

## TACOMA BASIN

### Water Resource Inventory Area 12

The Tacoma basin is comprised of the area between the Puyallup River and the Nisqually River, principally from Point Defiance south through the Tacoma Narrows to the Nisqually Reach, and inland to the apex between Muck Creek and the Puyallup River system near the community of Graham. Within this basin there are only two relatively small independent drainages, Chambers Creek and Sequalitchew Creek. Twenty identified streams provide over 53 linear miles of drainage in this basin.

The Chambers Creek drainage originates from spring and groundwater run-off on the flat plateau at the 400-foot elevation of the South Tacoma District and flows 18.1 miles northwest, entering southern Puget Sound one mile north of the community of Steilacoom. Clover Creek forms the headwaters of Chambers Creek and originates in the Spanaway-Parkland residential districts east of McChord Air Force Base. It drains northwesterly through McChord Field into the heavy residential and business district of Lakewood where it enters Steilacoom Lake. Chambers Creek is then formed from the outlet of Steilacoom Lake flowing 4.0 miles north and west down a narrow ravine where it forms Chambers Bay. A dam with a spillway and fish ladder forms the head of Chambers Bay approximately 0.75 miles upstream from the Northern Pacific Railroad dike at tidewater. The outlet of Chambers Bay is very narrow and restricted due to the railroad dike and tracks across the mouth.

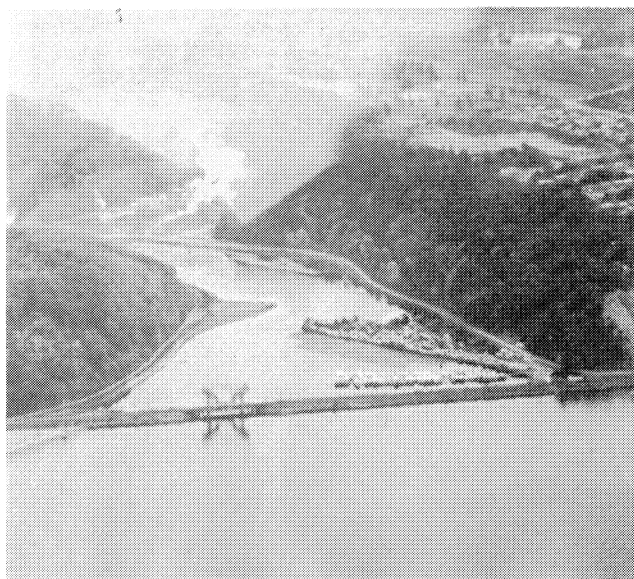


PHOTO 12-1. Chambers Bay, mouth of Chambers Creek.

The upper two miles of Chambers Creek contain fair to good gravel composition with about 70% riffle area. It generally has all the characteristics of a typical lowland-type stream with stable bank areas, good stream bank cover, and moderate gradient. There are several lakes, ponds, and marshes in the Manitou and Fircrest area that provide groundwater seepage into Flett and Leach creeks, the two major tributaries to Chambers Creek. Approximately 9.4 stream miles are accessible to salmon utilization in the Chambers Creek drainage.

Sequalitchew Creek is formed from the overflow from American Lake in the Lakewood District, which drains into Sequalitchew Lake where the outlet creates the creek. Sequalitchew Creek flows for 3.05 miles on the Fort Lewis Military Reservation through two large marsh areas and converges with southern Puget Sound marine waters near the DuPont Wharf on the northern edge of the Nisqually Reach. The stream is small, averaging about 8 feet in width and has a gentle gradient in the area above the marshes. A steep-sided ravine in the lower 1.5 miles has a steep gradient over which the stream descends rapidly to the sound. The bottom is comprised of small gravel in the upper section and contains long glide-pool areas separated by short riffle sections. Heavy stream bank cover of deciduous trees and brush encompasses the entire stream length.



PHOTO 12-2. Several lakes contribute flow to Chambers and Sequalitchew creeks. (American, Gravelly and Steilacoom lakes)

### Fish Inventory and Distribution

Two species of Pacific salmon, coho and chum, currently utilize the Chambers and Sequalitchew drainages. These salmon migrate, spawn, and rear in approximately 12.4 linear miles of stream within the systems.

**Coho Salmon** — All accessible sections of the mainstem stream and tributaries are utilized by coho salmon. Coho ascend up to the outlet dam of Steilacoom Lake and throughout the entire lengths of Flett Creek and Leach Creek when winter flows fill these tributaries to capacity. In Sequalitchew Creek adult coho ascend up to the screens at the outlet of Sequalitchew Lake.

Coho spawning migrations in Chambers Creek occur with the beginning of fall rains normally around the end of September and extend into January (Table 12-1). In the Sequalitchew system the adult spawning migration is later due to the low flow and low levels of both American Lake and Sequalitchew Lake that feed this stream. Considerable

Timing of salmon fresh-water life phases in Tacoma Basin WRIA 12

Species	Fresh-water Life Phase	Month																
		J	F	M	A	M	J	J	A	S	O	N	D					
Coho	Upstream migration																	
	Spawning																	
	Intragravel develop.																	
	Juvenile rearing																	
	Juv. out migration																	
Chum	Upstream migration																	
	Spawning																	
	Intragravel develop.																	
	Juvenile rearing																	
	Juv. out migration																	

rainfall is required to swell the groundwaters enough to provide sufficient flows to attract the adult coho into the stream. Migration here starts in late September or early October and extends well into late January.

Two distinct runs of coho occur with the early run in mid-October in both watersheds and the late run spawning during the last week of December into mid-January. Intragravel egg development extends into March when fry begin emerging from the gravel. The juveniles generally reside within the system for more than a year before seaward migration occurs. However, population pressures, low water, and warm water conditions tend to force many coho fingerlings into the bays and estuaries within their first year. Out-migration normally occurs in their second year of fresh-water life with the major migration coinciding with the spring run-offs in late February to mid-April, trailing off into late June.

Based on stream surveys and the total available rearing area in the basin, these two streams can support the progeny of 5,000 adult coho annually (Table 12-2).

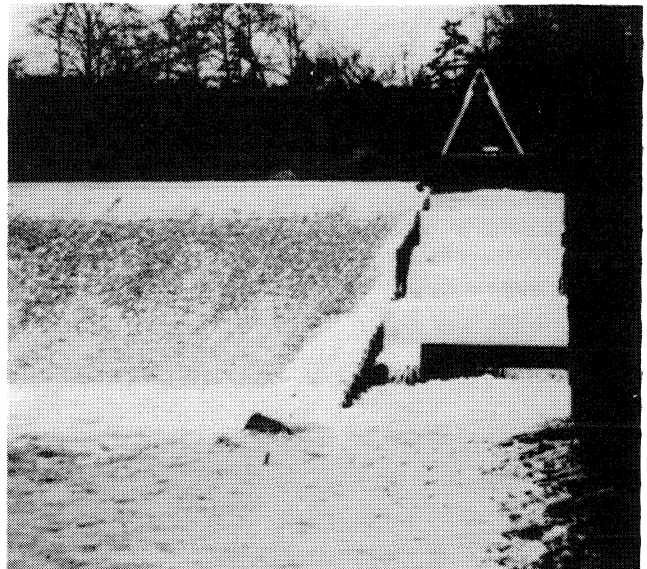


PHOTO 12-3. A dam and fishway are situated on Chambers Creek at the head of tidewater.

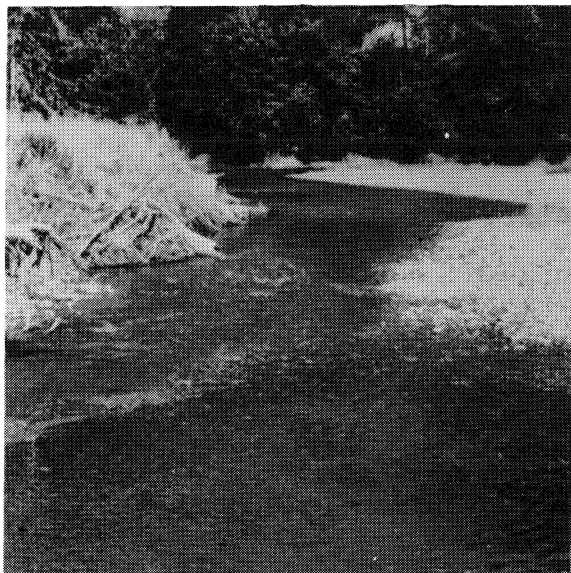


PHOTO 12-4. Portions of Chambers Creek provide excellent spawning for coho and chum.

TABLE 12-2. Salmon Escapement Level for the Tacoma Basin WRIA 12.

Species	1966-1971 Escapements <sup>1</sup>	
	Range	Average
Coho	550—1,650	1,100
Chum	400—1,400	850
Natural Escapement Potential		
Coho	1,200	
Chum	2,500	

<sup>1</sup> Includes natural plus artificial combined escapements.

**Chum Salmon** — This species has not been observed in Sequelitchew Creek; however, there should be chums utilizing the lower half mile and possibly up to Edmond Marsh, approximately one mile above tide-water. Fair runs of chum inhabit the Chambers Creek watershed including both Flett Creek and Leach Creek. Two distinct runs have been recorded from annual spawning ground surveys in this system. Both the early and late chum runs utilize essentially the same sections of stream with major spawning occurring within mainstem Chambers Creek in the vicinity of the mouth of Flett and Leach creeks. Fair spawning gravel and gradients occur below RM 3.0. A faulty culvert at the mouth of Flett Creek has created a barrier to chum passage in past years. Adult spawners do get past this culvert under certain flow conditions. In Leach Creek the chums spawn heavily in the lower half mile.

The early chum migration occurs between the middle of October and the first week of November with spawning occurring within a week after the fish reach the spawning area. The late chum spawners migrate upstream between the last week in December and mid-January with spawning taking place between January 1 and 20.

From past spawning surveys and determinations of suitable spawning area, it is calculated that the potential number of adult spawners for Chambers Creek amounts to between 700 and 800 early-run chums and 1,000 to 3,000 late-run chums (Table 12-2).

Chum fry emerge from the gravel starting in late February and extend into May. These small juveniles migrate directly to the marine environment following emergence from the gravel.

### Salmon Production

Plants of coho fingerlings have been made into the basin streams from Minter Creek Hatchery stocks. Coho yearling plants of 10,000 to 13,000 fish were released into Chambers Creek during the period 1950 to 1957, but no coho plants have been made here since. Chum fry releases were made for three consecutive years, 1959 to 1961, in Chambers Creek which amounted to 200,000, 250,000 and 200,000 fry, respectively for these years.

A spring chinook plant of 19,125 yearlings was made in 1973, as was a release of 150,000 pink yearlings from Steilacoom ponds.

The State Game Department hatchery located below the outlet of Lake Steilacoom plants these waters annually with steelhead and trout.

### Harvest

Salmon produced or reared in the Tacoma basin contribute to both the U.S. and Canadian, Pacific Ocean sport and commercial fisheries, and to the sport and net fisheries existing through the Strait of Juan de Fuca and Puget Sound. The estimated total contributions of coho and chum to these various fisheries has, in recent years, ranged from 3,200 to 14,400 salmon.

The commercial salmon net fishery Areas 4, 4A, and 6 intercept much of the salmon destined for the Tacoma basin from the ocean feeding grounds. Both coho and chum salmon are extensively sought in these areas. Sport angling is heavy in the Tacoma Narrows and south sound waters as shown by the sport catch records for 1964 through 1971, with an eight-year average of 5,882 coho harvested from these local waters. Although many other rivers and independent streams in the south sound area also contribute to this local sport fishery and adjacent areas, it is calculated that coho reared from Chambers Creek and Sequelitchew Creek have annually provided 4,400 fish to these various fisheries. No sport angling is permitted within the streams of this basin for salmon.

### Limiting Factors

Limiting factors refer to conditions that lead to a complete loss or reduction of the environment's fish production potential, excluding harvest. Within the Tacoma basin major limiting factors include low summer flows, barriers due to gradients or poor flow conditions, concentrated watershed development and encroachment, and poor water quality.

**Stream flow** — Low summer flows occur in these streams annually due to the sensitivity of the ground-water levels.

**Physical barriers** — Debris jams and some beaver activity cause intermittent blockages in several of the creeks in this basin. Sequelitchew Creek has some cascades and steep gradient blockages in its lower reaches. These problems are worse during the low flow periods of summer.



PHOTO 12-5. Streambed controls help fish negotiate poorly designed culverts (Leach Creek).

**Water quality** — Increased population and land developments have caused a general deterioration of water quality. High water temperatures associated with low summer flows and loss of streamside cover reduce fish production.

**Limited spawning and rearing** — Urban development has increased siltation and destabilized stream flows to the point that spawning and rearing areas have been severely limited.

**Watershed development** — Alterations to the streams in this basin through construction of roads and communities have seriously reduced the stream area and water quality for fish production. The continuous increase of activities and expansion on the Fort Lewis Army Reservation and McChord Air Field has also stimulated an increase in population growth within this watershed. This has in turn affected the groundwater table, flows, and water quality of the area.

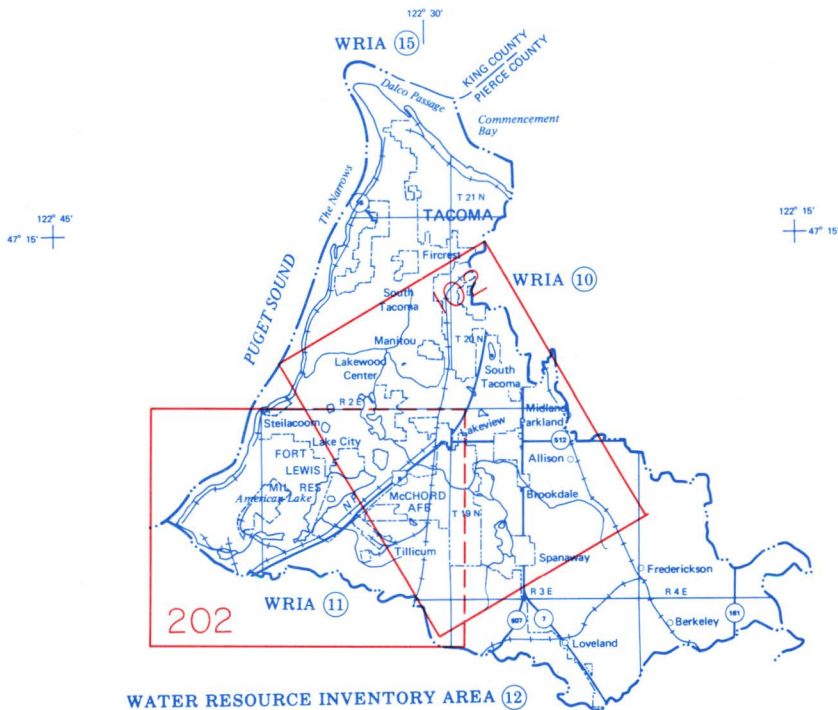


**TACOMA BASIN WRIA 12  
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# TACOMA BASIN

## WRIA-12



WATER RESOURCE INVENTORY AREA 12

47° 00' +  
122° 45'

SCALE 1:125,000

122° 30' +



MAP NO. 12

+ 47° 00'  
122° 15'

## CHAMBERS CREEK DRAINAGE

The Chambers Creek drainage is located in south Tacoma. It crosses under the McChord Air Force Base airstrip and flows through the community of Lakewood before converging with Puget Sound north of the community of Steilacoom. There are 18.6 linear miles of mainstem plus 19.2 stream miles of tributaries. The I-5 freeway bisects Clover Creek at R.M. 7.3 near Gravelly Lake, and many connecting roads provide access to Chambers Creek and its tributaries.

### Stream Description

Clover Creek originates from springs and groundwater drainage approximately 6.0 miles east of Spanaway in suburban residential area. Its North Fork heads three miles east of Brookdale and Parkland, and flows 13.2 miles northwesterly through McChord Field and the heavy residential and business districts of Lakewood into Steilacoom Lake. Spanaway Creek, a tributary of Clover Creek, is formed by springs and marshes that drain through Spanaway Lake and converge with Clover Creek at R.M. 9.2 on McChord Field. Tule Lake also drains into Spanaway Creek. The stream continues as Chambers Creek from the outlet of Steilacoom Lake (313 surface acres), flowing north for 1.5 miles and then west through a narrow, steep-sided ravine for 2.5 miles until it enters Chambers Bay. This creek also has two tributaries: Flett Creek originates near the community of Manitou and flows west 3.1 miles and converges at R.M. 2.55 on Chambers Creek; Leach Creek originates near Fircrest and flows south 2.3 miles where it joins Chambers Creek at R.M. 2.4.

Natural springs, surface, and groundwaters form the source of Clover Creek, North Fork Clover Creek, Flett Creek, and Leach Creek. There are several larger lakes plus many small lakes, ponds, and marsh areas that directly or indirectly provide seepage to this system to sustain summer flows. A formal dam controls the flow at the outlet of Steilacoom Lake at R.M. 4.11 and creates a total block to anadromous fish passage.

Chambers Creek has widths to 25 feet and varies in depth from 6 inches to 2 feet. It contains excellent gravel and good pool-riffle ratios with a moderate gradient. Deciduous trees and growth overhang the banks and provide excellent shade and cover except in the upper section where residences abut the stream. A canyon section from R.M. 0.5 to 1.75 contains steep hillsides and a narrow confined valley.

Leach Creek is a small tributary varying in width from 6 to 15 feet and from 6 inches to 2 feet in depth, and contains good gravel and pool-riffle balance. Housing developments are located along the upper section of the creek where stream cover has been removed. Otherwise, bank cover consists of heavy deciduous trees and underbrush with intermittent open farmland. Flett Creek also contains good gravel and pool-riffle balance in the lower half of the stream.

Clover Creek remains near its natural state except where it enters the military reservation. Here it has been placed in straight sections of formal channel for several miles. It is also contained within a concrete underground culvert below the runways at McChord Air Force Base and the I-5 freeway. Land use of the entire watershed is largely residential.

### Salmon Utilization

The principal salmon species utilizing Chambers Creek and its tributaries are coho and chum. In 1973 releases of pink and spring chinook fingerlings were made at the new Garrison Springs station at Western State Hospital. Major chum spawning occurs in Chambers Creek above R.M. 2.0 and in the lower 0.5 mile of both Leach and Flett creeks. Coho adults also utilize these sections but ascend to the headwaters of the tributaries as well. Chambers Bay is approximately 0.5 mile in length and forms an excellent estuary rearing area in the lower stream.

### Limiting Factors

All of the streams and lakes in the subregion experience high summer temperatures and low flows due to minimal groundwater levels. The gage on Chambers Creek near Steilacoom recorded a minimum of 20 cfs in 1970. The average discharge from 1966 to 1971 was 81.9 cfs. Average yearly discharges of 7.5 cfs occur in Flett Creek and about 9.5 cfs in Leach Creek. The upper sections of these creeks go dry during part of the summer season. Former rural areas are now being altered by urbanization and shopping centers. Encroachment and development have substantially reduced the stream area and quality for fish production. Water quality is a serious problem due to drainage from septic tanks and storm drainage. The paper factory on Chambers Bay also creates estuarial water quality problems. Silt compaction is evident in the streambeds of Chambers, Leach, and Flett creeks. Creation of ponds and poor road culverts are serious problems in Leach and Flett creeks.

### Beneficial Developments

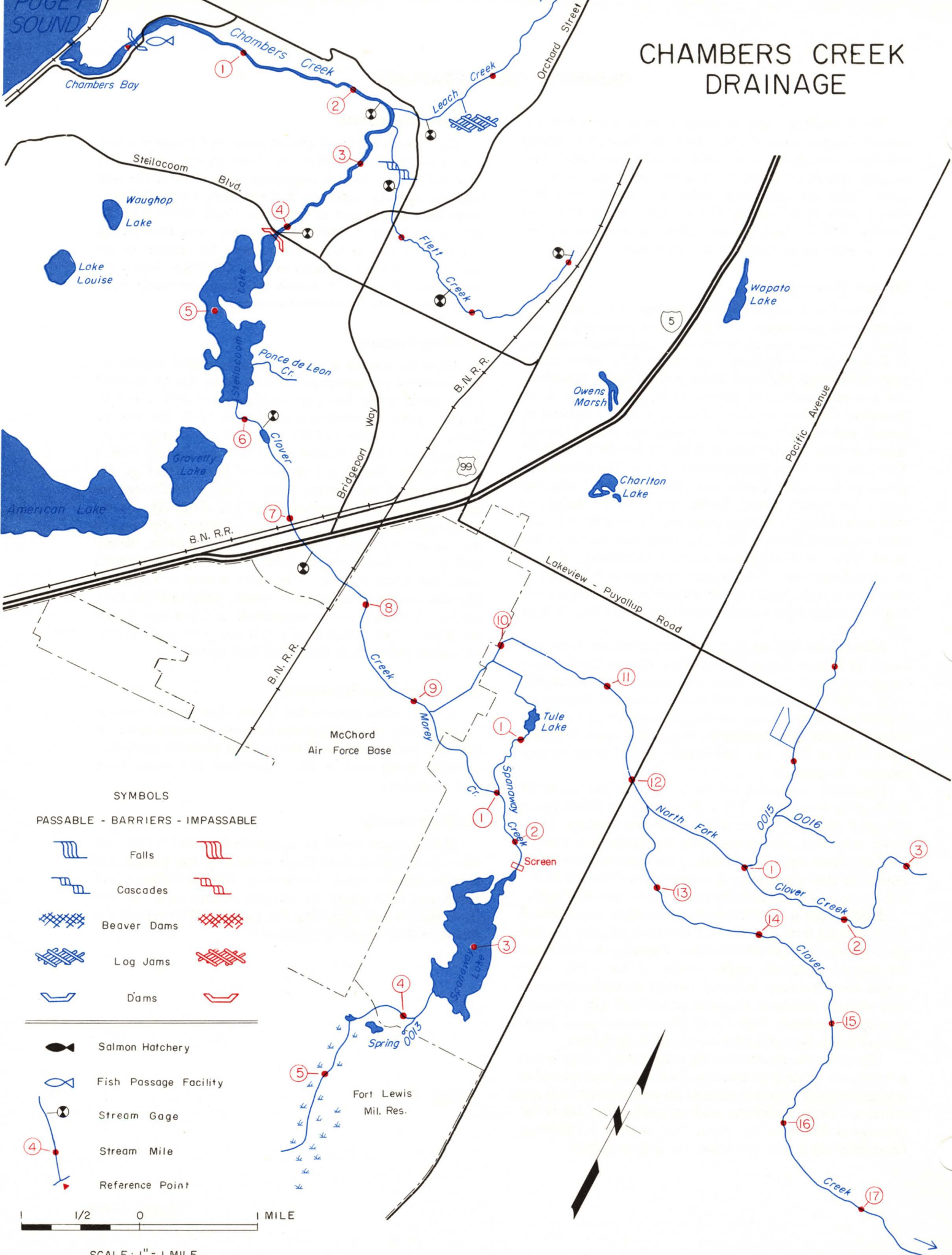
A fish ladder constructed in the dam at the head of Chambers Bay provides passage for adult salmon migrations. Garrison Springs on the Western State Hospital grounds is currently being used by the Department as a warm water supply hatchery.

### Habitat Needs

Modifications should be undertaken to the U.S.G.S. dam near the mouth of Flett Creek to provide fish passage and alleviate erosion below the structure. Road culverts on both Leach and Flett creeks are creating serious streambed and bank erosion and impairing fish passage. Water quality in this watershed should be monitored.



# CHAMBERS CREEK DRAINAGE

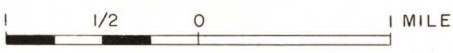


**SYMBOLS**

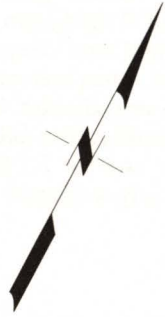
**PASSABLE - BARRIERS - IMPASSABLE**

	Falls	
	Cascades	
	Beaver Dams	
	Log Jams	
	Dams	

- Salmon Hatchery
- Fish Passage Facility
- Stream Gage
- Stream Mile
- Reference Point



SCALE: 1" = 1 MILE



**CHAMBERS CREEK DRAINAGE  
Tacoma Basin — WRIA 12**

<b>Stream Number</b>	<b>Stream Name</b>	<b>Location Of Mouth</b>	<b>Length</b>	<b>Drainage Area</b>	<b>Salmon Use</b>
0001	Unnamed	Sec30,T21N,R3E	1.05	—	None
0007	Chambers Creek	Sec29,T20N,R2E	18.6	108.0	Chin., Coho, Chum,(Sockeye)
0008	Leach Creek	RB-2.4	2.3	—	Coho, Chum
0009	Flett Creek	RB-2.55	3.1	8.10	Coho, Chum
	Unnamed Pond	Outlet-3.3	—	—	
	Unnamed Lake	Outlet-3.85	—	—	
	Steilacoom Lake	Outlet-4.11	—	—	
	Chambers Cr. cont. as Clover Creek	@ mi. 5.81			
	Unnamed Reservoir	Outlet-6.2	—	—	
	Culvert	Outlet-8.8	—	—	
0011	Morey Creek	LB-9.15	1.0	—	None
0012	Spanaway Creek	LB-9.85	5.8	—	None
	Tule Lake	Outlet-0.71	—	—	
	Unnamed Lake	Outlet-1.21	—	—	
	Unnamed Lake	Outlet-1.65	—	—	
	Spanaway Lake	Outlet-2.3	—	—	
0014	N. Fk. Clover Cr.	RB-12.25	3.2	—	None
0015	Unnamed	RB-1.0	2.75	—	None
	Unnamed Lake	Outlet-12.7	—	—	
	Unnamed Lake	Outlet-12.8	—	—	
	Unnamed Lake	Outlet-16.81	—	—	

## SEQUALITCHEW CREEK DRAINAGE

The Sequalitchew Creek drainage lies south of Tacoma between the communities of Gravelly Lake, Lakewood, and DuPont. Access to the watershed is from I-5 freeway to the DuPont-Steilacoom Road and by unimproved roads on the Fort Lewis Military Reservation. This stream lies completely within Pierce County.

### Stream Description

Kinsey Marsh, which lies south of McChord Air Force Base, is the beginning of the upper watershed. Murray Creek drains this marsh south and west through the center of Fort Lewis. It crosses I-5 and flows through the Camp Murray National Guard Station, then enters American Lake (1,162 surface acres) on the southeast shoreline. The overflow from American Lake drains south into Sequalitchew Lake; however, it does not flow the year around. Springs and seepage of the table maintain the levels of these two lakes.

Sequalitchew Creek is formed by the overflow outlet of Sequalitchew Lake (80.9 surface acres) and drains westerly for 0.5 miles in channelized stream and along the edge of

Hamer Marsh on the Fort Lewis Military Reservation. The creek then courses through Edmond Marsh and across more than 1 mile of DuPont Powder Company property. Each of these marshes has more than 100 surface acres. The creek descends from 200-foot elevation through a steep-sided ravine in the lower 1.5 miles, where it abruptly enters salt water south of the DuPont Wharf. At this junction with the marine environment, the stream passes through a large culvert under the dike supporting the Northern Pacific and Burlington Northern railroad tracks. Little natural estuary is present, but the extensive Nisqually Flats that lie immediately to the south of the creek mouth provide estuarial rearing for salmon smolts from this system.

Large second growth firs, heavy stands of brush, and blackberry vines are prevalent along the stream. The swampy marshes are densely covered with natural tule weeds, cattails, devils club, salmonberry brush, and aquatic weeds. Parts of the creek and marsh lands are impenetrable from the thick growths. Streambed material is mainly small gravel except in the marsh areas where a deep narrow channel with mud bottom occurs. The stream contains a fairly flat gradient above stream mile 1.5 with gentle flows through long glide-pool areas interspersed with short riffle sections. At Sequalitchew Lake the flows are manually manipulated through stop logs at the outlet. The summer lake level drops below the outlet level on some years.

A bypass canal was also constructed from Hamer Marsh and the outlet of Sequalitchew Lake and drains directly to the sound near the DuPont Wharf. It contains an overflow section allowing release of flood waters into this bypass when the marsh and lake levels build up to overflowing the road to North Fort Lewis.

### Salmon Utilization

Coho salmon spawn and rear in all accessible portions of Sequalitchew Creek below the lake. Rotary fish screens set in a concrete sill at the outlet of Sequalitchew Lake retain trout within the lake and form a barrier to anadromous species.

Estimates based on available spawning and rearing area of the stream show the potential capacity at not over 200 adult coho. Chum salmon are known to spawn in the lower 200 yards of creek upstream of the mouth.

### Limiting Factors

Major limiting factors affecting salmon production in this drainage include summer low flows, unregulated water withdrawals from Sequalitchew Lake by the U.S. Army to facilitate the needs of North Fort Lewis, and water quality. Low summer flows in the stream relate directly to the lake level which provides the sole supply during dry periods. Large pumping facilities are located over springs near the head of the lake and are operated continuously to provide domestic and emergency water supplies for the military installations here. Storm water drainage contributes to water quality problems in this area. Beaver dams have created blockage problems in the marsh areas in past years.

### Beneficial Developments

No specific plans nor programs have been developed to enhance salmon production within this drainage. For two years, 1959-60, the lake was utilized by the Fisheries Department as a fish farm and coho salmon were reared and released.

### Habitat Needs

Since this creek lies within the military reservation boundaries, the utilization of this stream for salmon production is solely at the discretion of the commanding officer.

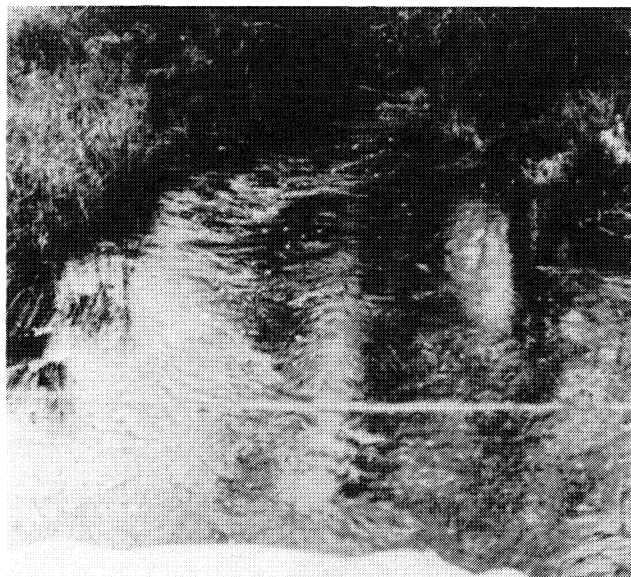
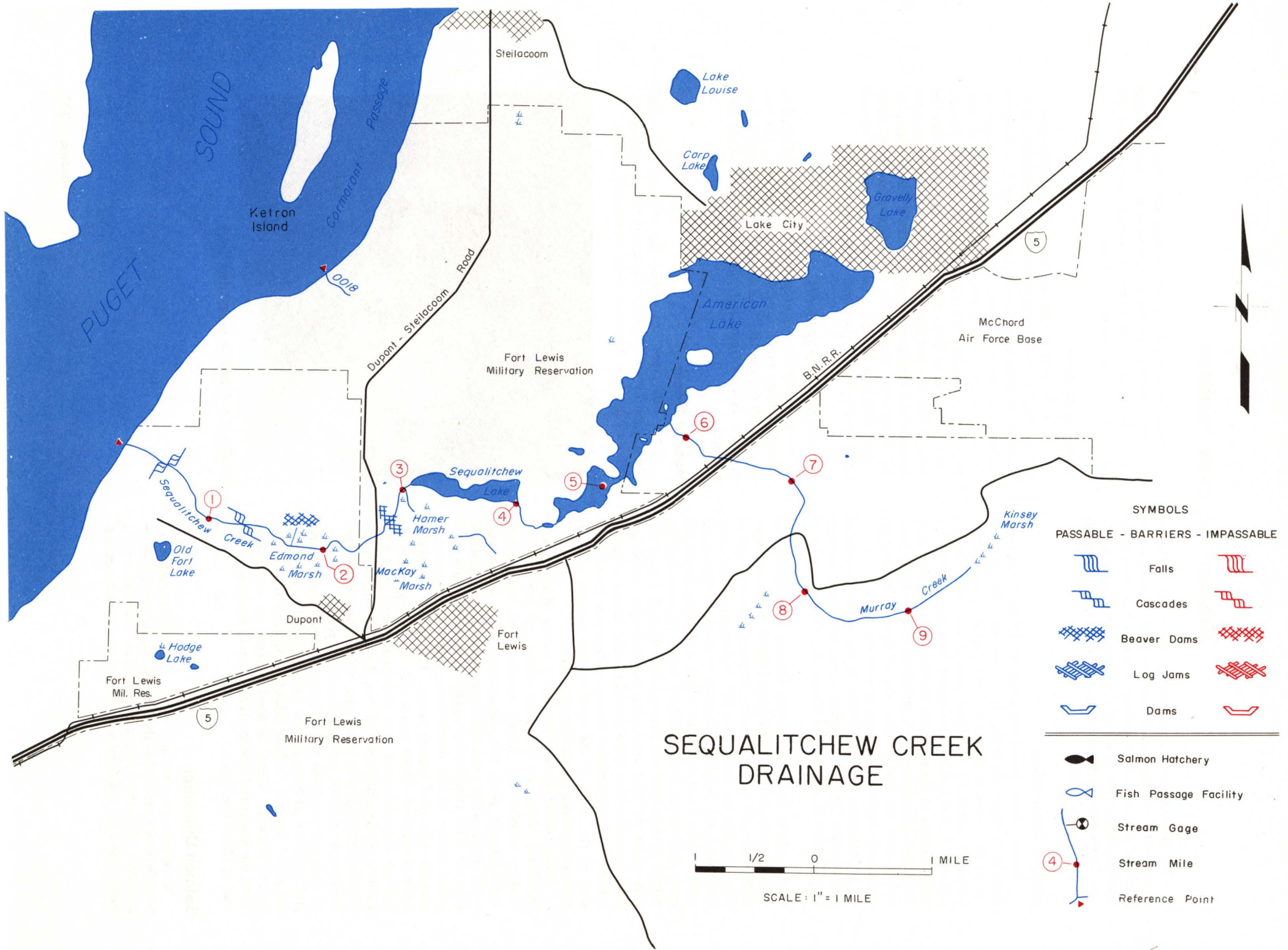


PHOTO 12-6. Culvert on Sequalitchew Creek.





PUGET SOUND

Ketron Island

Cormorant Passage

Dupont - Steilacoom Road

Steilacoom

Lake Louise

Carp Lake

Lake City

Gravelly Lake

5

McChord Air Force Base

Fort Lewis Military Reservation

B.N.R.R.

American Lake

Sequalitchew Lake

3

5

Hamer Marsh

4

Edmond Marsh

2

MacKay Marsh

Old Fort Lake

Dupont

Hodge Lake

Fort Lewis Mil. Res.

Fort Lewis

Fort Lewis Military Reservation

5

SEQUALITCHEW CREEK DRAINAGE

- SYMBOLS**
- PASSABLE - BARRIERS - IMPASSABLE
- Falls
  - Falls
  - Cascades
  - Cascades
  - Beaver Dams
  - Beaver Dams
  - Log Jams
  - Log Jams
  - Dams
  - Dams
  - Salmon Hatchery
  - Fish Passage Facility
  - Stream Gage
  - Stream Mile
  - Reference Point

**SEQUALITCHEW CREEK DRAINAGE**  
**Tacoma Basin — WRIA 12**

<b>Stream Number</b>	<b>Stream Name</b>	<b>Location Of Mouth</b>	<b>Length</b>	<b>Drainage Area</b>	<b>Salmon Use</b>
0019	Sequalitchew Creek	Sec22,T19N,R1E	9.6	38.4	Coho, (Chum)
	Edmonds Marsh	Outlet-1.6	—	—	
0020	Drainage Ditch	LB-3.0	~ 1.0	—	Unknown
	Sequalitchew Lake	Outlet-3.05	34.2	—	
	American Lake	Outlet-4.41	—	—	
	Sequalitchew Cr. cont. as Murray Cr.	@ mi. 5.81	—	—	
	Kinsey Marsh	Outlet-9.6	—	—	