City of Bellevue Basin Fact Sheets:
Background, Data Sources, and Definitions

BACKGROUND

The Basin Fact Sheets provide a snapshot of the built and natural conditions in the 26 drainage basins in Bellevue as of 2009. This information is intended for homeowners, business owners, developers, consultants, students and City staff looking for information about Bellevue's drainage basins.

The term "drainage basin" generally refers to a small watershed. Everyone lives in a watershed. In basic terms, a watershed, or basin, is all the land that drains to the same body of water, such as a stream, lake or wetland. Watersheds have natural boundaries defined by the shape of the land and the flow of water. Smaller watersheds become part of larger watersheds. This means wherever you are and wherever you go, you're in a watershed. For example, the city of Bellevue lies within the larger 692 square mile Lake Washington Cedar/Sammamish watershed unit (Water Resource Inventory Area 8 or WRIA 8) that drains to Puget Sound. Each of Bellevue's 26 drainage basins ultimately drains either to Lake Washington or Lake Sammamish, which are part of this larger watershed unit.

In size, Bellevue's drainage basins range from 220 to 2,816 acres (1 square mile equals 640 acres). They are largely contained within City boundaries, but not entirely; portions of 16 of Bellevue's 26 drainage basins extend into other jurisdictions. For example, some basins start in Bellevue and end in Issaquah (such as the Lewis Creek drainage basin), or have portions of land within unincorporated King County (such as Coal Creek drainage basin) or another city (such as the Sears Creek drainage basin and Redmond). Within each basin is a mix of privately and publicly owned land, including the land that open streams flow through and lakes cover. Stormwater runoff from land in the basin flows directly into or indirectly (via a storm drainage system) into the basin's streams, lakes and wetlands.

In addition to city, state and federal programs to protect the water quality of these water resources, citizens can take actions to minimize water quality impacts from everyday activities. Everyday activities such as fertilizing the lawn, washing the car, and failing to scoop pet waste can affect surface water quality. By making small changes to prevent pollutants from entering the drainage system or water resources, businesses and homeowners can have a direct impact on the quality of the streams, lakes and wetlands. For information on how citizens can make a difference, please go to: http://www.bellevuewa.gov/preventing_water_pollution.htm

The remainder of this document describes the information listed on the Basin Fact Sheets, PDF files accessed by clicking on the link to "Basin Stream and Land Use Fact Sheet" or the basin map on the web page for a particular basin. The geographic representation and data provided here as a snapshot of current (as of 2009) built and natural conditions is provided on an "as is" basis and disclaims all warranties, express or implied. The City of Bellevue does not guarantee that the information provided herein is accurate or complete. Users should verify the information.

DEFINITIONS AND DATA SOURCES

All data included in the Basin Fact Sheets were collected, calculated or estimated based on the best available data as of the date of the latest Basin Fact Sheet revision. All Geographic Information Systems (GIS) work was done with ArcGIS version 9.3.1 software from ESRI, Inc.

LAND CHARACTERISTICS

Lake Washington Watershed (WRIA 8): A "watershed" is an area draining into a river, lake, or other waterbody. Washington Department of Ecology and other state natural resources agencies have divided the state into 62 "Water Resource Inventory Areas" or "WRIAs" to delineate the state's major watersheds. All of Bellevue is within WRIA 8, which includes the Cedar River, Lake Washington, and Lake Sammamish, and drains through the Ballard Locks into Puget Sound.

State Stream #08-XXXX: Unique number assigned to each stream in Washington state, available from Washington Department of Fish and Wildlife: "A catalog of Washington streams and salmon utilization." 1975. Seattle, WA : Washington Dept. of Fisheries. The first two numbers indicate the WRIA, or watershed number, the next four uniquely identify the stream.

Basin Area: The total acreage within the drainage basin. The drainage basin is the land that slopes towards a common low elevation at the outlet of a stream channel. The City's basin area as a percentage of the City's total area (20,530 acres based on annexation surveys) is also identified.

Drainage Jurisdiction(s): Identifies whether the *Basin Area* is entirely within Bellevue city limits or is shared among two or more local jurisdictions (including Bellevue), such as Kirkland, King County, Issaquah, etc. The acreage by local jurisdiction is identified for shared basins.

Highest Elevation: The highest elevation within the *Basin Area* given in feet with reference to the North American Vertical Datum of 1988. The location of the highest elevation is not shown on the basin maps.

Lowest Elevation: The lowest elevation within the *Basin Area* given in feet, based on the North American Vertical Datum of 1988. This is sometimes called the basin outlet elevation. The location of the lowest elevation is not shown on the basin maps.

Total Length of Open Channel: The lengthwise distance of open storm and surface water channels in the basin, measured in linear feet. Open channels include public and private streams, drainage ditches (i.e., swales), ravines, and other open conveyance systems where runoff flows on the surface at some point during the year (i.e., not under the ground or through a structure such as a pipe). Runoff is water that doesn't soak into the ground - whether from rain, snowmelt, farming operations, car washing, or leaking pipes.

Stream channels were located using GPS recordings made while walking streams. Streams that could not be located accurately by walking were located using digitized aerial photographs and Light Distance and Ranging (LiDAR) data layers (Puget Sound LiDAR Consortium, 2000). Approximately 15% of the channels located using LiDAR were randomly selected for field investigations to ground truth locations.

Total Length of Storm Drainage Pipe: Total length (in linear feet) of public storm drainage pipes in the basin, estimated from the Utility Storm Drainage as-built public storm drain database. This does not include private storm and surface water drainage systems.

Built Rain Storage Volume per Acre of Impervious Surface: This consists of the storage volume of constructed public and private detention and/or retention systems (e.g., underground stormwater tanks and detention vaults) divided by the total *impervious* area within a basin. It is an indicator of the relative amount of rain (in inches) that can fall before excess water would run off into the streams if the ground was saturated and no evaporation occurred. This was calculated by adding together flood storage volumes from both the private drainage facility database and a database of publicly owned facilities, which includes both regional and neighborhood facilities. It only includes individual single family lot storage from rain gardens or other on-site stormwater best management practices if the lot was part of a plat development. Built rain storage volume can be used to indicate the relative amount of constructed flood control storage for comparison between basins. Higher numbers can indicate greater flood protection; however, this is not a general rule because it is only one of many factors that influence runoff, and doesn't consider other basin conditions that influence flood protection such as tree canopy and storage provided by lakes, wetlands, streams, underground aquifers, and other features.

SALMON PRESENT IN BASIN

Limited data about the salmonids (of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish) that live and spawn in Bellevue streams are available. Salmon listed here may be present in the basin's streams or adjacent Lake Sammamish or Lake Washington shoreline at some times of the year; for more information, consult the WRIA 8 salmon and trout distribution map below, or a professional. (The Stream Types shown on each basin map are based on the presence "fish or fish habitat," and may indicate the presence of salmon or other types of fish.) For salmon identification, see the Fish Use document located on the citywide Basin Fact Sheet page. Salmon information was obtained from the following sources:

- Annual fall (September – December) salmon spawning surveys conducted between 2001 and 2009 in selected Bellevue streams, including Kelsey Creek, West Tributary, Richards Creek, Goff Creek and Coal Creek;
- Salmon Watchers - http://www.kingcounty.gov/environment/animalsAndPlants/salmon-and-trout/salmon-watchers.aspx ;
- WRIA 8 salmon and trout distribution map - http://www.kingcounty.gov/environment/animalsAndPlants/salmon-and-trout/salmon-watchers/maps/2006.aspx; and
- "Final Report: City of Bellevue Stream Typing Inventory", prepared by The Watershed Company, August 14, 2001.

- Personal observations documented by Bellevue professional staff.

** Listed Federal Endangered Species:* Asterisk indicates salmonids listed as threatened under the Endangered Species Act of 1973 (ESA), a set of federal laws designed to prevent the extinction of species as a "consequence of economic growth and development untempered by adequate concern and conservation" (Section 2, ESA).

+ City Species of Local Importance (Bellevue Land Use Code 20.25H.150A): Bellevue's Land Use Code (LUC), Critical Areas Overlay District Part 20.25H lists species of local importance. LUC 20.25H.150 specifies that habitat associated with a species of local importance is a critical area, and some restrictions on land use may apply for sites with a documented species presence or use.

POPULATION WITHIN CITY OF BELLEVUE

City Basin Population (2000): Estimated number of people living in Bellevue within the *Basin Area* based upon year 2000 census data.

Basin Population Density: Estimated population density within the city-owned portions of the *Basin Area* based upon year 2000 census data, calculated in terms of the number of people per square mile. It is a relative measure of how densely urbanized a basin is.

Number x of 26 Basins: The relative ranking of the 26 drainage basins by *Basin Population Density,* with one (1)as the least dense (fewest people per square mile) and twenty-six (26) as the highest density (most people per square mile).

LAND USE (within Bellevue city limits)

Land use describes what a parcel of land is used for in Bellevue. Land use types were originally classified by City staff using aerial photographs and knowledge of the land use on each parcel. Land use data are updated periodically when land use changes according to the City's development permit system. Land use areas do not add up to the basin area within Bellevue because the source for the public right of way areas is different than the source for the remaining land use areas, and the two maps do not line up. Also, there are portions of the small lakes, wetlands and other parcels that were not given a land use classification; these data gaps will be filled as staff time allows.

Public Right of Way: The estimated area of public right-of-way (including streets, sidewalks, planting strips, and other public land owned by the state and Bellevue, and used for transportation purposes) by basin, obtained by excluding private and non-right-of-way land parcels using a parcel database in ArcGIS.

Commercial/Office: General office, medical/dental, office park and business service.

Industrial: Business/manufacturing parks, warehouse/wholesale, mini storage, light manufacturing, vehicle repair/truck/bus storage, non-vehicle repair, construction yard and railroad right-of-way.

Institutional/Government: Convalescent facility, hospital, preschool/daycare, elementary school, middle/junior school, high school, college, church, government building, utility, cultural center, cemetery, convents and group homes.

Mixed Uses/Misc: Mixed use, agricultural, under demolition, under construction, Parking, landscaping, vacant buildings and access roads.

Multi-Family Residential: Multi-family residences and senior housing.

Open Space/Parks: Open space, streetscape, and water/sewer.

Single family Residential: Single family residences and manufactured homes.

LAND COVER (within Bellevue city limits)

Describes what is covering or shading the ground on the earth's surface, as seen from airplanes. This can include vegetation and built features.

Impervious: The percentage of impervious surface area in the basin. This indicator is a rough guide for how much concentrated rainfall we might need to manage. The impervious data includes impervious surfaces, which are hard surfaces (usually built), where water cannot permeate, but runs off. For this analysis it includes roads, roofs/buildings, sidewalks, parking lots/driveways, structures over water, and miscellaneous features – but does not include open water. The impervious analysis was completed in 2007 by the Sanborn Map Company, by manually digitizing, or tracing, the impervious surfaces from four-inch resolution aerial photographs. This imagery is in RGB (true color) format. The aerial photographs were obtained during plane flights in spring of 2007.

Tree Canopy: This is the percentage of deciduous and evergreen tree cover over the entire city as estimated by American Forests (www.AmericanForests.org) in 2007. It was derived from high-resolution, (2-foot) multi-spectral satellite imagery taken in 2007.

Impervious in 100 ft Stream Buffer: Percentage of land area covered by *impervious* surfaces within 100 feet on each side of the stream center line. Calculated using ArcGIS, using the intersection of the 100-foot buffer around the streams (open channel) with the *impervious* layer.

Tree Canopy in 100 ft Stream Buffer: Percentage of land area with tree canopy within 100 feet on each side of the stream center line. Calculated using ArcGIS, using the intersection of the 100-foot stream buffer with the *tree canopy* layer.

MAP LEGEND

Basin – Approximate drainage basin boundary is outlined in blue.

Storm Drainage Basins - The adjacent drainage basins are outlined in light brown.

Stream Types – Most streams in Bellevue have been preliminarily classified according to the stream classification definitions in the City's Critical Areas Ordinance (Land Use Code 20.25H.075) as "Shore," "Fish-bearing," or "Non-fish bearing." Non-fish bearing are further classified as Ns (seasonal) and Np (perennial). Some streams are not typed. These maps are intended for general information only, other sources, such as site specific field study, should be used to determine fish use for specific parcels.

Outside of Bellevue – Areas of the drainage basin lying outside Bellevue city limits are shaded in gray (shows as a lighter color than remainder of shared drainage basin).

Rain Gauges and Elevations – Locations of current and historic rain gauges, and the elevation (NAVD88) of each rain gauge location. Not all rain gauges were used consistently, and some data is provisional, subject to quality assurance checks.

Flow Gauges – Locations of current or historic water height gauges in streams and at regional facilities. Historic gauges are those gauges installed as part of a past study or project and used for a limited period of time. Flow gauges are generally staff gauges that only measure water height; some are electronic, and some require a field visit for reading. These gauges can only be used to estimate flow rates if additional work is done to determine the relationship between the water height and the flow rate ("flow rating curve"); flow rating curves were maintained on a limited basis as needed and based on staff availability.

Regional Detention Pond – Centrally located facilities that are capable of detaining stormwater runoff until it can be released without causing damage downstream, located to capture runoff from urban development where on-site runoff controls were minimal.

Oil Pipeline – Underground Olympic oil pipelines in the general vicinity, use caution. Always call the local utilities before digging to have underground utilities located.

Type A and B Wetlands – The wetlands shown on the Basin Fact Sheets are based on the Bellevue Sensitive Areas Notebook (City of Bellevue, 1987); these were mapped based on aerial photographs, and most have not been verified by field surveys. The wetland types A and B are no longer being used by the City. The wetlands shown on the Basin Fact Sheets should only be used to indicate that a wetland is likely to be located in this area. In addition, some constructed detention ponds are mistakenly shown as wetlands on the Basin Fact Sheets. For information on wetlands, including the classification system currently in use by the City, contact the land use planner at (425) 452-6800.

Note: Type A refers to wetlands which generally had a major stream channel running through them or were adjacent to streams or lakes. Type B refers to wetlands which were more isolated and/or smaller.