SUMMARY

In order to gain a better understanding of drainage systems, streams, and habitat issues in the Boise Creek, Patterson Creek, and Vashon/Maury Island drainage basins, the King County Council authorized, in 2001, the accelerated development of drainage plans for these areas. The *Boise Creek Rapid Rural Reconnaissance (RRR) Report* is one of three reports prepared to assess these rural drainage basins in King County's expanded surface water service area. The reports provide a general overview of the existing stream and basin conditions and problems related to surface water in these rural areas and identify high priority capital improvement needs and opportunities. They present plans for existing and future drainage infrastructure needs in a way that identifies how to reduce road and property flooding, protect and enhance aquatic habitat, and reduce stormwater pollution.

SCOPE OF ANALYSIS

The two primary goals of the RRR Report were to characterize the drainage basin and prepare an action plan to protect the existing natural drainage systems and address existing problems. The study area for this report includes the entire drainage basin for Boise Creek. However, the upper watershed, north of Highway 410, was not investigated in detail because it is a forest reserve area with limited vehicular access. Fish passage is also limited due to a long 42-inch culvert under the old Weyerhauser lumber mill, which ceased operation in 2003. Predevelopment and existing-conditions flows were estimated using the Hydrologic Simulation Program–FORTRAN (HSPF) drainage model. Drainage, water quality, and habitat needs were developed by reviewing all the available information and conducting field investigations.

BASIN DESCRIPTION

The Boise Creek Basin covers 9,861 acres (15.4 square miles) in southeast King County, encompassing part of the City of Enumclaw. Boise Creek flows into the White River at RM 23.3. The White River becomes the Puyallup River, which flows into Puget Sound at Commencement Bay in the City of Tacoma. Boise Creek is 12.2 miles long. The elevation of the basin varies from about 630 feet in the west to over 3,900 feet in the east. Based upon existing (2001) land use conditions, approximately 7 percent of the basin is estimated to be impervious.

Drainage systems in the unincorporated portion of the basin generally consist of open channels and road culverts. Beaver Creek, a large tributary to Boise Creek, combines with Boise Creek at RM 3.1 near SE 464th Street and 284th Avenue SE. The portion of the drainage basin in the City of Enumclaw is primarily pipe systems and some open ditches.

ASSESSMENT OF SUBBASINS

To characterize the drainage basin, it was first divided into seven subbasins. For each subbasin, a systematic inventory and analysis of stream conditions and drainage systems was conducted, covering resources and problems under current and future land uses. Each subbasin was ranked using the methods of the Center for Watershed Protection's

Watershed Vulnerability Analysis. The eight-step analysis provides the following information for each subbasin:

- An initial subbasin classification, based solely on impervious area
- A final subbasin classification, based on more detailed assessments of conditions along the stream corridor and throughout the subbasin
- A ranking of subbasin vulnerability to impacts from future changes
- A priority ranking of subbasins that most merit prompt restoration activities.

Table S-1 summarizes the results of the analysis for the Boise Creek subbasins.

TABLE S-1.
RESULTS OF WATERSHED VULNERABILITY ANALYSIS

Subbasin	Classification[a]		Vulnerability Rank[b]	Priority Rank for Restoration Activities[c]
	Initial	Final		
1	Impacted	Impacted & Restorable	4	4
2	Impacted	Impacted & Restorable	3	1
3	Sensitive	Sensitive & Restorable	1	3
4	Impacted	Impacted & Restorable	4	2
5	Sensitive	Sensitive & Restorable	4	5
6	Sensitive	Sensitive & Restorable	2	6
7	Sensitive	Sensitive & Restorable	4	7

a. Sensitive = high quality streams, <10% impervious area; impacted = degraded streams, 10 – 25% impervious area; restorable = having potential for meaningful improvements in hydrology and pollutant loading.
b. 1 = most vulnerable to impacts from future development; Subbasins 1, 4, 5, and 7 are ranked the same because the analysis for vulnerability showed no difference between them.
c. 1 = highest priority for restoration activities.

RECOMMENDED ACTIONS

Based on the subbasin analysis, 29 Recommended Actions were identified to help restore natural flows and sediment regimes, fish passage and habitat by reconnecting fragmented environments; and reducing the risks to health, safety and aquatic habitat. The Actions include capital improvement projects (CIP), right-of-way acquisition, studies, and programs. Some of the more extensive habitat recommendations were split into multiple improvement projects such as 4A, 4B, and 4C. The Recommended Actions were than ranked by County staff as high, medium, and low. Ranking criteria used consisted of the following: 1) Ecological Significance, 2) Threat to Life, Limb, and Property, and 3) Project Efficacy (what is the likely-hood of project success). The details of this ranking criterion are shown in Figure 9-2.

The ranked recommended actions are listed in Table S-2 and shown on Figure 9-1.

TABLE S-2
RANKED RECOMMENDED ACTIONS

Project BC#	Rank	Project Name	Project Type	Estimated Cost ($1,000)
BC-1	**L**	Boise Creek Golf Course Revegetation	CIP	$168
BC-2	H	Boise Creek Golf Course Channel Relocation	CIP	$1,360
BC-4A	H	Boise Creek REACH A Riparian Habitat, Channel and Floodplain Restoration	CIP	$207
BC-4B	H	Boise Creek REACH B Riparian Habitat, Channel and Floodplain Restoration	CIP	$191
BC-4C	H	Boise Creek REACH C Riparian Habitat, Channel and Floodplain Restoration	CIP	$327
BC-5A	H	Boise Creek acquisition between RM 2.7 and 3.3 for riparian and floodplain corridor	ACQUISITION	$217
BC-5B	H	Boise Creek acquisitions to restore ecosystem functions.	ACQUISITION	$217
BC-5C	H	Boise Creek acquisitions to restore ecosystem functions.	ACQUISITION	$217
BC-6	M	Beaver Creek Channel Relocation	CIP	$339
BC-7	H	Boise Creek LWD Complex Placement RM 4.9 - 5.4	CIP	$386
BC-8	L	Boise Creek Stream Home Relocation; Near RM 0.4	ACQUISITION	$218
BC-9	L	Boise Creek Stream Bank Stabilization; Near RM 1.1	CIP	$362
BC-10A	H	Weyerhaeuser Stream Restoration; RM 5.4-6.1 (Feasibility)	STUDY	$50
BC-10B	H	Weyerhaeuser Stream Restoration RM 5.4-6.1 (Acquisition)	ACQUISITION	>$600
BC-10C	H	Weyerhaeuser Stream Restoration; RM 5.4 - 6.1 (Capitol Component)	CIP	>$500
BC-11	M	Beaver Creek Revegetation	CIP	<$75
BC-12	L	Flooding near 46905 283rd Ave SE	CIP	<$75
BC-13	H	Subbasin 5 Riparian Under Story Conifer Plantings	CIP	<$75
BC-14	L	Overbank Flooding between 280th Ave. SE and 260th Ave. SE	CIP	>$250
BC-15	M	Boise Creek and 284th Ave SE Riparian Habitat Improvement	CIP	>$250
BC-16A	H	Beaver Creek Acquisition and/or Easement, and Restoration (Acquisition Component)	ACQUISITION	<$500
BC-16B	H	Beaver Creek Acquisition and/or Easement, and Restoration (Restoration Component)	ACQUISITION	<$500
BC-17	M	Golf Course Tributary Improve Fish Passage	CIP	>$200
BC-18	H	Historic Channel Mapping	STUDY	<$20
BC-19	H	Flood Calibration	STUDY	<$20
BC-20	H	Boise Creek Mouth Relocation	CIP	>$750
BC-21	**M**	Acquisition & LWD placement within reach of Boise Creek that traverse the mudflow cut.	CIP	<$100
BC-22	**H**	Agriculture & Stewardship Coordination	PROGRAM	Staff Time
BC-23	**H**	Channel Relocation around Water Fall Fish Passage Barrier	STUDY	<$50
BC-24	**H**	Foothills Rails to Trails Revegetation	PROGRAM	<$20
BC-26	**H**	Enumclaw Nonpoint Public Outreach	PROGRAM	Staff Time
BC-27	**H**	Upper Boise Creek Habitat Reconnection and Improvements.	STUDY	<$50
BC-29	**H**	Water Quality Remediation on Tributary #10.0058	STUDY	<$75

Detail project sheets including feasibility sketches and cost estimates were prepared for 10 early action projects. The remainder of the Recommended Actions was estimated by professional judgment as less than $75,000, $75,000-$250,000, and greater than $250,000 as shown in Table S-2. The early action projects are listed in Table S-3 and the detail project sheets are contained in Appendix A. Table S-4 lists the 10 Early Action projects by subbasin and compares the total action item cost for each subbasin to the subbasin priority rank as determined by the watershed vulnerability analysis.

TABLE S-3.
EARLY ACTION PROJECTS

Project	Title	Problem Addressed	Proposed Improvements	Planning Level Cost Estimate
BC-1	Boise Creek Golf Course Revegetation	Stream corridor provides poor fish habitat	Plant riparian vegetation along several high priority reaches.	$168,000
BC-2	Boise Creek Golf Course Channel Relocation	Stream corridor provides poor fish habitat	Relocate approximately 1,500 feet of Boise Creek, plant riparian vegetation, and establish a 100-foot buffer	$1,360,000
BC-4	Boise Creek Riparian Habitat Restoration	Reaches A, B, and C are nearly devoid of riparian vegetation	Plant riparian vegetation along several high priority reaches	$721,000
BC-5B	Boise Creek Off-Channel Habitat	Reach is nearly devoid of riparian vegetation	Acquire land adjacent to Boise Creek and construct an off-channel pond or side channel	$217,000
BC-6	Beaver Creek Channel Relocation	Reach is nearly devoid of riparian vegetation or channel structure	Relocate approximately 600-feet of channel and establish 50-foot buffer	$339,000
BC-7	Boise Creek Channel Stabilization	Numerous areas are experiencing channel erosion in Subbasin 5	Construct several debris dams and some stream bank stabilization to help control downstream sedimentation	$386,000
BC-8	Bank Stabilization near 248 Ave SE	Channel erosion is threatening home	Relocate home and other building away from the top of stream bank	$218,000
BC-9	Boise Creek Bank Stabilization at 252nd Ave SE	Channel erosion is causing downstream sedimentation and threatening bridge	Stabilize stream bank by using bioengineering methods	$362,000
BC-10	Weyerhaeuser Stream Restoration Study	Boise Creek flow is partially diverted through mill	Do a study to determine what opportunities there are to improve/ preserve upstream detention and habitat with the closure of the mill	$50,000
Total				**$3,821,000**

TABLE S-4.

EARLY ACTION COSTS BY SUBBASIN

Project BC#	Sub-basin	Project Name	Project Type	Estimated Cost	Subbasins Costs 1	2	3	4	5	6	7
BC-1	4	Boise Creek Golf Course Revegetation	CIP	$168				168			
BC-2	4	Boise Creek Golf Course Channel Relocation	CIP	$1,360				1,360			
BC-4A	2	Boise Creek REACH A Riparian Habitat, Channel and Floodplain Restoration	CIP	$207		207					
BC-4B	2	Boise Creek REACH B Riparian Habitat, Channel and Floodplain Restoration	CIP	$191		191					
BC-4C	2	Boise Creek REACH C Riparian Habitat, Channel and Floodplain Restoration	CIP	$327		327					
BC-5A	2	Boise Creek acquisition between RM 2.7 and 3.3 for riparian and floodplain corridor	Acquisition	$217		217					
BC-6	3	Beaver Creek Channel Relocation	CIP	$339			339				
BC-7	5	Boise Creek LWD Complex Placement RM 4.9 - 5.4	CIP	$386					386		
BC-8	1	Boise Creek Stream Home Relocation; Near RM 0.4	Acquisition	$218	218						
BC-9	1	Boise Creek Stream Bank Stabilization; near RM 1.1	CIP	$362	362						
BC-10A	6	Weyerhaeuser Stream Restoration; RM 5.4-6.1 Study	Study	$50						50	
Total Cost for Early Action Items by Subbasin				$3,825	$580	$942	$339	$1,528	$386	$50	$0
Priority Ranking for Restoration by Subbasin					4	1	3	2	5	6	7

Total Cost For Early Action CIP = $3,340,000

Total Cost for Early Action Acquisition = $435,000