# SHELTON BASIN
## Water Resource Inventory Area 14

No major river system is located within the boundaries of the Shelton Basin. Eleven important salmon streams plus numerous smaller independent fish producing watersheds compose the freshwater drainages flowing generally north and east from the rolling hills formed between the inlets of southern Puget Sound and the southern extremity of the Olympic range. There are 139 identified streams that provide approximately 240 linear miles of small independent streams and tributaries. Many varied marine environments exist within this basin formed from the many inlets and their shallow estuarial extremities where the confluence of the streams are generally located. Eld Inlet including Mud Bay, Totten Inlet including Oyster Bay and Skookum Inlet, Hammersley Inlet including Oakland Bay, and upper Case Inlet including North Bay, provide enriched waters at the stream mouths due to the rather slow tidal interchange from the long, enclosed bodies of water.

All of the streams in this basin are typical, lowland types with their headwaters originating from natural springs and surface water drainages, swampy beaver ponds, or small lakes in the foothills. The upper watersheds are located in moderate to heavily forested terrain, a large portion of which is second and third growth conifers interspersed with brush and grassland. Flowing generally north and east, most streams pass through steep-sided ravines and gulleys eventually reaching broader, gently-sloping alder bottom flats interspersed with ferns, brush and blackberries, or pasture lands before entering the tide flats. Other streams retain this broad valley configuration throughout their length. Small farms and/or communities are generally associated with the lower stream sections and adjacent salt water bays.

Perry Creek is the southernmost stream entering Mud Bay and Eld Inlet through the community of Mud Bay. It originates from surface water drainage within several sharp-sided valleys above State Highway 8 and flows generally northerly through heavily timbered slopes some 4.3 miles to its confluence with salt water marshes and extensive mud flats. The marine shorelines, extensive mud flats, and estuarine habitat within Mud Bay are rich production areas for shellfish, marine fish, and anadromous fish populations. McLane Creek also drains into Mud Bay, but has been included in WRIA 13 (Deschutes River).

Moving clockwise from south to north three streams flow into Totten Inlet; Kennedy Creek and Schneider Creek enter the closed end of Oyster Bay, and Skookum Creek enters the extreme end of Skookum Inlet, a northwest arm of Totten Inlet. Kennedy Creek is the largest stream in this group with its headwaters originating on the north slopes of the Black Hills. Four tributary streams join Kennedy Creek in its upper 3 miles on the south side of State Highway 8, while the outlet of Summit Lake provides another tributary source north of the highway. Kennedy Creek is more than ten miles in length; however, a series of falls, cascades, and log jams that drop in excess of 60 feet in 300 yards of narrow canyon forms a block approximately 2.5 miles upstream from the mouth. USGS gauge readings recorded since February 1960 indicate that the mean monthly flows have ranged from 3 cfs in September to highs of about 200 cfs in January. Most of the land in the watershed is owned by Simpson Timber Company and the State Forest Board, precluding building developments except around Summit Lake. The upper watershed is heavily forested with conifers while the broad valley is pasture land with deciduous growth.

PHOTO 14-1. Short-run, lowland streams of this basin are highly productive. (Kennedy Creek)

Schneider Creek originates on Schneider's Prairie northeasterly and immediately below the Summit Lake basin. This intermittent stream, 5.3 miles long, flows easterly through pastures and moderate timber down to Highway U.S. 101, then northwesterly through mixed coniferous and deciduous growth along the highway and pasture land to the tideflats. The stream gradient is gentle throughout its length.

Skookum Creek drains northeasterly for 7.0 miles through the Kamilche Valley paralleling State Highway 108 to its confluence with Skookum Inlet. The headwaters originate in a pass near Stimson Station on the Northern Pacific R.R. from ground water seepage which provides good year-round flows. The valley floor is principally pasture land bordered by second growth conifers, alders, and brush.

Hammersley Inlet, although the shallowest and narrowest of all the south sound inlets, contains six independent streams that are important salmon producing drainages. Five of these flow into Oakland Bay.

Mill Creek which enters the south shoreline of Hammersley Inlet midway between Arcadia and Shelton is comprised of two drainage systems. The major flow originates from Gosnell Creek which forms in the timbered foothills southeast of Shelton some 3.9 miles above Lake Isabella. The outlet flow of Lake Isabella continues as Mill Creek through the outskirts of the southern boundary of the town of Shelton then turns easterly to its mouth. Forbes Lake near Arcadia provides the source of the second tributary; however, this outflow is only a small percentage of Mill Creek. It flows westerly joining Mill Creek near its confluence with salt water. The Mill Creek drainage contains 16.0 linear miles of lowland type stream, which is accessible to anadromous fish through its length.

Goldsborough Creek enters lowland Oakland Bay in the heart of the town of Shelton. The headwaters of the South Fork originate from springs, surface drainage, and small lakes about 3 miles south of the community of Dayton and west of Dayton Peak. The North Fork is spring-fed and originates about two miles northeast of Dayton. Winter Creek, 3.8 miles in length, is a tributary joining the North Fork about one mile north of Dayton. The terrain within the North Fork drainage is mainly shallow gradient plateaus and foothills of second growth conifer. The terrain in the Winter Creek drainage is rolling plateau covered with heavy stands of second growth conifers. The South Fork drainage is located in marshy lands with heavy brush and deciduous growth surrounded by hillsides of moderate stands of conifer. The South Fork flows northerly through a small lake in Egypt Valley where the North Fork joins below the lake and forms the main creek. Flowing eastward the stream then passes through about a mile of steep brushy canyon. A diversion dam is located in the lower section at RM 2.3 and contains fish passage facilities. Another dam was located at RM 5.2, but has since been removed. Coffee Creek is a spring-fed drainage with headwaters forming above beaver dams approximately 2 miles up Shelton Valley, which contains broad valley pasture lands. The combined Goldsborough drainage encompasses 14.0 miles of stream. USGS gauge readings recorded since 1960 show a range in mean monthly low flows of 20 cfs in September to a high of 395 cfs in February.

Johns Creek is 8.3 miles in total length and drains generally eastward from its headwaters at Johns Lake to its confluence with central Oakland Bay at Bay Shore. A broad flat valley full of swamps forms the upper half of Johns Creek while the lower half is composed of a narrow valley of moderate gradient. Brush comprises the main vegetation in the swampy areas which are bordered by Christmas tree lands. Mixed deciduous and coniferous trees are predominant in the lower valley land.

Cranberry Creek drains in a general easterly direction for 9.7 miles and meets Oakland Bay in the northern extremity. Cranberry Lake, at RM 4.7, is approximately 1½ miles long and contains 170 surface acres with an additional 96 acres of marsh and springs surrounding it. Three intermittent inlets flow into the lake from smaller bog lakes a mile or more northward. The outlet flows easterly for one-half mile and enters the waters of Lake Limerick which is about the same size as Cranberry Lake. Lake Limerick is a man-made lake formed behind a 15-foot-high dam at RM 3.5 in Cranberry Creek. Most of the terrain in the Cranberry Creek drainage is logged-off, gently sloping hills converted to Christmas tree farms. The stream has a moderate gradient in the lower 3 miles with an average flow of 15 to 20 cfs.

Deer Creek enters the extreme northeast end of Oakland Bay about ¼ mile east of the mouth of Cranberry Creek. However, Deer Creek originates approximately 8.5 miles northeast of Oakland Bay from natural springs on the mainstem and the outflow from Benson Lake. Deer Creek also flows through dense Christmas tree lands and extensive swampy areas. Five small tributaries contribute additional flows from RM 3 to RM 6. This stream is very similar in size and flow to Cranberry Creek.

Campbell Creek is located on the east shore of Oakland Bay and enters the estuary in the extreme end of Chapman Cove. This creek is 4.5 miles in length and is formed from overflow from Phillip Lake as well as surface run-off from a large swampy area above RM 3. Two short, right bank tributaries also provide flows in winter and spring months to Campbell Creek. The moderate gradient of this drainage flows through mixed stands of conifers and alders on the northwest side of the creek and tule grasses and swampy areas on the east side.

Sherwood Creek is the northernmost creek in the southern Puget Sound drainage and enters the extreme end of Case inlet at North Bay next to the community of Allyn. This creek is the largest creek in this area containing 18.3 miles of stream and tributaries with an average flow of 15 to 25 cfs. Sherwood Creek is formed from the outlet flows of Mason Lake and Prickett Lake. Above Mason Lake, Shumacher Creek with four tributary streams provides an inlet flow.

Trask Lake is a small lake of 18 surface acres providing flow to the first tributary of Shumacher Creek at RM 13 immediately above the inlet to Mason Lake. Mason Lake is a large lake of 977 surface acres and four miles long. Prickett Lake contains 73 surface acres and is approximately ¾ of a mile in length. A small mill pond is also located near the mouth of Sherwood Creek at RM 1. Most of the terrain in the upper watershed above RM 3 is primarily dense second growth conifer or cultivated Christmas tree lands. The steeper ravines in the lower Sherwood Creek drainage contains mainly alder, maple, and fern.

## Fish Inventory and Distribution

Three species of Pacific salmon, chinook, coho, and chum, currently utilize the small, typical lowland, independent streams located in the Shelton basin. These fish migrate, spawn, and rear in some 70 miles of small, short-run streams which drain into the inlets and shallow bays of the extreme enclosed end of southern Puget Sound.

**Chinook Salmon** — In this basin only two of the eleven larger salmon producing streams contain consistent small runs of fall chinook. They are Deer and Sherwood creeks. Use of these independent drainages by this species is minimal since all of these streams exhibit very low flows during normal adult migration and spawning periods. The chinook that utilize these streams have had to adapt their specific habits to fit into these non-typical environments in order to perpetuate their kind.

Juvenile chinook rear for only short periods of time in these small streams as compared with the larger river systems. The survival of the young chinook is highly dependent on the conditions found in the estuarine and marine waters of the bays and inlets during the early spring months of high run-off conditions.

The adult chinook spawning migration starts in mid September to early October and is usually completed by the first week of November (Table 14-1). Spawning commences in mid October and is finished by mid November. The first heavy fall rains, which influence the flows and temperatures of these small streams, normally trigger spawning. Most of the spawning activity normally occurs in the lower stream sections where larger sized gravel has washed downstream and created suitable gravel bars. However, these chinook are often observed spawning in small patch gravel areas farther upstream which is atypical of the species.

The annual natural escapements of adult chinook within these independent streams have ranged from 40 to 220 fish for the period 1966 through 1971, averaging around 148 fish.

**Coho Salmon** — All of the accessible independent streams and tributaries draining into the Shelton basin are utilized by coho salmon. Eight of the larger streams contain significant runs of coho, combining both hatchery and natural returns which annually amount to more than a thousand spawners per stream. The most important streams within this basin are Perry, Kennedy, Skookum, Mill, Goldsborough, Johns, Deer, and Sherwood creeks.

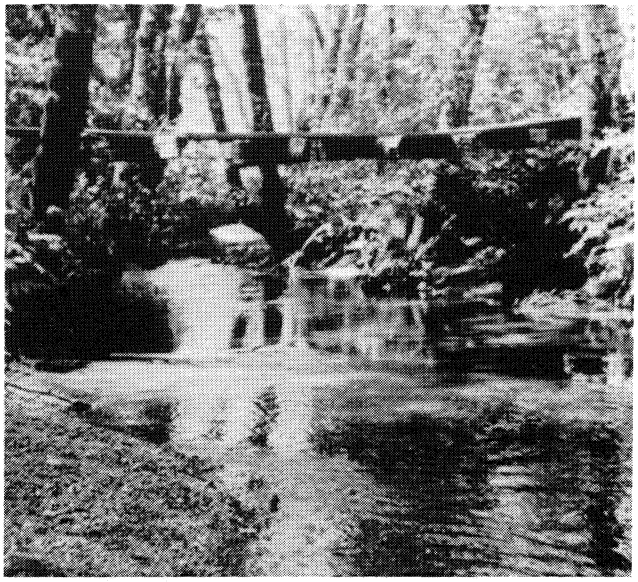


PHOTO 14-2. Skookum Creek is an excellent coho and chum stream.

Juvenile coho rear throughout the accessible lengths of all basin streams. Following incubation and emergence from the gravel, the juveniles generally remain within the stream systems for more than a year, migrating seaward early in their second year of fresh-water life. The shallow bays and estuaries of the marine environment provide ideal habitat for the outmigrant coho smolts.

Based on spawning ground information, it is estimated that coho escapements to the Shelton basin have ranged from 1,000 to 8,000 for the period 1966 to 1971, averaging 4,800 annually.

**Chum Salmon** — The independent drainages of the Shelton basin are particularly adaptable to the production of chum salmon. Excellent populations of chum salmon inhabit Perry Creek, Kennedy Creek, and Sherwood Creek, with some using Skookum Creek and tributaries to these streams. Since the young chum fry emerge from the gravel and immediately migrate to salt water, the estuarial and marine waters within the southern Puget Sound basin are of prime importance to the successful rearing and survival of this particular species.

Adult chum salmon enter the basin drainages beginning in early September and extend on into mid-January. Early chum runs inhabit Mill, Kennedy, Cranberry, Deer, Johns, and Sherwood creeks. Late runs of chum predominate in Perry, Goldsborough, and Skookum creeks. Spawning of the early chum run occurs from about the first week of October until mid-November while the late run spawning occurs from mid-November through mid-January. Following incubation and subsequent fry emergence, the juveniles move seaward with this migration occurring from late February into May.

Based on spawning ground information, it is estimated that chum escapements to the Shelton basin have ranged from 10,400 to 33,000 for the period 1966 to 1971, averaging about 16,300 annually.

**Timing of salmon fresh-water life phases in the Shelton (South Puget Sound) Basin WRIA 14**

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

## Salmon Production

Releases of surplus chinook and coho fingerlings have been made in past years into the larger creeks of the southern Puget Sound basin to stimulate depressed spawning returns. Although no salmon hatcheries exist within this drainage, the stocks of salmon used in the planting program originate from the Puget Sound stocks at Minter Creek, Purdy Creek, and Green River hatcheries. These supplemental plants have contributed fish for both the Puget Sound commercial and sport fisheries as well as the spawning escapements to these streams.

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.

TABLE 14-2. Salmon Escapement Level for the Shelton Basin WRIA 14.

1966-1971 Escapements [1]

| *Species* | *Range* | *Average* |
|---|---|---|
| Chinook | 40— 220 | 150 |
| Coho | 1,900— 8,000 | 4,800 |
| Chum | 10,400—33,000 | 16,300 |

Natural Escapement Potential

| | |
|---|---|
| Chinook | 300 |
| Coho | 10,000 |
| Chum | 25,000 |

[1] *Includes natural plus artificial combined escapements.*
*Shelton Basin includes all of Southern P.S. less the Nisqually and Deschutes basins.*

## Harvest

Salmon produced or reared in the Shelton basin contribute to U.S. and Canadian, Pacific Ocean sport and commercial fisheries, and to the sport and commercial fisheries existing through the Strait of Juan de Fuca and Puget Sound. The estimated total contribution (all species) to these various fisheries has, in recent years, ranged from 18,120 to 65,660 salmon.

The basin's marine waters are closed to commercial salmon fishing except for the Squaxin Indian fishery which encompasses the waters one-half mile off shore around Squaxin Island and the Squaxin fishing Area 2 at Rocky Point on Eld Inlet. This fishery is open from October 1 through December 27. One Squaxin Indian also fishes in the mouth of Skookum Inlet within Totten Inlet for his own personal use. During the past 6-year period, 1966 to 1971, these Indian-set nets have annually harvested from 33 to 74 chinook, 411 to 741 coho, and 89 to 1,986 chum.

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.

Sport fishing is popular throughout the south sound marine waters especially in the tiderips around Steamboat Island and Dana Passage where several of the inlets converge. Another popular area is the northern end of Hartstene Island in Pickering Passage. Here immature feeding salmon abound in the early spring months with some present the year around. No freshwater sport angling for salmon is permitted within this basin as the streams are too small to adequately manage a fishery.

## Limiting Factors

Limiting factors refer to conditions that lead to a complete loss or reduction of the environment's fish producing potential, excluding harvest or exploitation. They include only those conditions presently considered alterable. Within the Shelton basin major limiting factors include seasonal flooding, low summer flows, natural barriers and intermittent debris or beaver dams, water quality problems associated with summer home developments, polluted marine tidelands, and predation and poaching problems.

**Stream flows** — Due to the 62 inches of annual rainfall that occurs here in the southern extremity of the Olympic range, seasonal flooding occurs in each of the independent streams. High water conditions reach intensities capable of destroying salmon spawn and altering the fish rearing habitats of the stream. Low summer flows are common in all the streams of this drainage basin. There is very little opportunity for flow augmentation in these small watersheds, even where lakes and beaver dam swamps form the headwaters.

PHOTO 14-3. Low flows limit rearing habitat in all streams of this area. (Perry Creek)

**Physical barriers** — A series of falls, cascades, and log jams occurs at RM 2.5 on Kennedy Creek totally blocking anadromous fish migrations. A diversion dam is located in the lower section of Goldsborough Creek at RM 2.3 and contains a fish ladder. Lake Limerick is a man-made lake behind a 15-foot high dam on Cranberry Creek at RM 3.5. Fish passage is provided here through a very effective ladder.

Many intermittent barriers are created by debris build-up, or by beaver activity on all of the lowland type streams in this basin.

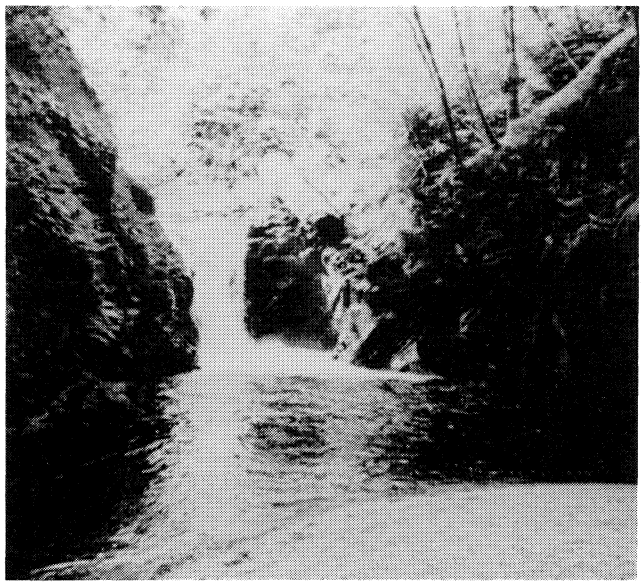


PHOTO 14-4. Kennedy Falls is one of the few natural barriers in this basin. (Kennedy Creek)

**Water quality** — No serious water quality problems have been detected within the smaller streams of the Shelton basin. Water temperatures in Cranberry Creek have been increased due to the development of Lake Limerick, but as yet have not caused fish mortalities. In Goldsborough Creek the stream below the Greystone gravel washing ponds has been observed to be heavily off-colored on several occasions, suggesting the settling ponds are not capable of holding the operational capacity of the plant.

The marine environment in Oakland Bay still is suffering residual effects of the old pulp mill wastes at Shelton. Heavy deposits of organic detritus are still very prevalent throughout these estuary tide flats. Bark from the Shelton log dump and particles from Simpson's insulation board plant are currently observed floating in abundance within Oakland Bay.

**Limited spawning and rearing area** — Most of the southern Puget Sound streams contain a good balance of spawning and rearing area. Extreme low flows occur in most of these streams which restrict the available rearing capacity. The headwaters of streams containing lakes, beaver ponds, and swamps have restricted spawning areas with limited quantities and quality of spawning gravel.

Perhaps the most serious limiting factors affecting salmon production in the smaller lowland streams of this basin is poaching. Since large segments of these streams flow through isolated woods and ravines, but are still convenient to road access, heavy poaching occurs each year on the adult spawners. Entire stocks of chinook and chum salmon have been snagged out of these streams before they have a chance to spawn. Many of the females are often killed and their eggs removed for steelhead fishing with the carcasses left on the stream bank. Predation on adult spawners by dogs, bears, and other wild animals has, on occasion, been rather serious in some areas. Bird predation during low flow conditions occurs regularly on coho fry and yearlings trapped in shallow pools and receding beaver dam potholes.

**Watershed development** — Land developers have not yet seriously encroached upon the small streams of this basin. Usually a dam is constructed across the stream in a strategic location to create an artificial lake for recreational developments. The stream area is inundated with loss of spawning areas, increased water temperatures, water quality problems and altered flow patterns in the stream below. Lake Limerick on Cranberry Creek is the first such development in the Shelton Basin. Summer homes are numerous around Summit Lake on Kennedy Creek, Lake Isabella on Gosnell Creek, Forbes Lake on Mill Creek, Phillip Lake on Campbell Creek, and Mason Lake and Trask Lake on Sherwood Creek.

Since most of these watersheds have been heavily logged several decades ago, the second growth timber has stabilized some of the influence of heavy rainfall and damaging run-off. The beach summer homes and tideland developments throughout the marine waters of southern Puget Sound have accelerated in the past 10 years bringing with them demands for breakwaters, dikes, fills, docks, marinas, and tideland alterations which impair and reduce production of salmon and shellfish.

At the present time the demand for municipal, agricultural, and industrial water supplies is being met; however, the increasing population and growth of this basin is expected to make greater demands on the existing streams. Thus further limitations on natural fish production will result.

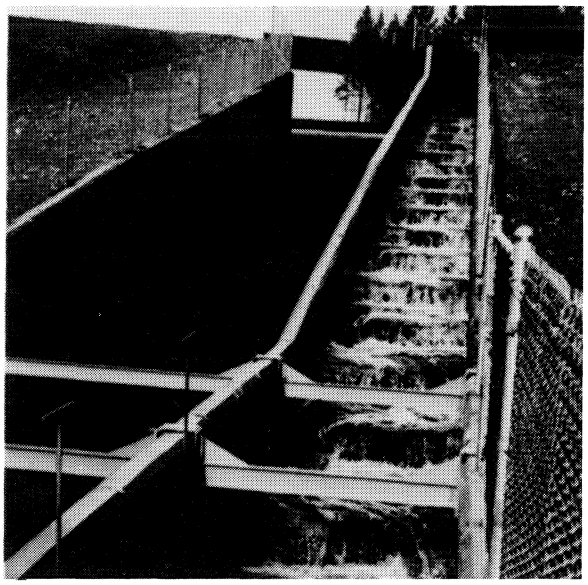
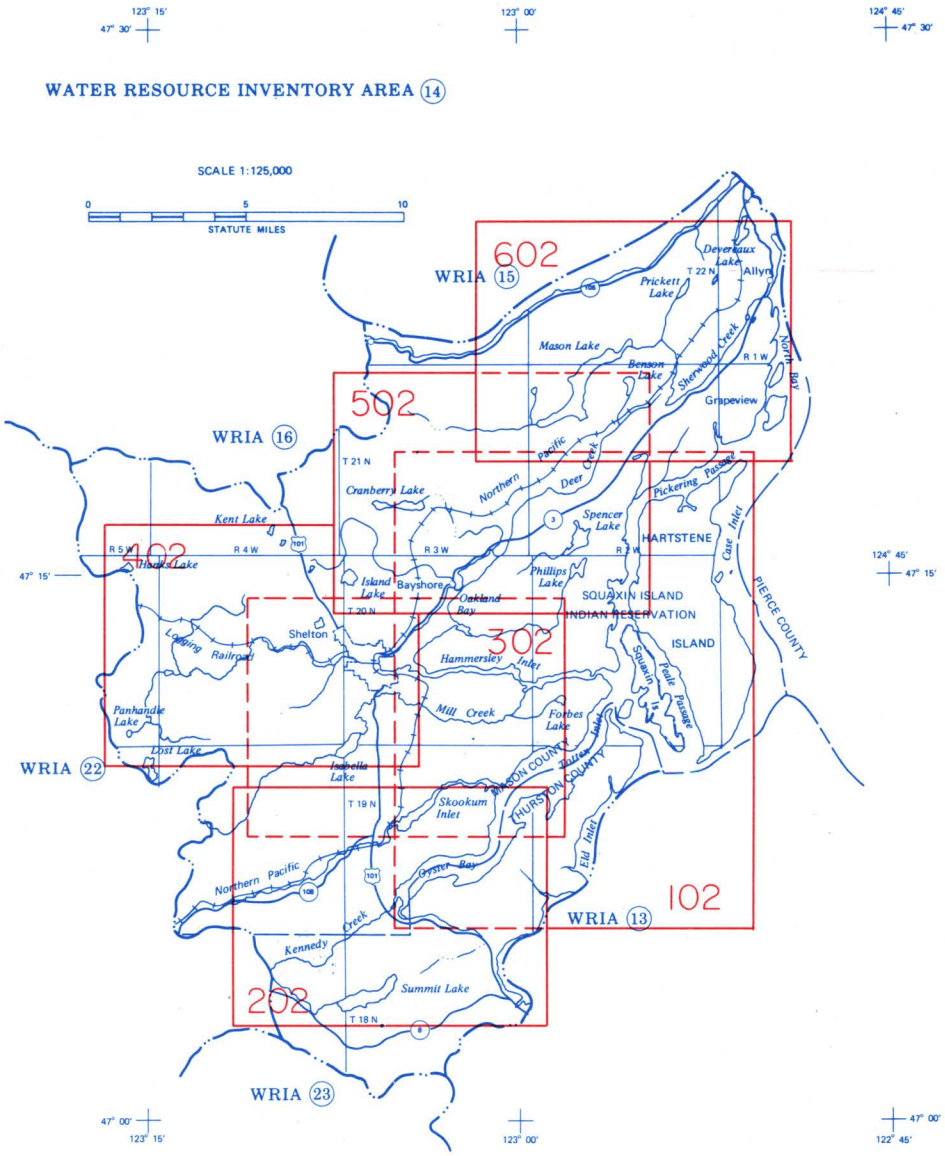


PHOTO 14-5. Dam and fish passage facilities at Lake Limerick (Cranberry Creek).

# SHELTON BASIN WRIA 14
## Index to Key Map

# SHELTON BASIN
# WRIA-14



This broad drainage description is presented as an orientation for the reader so that he can fully understand the relationship of the various salmon production areas to one another in southern Puget Sound. Numerous independent drainages enter the many bays and inlets that make up this drainage section. These confined inter-connecting passages offer ideal saltwater transition areas for juvenile salmon during the early portions of their life.

## Stream Description

Streams in this area are all quite similar in regard to physical characteristics. They are typically less than 15 miles in total length, and generally head in low rolling foothills that are devoted to logging or Christmas tree farming. The lower areas of these streams usually have some agricultural or grazing lands and some moderate summer home or residential development. The physical characteristics of these streams generally include swampy or marshy lands in the headwaters and several have lakes in their upper areas. Most of these streams are accessible for anadromous fish use to points very near their headwaters. There are some notable exceptions to this, however, in both Kennedy and Perry creeks where impassable waterfalls block salmon use in major portions of their upstream areas.

All of the streams in this southern Puget Sound area have exceptional salmon production capabilities due to limited human development and land use practices that are compatible with fisheries resources. These various drainages, while providing suitable spawning and rearing areas for anadromous species, also contribute to the ecological make-up of estuarine and marine habitats at their confluence with salt water. These estuaries are of great importance, particularly to anadromous species, for they provide the critical transition zone for juvenile and adult fishes as they move from one environment to another. Inclosed marine waters of southern Puget Sound provide excellent rearing conditions for immature salmon.

Each of the specific drainage areas in southern Puget Sound is covered separately in individual stream reach discussions.

## Salmon Utilization

Coho and chum salmon are the primary species produced in the numerous streams of southern Puget Sound. Coho usually spawn in the upstream sections of these drainages while the juveniles use all accessible areas for rearing. Spawning distribution of chum salmon is normally limited to the lower streams areas within several miles of tidewater. They do, however, extend their spawning distribution farther upstream during years of large escapement. Both return to virtually all southern Puget Sound streams where size and gradient afford access. Chinook and pink salmon occasionally occur in some of the larger drainages, and their distribution is generally limited to the lower stream reaches. For a more detailed assessment of salmon utilization and specific streams, refer to individual stream reach descriptions for Water Resource Inventory Area 14.

## Limiting Factors

Two factors having the greatest limiting effect on anadromous fish production in the streams of this area would be low summer flows and illegal fishing for spawning salmon. Because of the type of drainages and relatively small stream sizes, little can be achieved to alleviate the low flow problems. Stream bank clearing has accentuated the flow problem by causing elevated water temperatures. In addition to these freshwater limiting factors there are several local marine areas that are experiencing a deterioration of water quality. The two major problem areas occur in the waters adjacent to the towns of Shelton and Olympia where rapid residential expansion and industrialization adversely affect the qualities of marine waters.

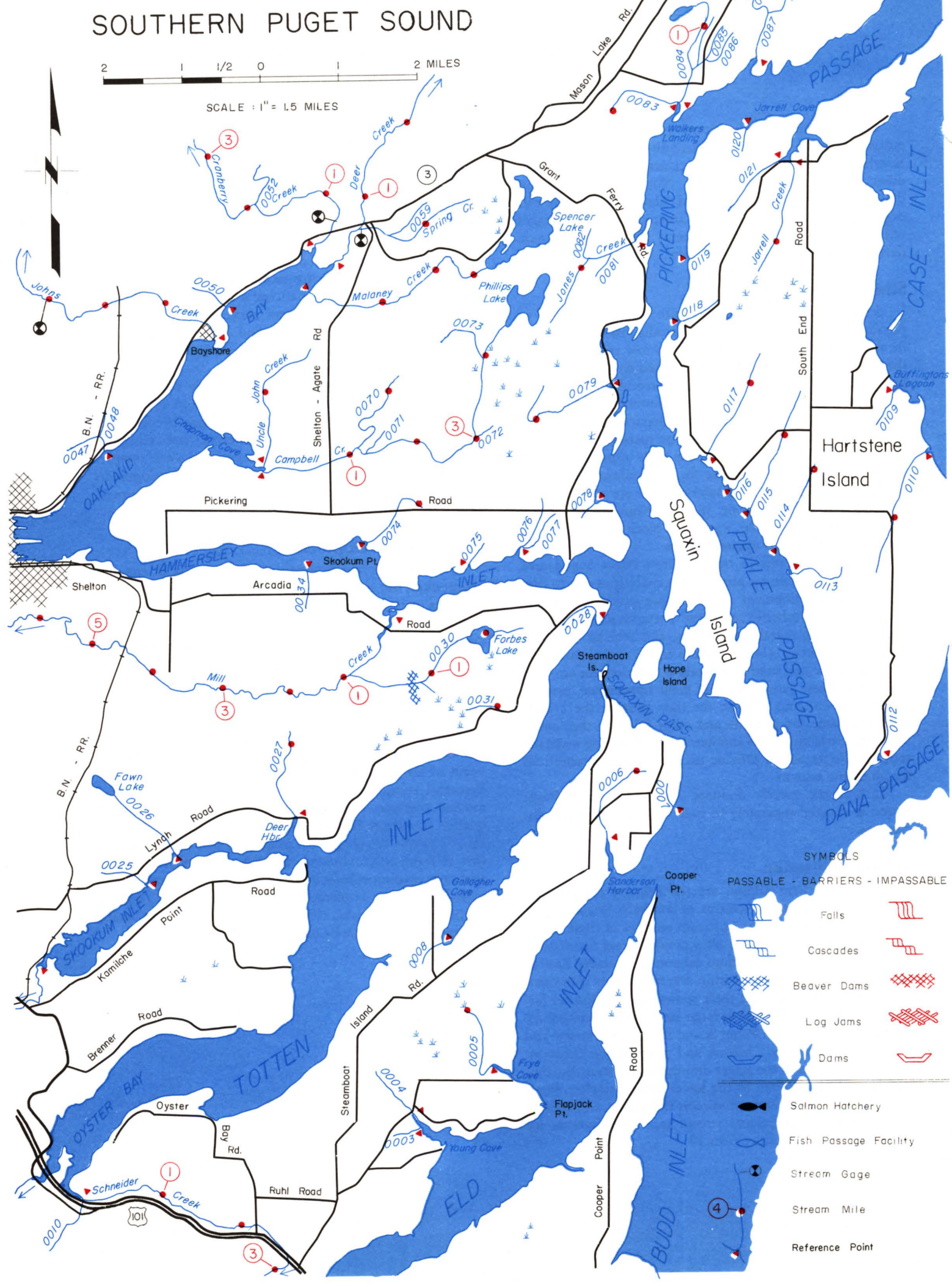
Recreational developments have recently become quite popular, and have also been very destructive to fish production habitat. These enhance property values by damming and creating lakes on flowing streams, but eliminate spawning and rearing area and cause elevated water temperatures that affect all downstream areas. These developments must come under tighter state control to assure the protection of the aquatic resource.

## Beneficial Developments

This area has had limited need for projects to enhance anadromous fish production. Accomplished beneficial developments include beaver dam and log jam removal, road culvert repair, and installation and operation of fish passage facilities. Implementation of recently developed state water quality standards will certainly have a beneficial effect on marine water quality.

## Habitat Needs

It is essential that any future watershed developments of this area include total consideration for the environmental needs of the aquatic resources in their pre-planning stages. Foremost consideration should be the maintenance of the amount and type of stream-side cover, and the quantity and quality of stream bottom materials available for fish use. Strict controls should govern projects which would alter either of these environmental conditions. The human predation on spawning salmon must be eliminated and this would probably require implementation of more strict punitive measures. In addition, close adherence to existing water quality standards must be maintained.


SOUTHERN PUGET SOUND
2 1 1/2 0 1 2 MILES
SCALE : 1" = 1.5 MILES
Mason Lake Rd.
Grant Ferry Rd.
PICKERING PASSAGE
CASE INLET
Jarrell Cove
Walkers Landing
Jarrell Creek
South End Road
Buffingtons Lagoon
Hartstene Island
Squaxin Island
PEALE PASSAGE
DANA PASSAGE
Hope Island
Steamboat Is.
SQUAXIN PASS
Cooper Pt.
Sanderson Harbor
Gallagher Cove
Frye Cove
Young Cove
Flapjack Pt.
Cooper Point Road
BUDD INLET
ELD INLET
TOTTEN INLET
Steamboat Island Rd.
OYSTER BAY
Oyster Bay Rd.
Brenner Road
Kamilche Point
SKOOKUM INLET
Lynch Road
Deer Hbr.
Fawn Lake
Mill Creek
Forbes Lake
Skookum Pt.
HAMMERSLEY INLET
Arcadia
Shelton
Pickering Road
OAKLAND BAY
Chapman Cove
Campbell Cr.
Uncle John Creek
Shelton - Agate Rd
Malaney Creek
Phillips Lake
Spencer Lake
Jones Creek
Spring Cr.
Deer Creek
Cranberry Creek
Johns Creek
Bayshore
B.N. - RR.
Schneider Creek
Ruhl Road
101
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point

## SOUTHERN PUGET SOUND
### Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0001 | Perry Creek | Sec13,T18N,R2W | 4.5 | — | Coho, Chum |
| | (See Shelton 203) | | | | |
| 0005 | Unnamed | Sec19,T19N,R2W | 1.0 | — | Unknown |
| 0006 | Unnamed | Sec4,T19N,R2W | 1.2 | — | Unknown |
| 0009 | Schneider Creek | Sec32,T19N,R2W | 5.3 | — | Coho, Chum |
| | (See Shelton 203) | | | | |
| 0012 | Kennedy Creek | Sec32,T19N,R2W | 9.6 | — | (Chin.), Coho, Chum |
| | (See Shelton 203) | | | | |
| 0020 | Skookum Creek | Sec17,T19N,R3W | 9.0 | — | (Chin.), Coho, Chum |
| | (See Shelton 203) | | | | |
| 0026 | Unnamed | Sec10,T19N,R3W | 1.0 | — | Unknown |
| | (See Shelton 303) | | | | |
| 0027 | Unnamed | Sec2,T19N,R3W | 1.2 | — | Unknown |
| | (See Shelton 303) | | | | |
| 0029 | Mill Creek | Sec25,T20N,R2W | 16.0 | — | (Chin.), Coho, Chum |
| | (See Shelton 303) | | | | |
| 0035 | Goldsborough Creek | Sec20,T20N,R3W | 14.0 | — | Chin.,Coho,Chum |
| | (See Shelton 403) | | | | |
| 0044 | Shelton Creek | Sec20,T20N,R3W | 2.6 | — | Coho, Chum |
| | (See Shelton 303) | | | | |
| 0049 | Johns Creek | Sec3,T20N,R3W | 8.3 | — | (Chin.), Coho, Chum |
| | (See Shelton 503) | | | | |
| 0051 | Cranberry Creek | Sec35,T21N,R3W | 9.4 | — | (Chin.), Coho, Chum |
| | (See Shelton 503) | | | | |
| 0057 | Deer Creek | Sec36,T21N,R3W | 8.5 | — | (Chin.) Coho, Chum |
| | (See Shelton 503) | | | | |
| 0067 | Malaney Creek | Sec2,T20N,R3W | 2.9 | — | Coho, Chum |
| | (See Shelton 503) | | | | |
| 0068 | Uncle John Creek | Sec14,T20N,R3W | 1.9 | — | Coho, (Chum) |
| | (See Shelton 503) | | | | |
| 0069 | Campbell Creek | Sec14,T20N,R3W | 4.5 | — | Coho, (Chum) |
| | (See Shelton 503) | | | | |
| 0074 | Unnamed | Sec24,T20N,R3W | 1.05 | — | Unknown |

## SOUTHERN PUGET SOUND
## Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0079 | Unnamed | Sec9,T20N,R2W | 1.45 | — | Unknown |
| 0080 | Jones Creek | Sec33,T21N,R2W | 1.8 | — | (Coho), (Chum) |
| 0083 | Unnamed | Sec22,T21N,R2W | 1.0 | — | Unknown |
| 0084 | Unnamed | Sec22,T21N,R2W | 1.5 | — | Unknown |
| | Unnamed Lake | Outlet-1.5 | | | |
| 0087 | Unnamed | Sec23,T21N,R2W | 1.8 | — | Unknown |
| 0088 | Unnamed | RB-0.6 | 1.0 | — | Unknown |
| 0093 | Unnamed | Sec32,T22N,R1W | 1.0 | — | Unknown |
| | (See Shelton 603) | | | | |
| 0094 | Sherwood Creek | Sec20,T22N,R1W | 18.3 | — | Chin., Coho, Chum |
| | (See Shelton 603) | | | | |
| | HARTSTENE ISLAND [1] | | | | |
| 0110 | Unnamed | Sec18,T20N,R1W | 1.6 | — | Unknown |
| 0114 | Unnamed | Sec23,T20N,R2W | 1.05 | — | Unknown |
| 0115 | Unnamed | Sec14,T20N,R2W | 1.6 | — | Unknown |
| 0117 | Unnamed | Sec15,T20N,R2W | 1.45 | — | Unknown |
| 0122 | Jarrell Creek | Sec26,T21N,R2W | 1.4 | — | Unknown |

[1] *Tributaries to Puget Sound listed clockwise around Island beginning at northernmost point (Dougall Point).*

## TOTTEN-ELD INLET
## Independent Drainages

This drainage section in southern Puget Sound contains numerous independent tributaries that are significant salmon producers. These streams enter Skookum, Totten, and Eld inlets, and have their headwaters originating in the Black Hills. The major stream in this area is Kennedy Creek, and others of importance would include Skookum Creek, Schneider Creek, and Perry Creek. In all, over 46 miles of streams have been cataloged for this drainage section. Portions of the streams are accessible by State Highways 8 and 108, and U.S. Highway 101.

### Stream Descriptions

Physical characteristics of all the streams in this drainage area are very similar. Logging is the predominant land use and second growth timber covers these watersheds. There is some agricultural development, mostly in the form of pasturage along the lower reaches of each of these streams. There has been very limited residential development in this area with the exception of Summit Lake, which is a major recreational area.

Kennedy Creek is one of two streams entering the south end of Oyster Bay, and is located approximately 15 miles west of Olympia. From its headwaters on the north slope of the Black Hills, the stream flows generally northwesterly for about five miles, and then turns sharply and flows an additional five miles in a northeast direction to its confluence with Oyster Bay. Four tributary streams join Kennedy Creek in its upper three miles, the major tributary being the outlet of Summit Lake. The basin, a moderate-width valley with hills rising several hundred feet on both sides of the stream, has a drainage area of 20.3 square miles. Surrounding slopes are covered in second growth conifer timber while on the valley floor, heavy deciduous cover predominates. A series of falls, cascades, and log jams exists in a narrow canyon 2.5 miles upstream from the mouth of Kennedy Creek. A total drop in excess of 60 feet in approximately 300 yards of canyon has blocked the upper 7.5 miles of stream to use by spawning anadromous fish species. Kennedy Creek is ideally suited for the production of salmon in all categories, with the exception of somewhat limited summer rearing potential. Stream widths below the falls range from 10 to 30 feet, and the gradient is moderate throughout. The extremely high quality spawning areas are interspersed with numerous pools, offering a nearly ideal environment for anadromous fish species.

Skookum, Schneider, and Perry creeks are all very similar to Kennedy Creek with the exception of having received more agricultural development. The most obvious effect of this development has been a reduction in the stream-side cover along major sections of these streams resulting in elevated summer water temperatures. There are numerous high quality spawning areas in each of these streams; however, low summer flows limit the rearing potential. Perry Creek has the only significant block, a waterfall at mile 1.2. Both Skookum and Schneider creeks are accessible throughout their length. Each of these independent drainages, including Kennedy Creek, has extensive estuarine areas. Each flows into the head of the closed saltwater bays, creating the extremely important transition zone for young out-migrant salmon.

### Salmon Utilization

Each of these watersheds supports excellent runs of coho and chum salmon. Coho salmon utilize all accessible areas of these streams for spawning and rearing, while the chum salmon generally limit their spawning distribution to the lower reaches of these streams. Salmon production potential of the areas above the falls of both Kennedy and Perry creeks is extremely high, and these areas have been utilized for planting sites for hatchery produced fish.

### Limiting Factors

Principal fish production limitation in these drainage basins include severe low summer flows, removal of stream bank cover, and the major fish passage barriers of Kennedy and Perry creeks. Schneider Creek has intermittent flows in much of its length. Road construction projects have caused some limited damage to certain segments of these streams, but this has mostly occurred outside of major production areas.

### Beneficial Developments

No fishery enhancement programs have been initiated in this drainage section. Planting of hatchery origin fish in stream sections above anadromous fish blocks, however, has provided production increases for this area.

### Habitat Needs

To maintain fish production potentials in this drainage section, all contributing environmental conditions, must be preserved. Sufficient cover must be kept in areas adjacent to the streams and along upper tributaries. Selective reestablishment of cover along cleared sections would be highly desirable. No gravel removal or channel alterations should be allowed on any streams in this area.

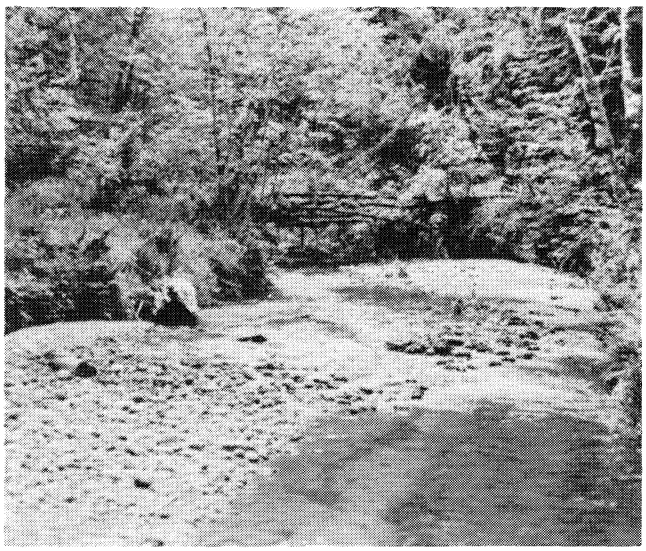
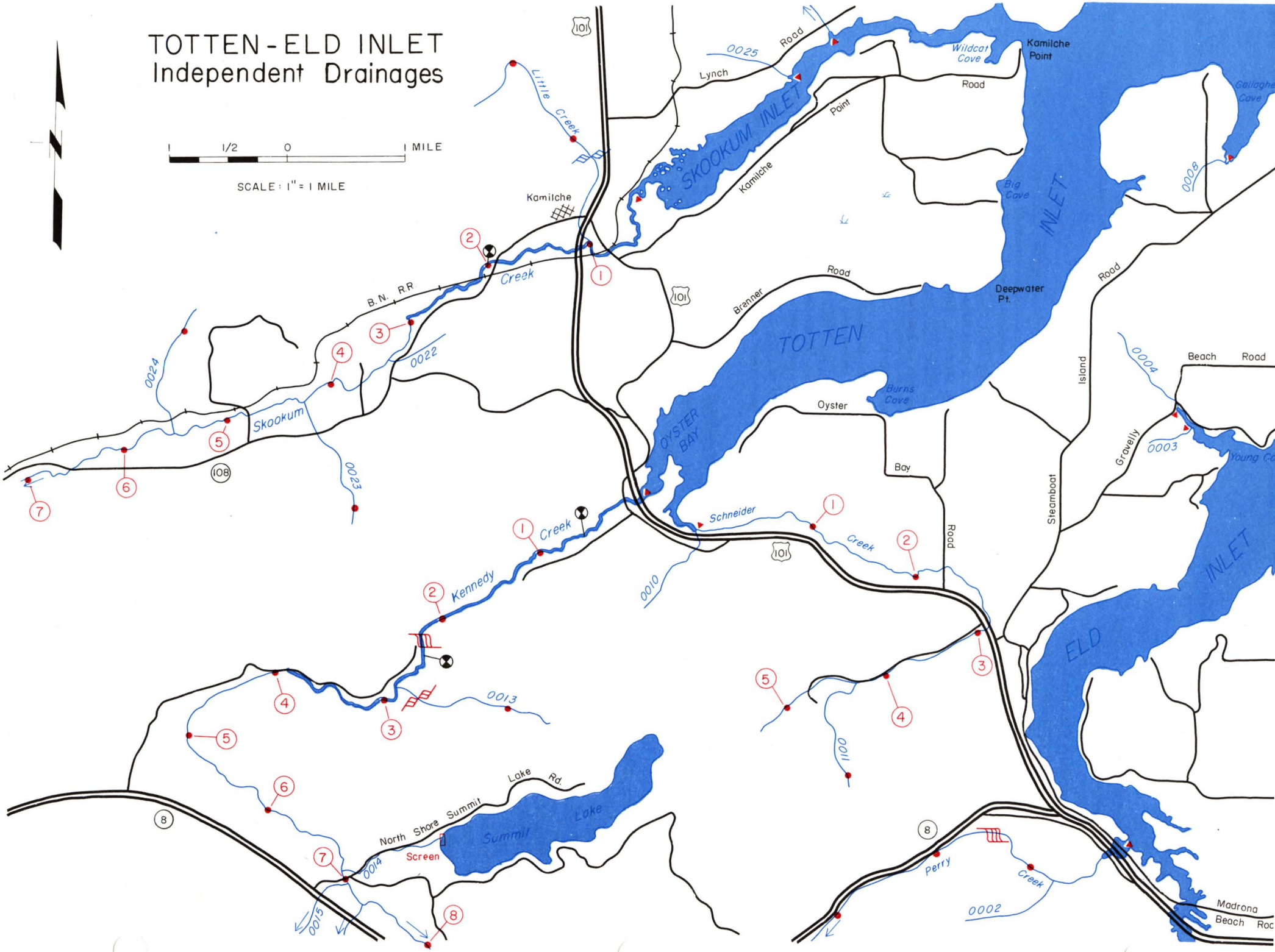


PHOTO 14-6. Lower Johns Creek.


TOTTEN-ELD INLET
Independent Drainages
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE
Little Creek
Kamilche
B.N. RR
Creek
Skookum
0024
0022
0023
0025
Lynch
Road
Wildcat Cove
Kamilche Point
SKOOKUM INLET
Point
Kamilche
Road
Big Cove
INLET
0008
Gallaghe Cove
Brenner
Road
Deepwater Pt.
TOTTEN
Burns Cove
Oyster
Bay
OYSTER BAY
Island
Road
Steamboat
Road
Gravelly
Beach
Road
0004
0003
Young Co
Schneider
Creek
Kennedy
Creek
0010
0013
0011
ELD
INLET
Lake
Rd.
North Shore Summit
Summit
Lake
Screen
0014
0015
Perry
Creek
0002
Madrona
Beach
Roc
101
108
8

## TOTTEN-ELD INLETS — INDEPENDENT DRAINAGES
## Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0001 | Perry Creek | Sec13,T18N,R3W | 4.5 | 6.08 | Coho, Chum |
| 0009 | Unnamed | Sec19,T19N,R2W | 1.0 | — | Unknown |
| | (See Shelton 103) | | | | |
| 0006 | Unnamed | Sec4,T19N,R2W | 1.2 | — | Unknown |
| | (See Shelton 103) | | | | |
| 0009 | Schneider Creek | Sec32,T19N,R3W | 5.3 | — | Coho, Chum |
| 0011 | Unnamed | RB-4.3 | 1.1 | — | Unknown |
| 0012 | Kennedy Creek | Sec32,T19N,R3W | 9.6 | 20.3 | (Chin.), Coho, Chum |
| 0013 | Unnamed | RB-2.8 | 1.4 | — | None |
| 0015 | Unnamed | LB-7.05 | 1.3 | — | None |
| 0017 | Unnamed | LB-8.25 | 1.0 | — | None |
| 0018 | Unnamed | LB-8.85 | 1.3 | — | None |
| 0020 | Skookum Creek | Sec17,T19N,R3W | 9.0 | — | (Chin.), Coho, Chum |
| 0021 | Little Creek | LB-1.0 | 2.6 | — | Coho, Chum |
| 0023 | Unnamed | RB-4.3 | 1.15 | — | (Coho) |
| 0024 | Unnamed | LB-5.5 | 1.2 | — | (Coho) |
| 0026 | Unnamed | Sec10,T19N,R3W | 1.0 | — | Unknown |
| | (See Shelton 303) | | | | |

# MILL CREEK DRAINAGE

This section of the Shelton Basin includes the entire Mill Creek drainages plus Shelton Creek and four unnamed tributaries that drain the peninsula lying between Hammersley and Totten inlets. There are only 30.7 stream miles within the district, with 23.4 of them located in the Mill Creek watershed. Shelton Creek and its tributaries total 4.0 miles, while the remaining 3.3 miles lies in the unnamed tributaries. Goldsborough Creek also enters nearby, but is described in Shelton 402.

## Stream Description

Mill Creek has its headwaters in low foothills several miles southwest of Shelton, in Mason County, and flows in a generally westerly direction to enter the middle section of Hammersley Inlet. Above Lake Isabella the stream assumes the name Gosnell Creek, while the lower 8.8 miles, below the lake, is Mill Creek. Two branches form the headwaters, the mainstem and Rock Creek, which join at stream mile 12.9. The watershed in both forks flows through second growth coniferous timber with cover forming a canopy over the flowing stream. Gradient is moderate and substrate is predominantly gravel.

Below Rock Creek, Gosnell Creek flows through Isabella Valley for 3.0 miles before entering Isabella Lake. Gradient in this stream section is relatively shallow, with numerous riffles separated by frequent pools. Substrate is predominantly gravel, with frequent intermittent sandy areas. Isabella Lake is 208 acres, and occupies the Mill Creek drainage between mile 8.8 and 9.9. Below Lake Isabella, Mill Creek retains its shallow gradient and meanders through a lowland valley in its lower 8.8 miles. The watershed is predominantly second growth deciduous timber, with only light to moderate development, and stream bank cover is excellent and frequently dense. Streambed substrate in lower Mill Creek is predominantly gravel, with numerous areas of sand and fine material in areas where gradient becomes very shallow.

There are a number of rural residences interspersed throughout the watershed. Heaviest development has been in the Gosnell Valley above Lake Isabella, where several small farms border the creek, and within the area near Shelton (mile 4.5 to 7.0) where occasional residence or pastureland approaches the stream. Mill Creek is very stable with little evidence of channel changes or erosion problems. Very limited stream flow information indicates that low summer flows are normally 11 cfs or higher.

The unnamed (RB) tributary at mile 0.9 drains Forbes Lake and, aside from Rock Creek, is the only important tributary of the system.

Shelton Creek is an important salmon producing stream, which flows through (and under) the City of Shelton. It is definitely an atypical salmon stream. Its mainstem above mile 0.4 is dry throughout much of the year, while an unnamed tributary (City Springs) provides annual flow for downstream areas. The gradient of lower Shelton Creek is moderate with predominantly gravel substrate, except for areas of concrete conduit and culverts. Bank cover includes back yard lawns, gravel alleys, service stations and grocery stores. Upper Shelton Creek supplies domestic water for the City of Shelton, and flow is thus heavily regulated.

Two of the four independent tributaries, those entering on Totten Inlet, contain gravel areas within their lower reaches and are accessible to salmon.

## Salmon Utilization

Mill Creek is accessible to salmon throughout virtually its entire length, and is heavily utilized by coho within the upper reaches, and to a lesser extent downstream from Lake Isabella. Chum salmon spawn below Lake Isabella, with both early runs (late October—early November) and late December stocks. Shelton Creek, in spite of the limited spawning area, supports an important run of chum salmon. All gravel areas in the lower 0.4 mile are intensively spawned, plus some lower reaches of Canyon Creek, a tributary. Two unnamed tributaries within this sub-basin that enter Totten Inlet provide spawning area for chum salmon in their lower reaches, plus a few coho. Escapements to the drainages in recent years have been 1,100 coho and 3,000 chum.

## Limiting Factors

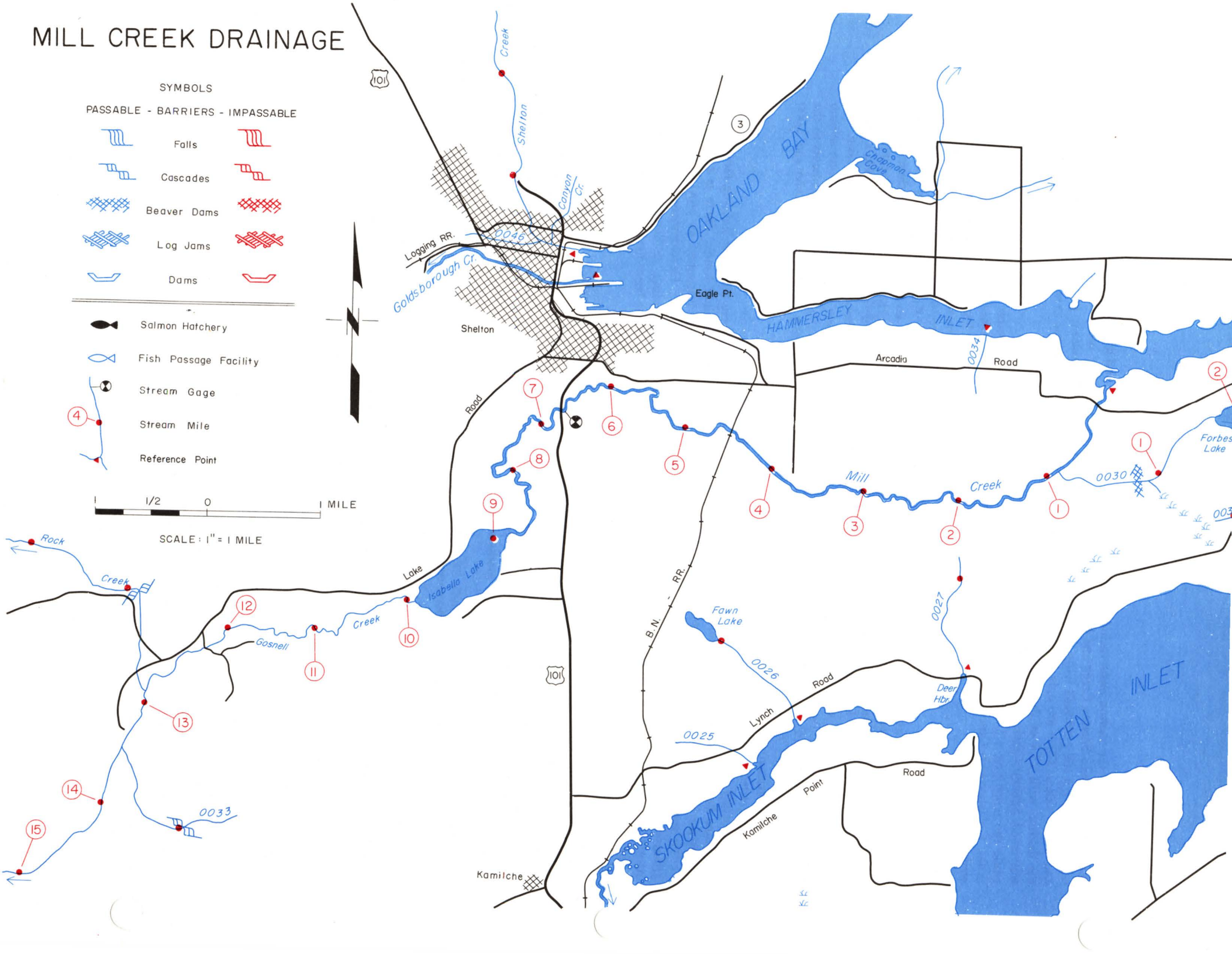
Streams described here have few limiting factors, with the exception being Shelton Creek. There is a diversion from the Shelton Creek watershed to provide municipal water for the City of Shelton. Development along the creek has been extensive, including residential and industrial areas. Spawning gravel has been displaced by city improvements.

## Beneficial Developments

There have been no facilities nor programs devoted to enhancement of fisheries resources within this drainage area. Additional regulation of Shelton Creek is proposed by U.S. Army Corps of Engineers, sponsored by the City of Shelton, and mitigative measures may provide greater production potential for the stream.

## Habitat Needs

Salmon production in streams within this area is favorable. Protection of these streams through enforcement of the hydraulic code is the best means of maintaining production.


MILL CREEK DRAINAGE
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
1/2
0
1 MILE
SCALE: 1" = 1 MILE
OAKLAND BAY
Chapman Cove
Eagle Pt.
HAMMERSLEY INLET
Shelton
Creek
Shelton
Canyon Cr.
Logging RR.
0046
Goldsborough Cr.
Arcadia
Road
0034
Forbes Lake
0030
Mill
Creek
0027
Fawn Lake
0026
Deer Hbr.
Lynch
Road
0025
B.N. RR.
Road
Rock
Creek
Lake
Isabella Lake
Gosnell
Creek
0033
Kamilche
SKOOKUM INLET
Point
Kamilche
Road
TOTTEN INLET
101
3

## MILL CREEK DRAINAGE
## Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0026 | Unnamed | Sec10,T19N,R3W | 1.0 | — | Unknown |
| 0027 | Unnamed | Sec2,T19N,R3W | 1.2 | — | Unknown |
| 0029 | Mill Creek | Sec25,T20N,R2W | 16.0 | — | (Chin.), Coho, Chum |
| 0030 | Unnamed | RB-0.9 | 2.4 | — | Coho, (Chum) |
| 0031 | Unnamed | LB-0.9 | 1.15 | — | Unknown |
| | Forbes Lake | Outlet-1.75 | — | — | |
| | Isabella Lake | Outlet-8.8 | — | — | |
| | Mill Creek cont. as Gosnell Creek | @ mi. 9.91 | | | |
| 0032 | Rock Creek | LB-12.9 | 2.3 | — | Coho |
| 0033 | Unnamed | RB-13.5 | 1.5 | — | (Coho) |
| 0035 | Goldsborough Creek | Sec20,T20N,R3W | 14.0 | — | Chin., Coho, Chum |
| | (See Shelton 403) | | | | |
| 0044 | Shelton Creek | Sec20,T20N,R3W | 2.6 | — | Coho, Chum |

# GOLDSBOROUGH CREEK DRAINAGE

Goldsborough Creek is a medium size stream draining the lower foothills of the southern Olympic Peninsula. It contains 14.0 mainstem miles plus 14.3 miles in 6 tributaries. It flows easterly from the junction of the north and south forks through the center of the City of Shelton, and enters Oakland Bay in Hammersley Inlet.

## Stream Descriptions

Goldsborough Creek is the largest drainage in the Shelton Basin, although only 14 miles total length. Upper Goldsborough Creek is divided into north and south fork areas above mile 8.9. Both are spring fed streams that drain shallow upper watershed valleys. Gradient is shallow to moderate with intermittent marshy areas or small lakes. Watershed cover is predominantly second growth timber, with dense intermittent deciduous growth along the stream banks. Area bordering the stream is sparsely settled with rural homes and occasional small farms. At approximately mile 7 the valley begins to narrow and stream gradient steepens slightly, and eventually enters a rather confined section between mile 2 and mile 5. This section is sparsely settled and is predominantly second growth timber, with excellent stream bank cover. Goldsborough Creek is in contrast with most Puget Sound streams, where upper watersheds have steep gradients and narrow valleys that broaden toward the stream mouths. Upper Goldsborough Creek lies in broad valleys and has shallow stream gradient and conditions reverse themselves downstream.

Gradient is moderate in the lower 2 miles as it flows through the town of Shelton. Stream cover is surprisingly good in spite of dense settlement and heavy development. Special features include a dam at mile 2.3, where water is diverted to a steam electric plant operated by Simpson Timber Company; gravel mining and washing operations conducted by Graystone near mile 2; stream channelization of the lower mile completed many years ago, and finally the extensive Simpson Timber Company sawmill complex at the immediate mouth of the stream.

Goldsborough Creek is stable, with flows seemingly controlled by favorable ground water conditions in the shallow valleys and marshy areas of the upper watershed. Mean flow at the gaging station (mile 0.85) is 117 cfs, with the normal range being 20 cfs in late summer or fall to about 400 cfs in winter. The dependable nature of the stream discharge is also reflected in the stability of the stream channel and substrate.

There are only 2 sizeable tributaries, these being Winter Creek and Coffee Creek. Winter Creek enters the north fork and is 4.6 miles in length; however, most of the stream is dry during much of the year. Coffee Creek enters at mile 1.65, and is 2.1 miles long. It drains Shelton Valley, a farm land section lying south of the mainstem.

## Salmon Utilization

Goldsborough Creek is an excellent coho stream, with virtually all areas providing excellent rearing habitat and abundant spawning area. Coho escapement to the system is typically 1,800 fish annually. Some chum salmon spawn in the lower 2 miles of Goldsborough Creek, totaling from 500 to 1,000 adults each year. Chum salmon are of the late spawning stock, entering in late December and early January.

## Limiting Factors

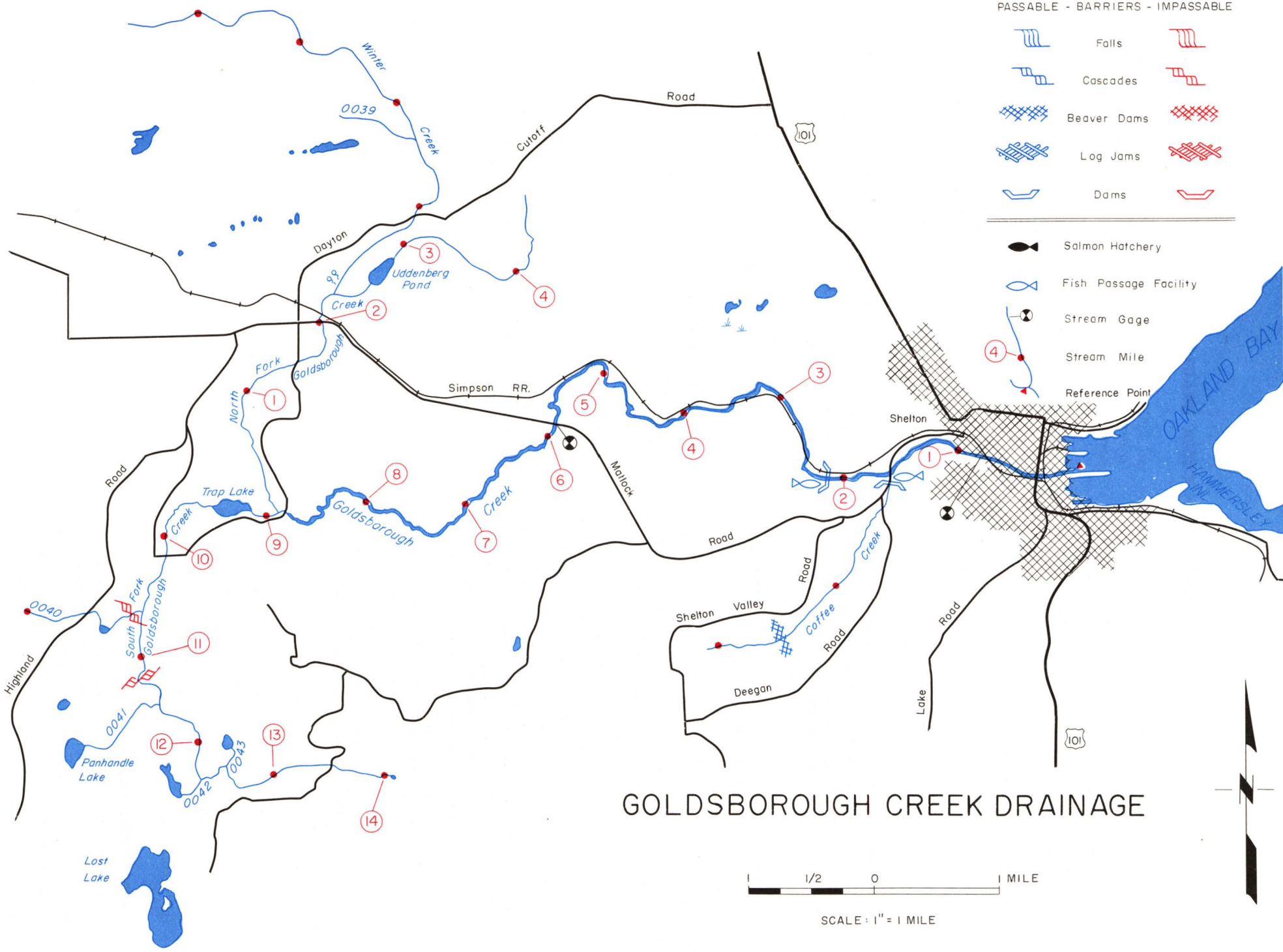
A former diversion dam at mile 5.2 has been removed and the stream channel has reestablished itself. The diversion dam at river mile 2.3 is equipped with an adequate fishway, and it is readily used by coho but not by chum salmon. Below the dam there has been siltation when wash water at the gravel operation has not been properly impounded for settling. Water quality in the lower stream has been influenced by storm drainage and effluents from the numerous homes and businesses that line the stream. Simpson Timber Company operates a major timber processing complex at the immediate mouth, with potential for impact on the habitat. One recent example was the errant homing of several hundred adult coho to the return water from their steam generating plant. This water has been removed at the diversion dam and was being returned to Oakland Bay a short distance south of the mouth of Goldsborough Creek.

## Beneficial Developments

There are no facilities to enhance salmon production on Goldsborough Creek; however, plants of coho have been made in past years.

## Habitat Needs

The City of Shelton and Mason County should develop a watershed management plan under the Shorelines Management Act to prevent further development on this stream. Some spawning habitat improvement work in the lowermost sections of the stream may be feasible in the future.


SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point
Winter Creek
0039
Cutoff Road
101
Dayton
98 Creek
Uddenberg Pond
Simpson RR.
North Fork Goldsborough Creek
Trap Lake
Goldsborough Creek
Mallock Road
Shelton
OAKLAND BAY
HAMMERSLEY INL
Shelton Valley Road
Coffee Creek
Deegan Road
Lake Road
Highland Road
0040
South Fork Goldsborough Creek
Panhandle Lake
0041
0042
0043
Lost Lake
GOLDSBOROUGH CREEK DRAINAGE
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE

## GOLDSBOROUGH CREEK DRAINAGE
### Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0035 | Goldsborough Creek | Sec20,T20N,R3W | 14.0 | — | Chin., Coho, Chum |
| 0036 | Coffee Creek | RB-1.65 | 2.1 | — | Coho |
| 0037 | N.Fk. Goldsborough Cr. | LB-8.9 | 4.7 | — | (Chin.), Coho |
| 0038 | Winter Creek | RB-2.3 | 4.6 | — | (Coho) |
| | Uddenberg Pond | Outlet-2.6 | — | — | |
| | Goldsbor. Cr. cont. as S.F. Goldsborough Cr. | @ mi. 8.91 | | | |
| | Trap Lake | Outlet-9.15 | — | — | |
| 0040 | Unnamed | LB-10.65 | 1.0 | — | Unknown |
| | Unnamed Lake | Outlet-14.0 | — | — | |

# UPPER OAKLAND BAY
## Independent Drainages

There are 8 independent streams that enter the upper portion of Oakland Bay. Largest and most important of these are Johns Creek, Cranberry Creek, and Deer Creek. Total mileage within all streams, including tributaries, is 53.9, with 75% of this in the 3 major watersheds. These creeks all lie northeast of Shelton in Mason County, and are accessible by several roads at various points.

### Stream Descriptions

Johns Creek is 8.3 miles in total length and surprisingly has no tributaries. It arises in Johns Lake where several springs emerge from the lake bottom. The upper five miles of watershed has extremely shallow gradient, with swampy land bordering the stream. The lower 3.5 miles has moderate gradient throughout with excellent gravel substrate and favorable stream bank cover as it flows through a confined valley with no development adjacent to the stream except near its mouth.

Cranberry Creek is 9.4 miles in length, and has 5.4 miles of tributary streams. Like Johns Creek its upper reaches include extensive swampy areas. In fact, Johns Creek and Cranberry Creek at one point flow through the same swampy section and there is no perceptible land mass that separates them. Major features of Cranberry Creek include two large lakes, Cranberry Lake and Lake Limerick. Cranberry Lake is a large shallow marshy area of 170 surface acres with its outlet at mile 4.7. Downstream one-half mile Cranberry Creek enters Lake Limerick, a large man-made lake formed out of a former swamp approximately equal in size to Cranberry Lake. Below Lake Limerick the remaining 3.5 miles of stream has moderate gradient with substantial areas of gravel substrate. Watershed developments include a rural settlement around Lake Limerick and on downstream. Second growth mixed timber is predominant and stream bank cover is favorable in most sections.

Deer Creek enters at the uppermost end of Oakland Bay. It is 8.5 miles in length with 8.6 miles of tributary streams. Its watershed is similar to other streams in the area, with sparse development and predominantly second growth timber. Stream bank cover is dense. Gradient is moderate to shallow, including some marshy sections. Stream substrate is predominantly gravel in reaches containing moderate gradient.

Malaney, Uncle John, and Campbell creeks enter Oakland Bay from its south shore. Campbell Creek, 4.5 miles in length, enters Chapman Cove and is the largest of the 3 streams. The intermittent outlet of Phillips Lake drains into swampy areas that form the headwaters of Campbell Creek. All of these drainage areas have moderate gradient through most of their length, with considerable gravel substrate and favorable stream bank cover. Watersheds are covered with second growth timber, with occasional rural residential development.

Limited U.S.G.S. flow data are available for streams in this sub-basin. John Creek flows range from 4 to 211 cfs; Cranberry Creek from 5 to 860 cfs; and Deer Creek appears more stable with 16 to 386 cfs range.

### Salmon Utilization

The upper Oakland Bay tributaries are very important producers of coho and chum salmon. While there are limiting factors, both natural and man made, portions of all streams except the 2 unnamed tributaries support salmon runs. Coho utilize the lower 3.5 miles of John Creek, the lower section of Cranberry Creek, and much of the accessible reaches of Deer, Malaney, Uncle John, and Campbell creeks. John Creek supports an extremely large population of chum salmon, both early and late run stocks, while Cranberry and Deer creeks have smaller runs. Total spawning populations of all streams include over 2,000 chum salmon and approximately 1,000 coho.

### Limiting Factors

The shallow gradient and swampy areas found in portions of several of these streams restrict the amount of area utilized by salmon. The swamps in Johns and Cranberry creeks occur in the uppermost watershed and all spawning takes place some distance downstream. Juveniles do not migrate upstream into these areas. Production in Cranberry Creek is limited by the 2 large lakes where surface discharges of extremely warm water during summer months sharply reduce the coho rearing capacity in all but the lowermost areas.

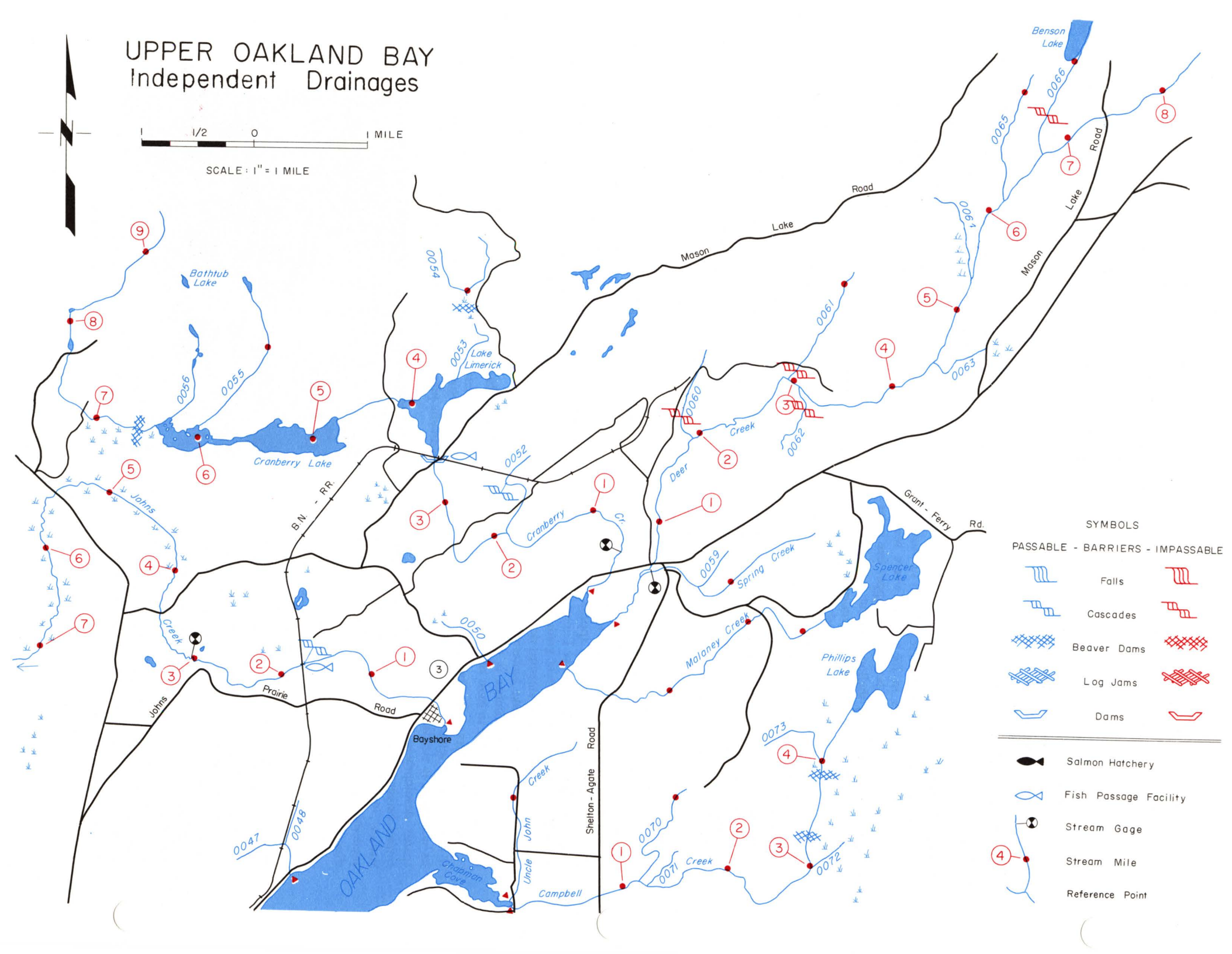
### Beneficial Developments

Fish passage facilities are incorporated into the formal dam at the outlet to Lake Limerick. Hatchery plants of coho have been made in past years in several of the streams. During the late 1950's and early 1960's Cranberry Lake was utilized as a natural rearing facility, with only limited success.

### Habitat Needs

The watershed in this area are highly productive and the principal need is to include conservative provisions on any hydraulic project approval that could impact the streams.

PHOTO 14-7. Cranberry Creek during summer low flow.


UPPER OAKLAND BAY
Independent Drainages
1 1/2 0 1 MILE
SCALE: 1" = 1 MILE
Benson Lake
Bathtub Lake
Lake Limerick
Cranberry Lake
Mason Lake Road
Mason Lake Road
Grant - Ferry Rd.
B.N. - R.R.
Johns Creek
Johns Prairie Road
Bayshore
OAKLAND BAY
Chapman Cove
Shelton - Agate Road
Cranberry Cr.
Deer Creek
Spring Creek
Malaney Creek
Phillips Lake
Spencer Lake
John Creek
Uncle Campbell
0047
0048
0050
0052
0053
0054
0055
0056
0059
0060
0061
0062
0063
0064
0065
0066
0070
0071 Creek
0072
0073
SYMBOLS
PASSABLE - BARRIERS - IMPASSABLE
Falls
Cascades
Beaver Dams
Log Jams
Dams
Salmon Hatchery
Fish Passage Facility
Stream Gage
Stream Mile
Reference Point

## UPPER OAKLAND BAY — INDEPENDENT DRAINAGES
### Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0049 | Johns Creek | Sec3,T20N,R3W | 8.3 | — | (Chin.), Coho, Chum |
| | Johns Lake | Outlet-8.3 | — | — | |
| 0051 | Cranberry Creek | Sec35,T21N,R3W | 9.4 | — | Coho, Chum |
| | Lake Limerick | Outlet-3.5 | — | — | |
| 0053 | Unnamed | LB-3.9 | 1.6 | — | (Coho) |
| | Cranberry Lake | Outlet-4.7 | — | — | |
| 0055 | Unnamed | LB-6.0 | 1.5 | — | (Coho) |
| 0057 | Deer Creek | Sec36,T20N,R3W | 8.5 | — | (Chin.), Coho, Chum |
| 0058 | Spring Creek | LB-0.5 | 1.85 | — | Coho, (Chum) |
| 0061 | Unnamed | RB-2.9 | 1.2 | — | Unknown |
| 0065 | Unnamed | RB-6.2 | 1.2 | — | Unknown |
| 0066 | Unnamed | RB-6.7 | 1.1 | — | Unknown |
| 0067 | Malaney Creek | Sec2,T20N,R3W | 2.9 | — | Coho, Chum |
| | Spencer Lake | Outlet-2.9 | — | — | |
| 0068 | Uncle John Creek | Sec14,T20N,R3W | 1.9 | — | Coho, (Chum) |
| 0069 | Campbell Creek | Sec14,T20N,R3W | 4.5 | — | Coho, (Chum) |
| 0070 | Unnamed | RB-1.15 | 1.2 | — | Unknown |
| | Phillips Lake | Outlet-4.5 | — | — | |

# UPPER CASE INLET
## Independent Drainages

This drainage section contains the Sherwood Creek-Mason Lake complex as well as several independent streams tributary to Case Inlet. These streams enter the northwest section of Case Inlet, which is one of the farthest inland extensions of Puget Sound proper. Sherwood Creek is the major fish production drainage in this area and consists of 18.3 miles of mainstem and more than 15.9 linear miles of tributaries. 52.4 total miles of stream drainage occurs in this section of Case Inlet.

### Stream Descriptions

The Sherwood Creek basin originates in low foothills approximately six miles north of Shelton. Schumocher Creek and its associated tributaries make up the upper reaches of this basin. This area is devoted to Christmas tree farming, brush picking, and has recently undergone extensive recreational development. Land areas immediately adjacent to Schumocher Creek are quite swampy and beaver dams and ponds are the predominant feature. Schumocher Creek enters the western end of Mason Lake (977 surface acres), and exits at the northeast end of the lake as Sherwood Creek. From the lake, Sherwood Creek flows 8.6 miles to its confluence with Case Inlet. Through much of this area the stream is contained in a moderate sized valley which is predominantly covered by second growth timber. The creek parallels State Highway 14A but has access at only one point except near the mouth. Stream widths in this lower 8.6 mile range from 8 to 25 feet and the total area is made up of about 70% riffles and 30% pools. Numerous natural blow downs and log jams have formed in the creek; however, winter flows keep them from becoming blocks. There is heavy conifer and deciduous cover along the streambed, and the stream has a natural and unspoiled appearance. Each of these characteristics provides for excellent salmon production areas, and spawning and rearing areas are excellent throughout the drainage.

There has been some moderate residential development along the lower mile of Sherwood Creek, with very little influence on the stream itself. Mason Lake, on the other hand, has experienced extensive residential and summer-home development.

Several independent drainages enter Case Inlet in this section. These streams are generally less than one mile in length and each has some fish production capability. The enclosed waters of Case Inlet provide an excellent estuarine environment for young migrant salmon.

### Salmon Utilization

Chum and coho salmon are the two primary species that utilize the Sherwood Creek drainage; however, chinook and pink salmon do occur in minor abundance. Coho spawning occurs throughout the system, but the heaviest densities are usually observed in the upper tributaries, particularly Schumocher Creek. Chum salmon distribution is limited to that area below Mason Lake and heaviest densities normally occur between mile 5.0 and tidewater. Utilization by chinook and pink salmon is usually limited to the lower portions of Sherwood Creek proper. All accessible areas of those streams tributary to Case Inlet are utilized by coho and chum salmon.

### Limiting Factors

Due to the nature of the land use in this area there are very few physical factors that limit anadromous fish production in these streams. It is expected, however, that as summer home and residential development accelerates, those factors that affect fish production in more heavily populated areas will begin to have their impact on these streams. Currently, the most severe limiting factor on these streams is the problem of illegal human predation on spawning salmon.

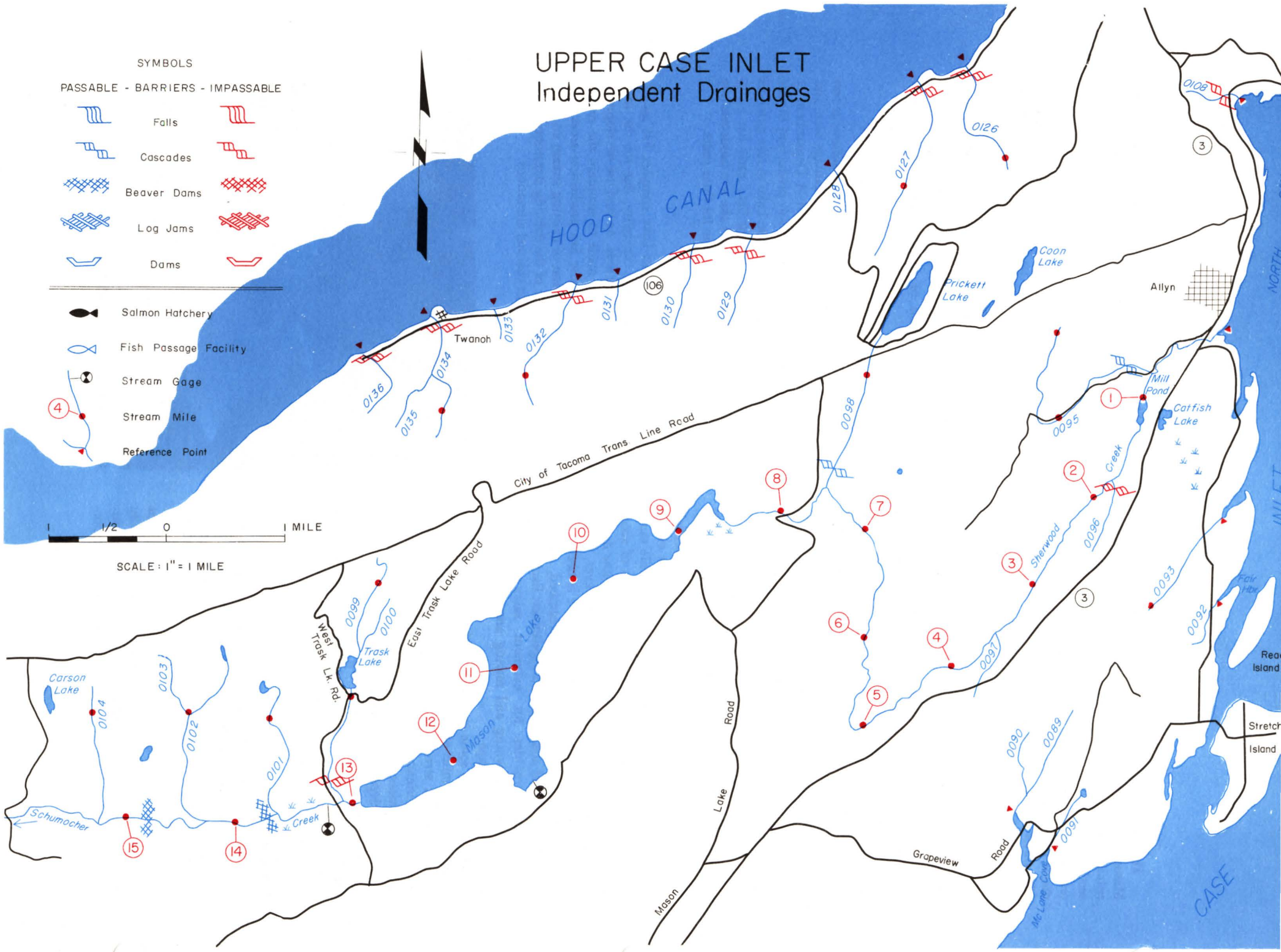
### Beneficial Developments

No physical developments beneficial to anadromous fish production have been undertaken in this drainage area, and for the most part none have been needed. A Department of Fisheries program that has increased fish production in this area has been the utilization of Mason Lake to rear numbers of artifically produced salmon during their early life histories. Trails End (formerly Pricketts) Lake was unsuccessfully used as a natural production fish farm for three years.

### Habitat Needs

The Sherwood Creek-Mason Lake complex has an extremely high fish production capability, due for the most part to limited land use of the area. As land use development occurs, every effort must be made to maintain the natural physical characteristics of these fish production areas. This would include the preservation of existing stream and bank cover, and the maintenance of the existing streambed by allowing no gravel removal or channel alterations.

PHOTO 14-8. Lower Sherwood Creek.


UPPER CASE INLET
Independent Drainages
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
HOOD CANAL
Twanoh
Prickett Lake
Coon Lake
Allyn
Mill Pond
Catfish Lake
City of Tacoma Trans Line Road
East Trask Lake Road
West Trask Lk. Rd.
Trask Lake
Lake Mason
Mason Lake Road
Grapeview Road
Sherwood Creek
Schumacher Creek
Carson Lake
McLane Creek
CASE INLET
Stretch Island
0126
0127
0128
0129
0130
0131
0132
0133
0134
0135
0136
0108
0098
0095
0096
0093
0092
0091
0090
0089
0100
0101
0102
0103
0104
106

## UPPER CASE INLET — INDEPENDENT DRAINAGES
### Shelton Basin — WRIA 14

| Stream Number | Stream Name | Location Of Mouth | Length | Drainage Area | Salmon Use |
|---|---|---|---|---|---|
| 0093 | Unnamed | Sec32,T22N,R1W | 1.0 | — | Unknown |
| 0094 | Sherwood Creek | Sec20,T22N,R1W | 18.3 | — | Chin., Coho, Chum |
| 0095 | Unnamed | LB-0.7 | 2.05 | — | Coho, (Chum) |
| | Mill Pond | Outlet-1.0 | — | — | |
| 0098 | Unnamed | LB-7.5 | 1.5 | — | Coho, (Chum) |
| | Mason Lake | Outlet-8.5 | — | — | |
| | Sherwood Cr. cont. as Schumocher Creek | @ mi. 12.91 | — | — | |
| 0099 | Unnamed | LB-13.1 | 2.35 | — | (Coho) |
| | Trask Lake | Outlet-1.06 | — | — | |
| 0101 | Unnamed | LB-13.65 | 1.3 | — | Coho |
| 0102 | Unnamed | LB-14.3 | 1.6 | — | Coho |
| | Unnamed Lake | Outlet-1.6 | | | |
| 0104 | Unnamed | LB-15.2 | 1.2 | — | Unknown |
| 0105 | Unnamed | LB-16.3 | 1.2 | — | Unknown |
| | Unnamed Lake | Outlet-18.3 | — | — | |
| | HOOD CANAL — TRIBUTARIES SOUTH OF UNION RIVER | | | | |
| 0124 | Unnamed | Sec6,T22N,R1W | 1.3 | — | Unknown |
| 0126 | Unnamed | Sec12,T22N,R2W | 1.15 | — | Unknown |
| 0127 | Unnamed | Sec11,T22N,R2W | 1.65 | — | Unknown |
| 0132 | Unnamed | Sec21,T22N,R2W | 1.2 | — | Unknown |
| 0134 | Unnamed (Twanoh Creek) | Sec19,T22N,R2W | 1.3 | — | Chum |
| 0138 | Unnamed (Alderbrook Cr.) | Sec33,T21N,R3W | 1.3 | — | (Coho), (Chum) |