Fanno Creek Watershed

Summaries of Resource Site Inventories

Bureau of Planning
City of Portland, Oregon
October 1999

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The Original Fanno Creek and Tributaries Conservation Plan
Adopted by Ordinance Number 167293, as Amended, on January 19, 1994
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Introduction and Purpose

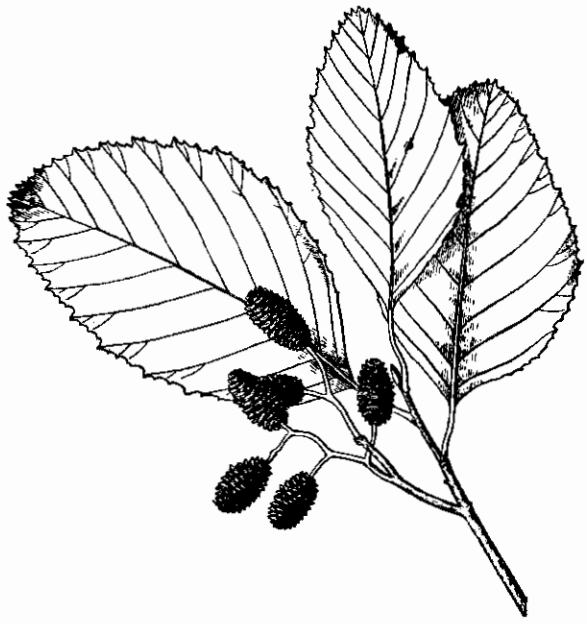
This document provides a summary of the State Goal 5 natural resource inventories for City Resource Sites within the Fanno Creek Watershed. The summaries are taken from the Fanno Creek and Tributaries Conservation Plan, Volume 1, 1994 (FCP). The FCP was adopted by City Council on January 19, 1994.

The purpose of this document is to provide a useful single source reference for information on the location, quantity, and quality of resources in the City Resource Sites found within the Fanno Creek Watershed. This document serves as a reference for planning staff, citizens, designers, and developers. Background information and process descriptions are provided only as they relate to the resource inventory. All other background information, the Economic, Social, Environmental, and Energy analysis (ESEE), and the appendices from the original reports are not included within this document. Copies of the original reports, Volumes 1 through 5, are available for review at the Portland Planning Bureau.

Adopted code regulations can be found in City of Portland Zoning Code, Title 33, Chapter 33.430, Environmental Overlay Zones. The location of the Environmental Overlay Zoning is shown on the Official City Zoning Maps.

CHAPTER 1

BACKGROUND



Overview of the Plan Area

The following overview of the Fanno Creek Watershed includes sections on history, topography, geology, soils, climate, hydrology, vegetation, and fish and wildlife.

History

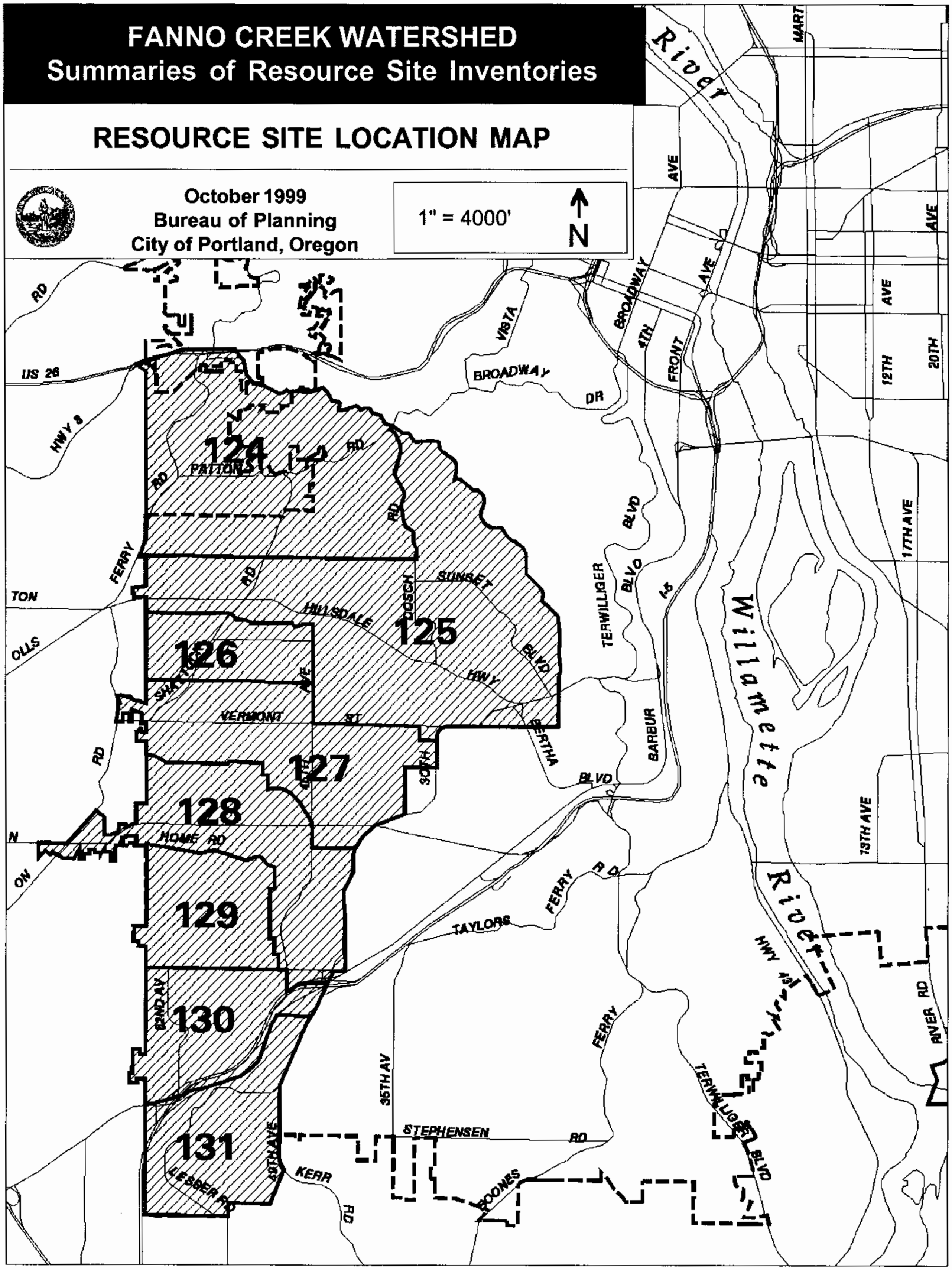
Fanno Creek is named after one of Oregon's earliest settlers, Agustus Fanno, a native of Portland, Maine, who settled in the area of 8300 S.W. Highway 217 in 1847. Agustus, his wife, and young son, crossed the plains from Independence, Missouri, traveled down the Columbia River by flat boat, and arrived in the Oregon City area in 1846. Mrs. Fanno died that year at Linn City, and the next year Agustus settled a 640 acre donation land claim. His claim was on the lowlands along Fanno Creek. His nearest neighbor was five miles away. Native Americans used parts of his claim to pick huckleberries; and with their help, he cleared the dense forest and started an onion farm in the rich bottom land.[1] Agustus married a second time, and died on June, 30, 1884.

The Fanno family farmed portions of the original claim until 1971, when the last 83 acres was offered for sale after some 124 years in the family. The seller, Norman Fanno, recalled in a newspaper interview, that he caught an 18 inch cutthroat trout in the creek when he was a boy. He also remembered being able to hear the falls at Oregon City on a quiet day, and that deer and an occasional cougar crossed the farm in the 1960's.[2]

The part of the Fanno drainage system between its eastern edge at Hillsdale, and the communities of Multnomah, Maplewood, and Gardenhome to the west, were settled gradually during the late 1800's. The area was heavily forested and wild, without roads or good communication with Portland. Settlers sighted bear and deer frequently. Francis and Caroline Niebur filed for a donation land claim of 320 acres in 1873. Their farm buildings were at the current site of April Hill Park in Maplewood. A history of the Maplewood area compiled in 1976 by Marjorie Hoffman, relates that the Niebur's had no neighbors, and had to carry their provisions over Council Crest from Portland. Early settlers reported finding many arrowheads at about S.W. Fifty-first and Vermont, near the Niebur farm site. The Niebur's related, that like Agustus Fanno; they had frequent and friendly contact with the original inhabitants of the watershed.[3]

These early settlers were mostly woodsmen, farmers and dairymen. An early dairyman and Portland native, John P. Hoffman, built his house that is still standing at S.W. Fifty-third Avenue and Vermont Street, in the 1880's. He hired Swiss immigrants to help build and operate his dairy farm; but the road from Portland ended at Hillsdale. This made it impossible to transport milk during rainy periods, so he built a plank road. This road, first called Hoffman Road and later Vermont Street, was built to Hillsdale with the help of Chinese laborers. He also employed these laborers in cutting down large fir trees that were burned into charcoal in a pit at S.W. Fifty-third Avenue and Texas Street. He sold the wood to Portland restaurants for cooking fuel.[4]

1 The Oregon Journal, July 30, 1937.
2 The Oregonian, April 11, 1971.
3 History of Oregon, Volume 3: The Pioneer Publishing Company, 1921.
4 Hoffman, Marjorie E., Maplewood Centennial 1875-1975,1976


FANNO CREEK WATERSHED
Summaries of Resource Site Inventories
RESOURCE SITE LOCATION MAP
October 1999
Bureau of Planning
City of Portland, Oregon
1" = 4000'
N
124
125
126
127
128
129
130
131
US 26
HWY 8
PATTON
RD
FERRY
HILLSDALE
SUNSET
BLVD
HWY
VERMONT
ST
30TH
HOME RD
TAYLORS
FERRY
RD
35TH AV
STEPHENSEN
RD
KERR
RD
40TH AVE
BOONES
TERWILLIGER
BLVD
BARBUR
BERTHA
BROADWAY
DR
VISTA
4TH
FRONT
AVE
12TH
20TH
13TH AVE
17TH AVE
RIVER RD
Willamette
River

John Hoffman's son, Frank, was born in Maplewood in 1889 and died there in 1971. He remembered catching trout in Fanno Creek as a boy. He also hunted pheasant, ducks, and deer along the creek bottoms. The settlers depended on the groundwater that feeds the creek for domestic needs. Fanno Creek crossed the Hoffman farm and Frank's father built a windmill near the creek to supply his dairy operation. In 1911 he drilled a well at S.W. Fiftieth Avenue and Custer Street, installed a three-inch wooden main to a 1200 gallon wooden tank at S.W. Fifty-third Avenue and Nevada Street, and thus began Oregon's oldest water company.[5] Frank Hoffman recalled that the tank usually ran dry about 10:00 a.m. on Monday, wash day. The water company became a municipal corporation in 1919, connected to the Portland system in 1920, and operated as an independent water district until 1964.

One of the earliest families in the Multnomah area, Thomas and Polly Ann Price, settled their 640 acre claim in 1850.[6] Their claim, which contained the present day Multnomah business district, was heavily wooded. By the turn of the century several large tracts of forests had been cleared for the local dairy industry. This industry grew to 17 dairies at its peak, but Multnomah was still sparsely settled, and contained substantial forested areas. Children from Maplewood and Multnomah walked or rode wagons to West Portland grade school. The school was built between S.W. Forty-first Avenue and Capitol Highway on Taylor's Ferry Road in 1901. The route of the footpath from Maplewood to the school was marked by rags tied to trees so the children could find their way in the dense forest.

The pace of settlement of the Fanno Creek Watershed increased with development of the Southern Pacific railway in the late 1800's, and the Oregon & Electric railway in the early 1900's. Communities with stations on these interurban passenger lines still bear the names of the stops, and the location of the old rights-of-way can still be seen on the city zoning maps.

Construction of the first twenty miles of the Southern Pacific railroad line to Hillsboro was completed in December of 1871.[7] The route followed Fourth Street from downtown Portland, then along Barbur Boulevard to Bertha,[8] next along the south side of Beaverton-Hillsdale Highway to Beaverton, then from Hillsboro to Forest Grove. The Southern Pacific station at Hillsdale was originally named Summit, because it was at the divide between the Tualatin River[9] and Willamette River drainages. The railroad renamed the station Bertha about 1890 rejecting its original name because of other places in the state named "Summit" and wishing to avoid confusion of the names Hillsdale and Hillsboro.[10]

5 Portland Reporter, March 16, 1964.
6 Davis, Marguerite Norris, and Tully, Cecil R., The Building of a Community, 1976.
7 Southern Pacific Bulletin, January, 1930.
8 Bertha is now called Hillsdale.
9 Fanno Creek is a tributary of the Tualatin River.
10 McArthur, Lewis A., Oregon Geographic Names: Western Imprints.

The route of the Oregon Electric originated at S.W. Jefferson and Front Street and followed the Interstate Five alignment up out of Portland, along Multnomah Boulevard through Maplewood to Garden Home, where it split into Salem and Forest Grove branches. Most of the 49,000 mile system was built between 1903 and 1915, with passenger revenues reaching a peak of $891,000 in 1920.[11] Multnomah received its name, and many new residents from the opening of the Oregon Electric railway station in 1908. The station was located at S.W. Thirty-fifth Avenue and Capitol Highway, and was named "Multnomah" by the railroad company. The Oregon Electric Company had a policy of giving the names of famous Native Americans to its new stations.

Multnomah Station, coupled with the paving of Slavin Road[12] in 1903, opened up the Fanno Creek Watershed to more rapid development. Multnomah residents could travel in comfort to S.W. Broadway and Washington Street in 15 minutes on the rail line. People looking for a little elbow room and the country life could move to Multnomah and easily commute to their jobs downtown. The population around Multnomah, Maplewood, Hillsdale, and West Portland Park had increased to 2,000 by 1915 when the Portland General Electric Company installed electricity to the area. In 1926 the *Oregonian* described growth in the Multnomah area as "phenomenal" as large numbers of houses were being built for speculation. These houses were generally well built and sold for an average price of $3,500.[13]

The Southern Pacific lines began electrification in 1912, becoming the Red Electric trains. It was on this line in May of 1920 that there was a collision between two commuter trains at Bertha. This collision killed nine people and injured 101 more. The last train ran in July of 1929, after which Southern Pacific replaced interurban rail passenger service with electric busses.[14] The rapid improvement of roads and the advent of more affordable automobiles reduced rail travel. By the last full-year of inter-urban operations in 1932, Oregon Electric passenger revenue had decreased to $17,313.

The major automobile route through the Fanno Creek Watershed is Beaverton-Hillsdale Highway. This Highway follows the upper main-stem of Fanno Creek to the Multnomah/Washington County line where the creek crosses under the Highway in a long culvert. The road was named Bertha-Beaverton in 1917 when it was an unpaved Multnomah County road. In 1920 the State Highway Department loaned the Multnomah County the funds to pave the road to the Washington County line.[15]

Topography

Fanno Creek drains the southwest portion of the Tualatin Mountains. The highest part of the Fanno Creek basin is 1,060 feet above sea level at Council Crest. The upper portion of the Watershed contains streams in deep ravines. Some of the upper streams drop more than 400 feet in elevation per mile traveled. Fanno Creek and its tributaries flow west as they leave the Portland City Limits. All creek elevations are less than 300 feet at the city limits.

11 "Oregon Electric Railway", Souvenir of Excursion, October 23, 1955.
12 Slavin Road is now called Capitol Highway
13 The Oregonian, May 16, 1926.
14 Hedene, Phil, The Red Electrics of Portland, Oregon: Interurbans, 1949.
15 Report of the Oregon State Highway Commission, 1919-1920.

Geology

The Fanno Creek Watershed is on the southeast slope of the Tualatin Mountains. In Portland these mountains are commonly known as the West Hills. They are composed mostly of Columbia River Basalt. The mountains contain remnant volcanoes, and these are composed of Boring Basalt. Basalt is an igneous rock that begins as lava and fractures as it cools. It usually has a medium gray to almost black color. When it weathers, the surface can turn brown and red. This color is a crust of iron and manganese oxides. The inside of the rock will still be black. In a tropical climate basalt can break down into a red clay called laterite. The spot on the globe where Portland is now was enjoying a tropical-like climate 50,000 years ago. Much Columbia River Basalt was exposed during this time. This explains why patches of brown and red clay are common in the West Hills.

Red, brown, and black basalt flows are exposed in ravines. In other places the basalt is covered by about 25 feet of wind deposited silt. Because basalt fractures when it cools, it stores water in honey-combed shaped spaces between the rock. Underground streams flowing through these cracks are called aquifers. This is why springs are common in areas of exposed basalt. Fractures and faults in the West Hills are also identified as severe earthquake hazards. Soil that is saturated, but not consolidated, amplifies the motion of earth quakes.

Soils

Fanno Creek watershed soils are mostly silts and clays. The United States Soil Conservation Service has identified five soil types (Cascade, Cornelius, Delena, Goble, and Saum) in the watershed. Prior to urban development, almost 95 percent of Portland's portion of the Fanno Creek Watershed was composed of Cascade Silt-loam. This is a wind-deposited soil that erodes easily and does not soak-up storm water very quickly. This top soil is over a harder layer of soil called a "fragipan." Very little water can soak down through this fragipan; plant roots also have a hard time growing through this layer. When it rains, the top two to five feet of soil saturate because water can penetrate no lower. This situation causes aquifers to perch on fragipans during the winter. This is a naturally occurring but dangerous situation. Erosion potential is high; there is a lot of storm water run-off, and land slides result if vegetation is removed from slopes. In the steep headwaters of Fanno Creek, forests hold soil to the sides of the hills. In fully vegetated sites, there is still a high natural rate of soil erosion. This rate is about three tons, per acre, per year.

Since Portland contains almost all the steep headwaters of Fanno Creek, the City is the only place where water runs fast enough to flush eroding soil from gravel stream beds at a rate faster than the natural rate of erosion can silt them up. Most of Fanno Creek has, and has always had, a mud bottom.

Climate

The Fanno Creek Watershed, like the rest of Portland, enjoys mild wet winters and cool dry summers. The climate results from Pacific Maritime air affected alternately by the warming and cooling Japan and the Humbolt Currents. In short, for the latitude, climate is warmer than usual in the winter (average range of 25° to 45°F), and cooler in the summer (average range of 70° to 90°F). Photoperiod (length or darkness at night versus light during the day) is typical of temperate climates with summer daylight much brighter and longer than in the winter. This makes for a March to November growing season. The Fanno Creek Watershed gets about 50 inches of precipitation (98% rain and 2% snow) per year. A little more than the official measuring station at the Portland Airport that records 45 inches per year. Almost all

(88%) this rain falls between October to May, with half the annual total falling in November, December, and January.

Hydrology

Fanno Creek and many of its tributaries originate in southwest Portland. The main-stem begins near Wilson High School and flows along the north side of S.W. Beaverton-Hillsdale Highway. This main-stem is supplemented by several small streams in deep ravines flowing from the north and east. Small creeks flow in underground culverts through fills in S.W. Hewett, Patton, Hamilton, Scholls Ferry, Shattuck, and Dosch Roads. Four other small streams, all east of S.W. Forty-fifth Avenue and north of S.W. Multnomah Boulevard, flow to the north, disappear in culverts under Beaverton-Hillsdale Highway; they then reappear, and join the main-stem slightly north of the highway. The supplemented main-stem of Fanno Creek drains 1,920 acres within Portland's City Limits.

Another set of Fanno Creek tributaries, all south of S.W. Beaverton-Hillsdale Highway, flow to the west where they join the main-stem of Fanno Creek beyond the Portland City Limits. Some of these tributaries flow parallel to S.W. Pendelton, Vermont, and Canby Streets. These tributaries are in culverts crossing under Taylor's Ferry Road, Multnomah Boulevard, and Forty-fifth Avenue. The Woods Creek and South Fork Ash Creek watersheds include some land south and east of Interstate 5. Another small watershed is east of Interstate 5 and west of the Portland Community College's Sylvania Campus. The 515 acre area between the Community College and the Interstate-5 Freeway appears to be the only part of the Fanno Creek Watershed that does not have a creek that flows all year.

These southern tributaries drain the following areas within Portland's City Limits: Pendelton Tributary, 246 acres; Vermont Tributary, 641 acres; Multnomah Tributary (called Woods Creek in its upper reaches), 596 acres; North Fork of Ash Creek, 341 acres; and South Fork of Ash Creek, 397 acres. Fanno Creek does not flow directly to the Willamette River. It flows west and south through Tigard before joining the Tualatin River near the Unified Sewage Agency's treatment plant outfall at Durham.

There has not been a 100 year flood since the Fanno Creek watershed has become urban. Significant flooding did occur in December of 1977, putting portions of S.W. Fifty-sixth, Sixtieth, Olsen Road, and Beaverton-Hillsdale Highway under water. Urbanization has made severe flooding more likely. Some stream segments flow to culverts and pipes that are too small to pass a large flood. There are more than 50 acres of the Fanno Creek Watershed in the 100 year flood plain, and property could be submerged during a large flood. A benefit of urbanization is those small tributaries of Fanno Creek, which would usually dry up in the summer, are now perennial. Summer flows are the result of municipal water service. This service has the effect of importing Bull Run water to Fanno Creek through drain fields and lawn sprinklers. The added water is good for fish and wildlife.

Vegetation

The Fanno creek watershed is in a transition area between the *Tsuga heterophylia* (Western Hemlock) and Willamette Valley vegetation zones. Although western hemlock is the theoretical dominant species in the first zone, Douglas fir, western red cedar, or grand fir are just as likely to dominate mature stands. Immature stands have a great deal of red alder and big-leaf maple. The characteristic understory plant is the sword fern. This zone contains the headwaters of Fanno Creek.

The Willamette Valley zone begins where Fanno Creek flattens out into a more slowly moving stream. This zone includes Oregon white oak, mixed conifers, black cottonwood, willows, alder, and grasslands. Native Americans preferred grassland environments to forest, and would set fire to forests to reestablish grasslands. Early settlers continued the practice. A few thousand years of prehistoric management makes it difficult to say what a "natural" flat-land Fanno Creek environment would be. Logging, pasturing, and urbanization are more recent disturbances to the environment.

This plan compiles information on plant communities and successional patterns from several sources. Information on vegetation types, distribution, and resource values was gathered through aerial photo-interpretation and on-site reconnaissance. Field surveys were conducted throughout the study area from 1991 to 1993. Current scientific literature on the subject was consulted during this time, with primary sources including *Natural Vegetation of Oregon and Washington* (Franklin and Dyrness 1973), *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), *Forest Park—One City's Wilderness: Its Wildlife and Habitat Interrelationships* (Houle 1982) and *Portland Bureau of Planning Goal Five Study: West Hills* (Lev 1986).

Many hillsides within the Fanno Creek Watershed are clothed by coniferous forest of the *Tsuga heterophylla* (western hemlock) vegetation zone.[16] This zone extends throughout the wet, mild, maritime climate of the western portions British Columbia, Washington, and Oregon. A vegetation zone, as defined by Franklin and Dyrness (1973), delineates a region of "essentially uniform macroclimatic conditions with similar moisture and temperature gradients where one plant association predominates." The lowlands next to the forest are part of the more prairie-like Willamette Valley Zone. Emergent, scrub-shrub and forested wetland plants grow along some of the creeks and in the palustrine wetlands that occur within the study area.

Western hemlock and western red cedar *(Thuja plicata)* are considered climax species within the Western Hemlock Zone because of their potential to dominate mature stands. The subclimax Douglas fir *(Pseudotsuga menziesii)*, however, tends to dominate large areas within this region. Historically, Douglas fir has dominated forest regeneration over much of the zone in the last 150 years (Munger 1930, 1940).

The expected plant species of a Western hemlock forest do cover many hillsides within the Fanno Creek Watershed, but two hardwood trees, bigleaf maple and red alder, are more widely established than typical. The overabundance of these hardwoods is result of repeated disturbances caused by logging, brush fires, and urbanization. Over time, these events have depleted soil nutrients. The depletion of nutrients, coupled with the depletion of mycorrhizal fungi, which help to process nutrients for plant uptake and are particularly important to conifers, has given the hardwoods an edge over the firs, cedars, and hemlocks. Pioneer species such as red alder,[17] commonly found only in riparian areas, quickly colonize these disturbed areas and are now widely established on the upland slopes. Thus, past disturbances have strongly influenced the composition of the plant communities in the Fanno Creek

16 Evidence of historic vegetation types is presented in Houle (1982) and Munger (1960).
17 Red alder helps to heal degraded land by replenishing the soil with nutrients: they can provide 40-150 kg/hectare of nitrogen per year. Alders also colonize sites that are plagued by laminated root rot and facilitate regeneration of the pre-existing plant community. Recent studies have shown that alders serve as hosts to mycorrhizal fungi, the same fungi which colonize Douglas fir roots, process nutrients and enable the trees to grow (Norse 1990).

Watershed.

The *Tsuga heterophylla* with *Polystichum munitum* (Western hemlock with sword fern) association generally characterizes the herb-rich community found in the Fanno Creek Watershed forests.[18] Overstory species of this association typically include Douglas fir, western red cedar, grand fir, and western hemlock. The understory is dominated by a lush growth of herb species including sword fern, wild ginger, inside-out flower, Oregon oxalis, trillium, and Smith's fairybells. Understory shrubs include the following: red huckleberry, Oregon grape, vine maple, red elderberry, wood rose, and salmonberry. (Franklin and Dyrness 1973:58)

Early observations of Portland's forests point to the dynamic pattern of successional stages active within the forest community over the past two centuries. The predominantly old growth coniferous forest that William Clark, of Lewis and Clark, recorded in 1806 has been transformed through logging and fire into a younger, mixed hardwood and coniferous forest (Munger 1960). Despite these disturbances, signs of a returning Western hemlock climax forest are widely apparent. The forest types occurring in the Fanno Creek Watershed may be viewed as a sequence of successional stages of forest regeneration following logging and fire. These stages closely follow those of the Western Hemlock Zone as described by Franklin and Dyrness (1973) and Hall (1980). Six distinct successional stages are evident on forested slopes; their patchwork distribution reflects the location, degree and chronology of past disturbances.

Houle (1982) describes the following stages for West Hills forest succession: Grass-forb, Shrub, Hardwood with young conifer, Hardwood topped by conifer, Mid-aged conifer, and Old growth vegetation types (see Figure 1 below).

The grass-forb stage contains low, herbaceous plants such as fireweed, bracken fern, and Canadian thistle. These plants are the first colonizers of an area after removal of vegetation. This stage lasts approximately two to five years and occurs along roads, power-line right-of-ways, and in open fields throughout the Fanno Creek Watershed.

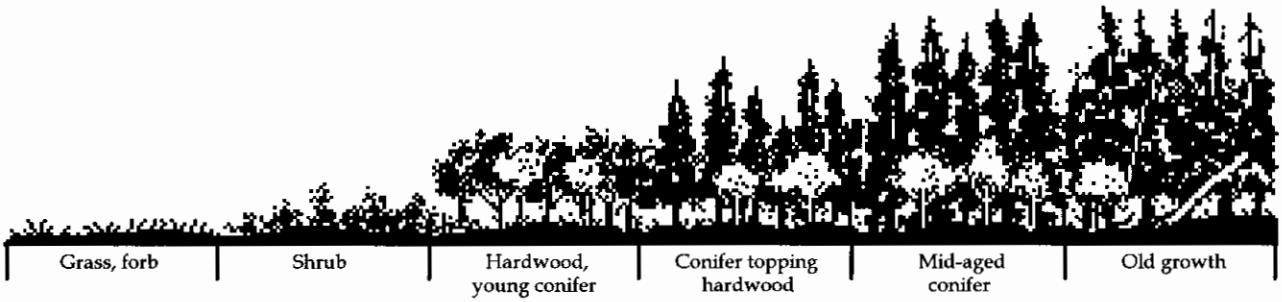


Figure 1. Stages of Fanno Creek Watershed Forest Succession

The shrub stage often develops as a thicket of such species as thimbleberry, salmonberry, blackberry, red huckleberry, salal and Indian plum. This stage typically lasts between three and ten years, but will persist as long as 30 years if conifer regeneration is delayed.

18 Related West Hills plant associations include *Tsuga heterophylla/Berberis nervosa/Polystichum munitum, Tsuga heterophylla/Athyrium filix-femina, Tsuga heterophylla/Tiarella trifoliata, Tsuga heterophylla/Holodiscus discolor,* and *Tsuga heterophylla/Gaultheria shallon.*

The hardwood with young conifer stage is a young, vigorous broadleaf forest predominantly made up of red alder and big-leaf maple, though it often includes bitter cherry, black cottonwood and juvenile Douglas fir. Understory species include sword fern, Oregon grape, and red elderberry. This young, second growth forest usually occurs ten to 35 years following a disturbance.

The fourth stage of succession, conifer topping hardwood, is still a vigorous, though now mixed, hardwood and conifer forest. While the alders and maples approach 100 feet in height during this stage, conifers, primarily Douglas fir, break through the hardwood canopy and grow to heights of 180 feet or more. Characteristic conifer species also include young western red cedar, grand fir, and western hemlock. This mixed stage of second growth forest follows 30 to 80 years after disturbance, and is the most widely distributed vegetation type on forested slopes within the Fanno Creek Watershed.

The next successional stage, mid-aged conifer, is dominated by Douglas fir. Young, shade-tolerant western hemlock, western red cedar, grand fir, and pacific yew are gradually making their way up through the understory, while some of the older hardwoods such as alder and cherry, are beginning to fall to the forest floor. Sword fern, salal, Oregon grape, red huckleberry, and vine maple thrive as the older trees begin to fall. This stage develops between 80 to 250 years after the last major disturbance. Several areas within the Fanno Creek Watershed display these characteristics.

If the forest is left undisturbed following the mid-aged conifer stage, it progresses into an old growth forest community. The *old growth* stage is self-perpetuating and will continue indefinitely unless fire, logging or other disturbances set back the forest to an earlier stage of succession. Though Western hemlock and Western red cedar are climax species, long-lived serial species can remain a component of the community for several hundred years. Several areas within the deep ravines of the Fanno Creek Watershed are beginning to develop old growth characteristics. These characteristics include the presence of large snags and downed logs in various stages of decay.

Native forests represent a unique urban amenity. Forested hillsides in the Fanno Creek Watershed provide fine examples of the Pacific Northwest's Western hemlock forest community, which is unique among all temperate forests in the world (Waring and Franklin 1979).[19] Forested hillsides also help to define Portland as a place, and contribute to the identity of the region.

Forests within the Fanno Creek Watershed are home to several plant species with newly discovered uses. The pacific yew *(Taxus brevifolia)*, for example, is an exceptionally slow growing tree species that is abundant only in climax forests of the Pacific Northwest. In recent years, a cancer-fighting substance known as "taxol" was discovered in the bark of the yew. Taxol has proven effective in fighting ovarian cancer[20] and early results indicate that the substance may also prove effective for treating leukemia and colon, lung, mammary, prostrate, and pancreatic cancers (Wood 1990, Norse 1990).

19 The western hemlock forest of the Pacific Northwest has the greatest biomass accumulation of any plant community in the temperate zone and in it are found the largest and (usually) longest lived species of conifers within the zone.

20 Ovarian cancer kills 12,400 women annually in the United States (High Country News 11/19/90).

Fish and Wildlife

The Fanno Creek Watershed is used by about a hundred bird species, several small and medium sized mammals, and a few fish species. Commonly seen mammals include beaver, raccoon, opossum, spotted skunk, Douglas Squirrel, and Townsend's Chipmunk. Occasional visitors include black-tail deer and coyote There was one coyote siting in 1993. The last elk siting was in 1992, the last black bear sighting was about ten years ago, and the last cougar siting was about 30 years ago.

Fanno Creek contains Cutthroat trout *(Oncorhyncus clarki).* There are different types of these trout, and each type has a distinct life cycle. Some live in the ocean and spawn in streams; others live in lakes and spawn in streams; a third kind lives in large streams and spawns in small streams, and the last kind spends its entire life in small streams. This last kind doesn't grow very large (about seven inches). These small fish are full year residents of Fanno Creek and may only migrate a few hundred yards in an entire life time. Ocean and lake dwelling cutthroat do not visit Fanno Creek, but an occasional large trout will swim up the Willamette and Tualatin Rivers to spawn in Fanno Creek. The spawning beds for both these cutthroat types are in the faster, gravel-bottomed headwaters. The portion of the watershed within Portland contains almost all known spawning areas. This is because the small hillside tributaries north of Beaverton-Hillsdale Highway, and the Woods Creek tributary south of Beaverton-Hillsdale Highway, have gravel bottoms. Topography flattens out as the creeks near the Washington County line. These flat-land creeks have mud bottoms that are not suitable for spawning, but they are very important for rearing and feeding, especially during seasonal low water and droughts. Other fish species observed include sculpins, dace, and mosquito fish.

The Piliated woodpecker *(Dryocopus pileatus)* is a species dependent on standing dead and dying trees in older forests. The bird is a cavity nester, and is disappearing from rural areas because of timber harvest and the use of agricultural chemicals. The woodpecker is doing surprisingly well in some urban areas, and can be observed in the Fanno Creek Watershed. Protection of older forests in urban areas is an important conservation strategy for the survival of this species.

Different species use different habitat during different stages of their life cycle. These stages include mating, feeding, and the rearing of young. The vegetative structure of the habitat (downed logs, standing snags, and live herbs, shrubs, and trees) is a key factor in determining the distribution and abundance of wildlife (Thomas 1979). Each stage of forest succession in the Fanno Creek Watershed has its own specific structure. Most species have known preferences for structural components found in distinct successional stages and use these vegetative types to meet all or part of their life cycle requirements (Maser and Thomas 1978; Harris 1984).

The balanced relationship between the Fanno Creek Watershed's geologic formations, soils, groundwater, and surface water is perpetuated by the extensive canopy cover and root system of the forest which shelters and stabilizes the hillside slopes. Activities that disturb this fragile relationship can substantially degrade resource values by causing landslides, flooding, erosion, and sedimentation. Groundwater and precipitation feed the many creeks within the Fanno Creek Watershed. These creeks provide habitat for fish, amphibians, and other aquatic organisms and, which in turn, provide a source of food for terrestrial wildlife. These creeks are also the most important source of water for terrestrial wildlife. The mosaic of Fanno Creek Watershed forest

types provides a range of habitat for a diverse population of indigenous wildlife. These interacting and interdependent elements play vital roles in protecting the balance, health, and vitality of the Fanno Creek Watershed forest and of watershed ecology as a whole.

Authorities Guiding the Plan

Several authorities have guided the preparation of this plan. They include state, federal, and local authorities. Some of these authorities are advisory and others are mandatory.

Statewide Planning Goal 5 and Administrative Rule

Statewide Planning Goal 5 requires all city and county governments to, "Conserve open space and protect natural and scenic resources." The Oregon Land Conservation and Development Commission adopted this Goal in 1974, and provided further guidance for carrying it out in 1981. Between 1974 and 1981 the City enacted a variety of land use regulations to meet Statewide Planning Goal 5. The State agreed that these regulations were sufficient, and approved the Portland Comprehensive Plan on May 1, 1981.

The State did not draft an administrative rule describing how local governments should apply Statewide Planning Goal 5 until after the Portland Plan had been submitted for approval. Land Conservation and Development Commission records show that the Goal 5 Administrative Rule was adopted during the same meeting in which the Portland Plan received state approval. The rule was not, however, applied to the Portland Plan because the rule was not effective until it was filed with the Secretary of State's office on May 8, 1981. The new rule established substantive and procedural requirements for the protection of resources that the City of Portland had not followed in formulating its Comprehensive Plan. Inventory methods, forms of analysis, and protective measures were the most obvious examples.

The Oregon Legislative Assembly also enacted legislation in 1981 authorizing periodic review of all previously approved land use plans. The combined effect of the 1981 legislation and Goal 5 Administrative Rule was a requirement that the City bring its Comprehensive Plan, land use regulations, and zoning maps into compliance with the new rule before its first periodic review. The Portland City Council adopted ordinances in 1982 and 1988 correcting most deficiencies relating to Statewide Planning Goal 5 requirements, but the Goal 5 Administrative Rule has never been applied to natural resources in the Fanno Creek Watershed. Fanno Creek natural resources must, therefore, be identified, and in certain cases protected, before the State will allow the City to complete periodic review. The following paragraphs outline the content of the Fanno Creek Plan and describe process required by the 1981 administrative rule to identify, evaluate, and protect natural resources.

The Fanno Creek study area was divided into eight City Resource Sites. The Goal 5 inventory and analysis was conducted on each of these sites and the results are presented in the next section. The following paragraphs describe the inventory steps in more detail.

Natural resources are identified as part of the inventory section. The inventory describes the location and size of each resource site in the Fanno Creek Watershed.

The inventory is used to compare the quantity and quality of resources present on each site, and provide information needed to rank the quality of each site. The location of the City Resource Sites is shown on Map 1, Fanno Creek Watershed and City Resource Sites. Generalized locations of resources within the resource sites are included with each specific inventory.

Resource quantity was determined by inventorying each site in several places, and noting the type and abundance of resources. There are several inventory locations for each resource site. The quality of a site was determined by comparing its resource values with all other sites of the same resource category. Resource values were identified through field surveys, published national wetland inventories, and aerial photography. The photographs are false color infrared images at the same scale as the official city zoning maps; one inch representing 200 feet. The photographs were taken on June 11, 1989. Comparisons are made with all Fanno Creek Watershed sites.

The only portions of the Fanno Creek Watershed excluded from the inventory were seven portions of the Portland City Limits extending west of the Willamette Meridian[21]. The small size and discontinuous nature of these portions made them insignificant. All other portions of the watershed within the City Limits are significant and are included within a resource site. Enough information was collected for each resource site to perform analyses required by state law.

The Fanno Creek and Tributaries Conservation Plan (1994) contains the full Goal 5 analysis including sections on identification of all allowed uses in the resource site, an analysis of the economic, social, energy, and environmental consequences of varying levels of resource protection, and a section describing decisions for the level of protection afforded each resource site. These sections are not included in this document.

The Goal 5 Administrative Rule provides for the adoption of regulations when an analysis demonstrates the following: that existing zoning is not adequate to protect a resource, and that a local government has reasons to believe that a resource is more important than benefits expected from continuing the conflicting uses. New zoning can also be enacted to limit, but not prohibit, conflicting uses. The rule provides for this decision when an analysis demonstrates that existing zoning is not adequate to protect a resource, but a local government has reasons to believe that both the conflicting use and the resource are important. Decisions can also be made to leave in place existing zoning; even though this zoning is not adequate to protect a known resource. The rule provides for this decision when a local government has reasons to believe that an expected benefit of allowing a conflicting use is more important than a harmed resource.

This plan also examines conflicting uses for cumulative effects on the entire Fanno Creek Watershed and effects that may extend between or beyond the City's designated resource sites. Many regulations are designed to preserve watershed functions as well as to protect specific resources within specific resource sites. Examples of protected functions include flood conveyance and erosion control. The adequacy of site specific and general regulations was determined by comparing the restrictions and prohibitions to be established by this plan against the requirements of state and

21 This meridian is the Multnomah/Washington County line. This line is often S.W. Sixty-fifth Avenue.

federal law. Individual resources of the same type were examined for their contribution to a resource category as a whole. In situations where a resource of moderate importance was near a similar resource of high importance, proximity often justified the protection of both resources. Similar situations arose when clustered or continuous resources of only moderate importance comprised a functional unit of high importance. Uses with widespread benefits were allowed whenever harm was limited to resources of only moderate importance. All of these factors were considered in the Fanno Creek Plan. This Plan is the City of Portland's program to achieve the purpose of Statewide Planning Goal 5.

Other Statewide Planning Goals

Goal 5 is only one of nineteen Statewide Planning Goals. Ten other goals also apply to this plan. Two of the applicable goals establish a decision making process. These are Goal 1, Citizen Involvement, and Goal 2, Land Use Planning. These mandated procedures were applied during the preparation, review, and presentation of the various drafts of this plan.

Three of the applicable Statewide Planning Goals have objectives that are fully compatible with Goal 5. They are Goal 6, Air, Water, and Land Resources; Goal 7, Areas Subject to Natural Disasters and Hazards; and Goal 13, Energy Conservation. The comprehensive plan and land use regulation amendments recommended by this plan are designed to carry out the purposes of these goals as well as those of Goal 5. The benefits of avoiding pollution, disasters, and hazards; and of conserving energy are described in the analyses for each resource site.

Five of the applicable Statewide Planning Goals address uses which can be "conflicting uses" within the meaning of the Goal 5 Administrative Rule. These are Goal 8, Recreational Needs; Goal 9, Economic Development, Goal 10, Housing; Goal 11, Public Facilities and Services; and Goal 12, Transportation. The effects of providing these uses in the same locations as significant natural resources are described in the analyses for each resource site.

Statewide Planning Goals inapplicable to this plan include Goal 3, Agricultural Lands, and Goal 4, Forest Lands. These Goals apply only to lands outside urban growth boundaries. Since this plan does not amend the Metropolitan Urban Growth Boundary, Goal 14, Urbanization, is also inapplicable. Goals 15 through 19 are inapplicable because they address resources that do not exist in the Fanno Creek Watershed (Willamette River Greenway, Estuarine Resources, Coastal Shorelands, Beaches and Dunes, and Ocean Resources).

Portland Comprehensive Plan Goal 8 - Environment

The purpose of Portland's Environment Goal is, "To maintain and improve the quality of Portland's air, water and land resources and protect neighborhoods and business centers from detrimental noise pollution." The policies and objectives of this goal generally meet or exceed the requirements of the Statewide Planning Goals 5.

Ordinances adopted through 1993 have added new Goal 8 policies controlling development in groundwater areas, drainage ways, natural areas, scenic areas, wetlands, riparian areas, water bodies, uplands, wildlife habitats, aggregate sites, and in areas affected by noise and radio frequency emissions. These ordinances also established new Goal 8 objectives. These objectives include controlling hazardous substances; conserving aquifers, drainage ways, wetlands, water bodies, riparian areas, and fish

and wildlife habitat; prioritizing properties for public acquisition; coordinating City regulations with the regulations of state, federal, and other affected local governments; avoiding harm to natural resources; mitigating unavoidable harm to natural resources; maintaining vegetative cover; improving water quality; and preventing soil erosion and stormwater flooding. Each of these new policies and objectives is acknowledged as complying with Statewide Planning Goal 5.

Other Portland Comprehensive Plan Goals

There are ten Portland Comprehensive Plan goals besides the City environment goal. These goals address metropolitan coordination, urban development, neighborhoods, housing, economic development, transportation, energy, citizen involvement, plan review and administration, and public facilities. As with the Statewide Planning Goals, the required procedures were addressed in the preparation, review, and presentation of this plan.

Relation to Other Goal 5 Studies

The City has completed several Goal 5 studies. These completed studies, and their relationship to this plan, are described below.

Mineral and Aggregate Sites

Mineral and aggregate resources in the Portland metropolitan area are identified in the 1988 *Mineral and Aggregate Resources Inventory*. This document, together with amendments to the Comprehensive Plan Policies and Zoning Code adopted in 1982, satisfies Statewide Planning Goal 5 requirements for mineral and aggregate resources. The Bureau of Planning reviewed information collected from the State Department of Geology and Mineral Industries and the *Mineral and Aggregate Resources Inventory*, and determined that there were no significant mineral and aggregate sites within the Fanno Creek Watershed. This inventory is acknowledged as complying with statewide Planning Goal 5.

Scenic Resources

City Council adopted the *Scenic Resources Protection Plan* on March 20, 1991. The plan preserves significant scenic resources. The plan contains policies, land use regulations, and zoning maps that protect and enhance scenic resources. This plan is acknowledged as complying with Statewide Planning Goal 5.

The *Scenic Resources Protection Plan* identifies two scenic corridors that within the boundaries of the *Fanno Creek and Tributaries Conservation Plan.* These are S.W. Fairmount Boulevard and the portion of S.W. Multnomah Boulevard west of S.W. Forty-fifth Ave.

A scenic corridor is a linear resource that may include streets, bikeways, trails or waterways (rivers, creeks, sloughs) through parks, natural areas, or urban areas. The corridor may include scenic views along it, but may also be valued for its intrinsic scenic qualities such as a winding road through a wooded area. All development and vegetation within a scenic corridor are subject to special regulations. A scenic corridor preserves and enhances linear scenic character, and where possible, provides scenic vistas. This is accomplished by limiting the length of buildings, preventing development in side setbacks, screening mechanical equipment, and restricting signs.

22 Portland City Code, 33.480.060.

The City's acknowledged land use regulations provide that when an environmental zone has been applied at the location of a designated scenic resource, the scenic designation is removed, but the environmental review must include consideration of the scenic qualities of the resource as identified in *Scenic Resources Protection Plan.*[22] The analyses of the *Scenic Resources Protection Plan* are not repeated in the analyses of this plan.

Historic Resources

The location and quality of several historic resources in the Fanno Creek Watershed were identified in an inventory published by the Planning Bureau in May of 1984. This inventory has not been accepted by either the Planning Commission or the City Council. This work is being completed by a separate Goal 5 study and is not addressed by the Fanno Creek Plan. Known historic sites are currently protected by Chapter 33.222 of the City Planning and Zoning Code, and are not addressed by this report. Chapter 33.222 is acknowledged as complying with Statewide Planning Goal 5.

Cultural Resources

There are no known significant archaeological or cultural resources within the Fanno Creek Watershed. The best information suggests that an average of one significant site may exist per 40 acres in the upper watershed.[23] This hypothesis is extrapolated from sites found in similar areas in Washington and Clackamas Counties. All of these sites are associated with drainages. Frequencies ranged between a high of one site per 195 acres to a low of one site per seven acres. Headwaters appear to have been preferred sites for prehistoric use, particularly as travel routes and temporary camps. The identification of cultural resources in the Fanno Creek Watershed is not part of the City of Portland's Periodic Review work program.

A separate study is underway to identify and protect archaeological resources, but only for the Columbia South Shore. The Fanno Creek Plan does not propose environmental zones for the protection of cultural and archaeological sites. But, because many headwaters are protected for other reasons, a high degree of incidental protection may be afforded to unknown archaeological sites.

Open Space

Open space is conserved by existing base zones and comprehensive plan designations. While the *Fanno Creek Plan* does not provide open space *per se*, it will provide for environmentally sensitive development and a visually appealing city. The City's open space designations are acknowledged as complying with Statewide Planning Goal 5. The review of these designations is not part of the City of Portland's Periodic Review work program.

Portland Future Focus

The City of Portland recently adopted the *Portland Future Focus: Strategic Plan.* The plan is a culmination of sixteen months work between the city and eighty citizens. The purpose of the strategic plan is to guide the shared efforts of government, businesses, community organizations, and citizens in ensuring a healthy city. *Future Focus* is not part of the Portland Comprehensive Plan, but is being used to guide planning decisions.

The strategic plan includes an action plan for managing regional growth. The first strategy of this action plan is:

1. Maintain livability in the Portland Metropolitan region through an integrated planning process that focuses appropriate growth in the Central City, protects the natural environment and open spaces, strengthens cultural programs and enhances neighborhoods.

Several action items under this strategy are consistent with the provisions of the Fanno Creek Plan. These action items include:

1.2 Create a regional system of linked greenways and greenspaces. As part of its Metropolitan Greenspaces Program, METRO should institute a cooperative regional system of natural areas, open space, recreational trails, crop lands and greenways. The system should integrate landscape features, natural areas, wildlife refuges, rivers and streams. The Greenspaces network should be served by a regional trail system: the 40-Mile Loop, Chinook Trail, and other trails.

1.3 Institute ecosystem protection, restoration and management program that integrates landscape ecology, protection of open space, wildlife refuge parks, crop lands and the maintenance of air and water quality with economic development. The programs should include waste management and recycling. Functions of the Bureau of Environmental Services, Planning, Parks and Recreation, Transportation and Water should be integrated as they relate to ecosystem protection.

Carrying out the provisions of the Fanno Creek Plan will also carry out Future Focus action items.

Greenspaces Program

The Metropolitan Greenspaces Program is underway to identify and protect natural areas within the Portland metropolitan area and Clark County, Washington. The project's study area includes the Fanno Creek Watershed. The program is a cooperative effort with cities, counties, special districts, nonprofit environmental and conservation organizations, and citizens. The goal is to establish a regional system of natural areas, parks and open spaces that are connected by trails and greenways. The inventory of areas needed for this purpose is not adopted as a regional "functional plan" under the Metropolitan Service District's statutory and charter authorities, but was considered in the Fanno Creek Plan.

Regional Urban Growth Goals and Objectives

Along with the Greenspaces Program, the Metropolitan Service District has developed the *Regional Urban Growth Goals and Objectives*. These objectives are not adopted as a regional "functional plan" under the Metropolitan Service District's statutory and charter authorities, but were considered in the Fanno Creek Plan.

Goal 2, Natural Environment states:

> Preservation, use and modification of the natural environment of the region should maintain and enhance environmental quality while striving for the wise use and preservation of a broad range of natural resources.

Objective 9, Natural Areas, Parks and Wildlife Habitat, would require local govern-

ments to acquire, protect and manage (1) open spaces to provide passive and active recreational opportunities, and (2) an open space system providing habitat for native wildlife and plant populations. Strategies 9.1 and 9.2 require local governments to accomplish several tasks to meet this objective. The development and implementation of the Fanno Creek Plan addresses the following strategies:

> 9.1 Open Space Assessment: This strategy calls for local governments to establish quantifiable targets for setting aside certain amounts and types of open space. The city's Goal 5 update process carries out this strategy.
>
> 9.2 Corridor Systems: This strategy calls for the development of interconnected recreational and wildlife corridor systems within the metropolitan region. The Fanno Creek Plan will advance this objective by preservation of natural areas where passive recreational opportunities exist. The individual site inventories included in the Fanno Creek Plan will also aid in the development of recreational and wildlife corridors. This strategy also requires a detailed biological inventory of the region to be maintained to establish an accurate baseline of native wildlife and plant populations. The resource inventories contained in the Fanno Creek Plan provide new data for this regional inventory.

Oregon Benchmarks

The report *Oregon Benchmarks, Setting Measurable Standards for Progress, Report to the 1993 Legislature* was adopted by the Oregon Progress Board. The report embodies a statewide consensus, and defines a preferred future for Oregon as both a people and a place. The report includes both short and long term benchmarks, and whenever present circumstances fall significantly short of the ideal, incremental steps are established. Benchmarks are divided into following three categories: People; Quality of Life; and Economy. All benchmarks are clear, objective, numerical standards that focus on results. Quality of Life Benchmark 28 is the, "Percentage total land within the Portland metropolitan area preserved as open space."

The report calls for 20 percent open space, and recognizes that only three percent is protected. The *Fanno Creek and Tributaries Conservation Plan* is part of an overall program that will result in 17 to 18 percent of the City being placed in environmental zones. While environmental zones are not open space *per se*, they will achieve the benchmark purpose of environmentally sensitive development and quality of life. Other relevant benchmarks address a no net loss of wetlands and affordable housing.

Since it is difficult to achieve environmental protection and affordable housing in the same place, most affordable housing will occur in the 82 percent of the City not in environmental zones. Areas with environmental zones are generally excluded from the City's inventory of lands needed for housing, because 98 percent of them are on slopes of 30 percent or greater, or are within floodways. The portion of the Fanno Creek Watershed within the Portland City Limits has an area of 4,660 acres. Within this area, the Fanno Creek Plan proposes 306 acres of environmental protection zones and 757 acres of conservation zones. This is six percent protection zoning and 17 percent conservation zoning.

CHAPTER 2

SUMMARY OF RESOURCE SITE INVENTORIES

Process

The following information was used to define the study area: the United States Fish and Wildlife Service's National Wetlands Inventory (scale 1:24,000), false color infrared photography commissioned jointly by the Portland Audubon Society and the Metropolitan Service District in 1989 (scale 1:200), City base topography maps (1:100 and 1:200 scales), and 151 field visits.

The study area, with minor exceptions, is the Fanno Creek Watershed within Multnomah County and the Portland City Limits. The inventory was prepared jointly with Multnomah County, but regulations are, of course, only proposed for lands within the political jurisdiction of the City of Portland. Small portions of the city limits extend west of the Willamette Meridian into Washington County and these lands were also examined.

Site Selection

The study area is divided into eight City Resource Sites. These divisions are generally drainage sub-basins. The resource areas include Fanno Tributaries north of S.W. Hamilton Road and west of S.W. Dosch Road, the mainstream of Fanno Creek, the Pendelton Tributary, the Vermont Tributary, the Multnomah Tributary (also called Woods Creek), the North Fork of Ash Creek, the South Fork of Ash Creek, and an unnamed tributary east of Interstate-5.

Because road fills have significantly altered natural drainage, existing roads have been used to approximate boundaries between sub-basins. This approach is more reflective of reality than strictly topographic boundaries. Its also facilitates public review, because people are more likely to know the name of the nearest major street than the elevation of their lot.

Field Inventory Method

The field inventory for Fanno Creek Plan Inventory was done differently than the City's earlier environmental studies. In other study areas a single field examination could represent several acres of fairly homogeneous resources. Because the Fanno Creek Watershed is more developed than other study areas, a single examination might not be representative of an entire forest or stream segment. To gain a better understanding of the ecological functions state and city goals seek to maintain, each of the eight resource sites contains more than one inventory site. Scores taken at several inventory sites were aggregated to gain a general understanding of the resource site as a whole. There are a total of 151 inventory sites. Since the same evaluator was present at every examination, any subjectivity is canceled out, and scores reflect the relative values of all resources present in the watershed.

General Inventory

The following is a general description of the natural resources of the Fanno Creek Watershed. The inventory includes only ecologically significant natural areas. The Portland City Code defines ecologically significant natural areas as, "Land and water that has substantially retained its natural character, but is not necessarily completely natural or undisturbed, and which is significant for historic, scientific, paleontological, or natural features." This Code definition is very similar to the definition of "Natural Areas" in the Statewide Planning Goals, but the State definition stresses the importance of habitat for plants and animals. The Statewide Planning Goals define ecosystem as, "The living and non-living components of the environment which interact or function together, including plant and animal organisms, the physical environment, and the energy systems in which they exist. All the components of an ecosystem are interrelated."
The common meaning of term "significant" is, "noticeable, meaningful, or measurable." The term allows the Portland City Council to exercise its proper judgment to determine which areas have meaningful natural character. Council provided guidance for the identification of "ecologically significant natural areas" through enactment of new Comprehensive Plan Policies beginning with Ordinance No. 160890, June 1988. The following policies are especially relevant:

8.8 Groundwater Protection. This policy directs the conservation of groundwater by protecting ground and surface waters, and areas of groundwater recharge from pollution.

8.10 Drainageways. This policy directs the regulation of development in drainageways to control stormwater runoff, and to protect riparian vegetation for water quality and wildlife. Drainageways are especially important as corridors which allow passage of wildlife between natural areas and throughout the City. They can also be important habitat whenever they provide food, water, or cover; or breeding, nesting, resting, or wintering areas. Drainageways must, however, be maintained on a regular basis to allow them to adequately control stormwater runoff.

8.11 Special Areas. This policy recognizes that different parts of the City have unique land qualities and directs the adoption of specific planning objectives for special areas.

8.12 National Flood Insurance Program. This policy directs measures to ensure continued City eligibility for this program.

8.13 Natural Hazards. This policy directs that development density be controlled in areas of natural hazards.

8.14 Natural Resources. This policy establishes a framework for resource conservation. It includes directives to avoid impacts, mitigate unavoidable impacts, and to prevent soil erosion.

8.15 Wetlands/Riparian/Water Bodies Protection. This policy directs the regulation of development to retain the ecological functions and natural values of these areas. It requires the protection of buffers around resources, and the restriction

of non-water dependent and non-water related development within riparian areas. It also directs the improvement of water quality and the conservation of flood control values.

8.16 Uplands Protection. This policy directs the conservation of upland wildlife habitats, particularly important are uplands that connect habitats and buffer wetlands and water bodies. It also requires the protection of slopes from landslides and erosion through the retention and use of vegetation.

8.17 Wildlife. This policy directs the conservation of existing habitats and encourages activities that increase the variety and quantity of fish and wildlife throughout the City. It directs the regulation of development which is detrimental to the provision of food, water, and cover for fish and wildlife.

Through the application of this policy guidance the Portland Planning Bureau and Planning Commission determined that "ecologically significant natural areas" within the Fanno Creek Watershed are limited to certain upland forests, certain riparian areas, and certain drainageways, wetlands, and water bodies. These are natural resources that provide values through their ecological functions. For example, a forest provides habitat for plants and animals. The forest is the "resource." Urban wildlife and the other benefits of the forest are "values."
The ways that resources provide these values are ecological "functions." Our example forest might provide habitat for a certain animal species, but only if it contained plant species providing the necessary food and cover. These plant species would not exist unless all the ecological functions (interactions between the physical, chemical, and biological components of an environment) such as light, temperature, moisture, and substrate were within proper limits.

The Planning Bureau identified resources, values, and functions from secondary sources, aerial photography, and original field work. Resources were identified at a scale of one inch representing 200 feet on a hand colored maps dated October 18, 1991. Because of their size, and the expense of color reproduction, these maps are not included in this summary document. More detailed descriptions of resources and generalized maps of the resources and resource sites are included with each site inventory summary. Copies of the Habitat Evaluation forms are included in a separate volume.

Resources
The Planning Bureau identified the following types of ecologically significant natural resources in the Fanno Creek Watershed:

Streams - These are flowing bodies of water and seasonal drainageways. Flow may be perennial, intermittent, or seasonal. Fanno creek and its tributaries are streams. Since these streams are small, they are identified as palustrine wetlands in the National Wetlands Inventory, but the Fanno Creek Plan inventory borrows terms from the United States Fish and Wildlife Service's riverine classification scheme to give a better definition of stream flow and substrate. Technically, all forested wetlands are palustrine, and the riverine classification is used for only streams so wide that they cannot be completely overarched by trees. Forested wetland types are listed as riparian habitats in the Fanno Creek Plan inventory.

Riparian Areas - These boarder water bodies. They are transitional areas between uplands and wetlands. Water bodies, wetlands, riparian areas, and uplands function together as ecological units. Values cannot be maintained by protecting just a water body, just a wetland, just a riparian area, or just an upland.

Forests - These areas include upland forests, riparian forests, and wetland forests. Any of these forests may be completely coniferous, mixed coniferous and deciduous, or completely deciduous.

Ponds - These are still open bodies of water. In Fanno Creek the only ponds are small reservoirs constructed by placing check dams in the stream channel. Since these ponds are small, they are identified as palustrine wetlands in the National Wetlands Inventory, but the Fanno Creek Plan inventory borrows terms from the United States Fish and Wildlife Service's lacustrine classification scheme to give a better definition of substrate types and amounts of open water. Technically, all forested wetlands are palustrine, and the lacustrine classification is used for ponds so wide that they cannot be completely overarched by trees.

Marshes - These are palustrine wetlands dominated by grasses.

Scrub-Shrubs - These are palustrine wetlands dominated small woody plants.

Urban Landscapes - These are lawns and gardens. Although some native trees remain, most native plants are replaced by exotic shrubs and grasses. Urban landscapes provide habitat for exotic animal species, and certain adaptive native animal species. They also contribute to watershed values as a whole.

Values and Functions

Natural resources provide the following values through the listed functions. Since some functions contribute toward two or more values (For example, soil stabilization contributes to both public safety and pollution control.) the lists of functions should be considered illustrative rather than exhaustive.

Public Safety - The natural resources of the Fanno Creek Watershed make significant contributions to public safety by stabilizing slopes and banks, and by controlling floods.

1. Anchoring of shorelines and stream-banks. Vegetation provides natural armor for stream banks and shorelines. In some situations vegetation can serve as a natural alternative to rip-rap or concrete stream liners.

2. Dissipation of the erosive forces of stormwater. Vegetation slows the velocity of stormwater. To the extent that stormwater is held in check, less erosion and bank failures result.

3. Retention of soils and stabilization of slopes. Forests root systems hold soil on hillsides. When forests are removed, and when the stumps and roots either rot or are pulled out, landslides can result. These slides usually occur in the rainy season when soils become saturated.

4. Storage, conveyance, and desynchronization of stormwater. Rain falling on a forest bounces off leaves and twigs, drips into the spongy forest floor, and drains slowly down hill. Rain falling on pavement runs immediately downhill. Forest can lower peak flood heights by slowing stormwater runoff. Older coniferous forests do this better than younger deciduous forests. Ponds and marshes also store and desynchronize flood water. Forests can also store water from the wet season and release it during dry spells. The extra water can help aquatic life.

Pollution Control - Vegetation within Fanno Creek Watershed resource sites helps maintain and improve air and water quality.

1. Trapping air-born pollutants. A mature tree can intercept up to 50 pounds of atmospheric particles every year. To the extent that particulates are trapped in forests, water quality benefits as well. Many stormwater born pollutants in the Fanno Creek Watershed originate as particulates from construction sites, others originate from motor vehicles.
2. Trapping sediment from stormwater - Stormwater flowing through vegetation can loose between 10% and 57% of its sediment bound phosphorous and nitrogen based pollutants by natural filtering and slowing of runoff.[24] Streams bordered by wide amounts of vegetation provide higher biofiltration values than denuded banks. Vegetated stream-side areas that are wide enough to provide good quality wildlife habitat, are also wide enough to provide a measurable degree of biofiltration.

3. Assimilating and breakdown of water-born pollutants. Dissolved phosphorous cannot be filtered out of stormwater runoff, but it can be assimilated in water bodies by aquatic plants. Aquatic bacteria can also break down some toxins to less harmful chemicals, but toxic chemical runoff is not a known problem in the Fanno Creek Watershed. Both assimilation and breakdown take time, so these processes are most effective in slow moving, shallow water. Assimilation by algae is a problem. These microscopic plants can grow, die, and rot all in one summer, and entire streams can be deprived of the dissolved oxygen necessary for aquatic life. Marsh grasses also grow, die, and rot, but grasses decompose in the winter when temperatures are lower (stream water can carry more dissolved oxygen at lower temperatures) and flows are higher, so stream life is not usually threatened. Woody plants incorporate nutrients into long-lived tissue, and thus retain nutrients for several seasons.

Fish and Wildlife - Every Fanno Creek Watershed resource site contains important habitat for fish and wildlife. Two species of special concern are the piliated woodpecker and the cutthroat trout. These species are becoming more rare, and will disappear entirely from the urban environment unless their habitat is maintained.

1. Provide for spawning, rearing, feeding, and migration of fish. All water bodies in the Fanno Creek Watershed contain significant fish habitat because they provide for spawning, rearing, feeding, and migration of fish. Many drainageways, seasonal streams, and stream segments where fish are not

24 Martin, E. and Smoot, J., Load Changes in Urban Stormwater Runoff, USGS Report 85-430. Tallahassee, Florida. 77 pages.

present, or not present year-round, are also significant because they provide the quantity and quality of water to support down-stream fisheries.

2. Provide food, water, cover, and dispersion for wildlife. All Fanno Creek Watershed resources sites contain significant wildlife habitat. Each site is assigned a numerical habitat value. Habitat value was determined by the presence of food, water, and cover; connections to other resource areas; and the amount of degradation caused by existing development. Connections to other resource areas are particularly important in the Fanno Creek Watershed. All vegetated stream banks are significant for wildlife, because they provide a sheltered means of dispersion between resource areas in the same sub-basins. S.W. Maplewood, Multnomah, and Fairvail are forested, abandoned, rail right-of-way embankments with seasonal wetlands on their up-hill sides. They provide the only significant wildlife dispersion opportunities between the sub-basins of the Fanno Creek Watershed.

Climate - Forests help maintain temperatures within normal ranges on both local and global scales. All Fanno Creek Watershed sites have their own important microclimates. These sites, in total, can make a measurable contribution toward maintenance of the regional climate.

1. Maintenance of microclimates. Mature forests establish their own climates. These microclimates are cooler, darker, and more moist than urban landscapes. These microclimates are important habitat components, and are essential for the perpetuation of native plant and animal species. These microclimates also provide "passive air conditioning" that reduces domestic energy use in the summer.

2. Maintenance of global climate. Portland is one of twelve local governments designated by the United Nations' 1988 Toronto "World Conference on the Changing Atmosphere" to retard global warming by slowing the build-up of carbon dioxide. Urban forests in the United States store approximately 800 million tons of carbon, or about five percent of all forest carbon storage in the entire country. A mature tree absorbs about 13 pounds of atmospheric carbon dioxide every year. The City of Portland's draft *Carbon Dioxide Reduction Strategy* demonstrates that maintenance of existing trees, and the planting of new trees, will cause a measurable reduction in atmospheric carbon dioxide. This is the only "sink increase" element in the strategy; the others are "source reduction" elements.

Recreation and Scenery - The city regulations that protect and conserve natural resources do not authorize public use. The only significant scenic resources in the Fanno Creek Watershed are corridors along the portion of S.W. Multnomah Boulevard west of S.W. Forty-fifth Avenue, and along S.W. Fairmont Boulevard. Some natural resources are on public park land, and these areas are significant for recreation.

Research and Education - Resources significant for scientific investigation probably do not exist in the Fanno Creek Watershed. Some natural resources are, however, on school grounds or in parks. These areas provide significant educational values.

Water Supply - Surface water is supplied through seasonal recharge and discharge of groundwater. The silt-clay soils in the Fanno Creek Watershed are so impervious that recharge is a very slow process, and most groundwater tends to remain confined in seasonal perched aquifers. Discharge is most apparent in areas with exposed basalt or fragipans. While recharge is not recognized as particularly significant at individual resource sites, it is important to the watershed as a whole. Discharge is not an important domestic source of water, but groundwater discharge contributes water to streams during critical periods of low flow. This water is extremely important for fish and wildlife.

Site Specific Inventories

The following pages list the resources, values, and functions that were identified at the eight City Resource Sites. Since the Portland Comprehensive Plan emphasizes the use of drainageways for a variety of values, hydrographic considerations drove the selection of resource sites. The resource sites are the main stem tributary subbasins of the Fanno Creek watershed. Standard habitat evaluation methods were employed at several times and at several places within each resource site.[25] Each Resource Site has several habitat inventory locations. The 151 habitat inventory locations are divided among the eight City Resource Sites.

25 Field notes are transcribed as Volume 3 of the Fanno Creek Plan.

Resource Site 124

Location: **Fanno Creek Tributaries North of S.W. Hamilton Road and East of S.W. Dosch Road**

Area: **579 Acres**

Significant Wetland Habitats:
Palustrine, Intermittent stream, Unconsolidated cobble-gravel bed;
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed;
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Limnetic pond, Unconsolidated silt-loam bed;
Palustrine, Littoral pond, Unconsolidated silt-loam bed;
Palustrine, Emergent, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous; and
Palustrine, Forested, Mixed Coniferous and Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

Wildlife Habitat Assessment Scores:
High 92, Low 17, Average 62.

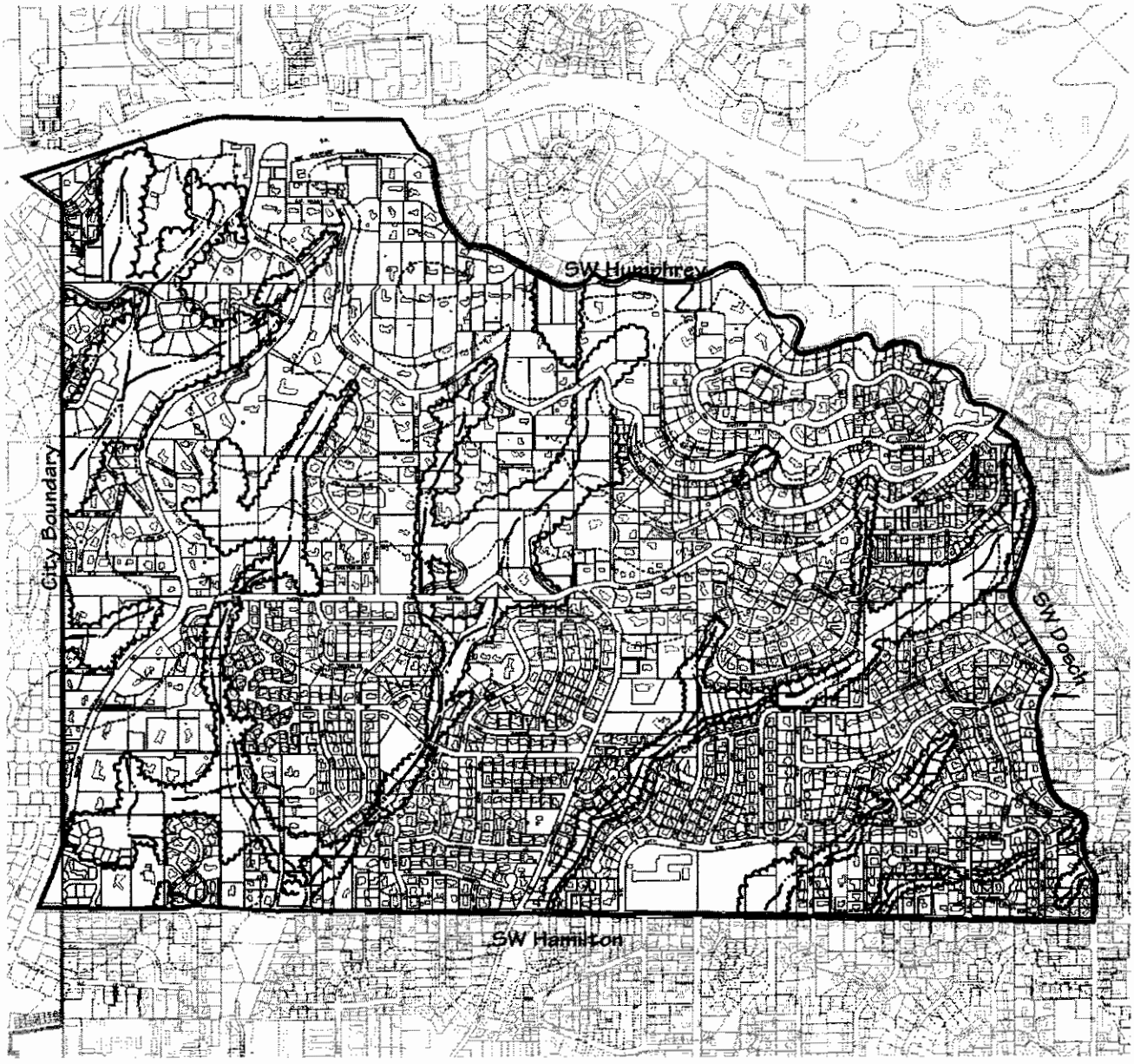
Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

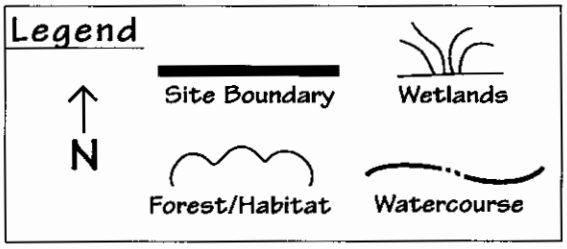
Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils
Spawning, rearing, feeding, and migration areas for fish
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 7/10/91 to 9/11/91

Habitat Inventory Locations (72 Included in this Resource Site):
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 79, 81, 82, 83, 84, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, and 97.

Resource Site 124





Resource Site 125

Location: **Fanno Creek Mainstream and Tributary Junctions**

Area: **1,341 Acres**

Significant Wetland Habitats:
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed;
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Limnetic pond, Unconsolidated silt-loam bed;
Palustrine, Littoral pond, Unconsolidated silt-loam bed; and
Palustrine, Emergent marsh, Unconsolidated silt-loam bed.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous;
Palustrine, Forested, Mixed Coniferous and Deciduous; and
Palustrine, Forested, Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

Wildlife Habitat Assessment Scores:
High 77, Low 22, Average 49.

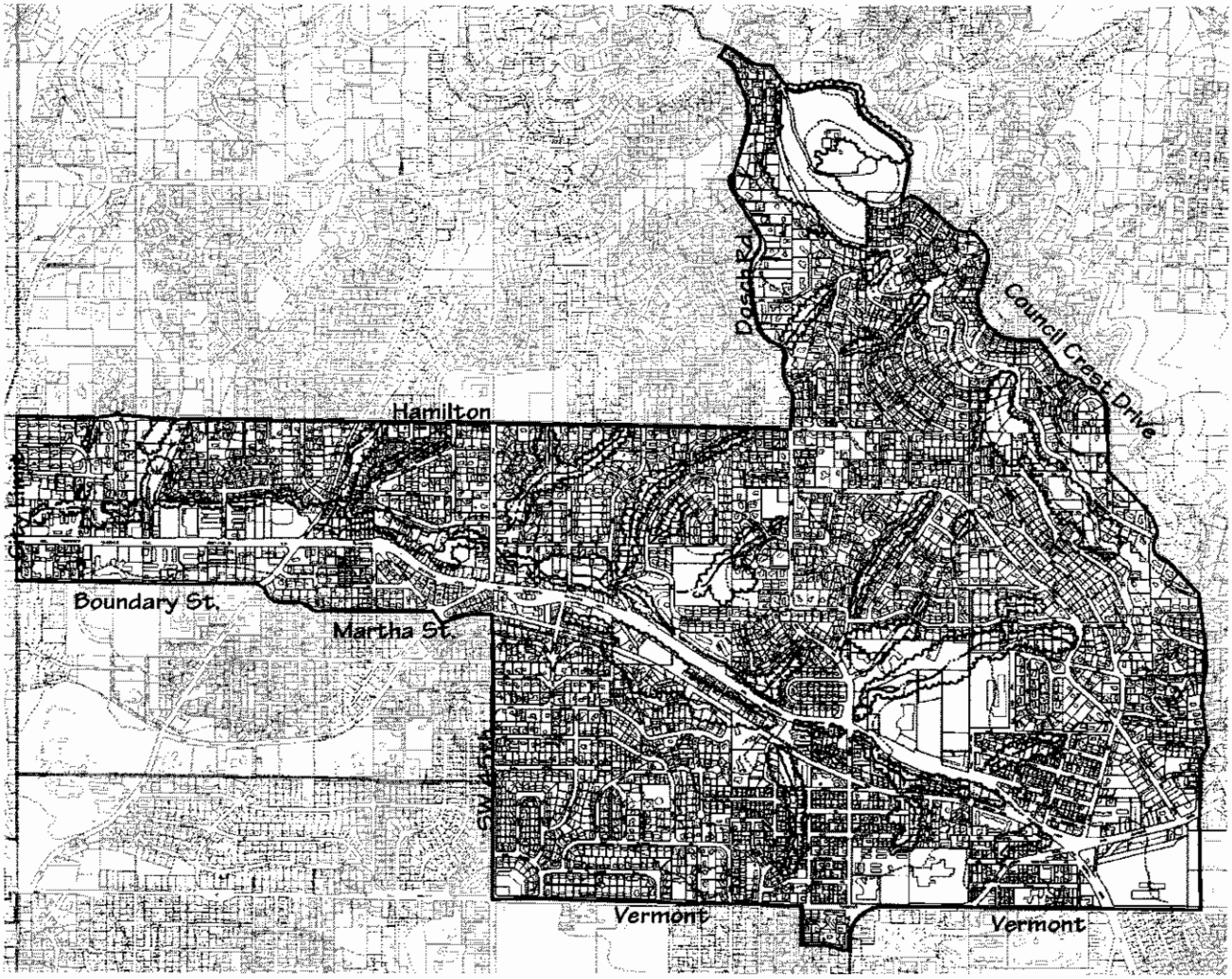
Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

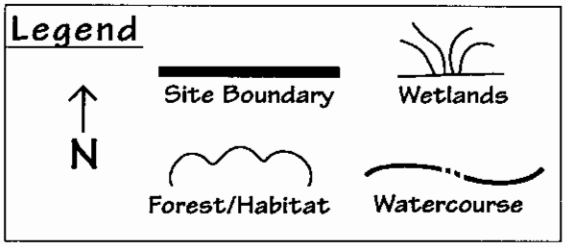
Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils
Spawning, rearing, feeding, and migration areas for fish
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 8/22/91 to 9/24/91

Habitat Inventory Locations (35 Included in this Resource Site):
56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 80, 85, 98, 99, 100, 101, 102, 103, 104, 105, 106, 125.

Resource Site 125





Resource Site 126

Location: **Pendelton Tributary of Fanno Creek** Area: **246 Acres**

Significant Wetland Habitats:
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Emergent marsh, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous;
Palustrine, Forested, Mixed Coniferous and Deciduous; and
Palustrine, Forested, Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

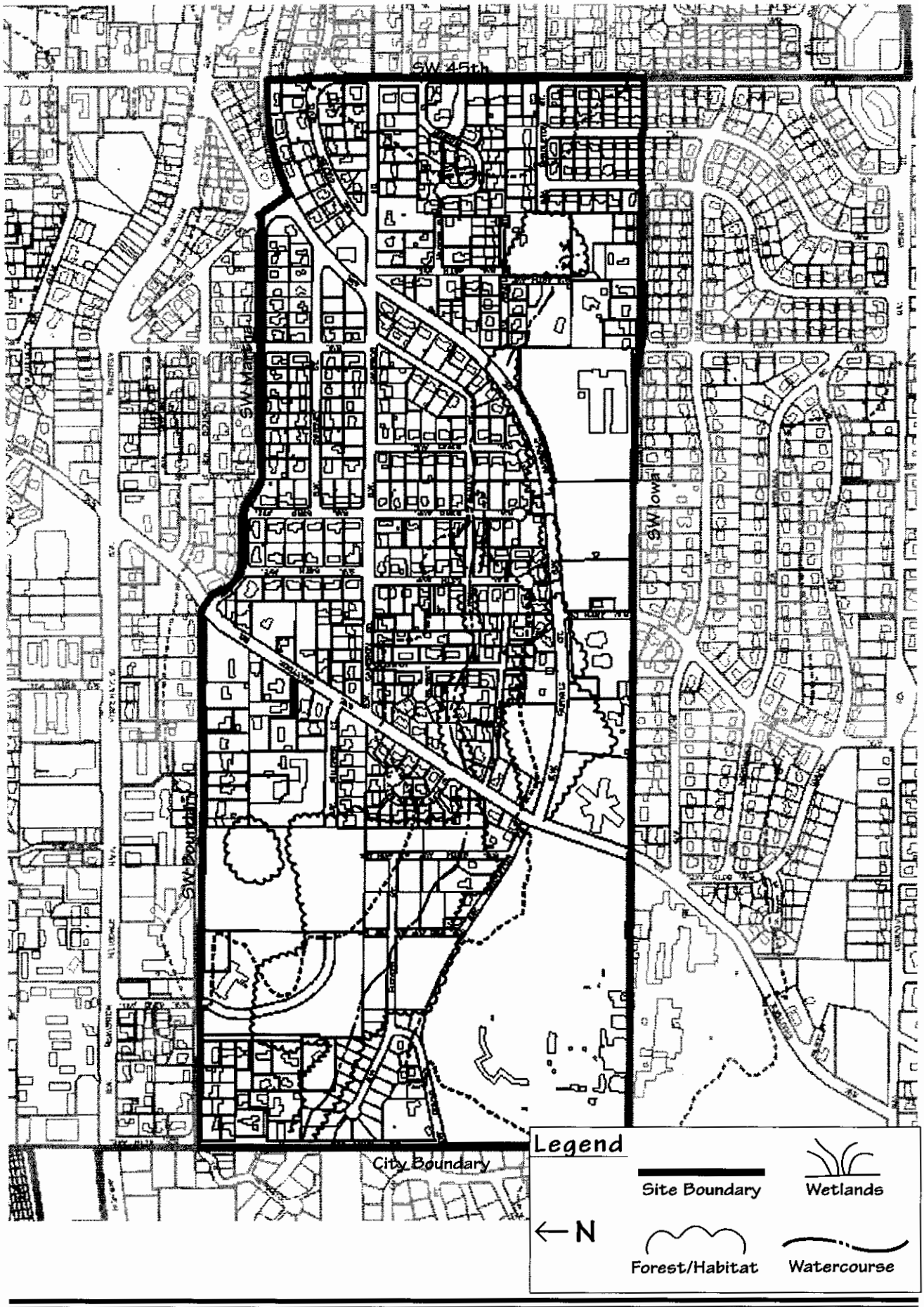
Wildlife Habitat Assessment Scores:
High 82, Low 21, Average 43.

Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Rearing, feeding, and migration areas for fish
Retention of soils
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 9/13/91 to 9/19/91

Habitat Inventory Locations (6 Included in this Resource Site):
107, 108, 109, 110, 111, and 112.


SW 45th
SW Lowell
SW Boundary
City Boundary
Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse

Resource Site 127

Location: **Vermont Tributary of Fanno Creek**

Area: **641 Acres**

Significant Wetland Habitats:
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed;
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Limnetic pond, Unconsolidated silt-loam bed;
Palustrine, Littoral pond, Unconsolidated silt-loam bed;
Palustrine, Emergent marsh, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous;
Palustrine, Forested, Mixed Coniferous and Deciduous; and
Palustrine, Forested, Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

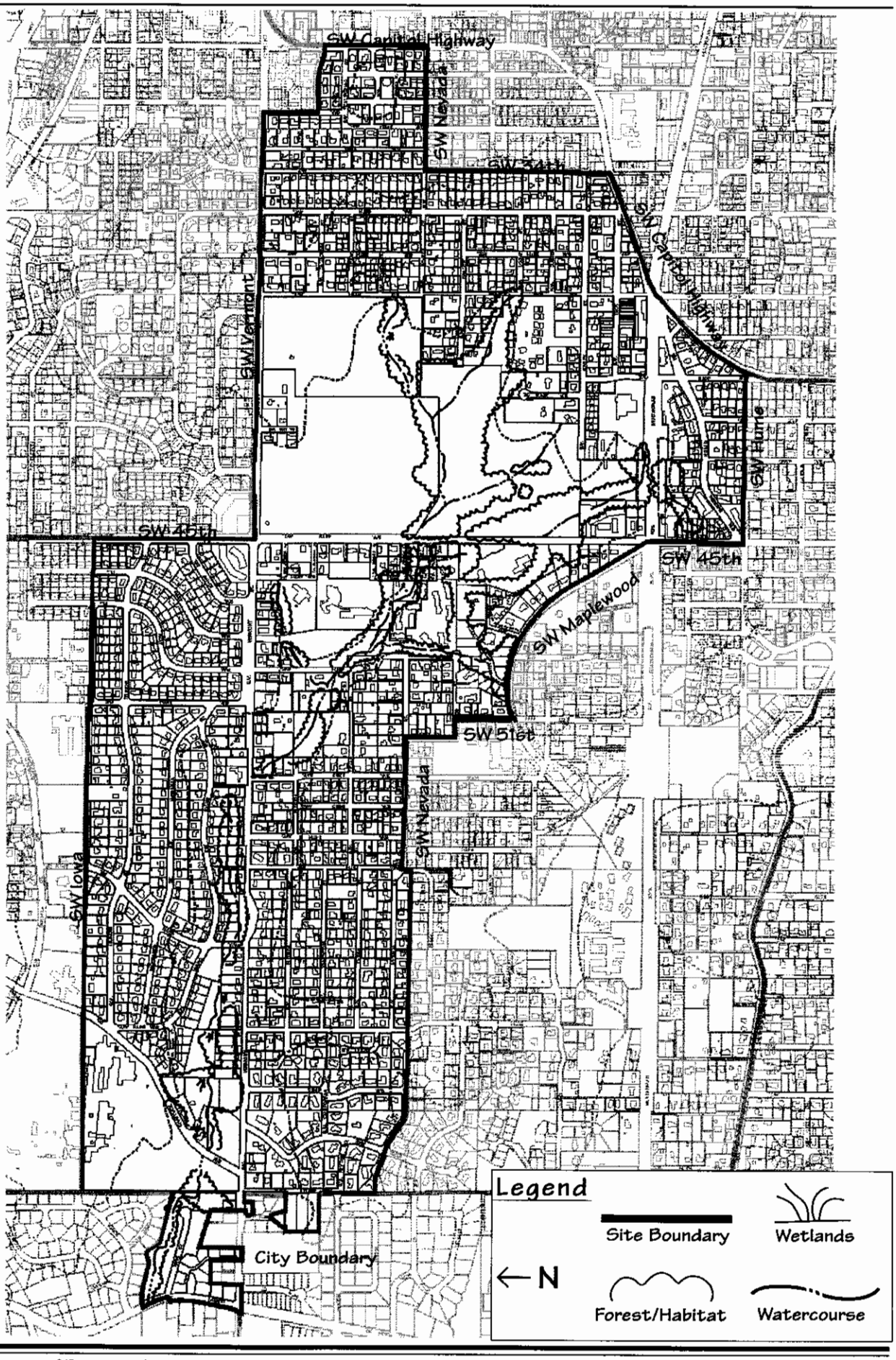
Wildlife Habitat Assessment Scores: High 82, Low 23, Average 49.

Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils
Spawning, rearing, feeding, and migration areas for fish
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 9/20/91 to 10/4/91

Habitat Inventory Locations (17 Included in this Resource Site): 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 126, 127, 128, 129, and 130.


SW Capitol Highway
SW 34th
SW Vermont
SW 45th
SW Maplewood
SW 51st
SW Nevada
SW Iowa
City Boundary
Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse

Resource Site 128

Location: **Woods (Multnomah)**
Tributary of Fanno Creek

Area: **596 Acres**

Significant Wetland Habitats:
Palustrine, Intermittent stream, Unconsolidated cobble-gravel bed;
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed;
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Emergent marsh, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous; and
Palustrine, Forested, Mixed Coniferous and Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

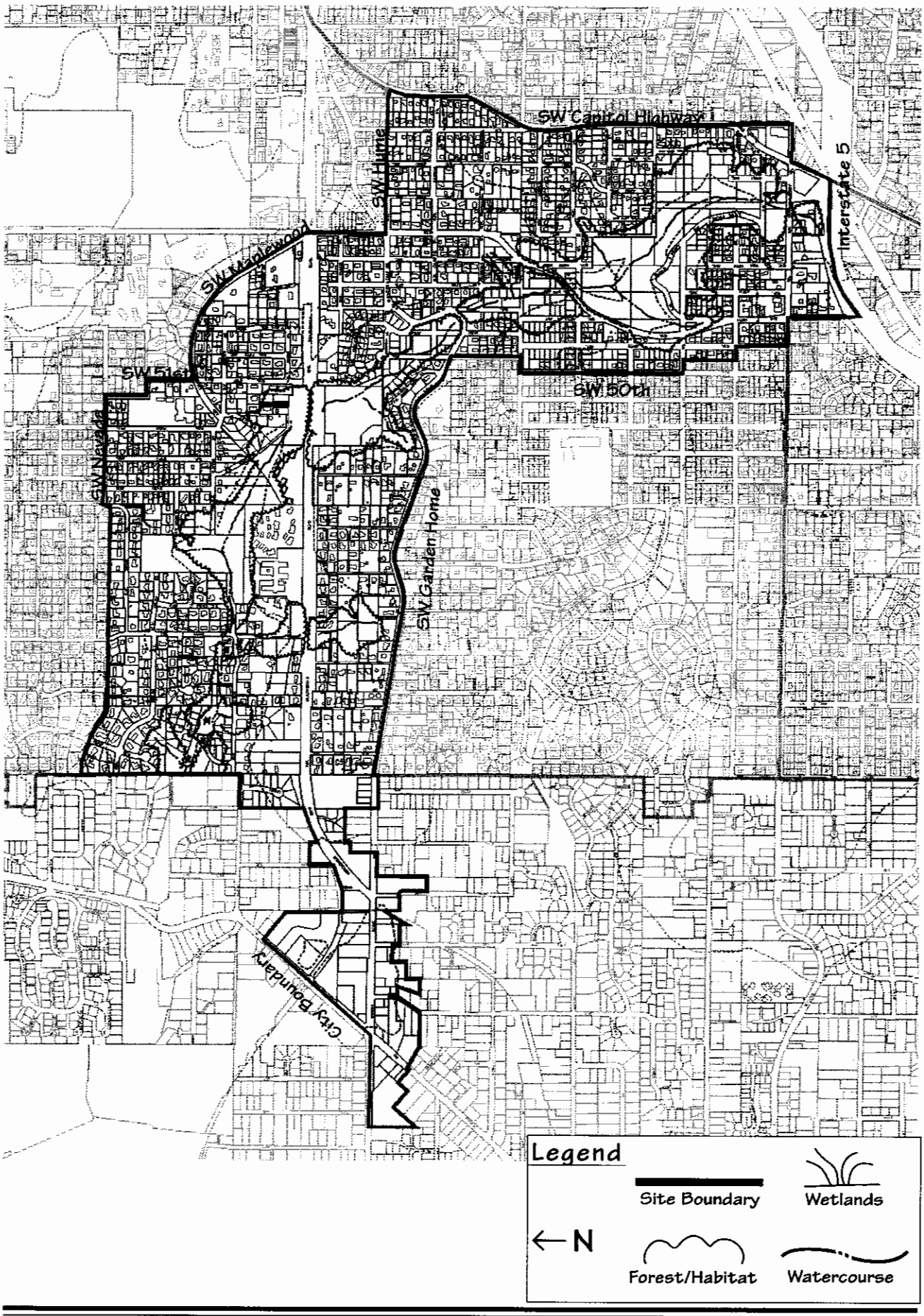
Wildlife Habitat Assessment Scores:
High 90, Low 37, Average 65.

Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils
Spawning, rearing, feeding, and migration areas for fish
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 10/4/91 to 10/11/91

Inventory Sites (12 Included in this Resource Site):
131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, and 143.


SW Capitol Highway
Interstate 5
SW Hume
SW Maplewood
SW 51st
SW 50th
SW Garden Home
City Boundary
Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse

Resource Site 129

Location: **North Fork Ash Creek**
Tributary of Fanno Creek

Area: **341 Acres**

Significant Wetland Habitats:
Palustrine, Intermittent stream, Unconsolidated cobble-gravel bed;
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed;
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Emergent marsh, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous;
Palustrine, Forested, Mixed Coniferous and Deciduous; and
Palustrine, Forested, Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

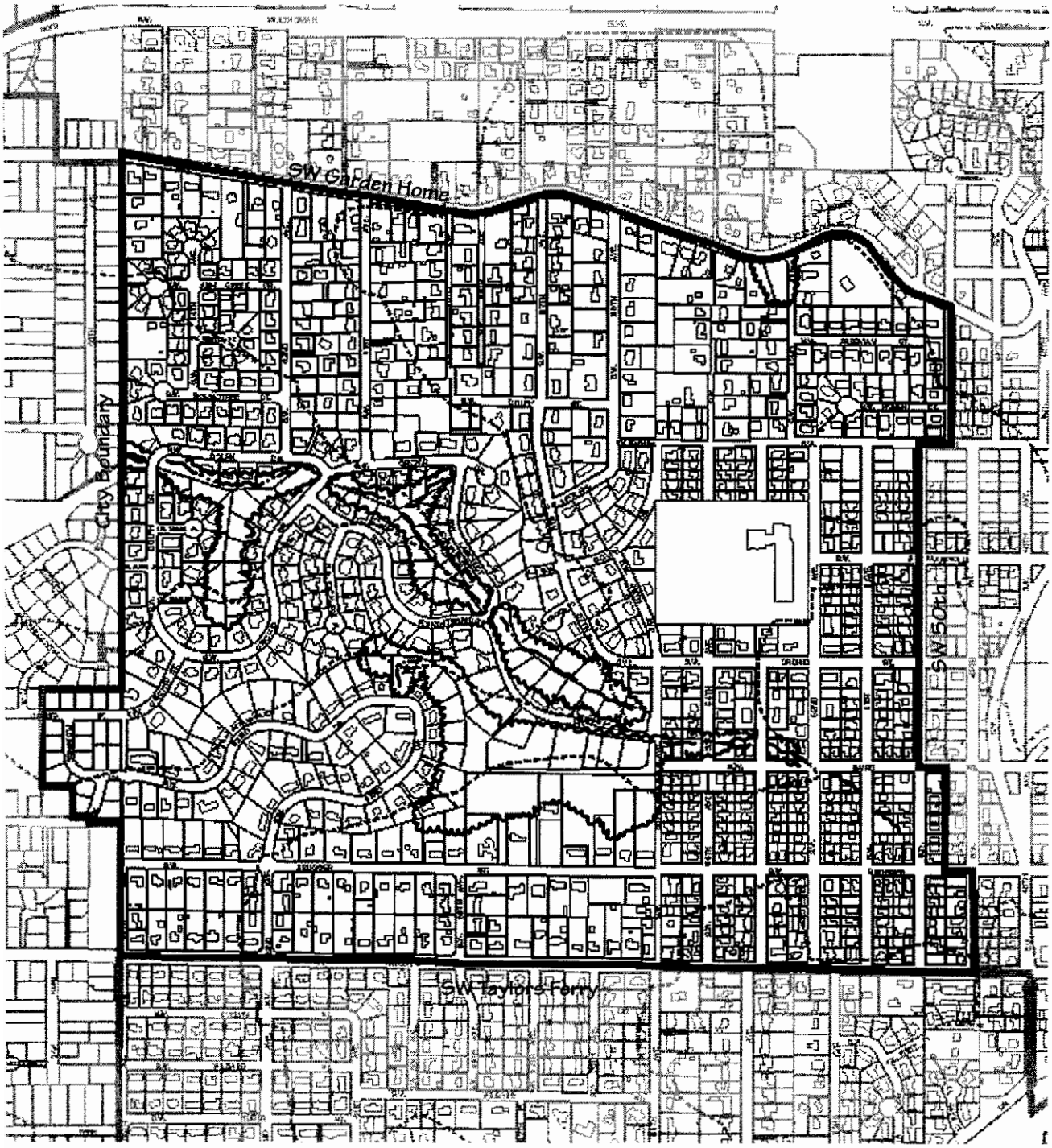
Wildlife Habitat Assessment Scores:
High 60, Low 44, Average 52.

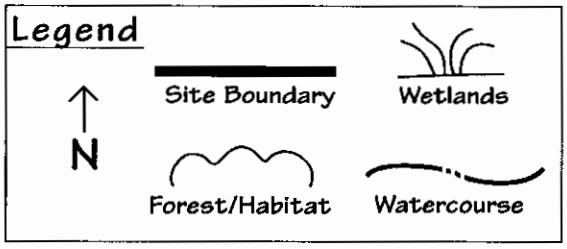
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils
Spawning, rearing, feeding, and migration areas for fish
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Dates of Field Inventories: 10/9/91 to 10/11/91

Habitat Inventory Locations (4 Included in this Resource Site):
144, 146, 142, and 145.


SW Garden Home
City Boundary
SW 80th Ave
SW Taylors Ferry


Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse

Resource Site 130

Location: **South Fork Ash Creek**
Tributary of Fanno Creek

Area: **397 Acres**

Significant Wetland Habitats:
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed;
Palustrine, Emergent marsh, Unconsolidated silt-loam bed; and
Palustrine, Scrub-shrub;

Significant Riparian Habitats:
Palustrine, Forested, Mixed Coniferous and Deciduous; and
Palustrine, Forested, Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

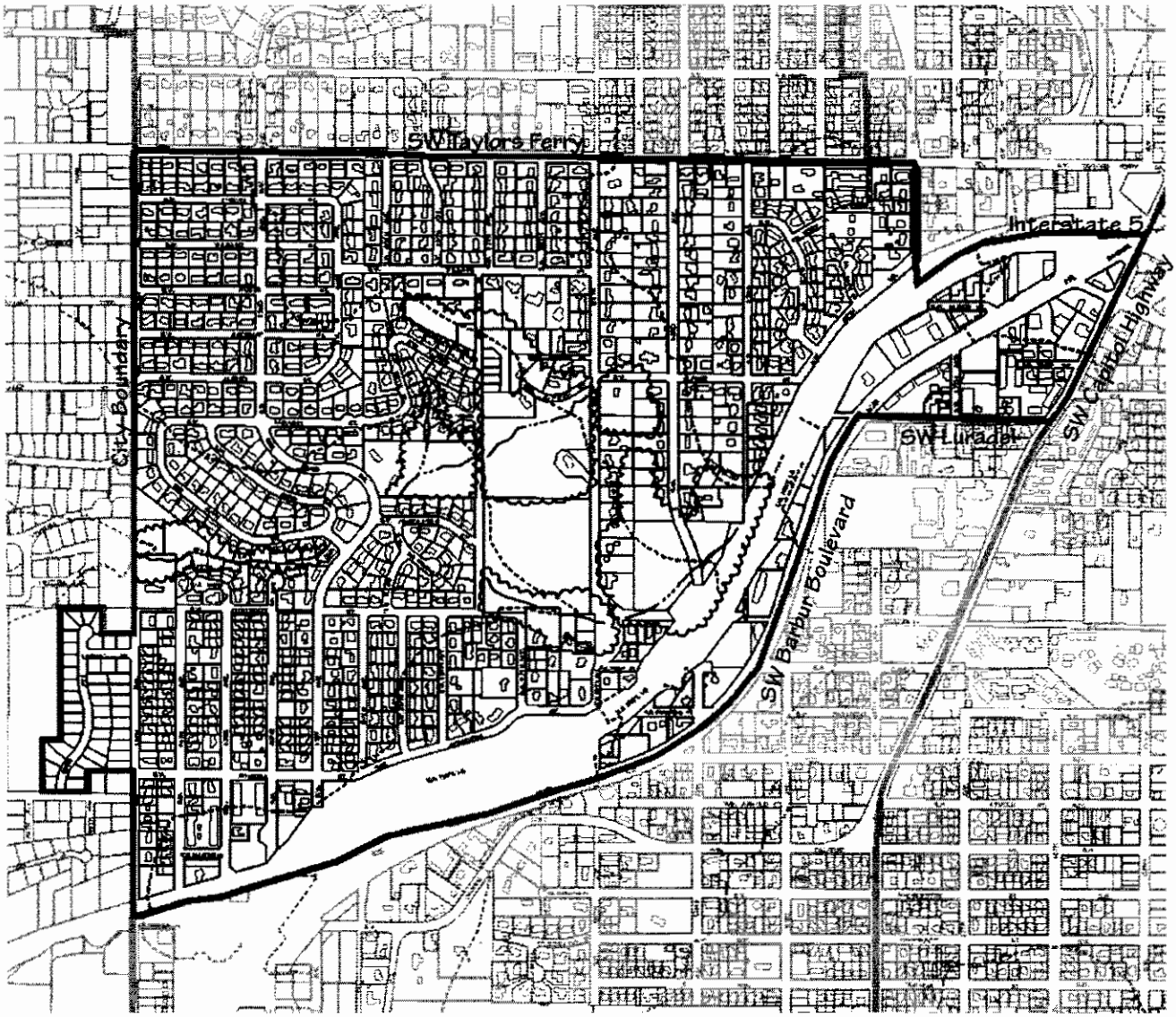
Wildlife Habitat Assessment Scores:
High 79, Low 40, Average 60.

Significant Values:
Public Safety
Pollution Control
Fish Habitat
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Rearing, feeding, and migration areas for fish
Retention of soils
Stabilization of slopes
Storage, conveyance, and desynchronization of stormwater
Trapping air-born pollutants
Trapping sediment from stormwater

Date of Field Inventories: 10/11/92 and 2/3/93

Habitat Inventory Locations (2 Included in this Resource Site): 147 and 148.


SW Taylors Ferry
Interstate 5
City Boundary
SW Capitol Highway
SW Barbur Boulevard
Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse

Resource Site 131

Location: **Far Southwest**
Tributaries of Fanno Creek

Area: **515 Acres**

Significant Wetland Habitats:
Palustrine, Intermittent stream, Unconsolidated cobble-gravel bed;
Palustrine, Upper perennial stream, Unconsolidated cobble-gravel bed; and
Palustrine, Lower perennial stream, Unconsolidated silt-loam bed.

Significant Riparian Habitats:
Palustrine, Forested, Coniferous; and
Palustrine, Forested, Mixed Coniferous and Deciduous.

Significant Upland Habitats:
Forest Coniferous;
Forest Mixed Coniferous and Deciduous;
Forest Deciduous; and
Urban Landscape.

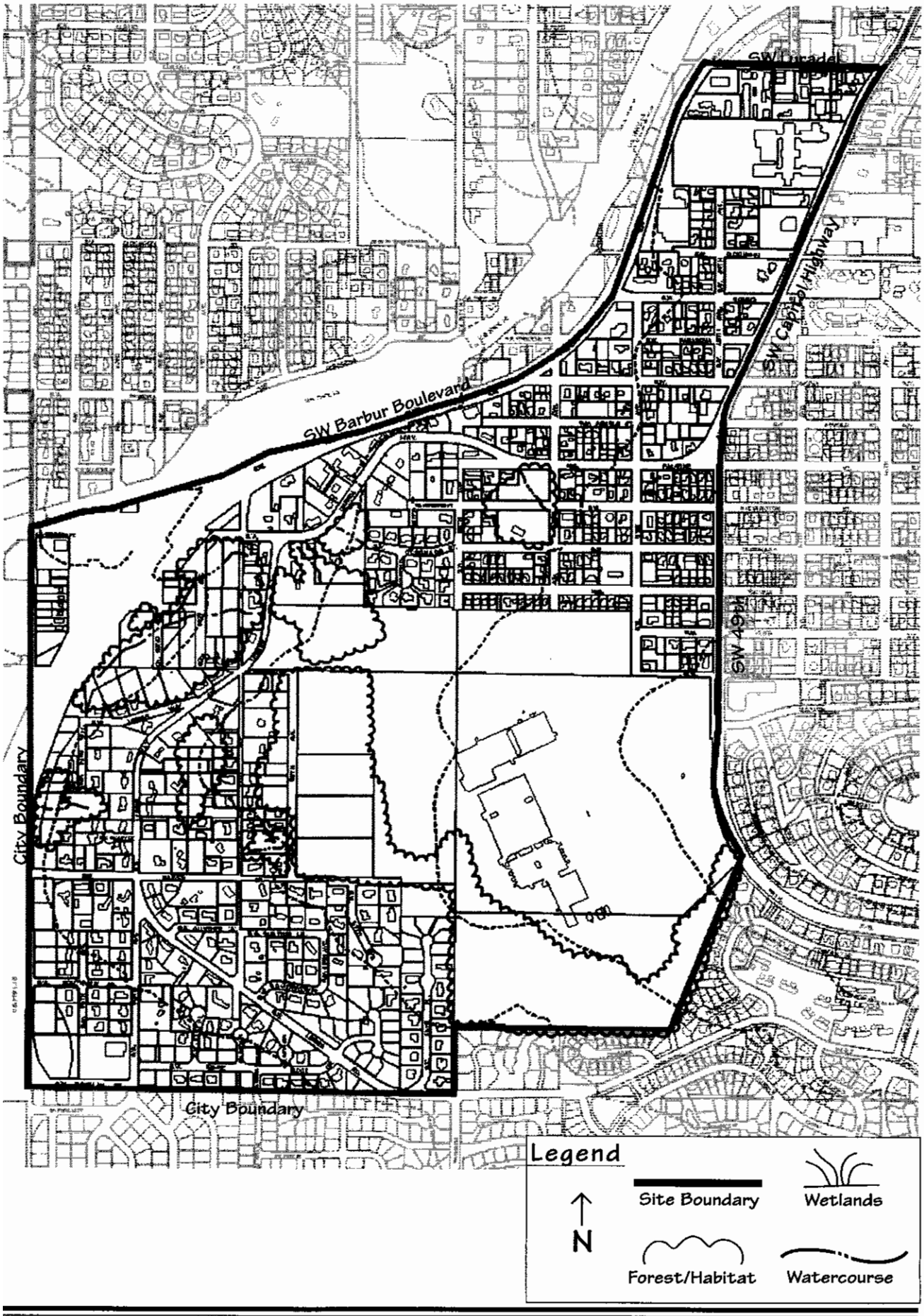
Wildlife Habitat Assessment Scores:
High 66, Low 60, Average 63.

Significant Values:
Public Safety
Pollution Control
Wildlife Habitat
Scenery
Education
Recreation
Water Supply

Significant Functions:
Anchoring of shorelines and stream-banks
Assimilation of water-born pollutants
Dissipation of the erosive forces of stormwater
Feeding, watering, hiding, and dispersion areas for fish
Groundwater discharge
Maintaining native forest microclimate
Retention of soils

Date of Field Inventories: 10/11/91

Habitat Inventory Locations (2 Included in this Resource Site): 149 and 150.


SW Barbur Boulevard
SW Capitol Highway
SW 49th
City Boundary
City Boundary
Legend
Site Boundary
Wetlands
N
Forest/Habitat
Watercourse