LAKE WASHINGTON BASIN
Water Resource Inventory Area 08

The drainage system of the Lake Washington basin is comprised of all waters funneling into Lake Washington and hence through Lake Union and the Salmon Bay waterway to Puget Sound at Shilshole Bay. These stream areas include principally the Cedar River system, the Sammamish River system, and eight smaller streams entering Lake Washington independent of either the Cedar or Sammamish rivers. These smaller independent streams include Lyon, McAleer, Thornton, Juanita, Mercer Slough, Coal, May, and one unnamed creek. The Lake Washington drainage basin contains 470 identified streams providing approximately 700 linear miles of rivers, streams, and tributaries plus independent streams. Virtually all of the basin's drainage areas provide suitable spawning and rearing characteristics for the many anadromous and resident fishes common to the area. Also, this drainage has a significant influence on the estuarine and marine ecology near its confluence with Puget Sound.

To clearly describe the watersheds contained within the Lake Washington basin it is necessary to categorize them into three systems; the Cedar, the Sammamish, and the independent Lake Washington drainages.

The Cedar River originates in relatively high mountain country of the Cascade Range near Stampede Pass. It flows generally west-northwest for nearly 50 miles to its confluence with the southern end of Lake Washington at Renton. The upper ten miles of this stream cut through narrow valleyed, steep sloped, and heavily forested mountain terrain. Here it is typically a mountain-type stream containing numerous rapid and cascade areas and few pool-riffle sections. Below this, the next 9 miles contain two man-made storage reservoirs, Chester Morse and Cedar Lake, whose waters spread over the moderately broad valley floor. Below Cedar Lake, downstream to the Seattle City Water diversion dam at about river mile 21 near Landsburg (a distance of 14 miles), the Cedar courses through a relatively shallow and broad valley, densely forested with mixed conifer and deciduous growth. This section contains numerous gentle gradient stretches with many pool-riffle areas, and is considered highly suitable for fish spawning and rearing. Below the diversion dam, which presents a total barrier to upriver migration, the Cedar River flows some five miles to Maple Valley through a somewhat narrow, moderately steep sloped, densely forested valley interspersed with summer home developments. This stretch presents only intermittent areas having pool-riffle character, with numerous semi-rapid and large boulder sections. Below the town of Maple Valley the lower thirteen miles of river meander over a shallow, relatively broad valley containing increasing summer home and urbanization developments. The lower three miles of stream move through an intensely industrialized area. Below Maple Valley the Cedar maintains predominantly a pool-riffle character, providing excellent spawning and rearing conditions for both anadromous and resident fishes. Principal Cedar River tributaries contributing significant flow and accessibility for anadromous fish include Rock and Downs creeks, one unnamed creek, and possibly Peterson Creek. Total accessible stream area provided by this system is approximately 28 linear miles.

PHOTO 08-1. The ship canal provides anadromous fish access between Puget Sound and Lake Washington tributaries.

The Sammamish River complex includes Lake Sammamish and its principal tributaries, Issaquah, Tibbetts, and Laughing Jacobs creeks; and the Sammamish River and its tributaries, Big Bear, Bear, North, and Swamp creeks. Of the Lake Sammamish tributaries, Issaquah Creek provides the greatest amount of pool-riffle stream area which is highly suitable for fish spawning and rearing. This stream heads in the moderately steep, heavily forested foothill slopes near Hobart and meanders generally north some twelve miles to Lake Sammamish. Along its course, cleared farm lands and deciduous thickets intermittently border the stream along with increasing urban development. The other Lake Sammamish tributaries have similar characteristics; however, their accessible lengths are much shorter. The Sammamish River runs north and west from the north end of Lake Sammamish twelve miles to the north end of Lake Washington exhibiting predominant characteristics of sluggish flow and heavy bottom siltation. The surrounding terrain consists mainly of cleared, level farm land with an increasing number of urbanization projects. Some rearing potential exists along this stretch; however, the river's most useful purpose is for anadromous fish transportation water. Each of the tributary streams entering the Sammamish River flows over mostly gentle gradients and contains numerous pool-riffle sections of high quality for fish utilization. The terrain surrounding these streams contains intermittent cleared farm lands, occasional dense deciduous thickets, and increasing urbanization. Total accessible stream length provided by the Sammamish River drainage complex is approximately 122 linear miles.

The smaller basin streams draining into Lake Washington have mostly moderate gradients and contain intermittent sections of good quality fish production area. However, the majority of these streams are located in areas already heavily populated or experiencing rapid urbanization.

This is increasingly limiting these streams' total fish production capacity. Total accessible stream area provided by these independent drainages is approximately 20 linear miles.

Inventory and Distribution

Three of the Pacific salmon utilize the aforementioned drainages within the Lake Washington basin. These include chinook, coho, and sockeye salmon. Anadromous game fish utilizing the basin include steelhead and sea-run cutthroat trout. Chinook salmon are known to utilize principally the Cedar River and the larger tributaries entering the Sammamish River drainage. All accessible streams receive each of the other species inhabiting the basin.

Chinook Salmon — Chinook salmon populating the Lake Washington basin are generally classified as the fall variety. These fish utilize much of the accessible stream area on the Cedar River and sections of the larger Lake Sammamish tributaries including Issaquah and Big Bear creeks. The occurrence of chinook spawning in other basin drainages is minimal since each of these streams exhibits very low flows during the adult migration and spawning period.

Juvenile chinook salmon rear throughout the entire accessible length of the mainstem Cedar River and in each of the tributaries utilized by spawning adults. In addition, important rearing occurs within Lake Sammamish, the Sammamish River, and Lake Washington waters. Lake Union, Salmon Bay, and Shilshole Bay are critical areas for all juvenile fish migrating from the Lake Washington system to Puget Sound.

Adult chinook salmon enter the Lake Washington drainages beginning early in July and continue into early November (Table 08-1). Spawning generally commences in early to mid-September and is usually completed by late November. Following egg incubation and subsequent fry emergence, the juvenile chinook characteristically remain in the river system for approximately three months before migrating seaward from early March to early July.

Based on spawning ground survey information, it is estimated that the chinook salmon escapements to Lake Washington drainage spawning grounds have ranged from 8,300 to 15,200 fish for the period 1966 to 1971, averaging about 11,500 annually. In addition to natural production, the Washington Department of Fisheries operates a hatchery on Issaquah Creek propagating this species. Here, as many as 7,000 adult chinook have been handled at the racks during this time period. Also, some chinook are produced and released from the University of Washington hatchery; however, their numbers are probably insignificant at this time.

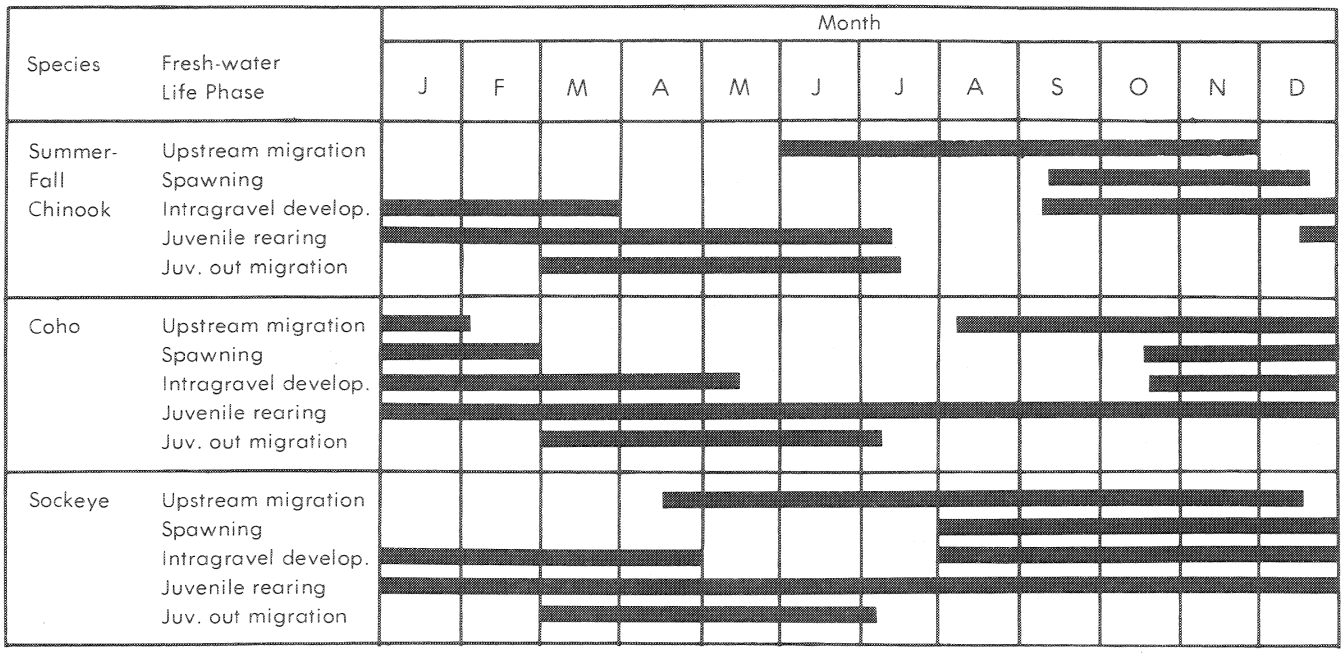
Coho Salmon — Virtually all accessible streams in the basin are utilized to some extent by coho salmon. Principal spawning areas include portions of the Cedar River and its tributaries Rock, Downs, and one' unnamed creek; Sammamish River drainages including Issaquah, Tibbetts, Laughing Jacobs, Evans, Big Bear, Bear, North, and Swamp creeks; and each of the eight independent Lake Washington drainages.

Rearing coho salmon can be found in nearly every accessible tributary stream within the basin, as well as in Lake Sammamish and Lake Washington. Again, very critical areas for these young fish exist in Lake Union and the Salmon Bay waterway, in addition to the basin's estuary waters.

Adult coho salmon have been observed in the Lake Washington basin as early as mid-August with the run continuing into November. Spawning generally commences in late October and continues into late December. Following fry emergence the juvenile coho characteristically remain within the system for more than a year before migrating seaward. This migration usually occurs between early March and early July; however, some coho smolts may be found throughout the year.

Based principally on spawning ground information, it is estimated that annual coho escapements to the Lake Washington drainages have ranged from 15,800 to 59,300 fish for

Timing of salmon fresh-water life phases in Lake Washington-Cedar Basin WRIA 08



the period 1966 to 1971, averaging about 31,200 per year. In addition to natural production of coho salmon, the Issaquah hatchery propagates this species. Here as many as 35,200 adults have returned to the racks during a single season for this time period. Some coho are occasionally released from the University of Washington hatchery; however, total production from this research station is probably insignificant at this time.

Sockeye Salmon — Adult sockeye salmon utilize principally the Cedar River and its tributaries, plus the Issaquah Creek and Big Bear Creek drainages on the Sammamish system. However, some sockeye spawning occurs in virtually all of the accessible drainages within the Lake Washington basin. In addition, known beach spawning occurs in some areas along Lake Washington's eastern shoreline and probably occurs in some areas of Lake Sammamish. Juvenile sockeye rear throughout the accessible length of the basin streams with major rearing in the waters of Lake Sammamish and Lake Washington. Important rearing areas for the juvenile outmigrants also exist in Lake Union, Salmon Bay waterway, and in the basin's estuarine waters.

Adult sockeye salmon enter Lake Washington beginning in mid-June with the run continuing until the first of October. Spawning commences about the first of September and is usually completed by the end of October. Following egg incubation and subsequent fry emergence the juveniles characteristically remain within the watershed for one year before migrating seaward. This migration generally occurs between the first part of March and early July.

Based principally on spawning ground information, it is estimated that sockeye salmon escapements to the Lake Washington basin have ranged from 45,000 to 200,000 fish for the period 1966 to 1971, averaging approximately 150,000 annually. In addition to natural production, the Issaquah Creek hatchery occasionally propagates this species. Also, relatively small plants of sockeye are sometimes made from the University of Washington hatchery. At Issaquah as many as 420 returning adults have been recorded at the racks during a single season. The total run, as measured by spawning populations, has displayed a definitely increasing trend during recent years.

Salmon Production

A six-year base period, 1966 through 1971, has been selected for the presentation of all salmon production figures. This span of years is used for both naturally and artificially produced fish, as well as escapement and harvest figures.

The natural production of sockeye salmon in the Lake Washington basin as of 1971 hit a record of 553,000 adults of which 183,000 escaped to spawn naturally. Sockeye escapements have averaged 150,000 adults from 1966 to 1971. In addition, an average spawning escapement of 5,000 chinook salmon and 15,000 coho salmon utilized the tributary streams of Lake Washington during this period (Table 08-2).

The Washington Department of Fisheries maintains and operates the Issaquah halmon Hatchery at the town of Issaquah. Water source for this 22 standard pond equivalent [1] station is Issaquah Creek. The station's hatching capacity is approximately 6,700,000 salmon fry with its present rearing capacity about 1,200,000 yearlings and 3,200,000 fingerlings or 56,000 lbs. [2] Construction of new ponds and increased water supply will increase the capacity to 103,000 lbs. by 1976. The station handles principally fall chinook and coho salmon, and occasionally sockeye. Virtually all fish produced and reared here are planted into the Cedar or Sammamish drainage.

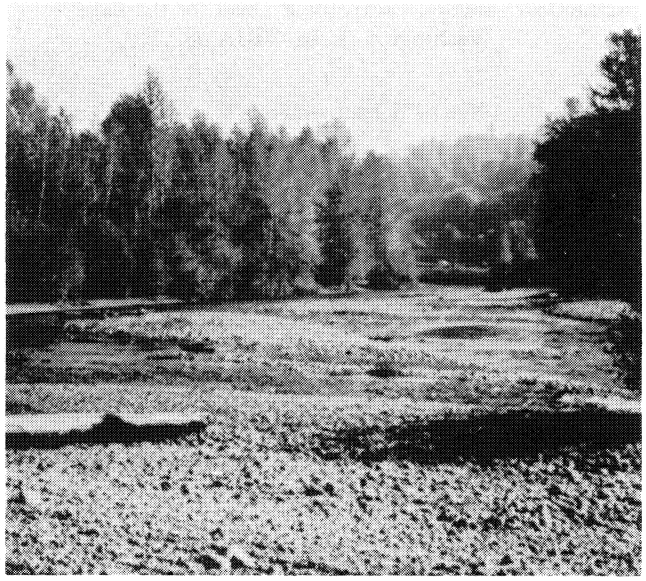


PHOTO 08-2. The Cedar River provides some of the most exceptional salmon habitat in Washington State.

For the period 1966 to 1971, chinook returns to the Issaquah Creek rack ranged from 5,248 to 7,035 adults, averaging 6,001 annually. Coho rack counts ranged from 9,596 to 35,186, averaging 17,382 spawners annually.

A second hatchery is operated by the University of Washington, College of Fisheries, and is located on the campus adjacent to the Lake Washington Ship Canal. Here, major emphasis is on research; however, salmon propagation is supplemented via releases made from the station.

In addition to juvenile salmon released from basin hatcheries, occasional transplants are made from the facilities located in other basins; however, plantings of this type have been relatively small in the past. For the period 1966 to 1971 a total of 19,214,000 chinook and 7,805,000 coho were planted in Lake Washington tributaries. Plants in 1971 included 4,128,500 juvenile chinook (38,000 lbs.) and 1,692,300 juvenile coho (71,500 lbs.) into the Lake Washington watershed.

Preliminary information from commercial and sport catch statistics indicate the present planting program in the Lake Washington basin contributes approximately 26,000 chinook and 60,000 coho to these fisheries annually.

[1] *One standard pond is equivalent to 2,400 cu. ft.*

[2] *The average weight of juvenile salmon when released from hatcheries is 20 coho/lb. and 125 chinook/lb.*

TABLE 08-2. Salmon Escapement Level for the Lake Washington Basin WRIA 08.

Species	1966-1971 Escapements [1] Range	Average
Chinook	8,300— 15,200	10,500
Coho	15,800— 59,300	31,200
Sockeye	45,000—200,000	148,000
Natural Escapement Potential		
Chinook	8,500	
Coho	17,000	
Sockeye	300,000	

[1] *Includes natural plus artificial combined escapements.*

Harvest

Salmon produced or reared in Lake Washington-Cedar River waters contribute to U.S. and Canadian, Pacific Ocean commercial and sport fisheries, to various Indian fisheries, and to commercial and sport fisheries conducted through the Strait of Juan de Fuca and into Puget Sound. They also contribute to sport fisheries only within the basin's freshwater areas. The estimated annual total contribution (all species) to these fisheries has in recent years ranged from 109,800 to 550,400 salmon. Commercial net fisheries were first initiated on the Lake Washington adult sockeye returns in 1967 when 4,000 fish were harvested with 25,000 harvested in 1968 and 70,000 in 1969. No net fishery was allowed in 1970 due to predicted low escapements, but nearly 350,000 were harvested in 1971.

The question of Indian fishing rights has been contested for many years and adjudication now in progress may cause significant alterations in both fishing patterns and distribution of catch.

The basin's marine waters support a relatively light commercial fishery for salmon. Popular areas utilized strictly by gill netters include Richmond Beach, Meadow Point, and Ballard. Most commercial landings of salmon caught in these waters go to dealers located in Seattle, with some fish shipped north to Everett. The Ballard-Lake Union area with its extensive marine vessel facilities serves as the major fleet base for the Puget Sound region.

Salt-water sport fishing for salmon is extremely popular within basin waters. Lending to this popular recreation activity are the large number of boat rental houses, extensive private boat moorage areas, a large number of small boat owners, and numerous accesses to popular salt-water fishing areas. In 1965 nearly 135,000 angler trips were recorded within local waters. The more popular fishing sites include the waters from Richmond Beach to Meadow Point, Ballard, and outer Shilshole Bay. A great many of the sport fishermen, originating their trips from within the basin travel away from local waters to find their favorite fishing locations in West Sound, and San Juan-Whidbey basin marine waters.

Fresh-water angling for salmon within the Lake Washington basin is permitted in Lake Washington, Lake Sammamish, and the Sammamish River. Lake Washington and Lake Sammamish are open the entire year to the harvest of both adult and jack salmon.[3] The majority of the Sammamish River, flowing between Lake Sammamish and Lake Washington, is open to jack salmon angling only, being confined to the period July through mid-November. The recorded average annual fresh-water catch for the period 1966 through 1971 was nearly 6,065 salmon for this basin. The majority of this catch was coho salmon prior to 1970 when 9,398 adult sockeye were taken on sport gear followed by a record sockeye sport fishery in 1971 of 20,389 fish.

Limiting Factors

Limiting factors refer to conditions that lead to a complete loss or reduction of the environment's fish producing potential, excluding harvest. Within the Lake Washington drainages major limiting factors include low stream flows, poor water quality, and concentrated watershed development of the streams and lakes.

Stream flow — Seasonal flooding is common in all the independent drainages due in part to logging and extensive land clearing associated with urban developments. This is a common occurrence on all the smaller, but extremely important, fish producing streams within the Greater Seattle metropolitan areas.

The Lake Washington basin is subjected to low summer flows that curtail fish production. This problem is further complicated on the Cedar River by a water diversion dam near Landsburg which the City of Seattle operates.

Physical barriers — The above-mentioned water diversion dam near Landsburg on the Cedar River, located at river mile 21.3, blocks 14 additional miles of upper watershed suitable for use by anadromous fishes. Low summer flows below Landsburg are directly associated with municipal and industrial water supply demands from this source.

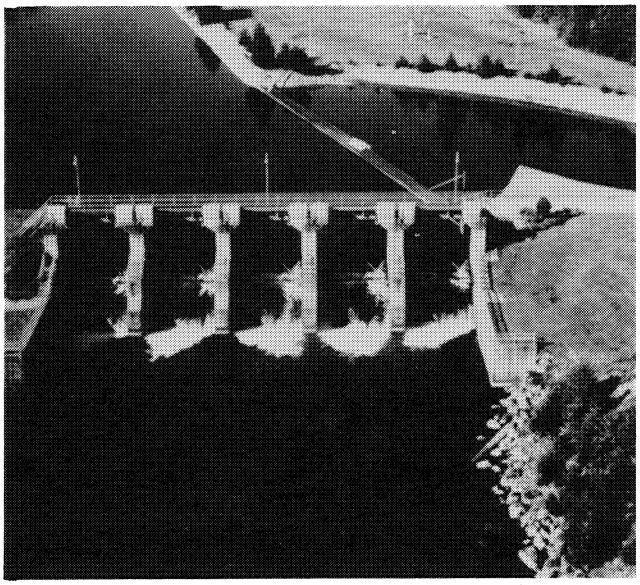


PHOTO 08-3. The City of Seattle water diversion dam restricts salmon production to the lower 21.3 miles of Cedar River.

[3] *Not less than 10 inches nor more than 20 inches in length.*

Virtually all of the small- to moderate-sized streams in the Lake Washington basin experience intermittent blocks or barriers to anadromous fish migration. They are usually created by debris buildup, man-made impoundments, or culvert washouts. Barriers of these types leave the adult fish vulnerable to harassment or poaching by man, predation, or cause serious delays in spawning migration.

The Government Locks on the Lake Washington Ship Canal are equipped with a ladder to afford upstream migration of anadromous fishes. These adult salmon and trout can also ascend into the lake through the boat locks when lockage of vessels is being made. Often, however, serious delays in the natural migration timing occur at this point due to poor fish attraction waters near the fish ladder and the poor location of the outfall for pumping "drawdown" waters from the locks that distract these fish away from the access points. State fisheries agencies have worked closely with the Corps of Engineers to develop improved fish facilities and attraction waters to rectify this situation.

Water quality — The recent installation of the Metro sewage disposal system throughout much of the Lake Washington drainage and the City of Seattle has alleviated the major source of water pollution that was evident in the Lake Washington basin. It may be necessary within the next decade to allow some raw sewage to be released in Lake Washington to help fertilize the waters and develop plankton blooms essential for sockeye salmon survival. There are still numerous sources of domestic, agricultural, and industrial effluents from the outlying independent drainages, particularly near the various population centers. Effluents from each of these areas tend to alter natural water chemistry, especially at low stream flows. Major sources of contamination occur through the use of DDT, weed and brush control, and chemicals used for cleaning and de-icing.

All of the lowland-type streams in the basin experience high summer temperatures. Only limited temperature information is available for most of these streams, but occasional spot checks have shown temperatures in excess of the tolerable range for anadromous fish life. In the Sammamish River the 1965-1966 records show many days during July and August where water temperatures reached or exceeded 70°F. This level will debilitate or kill anadromous species. Since the Sammamish River is comprised essentially of surface overflow from Lake Sammamish, the only means of cooling the river would be to draw the water from the deeper, colder portion of the lake during the summer months. Temperature records for the Cedar River at Renton for 1965-1966 show many days in late July and in August where water temperatures reached 70°F.

One of the greatest concerns of fisheries agencies in this basin involves the level of salt water intrusion into the ship canal and Lake Union from the boat lockage at the Government Locks. Excessive buildup of salt water into this freshwater area could increase the stratification to a point where the salt water would back up into Lake Washington and completely change the environment. Should this occur, the anadromous fish could have a difficult time locating the exit from this system on their seaward migration. It is possible then that most or all of these fish would then become resi-

PHOTO 08-4. Salmon use both the ladder and locks during their migrations in and out of Lake Washington. (Hiram M. Chittenden Locks)

duals and never leave the lake. The salt water strata would also be very deleterious to the freshwater species that presently inhabit Lake Washington.

PHOTO 08-5. Flood control practices are often destructive to salmon habitat. (Cedar River)

Limited spawning and rearing — Siltation and poor water quality associated with urban development and agricultural practices account for the major limitations on spawning and rearing area in the Lake Washington basin. Some examples of habitat deterioration involve flood control projects such as the Sammamish River channelizing project and the Cedar River channeling and bank stabilization projects. Floods in the Cedar River have periodically impacted the sockeye run by scouring spawning gravel and destroying eggs.

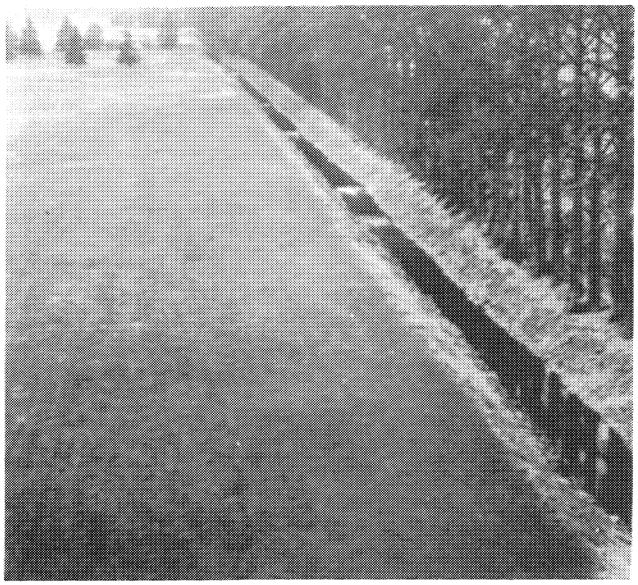


PHOTO 08-6. Channelization has reduced the lower reaches of several Sammamish River tributaries to transportation water only. (Bear Creek)

Watershed development — Encroachment of civilization on the streams of the basin has substantially reduced the stream area and quality for maximum fish production. Much of the upper watersheds flow through farmland and rural areas interspersed with small communities, while lower stream areas, particularly around Lake Washington and Lake Sammamish, are confined and altered by urbanization and small towns or shopping centers. Wherever large home developments occur on the stream flood plains, they are accompanied by requests for channel changes, creation of ponds, or pools with waterfalls, under the guise of stream beautification, which are nearly always in direct conflict with fish needs. Inevitably, flood protection measures are required with these developments, particularly riprap bank protection, channelization, or dikes. Storm drainages are commonly piped directly into the stream channels where the rate of natural run-off into the stream is increased beyond the normal capacity, thus causing intermittent flooding conditions soon after each heavy rainfall.

Such creeks as Thornton, McAleer, and Lyons are examples of streams whose fish production capacity has been lost to metropolitan and suburban expansions. Swamp and North creeks are now suffering from encroachment and extensive alterations, and it is feared that these too will become unsuitable for anadromous fish production. Both Issaquah Creek and the Cedar River below Maple Valley have become heavily urbanized with homes and industry during the past few years, especially within the city limits of Issaquah and Renton. Flood control alterations within these two systems have completely changed the streambed profile in several sections and eliminated the pool and riffle areas vital to anadromous fish production.

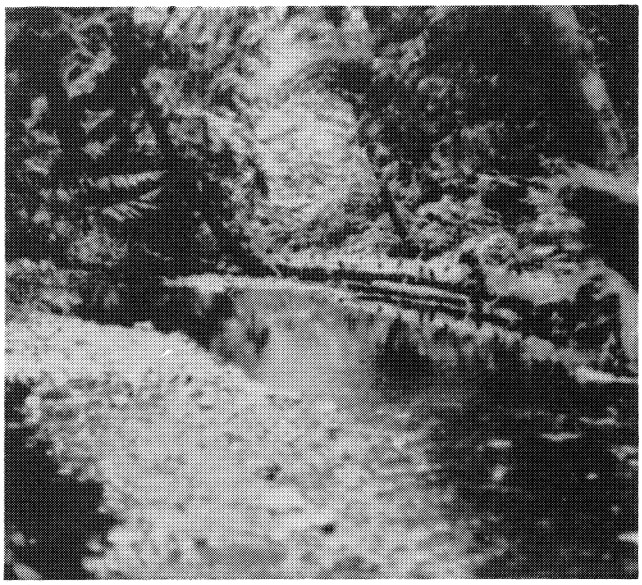
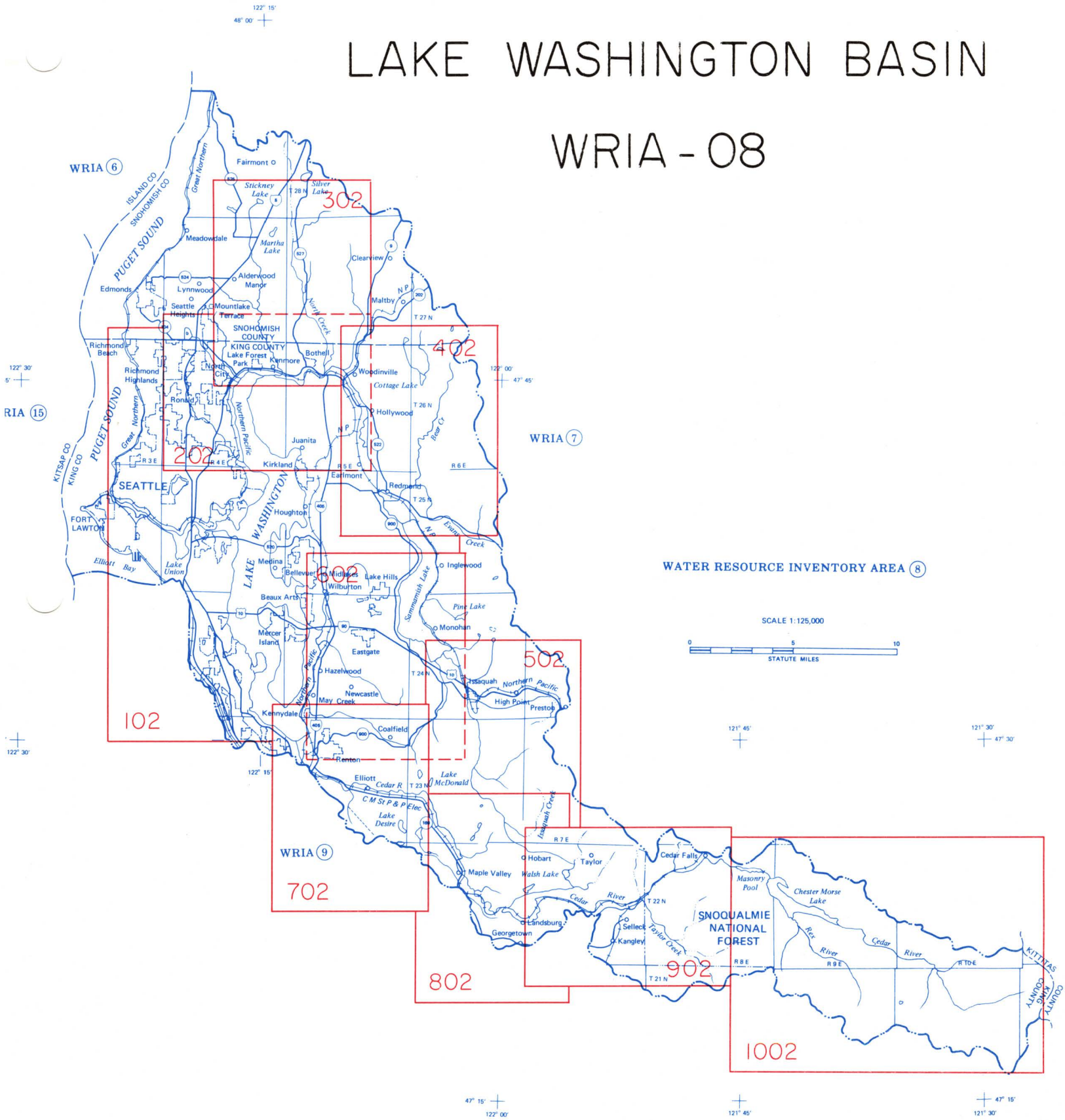


PHOTO 08-7. Undeveloped reaches of Little Bear Creek provide exceptional coho habitat.

LAKE WASHINGTON BASIN WRIA 08
Index to Key Map

LAKE WASHINGTON BASIN

WRIA - 08



LAKE WASHINGTON-SAMMAMISH

The Lake Washington-Lake Sammamish drainage lies directly in the greater Seattle metropolitan-residential area, bounded by the towns of Mountlake Terrace, Kenmore, Kirkland, Bellevue, and Renton around Lake Washington, and by Redmond and Issaquah around Lake Sammamish. This drainage funnels all waters from Lake Sammamish into Lake Washington via the Sammamish River and from Lake Washington through Lake Union and the Salmon Bay waterway to the Sound. There are 706 square miles of surface drainage area within this basin.

Stream Description

This watershed extends from the headwaters of North Creek near Everett to the headwaters of the Cedar River southeast of North Bend. Forty-four streams over one mile in length drain into this large lake complex. There are also many small streams and tributaries less than a mile in length. A total of 656 miles of rivers, creeks, and their tributaries drain into the Lake Washington-Lake Sammamish system.

Lake Washington contains 22,138 surface acres and is 50 miles in circumference, and approximately 20 miles long. Nine miles of waterway connect Lake Washington to Puget Sound via locks at Ballard. Lake Sammamish is 4,897 surface acres, 7.6 miles long, and 16 miles in circumference. The Sammamish River is 13.8 miles in length and connects the lakes.

The Government Locks and Lake Washington Ship Canal were constructed in 1916. Prior to this the Black River provided outlet at the southern end of Lake Washington. The Cedar River discharged into Black River immediately below the lake, which then flowed into the Duwamish River to Puget Sound. The ship canal was dredged to provide navigation from Lake Washington through Lake Union to Puget Sound. The height of the locks then raised the water level in the ship canal to that of Lake Union and lowered the lake level by about 10 feet. The Cedar River was diverted into Lake Washington which increased the lake inflow, improving both circulation and flushing rate.

The lands bordering Lake Washington and the ship canal are intensively utilized by residential, commercial, and industrial developments. Lake Sammamish has heavy residential use. The lands between the lakes have been completely developed in the past ten years to accommodate intensive population growth. In this WRIA, the stream environments have all been greatly influenced by civilization, with those in closest proximity to the metropolitan area undergoing the greatest changes.

Streams not covered in other map sections include the 20 independent short-run tributaries draining directly into Puget Sound between Mukilteo and Shilshole Bay, and 2 unnamed tributaries of southwest Lake Washington. Of these streams only two, Pipers Creek and Hidden Lake Creek, are accessible to anadromous fish passage.

Salmon Utilization

The Lake Washington-Lake Sammamish drainage is utilized by coho, chinook, and sockeye salmon in all accessible stream reaches. Coho are the predominant species in all streams except the Cedar River, where sockeye have established record returns. Both deep lakes contain thermoclines required for good sockeye production. The sockeye rear in the lakes from 1 to 2 years before migrating seaward. A portion of the sockeye are lake beach spawners, preferring the upwelling waters along the gravel shorelines. Coho also rear in the lake's environment for their first year before migrating to salt water. It is believed that this extra rearing area is the reason many of the streams have maintained runs in spite of degradation and stream losses.

Limiting Factors

There are several limiting factors that affect the growth and survival of sockeye smolts in Lake Washington and Lake Sammamish. Lake fertility is related to sockeye growth and survival. Intensified sewage treatment by Metro has improved water quality; however, this is believed to have reduced lake productivity. Predation and competition from other fish species in the lake is a major factor. Mortalities, particularly in sockeye, are severe at the government locks where sudden pressure changes stun the juveniles. Seals are also a nuisance, as they capture and consume many adult salmon waiting to ascend the lockage.

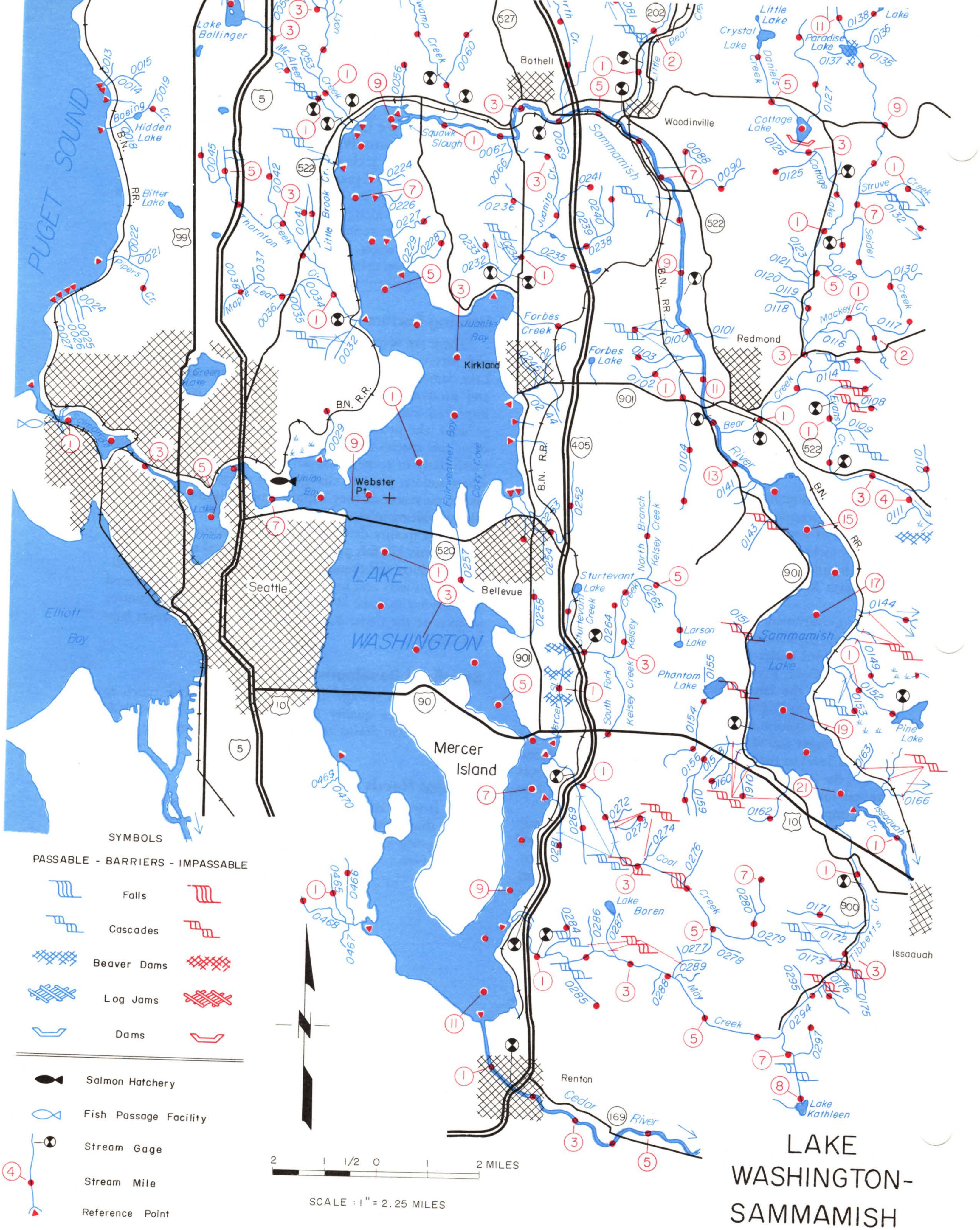
Water quality deterioration around storm drain outfalls and marinas kill fish periodically. Accidental spills of petroleum products and chemical wastes, and siltation from development projects and highway construction have all reduced productivity in Lake Washington tributaries. Flood control projects on the Cedar River have caused serious stream habitat losses.

Beneficial Developments

The Metro sewage disposal system has done much to maintain water quality for fish production. The RIBCO plans for storm drains and water quality control may prove valuable.

Habitat Needs

It is imperative that the aquatic environments be preserved throughout all these drainages. Cooperation is needed from Seattle City Water in maintaining fish flows in the Cedar River.



LAKE WASHINGTON-SAMMAMISH

LAKE WASHINGTON — SAMMAMISH
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0001	Big Gulch Creek	Sec17,T28N,R4E	1.25	—	Unknown
0004	Picnic Creek	Sec29,T28N,R4E	2.2	—	Unknown
0005	Norma Creek	Sec32,T28N,R4E	1.1	0.87	Unknown
0006	Lunds Gulch Creek (Van Buskirk Cr.)	Sec5,T27N,R4E	1.9	2.7	Unknown
0009	Shell Creek	Sec13,T27N,R3E	1.55	—	Unknown
	Unnamed Pond	Outlet-0.05	—	—	
0010	Shelleberger Cr.	Sec26,T27N,R5E	1.2	—	Unknown
0017	Hidden Lk. Cr.	Sec11,T26N,R3E	1.35	—	Unknown
	Hidden Lake	Outlet-0.6	—	—	
	Hidden Lk. Cr. cont. as Boeing Cr.	@ mi. 0.71	—	—	
	Pipers Creek	Sec26,T26N,R3E	1.35	—	(Coho)
0028	Lake Washington Ship Canal	Sec10,T25N,R3E	9.35	607.0	Chin., Coho, Sockeye
0029	Unnamed	RB-8.0	1.0	—	Unknown
	NORTH LAKE WASHINGTON [1]				
0030	Thornton Creek	Sec34,T26N,R4E	5.7	—	Coho, (Sockeye)
	(See Lk. Wash. 203)				
0049	McAleer Creek	Sec10,T26N,R4E	6.05	—	Chin., Coho, Sockeye
	(See Lk. Wash. 203)				
0052	Lyon Creek	Sec10,T26N,R4E	3.8	—	Chin., Coho, Sockeye
	(See Lk. Wash. 203)				
0056	Unnamed	Sec11,T26N,R4E	1.0	—	(Coho)
	(See Lk. Wash. 203)				
0057	Sammamish River	Sec11,T26N,R4E	13.8	—	Chin., Coho, Sockeye
0059	Swamp Creek	RB-0.6	10.9	—	Chin., Coho, Sockeye
	(See Lk. Wash. 303)				
0070	North Creek	RB-4.35	12.6	—	Chin., Coho, Sockeye
	(See Lk. Wash. 303)				
0080	Little Bear Creek	RB-5.4	7.7	—	Chin., Coho, Sockeye
	(See Lk. Wash. 303)				

[1] *Begins mile 9.35 mid-point of Lake Washington.*

LAKE WASHINGTON — SAMMAMISH
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0088	Unnamed	RB-6.55	1.4	—	(Coho)
	(See Lk. Wash. 403)				
0090	Unnamed	RB-7.3	1.6	—	(Coho)
	(See Lk. Wash. 403)				
0095	Unnamed	LB-8.0	1.2	—	(Coho)
	(See Lk. Wash. 403)				
0099	Unnamed	LB-9.8	1.0	—	(Coho)
	(See Lk. Wash. 403)				
0102	Unnamed	LB-10.6	1.6	—	(Coho)
	(See Lk. Wash. 403)				
0104	Unnamed	LB-10.95	3.15	—	Coho, (Sockeye)
	(See Lk. Wash. 403)				
0105	Bear Creek	RB-12.2	12.4	—	Chin., Coho, Sockeye
	(See Lk. Wash. 403)				Sockeye
	Sammamish Lake	Outlet-13.8	—	97.7	
0144	Unnamed	RS-16.7	3.2	—	(Coho),(Sockeye)
	Unnamed Lake	Outlet-1.9	—	—	
0146	Unnamed	LB-1.95	1.1	—	None
	Unnamed Lake	Outlet-2.7	—	—	
0149	Unnamed	RS-17.2	2.8	—	Unknown
	Unnamed Lake	Outlet-2.4	—	—	
	Unnamed Lake	Outlet-2.6	—	—	
0152	Pine Lake Creek	RS-17.75	2.0	—	(Coho),(Sockeye)
0153	Unnamed	LB-0.35	1.1	—	Unknown
	Pine Lake	Outlet-2.0	—	—	
0154	Phantom Lake	LS-18.7	2.9	—	Coho,(Sockeye)
	Phantom Lake	Outlet-0.5	—	—	
0156	Unnamed	LS-19.35	2.3	—	Coho,(Sockeye)
0160	Unnamed	LS-19.4	1.0	—	Unknown
0161	Unnamed	LS-19.8	1.0	—	Unknown
0162	Unnamed	LS-20.1	1.5	—	(Coho)
0166	Laughing Jacobs Cr.	RS-21.2	2.9	—	Coho, Sockeye
	(See Lk. Wash. 503)				
0169	Tibbetts Creek	RS-21.3	4.3	—	Coho, Sockeye
	(See Lk. Wash. 503)				
0178	Issaquah Creek	Sec17,T24N,R6E	17.35	—	Chin., Coho, Sockeye
	(See Lk. Wash. 503)				

LAKE WASHINGTON — SAMMAMISH
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0227	Unnamed	Sec23,T26N,R4E	1.0	—	Unknown
	(See Lk. Wash. 203)				
0228	Unnamed	Sec25,T26N,R4E	1.2	—	Unknown
	(See Lk. Wash. 203)				
0230	Juanita Creek	Sec31,T26N,R5E	3.5	—	Coho, Sockeye
	(See Lk. Wash. 203)				
0242	Forbes Creek	Sec31,T26N,R5E	1.8	—	(Coho)
	(See Lk. Wash. 203)				
0243	Unnamed	Sec6,T25N,R5E	1.5	—	Unknown
	(See Lk. Wash. 203)				
0252	Unnamed	Sec17,T25N,R5E	2.95	—	(Coho)
0255	Unnamed	Sec18,T25N,R5E	1.0	—	Unknown
0257	Unnamed	Sec24,T25N,R4E	1.4	—	Unknown
	SOUTH LAKE WASHINGTON				
0258	Unnamed	Sec31,T25N,R5E	1.2	—	Unknown
0259	Mercer Slough	Sec8,T24N,R5E	6.3	—	Chin., Coho, Sockeye
	(See Lk. Wash. 603)				
0268	Coal Creek	Sec17,T24N,R5E	7.0	—	Coho, (Sockeye)
	(See Lk. Wash. 603)				
0281	Unnamed	Sec17,T24N,R5E	1.3	—	Unknown
	(See Lk. Wash. 603)				
0282	May Creek	Sec31,T24N,R5E	8.6	—	Chin., Coho, Sockeye
	(See Lk. Wash. 603)				
0299	Cedar River	Sec7,T23N,R5E	58.0	—	Chin., Coho, Sockeye
	(See Lk. Wash. 703)				
0465	Unnamed	Sec35,T24N,R4E	1.5	—	(Coho)
0466	Unnamed	LB-0.15	1.4	—	Unknown
0468	Unnamed	RB-0.36	1.1	—	Unknown

NORTH LAKE WASHINGTON DRAINAGE

This drainage encompasses over 6 miles of the north end of Lake Washington, including all independent streams flowing into the lake north of a line between Sand Point and Kirkland. (The lower 6 miles of the Sammamish River are shown here, but discussed in Lake Washington 302.) Four good salmon-producing streams and eight small independent streams of limited fish use are located around the lake periphery. Combined, these provide over 57.0 total stream miles. These streams lie close to the King-Snohomish County line in north Seattle.

Stream Description

Thorton Creek flows south and east from Ronald Bog in Richmond Highlands and enters Lake Washington at Mathews Beach. Total drainage length is 18.45 miles, with 5.7 in the mainstem. Tributaries are Little Brook and Maple Leaf creeks, plus several small unnamed streams. McAleer Creek drains from Hall Lake north of Mountlake Terrace southwest into Lake Ballinger and continues as Hall Creek to Lake Washington at Sheridan Beach. The total length of this drainage is 6.85 miles. Lyon Creek originates in swampy areas immediately east of Mountlake Terrace and flows southerly entering Lake Washington at Lake Forest Park, a distance of 3.8 stream miles. Including three small unnamed tributaries, this drainage totals 6.0 miles.

Thorton, McAleer and Lyon creeks are lowland-type streams with headwaters at the 350-foot to 400-foot elevation. The upper valley floors are broad, then narrowing to more confined ravines in the lower extremities. The brush and natural stream cover have generally been cleared away and landscaped with grass, and few trees left in areas where homes or businesses abut the streams. The extensive road systems cross and parallel these streams all along their lengths, drastically altering these stream channels.

The stream gradient drops about 50 feet per mile with steeper gradients in short sections within the lower portions of these creeks. Bottom composition is patch gravel, with clay fines and rubble dispersed throughout the lengths. Stream widths vary from 3 to 6 yards with bottom composition of riffle-glide areas and occasional pools.

Juanita Creek flows from Norway Hill, south of Bothell, southerly to Lake Washington at Juanita Bay north of Kirkland. The total stream length is 14.15 miles. Juanita Creek lies in an area of rapid development, and although land along the creek is not totally settled, there has been degradation over much of the lower stream. Stream gradients are quite shallow throughout the valley floors, but tributaries contain falls and steep gradients. Hillside slopes that are undeveloped contain heavy growths of second and third growth conifers with alder, willow, and blackberry bushes in the ravines. The stream bottom is comprised of fine pea gravel, sand, and silt; however, the mainstem contains excellent gravel throughout lower reaches. Juanita Creek varies in width from 3 to 6 yards, and is interspersed with pool-riffle sections.

Four unnamed independent tributaries lie along the east shore of Lake Washington between Sammamish River and Juanita Creek, each less than 1 mile in length, and with limited access due to gradient. These streams are all heavily forested on the slopes with conifers, brush, and ferns.

Salmon Utilization

Salmon access of streams totals about 17.5 stream miles; in Thornton (6), McAleer (3), Lyons (3), Juanita (4.5), and the unnamed creeks (1). Coho adults spawn in all these streams and small numbers of chinook spawn in the lower portions of the larger streams. A few sockeye spawn in most of these Lake Washington tributaries.

Limiting Factors

A combination of limiting factors prevail in these streams. Silt deposits have compacted the gravel beds. Low summer flows with associated high water temperatures affect all streams. Flood control measures, primarily bank stabilization and stream beautification, contribute to encroachment and constricted flows. Poaching and harassment of spawners is a serious problem on all these streams. Impassable falls and fallen trees or timber slash form barriers to upstream migration. The many road crossings, bridges, and culverts cause considerable loss of stream spawning and rearing area. Littering the creeks with waste materials has degraded stream environments.

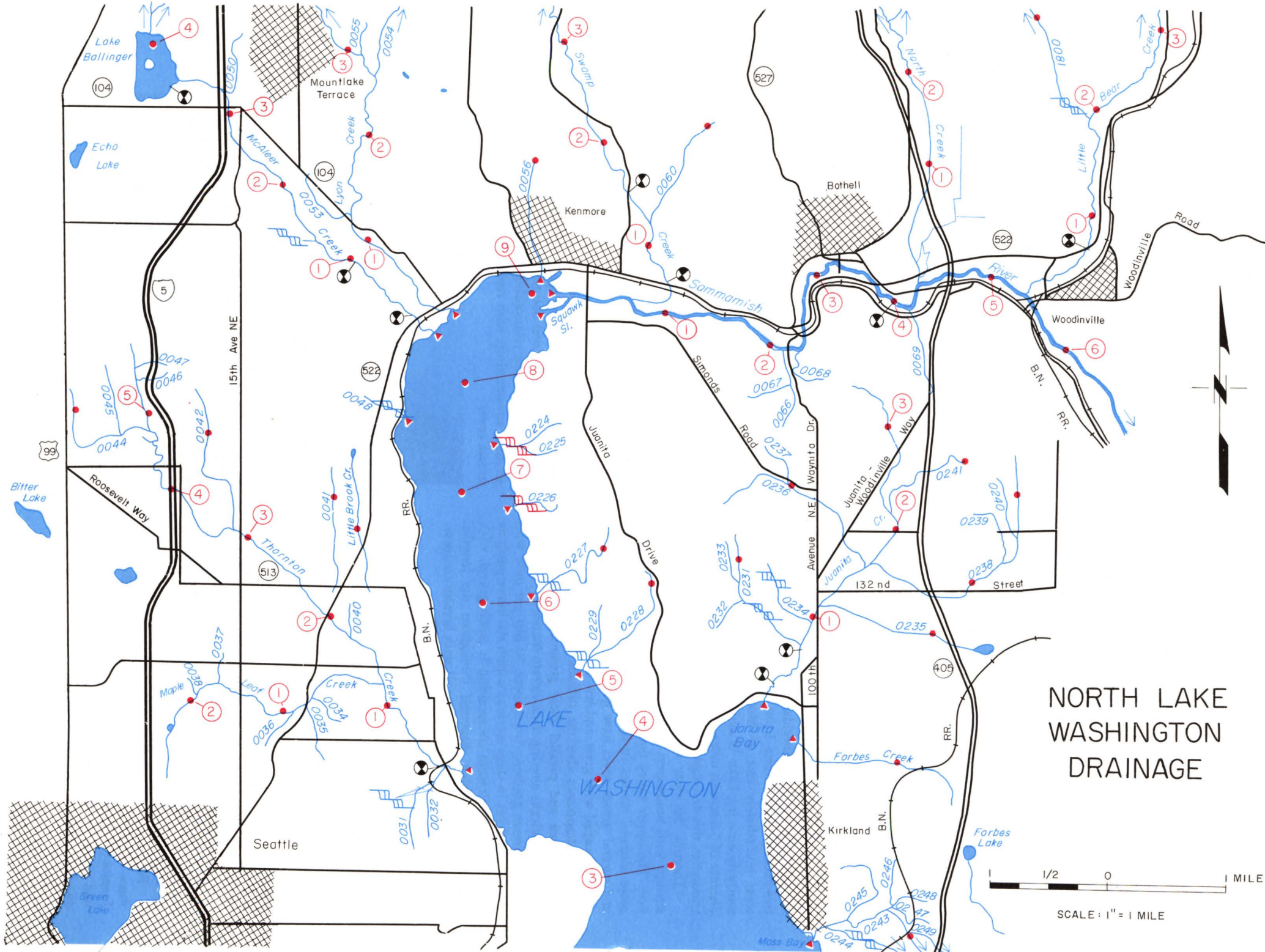
Beneficial Developments

The need for rehabilitation of these suburban streams is now recognized and protection is being incorporated into Shorelines Management Plans by these towns and cities. Storm drainage plans are being developed to save these creeks from complete scouring.

Habitat Needs

Educational programs to foster ecology awareness would benefit all streams. Cleaning the silt from these creeks and restoring suitable gravel are much needed community efforts. The pool-riffle relationship should be rehabilitated in all these streams along with replanting trees and protective stream cover.

PHOTO 08-8. Stream beautification is often detrimental to salmon habitat.


NORTH LAKE WASHINGTON DRAINAGE
LAKE WASHINGTON
Lake Ballinger
Echo Lake
Bitter Lake
Green Lake
Mountlake Terrace
Kenmore
Bothell
Woodinville
Seattle
Kirkland
Juanita Bay
Mass Bay
Forbes Lake
Forbes Creek
Swamp Creek
North Creek
Bear Creek
Little Bear Creek
McAleer Creek
Lyon Creek
Sammamish River
Squawk Sl.
Simonds Road
Juanita Drive
Juanita - Woodinville Way
Juanita Cr.
Waynita Dr. N.E.
Woodinville Road
132 nd Street
100 th Avenue
15th Ave NE
Roosevelt Way
Thornton Creek
Little Brook Cr.
Maple Leaf Creek
B.N. RR.
SCALE : 1" = 1 MILE
1 1/2 0 1 MILE

NORTH LAKE WASHINGTON DRAINAGES
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
	NORTH LAKE WASHINGTON [1]				
0030	Thornton Creek	Sec34,T25N,R4E	5.7	—	Coho, (Sockeye)
0033	Maple Leaf Creek	RB-1.3	2.75	—	Coho
	Unnamed Lake	Outlet-2.4	—	—	
0039	Little Brook Cr.	LB-1.6	1.6	—	Unknown
	Unnamed Lake	Outlet-1.6	—	—	
0041	Unnamed	LB-2.0	1.3	—	(Coho)
0042	Unnamed	LB-3.11	1.5	—	(Coho)
	Unnamed Lake	Outlet-4.4	—	—	
0044	Unnamed	RB-4.8	1.2	—	Unknown
0049	McAleer Creek	Sec10,T26N,R4E	6.05	—	Chin., Coho, Sockeye
	Lake Ballinger	Outlet-3.6	—	—	
	McAleer Cr. cont. as Hall Creek	@ mi. 4.11	—	—	
	Hall Lake	Outlet-6.05	—	—	
0052	Lyon Creek	Sec10,T26N,R4E	3.8	—	Chin., Coho, Sockeye
0054	Unnamed	LB-2.6	1.2	—	Coho
0056	Unnamed	Sec11,T26N,R4E	1.0	—	(Coho)
0057	Sammamish River	Sec11,T26N,R4E	13.8	—	Chin., Coho, Sockeye
	(See Lk. Wash. 303)				
0227	Unnamed	Sec23,T26N,R4E	1.0	—	Unknown
0228	Unnamed	Sec25,T26N,R4E	1.2	—	Unknown
0230	Juanita Creek	Sec31,T26N,R5E	3.5	—	Coho, Sockeye
0231	Unnamed	RB-0.71	1.2	—	(Coho)
0235	Unnamed	LB-1.06	1.4	—	Coho
	Unnamed Lake	Outlet-1.4	—	—	
0236	Unnamed	RB-1.6	1.7	—	Coho
0238	Unnamed	LB-1.65	2.3	—	Coho, (Sockeye)
0241	Unnamed	LB-2.15	1.0	—	Unknown
0242	Forbes Creek	Sec31,T26N,R5E	1.8	—	(Coho)
0243	Unnamed	Sec5,T25N,R6E	1.5	—	Unknown

[1] *Begins mile 9.35 mid-point of Lake Washington.*

LOWER SAMMAMISH RIVER DRAINAGE

This six-mile section of the Sammamish River contains three very important salmon-producing tributaries. These are Swamp Creek, North Creek, and Little Bear Creek. Prominent landmarks include the towns of Kenmore, Bothell, and Woodinville located along the Sammamish River, and Stickney Lake, Martha Lake, and Silver Lake, located 8 to 10 miles north of the river.

Stream Description

Swamp Creek joins the Sammamish at R.M. 0.6. It originates from the outlet of Stickney Lake (10.9 miles) and has one major tributary, Scriber Lake Creek, which drains Scriber Lake near Lynnwood. It flows 3.1 miles easterly and enters Swamp Creek at R.M. 4.5. Swamp Creek and tributaries have a total length of 20.4 stream miles.

North Creek originates from surface drainage within the community of Intercity in the southern Everett area. It then flows south 12.6 miles to its confluence at R.M. 4.35 on the Sammamish River east of Bothell. An unnamed tributary (1.8 miles) at R.M. 4.6 in the vicinity of the Maltby Road, is the only significant salmon-producing area other than the main creek. Penny Creek at R.M. 7.6 contains over 5 miles of tributary stream area, but has a reservoir dam at R.M. 0.5 which is a total block to fish passage.

Little Bear Creek originates at about 350-foot elevation from side hill drainage approximately 1.5 miles west of Clearview. It then drains south 7.7 miles into a broad valley intercepting the Sammamish River at R.M. 5.4 near Woodinville. Little Bear Creek has 5 unnamed tributaries, each being short and with limited fish habitat.

All of these streams lie in close proximity to each other, passing through similar terrain. They are typical lowland-type streams flowing from gentle hillsides and gradually meandering down between rolling hills through swampy areas and bottomlands with widening valleys where small farms and pasturelands are prevalent. Much of the soil is glacial till and clay, with poor gravelly soil in the lands closer to Everett. There are heavy stands of small conifers and scotch broom on the hills and adjacent lands in the upper portions of these watersheds. The valley itself supports mostly deciduous trees and underbrush. The creek bottoms contain heavy stands of deciduous trees, devil's club, and underbrush or pasture grasses.

Land use within these watersheds has changed drastically over the past ten years. The trend toward small farms, stump ranches, and ranchettes (1 to 3 acres) has been replaced by large residential developments and mobile home communities interspersed with large shopping centers, many small businesses, and supporting facilities. The encroachment is causing obvious degradation and changes in many sections of these three streams. Only the marsh lands and swampy areas still remain in their natural state.

The stream gradients are very gradual for all three creeks. They all contain good pool-riffle balance with many long glide areas. Swamp Creek has been channelized in the lower 1.5 miles above Kenmore. The stream widths vary from 2 to 6 yards with some channel splitting. The quality of gravel in these streams is excellent for spawning. Stream bottoms and banks have been seriously altered under the guise of beautification and flood control and these stream sections have been destroyed for fish production.

The lower six miles of the Sammamish River is transportation and rearing water, having been completely dredged, channelized, and widened, with a channel capacity of 1,900 cfs.

Salmon Utilization

Coho and chinook are the principal species utilizing Swamp Creek, North Creek, and Little Bear Creek. Sockeye are also known to spawn in fair numbers in these creeks. Coho fingerlings rear throughout the accessible stream lengths. Chinook fry normally rear up to 90 days in the creeks before ascending into Lake Washington to start their seaward migrations. Coho fingerlings also drop downstream and rear in the Sammamish River and Lake Washington.

Limiting Factors

The low summer flows restrict the rearing capacities for coho juveniles and occasionally preclude chinook salmon from ascending these streams until mid-October. Flood damage and siltation problems from construction developments have altered many sections of these streams, making them unsuitable for spawning and rearing. Poaching is a very serious problem on all streams.

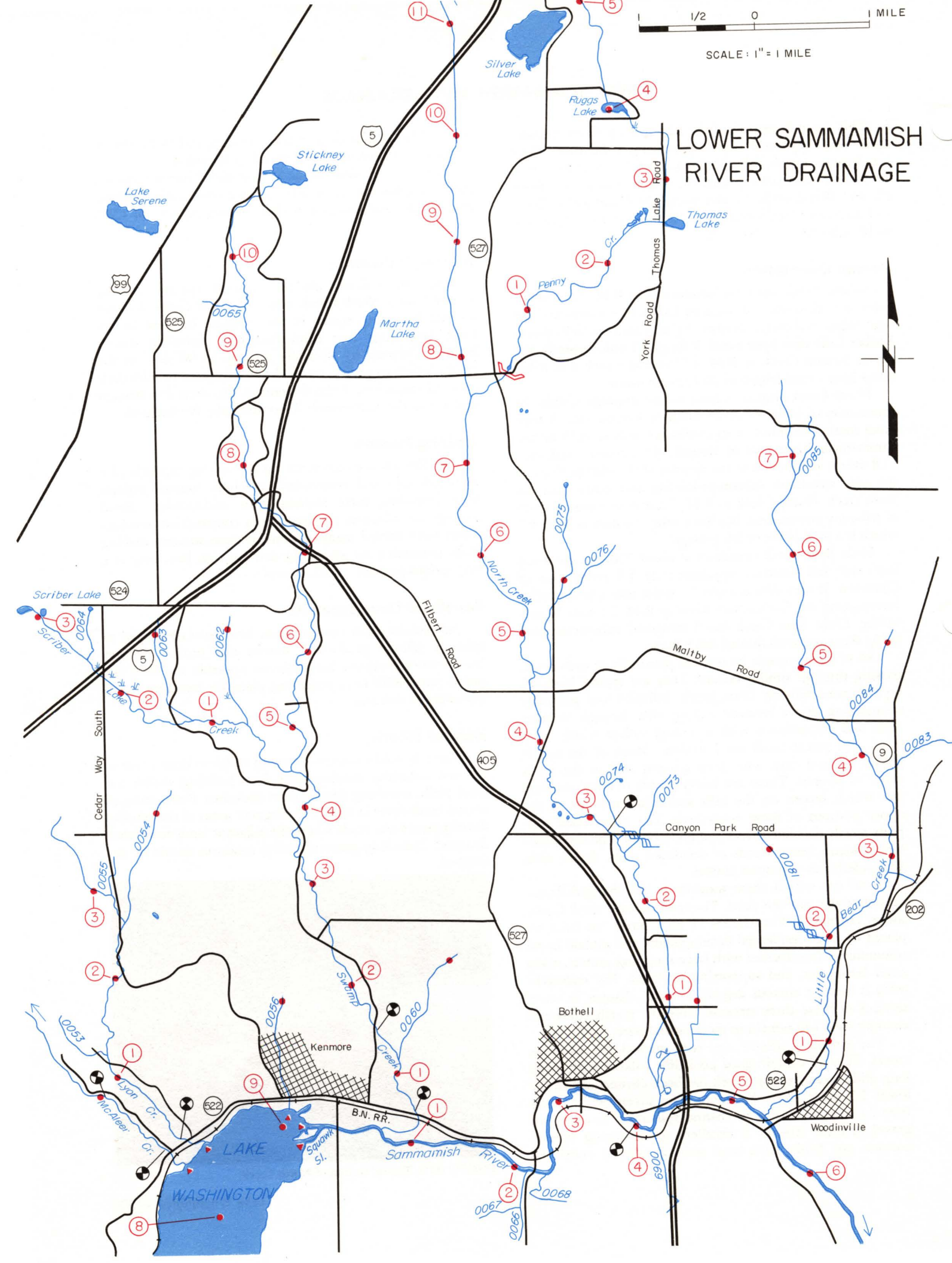
Beneficial Developments

No specific plans nor programs have been developed to enhance salmon production within this section. Stream maintenance programs keep culverts operable and clear out debris jams. RIBCO is proposing plans for handling storm drainages in this area.

Habitat Needs

There is need to develop zoning codes to keep residential and industrial developments from building within the flood plain, requiring flood control measures. Restoration of stream bank cover is needed throughout areas of community developments and roads where the adjacent lands have been denuded. Spawning gravel cleaning measures should be developed.

PHOTO 08-9. Typical section of North Creek.


LOWER SAMMAMISH
RIVER DRAINAGE
1/2 0 1 MILE
SCALE: 1" = 1 MILE
Silver Lake
Ruggs Lake
Stickney Lake
Lake Serene
Thomas Lake
Thomas Lake Road
York Road
Penny Ck.
Martha Lake
0065
0085
0075
0076
North Creek
Filbert Road
Maltby Road
0084
0083
Scriber Lake
Scriber Lake
0064
0063
0062
Cedar Way South
0054
0055
0074
0073
Canyon Park Road
0081
Bear Creek
Little Bear Creek
Swamp Creek
0056
0060
0053
Lyon Ck.
McAleer Ck.
Kenmore
Bothell
B.N. RR.
Squawk Sl.
LAKE WASHINGTON
Sammamish River
0067
0066
0068
0069
Woodinville
99
5
405
524
525
527
522
202

LOWER SAMMAMISH RIVER DRAINAGE
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
	NORTH LAKE WASHINGTON				
0057	Sammamish River	Sec11,T26N,R4E	13.8	—	Chin., Coho, Sockeye
0059	Swamp Creek	RB-0.6	10.9	—	Chin., Coho, Sockeye
0060	Unnamed	LB-1.2	1.1	—	Coho
0061	Scriber Lk. Cr.	RB-4.5	3.1	—	Coho
0062	Unnamed	LB-0.65	1.05	—	Coho
0063	Unnamed	LB-1.2	1.1	—	Coho
	Scriber Lk.	Outlet-3.1	—	—	
	Unnamed Pond	Outlet-7.56	—	—	
	Stickney Lk.	Outlet-10.9	—	—	
0070	North Creek	RB-4.35	12.6	—	Chin., Coho, Sockeye
0071	Drainage Ditch	LB-0.1	~ 1.8	—	Coho
0075	Unnamed	LB-4.6	1.8	—	Coho, (Sockeye)
	Reservoir	Outlet-1.8	—	—	
0077	Penny Creek	LB-7.6	5.1	—	Coho
	Reservoir	Outlet-0.41	—	—	
	Ruggs Lake	Outlet-3.85	—	—	
0080	Little Bear Cr.	RB-5.4	7.7	—	Chin., Coho, Sockeye
0081	Unnamed	RB-1.95	1.2	—	(Coho)
0084	Unnamed	LB-4.1	1.1	—	(Coho)
	(Continued Lake Washington 403)				

[1] *Begins mile 9.35 mid-point of Lake Washington.*

UPPER SAMMAMISH RIVER DRAINAGE

The Sammamish River is formed by the outlet of Lake Sammamish at R.M. 13.8, flowing northwesterly through a broad valley discharging into the northern end of Lake Washington at R.M. 5.5. There are 10 very small unnamed tributaries entering this section of river and one major tributary, Bear Creek. There are 5 important tributaries to Bear Creek, each with drainages greater than 2 miles in length. The total of the Bear Creek system is approximately 62.0 stream miles.

Stream Description

The Sammamish River lies between the towns of Redmond and Woodinville. In 1964 the Corps of Engineers channelized the entire Sammamish River for flood control. A low weir with a crest elevation of 25.0 ft m.s.l. was also constructed at the outlet of Lake Sammamish to regulate flow and lake level. The channel capacity from Redmond to Woodinville is 1,700 cfs and below North Creek increases to 1,900 cfs. The Sammamish valley below Redmond is 0.75 mile wide and is rapidly changing from agriculture to residential and light industrial.

Bear Creek is 12.4 miles in length, originating in Paradise Valley immediately north of Paradise Lake. It drains southwesterly to its confluence with the Sammamish River at R.M. 12.2 near Redmond. Bear Creek is endowed with 5 good tributaries: Evans Creek, 8.2 miles in length; Mackey Creek, 2.6 miles; Cottage Lake Creek, 6.65 miles; Seidel Creek, 2.8 miles; and Struve Creek, 1.8 miles. The main Bear Creek drainage lies within a flat valley approximately 1.0 mile in width. There are large ssctions of cleared land interspersed with areas of third-growth timber, deciduous trees, and brush. The more fertile lands of the watershed have undergone rapid development and residential growth within the past 10 years.

The stream gradient is gentle throughout its length with abundant pool-riffle-glide areas. The unaltered stream varies in width from 4 to 8 yards within well-defined channels containing stabilized bottom materials. Excellent spawning gravel and mostly favorable cover is present upstream of the York Road crossing at Avondale. Below this point, deeper pools and slower moving glide sections contain more silt and mud with patch gravel riffles. In the lower valley the creek is contained in a confined channel with limited stream -side cover.

Evans Creek originates 5 miles east of Redmond on Union Hill. It flows south from heavily forested hillsides through a narrow canyon with steep gradients of 200 feet per mile to the valley floor where it abruptly turns northwest until it joins Bear Creek at R.M. 2.0. The lower 2.5 miles of Evans Creek lie in the open Sammamish valley terrain. Evans Creek valley contains many farms and has some commercial use. Cascades, rapids, and small falls with large boulders, rubble, and fallen trees predominate in the canyon. A gentle gradient is evident below the swampy area at R.M. 5.0. Stream widths vary from 4 to 7 yards as it meanders through pasturelands with brush and blackberry vines along the stream banks. Good riffle-pool stability is evident with long glide areas. Bottom materials are gravel with occasional patches of aquatic vegetation.

Cottage Lake Creek originates from Little Lake and Crystal Lake about 1.5 miles north of the Woodinville-Duvall Road, and joins Bear Creek at R.M. 4.85. It is known as Daniels Creek above Cottage Lake. Cottage Lake acts as a stabilizing reservoir for this tributary resulting in limited flooding and erosion. This stream also has a gentle gradient and good pool-riffle-glide channel conditions.

All the other tributaries contain physical features and development similar to those of upper Bear Creek.

Salmon Utilization

The Sammamish River above Woodinville is utilized only as transportation and rearing water. In Bear Creek, salmon spawn and rear throughout the accessible length of the drainage. Chinook and coho are the most abundant species with good numbers of sockeye also evident. Coho ascend annually above Paradise Lake while chinook spawn from R.M. 4.0 to R.M. 11.0. Salmon have been observed in Evans Creek and Cottage Lake Creek. All the tributaries provide salmon production for coho.

Limiting Factors

Low summer flows and increased water temperatures caused by lake surface flow reduce rearing capacity for coho. Cascades, rapids, and minor falls block fish passage on several hillside tributaries. Storm runoff from farms and developments has lowered water quality.

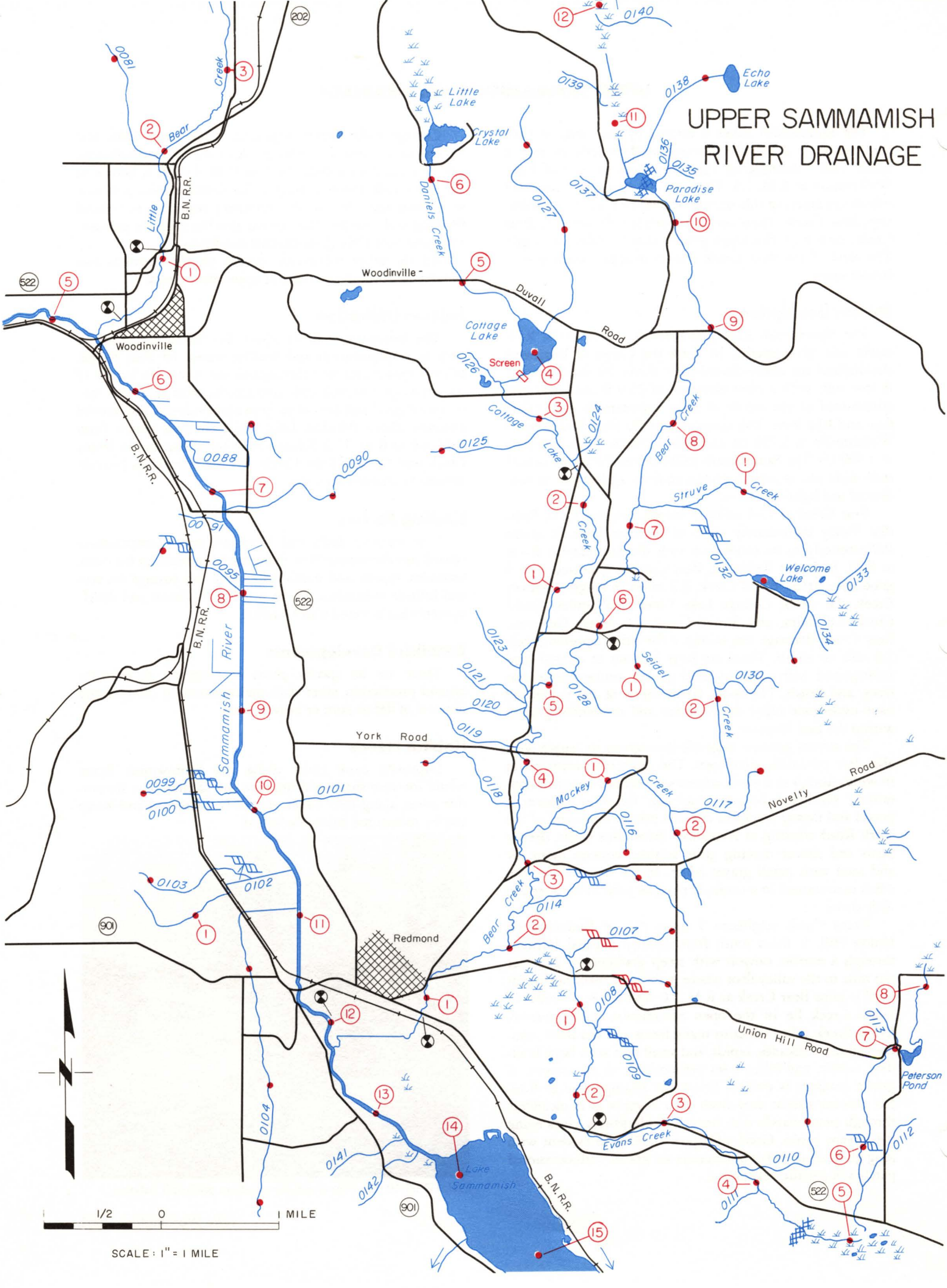
Beneficial Developments

There are no specific plans or programs to enhance salmon production other than maintenance of culverts and removal of debris jams or beaver dams.

Habitat Needs

Improved bank cover along the Sammamish River would increase shade and improve the habitat. The streamside cover along Bear Creek should be preserved and water quality monitored below Redmond.

PHOTO 08-10. Big Bear Creek has excellent pool-riffle balance.


UPPER SAMMAMISH
RIVER DRAINAGE
Woodinville
Redmond
Lake Sammamish
Little Lake
Crystal Lake
Daniels Creek
Echo Lake
Paradise Lake
Cottage Lake
Screen
Cottage Lake Creek
Bear Creek
Little Bear Creek
Struve Creek
Welcome Lake
Seidel Creek
Mackey Creek
Evans Creek
Peterson Pond
Sammamish River
B.N.R.R.
Woodinville - Duvall Road
York Road
Novelty Road
Union Hill Road
0081
0088
0090
0091
0095
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1 MILE
SCALE : 1" = 1 MILE

UPPER SAMMAMISH RIVER DRAINAGE
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
	NORTH LAKE WASHINGTON [1]				
0057	Sammamish River				Chin., Coho, Sockeye
0088	Unnamed	RB-6.55	1.4	—	(Coho)
0090	Unnamed	RB-7.3	1.6	—	(Coho)
0095	Unnamed	LB-8.0	1.2	—	(Coho)
0099	Unnamed	LB-9.8	1.0	—	(Coho)
0102	Unnamed	LB-10.6	1.6	—	(Coho)
0103	Unnamed	LB-0.35	1.1	—	(Coho)
0104	Unnamed	LB-10.95	3.15	—	Coho, (Sockeye)
0105	Bear Creek [2]	RB-12.2	12.4	—	Chin., Coho, Sockeye
0106	Evans Creek	LB-2.0	8.2	—	Coho, Sockeye
0107	Unnamed	RB-0.6	1.0	—	(Coho)
0108	Unnamed	RB-1.3	1.1	—	(Coho)
0110	Unnamed	RB-3.8	1.3	—	(Coho)
	Peterson Pond	Outlet-7.1	—	—	
0114	Unnamed	LB-2.55	1.5	—	Coho
0115	Mackey Creek	LB-3.15	2.65	—	Coho, (Sockeye)
0116	Unnamed	LB-0.4	1.0	—	(Coho)
0117	Unnamed	RB-1.8	1.0	—	Unknown
	Unnamed Lake	Outlet-2.3	—	—	
0118	Unnamed	RB-3.55	1.0	—	(Coho)
0122	Cottage Lk. Cr.	RB-4.85	6.65	—	Coho, Sockeye
0125	Unnamed	RB-2.7	1.1	—	Unknown
	Cottage Lake	Outlet-3.8	—	—	
0127	Unnamed	LB-4.1	2.3	—	Coho
	Cottage Lk. Cr. cont. as Daniels Cr.	@ mi. 4.31	—	—	Coho
	Crystal Lake	Outlet-6.11	—	—	
	Little Lake	Outlet-6.65	—	—	
0129	Seidel Creek	LB-6.61	2.8	—	Coho, (Sockeye)
0131	Struve Creek	LB-7.2	1.8	—	Coho, (Sockeye)
0132	Unnamed	LB-0.4	2.0	—	Coho, (Sockeye)
	Welcome Lake	Outlet-0.91	—	—	
	Paradise Lake	Outlet-10.3	—	—	

[1] *Begins mile 9.35 mid-point of Lake Washington.*
[2] *Shown as Evans Cr. on Topographic Map.*

UPPER SAMMAMISH RIVER DRAINAGE
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0138	Unnamed	LB-10.65	1.15	—	Coho
	Echo Lake	Outlet-1.15	—	—	
	Sammamish Lake	Outlet-13.8	—	97.7	
	(Continued Lake Washington 503)				

ISSAQUAH CREEK DRAINAGE

This section contains 3 tributaries of the southern end of Lake Sammamish near Issaquah in King County. Tibbetts and Laughing Jacobs creeks enter from west and east, and are relatively small. Issaquah Creek, the major drainage, enters the lake from the south. Issaquah Creek headwaters flow from Tiger Mountain and South Tiger Mountain, south and east of Issaquah, draining over 17.0 miles. Tributaries include North Fork Issaquah, East Fork Issaquah, Fifteen Mile, McDonald, Carey, and Holder creeks, plus twelve unnamed tributaries, and add approximately 73 linear miles.

Stream Description

Tibbetts Creek originates from springs and drainage along the west slope of Squawk Mountain, and runs 4.3 miles to the southwest corner of Lake Sammamish. The stream's lower 1.2 miles have been channelized into a formal ditch, flowing through pastureland, with residential dwellings from R.M. 1.0 to R.M. 2.0. The steep mountain hillsides are densely covered with conifers interspersed with deciduous trees and undergrowth. The stream banks are formed of earth rock cuts and solid rock faces with shale-type slide areas. The tributary streams all contain falls and steep cascades near their mouths. The bottom composition from R.M. 1.2 to R.M. 2.0 contains fair to good spawning material, but only patch gravel, rubble and boulders above.

Laughing Jacobs Creek originates from Laughing Jacobs Lake 2.9 miles east of Lake Sammamish. An impassable falls exists in the steep ravine approximately 0.5 mile upstream of the mouth. Flow is intermittent during summer months.

Issaquah Creek is the major drainage in this section with many tributaries flowing from the neighboring hillsides and distant mountains. This creek lies between Issaquah and the community of Hobart, 14.0 miles south. It heads in Holder Creek on Tiger Mountain, and in Carey Creek in a valley just east of South Tiger Mountain. Carey Creek joins Holder Creek at R.M. 11.4. East Fork Issaquah Creek lies in the main valley between Preston and Issaquah, originating on West Tiger Mountain. The East Fork joins Issaquah Creek at R.M. 2.15 in the town of Issaquah. North Fork Issaquah Creek flows from Yellow Lake, adjacent to Laughing Jacobs Lake, down a narrow valley, then into a steep ravine following the Fall City Road and intercepting Issaquah Creek north of I-90 at R.M. 1.9.

Issaquah Creek proper lies in a narrow valley about 0.25 miles wide between steep mountain walls formed of large rock outcroppings and densely covered with conifer and deciduous trees. Small farms populate the entire valley floor with dense development within the City of Issaquah. Lake Sammamish State Park is located at the mouth. Deciduous trees, brush and blackberry bushes line the stream banks throughout the area. Only within the city limits of Issaquah has riprap and other flood control measures been extensive. The mainstem of Issaquah Creek contains a very gentle gradient and ideal spawning gravel. Pool-riffle and glide areas are well dispersed with deeper pools in the lower stream section. Stream widths vary from 4 to 10 yards.

Salmon Utilization

Salmon use of Issaquah Creek for coho, chinook and sockeye is in the lower 12.0 miles of the main creek; 5.5 of East Fork; one mile of North Fork; 1.5 miles of Fifteen Mile Creek; and 2.5 miles of Carey Creek. A state salmon hatchery is located on Issaquah Creek at R.M. 3.1 within the city limits of Issaquah, allowing complete control of the numbers of each species passed upstream to spawn naturally. All fish have access to the North Fork and East Fork of Issaquah Creek when sufficient flows allow passage. Tibbetts Creek contains good salmon spawning area between mile 1.0 and 2.0 and Laughing Jacobs Creek is confined to the lower 0.5 mile. Coho is the mainnspecies with minor numbers of sockeye spawners. A select race of sockeye salmon also uses shallow, gravelly beach zones along the lake shore for spawning.

Limiting Factors

The principal limiting factor is low summer flow; however, this is compensated for, in part, by juveniles rearing in Lake Sammamish and Lake Washington. Surface layer of Lake Sammamish is often too warm in summer for the tolerance of salmon species. Highway construction, laying of interstate gas pipeline, and new home developments, all have contributed to heavy siltation and water quality problems.

Beneficial Developments

The Issaquah Hatchery has the equivalent of 21 standard rearing ponds plus three asphalt-lined ponds each approximately 0.24 acres in size. This station supplements the runs in this drainage and adjacent Lake Washington tributaries as well as other Puget Sound watersheds with plants of juvenile coho and fall chinook salmon.

Habitat Needs

Coordination of plans and associated project activities to maintain existing stream-side cover and natural stream channel conditions is imperative for all fish production streams. Reestablishment of vegetative cover where it has been removed and consideration of water quality and quantity would prove highly beneficial.

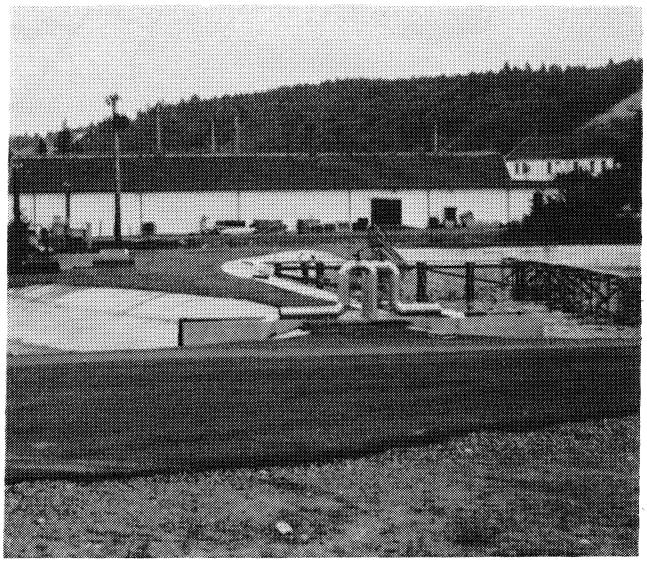
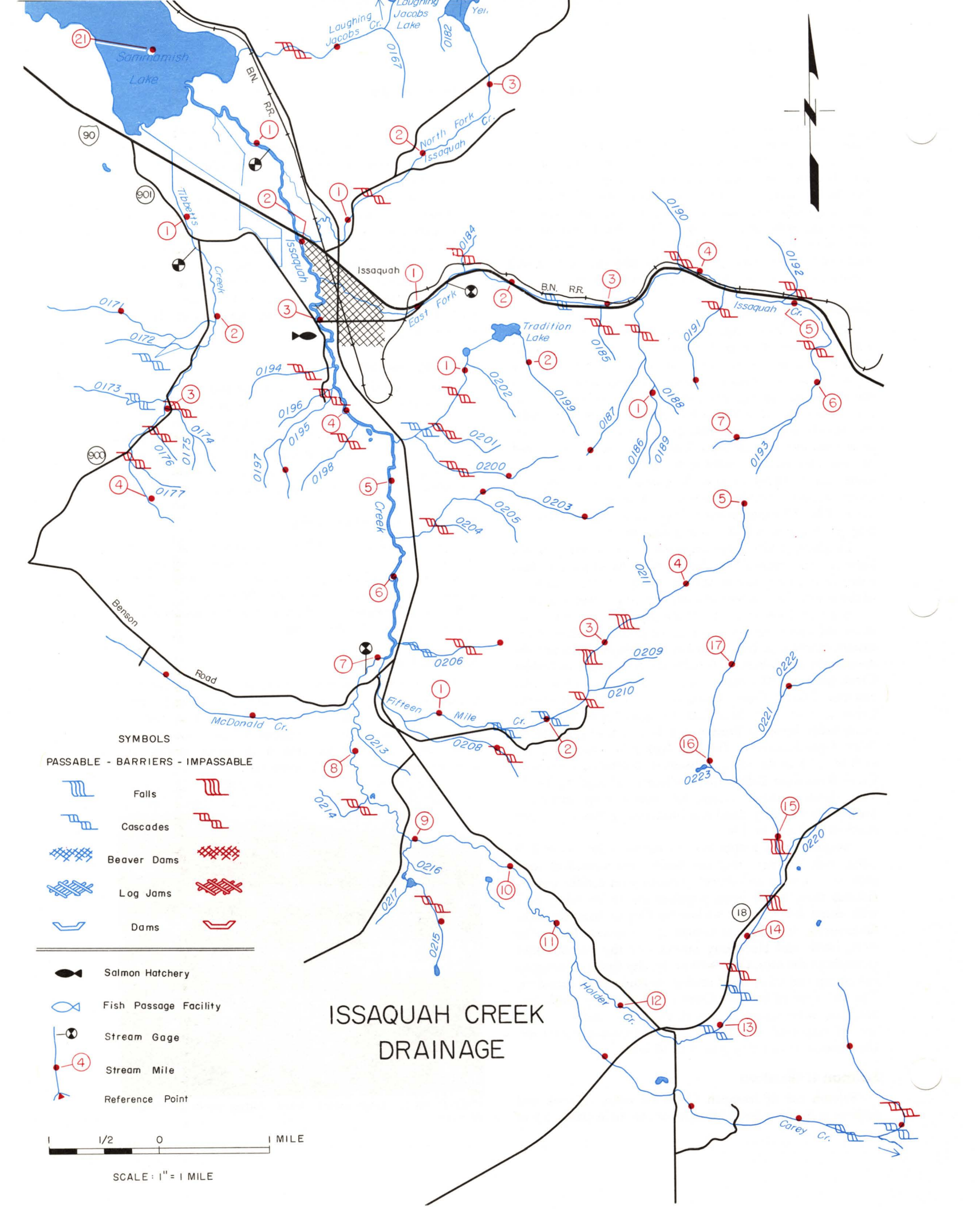


PHOTO 08-11. Large asphalt lined rearing ponds at Issaquah hatchery.


Sammamish Lake
Laughing Jacobs Lake
Laughing Jacobs Cr.
B.N. R.R.
North Fork Issaquah Cr.
Issaquah
Tibbetts Creek
East Fork
Tradition Lake
Issaquah Cr.
Benson Road
McDonald Cr.
Fifteen Mile Cr.
Holder Cr.
Carey Cr.
90
901
900
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE
ISSAQUAH CREEK DRAINAGE

ISSAQUAH CREEK DRAINAGE
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
	NORTH LAKE WASHINGTON [1]				
0057	Sammamish River				Chin., Coho, Sockeye
	Sammamish Lake	Outlet-13.8	—	97.7	
0144	Unnamed	RS-16.7	3.2	—	(Coho),(Sockeye)
	(See Lk. Wash. 103)				
0149	Unnamed	RS-17.2	2.8	—	Unknown
	(See Lk. Wash. 103)				
0152	Pine Lake Creek	RS-17.75	2.0	—	(Coho),(Sockeye)
	(See Lk. Wash. 103)				
0154	Phantom Lake Creek	LS-18.7	2.9	—	Coho, (Sockeye)
	(See Lk. Wash. 103)				
0156	Unnamed	LS-19.35	2.3	—	Coho, (Sockeye)
	(See Lk. Wash. 103)				
0160	Unnamed	LS-19.4	1.0	—	Unknown
	(See Lk. Wash. 103)				
0161	Unnamed	LS-19.8	1.0	—	Unknown
	(See Lk. Wash. 103)				
0162	Unnamed	LS-20.1	1.5	—	(Coho)
	(See Lk. Wash. 103)				
0166	Laughing Jacobs Cr.	RS-21.2	2.9	—	Coho, Sockeye
	Laughing Jacobs Lk.	Outlet-1.8	—	—	
0169	Tibbetts Creek	LS-21.3	4.3	—	(Chin.), Coho, Sockeye
0170	Drainage Ditch	RB-0.35	~ 2.0	—	Unknown
0171	Unnamed	LB-2.0	1.7	—	Coho
0178	Issaquah Creek [2]	Sec17,T24N,R6E	17.35	—	Chin., Coho, Sockeye
0181	N. Fk. Issaquah Cr.	RB-1.9	4.25	—	Coho
	Yellow Lake	Outlet-3.55	—	—	
0183	E. Fk. Issaquah Cr.	RB-2.4	7.2	—	Chin., Coho, Sockeye
0186	Unnamed	LB-3.3	1.75	—	Coho, (Sockeye)
0187	Unnamed	LB-0.6	1.05	—	None
0191	Unnamed	LB-4.3	1.1	—	(Coho)
0195	Unnamed	LB-3.7	1.2	—	Coho

[1] *Begins mile 9.35 mid-point of Lake Washington.*

[2] *Issaquah Creek is not presented as a continuation of the Sammamish River because the two streams are quite different in physical makeup.*

ISSAQUAH CREEK DRAINAGE
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0199	Unnamed	RB-4.6	2.75	—	Coho
0200	Unnamed	LB-0.25	1.5	—	Unknown
	Unnamed Lake	Outlet-1.2	—	—	
	Tradition Lake	Outlet-1.5	—	—	
0203	Unnamed	RB-5.5	2.3	—	Coho
0206	Unnamed	RB-6.7	1.0	—	Coho
0207	Fifteenmile Creek	RB-6.9	5.0	—	Chin., Coho, (Sockeye)
0208	Unnamed	LB-0.7	1.3	—	Coho
0212	McDonald Creek	LB-7.45	2.6	—	Coho
0215	Unnamed	LB-9.0	1.3	—	Coho
	Unnamed Lake	Outlet-0.3	—	—	
	Unnamed Lake	Outlet-0.4	—	—	
	Unnamed Lake	Outlet-1.3	—	—	
0218	Carey Creek	LB-11.4	5.6	—	Chin., Coho, Sockeye
	Issaquah Cr. cont. as Holder Cr.	@ mi. 11.41	—	—	
0221	Unnamed	LB-15.7	1.6	—	None

SOUTH LAKE WASHINGTON DRAINAGES

Along the east shore of Lake Washington, between the East Channel Bridge and Renton, are Mercer Slough, Coal Creek, May Creek, and one small unnamed stream. These drain the hills and low mountain range lying between the south end of Lake Sammamish and Lake Washington, and total approximately 50 stream miles.

Stream Description

Mercer Slough enters Lake Washington near Newport under the I-90 highway. Its headwaters are formed by Kelsey and Sturtevant creeks. Kelsey Creek originates from the outlet of Larsen Lake in Lake Hills and flows 4.6 miles to Sturtevant Creek, then continues as Mercer Slough for 1.7 miles to Lake Washington. Sturtevant Creek originates from the outlet of Sturtevant Lake near Midlakes in Bellevue, and flows south 1.3 miles to Mercer Slough.

The heavy peat bog valley containing Mercer Slough is rapidly being converted to commercial-industrial use. Sturtevant and Kelsey drainages also lie in the heart of industrial, business, and concentrated residential developments. The entire stream is confined within well defined cut banks with a gentle gradient. Fine gravel materials are predominant within long riffle-glide sections. The stream banks have been cleared in much of the area where residential property abuts the stream.

Coal Creek also enters the east channel of Lake Washington at Newport, flowing northwest 7.0 miles from the Newport Hill-Newcastle area. Many old coal mines are evident above Newcastle. Coal Creek drops through a very deep ravine of steep gradient between R.M. 2.7 and 4.0. An impassable cascade and log jam occurs at R.M. 2.7 and a 10-foot impassable falls at R.M. 3.7. Although Newport Hills is a highly developed residential area, Coal Creek has remained in its natural state due mainly to steepness of the ravines. The entire watershed is in a densely wooded valley below R.M. 2.7. Highway 405 crosses Coal Creek at R.M. 0.7 where the stream passes through a 457-foot culvert. Stream widths below the canyon vary from 2 to 4 yards with flows from 7 to 15 cfs in the fall-winter spawning period. The stream is confined within well defined cut banks overgrown with grass, brush and deciduous growth to its confluence with Lake Washington. The bottom composition is comprised of good quality gravel for spawning.

May Creek originates from the outlet of Lake Kathleen and flows westerly 8.6 miles to Lake Washington near Kennydale. Twelve small tributaries provide flow to May Creek. The lower three miles is heavy residential while the upper watershed is largely urban and small farms. The valley floor above R.M. 3.0 averages less than 0.25 mile wide with steep hills to the north, and gentle foothills to the south. From R.M. 1.0 to 3.0 the stream lies in a broad ravine with a gradient approaching 150 feet per mile. Heavy deciduous growth occurs along the lower four miles of stream with the upper stream only sparsely shaded with scattered deciduous vegetation through the farmlands. Conifers and heavy underbrush cover the upper hillsides. The stream bottom is composed mainly of gravel and rubble throughout much of its length, with numerous good quality spawning riffles, many glides, and few pools. The stream ranges from 2 to 4 yards in width.

Salmon Utilization

Salmon utilization extends to all accessible stretches of Kelsey Creek, Sturtevant Creek, and May Creek. It is restricted to the lower 2.7 miles of Coal Creek. Mercer Slough serves only as transportation and rearing area. Coho are the dominant species with chinook and sockeye occurring only rarely. A select race of sockeye utilizes shallow gravelly beach zones along the lake's east shore for spawning.

Limiting Factors

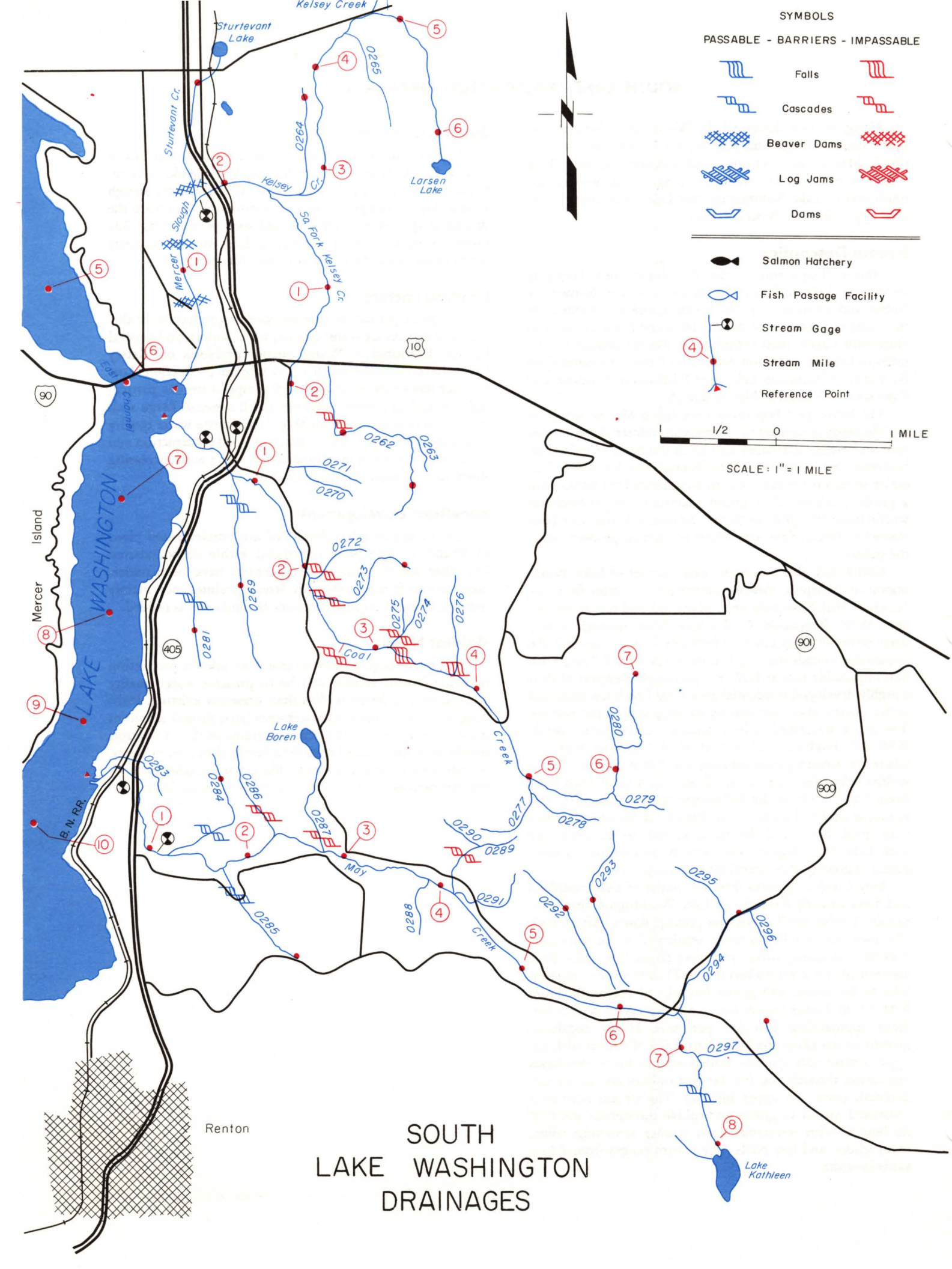
The principal factors limiting salmon production in this drainage section are water quality, water supply, and general habitat deterioration. Water quality problems on Kelsey Creek have curtailed much of its salmon production. Low summer flows with associated high temperatures are particularly crctical to rearing juveniles in all systems. Large scale residential developments on May Creek create water quality problems from storm drains, siltation, road construction and culverts. Elimination of natural cover, along with increasing storm runoff further limits production.

Beneficial Developments

City of Bellevue has developed and implemented plans to rehabilitate and preserve streams within its boundaries. No other specific projects or programs have been undertaken to benefit fish production. Stream maintenance, mainly removal of debris or small barriers, is conducted as needed.

Habitat Needs

The major requirement to maintain salmon production potential in this section will be to preserve water quality and quantity at levels no less than presently existing. Planning and coordination of water-associated project activities must consider fish and habitat requirements. Strict controls should be implemented regarding removal of stream water, introduction of storm drainage, placement of sanitary landfills and placement of culverts or bank protection devices.



SOUTH LAKE WASHINGTON DRAINAGES

SOUTH LAKE WASHINGTON DRAINAGES
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
	SOUTH LAKE WASHINGTON				
0059	Mercer Slough	Sec8,T24N,R5E	6.3	—	Chin., Coho, Sockeye
0260	Sturtevant Creek	RB-1.7	1.3	—	Coho
	Sturtevant Lake	Outlet-1.3	—	—	
	Mercer Slough cont. as Kelsey Creek	@ mi. 1.71			
0261	S. Fk. Kelsey Creek	LB-2.4	2.1	—	Coho, Sockeye
0262	Unnamed	RB-1.65	2.3	—	Coho
0264	Unnamed	RB-2.7	1.1	—	Unknown
0266	N. Branch Kelsey Cr.	RB-4.7	1.85	—	Coho
	Larson Lake	Outlet-6.3	—	—	
0268	Coal Creek	Sec17,T24N,R5E	7.0	—	Coho, (Sockeye)
0269	Unnamed	LB-0.8	1.7	—	(Coho)
0273	Unnamed	RB-2.25	1.05	—	Unknown
0281	Unnamed	Sec17,T24N,R5E	1.3	—	Unknown
0282	May Creek	Sec31,T24N,R5E	8.6	—	Chin., Coho, Sockeye
0284	Unnamed	RB-1.15	1.2	—	(Coho)
0285	Unnamed	LB-1.7	1.0	—	(Coho)
0292	Unnamed	RB-5.9	1.5	—	Unknown
0293	Unnamed	RB-6.1	1.65	—	Unknown
0294	Unnamed	RB-6.7	1.3	—	Coho
0297	Unnamed	RB-7.1	1.0	—	(Coho)
	Lake Kathleen	Outlet-8.05	—	—	

CEDAR RIVER
Renton Area

This segment extends over nine stream miles of the lower Cedar River from its mouth to the upper Jones Road Bridge. Ten small tributaries add 13.6 linear miles of stream length. The area is located within, and east of Renton. Access to much of the drainage is by Highway 169, the Renton-Maple Valley Road.

Stream Description

From the upper Jones Road Bridge, the Cedar River winds westerly for seven miles to Renton, then northwest about 1.5 miles through Renton to the southern end of Lake Washington. Principal tributaries include Madson and Molasses creeks.

The valley throughout most of this segment is relatively broad and quite flat. Bottomland cover consists of scattered stands of deciduous trees, underbrush, and some mixed conifers. Side valley terrain is relatively low, but rises abruptly from the valley floor. Here mixed deciduous and conifer growth provides the canopy. Development over the upper five miles is comprised of scattered rural and suburban residences, with a few moderate-sized farms. Toward Renton, rural development blends into mixed residential-commercial, while through Renton the commercial gives way to industrial complexes, particularly along the lower mile of Cedar River. Very heavy recreation use occurs on the river throughout this area.

The river maintains a moderate to gentle gradient all the way through this section, with its stable channel containing a few channel splits. Summertime stream widths range from about 12 to 25 yards, averaging 20 yards. A good-to-excellent pool-riffle balance exists through most of this section, with numerous long gliding riffles predominating. The stream bottom is mainly gravel and rubble composition, for the most part quite stable. Algae growth is heavy in some areas during the warmer summer months. Stream banks are characterized by low earth cuts, broad gravel-rubble beaches, or artificially contoured and riprapped stretches. Many of the lower river banks, particularly in the vicinity of Renton, have experienced extensive bank protection work. Stream side cover has intermittent stands or thickets of deciduous trees and underbrush separated by lengthy areas of cleared land. Most of the smaller tributaries entering within this stretch exhibit moderate to gentle gradient as they cross the valley floor; however, they are relatively steep as they fall from the adjacent hillsides above. Some offer limited access from the Cedar, presenting mainly gravel and sand bottoms.

Salmon Utilization

For its size, the Cedar River in this section supports one of the largest populations of salmon in the state. It provides transportation, excellent spawning and rearing conditions, and is utilized by chinook, coho, and sockeye salmon. Exceptional numbers of sockeye and a large population of chinook spawn in the extensive riffles in this area. The heaviest spawning concentrations occur in the upper five miles of this section. The small tributaries entering along this stretch have a limited use by coho and sockeye.

Limiting Factors

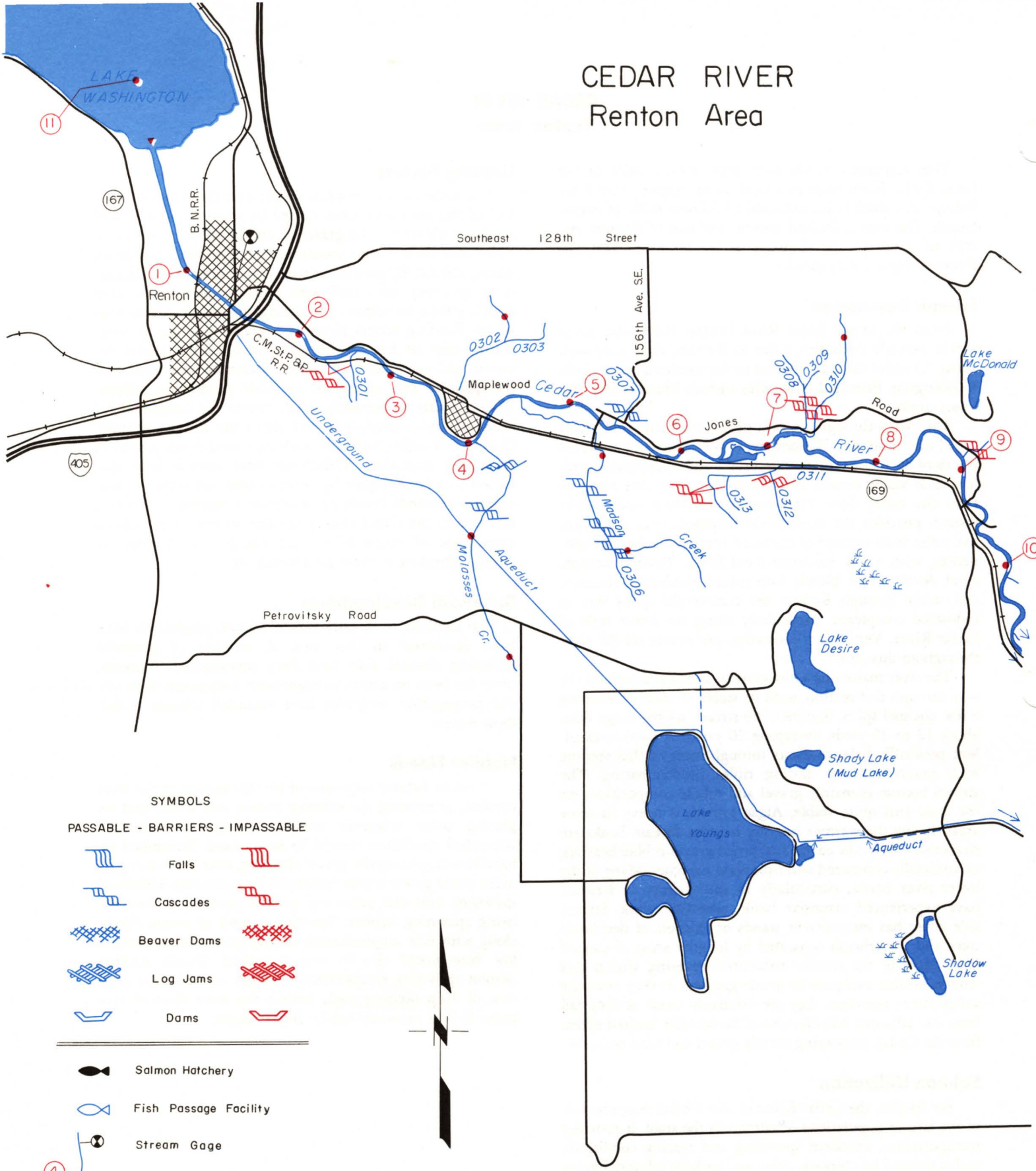
Streambed quality tends to deteriorate through the lower half of this stretch of river, caused by increased amounts of sand and silt within the gravel. A number of high clay bank slides contribute to this contamination. Persistent low flows during critical dry seasons, as well as occasional flow fluctuations generally associated with power peaking, can have drastic effects on salmon populating the system. Occasional severe flooding scours streambed gravel containing incubating eggs or fry. Streambed channelization, gravel removal, and some bank protection activities have restricted the quantity and quality of available production habitat. Water quality is presently good, except for occasional releases of toxic materials in and about the Renton vicinity. Quality will suffer, however, with increased development in the upper watershed. Tributaries have already been disturbed to a large degree by development occurring in their upper watersheds. Poaching of salmon is serious within this area due to the river's close proximity to heavily populated areas, ease of accessibility, and exceptional number of salmon returning to these waters each fall.

Beneficial Developments

No facilities to directly benefit salmon production have been developed in this area. A number of potential spawning channel sites have been investigated; however, there has been no action to implement such projects. Artificial propagation programs have included releases within these waters.

Habitat Needs

A major habitat requirement for this section of the river involves preserving the existing stream side cover, and replacing cover wherever possible. Natural streams and streambed conditions should be maintained. Streambed rehabilitation, principally gravel cleaning, over the lower four miles could prove highly beneficial by providing additional spawning area and achieving greater production from existing spawning habitat. Effective control of severe floods, along with flow augmentation during periods of prolonged low flow would also be very beneficial. Should sockeye salmon spawning escapements continue to build, the creation of deep holding pools within the river channel may prove to be a necessary habitat requirement.


CEDAR RIVER
Renton Area
LAKE WASHINGTON
11
167
B.N.R.R.
1
Renton
2
C.M.St.P.&P. R.R.
3
4
405
Southeast 128th Street
156th Ave. S.E.
0302
0303
0301
Maplewood
Cedar
5
0307
Underground
6
Jones
7
0308
0309
0310
Road
Lake McDonald
River
8
9
169
0311
0313
0312
Madson
Creek
0306
10
Molasses
Aqueduct
Cr.
Petrovitsky Road
Lake Desire
Shady Lake (Mud Lake)
Lake Youngs
Aqueduct
Shadow Lake
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE

CEDAR RIVER — RENTON AREA
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0299	Cedar River	Sec7,T23N,R5E	58.0	188.0 [1]	Chin., Coho, Sockeye
0302	Unnamed	RB-3.4	1.2	—	Coho
0304	Molasses Creek	LB-4.05	2.1	—	Coho, Sockeye
0305	Madson Creek	LB-4.5	2.9	—	Coho
0310	Unnamed	RB-7.25	1.2	—	(Coho)
0311	Unnamed	LB-7.75	1.7	—	Unknown
	(Cont. Lk. Wash. 803)				

[1] *Includes 3.67 square miles in vicinity of Youngs Lake.*

CEDAR RIVER
Maple Valley Area

This segment encompasses the Cedar River from the upper Jones Road Bridge upstream 12 miles to the Landsburg pipeline crossing. Eight tributaries enter within this stretch, adding 24.4 linear miles of stream length. The area is located about seven miles east of Renton in central King County. Access to the area is via Highway 169, Renton-Maple Valley, and the Ravensdale-Issaquah Road.

Stream Description

From Landsburg, the Cedar River winds west and northwest nearly seven miles to the community of Maple Valley, then continues northwest some five miles to the upper Jones Road Bridge. Principal tributaries in this section include the Walsh Lake Diversion Ditch, Downs Creek, and Rock Creek.

From Landsburg to Maple Valley, the Cedar flows through a relatively shallow, narrow valley with moderately steep hillsides. Bottomland cover is mainly deciduous timber and underbrush with some mixed conifers. Side slopes contain mostly conifer timber. Rural residences are scattered along the upper reaches. The area becomes more heavily populated near Maple Valley. Some patch clearing and selective logging occurs on the upper slopes, generally away from the river. Considerable recreation use is made of the entire area, including mass salmon spawning as a major attraction.

Below Maple Valley, the Cedar winds across a relatively broad, flat valley floor, bordered by low, steep-sloped hillsides. Bottomland cover consists mainly of intermittent stands of mixed deciduous trees and underbrush separated by increasing amounts of cleared area. Scattered rural development exists throughout this lower section with some agricultural land use.

The stream gradient over the upper 1 to 2 miles of this section is moderate to moderately steep, presenting fast riffles with considerable large rock and boulders, and limited patch gravel. Downstream the gradient decreases, and is moderate through the remainder of this section. Summertime widths range generally from 12 to over 20 yards, averaging about 17 yards. The channel is stable and relatively confined throughout the section with only occasional channel splitting. Bottom composition is predominantly silt free gravel and rubble with numerous broad and lengthy riffles offering excellent spawning habitat. Considerable algae growth occurs in places during warmer summer months. Stream banks are mainly stable earth or rock cuts through most of the upper half of this section, with increasing bank stabilization and riprapping below Maple Valley. A number of very large, steep gravel banks border the stream through the upper five miles, and erosion from these contributes vital spawning material to the river below.

Salmon Utilization

This segment of Cedar River supports exceptionally large populations of salmon. It provides transportation, and extensive spawning and rearing habitat, utilized by large numbers of chinook, coho, and especially sockeye salmon. Chinook and sockeye spawn in the mainstem river, with coho and sockeye populating the larger tributaries. The most intensive use occurs over the lower ten miles while the upper two miles receive moderate use.

Limiting Factors

The principal factor limiting salmon production is the pipeline crossing near Landsburg (R.M. 21.4), a 5 to 6-foot barrier to nearly all migrating fish. This barrier plus the diversion dam has also blocked gravel substrate recruitment in upper accessible portions of the river, and is responsible for the poorer quality spawning area in the two-mile section below the pipeline crossing. Persistent low flows during fall months of critical dry years, along with occasional extreme fluctuations during power peaking, restrict production capabilities. Also, severe floods disturb spawning gravel to the extent of destroying incubating eggs or developing fry. Stream channelization, gravel removal, and certain bank protection activities disrupt and destroy existing production habitat. Water quality is presently quite good, but will be affected with increased development. Poaching of salmon is at times a problem because of the ease of accessibility to the river, plus the attractiveness of the large salmon runs.

Beneficial Developments

No facilities have been developed to directly benefit salmon production; however, investigations have located potential spawning and egg incubation sites for future use. Plants of juvenile salmon, particularly chinook, from the Issaquah Hatchery have been made in previous years to supplement natural production. A potential for extensive increase in salmon production could be realized by providing fish passage facilities over the pipeline barrier and diversion dam located just upstream. This would also necessitate screening of water intakes at the diversion dam to protect juveniles as they migrated downstream.

Habitat Needs

A major habitat requirement for this section of Cedar River involves preserving existing stream side cover, profile, and streambed conditions. Preservation of the deeper pools is desirable to provide protection and holding waters for maturing sockeye salmon. Effective flood water storage plus increased opportunity for flow augmentation during prolonged low flow periods would be highly beneficial.

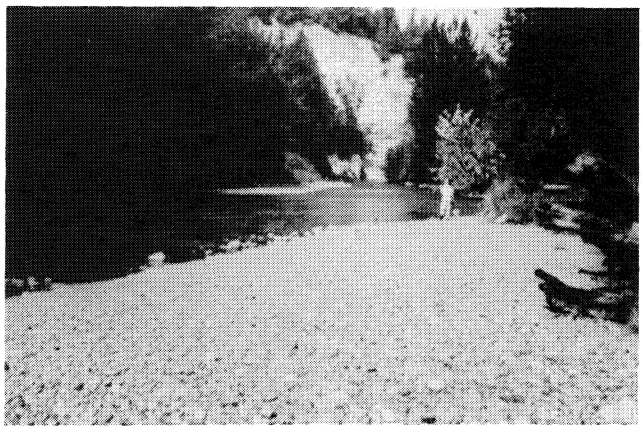
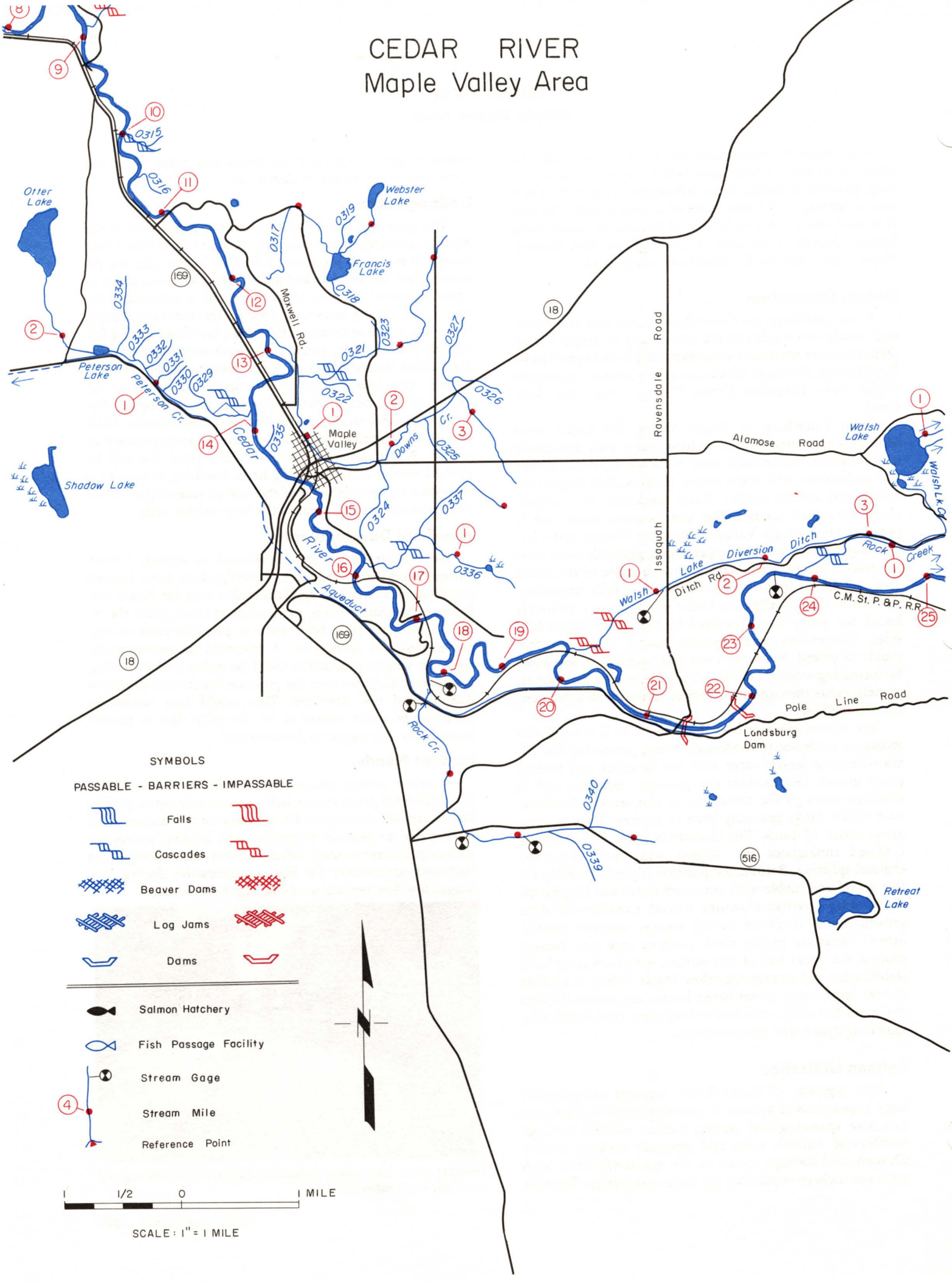


PHOTO 08-12. Ideal salmon production habitat is found throughout the Cedar River valley.


CEDAR RIVER
Maple Valley Area
Otter Lake
Webster Lake
Francis Lake
Peterson Lake
Shadow Lake
Maple Valley
Walsh Lake
Retreat Lake
Landsburg Dam
Maxwell Rd.
Peterson Cr.
Cedar River
Downs Cr.
Rock Cr.
Aqueduct
Ravensdale Road
Alamose Road
Issaquah Pole Line Road
Walsh Lk. Cr.
Diversion Ditch
Rock Creek
Walsh Lake Ditch Rd.
C.M. St. P. & P. R.R.
0315
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0335
0336
0337
0339
0340
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE

CEDAR RIVER — MAPLE VALLEY AREA
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0299	Cedar River				Chin., Coho, Sockeye
0317	Unnamed	RB-12.1	2.2	—	Unknown
	Francis Lake	Outlet-1.55	—	—	
	Webster Lake	Outlet-2.2	—	—	
0320	Downs Creek	RB-12.8	3.7	—	Coho, Sockeye
0321	Unnamed	RB-0.5	2.3	—	Coho, (Sockeye)
0328	Peterson Creek	LB-13.8	2.6	—	Coho, Sockeye
	Peterson Lake	Outlet-1.55	—	—	
	Otter Lake	Outlet-2.6	—	—	
0336	Unnamed	RB-15.85	1.6	—	Coho, (Sockeye)
0337	Unnamed	RB-0.65	1.0	—	Unknown
	Unnamed Lake	Outlet-1.3	—	—	
0338	Rock Creek	LB-18.15	3.2	—	Chin., Coho, Sockeye
0341	Walsh Lk. Diversion	RB-19.7	8.3	—	Coho, (Sockeye)
	(See Lk. Wash. 903)				
	(Cont. Lk. Wash. 903)				

[1] *Includes 3.67 square miles in vicinity of Youngs Lake.*

CEDAR RIVER
Landsburg Area

This segment includes the mainstem Cedar River from the Landsburg pipeline crossing upstream to the City of Seattle's Masonry Dam, more than 14 stream miles. Ten tributaries provide an additional 73.1 linear stream miles. The area is located about 12 miles southeast of Renton in central King County, and is accessible via the Issaquah-Ravensdale Road near Landsburg and the North Bend Road to Cedar Falls. Private roads extend into the watershed. The entire area is within the City of Seattle's watershed. The Walsh Lake Ditch-Rock Creek drainage is depicted on the accompanying map even though it enters the Cedar downstream (see Lake Washington 800).

Stream Description

From the Masonry Dam the Cedar River flows west about two miles to the small community of Cedar Falls, then west-southwest for approximately 12 miles to Landsburg. The principal tributaries are Williams Creek and Taylor Creek.

Ravine and canyon-like conditions prevail over the upper two miles, between Cedar Falls and the dam. From Cedar Falls downstream four miles to the vicinity of Taylor Creek, the Cedar flows through a relatively narrow, steep-sloped valley. Below this the shallow valley intermittently broadens and narrows all the way to Landsburg Dam. Dense cover consists mainly of conifer timber with mixed deciduous growth near the river bottom. The principal land use is as a storage watershed, providing a domestic supply for Seattle. Some logging has occurred, primarily on the upper slopes away from the river. There is limited recreation use of the area due mainly to inaccessibility associated with present land management practices. Essentially the only developments within the watershed have to do with Seattle's water storage, water diversion, and power production facilities. Water is diverted at the Masonry Dam through penstocks to the power production station at Cedar Falls. At Landsburg (R.M. 21.8) water is diverted into a pipeline which carries it to the Lake Young Reservoir southeast of Renton.

Gradient is very steep over the upper two miles below the Masonry Dam, with numerous cascades and falls with a predominantly boulder and rubble stream bottom. Stream widths range generally from 4 to 8 yards. Below Cedar Falls the gradient changes intermittently from moderate to moderately steep, providing fast riffle-type conditions, some rapid areas, and a few deep pools. The channel remains confined with widths ranging from 8 to 17 yards. The stable bottom is mainly boulders and rubble, with patch gravel riffles and side beach gravel stretches.

Below Taylor Creek the gradient is moderate except for a short stretch (R.M. 26.5-28.0) containing a few rapids and considerable large rock material. Summertime widths of the confined channel range from 12 to 20 yards, averaging 17 yards. Favorable pool-riffle conditions exist through this lower seven miles. The bottom is predominantly clean gravel and rubble, with numerous broad gravel riffles and long, relatively deep glides. Stream banks are stable rock or earth cuts, with relatively few gravel-rubble side beaches. Cover is mixed deciduous and conifer timber and thick underbrush. A few areas show signs of old logging operations; however, these are undergoing natural reforestation. The 0.5 mile between the diversion dam and the pipeline barrier has moderate gradient, good to excellent pool-riffle configuration and a bottom of gravel and rubble-sized material.

Salmon Utilization

Presently there is no salmon utilization within this section of Cedar River. Salmon do not ascend above the pipeline barrier marking the lower boundary of this segment. Since there are no facilities to transport juvenile salmon safely downstream past the diversion dam, no plants have been made. The Cedar River and a number of its tributaries within this section offer considerable potential for both spawning and rearing, suitable for chinook, coho, and sockeye salmon.

Limiting Factors

Present watershed management policies by Seattle preclude attempts to reestablish historical fisheries resource production to this productive stream section. The pipeline barrier (R.M. 21.4) presents a 5 to 6-foot falls, virtually eliminating use of the entire area. The diversion dam located just upstream also presents a total barrier. Conflicting view regarding impact by natural fish production on water quality of Seattle's domestic supply have influenced considerations for mitigation efforts.

Beneficial Developments

No projects or programs have been undertaken within this section of watershed to directly benefit salmon production. Nearly 13 miles to R.M. 34 could be utilized by providing adult salmon passage facilities over the pipeline barrier and diversion dam. At the same time it would be necessary to install screens at the diversion dam to protect downstream migrating juveniles. As an alternative, this upper river section could be utilized strictly as a rearing area for artificially-produced fish, this again calling for screening of the diversion.

Habitat Needs

The major requirement for maintaining the fish production potential of this area involves preserving existing stream side cover, as well as maintaining in as near a natural state as possible, the existing stream profile and streambed characteristics.

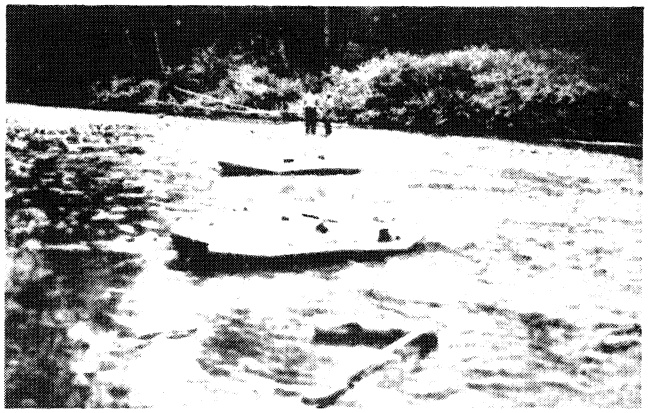
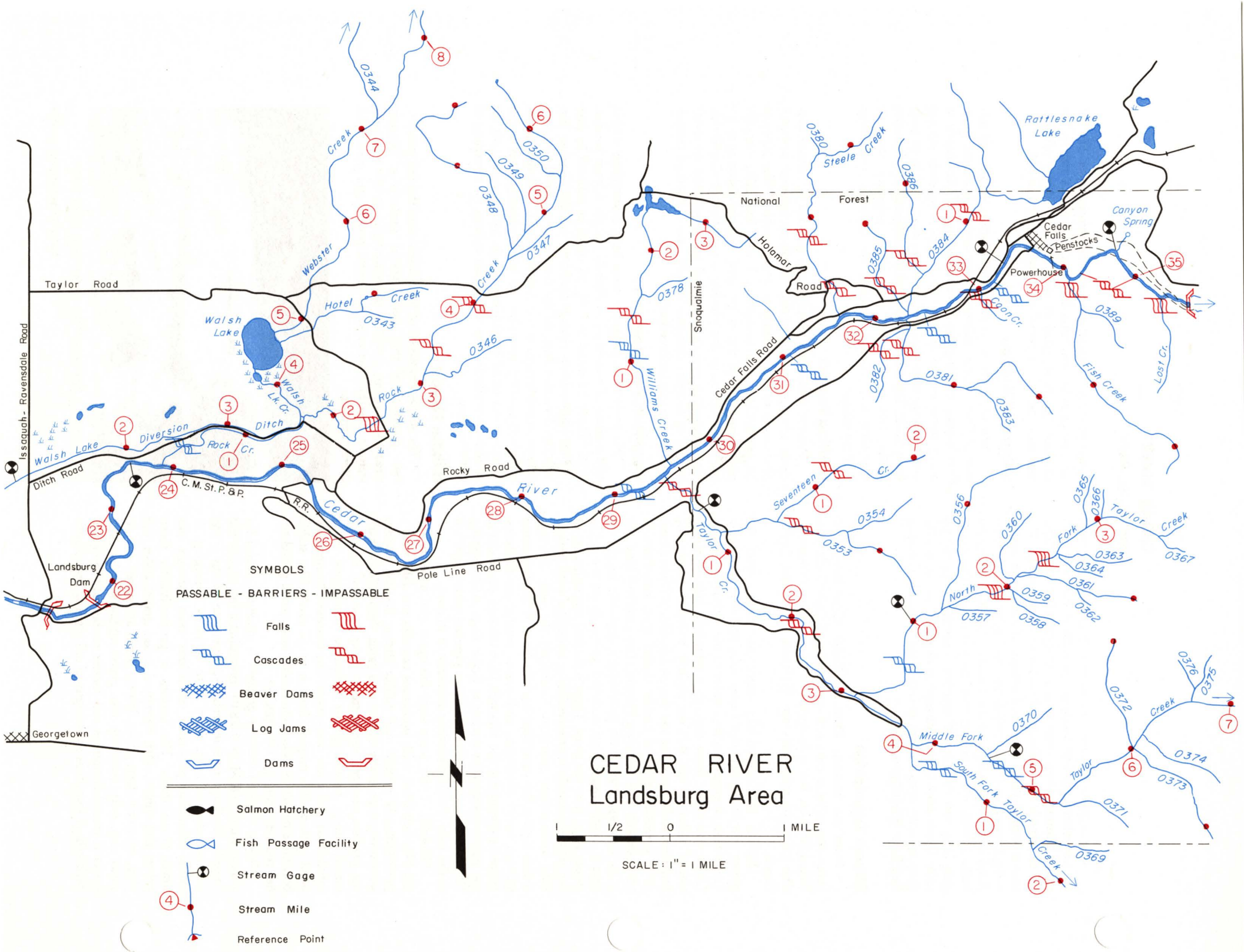


PHOTO 08-13. Spawning riffles on the upper Cedar River.


Taylor Road
Issaquah - Ravensdale Road
Ditch Road
Walsh Lake
Walsh Lake Diversion Ditch
Walsh Lk. Cr.
Rock Cr.
Webster Creek
Hotel Creek
Rock Creek
0344
0343
0346
0348
0349
0350
0347
Landsburg Dam
C. M. St. P. & P. R.R.
Cedar River
Rocky Road
Pole Line Road
Georgetown
Snoqualmie National Forest
Holamar Road
Cedar Falls Road
Williams Creek
0378
Steele Creek
0380
0386
0385
0384
Rattlesnake Lake
Cedar Falls Penstocks
Canyon Spring
Powerhouse
Lyon Cr.
0389
Fish Creek
Lost Cr.
0382
0381
0383
Seventeen Cr.
0354
0353
Taylor Cr.
0356
0360
0365
0366
Taylor Creek
Fork
0363
0364
0361
0362
0359
0358
0357
North
0367
Middle Fork
South Fork Taylor
0370
0372
0376
0375
Creek
0374
0373
0371
0369
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
CEDAR RIVER
Landsburg Area
1/2 0 1 MILE
SCALE: 1" = 1 MILE

CEDAR RIVER — LANDSBURG AREA
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0299	Cedar River			—	
0341	Walsh Lk. Diver. Ditch	RB-19.7	8.3	—	(Chin.), Coho, (Sockeye)
	Walsh Lk. Diver. Ditch cont. as Walsh Lk. Cr.	@ mi. 3.71	—	—	
	Unnamed Lake	Outlet-4.2	—	—	
	Walsh Lake	Outlet-4.35	—	—	
0342	Hotel Creek	LB-4.55	1.5	—	None
	Walsh Lk. Cr. cont. as Webster Cr.	@ mi. 4.71			
0344	Unnamed	RB-7.15	1.1	—	None
0345	Rock Creek	RB-23.9	6.5	—	None
0348	Unnamed	RB-4.6	2.1	—	None
	Unnamed Lake	Outlet-6.5	—	—	
0351	Taylor Creek	LB-29.5	7.5	—	None
0352	Seventeen Creek	RB-0.8	2.1	—	None
0353	Unnamed	LB-0.5	1.55	—	None
0355	N. Fk. Taylor Cr.	RB-3.1	3.8	—	None
0356	Unnamed	RB-1.3	1.9	—	None
0361	Unnamed	LB-2.11	1.0	—	None
0368	M. Fk. Taylor Cr.	LB-3.8	2.55	—	None
	Taylor Cr. cont. as M. Fk. Taylor Cr.	@ mi. 3.81			
0372	Unnamed	RB-6.0	1.0	—	None
0373	Unnamed	LB-6.01	1.1	—	None
0377	Williams Creek	RB-29.6	3.6	—	None
	Unnamed Lake	Outlet-2.5	—	—	
0379	Steele Creek	RB-31.7	2.4	—	None
0381	Unnamed	LB-32.29	2.2	—	None
0384	Unnamed	RB-32.3	1.7	—	None
0385	Unnamed	RB-0.01	1.0	—	None
0386	Unnamed	RB-0.4	1.4	—	None
0388	Fish Creek	LB-34.15	2.2	—	None
	(Cont. Lk. Wash. 1003)				

CEDAR RIVER
Headwaters

The upper Cedar River drainage includes 22.4 miles of mainstem river, plus 39 tributaries adding 94.2 linear stream miles. The section is located approximately eight miles southeast of North Bend in eastern King County, and is accessible from North Bend via county and private roads. The drainage is within City of Seattle watershed, and is bordered by Snoqualmie National Forest.

Stream Description

From Lost Lake, located in the high mountain reaches about six miles south of Snoqualmie Pass, the river begins as the North Fork Cedar. It falls in a west, southwest direction more than five miles to its confluence with the South Fork, and from here courses generally northwest nearly 1; miles through Chester Morse Lake, a major Seattle City reservoir. Below this the Cedar flows into Masonry Pool. This small, narrow reservoir angles west approximately 1.5 miles to the Masonry Dam. From here flow is diverted through penstocks to Seattle's Cedar Falls Power Plant located nearly two miles west on the bank of the main Cedar River. The major tributaries contributing to the upper drainage include the South Fork Cedar, Rex River, and Boulder Creek.

The majority of the upper Cedar drainage, above Seattle Creek (R.M. 48.0) is moderately steep mountain terrain. The North Fork, South Fork, and mainstem below the confluence has cut through shallow ravines or small canyon-like areas, timbered with moderate to dense stands of conifer timber. Although the principal land use is watershed for domestic supply, large sections of clear-cut logging has taken place on the adjacent side slopes. Many logging roads extend into these hillsides. Below Seattle Creek the valley floor begins to broaden slightly with adjacent hillsides rising less steeply. While the widening bottomland contains deciduous timber and underbrush, the side hills maintain predominantly conifer cover, with only a few recent logging operations evident. Stream side areas, logged in the past, appear in various stages of natural reforestation. The same is true for the shoreline bordering both Chester Morse Lake and the Masonry Pool (Cedar Lake).

Stream channel characteristics range from steep and mountainous above Seattle Creek to more moderate gradients proceeding downstream. Both the North Fork and South Fork fall rapidly from their source, presenting numerous falls and cascades with boulder and rubble stream bottoms, generally ranging from 3 to 5 yards. Immediate stream side cover is dense except where recent clear-cut logging has occurred.

Below Seattle Creek the gradient decreases and channel broadens toward Chester Morse Lake. The stream profile contains fast riffles for the next 2 to 3 miles, with fewer rapids and more pools. The river remains relatively confined through this section with only occasional areas of channel splitting, the stream ranging generally 5-15 yards in width during summer. The stream bottom offers mostly gravel and rubble composition, but shows signs of siltation approaching the lake. The lower 3 to 4 miles of river, above the lake, present high quality pool and riffle conditions. Stream banks throughout this lower section are generally quite low, natural earth or rock cut, with increasing stretches of gently sloping gravel-rubble beaches. Stream bank cover of deciduous trees and brush ranges from sparse to dense, depending on the degree of reforestation.

The Rex River, a principal tributary entering the south shore of Chester Morse Lake, offers predominantly moderate gradient conditions through its lower two miles. Here, stream widths range generally from 3 to 10 yards. The channel is relatively confined with mostly fast riffles, few pools, and substrate of rubble and gravel, interspersed with boulders. Headwaters exhibit the same characteristics as the South Fork and North Fork Cedar.

Salmon Utilization

There is no salmon utilization throughout the entire upper Cedar River drainage.

Limiting Factors

Salmon are restricted from utilizing the upper Cedar basin by the pipeline crossing and the water diversion dam at Landsburg. The area has salmon production potential, but habitat has been impacted by logging and road building activities.

Beneficial Developments

No facilities, projects, or programs have been implemented in the upper Cedar basin to benefit salmon production.

Habitat Needs

Salmon production potential within the Cedar River headwater section should be maintained in the event that future usage becomes a reality. This requires prudent stream and watershed management practices. Reservoir storage for low flow augmentation and/or flood control would be beneficial for salmon production in the lower river.

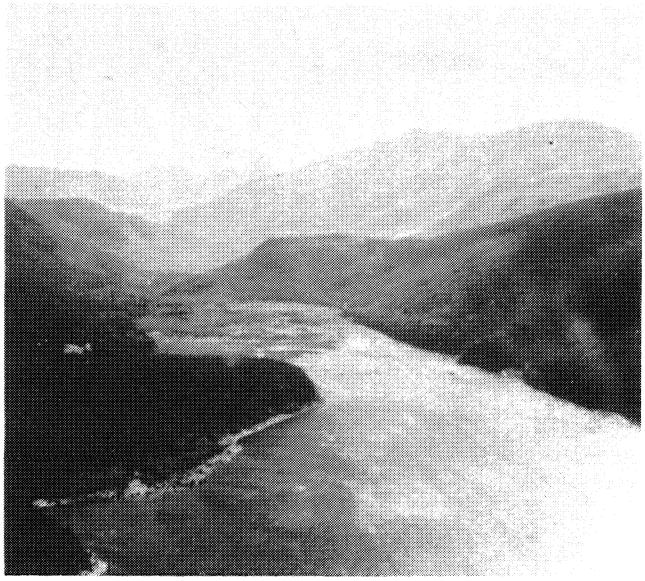
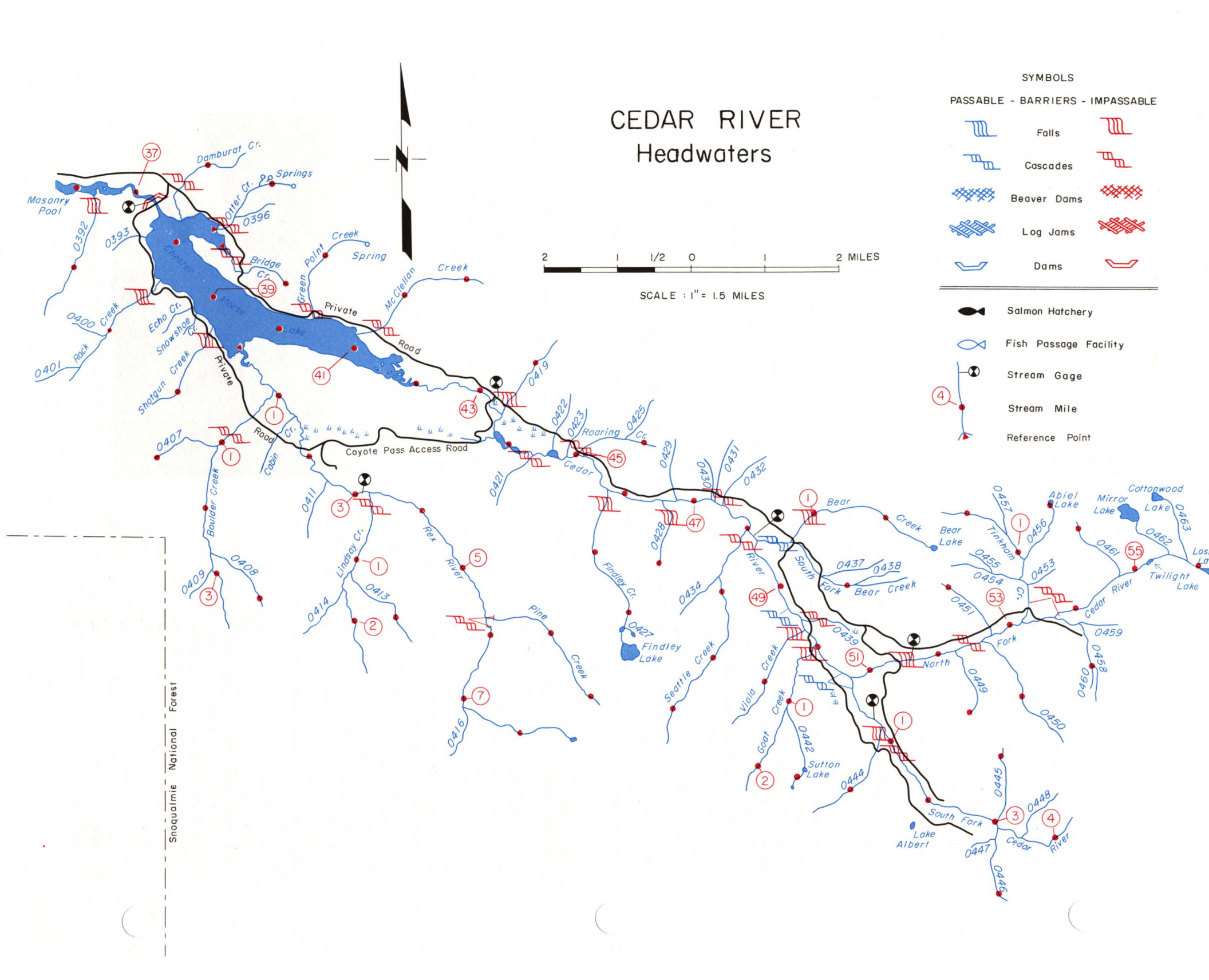


PHOTO 08-14. Cedar Lake forms the upper Cedar River watershed.


CEDAR RIVER
Headwaters
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
2 1 1/2 0 1 2 MILES
SCALE : 1" = 1.5 MILES
Snoqualmie National Forest
Masonry Pool
Damburat Cr.
Springs
Otter Cr.
Bridge Cr.
Green Point Creek
Spring
McClellan Creek
Chester Morse Lake
Private Road
Echo Cr.
Snowshoe Cr.
Shotgun Creek
Rock Creek
Private Road
Cabin Cr.
Coyote Pass Access Road
Roaring Cr.
Cedar
Boulder Creek
Lindsay Cr.
Rex River
Pine Creek
Findley Cr.
Findley Lake
Seattle Creek
South Fork Cedar River
Bear Creek
Bear Lake
Tinkham Cr.
Abiel Lake
Mirror Lake
Cottonwood Lake
Twilight Lake
Cedar River
North Fork
Viola Creek
Goat Creek
Sutton Lake
Lake Albert
South Fork Cedar River
0392
0393
0396
0400
0401
0407
0408
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0411
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CEDAR RIVER — HEADWATERS
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0299	Cedar River				None
0392	Unnamed	LB-36.2	1.7	—	None
0394	Damburat Creek	RB-37.8	1.5	—	None
0395	Otter Creek	RB-38.0	1.2	—	None
0398	Bridge Creek	RB-38.01	1.0	—	None
0399	Rack Creek	LB-38.3	1.8	—	None
0404	Shotgun Creek	LB-39.1	1.4	—	None
0405	Rex River	LB-39.6	8.6	—	None
0406	Boulder Creek	LB-0.9	3.7	—	None
0407	Unnamed	LB-1.1	1.0	—	None
0408	Unnamed	RB-2.7	1.1	—	None
0412	Lindsay Creek	LB-3.2	2.8	—	None
0413	Unnamed	RB-1.2	1.4	—	None
0415	Pine Creek	RB-5.7	2.2	—	None
	Unnamed Lake	Outlet-8.6	—	—	
0417	Green Point Creek	RB-40.4	1.7	—	None
0418	McClellan Creek	RB-40.9	2.3	—	None
0419	Unnamed	RB-43.45	1.4	—	None
0424	Roaring Creek	RB-45.0	1.2	—	None
0426	Findley Creek	LB-45.75	2.4	1.95	None
	Unnamed Lake	Outlet-2.21	—	—	
	Findley Lake	Outlet-2.4	—	—	
0433	Seattle Creek	LB-48.05	3.5	3.75	None
0435	Bear Creek	RB-48.2	2.7	—	None
0436	S. Fork Bear Cr.	LB-0.45	1.7	—	None
	Bear Lake	Outlet-2.7	—	—	
0440	Viola Creek	LB-49.7	1.8	0.64	None
0441	Goat Creek	LB-49.95	2.4	—	None
0442	Unnamed	RB-1.1	1.1	—	None
	Sutton Lake	Outlet-0.8	—	—	
	Unnamed Lake	Outlet-1.1	—	—	
0443	S. Fork Cedar River	LB-50.65	4.4	—	None
0444	Unnamed	LB-0.8	1.6	—	None
0445	Unnamed	RB-3.0	1.1	—	None
0446	Unnamed	LB-3.1	1.1	—	None
	Cedar R. cont. as N. Fork Cedar R.	@ mi. 50.66	—	10.3	
0449	Unnamed	LB-52.2	1.0	—	None

CEDAR RIVER — HEADWATERS
Lake Washington Basin — WRIA 08

Stream Number	Stream Name	Location Of Mouth	Length	Drainage Area	Salmon Use
0450	Unnamed	LB-52.6	1.9	—	None
0451	Unnamed	RB-52.7	1.1	—	None
0452	Tinkham Creek	RB-53.2	2.4	—	None
0456	Unnamed	LB-0.9	1.0	—	None
	Abiel Lake	Outlet-1.0	—	—	
0458	Unnamed	LB-53.65	1.5	—	None
0461	Unnamed	RB-54.75	1.1	—	None
	Twilight Lake	Outlet-55.15	—	—	
	Lost Lake	Outlet-55.95	—	—	