

CHAPTER 9. RECOMMENDED ACTIONS

9.1 CAPITAL IMPROVEMENT PROJECTS

9.1.1 Project Selection

A list of 26 potential capital improvement projects were developed from the recommendations on water quality, geomorphology, habitat and drainage presented in this report. All were given an initial priority ranking of high, medium or low, in the table. Criteria for the ranking included the reduction of potential life safety hazards, reduction of the risk to valuable habitat, and the ability to access, connect, or create additional habitat in the basin. Based on discussions with County staff, 10 of the projects were selected for detailed write-ups. Detailed project sheets developed for these 10 projects are contained in Appendix A. The estimated costs included on the project sheets are based on 2002 dollars. These projects and recommendations were discussed in two workshop meetings with County staff and the consultant. Following these workshops, modifications were made to the draft report including the addition of several new CIP projects and a more detailed analysis of high priority habitat acquisition and restoration areas. A total of 32 recommended actions including CIP projects and acquisitions were identified for the Patterson Creek Basin. The final recommendations are described in Table 9-1 and shown on Figure 9-1.

9.1.2 Project Ranking

The projects were ranked by King County staff based on the criteria shown in Figure 9-2. The projects were ranked as high, medium, or low and divided into two lists. The ranking criteria consisted of 1) Ecological Significance, which ecological feature and processes, 2) Threat to Life, Limb, and Property which assessed the significance of the threat and its urgency, and 3) Project Efficacy, which assessed the likelihood of project success and implementation. The worksheets for each of the recommended projects is contained in Appendix A. The ranking of these projects, based on the criteria worksheets, is shown on Tables 9-2 and 9-3.

TABLE 9-2.
CAPITAL IMPROVEMENT PROJECT RANKING

Ranking	Project Number	Project Name	Estimated Cost	Subbasin
1	5	NE 52nd Place culvert replacement	\$495,400	1
2	6	SE 40th Place culvert replacement	\$150,000	4
3	12B	Riparian Corridor restoration - Isaacson	< \$150,000	2
4	12A	Riparian Corridor restoration - Novack	< \$100,000	2
5	12C	Riparian Corridor restoration - Condit	< \$100,000 ¹	2
6	12D	Riparian Corridor restoration - Members' Club	< \$200,000	2
7	4	Pond Berm on Canyon Ck Trib	\$379,700	3
8	12E	Riparian Corridor restoration - APD	< \$100,000 ²	5
9	10	NE 67th Place culvert replacement	< \$100,000	1
10	17	NE 40th and 45 Street culvert	\$150,000	2
11	9	Upper Patterson Creek at SR 202	\$177,000	2
12	15	Patterson Tributary 0377	\$75,000	4
13	7	Remove Access road (NE 36th Place) and culvert	> \$600,000	4
14	13	4' x 2' Culvert Under SR 202	> \$275,000	4
15	3	Hirsovescu/Dry Creek Fish Passage	\$188,000	2
16	8	Erosion along Dry Creek at Ames Lake Rd	> \$600,000	2
17	1B	Patterson Creek Access Issues - East Main and NE 4th	> \$500,000	2
18	1A	Patterson Creek Access Issues - Provide emergency access to residences served by 268th and 264th	> \$500,000	2
19	1C	Patterson Creek Access Issues - Condit and Crittenden Access	> \$50,000 ³	2
20	2	Flooding Near Endeavour School and Issaquah-Fall City Rd.	\$419,700	3
21	11	Restoration of Tributary to Canyon Creek	> \$275,000	3
22	14	Ponding on Union Hill Road	< \$75,000 ⁴	2
	18	Monte Lindsey Dam ⁶	< \$500,000 ⁵	3

¹ Opportunity for cost sharing with landowner.

² Will not be an extensive planting event. Will only plan a narrow buffer area near stream.

³ Potentially a no cost solution to the County.

⁴ To clean.

⁵ To elevate the road.

⁶ Action has already been taken by County on this Project.

TABLE 9-3.
ACQUISITION PROJECT RANKING

Ranking	Project Number	Project Name	Estimated Cost	Subbasin
1	16C	Connection Piece by Korn Property	\$1,500,000	2
2	16B	Tributary 0383	\$2,500,000 ⁷	2
3	16D	Korn Reach extension	> \$1,500,000	2
4	16A	Stevlingson property	\$419,400	1
5	16E	Canyon Creek	> \$3,000,000 ⁸	3
6	19D	Mitchell Hill Acq	> \$4,800,000	4
7	19B	DNR Lands in Subbasin 2B	> \$6,400,000	2
8	19C	Laird Norton Trust properties	> \$6,400,000	2
9	19A	DNR Lands in Subbasin 2A	> \$3,200,000	2

9.1.3 Project Benefits

Table 9-4 lists the identified benefits of the original 10 projects identified for detailed write-up. Of the 10 projects, two address water quality problems, six address habitat problems, seven address drainage problems, and five address erosion problems. Many of the needs identified in the watershed vulnerability analysis presented in Chapter 8 are addressed by these projects.

⁷ Could be lower if we are able to employ lower cost measures such as conservation easements. (Needs to be assessed.)

⁸ Could be lower if we are able to employ lower cost measures such as conservation easements. (Needs to be assessed.)

RAPID RURAL RECONNAISSANCE RECOMMENDATION'S RANKING WORKSHEET					
GENERAL INFORMATION					
Recommendation ID:					
Recommendation Goals:					
Recommendation Objectives:					
RECOMMENDATION OVERALL SCORE HIGH / MED / LOW					
PLANNING LEVEL CRITERIA					
Ecological Significance					SCORE: High / Med / Low
Ecological Processes/Indicators <small>(Add additional attribute to this list if indices or processes are missing.)</small>	Improve <small>(Describe how or what ecological processes will be improved.)</small>	Protect <small>(Describe how or what ecological processes will be protected.)</small>	Scale <small>Reach/Site/Watershed</small>		
Hydrology					
Sediment Regime					
LWD Function					
Channel Function					
Floodplain Function					
Groundwater Recharge					
Water Quality					
Riparian Connectivity					
Fish Migration					
Anthropogenic Erosion					
Others					
Hazards To Life, Limb, And Property					SCORE: High / Med / Low
Hazard Type <small>(List the hazard type, e.g. flooding, landslide, emergency access)</small>	Safety/Threat <small>(Describe who or what is at risk if no action is taken.)</small>	Urgency <small>(How quickly do we need to respond to this hazard to prevent a problem from growing worse and requiring an increasingly costly solution?)</small>	Responsibility <small>(Does the problem relate to a County facility that King County has a legal commitment to maintain? Hazards associated with County facilities should be a higher priority than sites where no such commitment exists.)</small>	Frequency <small>(Describe the frequency of the hazard.)</small>	Scale <small>Reach/Site/Watershed</small>
Note: Priorities should be set in the following order: 1. Threats to public health and safety. 2. Damage to public infrastructure and developed public property. 3. Damage to private structures. 4. Damage to significant natural resources					
Solution Efficacy -- Part A					
List Recommended Action	Identified Problems <small>(What problems the recommendation should be addressing.)</small>	Does the recommendation address the problem?	Does the recommendation address the problem source or treat a symptom?	Time frame for problem resolution (e.g. immediate, 1yr, etc.)	
Solution Efficacy-- Part B					SCORE: High / Med / Low
What is the longevity of the recommendation?	Recommendation Readiness <small>(e.g. need further study, ready for feasibility, ready to build. Also, include what else is needed.)</small>	What are the benefits on a Geographic Scale? Site/Reach/Watershed	Cost		

Figure 9-2. Sample Worksheet for Ranking Recommended Capital Improvement Projects

TABLE 9-4.
PROJECT BENEFITS OF PROJECTS WITH DETAILED WRITE-UPS

Project Number	Project Name	Geomorphology	Water Quality	Stream Habitat	Flooding & Drainage	Erosion
PC-1	Patterson Creek Access Issues				Reduce flooding of access roads. Provide alternate emergency access.	
PC-2	Flooding near Endeavour School				Reduce flooding risk to Issaquah-Fall City Road.	
PC-3	Hirsovescu Fish Passage on Dry Creek	Construct new channel	Lower temperature	Cover and shade; remove fish passage barrier.		Stabilize stream bank
PC-4	Pond Berm on Canyon Creek Tributary	Remove dam		Remove fish passage barrier.	Reduce flooding potential to downstream system.	Stabilize new channel.
PC-5	NE 52nd Street Culvert			Remove fish passage barrier.	Reduce flooding potential of NE 52nd Street.	Reduce erosive velocities.
PC-16A	Stevlingson Property Acquisition and Creek Restoration		Lower temperature	Install new riparian and stream habitat.	Purchase of property eliminates access flooding issue.	
PC-7	State Land Acquisition and NE 36th Place Culvert Removal	Locate in old creek channel.		Provide new habitat		
PC-8	Erosion of Dry Creek along Ames Lake Road					Stabilize stream banks. Reduce seepage from upstream ponds
PC-9	Patterson Creek Culvert at SR 202				Reduce flooding potential of SR 202.	Eliminate sedimentation
PC-10	NE 67th Place Culvert			Remove fish passage barrier	Reduce flooding potential of NE 67th Place.	

9.2 BASINWIDE RECOMMENDATIONS

The Patterson Creek Basin is complex and contributes significantly to the Snoqualmie River Basin fishery. However, rural residential, grazing, and agricultural practices have significantly altered the integrity of the basin, resulting in aquatic habitat degradation. In particular, the integrity of the riparian habitat, which is an essential component of a healthy stream, is significantly impaired. The poor riparian habitat conditions consistently found in the Patterson Creek Basin are a significant habitat limiting factor. Although much of the basin has been degraded, areas of suitable habitat still remain. However, passage barriers at road crossings limit access to some of these suitable areas, substantially reducing the amount of available habitat.

The basinwide recommendations described below are intended to improve and protect the overall quality of the Patterson Creek Basin.

9.2.1 BW-1 Remove Fish Passage Barriers

Improving fish passage conditions is critical to restoring fisheries habitat and making the salmon spawning habitat in the basin accessible. The WRIA 7 Limiting Factors Assessment report (Haring 2002) indicated that there is an abundance of impassable culverts in the watershed (22 of 38 culverts). Replacing these culverts would increase the accessibility of spawning habitat in the watershed and broaden the salmonid distribution within the basin. Some of the identified culverts are included in the list of recommended capital improvement projects. Those that are not should be considered for replacement as part of the basinwide improvement activities.

9.2.2 BW-2 Riparian Habitat Restoration

Improving the riparian habitat of the Patterson Creek Basin would directly improve the salmonid habitat by providing cover, streambank stability, stream temperature control, production of fish prey (insects), and long-term LWD recruitment. Since riparian habitat impairment is widespread in the Patterson Creek Basin, the following prescriptions should be implemented where applicable:

- Reed canary grass and blackberry removal and revegetation with native plants.
- Riparian plantings with native trees and shrubs.
- Work with landowners to implement agricultural BMPs, including restricting livestock access to stream channels, wetlands, and riparian areas.

This restoration action is most applicable in Subbasins 2 and 5, where long expanses of the riparian habitat have been removed. Implementation of agricultural/grazing BMPs would also benefit Subbasin 4. Projects 12A – 12D identify the highest priority areas as identified by King County staff.

9.2.3 BW-3 Protect/Restore Natural Hydrology

Further development of the Patterson Creek Basin may alter the hydrology of the basin. It is necessary to maintain natural hydrology in Patterson Creek to prevent altering in-channel hydraulics, which could lead to channel incision, erosion, and transport of sediment to downstream low-gradient reaches. This basinwide recommendation includes strict adherence to the most current surface water drainage requirements with an emphasis on the following:

- Using BMPs that will maintain the interflow and groundwater flow recharge through infiltration wherever possible.
- Matching peak flows and durations from proposed development with the predeveloped conditions; if those rates create an unstable situation, even more stringent release rates and duration-matching criteria should be used.
- Ensuring that impacts from single-family residences are accounted for in overall basin management.

The findings of the reconnaissance indicate that maintaining forest cover and limiting effective impervious surface are of crucial importance for maintaining healthy stream systems and maintaining groundwater recharge. These can be protected to a limited extent through acquisition projects, but in order to protect these basin-wide, a regulatory strategy can be far more effective. The county is currently refining a comprehensive code revision proposal (the Draft Critical Areas Ordinance) that would limit clearing and effective impervious cover on rural-zoned properties. The proposed code revision would limit clearing to 35% of the parcel area on larger rural-zoned parcels and would limit the effective impervious area to 10%. Enactment of this code would provide a large measure of protection to the Patterson Creek Basin's aquatic resources. The findings of the reconnaissance strongly support this proposal.

9.2.4 BW-4 Habitat Preservation and Acquisition

The Patterson Creek Basin is a complex basin with a diversity of habitats that are essential for salmonid spawning and rearing that vary from good to poor condition. Due to the continual threat of development, property acquisition may be necessary to protect areas of existing quality habitat and improve degraded reaches. The following are high priority acquisition areas:

- Canyon Creek Subbasin—The Canyon Creek subbasin has some of the highest quality habitat in the Patterson Creek Basin, principally due to the large portion of the upper watershed that is publicly owned or protected by conservation easements. Further acquisition of land in this basin would ensure that the integrity of the Canyon Creek subbasin is maintained.
- Dry Creek Subbasin—The upper reaches of Dry Creek contain valuable and important spawning habitats. Portions of this watershed have already been protected by conservation easements; further acquisition or development of conservation easements would ensure preservation of the habitat along this reach.

- Upper Patterson Creek Subbasin—Subbasin 1 of the Patterson Creek Basin contains valuable spawning and rearing habitat. Portions of this reach are already protected by conservation easements; further acquisition or development of conservation easements would ensure the preservation of these habitats.
- Tributary 0383—Tributary 0383 contains approximately 1.5 miles of spawning and rearing habitat. Most of this watershed is still forested and in good condition. Since this reach provides valuable habitat that is in good condition, it is a high priority area for acquisition or development of conservation easements to protect the integrity of the watershed.
- Stevlingson Property—The Stevlingson property is directly upstream of SR 202 in Subbasin 1. The reach of Patterson Creek on this property is a transition area from moderate-gradient, confined stream channel to floodplain channel. Because of the change in gradient, the stream deposits large quantities of gravel, which creates high quality spawning habitat. Habitat conditions in this reach have been significantly degraded. Acquisition of this reach could be the first step to recovery of its habitat. Further habitat improvement projects could transpire after acquisition of the land to expedite the recovery process.

Projects 16A – 16D and 19A – 19D identify the highest priority acquisition and preservation areas as identified by King County staff.

9.2.5 BW-5 Addition of LWD

LWD is an important component of fish habitat and stream function (Reeves et al. 1991). Much of the Patterson Creek Basin is deficient in or void of LWD. Therefore, LWD should be added to Patterson Creek and its tributaries where applicable and feasible (private ownership will limit where this activity may occur).

9.3 FURTHER ACTIONS NEEDED

This characterization report provides an overall review of the Patterson Creek Basin for use as a planning-level tool. The drainage model could be strengthened as a design tool by gathering some additional data and performing additional computer analysis. The extent of the water quality problems is general at this time because of the lack of recent or comprehensive water quality measurements. The stream habitat assessment could also be made better with a more extensive stream evaluation. Specific activities to improve on the review presented in this report are as follows:

- **Drainage Analysis**—Additional monitoring and data gathering can be done to enhance this study. Beneficial activities include the following:
 - Inventory the drainage network including manmade components. This would be useful as an overall mapping and would also assist in determining capacity of specific components of the drainage network.
 - Gather survey information to determine the full extent of the floodplain.

- Continue to collect rainfall data.
- Perform a HEC-2 backwater study to determine the limits and magnitude of flooding.
- **Water Quality**—Continue to collect water quality data including temperature, fecal coliform, DO, and nutrients.
- **Stream Habitat**—Walk the critical reaches to better characterize and assess their condition.