CHAPTER 7.
STREAM HABITAT

Vashon-Maury Island has 75 mapped streams (Figure 7-1), ranging from high gradient streams with little or no salmonid habitat to lower gradient streams that support substantial salmonid populations (Washington Trout 2001). The larger streams originate from a series of groundwater seeps in the upland areas of the island and flow through a system of high-gradient ravines before discharging into Puget Sound (Kerwin and Nelson 2000). Smaller stream systems also originate from the upland seeps and springs and flow through steep, incised ravines to Puget Sound. All of the streams drop through these steep, 10- to 15-percent gradient channels through the bluff line that surrounds the island. Salmonid (salmon and trout) species that inhabit streams on Vashon-Maury Island include resident and sea-run coastal cutthroat trout (*Oncorhynchus clarki clarki*), rainbow/steelhead trout (*O. mykiss*), coho salmon (*O. kisutch*), and chinook salmon (*O. tshawytscha*) (Kerwin 2000).

The habitat conditions of Vashon-Maury Island streams were assessed in two parts. First, a review of existing literature was conducted to provide a qualitative description of habitat conditions and a list of habitat limiting factors for streams on the island. Second, a more detailed evaluation of the habitat conditions of the Judd Creek and Shinglemill Creek basins, the two largest stream systems on the island, was performed following a modification of the Urban Stream Baseline Evaluation Method (R2 Resources 2001).

7.1 ISLAND-WIDE HABITAT CONDITIONS

Stream habitat data are limited for the Vashon-Maury Island system. Most of the existing data were collected by Washington Trout and reconnaissance assessment (Washington Trout 2000/2001) or provided in the 2000 *Salmon Habitat Limiting Factors Report* for Water Resources Inventory Area 9 (WRIA 9) (Washington Trout 2001). These data are qualitative and based on best professional judgment.

7.1.1 Land Use

Vashon-Maury Island has been significantly altered from predeveloped conditions, as nearly the entire island was logged by 1897 (USGS 1900). However, most of the forest has regenerated, potentially allowing habitat to recover to some degree from the impacts of the logging. Land cover on Vashon-Maury Island has shifted from wetland and upland dominated forests prior to settlement to largely mixed forest and rural residential (Kerwin et al. 2000). These changes from historical conditions have altered natural drainage patterns and habitat conditions of streams on the island (Kerwin et al. 2000).

7.1.2 Stream Habitat Conditions

Many streams on Vashon-Maury Island have poor habitat conditions as shown in Table 7-1. Washington Trout (2001) assessed the conditions of the island's streams by examining nine parameters that are indicators of habitat conditions. Habitat conditions were rated as good, fair, or poor if information was available, as shown in Table 7-1. Table 7-1 also illustrates the lack of quantitative stream habitat data, but it describes what is known about habitat conditions of the streams on the island. Where data existed, habitat parameters were most frequently rated as poor. Of the nine parameters examined, access, large woody debris (LWD), streambed sediment, and riparian parameters had the most data. Fish access varied from poor to good, but was rated as poor in 63 percent of streams that were rated. Large woody debris was rated as poor in 50 percent of streams that were rated, fair in 25 percent, and good in 25 percent.

Streambed sediment was rated as poor in 88 percent of streams that were rated. Riparian conditions were rated as poor in 75 percent of streams rated.

7.1.3 Riparian Habitat and LWD

The data indicate that habitat conditions on Vashon-Maury Island have been significantly altered by land use practices. Until recently, logging and other land use practices rarely considered fish habitat, causing the degradation of riparian conditions and low quantities of LWD in many of the streams (Meehan 1991). One of the important functions of riparian vegetation is the contribution of LWD to the stream channel, which shapes channel morphology and creates pools (Murphy and Meehan 1991). The roots of riparian vegetation also stabilize stream banks and reduce soil erosion (Murphy and Meehan 1991). On Vashon-Maury Island, stream sediment conditions were frequently rated as poor. Many of the streams on the island are high-gradient streams or have high gradient reaches in steep ravines that are susceptible to erosion and landslides (Munday 1999). Due to the stream banks' high susceptibility erosion, maintaining a healthy riparian corridor is important for controlling erosion and fine sediment loading to the streams. The lack of LWD is likely a factor in the lack of pool habitats in many of the streams. Increasing the quantities of LWD may enhance habitat conditions, since it increases stream channel complexity, creates pools and side channel habitat, and provides cover (Hicks et al. 1991). In high-gradient streams, large woody debris can reduce local gradients by forming plunge pools and slack pools, producing a stepped sequence of pool habitats that can significantly increase available fish habitat in streams (Swanston 1999).

7.1.4 Habitat Limiting Factors

Table 7-2 lists the habitat limiting factors for each stream on Vashon-Maury Island as reported in the WRIA 9 report (Kerwin and Nelson 2000). The report identified three specific limiting factors: surface water withdrawal being highest during low flows; fish passage barriers; and mass wasting and streambed scour in Shinglemill Creek.

Fish passage barriers were the most frequent limiting factor to salmonid populations on Vashon-Maury Island. The report indicated that 31 of the 75 streams on the island have complete barriers to fish and another seven have possible or probable barriers (Figure 7-2). Seventeen streams were identified as salmonid-bearing streams. Salmonids are believed not to exist in 20 of the 38 streams with full or possible fish barriers. Some of the barriers only restrict fish passage to portions of basins, while others completely block entire stream basins. Both of these conditions prevent access to miles of potential spawning habitat, significantly impairing the production potential of the island.

TABLE 7-1.
STREAM HABITAT CONDITIONS AND FISH SPECIES PRESENT
FOR VASHON-MAURY ISLAND STREAMS

Stream Number/Name	Fish species	Access	Floodplain Conditions	Channel Conditions	Large Woody Debris	Streambed Sediment	Riparian	Water Quality	Hydrology	Biological Processes
1. McCloud Cr.	None	P	DG	DG	P	DG	P	DG	DG	P
2. Sylvan Cr.	None	P	P	DG	P	DG	DG	DG	DG	P
7. Water Wheel Cr.	None	P	DG	DG	P	P	P	DG	DG	P
10. McCormick Cr.	Cutthroat	P	DG	DG	P	DG	DG	DG	DG	P
11. Baldwin Cr.	Cutthroat, coho	P	DG	DG	F	P	F	DG	DG	P
12. Shinglemill Cr.	Cutthroat, Rainbow/ Steelhead, Coho	G	DG	F	P	P	P	DG	P	NA
12-A. Needle Cr.		G	DG	DG	DG	DG	P	G	DG	NA
12-C. J + Y Creek		G	DG	DG	DG	DG	DG	DG	DG	NA
12-D. Pit Bull Cr.	Possible cutthroat	F	DG	DG	DG	DG	DG	DG	DG	NA
12-E. Unnamed		F	DG	DG	DG	DG	DG	DG	DG	NA
13. Unnamed		P	P	P	P	P	F	DG	DG	P
15. Ober Cr.		P	DG	DG	P	P	DG	DG	DG	P
16. Skeeder Cr.	None	DG	DG	DG	G	F	DG	DG	DG	NA
19. Leo's Cr.	None	DG	DG	DG	G	P	DG	DG	DG	NA
20. Robinwood Cr.	Cutthroat	DG	DG	DG	G	F	DG	DG	DG	NA
21. Green Valley Cr.	None	P	DG	DG	G	DG	DG	DG	DG	P
23. Christianson (Jod) Cr.	Rainbow/ Steelhead, Cutthroat	G	DG	DG	DG	DG	DG	DG	DG	NA
24. Unnamed	None	P	DG	DG	DG	DG	DG	DG	DG	P
27. Unnamed	None	P	DG	DG	DG	DG	DG	DG	DG	P
28. Unnamed	None	P	DG	DG	DG	DG	DG	DG	DG	P
29. Unnamed	None	P	DG	DG	DG	DG	DG	DG	DG	P
32. Sealth Cr.	None	P	DG	DG	DG	P	DG	DG	DG	P
33. S 1 Cr.	None	P	DG	DG	DG	DG	DG	DG	DG	P
34. Spring Beach Cr.	None	P	DG	DG	F	P	P	DG	F	P

TABLE 7-1 (continued).
STREAM HABITAT CONDITIONS AND FISH SPECIES PRESENT
FOR VASHON-MAURY ISLAND STREAMS

Stream Number/Name	Fish species	Access	Floodplain Conditions	Channel Conditions	Large Woody Debris	Streambed Sediment	Riparian	Water Quality	Hydrology	Biological Processes
35. S 2 Cr.	None	G	DG	DG	DG	DG	P	DG	DG	NA
36. Slaighters Cr.	None	P	P	DG	DG	DG	P	DG	DG	P
37. Tahlequah Cr.	Cutthroat	G	DG	P	F	P	DG	DG	DG	NA
40. Shawnee Cr.	Cutthroat	P	P	DG	DG	DG	DG	DG	DG	P
41. Fisher Cr.	Cutthroat	DG	DG	DG	DG	P	DG	DG	DG	NA
42. Judd Cr.	Chinook, coho, chum, cutthroat	G	DG	DG	DG	DG	DG	DG	DG	NA
43. Tsugwalla Cr.	None	P	P	P	DG	P	P	DG	P	P
44. Raab's Lagoon Cr.	None	G	DG	DG	DG	P	DG	DG	DG	NA
45. Mileta Cr.	Cutthroat	P	DG	DG	P	P	DG	DG	DG	P
62. Ellis (Tramp Harbor) Cr.	Cutthroat	P	P	DG	DG	P	DG	DG	DG	P
63. Ellisport (Fuller) Cr.	Cutthroat	G	DG	DG	DG	P	DG	DG	DG	NA
64. Beal Cr.	Cutthroat	P	DG	DG	DG	DG	DG	DG	DG	P
65. Gorsuch Cr.	Cutthroat	G	DG	DG	F	F	F	DG	DG	NA
66. Dillworth	Cutthroat	G	DG	DG	DG	G	P	DG	DG	N
67. Glen Acres Cr.	None	P	DG	DG	DG	P	P	DG	DG	P

G = Good F = Fair P = Poor DG = Data Gap NA = not applicable
Source: Washington Trout, Kerwin and Nelson 2000).
Note: Only streams with existing information are included.

TABLE 7-2.
SUMMARY OF HABITAT LIMITING FACTORS FOR VASHON ISLAND STREAMS
IDENTIFIED IN THE WRIA 9 REPORT

Stream Number/Name	Habitat Limiting Factors
1. McCloud Cr.	1. Fish Passage: A 5-foot barrier from boxed wooden pipe. 2. Riparian: Only 60% of stream length is shaded. 3. Hydromodification: The boxed wooden pipe at the outlet; footpath along left bank limits lateral channel migration.
2. Sylvan Cr.	1. Fish Passage: A 4-foot high bulkhead blocks fish passage. 2. Riparian: Few conifer trees are present and only 50% of the stream length is shaded. 3. LWD: In-stream structure is sparse.
7. Water Wheel Cr.	1. Fish Passage: A 5-foot high bulkhead prevents fish passage; a 2-foot high diversion may also be a barrier. 2. Riparian: The lower 300 feet of the stream is dominated by English Ivy; approximately 10% of the stream is shaded.
10. McCormick Cr.	1. Fish Passage: Culvert barrier at Burma Dr.; water diversion structure 80 feet upstream of Burma Dr.; natural log jam is possible barrier. 2. Riparian: Approximately 60% of stream length is shaded.
11. Baldwin Cr.	1. Fish Passage: A 2-foot high, perched culvert and energy dispersion apron at Cedarhurst Drive is a passage barrier.
12. Shinglemill Cr.	1. Riparian: Approximately 70% of stream reaches are shaded. 2. Substrate: Streambed scour has caused sediment deposition in spawning areas. 3. Hydrology: The hydrology has been altered such that peak flows now are 37 to 39 cfs; historical peak flows were 10 cfs.
13. Unnamed	4. Fish Passage: A 3-foot high bulkhead at the mouth and a perched culvert between two driveways 200 feet upstream of the mouth block fish passage. 5. Riparian: Lower stream reaches are surrounded by rural residential and trees are not abundant; 50% of the stream length is shaded. 6. Substrate: Dominated by gravel, sand, and mud; may be poor substrate conditions. 7. Hydromodification: The lower reaches of the stream are contained in a culvert; channelization in the lower 300 feet by access road.
15. Ober Cr.	1. Fish Passage: Two possible barriers at perched culverts under Ober Drive. 2. Riparian: Approximately 40% of the stream is shaded. 3. Pool Habitat: Pool-to-riffle ratios are low (30:70). 4. Hydromodification: Dredging of sediments approximately every 10 years in the lower, residential reach may be adversely impacting spawning gravel quantity and scour of spawning areas.

TABLE 7-2 (continued).
SUMMARY OF HABITAT LIMITING FACTORS FOR VASHON ISLAND STREAMS
IDENTIFIED IN THE WRIA 9 REPORT

Stream Number/Name	Habitat Limiting Factors
16. Skeeder Cr.	1. Fish Passage: A perched bulkhead at the stream outlet may block fish passage.
17. Cove Cr.	1. Riparian: Most of the riparian vegetation near the power transfer station in the lower reaches has been removed; abundant Himalayan blackberry along the stream upstream of the power transfer station; only 60% of the stream is shaded.
19. Leo's Cr.	1. Fish Passage: A debris jam at the mouth of the stream may be a barrier; private water supply system diversions may reduce flows, possibly inhibiting fish passage; in tributary "B" a culvert under an access road is a barrier. No salmonids were found in the 2000 Washington Trout survey; anecdotal information suggests that fish historically inhabited the stream. 2. Sediment: The undercut culvert at tributary "B" may be contributing sediment to the stream. 3. Pool habitat: Pool habitats are not abundant; the pool-to-riffle ratio is 30:70.
20. Robinwood Cr.	1. Hydromodification: channel confinement where the stream crosses roads.
21. Green Valley Cr.	1. Fish Passage: A diversion dam 150 feet upstream of the stream mouth blocks fish passage. 2. Riparian: Approximately 60% of the stream is shaded; the riparian area of the lower 1,000 feet of the stream is dominated by garden and ornamental plantings. 3. Pool habitat: Pools are not abundant, as indicated by the 30:70 pool-to-riffle ratio. 4. Hydromodification: channel confinement exists at footbridges, diversion dam, and water wheel.
23. Christianson (Jod) Cr.	1. Fish passage: A perched culvert at Redding Beach Road blocks fish passage. 2. Riparian: Approximately 70% of the stream is shaded; the riparian vegetation in the lower stream reach has been replaced with landscaping and ornamental plantings. 3. Sediment: A landslide approximately 600 feet downstream of Redding Beach Road contributes sediment to the stream; stormwater discharge from a culvert near the confluence of the main stem of Christianson Creek with tributary "D" causes an active landslide that is contributing sediment to the stream. 4. Hydromodification: At least three constructed ponds exist in the basin; placement of boulders in the stream near a residence is confining natural channel migration.