Survey, 1961), Map GQ-158.
[5] "*Federal Way Community Plan,* p. 5.
[6] Waldron, Map GQ-158.
[7] "A look at the physical area," *Progress,* spec. issue of *Federal Way News,* August 1979, p. 54.
[8] "*Federal Way Community Plan,* p. 5.
[9] David Alt and Donald W. Hyndman, *Northwest Exposures: A Geologic Story of the Northwest,* (Missoula: Mountain Press Publishing Company, 1995), p. 233.
[10] Burns.
[11] Bates Mckee, *Cascadia: The Geologic Evolution of the Pacific Northwest,* (New York: McGraw-Hill Book Company, 1972).



Development of the crustal structure of western North America began more than 300 million years ago but the structural identity of the Puget Lowland (Puget Sound and the area between the Olympic Mountains and the Cascade Mountains) was established only within the last 20 to 30 million years.[13]

Starting around two million years ago a series of ice ages covered various parts of North America. There is no common agreement as to what caused them:

> Whatever caused them, ice ages must involve a change to a wetter and cooler climate in some combination that makes winter snowfall exceed summer snowmelt so that glaciers can grow. . . . As the snow deepens it turns into ice. And as the ice thickens it begins to flow, thus crossing the threshold from a patch of ice to a glacier.[14]

> Glaciers are masses of ice that originate in areas of permanent snowfields and flow down and away from the snowfield. . . . [The] controlling factors are relatively high rate of precipitation and low temperatures. The permanent accumulation of snow results in conversion to ice and eventually high internal pressure results in deformation that causes the ice to flow away from the region of accumulation. . . .
>
> Glaciation is one of the strongest of the surficial geologic processes that shape the surface of the earth. . . .
>
> The process of glaciation yields characteristic features that result from erosion, transport, and deposition of materials. The combination of these features generally provides a strong contrast with adjacent nonglaciated topography.[15]

The results of the interaction of ice with the ground beneath it are described as follows:

> . . . Loose soil and rock are plucked from the surface and frozen in the ice. As the glacier moves, these entrained fragments scour and grind material that they override. In addition to erosion, glaciation results in characteristic landforms of which the most important in the development of Puget Sound is the glaciated valley. In cross-section, glaciated valleys appear U-shaped, rather then V-shaped like stream cut valleys.
>
> Material deposited by glaciers is called glacial drift . . . Deposited drift can be eroded and redeposited by running meltwater in varying degrees. Drift that has not been reworked by meltwater remains irregularly deposited, poorly sorted material termed *till.* In contrast, layered and better sorted material can result from reworking of the drift by running water (glaciofluvial deposits) or

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[12] Alt.
[13] Burns, p. 24.
[14] Alt, pp. 328, 329.
[15] Burns, pp. 35, 36.

> in proglacial lakes (glaciolacustrine deposits). . . .
> . . . With alternating advances and retreats, earlier deposits may be removed or obscured by later ones.[16]

Effects of Last Ice Age on the Puget Sound Area

The northern part of the North American continent was covered at least four times in the Pleistocene by great ice sheets. The great tongue of ice that spread south from British Columbia across the Puget Lowland is known as the Puget Lobe. Ultimately the great glacier reached all the way to Olympia and slightly south. It covered all the hills of the Puget Lowland and the San Juan Islands and lay high against the flanks of the Olympics and the Cascades. The record of the earliest glaciations has been obliterated by the last, so our knowledge of the earlier glacial history of the lowlands is poor.[17]

Concerning the most recent ice age:

> We can assume [at the start of the most recent ice age] that the basic distribution of the major landforms was as we see it today with the Cascades and Olympic Mountains separated by a broad valley . . . Drainage was to the north and then west to the ocean via the Strait of Juan de Fuca. As the ice wall moved south across the Gulf Islands and San Juan Islands, the drainage of the Puget Lowland was probably affected very little. An entirely different situation prevailed, however, as soon as the advancing glacier reached the northeast front of the Olympics. At that time, the wall of ice effectively dammed the entire lowland, for little drainage could escape past the ice to reach the ocean. The result, inevitably, was the formation of a lake. Eventually, this lake filled the entire lowland between the ice wall, the mountains, and the divide between Puget Sound and the Chehalis River drainage basins. The lake received runoff from the mountains and meltwater from the Puget Lobe. When the basin filled, it drained to the ocean via the Chehalis River. This explains why the modern Chehalis River, which is not very large, occupies a valley suggestive of a much larger river. At its largest, the river probably had a discharge that was several times greater than of the modern Columbia River. The glacial discharge also explains the presence of very course gravel in the Grays Harbor area and on the adjacent continental shelf.[18]

The ice front continued to advance, ultimately covering almost all the lake basin and reaching very close to the Chehalis River itself. Evidence indicates the glacier did not occupy the maximum position for long. When it started to melt back it created a new lake, which persisted until retreat freed the natural drainage of the lowland via the Straight of Juan de Fuca. As normal drainage patterns were reestablished, the streams

[16] Burns, pp. 36, 37.
[17] McKee, p. 292.
[18] McKee, p. 292.

began eroding the sediments left in the lowland from the lake stage and from direct glacial deposition.[19]

Although geological evidence indicates that there have been several periods of major global glaciation, it was the most recent – during the last several tens of thousands of years – that was the principal agent in establishing Puget Sound as the dominant feature of the Puget Lowland.

Once the large-scale structure of the Puget Lowland was established, the detailed and surface, small-scale surface topography was shaped. This was accomplished primarily by surface processes. The most prominent of these was glaciation during the ice age of only a few tens of thousands of years ago.[20]

> Another effect of glaciation occurs when the total mass of ice accumulates enough weight to depress the level of underlying crustal rocks. Subsistence of crustal rocks of the Puget lowland during extensive regional glaciation resulted in a general local depression of the earth's surface relative to sea level. This depression subsequently rebounded after the ice retreated from the region, which was a factor in the shaping of Puget Sound.[21]

We know as little about what ended ice ages as of what started them. Radiocarbon dates leave little doubt that glaciers of the last ice age reached their maximum size approximately 15,000 years ago. Evidence of a rapid rise in sea level between then and 12,000 years ago shows that the great glaciers melted very rapidly, within a few thousand years. Sea level reached its present stand by about 10,000 years ago. This means that the ice cover in the Puget Sound area after the major melt was about the same as it is now. The climate must have changed rather quickly to melt the ice so rapidly.[22]

Koppel gives a brief description of the most recent ice ages.

> At the peak of the last glaciation of the Ice Ages – 18,000 to 20,000 years ago – great ice sheets covered much of northern Europe and Russia. In the southern hemisphere, enormous glaciers mantled the Andes. And in North America, the Laurentide ice sheet, with a central dome as much as three miles thick, extended from eastern Canada almost to the Rockies and down into the United States beyond the Great lakes. Another ice sheet, the Cordilleran, stretched over the Rockies to the coast of Alaska, British Columbia, and northern Washington State. So much water was locked up in ice that world sea level was 350 to 400 feet lower than it is today.[23]

As the climate changed the ice melted. A stagnant icescape existed where the glaciers were melting on hills and valleys covered with ice.

> On warm summer days, torrents of muddy water poured off the melting

[19] McKee, pp. 292, 295.
[20] Burns, p. 24.
[21] Burns, p. 37.
[22] Alt, p. 329.
[23] Tom Koppel, *Lost World,* (New York: Atria Books, 2003), p. xiii.

> ice, dumping loads of mud, sand, and gravel in the stream beds and in lakes on the ice. As the meltwater poured beyond the melting ice, it dumped its sediment in broad outwash plains. When the last of the lingering ice finally melted, it left a landscape of glacial sediments in which the hills are the deposits that accumulated in low places on the stagnant icescape and the hollows mark the ice hills, where no sediment accumulated. You see the inverted icescape in the heavily glaciated parts of our region.[24]

In the Seattle area, it is estimated the ice had a maximum thickness of 4,000 feet. This would exert a pressure of about 8,000 pounds per square inch. This depth can be estimated based on the sediments found on the Cascade and Olympic mountains.[25] The height can also be measured from the height on the flanking mountains of glacial erratics (large boulders). These are rocks that are lithologically distinct (different in composition) from local bedrocks.[26] Clearly, the ice was thick enough to bury all of the hills in the lowlands, including the Federal Way area.

The formation of a lake or lakes in the lowlands would have recurred as the ice retreated during melting. At the start of the melting, the water was flowing through the Chehalis River.

> The greatly diminished Chehalis River now wanders in the oversized valley it eroded when it was flush with all that glacial meltwater. Sea level was some 300 feet lower then; the shoreline [of the Pacific Ocean] was some 30 miles west of its present position, and the Chehalis River was that much longer. The rising sea level at the end of the last ice age flooded its lower course to make Grays Harbor, an estuary.
>
> As the ice began to melt, two curving lakes formed between the ice and the spillover point into the Chehalis River. Lake Russell was along the southward end of the ice lobe, west of Olympia. Lake Nisqually was along the south end of the lobe, in the area of small lakes about 25 miles south of Tacoma and Puyallup.
>
> When the ice had melted back to a point opposite Seattle, about 13,500 years ago, the many fingers of Lake Russell filled the present canals and bays of the south half of Puget Sound and flooded adjacent valleys, including a long arc through Lakes Washington, Youngs, and Tapps, and the lower Puyallup River, southeast of Tacoma.
>
> Meanwhile, ice in the Strait of Juan de Fuca still blocked the rivers flowing into Puget Sound. For example, the lower Puyallup River was diverted to the southwest through the site of Olympia into the Chehalis River. The ice in Puget Sound later melted back far enough north to permit drainage northwest into the Strait of Juan de Fuca which by then was also free of ice. Seawater did not immediately flood back into Puget Sound, because sea level was still well below its present stand.[27]

[24] Alt, pp. 329, 330.
[25] McKee, pp. 296, 299.
[26] Burns, p. 43.
[27] Alt, pp. 363-365.

Many of these lakes still exist from the shallow dug out basins that were formed. Lake Washington and Lake Sammamish are the two largest of these lakes that occupy two prominent linear depressions in part of the lowland. Meridith Olson's book, *What's the Issaquah Delta doing up there?,* discusses how Lake Sammamish was at one time 450 feet higher than at present and how this lake would have covered much of the present Sammamish Plateau.[28] This book provides a good argument for how the receding ice formed one large lake and several small lakes. Color photographs are used to show former deltas, high water marks, erratics and spillways.

Much of the lowland eastward from Puget Sound, including Federal Way, displays the characteristic topography of glacial till deposits. The elevation is, with a few local exceptions less than 500 feet above sea level. Much of the landscape consists of rolling hills with a relief of only a few hundred feet.[29]

Effects of Last Ice Age on the Federal Way Area

The Pleistocene geology of the general Federal Way area was originally examined and discussed by Willis in 1898,[30] Willis and Smith in 1899,[31] and Bretz in 1913.[32] Between 1954 and 1958, Waldron intermediately mapped the geology of the area.[33]

The Federal Way area is underlain by unconsolidated surficial deposits of Pleistocene and Recent ages.[34] Formations older than the middle Pleistocene are not found anywhere on the surface. Formations of early Pleistocene and Tertiary sedimentary and igneous rocks are found in adjoining areas so are thought to underlay the Federal Way area at depth.[35]

> Most of the quadrangle is covered by deposits formed during the latest glaciation. Older Pleistocene deposits of both glacial and nonglacial origin, however, crop out in the valley walls; Recent alluvium and lacustrine sediments underlie the valley floors and occur in isolated patches on the upland. . . . Pleistocene deposits consist predominantly of drift deposited during repeated invasions of the Puget Sound lowland by ice lobes that originated in the coastal mountains of British Columbia; they also include some sediments of nonglacial origin.[36]

At least four drift sheets and deposits of two nonglacial intervals are recognized as affecting the Puget Sound area and the Federal Way area. From oldest to youngest these

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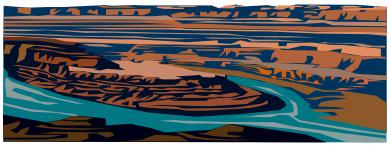
[28] Meredith B Olson, *What's the Issaquah Delta doing up there?,* (Seattle: Quality Books, Inc., 2003).
[29] Burns, p. 54.
[30] Bailey Willis, "Drift phenomena of Puget Sound," *Geological Society of America Bulletin,* 1898, v. 9, pp. 111 – 162.
[31] Bailey Willis and G. O. Smith, "Description of the Tacoma quadrangle," *Geological Atlas,* (Washington, D. C.: U. S. Geological Survey, 1899), Folio 54.
[32] J. H. Bretz, "Glaciation of the Puget Sound region," *Washington Geological Survey Bulletin,* 1913.
[33] Waldron, Map GQ-158.
[34] Waldron, Map GQ-158.
[35] Waldron, Map GQ-158.
[36] Waldron, Map GQ-158.

are: Orting drift, Alderton formation, Stuck drift, Puyallup formation, Salmon Springs drift, and Vashon drift.[37] All of the glacial tills are of northern provenance with no evidence that glaciers from the Cascade Range extended as far as the Federal Way area.[38]

The Vashon drift represents the latest of the glaciations and is also the one which most affected the Federal Way area. The Vashon glaciation, and its deposits, was originally discovered and discussed by Willis.[39] Willis based much of his work on his exploration of exposure on Vashon Island, hence, the name Vashon glaciation. He regarded the Vashon Glacier as a piedmont glacier formed by the coalescence of valley glaciers from the Canadian Coast Ranges to the north, the Olympic Mountains to the west, and the Cascade Range to the east. Subsequent investigations by Bretz,[40] Mackin,[41] and Crandell and Waldron,[42] however, have proved the Vashon glacier to be almost wholly of Canadian origin with none of the glaciers from the Cascade Range or Olympic Mountains ever extending far enough to merge with the Vashon glacier. Waldron feels the Vashon Glacier ice may have been up to 4,000 feet thick on average at the Federal Way latitude and on Vancouver Island it was probably 7,500 feet thick.[43] At its maximum extent the Vashon Glacier would have completely filled the Puget Sound area at least for 35 to 50 miles south of the Federal Way latitude.[44] The till and stratified drift left by the Vashon glacier comprise the surface deposits throughout the Federal Way area.

The Vashon glaciation seems to have occurred about the same general time as the major Wisconsin glaciation of the central United States.[45] Deglaciation is believed to have begun some time before 14,000 radiocarbon years ago.[46]

Des Moines Island



The land that Federal Way sits on is part of an elevated section 300-500 feet above sea level that runs from the Duwamish Head in Seattle to the heights west of Sumner near Tacoma. It is bounded on the west by Puget Sound and on the east by the valleys of the Duwamish, Green and White Rivers. It is a landform that is elevated a few hundred feet above sea level and is almost 30 miles long and 2 to 8 miles wide. West Seattle, Burien, Des Moines and Federal Way are some of the large communities on it today.

Bailey Willis, a geologist writing in the early 1900s, was one of the first to investigate the glacial character of the Puget Sound area. He concluded that when the great ice sheets

[37] D. R. Crandell, D. R. Mullineaux and H. H. Waldron, "Pleistocene sequences in southeastern part of the Puget Sound lowland," *American Journal of Science,* 1958, v. 246, pp. 384 – 397.
[38] Waldron, Map GQ-158.
[39] Willis, pp. 111 – 162.
[40] Bretz.
[41] J. H. Mackin, "Glacial geology of the Snoqualmie-Cedar area," *Journal of Geology,* v. 49, pp. 449 – 481.
[42] D. R. Crandell and H. H. Waldron, "A recent volcanic mudflow of exceptional dimensions from Mt. Rainier," *American Journal of Science,* 1956, v. 254, pp. 349 – 362.
[43] Waldren, Map GQ-158.
[44] Bretz and also Mackin, pp. 449- 481.
[45] R. F. Flint and Meyer Rubin, "Radiocarbon dates of pre-Mankato events in eastern and central North America," *Science,* 1955, v. 121, no. 3149, pp. 649 – 658.
[46] H. H. Waldron, D. R. Mullineaux and D. R. Crandell, "Age of the Vashon glaciation in the southern and central parts of the Puget Sound basin, *Geological Society of America Bulletin,* 1957, v. 68, no. 12, pt.2, pp. 1849 – 1850.

retreated from this region thousands of years ago, the highland was for a short period of time an island. Willis named this island Des Moines Island. He claimed the waters of an ancestral Puget Sound surrounded this island.[47]

Buerge develops some interesting theories based on Willis's ideas about Des Moines Island and ties them into Native American myths and legends of the area.[48] Several local Native American myths relate to the highland as an island with the water in the present White River and Green River Valleys as being salt water with whales found in it and the lakes that formed as the sea retreated. These myths recall the catastrophic events that accompanied the mainland's embrace of Des Moines Island, and serve as a prologue to all that followed. Today, much of the area is blighted with suburban sprawl, its legends all but forgotten and many of its myth sites destroyed, brutally scarred or at risk. A full discussion of these myths and their reliability and how they might relate to Des Moines Island and the retreat of the ice can be found in Dick Caster's, *Native American Presence in the Federal Way Area.*[49]

Soils

Currently, soil conditions in the Federal Way area are relatively stable, consisting mostly of gravelly sandy loams. Such soils are moderately well drained, have moderate permeability and present a slight erosion hazard. The underlying geology consists of a fairly uniform mixture of clay and gravel. Bedrock may lie from 10 to 50 feet below the surface, depending on the specific location within the area.[50]

The soils of the area are typical of those found throughout King County with the Alderwood series predominating.[51] Till deposited by the Vashon ice forms a discontinuous mantle of soil a few inches to several tens of feet thick on the eroded surface.[52] The till is essentially light gray, compact, nonsorted and composed of glacial debris ranging in grain size from clay to large boulders. In many places it contains crudely stratified layers of silt and sand and gravel. A natural soil is formed on the surface but oxidation rarely extends down more than two to three feet.[53] The combination of steep slopes and the Kitsap soils found in parts of the area, particularly near Puget Sound, create a number of areas where the potential hazards for landslides was originally very high.[54]

The glacial action, which created the plateau, left many poorly drained places underlain by glacial till. Numerous lakes (one figure indicates 12 originally),[55] swamps and peat bogs originally occupied depressions on the till surfaces. The lakes, many now gone or reduced in size, are generally small in size. The lakes are generally spring fed

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[47] David Buerge, "Indian myths inhabit suburbs," *Federal Way News,* 18 January 1989, p. A-1.
[48] Buerge, pp. A-1, A-3.
[49] Dick Caster, *Native American Presence in the Federal Way Area,* 5 January 2005, <http://www.federalwayhistory.org>.
[50] "A look at the physical area," p. 54.
[51] "A look at the physical area," p. 54.
[52] Waldron, Map GQ-158.
[53] E. N. Poulson, J. T. Miller and R. D. Flannery, "Soil survey of King County Washington," *Soil Survey Report* (Washington D. C.: U. S. Dept. of Agriculture, 1952) ser. 1938, no. 31, pp. 1 – 106.
[54] "*Federal Way Community Plan,"* p. 6.
[55] "A look at the physical area," p. 54.

with no specific outlet except through swamps that made drainage courses difficult to define. The lakes are all shallow with Steel Lake being the deepest at 50 feet. The Lakes have a combined area of about 300 acres. The area currently has eight natural lakes (Steel Lake, Mirror Lake, Five-Mile Lake, Lake Geneva, Star Lake, Mud Lake, Lake Dolloff, and North Lake) and two man-made lakes (Lake Jeanne and Lake Lorene). In addition to these lakes there are several ponds and some smaller man-made lakes around modern development activities.[56]

Peat

Peat can be defined as a partially carbonized vegetable tissue formed by partial decomposition in water of various plants (such as mosses of genus *Sphagnum*.)[57] In the past peat was used as a fuel.

Based on Rigg's work in the 1950s there were at least six areas in the Federal Way area that have been evaluated as commercial sources of peat, but not all have been used for commercial purposes. These are near Lake Dolloff, near Steel Lake, near the present Lakota Park, near Panther Lake, near Mirror Lake and near North Lake.[58] None of these sources is currently used as a commercial peat source. The discussion below is based on Rigg's work as indicated.

The Lake Dolloff peat area covered about 52 acres. It was in a depression in the glacial drift of the plateau region. The peat entirely surrounded the lake. R. S. Hord of Auburn sold peat from the south end of the lake through the1950s. The mixture of muck and diatomite at the surface was brown. The fibrous peat was brown and varied from disintegrated to decomposed. The sedimentary peat was olive in color and was mixed with fibrous peat. It had two inches of mixed sand and clay at the bottom. Under this was gravel. The total depth of the peat was 11 feet.[59]

The Steel Lake's peat was located about 800 feet east of the present Highway 99 and covered about 44 acres. A truck garden covered about nine acres of this area in the 1950s. About ten acres was pasture and wasteland and the remaining 25 acres was covered with a dense growth of hardhack brush with some Labrador tea, *Sphagnum* moss, small living deciduous trees, and some small dead hemlocks. While there was evidence that the area was currently prepared for commercial use, no evidence was available to determine how much peat had been extracted or if future extraction was planned. The area lies in a depression in the glacial drift of the plateau area. The peat was practically all fibrous. It was brown to dark brown; much of it was decomposed with some hydrogen sulfide bubbling up when test borings were made. The peat was strongly acidic (pH 3.7 to 4.3).[60]

The Panther Lake peat area was about 32 acres and completely surrounded the lake. Most of the Panther Lake peat was fibrous. It was brown to dark brown and varied from disintegrated to decomposed. The sphagnum is in a rather thin layer but was of good

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[56] "*Federal Way Community Plan,"* p. 6. The reference also lists Trout Lake, and indicates the area has nine lakes, but Trout Lake is not included here since it is slightly outside the boundary of the area covered by the Historical Society of Federal Way.
[57] "*Webster's New Collegiate Dictionary*," (Springfield, Massachusetts: G. & C. Merriam Company, 1958).
[58] George B Rigg, "Peat Resources of Washington," *Washington Division of Mines and Geology Bulletin No. 44,* 1956, pp. 79-81, 84, 90, 91.
[59] Rigg, p. 79.
[60] Rigg, p. 80.

quality. The sedimentary peat was olive in color. The layer of brown pumicite was one to two inches thick. One attempt to bore through the peat found it was too compact to be penetrated with the peat borer beyond 22.5 feet. Near the surface the peat was found to be strongly acidic (pH 4.3). South of the lake part of the peat area was utilized as a pasture and part as a hayfield. The part adjacent to the lake was swampy wasteland. No evidence of any attempt at utilization of this peat was seen. The area containing peat north of the lake was not evaluated. Bubbles of hydrogen sulfide arose from drill holes.[61]

The Lakota peat area covered 27 acres. It was in an undrained depression in the glacial drift of the plateau about one mile from salt water and 250 feet above sea level. At the time of the examination, the peat area was mostly a sedge meadow with some hardhack brush, numerous tussocks of rushes, and some grasses. Near the south border there was a dense growth of willows and hardhack, under which were numerous trunks of old fallen trees. [This area looks much the same today]. The fibrous peat is brown to dark brown and varied from disintegrated to decomposed. The mixture of fibrous and sedimentary peat is olive brown. The mixture of woody peat and fibrous peat was dark brown, decomposed and compact at the bottom. The layer of brown pumicite is 0.5 to 2 inches thick. The peat layer rested on gray clay and greenish-gray sand. This peat was recorded as being strongly acidic (pH 4.0 – 4.8). Some of the peat layer was used for pasture.[62]

The Mirror Lake peat area was about 14 acres. The peat was in an undrained depression in the glacial drift of the plateau. It was brown and mostly fibrous. It was disintegrated to decomposed. At the six-foot level it was found to be rather strongly acidic (pH 4.3.) The layer of brown pumicite was two inches thick.[63]

The North Lake peat area was about 13 acres. The peat and the lake are in a depression in the glacial drift of the plateau. The peat bordered the north end of the lake and merged into the marshy shore of the lake. The vegetation at the time of the survey was mostly undisturbed and consisted of low brush (hardhack and Labrador tea), small trees (crab apple and cascara), and small herbs and some mosses (not *Sphagnum).* The peat was mostly fibrous, either alone or mixed with sedimentary peat. It was dark brown and most of it was disintegrated. The sedimentary peat was olive brown and is compact at the bottom. It rested on blue clay.[64]

It is known that the Federal Way Humus Company was extracting peat from the above areas in the 1950s,[65] but it has not been determined when this type of peat extraction ceased in the area.

The area that now is West Hylebos City Park also contains peat bogs. Anyone desiring to walk on a peat bog and find out how it feels is urged to visit this city park. Rigg did not mention this area in his report. Another small amount of peat is also easily accessible near the shore of Panther Lake. Exploring around the shores of the other areas mentioned would also probably locate some peat although it is no longer desirable for commercial use. Much of the original peat in the area is gone or covered with developments although that reported at Lakota can probably still be found in the wet lands.

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[61] Rigg, p. 84.
[62] Rigg, p. 84.
[63] Rigg, p. 90.
[64] Rigg, pp. 90, 91.
[65] Rigg, p. 90.

Water Table

Originally the area had a good source of ground water. Most wells produced water from slightly below sea level to about 200 feet above sea level. Originally there were several that provided 200 – 500 gallons per minute. One well was originally rated at 2,600 gallons per minute and another was rated at 1,500 gallons per minute. Domestic and public groundwater has been plentiful up until the present. The area is provided public water from groundwater produced by 15 wells and one spring with a combined capacity of 12,730 gallons per minute.[66] (Note: This information is based on 1975 information and changes in supply sources and technology have changed the supply sources since then.) More current information is harder to define as the current Lakehaven Utility District actually covers a slightly different area than the area covered by the Federal Way School District, the boundary used by the Historical Society of Federal Way. Some of the area in the north part of the Federal Way School District has water supplied by other water districts and the Lakehaven Utility District provides water to towns outside the south, southwest and southeast corners of the school district.[67] The latest information available from the Lakehaven Utility District indicates:

> [The] water system includes approximately 450 miles of mainline, 20 wells, and 12 storage tanks with an approximate storage capacity of 34 million gallons. . . .
>
> The average daily pumping rate is about 10.5 million gallons per day.[68]

Until recently the high quality and purity of ground water, allowed the District to not have to treat or chlorinate its water supply. During the last few years, however, steps have been taken to treat the water and chlorinate it. The well water supply is being overpowered by the population increase so the Water District is now making plans to get additional water from the Tacoma Water system.

Water Drainage

Puget Sound is one of the deepest salt-water basins in the United States being more than 600 feet deep off the northern boundary of Federal Way.[69]

The most significant drainage course is the 8,500 acre drainage basin of Hylebos Creek that flows from the West Hylebos City Park in Federal Way through Pierce County to Commencement Bay in Tacoma. This drainage basin provides the drainage for North Lake, Lake Geneva, Mud Lake and Brook Lake. Until recently, when extensive flood control measures have been introduced, the drainage basin was subject to almost annual flood conditions. Dolloff Creek is the second most important drainage course. Dolloff Creek flows through Peasley Canyon in an easterly course down to the Green River. Five Mile Lake drains into the White River to the southeast. Mirror Lake drains in a westerly

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[66] "*Federal Way Community Plan",* p. 6.
[67] 2000 Adopted Budget Lakehaven Utility District, Miscellaneous District Statistics, p. 144, provided by Don Miller, copy in the office of the Historical Society of Federal Way.
[68] 2000 Adopted Budget Lakehaven Utility District, History of Lakehaven Utility District, pp. 142, 143.
[69] Waldron, Map GQ-158.

direction to Puget Sound. The two man-made lakes, Lake Jeanne and Lake Lorene, drain to Puget Sound by way of Joes Creek. Also, drainage ravines reach Puget Sound at Redondo and Woodmont. Lakota also provides a drainage ravine head to Puget Sound, as does the area now occupied by Dash Point State Park and Saltwater State Park.[70]

Timber

The Federal Way area was originally heavily timbered, mostly conifers (primarily native Douglas fir). Most of these were removed by logging in the first half of the 1900s. Skid roads were set up to take the timber from the plateau to Puget Sound. Stone's Landing (Redondo) was one of the first logging settlements on Puget Sound. Later, railroads were installed to remove logs. Some second growth timber grew in the cut and slash burned areas, but now even this has been cut. Prior to the rapid growth in the area since the late 1970s Marie Reed commented:

> The woods are gradually restocking to alder and conifer with Douglas fir, native Hemlock and cedar being dominant. Scotch broom and European elderberry are found in the porous upland terrace soils. The dominant deciduous tree is red alder and there are minor amounts of big leaf maple. And dogwood [sic]. Black cottonwood occurs near streams.[71]

Vegetation was originally very thick and almost impossible to travel through without being cut. In the damper areas and near the lakeshores the organic soils produced grasses, berry bushes and hardwood trees. This provided an excellent ecosystem around the shoreline.

Climate

The climate of the area is determined by the geographic relationship to Puget Sound and the Pacific Ocean. These water surfaces control the rain, wind and temperature reaching the area. The maritime air is a moderating influence and is responsible for the generally mild winters and summers. The average yearly temperature is 52° F. with a high in the summer of 90° F. and a low in winter of 25° F. The "dry" season is from May through September, and the rainy season is from October to April with 75 percent of the total amount of precipitation occurring during the latter period. The average yearly precipitation is 35-40 inches. The prevailing wind is from the southwest in the fall and winter months, gradually shifting to the northwest in the late spring and early summer. The growing season is approximately 190 days.[72]

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[70] "*Federal Way Community Plan",* p. 6.
[71] Marie Reed hand written editorial comments written on her copy of the Federal Way Community Plan (probably written shortly after the Community Plan was published in 1975), in the files of the Historical Society of Federal Way. Marie Reed was one of the six Federal Way area residents who served on the Policy Development Commission that helped develop this version of the Federal Way Community Plan.
[72] "*Federal Way Community Plan",* p. 6.

Future Work

The information on the water table and current sources of water is somewhat out of date and should be updated.

Information on early logging and land clearing and how it affects the current presence of trees and developed land could also be included.

More detail could be added on the origin of the area lakes and how they are now being used.

Photos of some of the items discussed could also be added after clearance is obtained.

Acknowledgement

I wish to thank Shirley Opstad for proof reading this document and making many improvements. Any remaining errors are mine.