3.5 EAST HILL TRIBUTARIES OF THE LOWER GREEN RIVER

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PHYSICAL DESCRIPTION

SUBBASIN

This chapter will cover the following streams (identified by local names and/or Williams' (1975) catalog number system):

- Olson Creek [09.0061];
- Lea Hill Creek [09.0069];
- Cobble Creek [09.0068]; and
- The Hillside Drainages [09.0068A-G].

In addition, there are numerous unnumbered channels and ditches that are included where information on them was provided.

Booth et al. (1994) summarized many of the conditions of these tributaries, and most of the information in this chapter is attributed to that report unless otherwise noted.

The boundaries of these creeks follow drainage basin lines but can be defined as those areas east of the Soos Creek subbasin, south of the Mill Creek subbasin and tributaries west and south to the Green River from approximately River Mile 28.5 to 30.0. These eastern tributaries that flow into the Lower Green River share many of the same attributes, including headwater locations on the east Kent plateau, drainage basin size and land use.

Historically, all of these stream systems traversed old-growth coniferous forests, down the relatively steep hillsides into the Green River Valley where stream gradients flattened before flowing through extensive wetland complexes prior to entering the mainstem Green River. The old-growth forests were removed beginning approximately 140 years ago, and the valley floor was then converted to agricultural purposes. During the last 25 years, this subbasin has been rapidly urbanized, a trend that continues today. Most of the wetlands historically found on the valley floor have been filled, drained or otherwise altered.

STREAM COURSE AND MORPHOLOGY

OLSON CREEK

Olson Creek drains approximately 1,022 acres, with approximately three miles of defined stream channel. Most of this stream system lies on the upland plateau between 350 and 500 feet in elevation. Williams (1975) identified two tributaries (09.0064 and 09.0063).

Olson Creek is formed from surface water of two Class 2 wetlands (King County Sensitive Areas Map Folio—Wetland Criteria 1990). A third wetland drains into the combined flow of the first

two at a series of constructed ornamental ponds at RM 1.08 just before the creek descends steeply through Olson Canyon to the valley floor.

LEA HILL CREEK

Lea Hill Creek drains approximately 406 acres and has approximately one mile of defined stream channel. It enters the left (east) bank of the Green River at approximately RM 30.15. Most of the subbasin lies on the upland plateau between 400 and 450 feet in elevation.

Its primary source is a forested swamp on the north side of SE 312th Street immediately upstream of 116th Avenue S.E. A secondary source lies in the vicinity of 112th Avenue S.E., where two large gullies have eroded from the road's end into the main stream channel.

COBBLE CREEK

Cobble Creek drains approximately 165 acres and is less than one mile long. Ames (1981) identified this creek as entering the right (east) bank of the Green River at RM 30.05. Most of the subbasin lies in areas of the valley floor and east wall.

The source of Cobble Creek appears to be surface runoff.

THE HILLSIDE DRAINAGES

The Hillside Drainages are a series of short streams originating a short distance above the bluff line. They are mentioned here because of their historic effects rather than current utilization by anadromous and resident salmonids.

SALMONID USE

The known freshwater distribution of anadromous salmonids is depicted in the report Appendix.

Historically, these creeks were thought to contain year-round populations of coho salmon, cutthroat trout and steelhead trout.

Williams (1975) either did not list these streams, or indicated that their utilization by anadromous salmonids was unknown. The WDFW Spawning Ground Survey Database (1999) does not note the presence of adults of any salmonid species in any of these creeks. Juvenile coho have been observed in several creeks (Booth 1994), but are probably the result of hatchery fry releases (Baranski 1999).

FACTORS OF DECLINE

FISH PASSAGE

OLSON CREEK

The upper limit of anadromous fish access on Olson Creek is defined by a natural 10-foot-high waterfall located at RM 0.49.

A culvert under Green River Road has been identified as a partial barrier at approximately RM 0.05.

An alluvial fan episodically builds out where Olson Creek enters the mainstem Green River channel (see Sediment Condition—Olson Creek). The alluvial fan may form a temporary access barrier until it erodes away each fall.

LEA HILL CREEK

A near-vertical 6- to 8-foot-high waterfall at RM 0.75 marks the historic upper extent of anadromous access. Downstream of this point, fish passage barriers are numerous throughout the stream. Within the alluvial fan between RM 0.13 and 0.25, loss of channel definition may cause temporary passage barriers depending on seasonal flows. The large concrete pipe under Green River Road (RM 0.13) periodically fills with sediment and small organic debris that can block anadromous fish passage.

COBBLE CREEK

A perched culvert blocks anadromous fish access as it enters the right (east) bank of the Green River at RM 30.05.

THE HILLSIDE DRAINAGES

In their original configurations, these drainages would have been important temperature and flooding refugia for overwintering anadromous salmonids. At present, upstream movement of salmonids from the Green River mainstem into many of these tributaries is blocked, and most of the remaining utilization by salmonids is the result of hatchery supplementation.

RIPARIAN CONDITION

OLSON CREEK

In the stream reach downstream of the confluence with 09.0061B, Olson Canyon widens and the riparian corridor consists of a deciduous second-growth forest. Between RM 0.65 and 0.17, the riparian corridor is somewhat intact and better functioning. However, downstream of RM 0.17, Olson Creek lacks any functioning riparian cover.

LEA HILL CREEK

The riparian habitat varies considerably throughout the Lee Hill Creek channel system. Second-growth coniferous and deciduous trees are present within the headwater wetland. Dead coniferous trees in one portion of the wetland are evidence of recent hydrologic changes. Sometime between 1981 (when the King County Wetlands Inventory was prepared) and 1994 (when King County carried out a reconnaissance study in this group of subbasins), approximately 20 percent of this headwater wetland was eliminated during the construction of the Auburn Hills Mobile Court.

At approximately RM 0.78, the stream channel begins a rapid descent to the valley floor through a high-gradient ravine. Historically a mature old growth coniferous forest, this uneven-aged

second growth deciduous forest presently provides adequate shading for the creek. Once the creek reaches the valley floor, the riparian zone largely consists of a narrow to nonexistent band of deciduous trees, willows and non-native plant species including reed canarygrass and Himalayan blackberry.

Downstream of SE 116th Street, the stream channel is confined within a 70-foot-wide forested corridor. Lawns border the edge of the stream in several places and there is no intact riparian canopy.

COBBLE CREEK

The riparian habitat in this stream ranges from fair to degraded.

THE HILLSIDE DRAINAGES

As can be expected given current levels of urbanization in these subbasins, current riparian habitats range from degraded to fair.

LARGE WOODY DEBRIS

Olson Creek

Remnant old-growth coniferous stumps are still present in the riparian corridor and streambed downstream of the confluence of Olson Creek with 09.0061B. However, most of the remaining LWD in the stream is small and of poor quality, suggesting that LWD sources have decreased and/or LWD has been deliberately removed from the stream channel over the past hundred or so years. The channel character changes in the vicinity of RM 0.3 – 0.4, where incision has been less than one foot over the last several decades. Instream LWD is more abundant although no counts or volume estimates have been made. LWD is again virtually absent downstream of RM 0.17.

Lee Hill Creek

At approximately RM 0.78, Lee Hill Creek descends rapidly to the valley floor through an uneven-aged second growth deciduous forest that provides some degree of LWD recruitment. Numerous old-growth stumps are also present on the hillside and in the creek.

HYDROLOGY

Hydrologic information on these systems is limited at this time.

SEDIMENT CONDITION

In general, Booth's 1994 study determined that sediment quality exceeded state standards. Modeling of study parameters indicates that large-scale future development will likely result in future sediment degradation.

OLSON CREEK

Anthropogenic activities appear to have increased the rate of erosion of the naturally unstable hillslopes within this subbasin, compared to rates of erosion that carved the original stream channel. Increased erosion and sedimentation in Olson Creek is the result of clearing of trees on the steep slopes to enhance views, piping of stormwater by inadequately engineered water conveyance systems, and grading activities. However, no data is currently available to quantify these sediment loads.

At RM 0.48, tributary 09.0061B enters Olson Creek from the north. This tributary descends off the plateau at such a steep gradient that it has eroded a large gully that has delivered several hundred cubic yards of sediment into Olson Creek . The recruitment of this material is believed to be slowing as less loose material remains. The deposition of coarse sediments is particularly evident between RM 0.0 – 0.8. An alluvial fan episodically builds out into the mainstem Green River channel and erodes away each fall.

LEA HILL CREEK

As would be expected of a stream system with such a high impervious area, erosion and sediment loads are major factors contributing to the poor functioning of this stream. The upper portion of the ravine is rapidly incising. Between November 1990 and November 1994 it was estimated that approximately 3,000 cubic yards of sediment had entered Lea Hill Creek from this source alone. Other smaller gullies also exhibit erosion problems. Channel incision and landslides are ubiquitous between RM 0.75 and 0.3. Once the creek reaches the valley floor and the stream gradient decreases, these sediments settle out, forming multiple high-flow channels that wind across an alluvial fan that covers the valley floor between RM 0.25 and 0.13. Spawning gravels are limited and often times cemented with fine sediments that settle out in the low-gradient reaches of the valley floor. The large concrete pipe under Green River Road (RM 0.13) periodically fills with sediment and small organic debris.

COBBLE CREEK

Neither flooding nor erosion are believed to be major problems. No major wetlands remain in the subbasin, and fine sediments along the entire stream channel now cement any remaining gravels.

WATER QUALITY

None of these creeks currently appear on the EPA Clean Water Act 303(d) list for water quality impairments. However, although this list is extensive in scope, numerous bodies of water may not appear on this list due to lack of adequate assessments. Booth (1994) examined a number of water quality parameters and modeled future pollutant loadings within this group of subbasins. Overall, for the parameters examined, stream water quality was determined to exceed state standards. Modeling of these parameters indicates that water quality will continue to exceedence state and federal standards.

LAND USE

All of the tributaries lie either wholly or mostly within the King County Urban Growth Boundary and on lands that are already urbanized, or expected to undergo future urbanization. Typically, urbanization is responsible for the degradation of both the form and function of the downstream aquatic ecosystem, as is the case in all of these systems.

The level of impervious surfaces adjacent to these streams is significant. Table East Hill-1 shows the level of land use as of 1992 and, where available, the projected impervious surface area at grow-out.

EH-1: Land Use of the East Hill Tributaries to the Green River

	Olson Creek	Lea Hill Creek	Cobble Creek	Hillside Drainages
Wetland	88.1	11.3	0.0	11.2
Forest	202.5	167.7	54.5	748.8
Grass	230.9	34.2	11.0	91.0
Single Family (low density)	469.2	110.5	54.7	296.0
Single Family (high density)	22.3	43.5	44.8	185.0
Multifamily	2.5	2.0	0.0	22.1
Industrial/Commercial	6.2	36.8	0.0	1.3
Total Acres	1021.7	406.0	165.0	1355.4
1994 Total Effective Impervious Surface (%)	3.0	11.7	8.1	5.1
Projected Total Effective Impervious Surface (%)	18.0	33.0	20.0	15.0

OLSON CREEK

Urban development has been slower in the Olson Creek subbasin than in many others addressed in this chapter. Standard provisions in King County and local jurisdiction sensitive area ordinances or similar regulations govern current development. In 1994, the effective impervious area was determined to be 3 percent, primarily in the form of low-density single family residences. However, future zoning would allow the impervious surface to increase to a projected 18 percent (Booth 2000), which will almost certainly have an adverse impact on aquatic resources.

LEA HILL CREEK

Urban development has been extensive in this subbasin. In 1994, 12 percent of this subbasin was covered with impervious surfaces, and impervious area was projected to climb to 33 percent under buildout conditions. This impervious area is largely of multifamily residential developments and two schools.

COBBLE CREEK

Urban development has been substantial in this subbasin. In 1994, the total impervious surface area was measured at 8 percent, and is projected to reach 20 percent at buildout.

THE HILLSIDE DRAINAGES

Development within all of these small watersheds consists of a mixture of low- to high-density single family residences.

NON-NATIVE SPECIES

ANIMALS

Information on the presence of non-native aquatic animal species in these streams is currently unavailable.

PLANTS

Non-native plant species found in the riparian zone of these streams include numerous ornamental species associated with plantings by private and public landowners. Examples include mountain ash (*Sorbus* spp.), blue beech (*Carpinus* spp.), butterfly bush (*Buddleia* spp.), cherry laurel (*Laurocreasus officenalis*), dogwoods (*Cornus* spp.), and non-native rhododendrons (*Rhododendron* spp.). Non-native species of plants more closely associated with riparian and aquatic environments include: Scot's broom (*Cytisus scoparius*), reed canarygrass (*Phalaris arundinacea*) (which is abundant throughout these subbasins), and Himalayan and evergreen blackberries (*Rubus discolor and R. laciniatus*).

HYDROMODIFICATION

THE HILLSIDE DRAINAGES

Minimally detained stormwater in this developed area has caused varying degrees of the stream channel damage. For example, in stream 09.0068A, channel incision of up to two feet was noted in the vicinity of the outfall pipe from SE 293rd Street.

In some reaches, the streambank consists of gabion basket bank armoring, while elsewhere the stream has been diverted through pipes into ornamental fountains.

KEY FINDINGS AND IDENTIFIED HABITAT-LIMITING FACTORS

- Historically, these creeks appear to have served as important refugia for anadromous salmonids that reared year round in the Green River basin.

- The impervious area of many of these subbasins is expected to range from 15 to 33 percent in the near future.

- Current and future development has and will likely continue to generate increased stream flows, channel instability problems and instream and riparian habitat degradation.

- Wetlands played an important function in maintaining streamflows in many these small streams. Many of these wetlands have been partly or completely eliminated and the remaining wetlands are continuing to be degraded.

- There is currently only very limited utilization by anadromous salmonids in these streams.
- Known and suspected anthropogenic barriers limit access to spawning and rearing habitat.
- The quality and quantity of gravels in the stream limits spawning success and, to a lesser degree, juvenile rearing habitat.
- Although only limited quantitative information is currently available, it is the professional judgement of the Factors of Decline Subcommittee that flood flows due to increased impervious surfaces effectively preclude successful incubation.

DATA GAPS

- There is no evidence that these streams can support all life stages of anadromous salmonids.
- Fish passage barriers have not been comprehensively assessed for the subbasin.
- Information regarding existing riparian conditions and functions for supporting salmon habitat is limited.
- There is no LWD inventory for the subbasin..
- Aquatic invertebrate populations should be monitored and the cause of lack of diversity and presence should be determined and addressed.

EARLY ACTION RECOMMENDATIONS

A comprehensive baseline habitat survey (including elements that address the above-referenced data gaps) should be initiated to shape a subbasin-wide strategy and rehabilitation objectives. This strategy should be used to direct the type and timing of rehabilitation efforts to maximize resource potential and promote efficient monetary expenditures. It is important that this subbasin strategy is well integrated with the overall WRIA 9 Strategy to recover salmon.

LIST OF TABLES