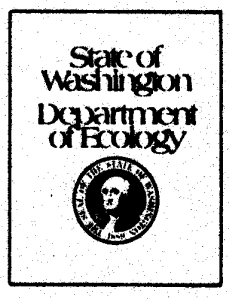

STATE WATER PROGRAM

W.W.I.R.P.P. SERIES – NO. 12

SKOKOMISH – DOSEWALLIPS
INSTREAM RESOURCES PROTECTION PROGRAM

(WATER RESOURCE INVENTORY AREA 16)

INCLUDING

PROPOSED ADMINISTRATIVE RULES

(CHAPTER 173-516 WAC)

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

JUNE 1985

DRAFT

INSTREAM RESOURCES PROTECTION PROGRAM
Skokomish - Dosewallips Water Resource Inventory Area

Including Proposed Administrative Rules
Chapter 173-516 WAC

Prepared by
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Washington State Department of Ecology

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Washington State Department of Printing
Olympia, Washington

June 1985

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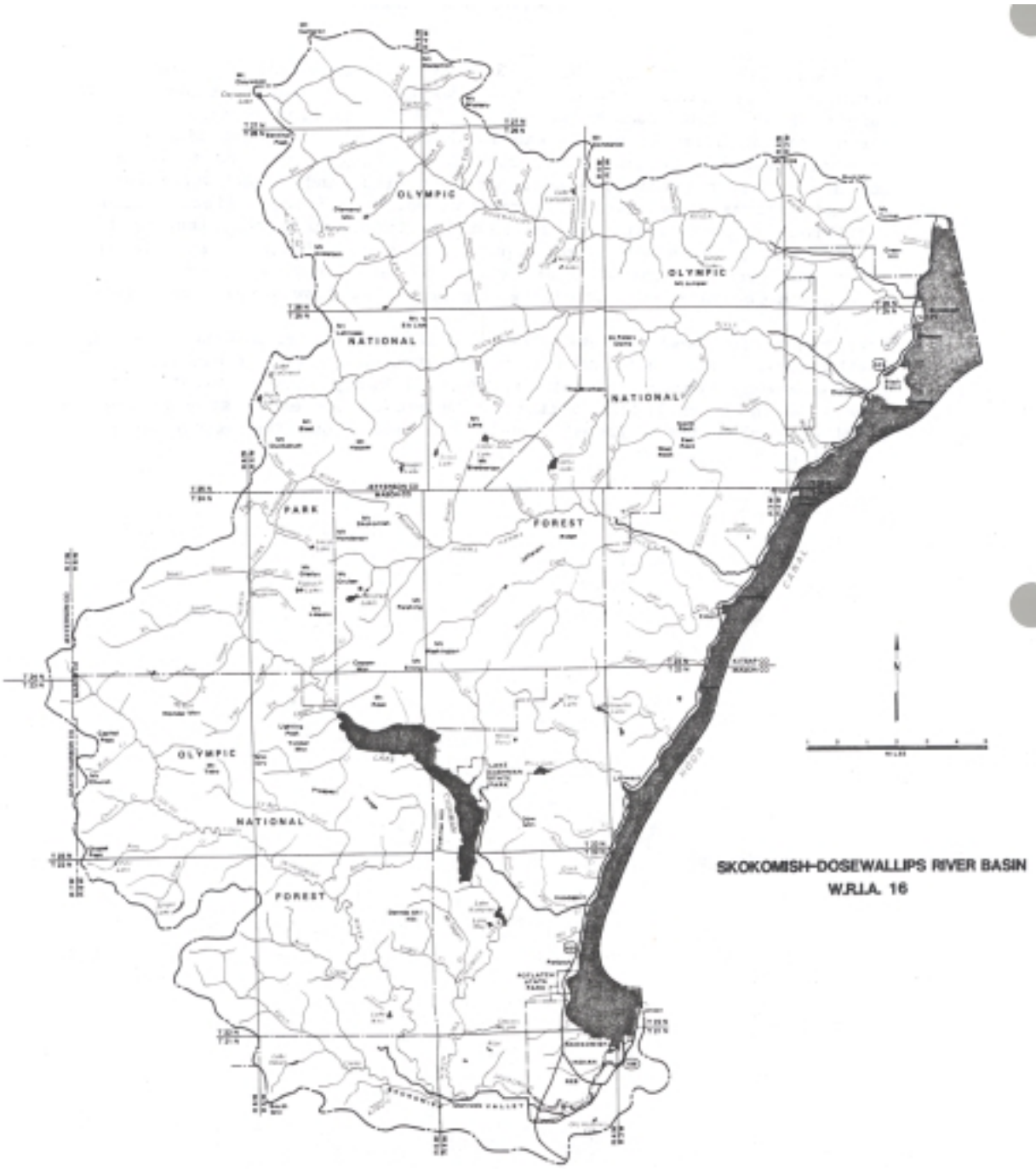
INTRODUCTION AND SUMMARY

The Skokomish-Dosewallips Water Resource Inventory Area (WRIA 16) encompasses the northwestern half of Mason County and the southeastern corner of Jefferson County (see figure one). Principal drainages in the basin are the Dosewallips, Duckabush, Hamma Hamma, and Skokomish rivers, with many smaller streams along Hood Canal. High elevation snow fields in the Olympic Mountains, direct precipitation, and ground water inflow maintain stream flow levels. Stream flows, therefore, reflect seasonal variation in precipitation. In addition to directly contributing to stream flow maintenance, those sources also contribute to storage in lakes and ground water aquifers which serve as natural reservoirs, helping to moderate extreme high and extreme low flow stream conditions.

Peak runoff in these streams occurs during the winter and early spring months during snow melt and when precipitation is at its highest. As precipitation subsides in late spring and early summer, stream flow levels begin to fall off so that by August or September streams have usually reached their lowest levels. Stream flows then increase as precipitation increases in the fall.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SKOKOMISH-DOSEWALLIPS RIVER BASIN
W.R.I.A. 16

Surface water in WRIA 16 is used for a variety of purposes. Hydroelectricity is generated on the North Fork of the Skokomish River and on Lilliwaup Creek, and is proposed on many other streams within WRIA 16. Small water diversions for commercial and domestic supply exist in the lowlands near Hood Canal and proposals exist to develop the Dosewallips, Duckabush, and Hamma Hamma Rivers as sources of municipal water supply for Port Townsend, Kitsap County, Jefferson County, and Bremerton. Streams of the area also serve as important production grounds for coho, chum, pink, and chinook salmon. Steelhead and cutthroat trout inhabit waters of this WRIA and are important to the recreational fishery of the area. Recreation is also a major instream use of water. Lakes and streams of the region are highly utilized for boating, swimming, and sport fishing. In addition to recreational and fisheries resource use, these streams and lakes are also important for their scenic and aesthetic qualities as well as for wildlife habitat and use. Waters of WRIA 16 are among the most pure in the State of Washington.

As population increases in the Hood Canal area and the Puget Sound region, the demand for water for water supply and energy production is likely to increase. This has already occurred for hydroelectric power generation. Water rights developed in the future have the potential to deplete flows in the rivers and streams of WRIA 16. In order to preserve flows for important instream uses, the Washington State Department of Ecology (WDOE) proposes to establish minimum instream flows on the following streams and their tributaries: Dosewallips River, Duckabush River, Eagle Creek, Finch Creek, Fulton Creek, Hamma Hamma River, John Creek, Jorsted Creek, North Fork Skokomish River, Skokomish River, and South Fork Skokomish River.

The following streams, including tributaries, are proposed to be closed to further consumptive use for the period of the year indicated:

Clark Creek	June 1 through December 31
Eagle Creek	June 1 through December 31
Finch Creek	All year
Fulton Creek	June 1 through December 31
Hill Creek	June 1 through December 31
Hunter Creek	June 1 through December 31
John Creek	April 1 through December 31
Jorsted Creek	June 1 through December 31
Lilliwaup Creek	June 1 though December 31
Little Lilliwaup Creek	June 1 through December 31
McDonald Creek	June 1 through December 31
Miller Creek	June 1 through December 31
North Fork Skokomish River	All year
Pierce Creek	June 1 through December 31
Purdy Creek (above George Adams hatchery)	All year
Schaerer Creek	June 1 through December 31
Sund Creek	June 1 through December 31
Vance Creek	June 1 through December 31
Waketickeh Creek	June 1 through December 31
Walcott Slough (#0558)	June 1 through December 31

Walker Creek	June 1 through December 31
Weaver Creek	June 1 through December 31
Unnamed Creek (#0010)	June 1 through December 31
Unnamed Creek (#215)	June 1 through December 31
Unnamed Creek (#216)	June 1 through December 31
Unnamed Creek (#217)	June 1 through December 31
Unnamed Creek (#218).	June 1 through December 31
Unnamed Creek (#439)	June 1 through December 31

EXISTING WATER RIGHTS WILL NOT BE AFFECTED BY THIS PROGRAM.

PROGRAM OVERVIEW

In June 1979, a Western Washington Instream Resource Protection Program (WWIRPP) report, including a final environmental impact statement (EIS), was distributed to the public and governmental agencies. (Copies are available upon request from the Department of Ecology, Olympia). In the EIS document, the Washington State Department of Ecology (WDOE) proposed a plan for developing and adopting instream flows for 24 western Washington Water Resource Inventory Areas (WRIAs) and two eastern Washington WRIAs. Another eastern Washington WRIA, the Wenatchee River Basin (WRIA 45), was added to the program in 1981.

In general, the methods and procedures used in the development of the Skokomish-Dosewallips program, and the environmental effects of the program, are those outlined in the Western Washington Instream Resources Protection Program Final Environmental Impact Statement (including Program Overview) (WWIRPP). Because the anticipated environmental impacts of this program are those discussed in the WWIRPP Final EIS, no basin specific EIS has been prepared for the Skokomish-Dosewallips program.

Reliance was put on data published by the United States Geological Survey (USGS) for stream flow rates, volumes and timing, high and low flows and other hydrological information. Flow recommendations for fish were based on the instream flow incremental method (IFIM) that has been developed since the 1979 WWIRPP report. IFIM is used to model the relationship of stream hydraulic characteristics (depth and velocity) to various flow rates through typical channel sections. IFIM was used in WRIA 16 to develop fish flow recommendations for 11 of the more important fishery streams. See page 34 for a more detailed description of IFIM.

In the Skokomish-Dosewallips Instream Resources Protection Program (IRPP), the Washington State Department of Ecology (WDOE) proposes to establish specific minimum instream flow levels, and year-long and seasonal stream closures to protect the instream resources of fish, wildlife, water quality, navigation, recreation, scenic, aesthetic, and other environmental values.

Authority

The Water Resources Act of 1971 provides that perennial streams and rivers shall be retained with base flows necessary to provide for preservation of wildlife, fish, scenic, aesthetic, and other environmental and navigational values [RCW 90.54.020(3)(a), 1971]. The state may also establish minimum water flows or levels for streams, lakes, or other public waters for the purposes of protecting fish, game, birds, or other wildlife resources, or recreational or aesthetic values, and water quality under the Minimum Water Flows and Levels Act [RCW 90.22.010, 1969]. Under provisions of the State Fisheries Code, the Department of Ecology may deny or otherwise limit water right permits if, in the opinion of the director of Game or the director of Fisheries, such a permit might adversely affect the ability of a stream to adequately support game or food fish populations [RCW 75.20.050, 1949]. The Skokomish-Dosewallips program is authorized by Chapter 90.54 RCW and supported by chapters 90.22 and 75.20 RCW.

The base or minimum flows proposed in this program are referred to by the generic term "instream flows."

Public Participation

Public participation in this program is intended to comply with the state Administrative Procedures Act (Chapter 34.04 RCW), the Water Resources Act of 1971 (Chapter 90.54 RCW), and the Minimum Water Flows and Levels Act (Chapter 90.22 RCW).

Public meetings were held in Hoodsport on May 23, 1984 and in Brinnon on March 7 and April 18, 1985 during the development of the proposed program. WDOE has also been in frequent contact with interested individuals, groups, and agencies during program development. Distribution of this document initiates official public review of the Instream Resources Protection Program for the Skokomish-Dosewallips Water Resource Inventory Area (WRIA) 16. All interested individuals, private groups, and public agencies are encouraged to comment on any aspect of the recommended measures for streams and lakes in the Skokomish-Dosewallips WRIA. Public comments will be accepted during two public hearing scheduled as follows:

County	Place	Time	Date
Mason	Hoodsport	7:00 p.m.	July 11, 1985
Jefferson	Brinnon	2:00 p.m.	July 11, 1985

Written comments and oral testimony will be fully considered in preparation of the final proposed administrative rules if received by the department by August 2, 1985. Formal adoption of the proposed rules will be considered in an adoption proceeding at the Department of Ecology, Air and Land Offices conference room, Rowesix, 4224 Sixth Avenue S.E., Lacey, Washington, on September 27, 1985.

BASIN DESCRIPTION

Physical Characteristics

The Skokomish-Dosewallips Water Resource Inventory Area (WRIA 16) is located on the eastern flank of the Olympic Mountains. This WRIA covers an area of about 660 square miles. Streams have their headwaters in the mountains in the western part of the WRIA and flow generally easterly into Hood Canal. To the north is the Quilcene River basin and to the south are the drainages of the Kennedy-Goldsborough Water Resource Inventory Area and tributaries of the Chehalis River. Topography of the Skokomish-Dosewallips WRIA ranges from the craggy snow-capped peaks of the Olympic Mountains to the estuaries of Hood Canal. Except in estuaries, Hood Canal beaches are typically narrow and steep, dropping off rapidly to the depths of the Canal only a short distance offshore. The beaches are usually submerged at high tide.

Geologic formation of the Olympic Mountains, like the more extensive Cascade Mountains to the east, occurred from uplifting during the late Pliocene Epoch of the Cenozoic Era, three million years ago. The highest peak in WRIA 16 is 7,788 foot Mt. Deception. A downwarp between the Olympics and Cascades formed the Puget Sound trough. Glaciers originating in Canada intruded into Puget Sound several times during the Pleistocene Ice Age of the Quaternary Period. The foothills of the Olympic Mountains mark the western boundary of recent continental glaciation. Igneous rock underlays much of the lowland near Hood Canal with older, consolidated sedimentary rock occurring in the Olympics.

Soils in WRIA 16 generally have a high erosion potential that is related to slope and is influenced by human activity. High water tables and compact subsoils are common. Soils on forest slopes are thin. Valley bottom soils are rich and silty and support agricultural activities in the lower reaches of the four major rivers of WRIA 16.

The weather of WRIA 16 is primarily affected by wind direction, terrain, and the location of high and low pressure centers over the North Pacific Ocean. The overall result is a temperate, west coast marine climate that generally yields wet winters and relatively dry summers. Temperatures average 40°F during the winter and 65°F during the summer.

Moisture-laden clouds coming off the Pacific Ocean precipitate as they are lifted over the Olympic Mountains producing a rain shadow on the lee (east) side of the mountains. The climate generally becomes dryer as one moves north along Hood Canal. Local precipitation quantities are greatly influenced by local topographic characteristics. Precipitation ranges from 60 inches per year along Hood Canal to over 120 inches per year at 7,319 foot Mt. Anderson on the headwaters of the Dosewallips River.

Population

The Hood Canal area is sparsely populated compared to the densely urbanized central Puget Sound basin. In 1980, the total population in WRIA 16 was 3,020.[1] Although the land area in WRIA 16 is evenly split between Jefferson and Mason counties, 84 percent of the 1980 population resided in Mason County. Growth in both counties is expected to continue through the 1980's at between 1.7 and 3.0 percent per year.[2]

Land Use and Economy

Sixty percent of the 660 square miles of the land area in WRIA 16 is located within Olympic National Park and Olympic National Forest. The remaining 40 percent (about 270 square miles) is state and privately owned.

Land within Olympic National Park is used for recreation, scientific research, and preservation of natural ecosystems. Numerous trails wander through river valleys, to the jagged peaks, and through the divides of the Olympic Mountains. Scenic vistas and snow-capped peaks are found throughout the higher altitudes of WRIA 16. The primary access points administered by the National Park Service are located at the Dosewallips Campground on the Dosewallips River and the Staircase Campground located on the northern end of Lake Cushman. Trails start at the end of many of the roads that follow the streams towards the interior Olympics, leading to alpine lakes and climbing locations such as The Brothers and Mt. Constance. Table one on page 23 lists public water-oriented recreation sites in the Skokomish-Dosewallips basin.

The Olympic National Forest is managed for multiple use of natural resources; the principle uses being timber, recreation, wildlife, and water (including fisheries). Within WRIA 16, timber management activities have been most intensive in the more accessible areas, with major harvesting taking place during the 1930s and through the mid-1970s. With the depressed timber market of recent years, many timber sales sold on the Hoodsport District (which comprises the bulk of National Forest lands within WRIA 16) have been uncut, particularly in the Cabin and Jefferson Creek drainages. The current annual allowable cut is 22 million board feet and administrators anticipate that amount to decline.[3] Recreational and wildlife use consists of camping, fishing, hiking, hunting, and wildlife viewing, as well as scenic and aesthetic enjoyment. Four new wilderness areas were designated in 1984 within WRIA 16 and they are: The Brothers, Buckhorn, Mt. Skokomish, and Wonder Mountain.

Most of the approximately 20,000 acres of state-owned lands are managed by the Department of Natural Resources (DNR). Their management focus is on timber production. Annual harvest volume is usually around five million board feet. There are two tideland leases for oyster

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1 Lawrence Weisser; Washington State Office of Financial Management; personal correspondence, 1984.

2 Dave Goldsmith, Planning Department, Jefferson County; personal correspondence. Rachel Carson; Planning Department, Mason County; personal correspondence, 1984.

3 John Perkins; USDA Forest Service, Olympic National Forest, Hoodsport Ranger District; personal correspondence; March 12, 1985.

farming: one at the mouth of the Hamma Hamma River and one at the mouth of the Duckabush River. One surface mining permit exists in the basin and it is for sand and gravel excavation near the mouth of the Hamma Hamma River.[4]

Land development along the upper stretches of the rivers is limited due to steep terrain and federal ownership. The southeastern shore of Lake Cushman, on the North Fork of the Skokomish River, is lined with retirement and vacation homes, and several lodges. Privately-owned homes and resorts are also found along the lower reaches of the Dosewallips and Duckabush rivers, and along much of Hood Canal's shores. Access to these numerous homes is provided by Highway 101, which runs the length of the WRIA, and by various state, county, and Forest Service roads that lead into the Olympic Mountains.

The Washington State Parks and Recreation Commission operates four parks within WRIA 16: Potlatch State Park (near the small community of Potlatch on southern Hood Canal), Lake Cushman State Park (on Lake Cushman's east shore), Dosewallips State Park (just south of Brinnon on northern Hood Canal) and Pleasant Harbor State Park (a boat access only park about two miles south of Brinnon). These parks receive heavy summertime visitation, but receive much lighter use during the winter.

The Hama Hama Gravel Company, near the mouth of the Hamma Hamma River, owns several hundred acres. In addition to the gravel mining operation, the company manages forested acreage for timber production and owns several tidal flats which are used to produce oysters.

The 4,987 acre Skokomish Indian Reservation borders much of Annas Bay at the mouth of the Skokomish River and is the only Indian Reservation within WRIA 16. Fishing is the primary commercial activity on the Reservation, while a lesser emphasis is placed on tribal enterprises such as the small store at Potlatch.

Small landholders within WRIA 16 are engaged in numerous small-scale activities: Christmas tree farming, shellfishing, recreational parks, and services.

Figure two depicts general land ownership within the WRIA.

Major economic activities include harvesting the substantial stands of timber on the eastern slopes of the Olympics and servicing the many tourists and recreationists that frequent WRIA 16. However, both these industries are subject to both seasonal and periodic market fluctuations. The timber industry is particularly sensitive to national and world-wide demand for forest products, interest rates, and housing starts; all factors beyond local control.

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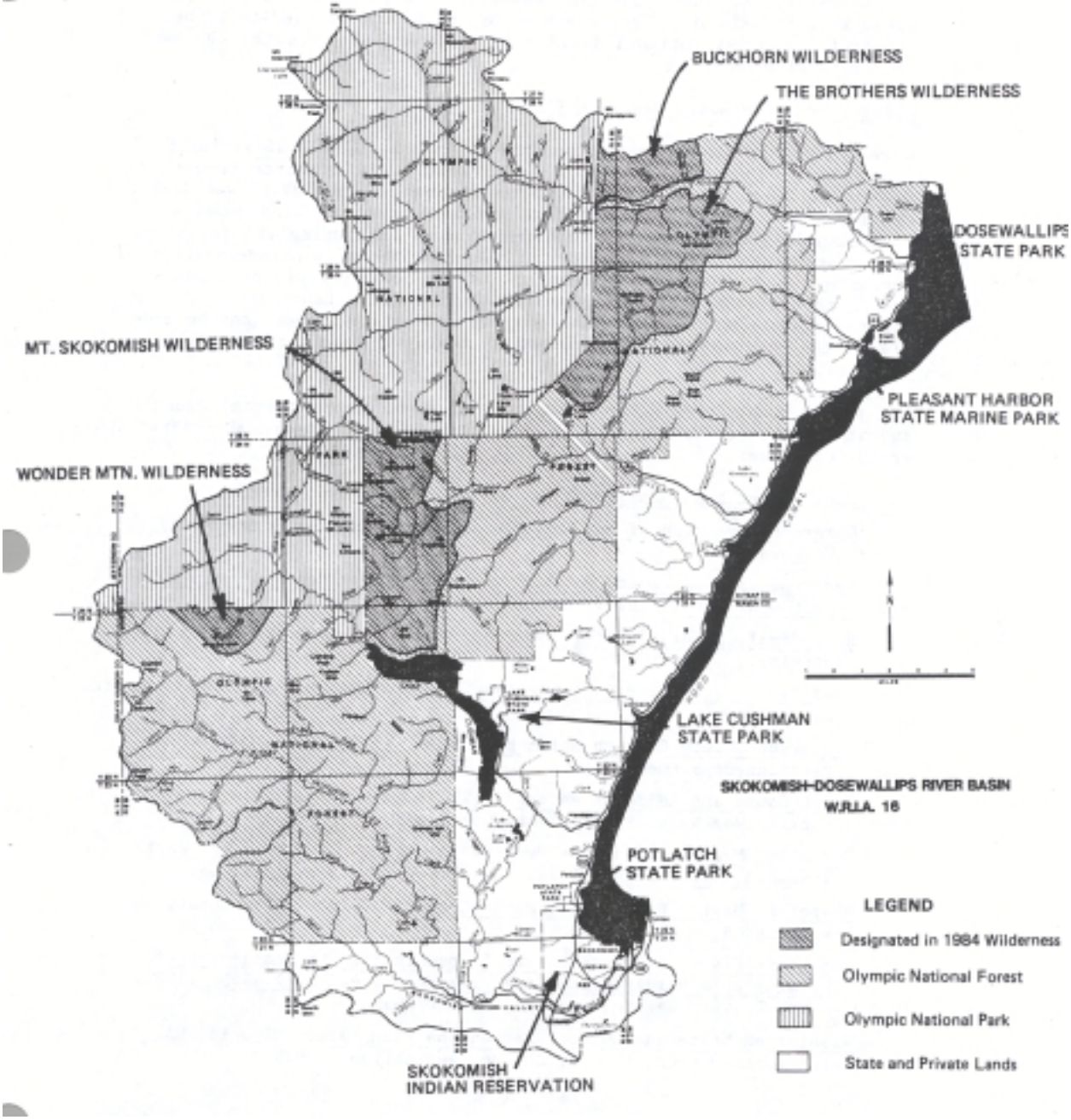
[4] Herb Cargill; Washington State Department of Natural Resources, Hoodsport Manager; personal correspondence, April 2, 1985.

Figure 2

GENERALIZED LAND OWNERSHIP



Hood Canal is well known for its production of market and seed oysters. Commercial fishing and shellfish production are prominent water-dependent activities in WRIA 16. The economies of the Hood Canal Indian tribes and commercial and recreational fishing are all dependent on the abundant fisheries of Hood Canal.

Related Land and Water Resource Plans

A recently completed plan of significant import to WRIA 16 is the Hood Canal Regional Planning Policy. In March 1984, in a letter from then Governor Spellman, the Washington State Ecological Commission was directed to prepare a regional planning policy for Hood Canal. The commission subsequently adopted a set of recommendations, including the following policy statement: "Since the Hood Canal area is one of unique values and resources of statewide significance, it is the policy of the state to ensure that all actions and programs affecting Hood Canal are evaluated for their impacts on environmental quality, and that decisions be made giving the protection and enhancement of the environment the highest priority."

Due to the landownership patterns of WRIA 16, many governmental agencies and other entities have developed plans affecting the Skokomish-Dosewallips area, including:

Canal Front Land Management Plan. 1979. USDA Forest Service.

Comprehensive Plan of Mason County. 1970. Consulting Services Corporation.

Comprehensive Water and Sewer Plan and Water Pollution Control and Abatement Plan. 1971. Mason County, WA.

Hood Canal, Priorities for Tomorrow. 1974. USDI Fish and Wildlife Service.

Hood Canal Regional Planning Policy. 1984. Washington State Ecological Commission.

Jefferson County Comprehensive Plan. 1979. Jefferson County Planning Department.

Puget Sound and Adjacent Waters. 1970. Puget Sound Task Force - Pacific Northwest River Basins Commission.

Shoreline Management Master Program for Jefferson County and Port Townsend, Washington. 1975. Jefferson County, Washington.

Shoreline Master Program for Mason County. 1975. Mason County, Washington.

Strategic Plan: A Comprehensive Framework for the Management ,of Washington's Wildlife and Game Fish Resources Until 1995. 1981. Final Draft. Washington Department of Game.

Washington Statewide Outdoor Recreation Plan 1979. Olympia, WA. Interagency Committee for Outdoor Recreation. 1979.

WATER RESOURCES

Surface Water

Streams within WRIA 16 originate on the Olympic Peninsula and flow eastward to Hood Canal. The four principal river systems in the basin are the Skokomish, Hamma Hamma, Duckabush, and Dosewallips Rivers. All of their headwaters originate in the rugged, forested areas of the Olympic National Park and Olympic National Forest. Numerous smaller independent streams between the major river systems drain the lower foothills of the Olympic Mountains. There are 557 identified streams providing over 825 linear miles of rivers, tributaries, and independent streams in this drainage basin. Steep, rugged terrain predominates throughout most of these watersheds with the exception of the lower Skokomish River which passes through a broad floodplain. The other three major streams have much smaller, lower river flood plain zones. Stream gradient in both the large and small watersheds is relatively steep, except as noted above.

The Skokomish River enters the southern-most point of Hood Canal. It is comprised of 9.0 miles of mainstem, 33.3 miles in the North Fork, and 27.5 miles in the South Fork. Tributary streams total 270 miles with Vance Creek (11.0 miles) being the largest and most important. Other important tributaries include Purdy Creek on the mainstem, Brown Creek and LeBar Creek on the South Fork, and McTaggart Creek on the North Fork. Both forks head in the high, rugged, mountainous areas of Olympic National Park and Olympic National Forest. The heavily timbered area of the uppermost watershed gives way downstream to areas where extensive logging has taken place over many years. Much of this area has been reforested and supports young stands of coniferous timber. Both major forks of the Skokomish River have upper basins bounded on the downstream end by deep, steep-walled canyons. Two hydroelectric dam projects are operated by Tacoma City Light in the canyon on the North Fork. The Upper dam forms Lake Cushman, which covers just over 4,000 acres. The active storage capacity of the Cushman reservoir is 453,300 acre feet. Lower Cushman Dam impounds 70 acres to form Lake Kokanee, with a capacity of 8,000 acre feet. A major portion of the flow from the North Fork of the Skokomish (up to 1,000 cubic feet per second) is diverted from the lower dam through a tunnel to generators located at Potlatch, ultimately discharging directly into Hood Canal. The average discharge of the North Fork below the Cushman project at USGS Station No. 12-0595-00 is 115 cfs, with the minimum recorded discharge being 1.3 cfs and the maximum being 7,740 cfs. Upper McTaggart Creek (a North Fork Skokomish tributary) can be diverted into the Cushman project for hydroelectric generation under a water right.

The South Fork of the Skokomish has not been impacted to the degree to North Fork has. Most activity has been of a farming or forestry nature although in the past there have been hydropower proposals for the South Fork and Vance Creek (a large tributary). The average discharge for the South Fork at USGS Station No. 12-0605-00 is 732 cfs. The maximum recorded instantaneous discharge on the South Fork is 21,600 cfs and the minimum is 62 cfs.

Below the canyons, near the confluence of the main forks, the valley floor broadens into a 4,600-acre floodplain used extensively for farming. All of the populated area along the Skokomish is in this area. The Skokomish Indian Reservation encompasses the lower five miles of the river.

The average discharge of the Skokomish River at USGS gage 12-0615-00 is 1,208 cfs, with the maximum instantaneous discharge of record being 27,000 cfs and the minimum instantaneous discharge of record being 125 cfs.

Stream gradient, in general, is steep in the uppermost parts of the watershed, becoming moderate in the upper basin, increasing again in the canyon areas, and returning to a moderate to shallow grade in the lower valley. The stream has formed an extensive estuary (roughly four square miles) that is rich in wildlife and shellfish. Some agricultural activity also occurs in parts of the delta.

Proceeding northward along Hood Canal, a number of small independent drainages flow from the Olympic Mountains' foothills. The most significant of these streams are: Hill Creek, Finch Creek, Miller Creek, Sund Creek, Little Lilliwaup Creek, Lilliwaup Creek, Eagle Creek, and Jorsted Creek. All except Lilliwaup Creek have sections of steep gradient in their upper reaches, but become moderate in gradient in their very lower reaches as they approach Hood Canal. These streams provide some very high quality salmon spawning areas, particularly for chum salmon. With the exception of Lilliwaup Creek, which drains a swampy plateau area, the streams flow through narrow valleys covered with dense second-growth timber. Additionally, all are short in length with Lilliwaup Creek being the longest with 6.9 miles of mainstem and 6.2 miles of tributaries. A small, privately-owned hydroelectric power facility exists at the falls on Lilliwaup Creek at approximately river mile 0.5. Because these streams are principally rainfall fed, their flows become very low during the summer. Smaller, independent creeks may dry up during this period.

Midway along the west shore of Hood Canal is the Hamma Hamma River drainage. This system has only 17.8 miles of mainstem, but has extensive tributaries totalling 74.1 miles. With its headwaters high in the Olympics, the Hamma Hamma is similar to other streams of this area with steep gradients in its upper reaches. One major waterfall and a long series of cascades in a steep canyon 2.5 miles above the mouth form a block to anadromous fish migration. Stream gradient below this point is shallow to moderate. This area includes some extremely productive salmon spawning habitat. Major tributaries include Jefferson, Washington, Cabin, and John creeks of which only John Creek is accessible to salmon migration. Hydroelectric projects are proposed on the mainstem of the Hamma Hamma River as well as on Cabin, Jefferson, and Lena creeks. Several alpine lakes, including Mildred Lake, Upper and Lower Lena Lake, are found in the highest reaches of the Hamma Hamma River basin. Coniferous forests predominate, although extensive logging has been done in portions of the drainage. The average discharge of the Hamma Hamma River at its month is 364 cfs (USGS gaging station 12-055-00). The maximum discharge for the Hamma Hamma is 4,500 cfs and the minimum is 30 cfs.

Waketickeh, Schaerer, Fulton, and McDonald creeks are the largest of several small independent drainages north of the Hamma Hamma. Watershed cover, stream gradient, population density, and general features are very similar to those of the small drainages south of the Hamma Hamma River. Fulton, McDonald, and Schaerer creeks provide excellent habitat for coho and chum salmon. An impassable barrier exists at about river mile 0.4 on Waketickeh Creek, restricting fish access, but coho and chum use the creek below this point.

The headwaters of the Duckabush River are deep in the interior Olympics of Olympic National Park and The Brothers Wilderness Area. The river flows through a deep valley throughout its 24.1 mile length. Its numerous tributaries, all of which are relatively short with steep gradients, total 34.2 stream miles. Stream gradient is also generally steep on the mainstem Duckabush with interspersed sections of moderate slope. Several falls and numerous cascades present impassable barriers to anadromous fish at about river mile seven. The average discharge of the Duckabush River at its mouth is 416 cfs, with the maximum discharge at USGS gaging station 12-0540-00 being 4,990 cfs and the minimum at 46 cfs.

The mountainous terrain of the upper Duckabush basin remains in a near virginal state with little logging and only seasonal recreational use. Stands of coniferous forest predominate. A number of homes are located along the lower four miles of the stream and during recent years recreational homesite development has sharply increased near the river's mouth.

Two small independent drainages, Pierce Creek and Walker Creek, immediately north of the mouth of the Duckabush River, support runs of coho and chum. These streams drain short, wooded, uninhabited valleys to their confluence with the Duckabush River estuary.

The Dosewallips River is the largest drainage entering the northern area of Hood Canal with 28.3 mainstem stream miles and 104.5 miles of tributaries. The Dosewallips has two major forks within the National Park. The west fork is 6.7 miles in length. The mainstem is 10.7 miles long from the junction with the West Fork to its headwaters. The Dosewallips originates from Eel glacier on Mt. Anderson in the Olympic National Park. Downstream from this, in the Olympic National Forest, some logging has been done, particularly in watersheds of tributary streams. Coniferous forests are the primary vegetation for this largely undisturbed system. Along the lower five miles, below the National Forest boundary, a number of rural homes and small farms border the river. The stream follows a deep, steep-walled valley throughout most of its length and only broadens near the mouth near the community of Brinnon. Tributary streams are generally small. The only major tributary is Rocky Brook Creek at river mile 3.6. The Brinnon Flats (or Dosewallips Flats), a broad delta at the mouth of the river, is rich in shellfish and aquatic life.

The average discharge (measured at USGS gaging station 12-0530-00) of the Dosewallips River at its mouth is 446 cfs, the maximum discharge is 5,510 cfs, and the minimum discharge is 67 cfs.

Hydrographs for larger WRIA 16 streams are located in Appendix B.

Ground Water

Ground water availability in WRIA 16 varies among the mountainous regions in the Olympics and the northern and southern lowlands along Hood Canal. The mountainous areas in the Olympic National Park and Olympic National Forest consist principally of consolidated materials. In this area, ground water yields of 10 gallons per minute (GPM) or less can be expected. In the northern lowlands, the most productive aquifers are in coarse Quaternary deposits of fluvial or glacial origin. Where these are absent, ground water is obtainable from older unconsolidated materials, which usually yield 10 GPM or less to wells.

In the southern lowlands, thick layers of recessional outwash, composed of sand, gravel, silt, and clay, cover many of the valley floors. Recent alluvium occurs primarily in the Skokomish floodplain. This consists primarily of fine sand and silt with minor amounts of clay and peat. With thicknesses of up to 100 feet, the alluvium is saturated to about river level. Quaternary sediments crop out on some of the slopes adjacent to the more deeply incised streams. Aquifers in the older Quaternary sediment are generally more productive.

The major source of aquifer recharge in WRIA 16 comes from rainfall, averaging from 60 to 120 inches per year. Only a portion of this rainfall actually ends up in the aquifers; some is lost to evapotranspiration, some to surface runoff, and some is retained as soil moisture. Replenishment of aquifers occurs during the months from November to April. The warmer and drier summer months are a period of natural depletion for the aquifers.

Ground water is discharged through springs or from wells. Almost all of the wells in WRIA 16 are for individual household or small community uses. Some water is pumped for irrigation in the Skokomish Valley. In most places in the basin, the water table is within 50 feet of the land surface. Water levels in individual wells fluctuate both seasonally and from year to year, as well as in response to development. Water table levels in lowland places such as the Skokomish River are often within ten feet of the land surface. Many 15-20 GPM wells serve small community domestic systems of three to five homes each. Commercial activities in WRIA 16 that use ground water are oyster processing, wine production, gravel washing, livestock production, hay production, fish propagation, and tree farming.

Ground water quality data suggest that ground water in WRIA 16 is acceptable for almost all purposes. However, excessive ground water pumping in WRIA 16 could cause local salt water intrusion, thus contaminating the fresh water aquifers in the nearshore areas of the basin.

Water Quality

All of the streams of WRIA 16 have been classified as "AA-Extraordinary" by the State of Washington. Water quality in the upper reaches of WRIA 16 streams is particularly good since the streams originate in essentially unsettled country. Downstream, siltation of streams can be accentuated temporarily following road building and logging operations that remove the forest cover.

Rivers and streams in the region are increasingly susceptible to pollution from development and recreational use in the watershed. Shellfish production in intertidal zones is especially sensitive to waterborne pollutants. The potential for ground water pollution depends upon waste disposal and other land use practices, the depth of the aquifers and their protection from surface contamination by an overlaying impervious layer.

Surface water quality in Hood Canal is satisfactory enough in most places to maintain fish and shellfish resources and to permit water-contact activities. However, very few areas are suitable for the septic tank disposal systems found along the Canal. Septic tank failures due to poor siting, construction, or maintenance can impact local water quality and create a health threat.

Throughout WRIA 16, local water pollution problems may also result from industrial wastes, storm runoff, livestock, logging, and land development. One of the important objectives in establishing minimum flows on a stream is to protect water quality.

WATER USES

Instream Uses

Fisheries

Chinook, chum, coho, and pink salmon utilize the estuaries, streams, and rivers of WRIA 16 (see Figure four for timing of freshwater life phases). A few sockeye salmon are observed incidentally in the basin. There are approximately 70 miles of available rivers, tributaries, and independent streams for anadromous species migration, spawning, and rearing. The Washington Department of Fisheries operates two salmon hatcheries within WRIA 16: the George Adams Hatchery along Purdy Creek on the lower Skokomish River and the Hood Canal Hatchery on Finch Creek at Hoodsport. The Skokomish Indian Tribe operates a salmon hatchery on Enetai Creek, just north of the mouth of the Skokomish River of Annas Bay.

Salmon produced and reared in the Skokomish-Dosewallips basin contribute to sport and commercial fisheries in Hood Canal, Puget Sound, the Strait of Juan de Fuca and the Pacific Ocean, as well as Canadian waters. Washington Department of Fisheries estimates total annual contribution for all salmon species from these various fisheries has ranged in recent years from

around 100,000 fish to over 350,000.[5] Office report 74-B, WRIA 16 Fisheries, Flows, and Hydrograph Derivations: Skokomish-Dosewallips Basin, WRIA 16 summarizes species occurrence in the various streams (see bibliography).

Chinook Salmon *(Oncorhynchus tschawytscha)*. The largest of all salmon species, chinook salmon generally utilize the four larger rivers of this basin in preference to the smaller drainages. These fish require greater flows and depths than those normally occurring in the smaller streams. Fall chinook comprise the major portion of the runs; however, a few distinct summer or spring chinook races are in the Skokomish, Duckabush, and Dosewallips rivers. A unique occurrence of land-locked chinook, which were trapped when the dam was built, run in the North Fork of the Skokomish upstream from Lake Cushman.

Fall chinook inhabit all the river sections throughout the accessible lengths of each of the four major rivers and their main tributaries in the Hood Canal basin. Fall chinook use of the independent streams is low due to very low natural flows during normal chinook migration and spawning periods. Fall chinook have been counted in these streams: Purdy Creek, Hunter Creek, Vance Creek, Lebar Creek, Lilliwaup Creek, Eagle Creek, John Creek, Fulton Creek, Rocky Brook Creek, and one unnamed creek (WDF #0355). Juvenile chinook rear in all the accessible stretches of these rivers and the tributary streams inhabited by the adult spawners.

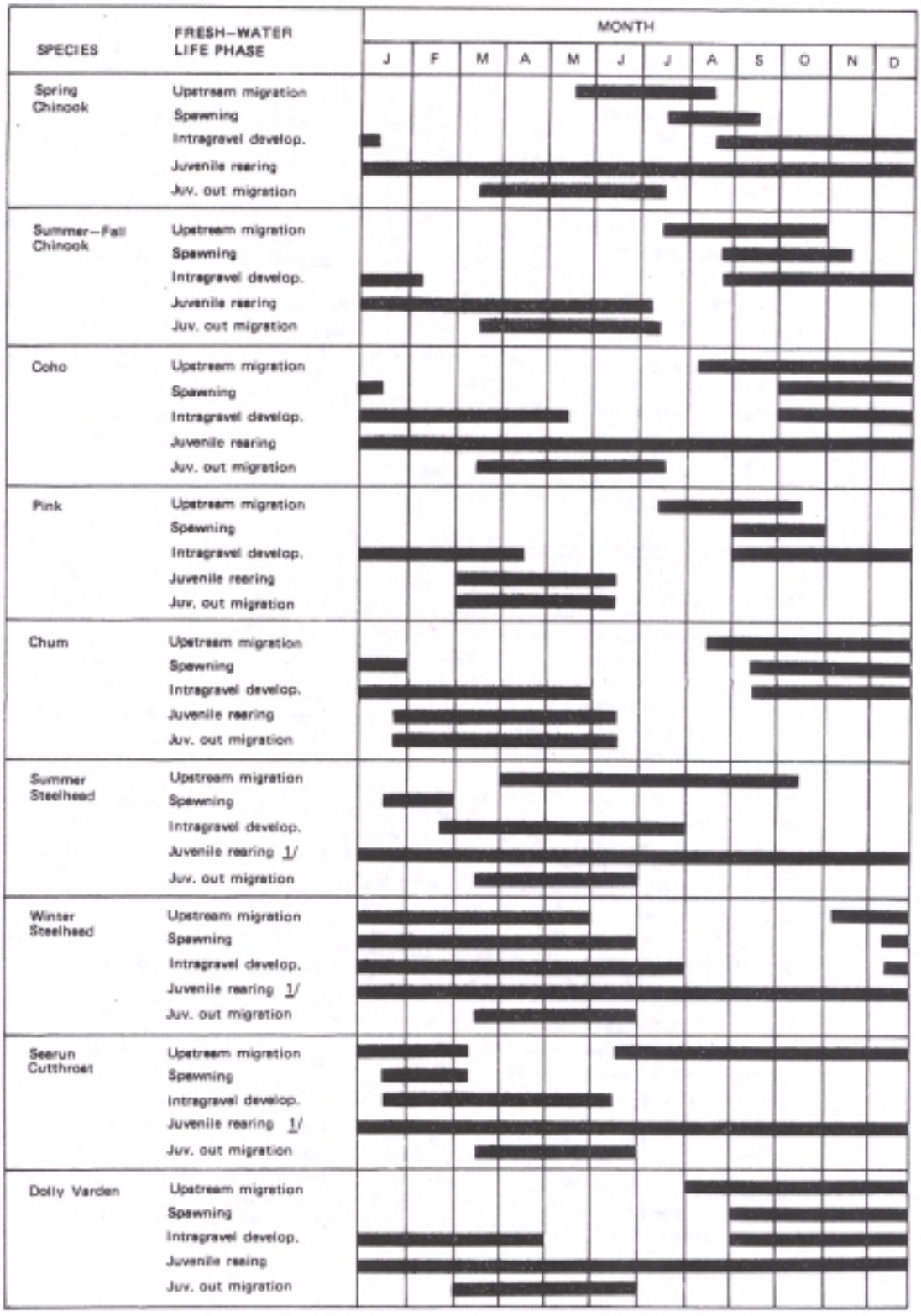
The spawning migration of fall chinook generally begins in mid-July and terminates by the end of October, with the peak of the upstream movement occurring about the last week of September (Figure three). Spawning commences in these rivers in late August and is normally completed throughout the basin by mid-November. The timing of the fall chinook spawning migration in the Hamma Hamma River usually lags behind that of the other rivers in this basin by approximately two weeks.

Intergravel development of the fry starts in late August and is normally completed early in February and emergence from the gravel follows closely thereafter. Juvenile rearing goes from the beginning of January through early July with most fry rearing for about three months. Major out-migration of juveniles occurs from mid-March until mid-July. A minor portion of the juveniles are known to remain for longer periods.

Spring chinook adults start their upstream migration in mid-May and complete it in mid to late August. Spawning occurs from mid-July through mid-to-late September. Intergravel development of the fry starts in mid-August and ends in mid-January. The spring chinook juveniles rear in the rivers for one to two years. The majority of juvenile out-migration occurs from mid-March through mid-July.

[5] Dale Ward; Washington Department of Fisheries; Personal Correspondence. June 4, 1985.

Figure 3 TIMING OF SALMON AND SEARUN TROUT FRESH WATER LIFE PHASES IN SKOKOMISH – DOSEWALLIPS WATER RESOURCE INVENTORY AREA.



1/ Includes early or late downstream juvenile migration.

Chum Salmon *(Oncorhynchus keta).* The four major rivers and their forks in the Hood Canal basin contain significant runs of chum salmon. This species also inhabits the river mouth sloughs as well as all the accessible portions of the small independent streams in this area. The Skokomish-Dosewallips Basin Technical Document Supplement, Office Report 74-B, lists species occurrence in these streams.

There are two distinct runs of chum salmon that return to the four major rivers; one early and one late. The small independent streams usually contain late-run spawners. The upstream migration for chum starts in early August and goes until the end of December with early-run fish entering the rivers in August and early September and the late run going from the first week in November through mid-December. Spawning for the early run takes place from mid-September to the end of October and for the late spawners from around the first week of November to the end of February. Intergravel development extends from mid-September through the end of May and fry rearing starts in late January and is completed by mid-June. Out-migration of juveniles happens in the same time frame as rearing. Because chum do not rear in fresh water year-round, they are capable of utilizing very small streams that do not flow year-round.

Coho Salmon *(Oncorhrynchus kisutch).* All rivers and streams in the Hood Canal basin can be inhabited by coho salmon throughout their accessible lengths. Spawning occurs in every stream where suitable conditions prevail, including many sections along the fringes and side channels of the mainstem rivers. Streams of particular importance for coho production are Vance Creek and McTaggart Creek on the Skokomish River, and the independent drainages of Eagle and Fulton creeks. All other river tributaries and independent streams in this basin are short, with moderate production value for coho. Collectively they provide significant contributions to the coho fishery.

The adult coho return to the rivers in this basin starting in early August and extending into January. Upstream migration for the smaller independent streams commences after the fall rains in mid-October. Spawning occurs between October 1 and February 1 intergravel development from October 1 but ending in mid-May. Rearing occurs throughout the year, with the juveniles usually remaining in the systems for more than a year, migrating seaward in the spring of their second year. Coho juvenile out-migration starts in February and ends in mid-July, with most out-migration occurring from late February to mid-April.

Juvenile coho rear throughout the accessible areas of all basin streams as well as in the mainstem rivers. Spatial pressures can force large numbers of these immature fish to move out from fresh water habitat in their first year to rear in estuaries along the Canal.

Pink Salmon *(Oncorhynchus gorbuscha).* Odd-numbered year runs of pink salmon are a predominant species in the Dosewallips, Duckabush, and Hamma Hamma rivers and their tributaries, while the Skokomish and their tributaries support a run of only a few hundred fish. Outside of these rivers, pinks have only been counted in Little Lilliwaup and Lilliwaup creeks.

Adult pink salmon enter the basin drainages in mid-July with the run continuing until mid-October. Spawning occurs in all of September and October. These runs of pinks are mainstem spawners with few of the tributaries providing adequate spawning flows and habitat. Intergravel development takes place from the first of September until mid-April. Juvenile rearing occurs from March through most of June, with out-migration occurring during the same time. The quality of the estuaries and waters of Hood Canal is a major factor in the survival and successful rearing of pink fry from these streams.

Sockeye (*Oncorhynchus nerka*). A few, incidental sockeye salmon have been counted within the basin and the run timing appears to coincide with that of the pink run.

Shellfish. Commercial shellfish production areas line the west shore of Hood Canal. For the entire basin, 1983 production of shellfish totalled 160,000 pounds of oysters, 11,000 pounds each of sea cucumbers and shrimp, 350 pounds of clams, and 200 pounds of crab. Production for 1984 was: 128,250 pounds of oysters; 15,000 pounds of shrimp; 291 pounds of clams, and no sea cucumbers or crab. The data for 1984 are preliminary.[6] Shellfish production is dependent on high quality water, which is related to inlet flushing rates. A substantial portion of the flushing of the inlets is due to stream flow. Because of this flushing action, stream flow is important for good shellfish production. Shell fishing by recreationists is one of the prime attracting factors in the basin and thus is important to the area's economy.

Game Fish

According to Washington Department of Game (WDG) personnel, most of the perennial streams in WRIA 16 can be utilized by steelhead, cutthroat, and Dolly Varden/bull trout.[7] Excellent sport fishing opportunities are available in the larger streams and the high lakes.

Anadromous Trout - Steelhead *(Salmo gardneri)* and cutthroat (*Salmo clarki*) trout spawn in flowing water over gravel during winter and spring. Cutthroat generally spawn in smaller streams that are not heavily used by steelhead. Dolly Varden and bull trout spawn during fall and require spawning habitat similar to that of steelhead. Once the fish have spawned, incubating eggs require a continuous flow of oxygen bearing water through the gravel. Steelhead incubation is generally completed by the end of June, although some steelhead spawning may continue into July.

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6 Dale Ward; Washington Department of Fisheries; Personal Correspondence. March 15, 1985

7 These two species were both called Dolly Varden until 1978 when their differences were recognized. Both species occur in Hood Canal streams, but both are uncommon with localized areas of abundance, such as the Skokomish River. Dolly Varden (*Salvelinus malma*), bull trout (*Salvelinus confluentus*).

Following emergence of steelhead fry from the gravel, they rear for two years (sometimes one or three years) in fresh water before smolting and migrating to sea in the spring. After two years at sea the large adults (3-35 lbs. for steelhead; 1-6 lbs. for cutthroat and Dolly Varden) return to spawn in their native streams. They may enter the streams at almost any season but peak migration of steelhead occurs in winter and summer. Peak migration of cutthroat and Dolly Varden/bull trout is in the late summer and fall. In some streams, low flows can restrict passage of adults.

Resident Fish - Several varieties of resident fish are found throughout WRIA 16 and are a very important recreational resource. However, resident trout are uncommon in waters that are accessible to anadromous trout. Higher productivity gives the anadromous trout a competitive advantage over smaller resident trout. The most typical resident game fish of small streams above migration barriers is the native cutthroat trout.[8] A few larger streams are inhabited by resident rainbow trout. As with steelhead and searun cutthroat, resident rainbow and cutthroat trout do not overlap very much - one or the other will predominate. Resident rainbow and cutthroat trout spawn in the spring. In some cases they may migrate upstream or into tributaries to spawn, and incubation extends into the summer. Juvenile and adult resident trout are present all year.

Large (15 lbs. or more) Dolly Varden and bull trout inhabit Lake Cushman. They spawn in the North Fork Skokomish River, near Staircase Rapids, during the fall. Olympic National Park regulations protect this population from angling at their spawning grounds.

Brook trout *(Salvelinus fontinalis)* have been introduced into some mountain lakes in WRIA 16. They also inhabit some of the streams flowing into and out of these lakes. Brook trout spawn in the fall.

Kokanee, a land-locked sockeye salmon, inhabit Lake Cushman. Kokanee are fall spawners which require a lake for rearing. Non-game fish in WRIA 16 include:

dace . . . . . .*Rhinichthys sp.*
sucker . . . . . *Catostomus sp.*
sculpin. . . . . *Cottus sp.*
shiners. . . . . .*Richardsonius balteatus*
sticklebacks . . . . . *Gasterosteus aculeatus*

Wildlife

Habitats and species found within the Skokomish-Dosewallips River basin are typical of those of western Washington. Certain species, however, have special water-related requirements (e.g. food chain links, habitat) and those only are considered in this plan.

[8] Migration barriers are any waterfall or cascade high enough to block fish migrations, generally at least 12-15 feet for steelhead.

Bald eagles, a Threatened species, have been observed nesting in several sites in WRIA 16. Moderate numbers of eagles (*Haliaeetus leuocephalus*) winter in the estuaries. A few osprey also nest in the Skokomish-Dosewallips basin. Osprey (*Pandien haliaetus*) and bald eagles are largely dependent upon salmon carcasses for food. The number of carcasses is related to the size of salmon runs, which may in turn be affected by instream flows.

A salamander (*Dicamptodom copei*) is endemic to this basin and other areas of southwestern Washington. A sucker (*Catostormus sp*.), possibly unique to Puget Sound streams, occurs in the Skokomish River. Harbor seals (*Phoca vitulina*) inhabit Hood Canal and frequently haul-out on mudflats in estuaries. River otter (*Lutra canadensis*) inhabit many of WRIA 16's streams. Both river otter and harbor seals are dependent on fish and thus could be indirectly affected by minimum instream flows.

Other animal species of special importance which occur in the basin include:

fisher . . . . . *Martes pennanti*
marten . . . . . *Martes americana*
whistling marmot . . . . . *.Marmota olympus*
heather vole . . . . . *.Phenacomys intermedius*
spotted owl . . . . . *Strix occidentalis*
Oreas angle wing butterfly. . . . . *.Polygonia oreas*
hoary elfin butterfly . . . . . *Incisalia polios*
American painted lady butterfly . . . . . *.Cynthia virginiensis*
dwarf mistletoe hair-streak butterfly . . . . *.Mitoura johnsoni*

Plant Life

Plant species of special concern which occur in the basin include chainfern (*Woodwardia fimbriata*), manzanita (*Arctostaphylos x media*), daisy (*Erigeron flettii*), lewisia (*Lewisia columbiana var. rupicola*), rockmat (*Petrophytum hendersoni*), violet (*Viola flettii*), gnome-plant (*Hemitomes congestum*), golden chinquapin (*Chrysolepis chrysophylla*), willow (*Salix arctica*), paintbrush (*Castilleja parviflora var. olympica*), elmera (*Elmera racomosa var. racemosa*), lousewort (*Pedicularis bracteosa var. atrosanguinea*), harebell (*Campanula piperi*), douglasia (*Douglasia laevigata var. laevigata*), sedge (*Carex circinata*), aster (*Aster paucicapitatus*), ground-clover (*Orthocarpus imbricatus*), grapefern *(Botrychium lanceolatum),* wallflower (*Erysimum arenicola var. arenicola*), and wool-grass (*Scirpus cyperinus var. brachypodus).* Wool-grass is a plant which could be affected by changes in water level and flow.

Recreation

The mountains, trails, and streams in WRIA 16 provide significant recreational opportunities. Its proximity to the urban areas of Puget Sound make it a favorite area for outdoor recreation. Hiking, camping, sightseeing, fishing, boating, hunting, and picnicking are all very popular activities in WRIA 16. Many out-of-state visitors and Washington residents alike come to the basin to enjoy the abundance of trails, streams, lakes, and vistas. Accordingly, population fluctuates seasonally and is concentrated along the banks of Hood Canal. Most recreation along Hood Canal is based upon water. Summer homes are found around the southeastern shore of Lake Cushman, along the Canal, and along the lower reaches of the Dosewallips and Duckabush Rivers.

Recreational shell fishing (clamming, crabbing, shrimping) is an important attraction that lures many to the area. Shellfishing is popular for several reasons: there are several public beaches along the Canal, access is fairly easy, skills required are minimal, and it can be done in conjunction with other recreation.

Numerous federal, state, and county recreation sites exist in WRIA 16 (Table one delineates water-oriented recreation sites within the WRIA 16). The Olympic National Park, Olympic National Forest, and parts of four Wilderness Areas occupy the western portion of the basin. The Staircase Recreational Area of Olympic National Park is located on the North Fork of the Skokomish, a short distance upstream from Lake Cushman. Another popular outdoor recreational site is Olympic National Forest's Brown Creek campground on the South Fork of the Skokomish River. The Dosewallips, Lake Cushman, Pleasant Harbor, and Potlatch State Parks, along Hood Canal, are administered by the State Parks and Recreation Commission. Numerous small, privately-owned parks can be found within the basin.

Water-oriented recreation is important in this basin as shown in the Washington Statewide Outdoor Recreation Plan which shown that approximately one-third of the population preferring to participate in fishing, swimming, boating, or visiting a beach.[9]

[9] Percentages are 30.81 for Clallam and Jefferson counties, and 31.15 for Lewis, Mason, and Thurston counties.

Table 1
WATER-ORIENTED RECREATION SITES IN WRIA 16

Facility	Agency	Location
Brown Creek Campground	Forest Service	South Fork Skokomish
Cushman Boat Launch	City of Tacoma	Hood Canal-Potlatch
Potlatch State Park	Washington State Parks & Recreation Commission	Hood Canal-Potlatch
Lake Cushman-State Park	Washington State Parks & Recreation Commission	Lake Cushman
Staircase Campground	National Park Service	Lake Cushman
Lilliwaup Campground	Forest Service	Lilliwaup Creek
Lena Creek Campground	Forest Service	Lena Creek
Hamma Hamma Campground	Forest Service	Hamma Hamma River
Collins Campground	Forest Service	Duckabush River
Seal Rock Campground	Forest Service	Hood Canal-Brinnon
Pleasant Harbor State Park	Washington State Parks & Recreation Commission	Hood Canal-Black Point
Dosewallips State Park	Washington State Parks & Recreation Commission	Dosewallips River
Elkhorn Campground	Forest Service	Dosewallips River
Dosewallips Campground	National Park Service	Dosewallips River

Until July 1984, no designated Wilderness Areas existed within WRIA 16. However, with the passage of the Washington Wilderness Act of 1984, four Wilderness Areas have been established from National Forest lands that have portions within WRIA 16. These are: Buckhorn, Mt. Skokomish, The Brothers, and Wonder Mountain (See Figure two).

Water is the key factor to several outdoor activities popular in WRIA 16, such as boating and fishing, and a significant contributing factor to enjoyment for several others such as hiking, camping and sightseeing. The abundant recreational resources in WRIA 16 have the capacity to satisfy growing recreational needs for visitors and area residents, provided the resources are managed for public enjoyment.

Aesthetic and Scenic Values

WRIA 16 encompasses a very scenic sub-region. The expansive and varied beauty of Hood Canal is complemented by the lush vegetation, steep hillsides, and high ramparts of the Olympic Mountains. WRIA 16 provides a stunning backdrop to Puget Sound for residents of Seattle and

surrounding communities. The natural beauty of the landscape, the pristine conditions, and the variation in scenery found in the basin provide a magnitude of aesthetic quality that is invaluable to the people of Washington. The splendor of blooming rhododendrons along a Dosewallips River cascade or the tumult of the rapids in the steep-walled canyons of the Skokomish serve as vivid reminders of the quality of the riverine environment within this area. Much of the recreational use in the area is tied to its grandeur. Many fishermen, for example, prefer the solitude and beauty of streams along the east side of the Peninsula to more accessible, but crowded streams in developed areas of Washington, particularly Puget Sound.

With the rush of water from mountain snowfields to Hood Canal being relatively short (about 34 miles maximum), and the elevation drop being up to 7,788 feet (Mt. Deception), it is little wonder the Skokomish-Dosewallips WRIA has many waterfalls and cateracts.

The Dosewallips Falls is located three-fourths of a mile inside the National Park and 14.2 miles west from Highway 101 along the Dosewallips River road. This falls is 100 to 125 feet high.

Hatana Falls is located where Hidden Creek drops into the Dosewallips River 5.1 miles upstream from the Dosewallips Ranger Station. Also on a Dosewallips tributary, Rocky Brook Falls is on Rocky Brook Creek about 100 yards north of the Dosewallips River Road and three miles west of Highway 101. This falls is 125 feet high.

The Lilliwaup Falls is located on Lilliwaup Creek about three-quarters of a mile upstream from Highway 101 at Lilliwaup.

The Hamma Hamma River has two falls: one at river mile 2.5 and one at river mile 14.5. Both falls are accessible to the public.

Navigation

Most boating in this WRIA is recreation-based (with the obvious exception of commercial fishing). Boating is common on Hood Canal and Lake Cushman. However, except for the lower eight miles of the Skokomish River, most of the streams in WRIA 16 are generally too small for navigation by larger boats: Portions of the Skokomish, Hamma Hamma, Duckabush, and Dosewallips are used by kayakers, rafters, and other small craft. Most boating use occurs at the mouths of these rivers, at the mouths of Fulton and Lilliwaup Creeks, and where the North Fork of the Skokomish enters Lake Cushman. However, kayakers have "discovered" these four major rivers and believe they have exceptional recreational and scenic values. Undoubtedly, kayaking and rafting on these streams will grow in popularity.

Water Resource Development

Hydroelectric Power

WRIA 16 is an attractive area for hydropower development due to the relatively large number of potential sites, high runoff, the rapid fall of streams from the mountains to Hood Canal, and the proximity to the urban power markets of Puget Sound. Hydropower is the most significant developmental use of water in WRIA 16.[10] Additionally, a major power transmission line runs through WRIA 16 from north to south allowing easy access to the northwest power grid.

Two hydroelectric developments have existed in the basin for some time (Lilliwaup on Lilliwaup Creek and Cushman on the North Fork Skokomish River); another project is under construction (Rocky Brook Falls); seven more are under study or are awaiting approval from state and federal regulatory agencies. (See figure four for a map showing project locations.)

Hydropower potential is great on the four larger rivers and their tributaries, as well as on some of the independent streams. During 1984, there were no less than 30 hydroelectric projects under consideration within WRIA 16. Recently, many projects have been dropped from consideration due to economic infeasibility, environmental problems, a weak market for new power sources in the Pacific Northwest, or a combination of these factors. As of January 1, 1985 there were ten "active" projects remaining within WRIA 16. Table two gives a summary of the status of each project. The Federal Energy Regulatory Commission (FERC) is the federal agency responsible for licensing hydropower projects. State and local permits; such as water rights, hydraulic project approvals and shoreline permits; are also required prior to construction of any project.

[10] For the purpose of this program, run-of-the-river hydroelectric projects are considered nonconsumptive with respect to the total discharge expected at the mouth of the stream; however, when hydro projects involve a bypassed reach or significant storage, they are considered consumptive for the affected reach.

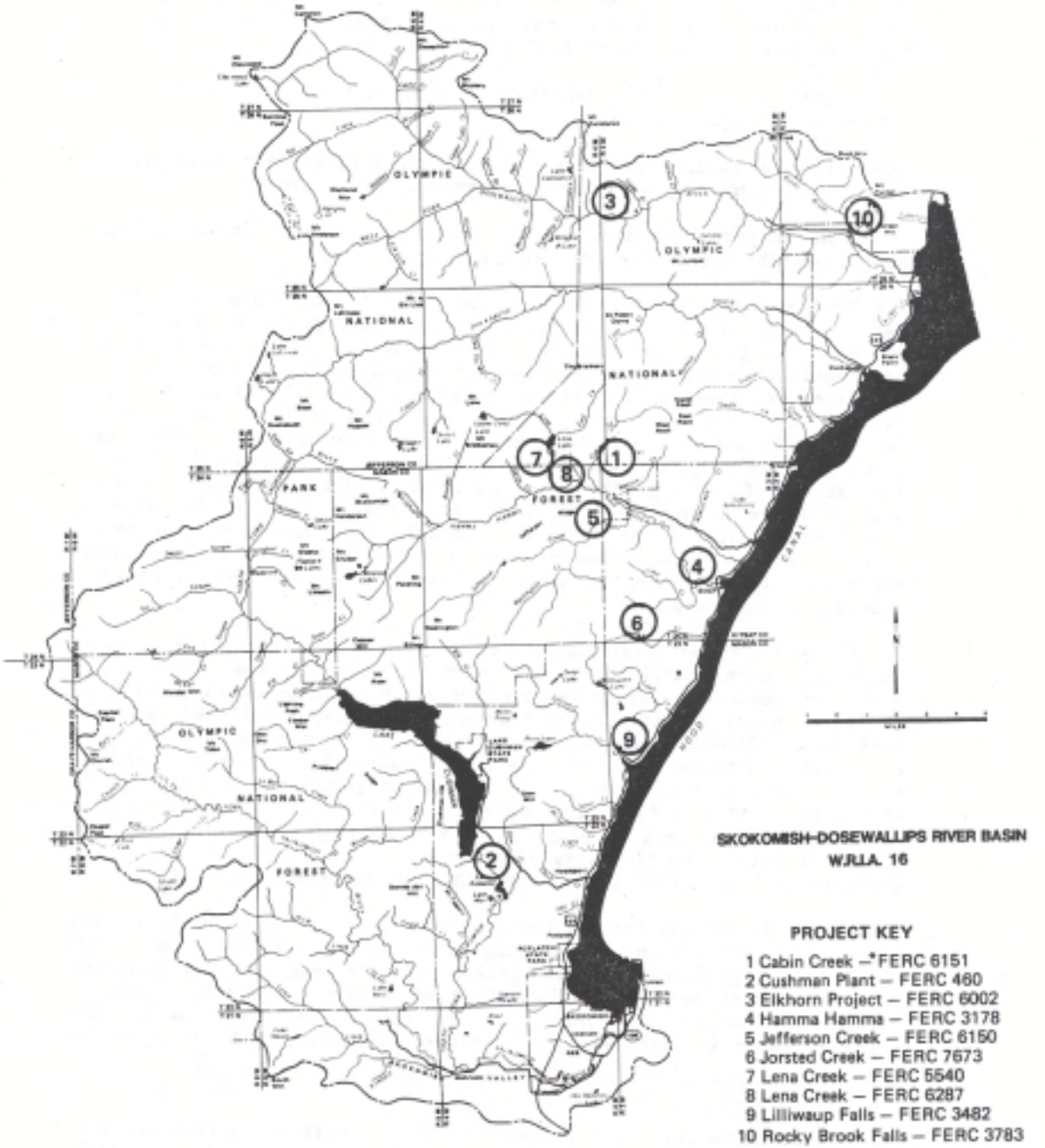
Table 2

Hydropower (FERC*) Projects Summary

Project	FERC No.	Proponent	FERC Status
Cabin Creek	6151	S.V. Hydrotech Inc	Exemption granted
	460	Tacoma City Li 1 T1(i-n4.9(t253-12.O)1)3.perati5(n)-14.6(1 T tioannu(n	

Figure 4

HYDROPOWER PROJECTS



SKOKOMISH-DOSEWALLIPS RIVER BASIN
WRIA 16

PROJECT KEY

1 Cabin Creek – FERC* 6151
2 Cushman Plant – FERC 460
3 Elkhorn Project – FERC 6002
4 Hamma Hamma – FERC 3178
5 Jefferson Creek – FERC 6150
6 Jorsted Creek – FERC 7673
7 Lena Creek – FERC 5540
8 Lena Creek – FERC 6287
9 Lilliwaup Falls – FERC 3482
10 Rocky Brook Falls – FERC 3783

* Federal Energy Regulatory Commission

The summary in the table two is a synopsis of lists and information from the Washington Department of Fisheries, the Bonneville Power Administration (BPA), proponents, contractors and consultants, FERC, and the Washington Department of Ecology.

In Appendix C, a detailed description is given for each project that was active as of January 1, 1985.

The Lilliwaup Falls hydroelectric facility, a relatively small project, generates one MW of power near the community of Lilliwaup.

A 1.5 MW project is under construction at Rocky Brook Falls on Rocky Brook, a tributary to the Dosewallips River.

The Cushman hydroelectric facility has been in existence since 1926. Water is impounded behind two dams on the North Fork of the Skokomish River and run through two powerhouses before being discharged into Hood Canal near Potlatch. Each plant diverts up to 1,000 cubic feet per second to generate a combined output of up to 124 megawatts (MW) of power. Upper Cushman Dam has a storage capacity of 453,300 acre-feet. Lower Cushman Dam impounds about 8,000 acre feet. Up to five cfs may be diverted from upper McTaggert Creek into Lake Cushman for subsequent power generation. Currently, there are no instream flow requirements for the North Fork below lower Cushman Dam. As a result, much of the time a significant reach of the North Fork is dried up. Resource agencies are seeking instream flow releases from the project through a relicensing proceeding for the project under the auspices of the Federal Energy Regulatory Commission.

The Cushman hydroelectric facility, though it provides a valuable energy resource, is an excellent example of why minimum instream flows in the diversion reach of a hydroelectric project need to be established.[11] At one time, a strong run of wild spring chinook salmon utilized the North Fork of the Skokomish River for spawning and rearing. Because there was no minimum instream flow attached to the water right or FERC license at the time of the original approvals for the project early in this century, stream flow was significantly reduced, and the chinook run was consequently depleted. The project developer, Tacoma City Light, have at least partially mitigated the fish loss with construction of the George Adams Fish Hatchery in Purdy Creek (tributary to the mainstem Skokomish River).

WDOE normally establishes minimum instream flows for a diversion reach of a new hydro project and attaches them as a condition to the water right. This is usually done on a case-by-case basis because most new hydropower projects affect only a small portion of a stream's total length. Furthermore, the reach bypassed by a hydropower project is usually a high gradient reach in which the stream flows established by WDOE may not be appropriate. For this reason,

[11] A diversion reach, or bypassed reach, is defined as that reach of stream from which water is diverted through a penstock or pipeline for conveyance to a generating turbine and then put back into the stream some distance downstream from the diversion.

hydropower project proponents are frequently required to perform site-specific instream flow studies that are used as the basis for determining instream flow requirements.

Domestic and Municipal Water Supply

Most of the domestic water use in WRIA 16 is supplied by numerous small water wells in the area. These wells are usually 6-inch drilled wells fitted with jet or submersible pumps that yield between six and ten gallons per minute (gpm). The average depth of wells is 120 feet, but the range is anywhere from 22 to 420 feet.[12] Average monthly domestic water use in WRIA 16 during 1975 was 43 million gallons.[13]

Mason County's 1971 Comprehensive Water and Sewer Plan, concluded that ground water is the most feasible future source of water supply in most areas, due to the absence of large surface supplies in the populated portions of the county. With few exceptions, the plan concluded that ground water will be adequate to meet Mason County needs through 1990. However, planners for Jefferson and Kitsap counties are looking toward the surface waters of WRIA 16 for future water supply. Jefferson County is faced with the problem of potential salt water encroachment from overtapping the freshwater aquifers of WRIA 16 and WRIA 17 (which is north of WRIA 16). Kitsap County and the City of Bremerton are faced with a growing population and limited water supply alternatives. These entities have submitted water right applications for surface waters in WRIA 16. However, whether or not these waters will be developed depends on many varied factors. Port Townsend holds a water right for 30 cfs from the Quilcene River of which 23 cfs is contracturally obligated to the Port Townsend Paper Company (formerly Crown Zellerbach) mill. In the possible event of this mill's closure, Port Townsend would gain 23 cfs. If Bremerton or Kitsap County wanted to develop the waters of WRIA 16, they would be faced with the difficult task of transporting the diverted water across or around Hood Canal. Following is a listing of pending water-right applications for municipal water supply development:

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12 DSHS Water Facilities Inventory, 1984.

13 Dion and Lum, 1977. USGS. Municipal, Industrial, and Irrigation Water Use in Washington, 1975.

Table 3
Municipal Supply
Water Right Applications

Name	Priority Date	Amount	Source
1. City of Bremerton	2/11/54	100 cfs	Hamma Hamma River
2. City of Bremerton	9/4/57	6000 acre-feet (storage)	Jefferson Creek
3. City of Bremerton	9/4/57	4000 acre-feet (storage)	Jefferson Creek
4. City of Port Townsend	2/20/56	50 cfs; 3,260 acre-feet (storage)	Dosewallips River
5. City of Bremerton	7/10/57	50 cfs	Jefferson Creek
6. Kitsap County PUD #1	10/27/64	100 cfs	Duckabush River

None of these applications are being actively pursued for development at this time. However in 1982, the proponents of these projects asked the WDOE to retain the applications on file for possible future development. No permits have been issued by WDOE for these developments. Permits would be required prior to actual development.

The instream resources protection program will affect these existing water right applications even though they have been on file for some time. Any new water right applications for consumptive appropriation received by WDOE will also be subject to the program.

Active interest has been expressed in Jefferson County in reserving water for future municipal supply needs from the Dosewallips River. The Jefferson County Water Utilities Coordinating Committee (WUCC) is preparing a coordinated water system plan and a request for a reservation of 15.2 million gallons per day (23.4 cfs) from the Dosewallips River for future municipal water supply. Future water rights developed for such a reservation, if approved, would be subject to this program.

Industrial Use and Irrigation

Farming plays a relatively minor role in the economy of WRIA 16 since the area lacks large areas of naturally fertile soil and is covered by dense forests. However, there are a few farms in the Skokomish Valley that irrigate land for agricultural crops. In 1975, an estimated 690 acres of land in WRIA 16 were irrigated with 732 acre-feet of surface water and 180 acre-feet of ground

water.[14] Forestry, in the form of Christmas tree farming, is also practiced, primarily in the Skokomish drainage.

In 1975, 167 million gallons of self-supplied (as opposed to municipally supplied) water was used for industrial and commercial use. Industries in WRIA 16 that use water include: gravel mining, wine making, trout farming, seafood culture and processing, and recreation. No adjudication of water rights has occurred to date in WRIA 16.

Fish Propagation

Water rights for fish propagation exist in several locations in the basin. Most of these are for hatcheries administered by the state. The Washington Department of Fisheries (WDF) operates the George Adams Hatchery on Purdy Creek, approximately one mile above its confluence with the lower Skokomish River. The Washington Department of Fisheries has water rights for fish propagation on Purdy Creek totaling 21.25 cfs. This hatchery was constructed with the cooperation of the City of Tacoma to mitigate for losses of salmon resources that occurred with construction of the North Fork Skokomish hydroelectric projects. The George Adams hatchery rears chinook and coho and has a hatching capacity of 9.7 million fry per year. Fisheries also operates the Hood Canal hatchery located at the mouth of Finch Creek in Hoodsport and has a water rights for 17.4 cfs from that stream. The hatchery uses essentially the entire water right amount from November through May for salmon propagation. The diversion, about one-quarter mile above the mouth of Finch Creek, substantially dewaters the creek in its lower reaches. This hatchery can use either fresh or salt water for experimental studies on salmon. Chinook, chum, coho, and pinks are handled at this facility.[15]

Within this WRIA, WDF holds a total of 60.65 cfs of surface water rights for fish propagation.

The Department of Game holds a total of 42.0 cfs of water rights for fish propagation in WRIA 16 and operates the Shelton trout hatchery on Hunter Creek, off the Skokomish River. Game holds water rights for 12 cfs from unnamed tributaries to Hunter Creek and 30 cfs on Vance Creek. Several species are raised at the Shelton Hatchery, including: sea-run cutthroat, steelhead, resident cutthroat, eastern brook, rainbows, and brown trout. Additionally, the Game Department formerly raised trout in rearing pens in Lake Cushman but abandoned that practice several years ago.[16]

The Skokomish Indian tribe operates a springfed hatchery adjacent to Hood Canal on Enetai Creek (#0217) which flows into Annas Bay north of the Skokomish River. This hatchery annually raises 2.2 million chum salmon, 750,000 fall chinook salmon, and 100,000 steelhead.

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14 Dion and Lum, 1977. USGS. Municipal, Industrial, and Irrigation Water Use in Washington, 1975.

15 Carl Gray; Washington Department of Fisheries, Hoodsport Hatchery Manager; personal correspondence; March 13, 1985.

16 Jim Gearheard; Washington Department of Game, Supervisor of Hatcheries; personal correspondence; March 13, 1985.

The chum are released at the hatchery, as well as about one-half the chinooks. The remaining chinook and all the steelhead are released into the Skokomish River.[17]

A private commercial hatchery is located on Hill Creek, just south of Hoodsport. The facility holds water rights totaling 0.8 cfs for fish propogation. This hatchery is part of a "chain" of hatcheries located throughout the Pacific Northwest.

ESTABLISHMENT OF ADMINISTRATIVE RULES

Current Administrative Status

Closures and low flow conditions have been established through water right actions of WDOE or its predecessor agencies under the authority of RCW 75.20.050 (Fisheries Code) and in consultation with the departments of Game and Fisheries, as required by that statute. Of the streams inventoried in WRIA 16, two have instream flow limitations (see below). No streams are currently closed to additional consumptive appropriation.

Table Four
Existing Surface Water Source Limitations in WRIA 16.

Stream*	Tributary to	Source Limitation
Waketickeh Cr.	Hood Canal	Low flow (0.60 cfs at a point 1150 ft. east of center of Sec. 23. T. 24 N., R. 3 W.W.M.)
McTaggart Cr.	North Fork Skokomish River	Low flow (2.0 cfs at a point 500 ft. west and 1,000 ft. south of the N¼ corner of Sec. 4, T. 7 N., R. 4 W.W.M.)

*Closures and low flow limitations also apply to tributaries of these streams.

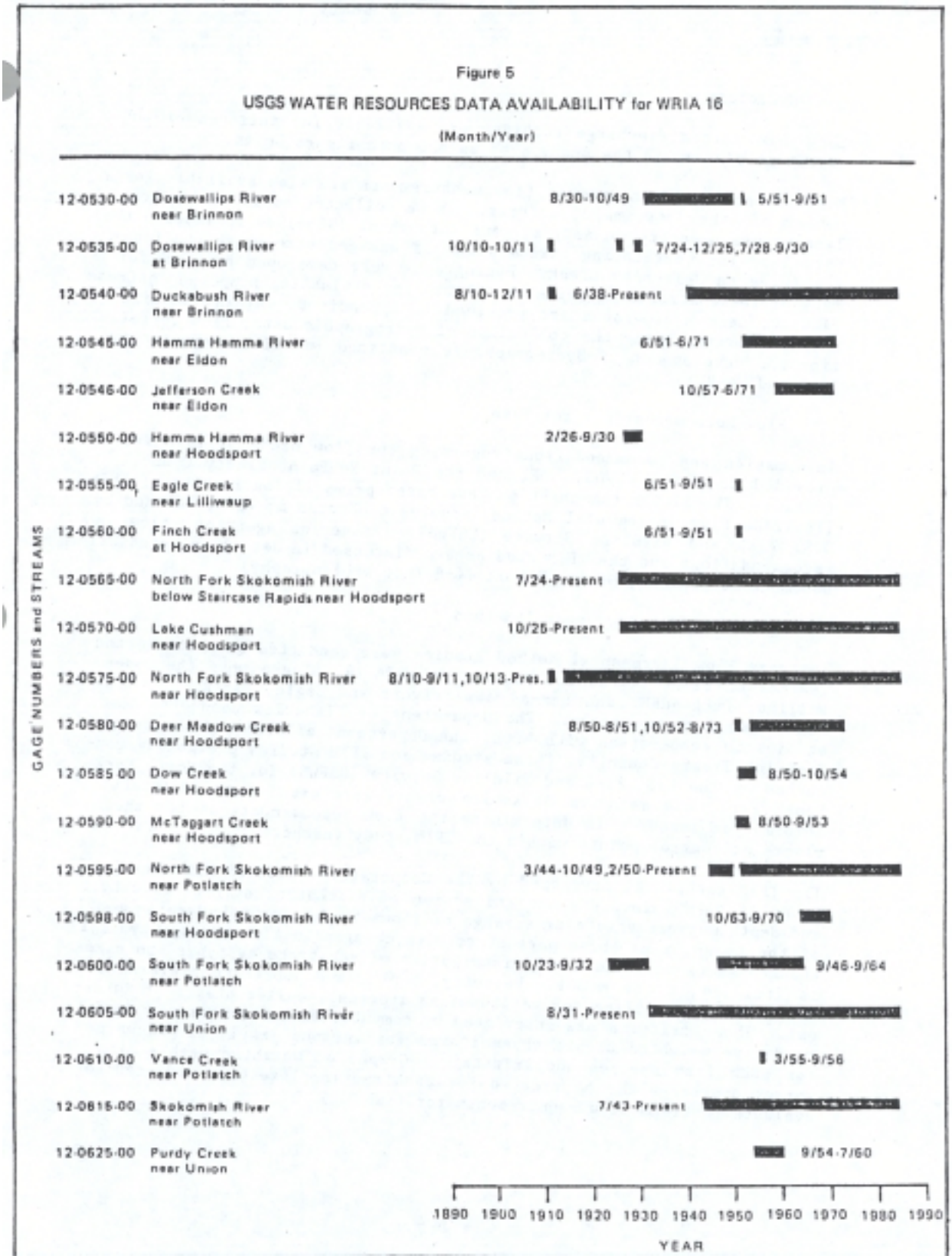
Technical Basis of Proposed Rules

A considerable amount of physical data were collected by WDOE and the state Department of Fisheries regarding the hydrology of the streams of WRIA 16 and the instream flow requirements of instream resources, particularly anadromous fish. This information is summarized in this section. More details are available from the three technical reports [Office Reports 74, 74-A, and 74-B] on this basin that are listed in the bibliography.

[17] John Barr; Skokomish Tribal Fisheries Manager; personal correspondence; April 1, 1985.

Figure 5

USGS WATER RESOURCES DATA AVAILABILITY for WRIA 16



Hydrology

Long-term stream discharge records were available for thirteen of the important streams in the study area as shown in figure seven.

Miscellaneous (noncontinuous) flow measurements are also available for a number of other streams of interest. WDOE collected additional miscellaneous measurements on many streams throughout 1983-1984 to improve the data base for correlating stream flows of ungaged streams to the long-term gage on Jefferson Creek. Hydrographs were developed by WDOE for many of these streams to serve as a basis for evaluating proposed instream flows. These hydrographs are provided in Appendix B. Again, detailed information regarding the collection of hydrographic data, flow correlation and development of hydrographs is contained in Office Reports 74, 74-A and 74-B.

Flow Recommendations for Fish

Information and recommendations regarding the flow needs of fish were provided to WDOE by WDG, WDF, and the Point-No-Point Treaty Council (PNPTC). The flow recommendations are based primarily on results of IFIM (Instream Flow Incremental Method) studies conducted by WDOE, WDF and by U.S. Fish and Wildlife Service (USFWS). Fisheries agencies' flow recommendations and the IFIM studies are discussed in detail in Technical Document Supplement, Office Report 74-B (see bibliography).

Instream Flow Incremental Method

Instream Flow Incremental Method studies were conducted on the selected reaches on eight rivers and streams in WRIA 16. These were the Dosewallips, Duckabush, and Hamma Hamma rivers and Eagle, Finch, Fulton, John, and Jorsted creeks. The Department of Fisheries conducted the studies in cooperation with WDOE, the Department of Game and the Point-No-Point Treaty Council. These studies and IFIM studies previously conducted by the U.S. Fish and Wildlife Service (USFWS) for the North Fork, South Fork, and mainstem Skokomish rivers were used as an important information resource in determining the flow recommendations for those rivers at control points within the IFIM study reaches.

The IFIM technique, developed by the Cooperative Instream Flow Service Group of USFWS, involves the collection of discharge, stage, velocity, and depth measurements over a range of flows to develop a hydraulic model of the behavior of these parameters with changes in flow through typical channel sections. The areal distribution of substrate by types and sizes is included in the model. Velocity, depth, and substrate preference criteria are specified for various fish species and life stages of interest. These criteria are interfaced by computer with the hydraulic model to derive weighted usable channel area for various levels of discharge for each fish species and lifestage. Graphs of weighted usable area versus discharge can be created for each species/lifestage and used to evaluate instream flow requirements for fish.

Sites for the IFIM studies on each stream are chosen to typify the entire stream reach for which the study will apply. For example, eight study transects were used at the IFIM site on the Duckabush River to represent the deep pool-wide riffle patterns so common in the lower portion of that river.

Using depth, velocity, and substrate preference criteria provided by WDF and WDG, weighted usable area versus discharge tables were obtained from the computer. These are found in the technical report for this program [Technical Document, Office Report 74-B]. These curves were used as the basis for determining instream flows for the lower river reaches where IFIM studies were conducted. In each case, the instream flows are tailored to the species and lifestages found in the stream at a particular time. Because different species/lifestages may prefer different conditions; it is necessary, during some periods, to optimize among them. For instance, this is the case in the timing for coho and chum spawning which overlap during the fall.

The hydrographs developed for the streams of WRIA 16, together with the fish habitat/flow information developed using the IFIM and toe-widths, and recommendation from WDF, WDG and PNPTC, were used to develop the instream flows and other actions proposed by WDOE in this program. Hydrological and fishery data are located in the technical office reports cited in the bibliography.

Proposed Administrative Status

WDOE proposes to adopt administrative rules (proposed Chapter 173-516 WAC) in accordance with the state Administrative Procedures Act (Chapter 34.04 RCW), the Water Resources Act of 1971 (Chapter 90.54 RCW), and the Minimum Water Flows and Levels Act (Chapter 90.22 RCW) for the purpose of protecting and preserving the instream values of streams in WRIA 16. The department proposes to (1) officially adopt as administrative rules, the existing surface water source limitations listed in Table 4 of this report, except as indicated in the footnotes, in WAC 173-516-040(3), (2) adopt new closures to consumptive uses for 19 streams, and (3) adopt minimum instream flows on 11 streams in WRIA 16. These actions would apply to the specific streams named and all tributaries, including lakes. Uses which are proposed to be exempt from the instream flows and closures include: 1) existing water rights, 2) single domestic use which includes up to one-half acre of land and garden irrigation, 3) stock watering, except that related to feedlots and 4) nonconsumptive uses.

Projects that reduce the flow in a portion of a stream's length (e.g. hydroelectric projects) may be considered independently from these regulations on a case-by-case basis in accordance with proposed WAC 173-516-030(5). Under this subsection, bypass-type projects may be exempted from stream closures or instream flows specified in the proposed regulation. Instream flows and water right approvals will be evaluated on a case-by-case basis in considering the specific instream flow needs of the bypassed reach. Site-specific instream flow studies may be required of an applicant.

Existing Surface Water Source Limitations

The existing low flow limitations listed in Table four, page 32 of this report are proposed to be confirmed and adopted as administrative rules in proposed Chapter 173-516 WAC.

Proposed Minimum Flows and Proposed Control Stations

The department proposes to establish minimum instream flows on 11 streams. Future consumptive water rights issued by WDOE for diversions from these streams will be conditioned with these flows and will be subject to regulation to retain these flows instream. The proposed network of control stations and related flows is intended to provide control of future surface water appropriations under permits provisioned with the minimum flows established by the regulation. Figure six shows the location of proposed control stations and figures seven through 17 depict proposed minimum instream flows for the streams.

Figure 6

PROPOSED CONTROL POINTS

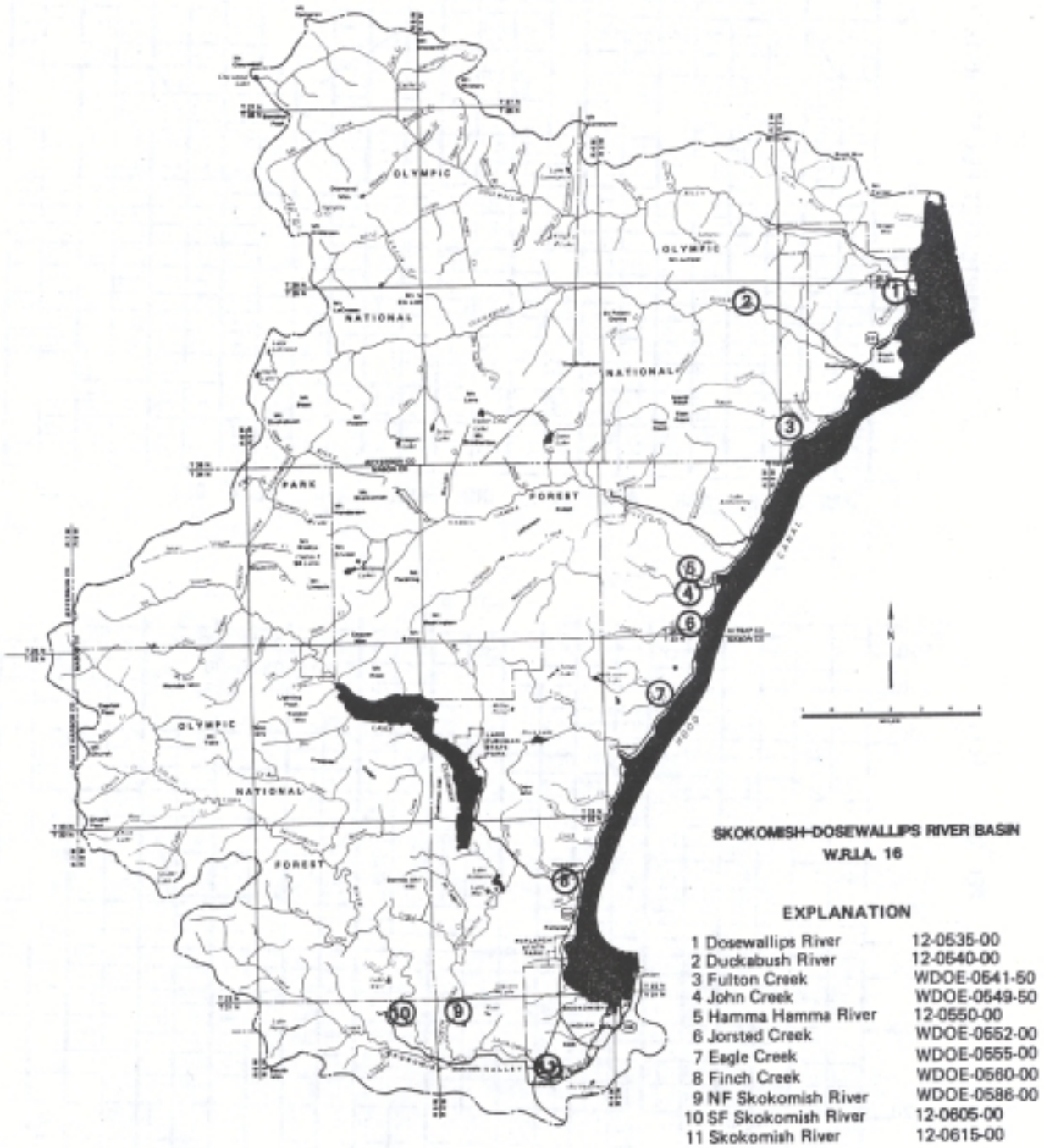


Figure 7

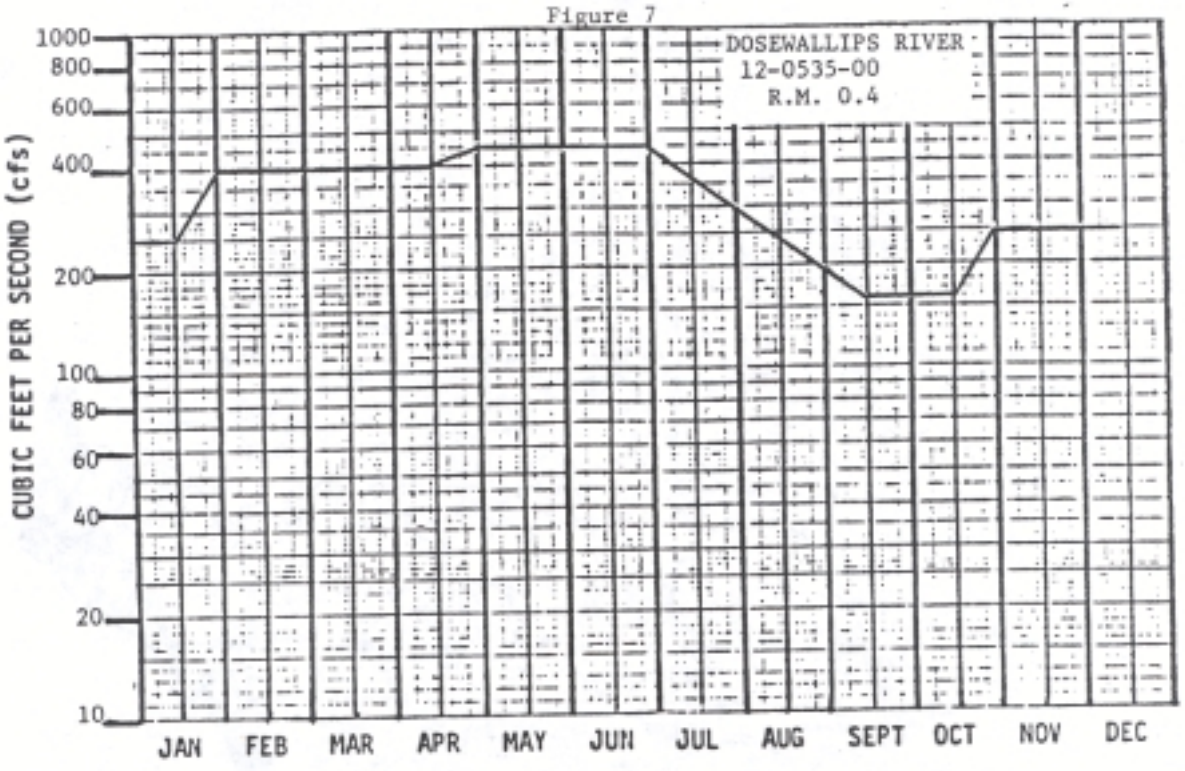


Figure 8

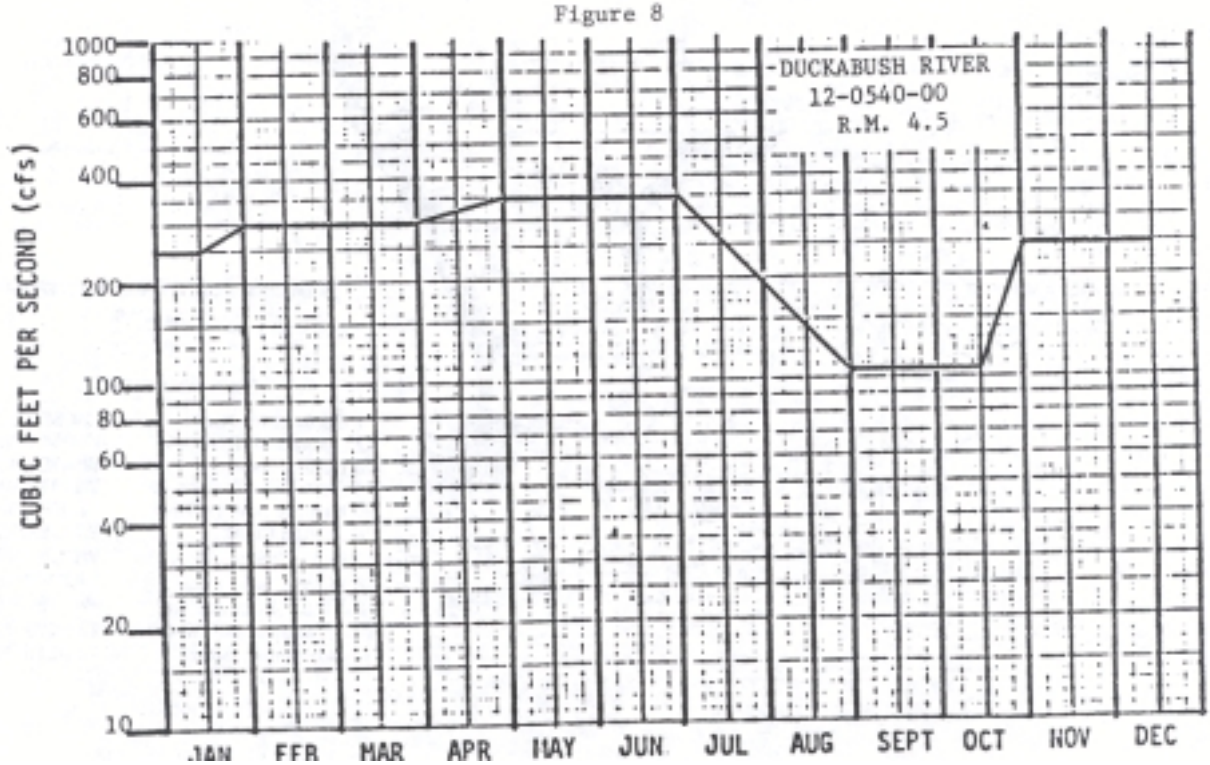
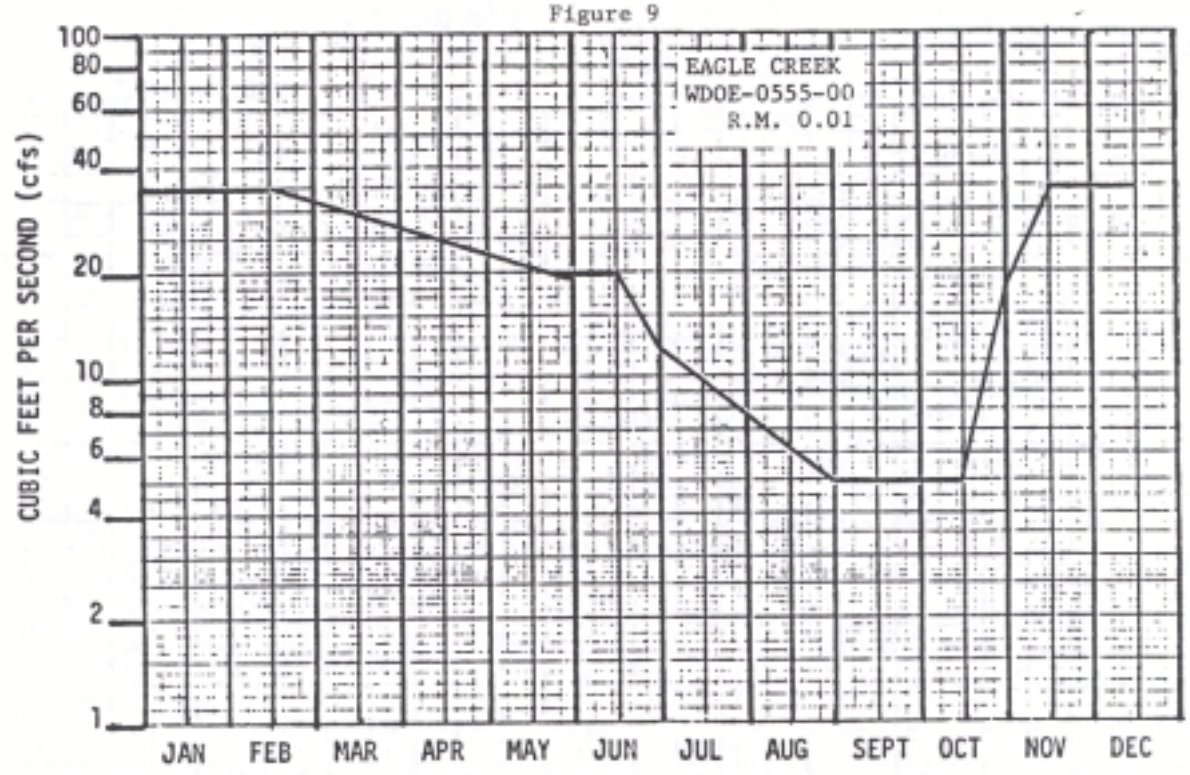


Figure 9



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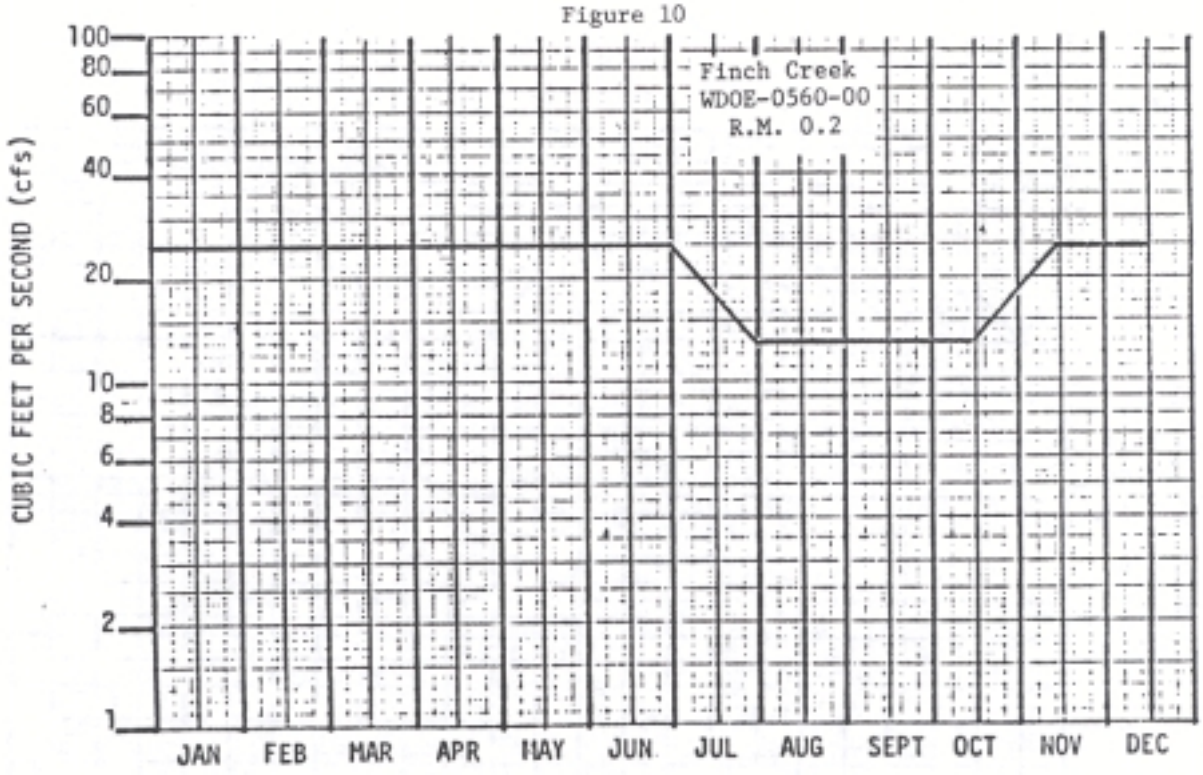
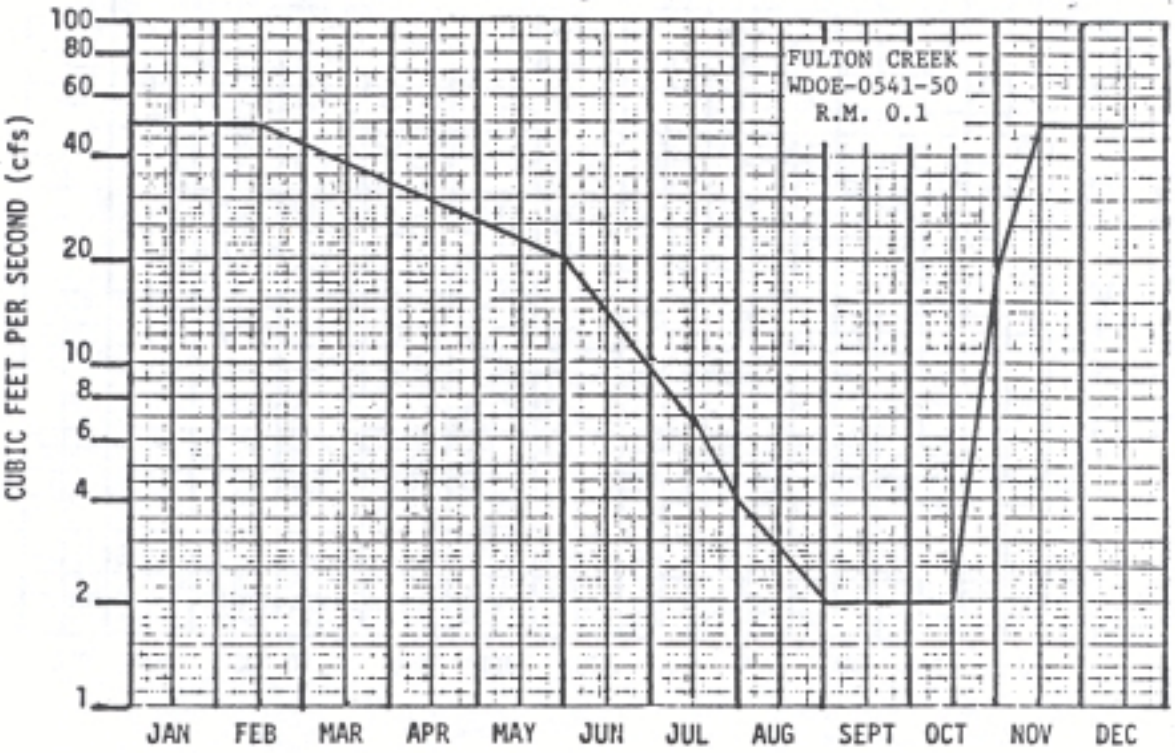


Figure 11



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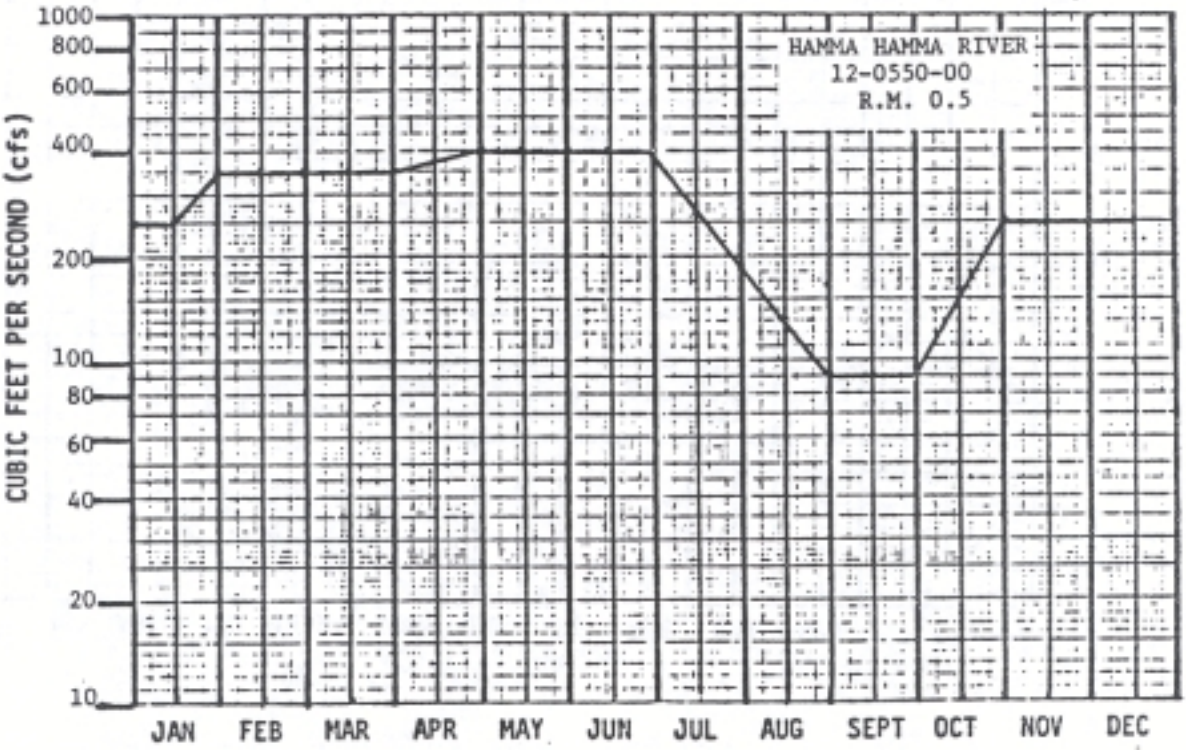


Figure 13

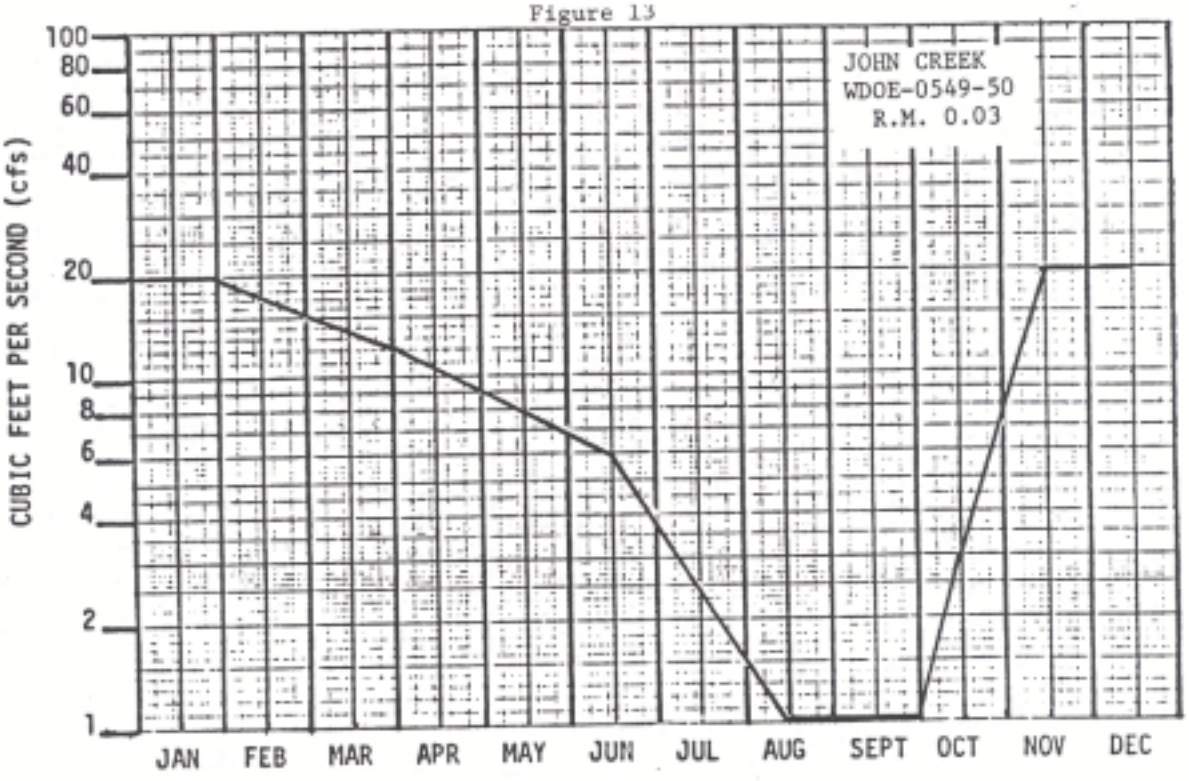


Figure 14

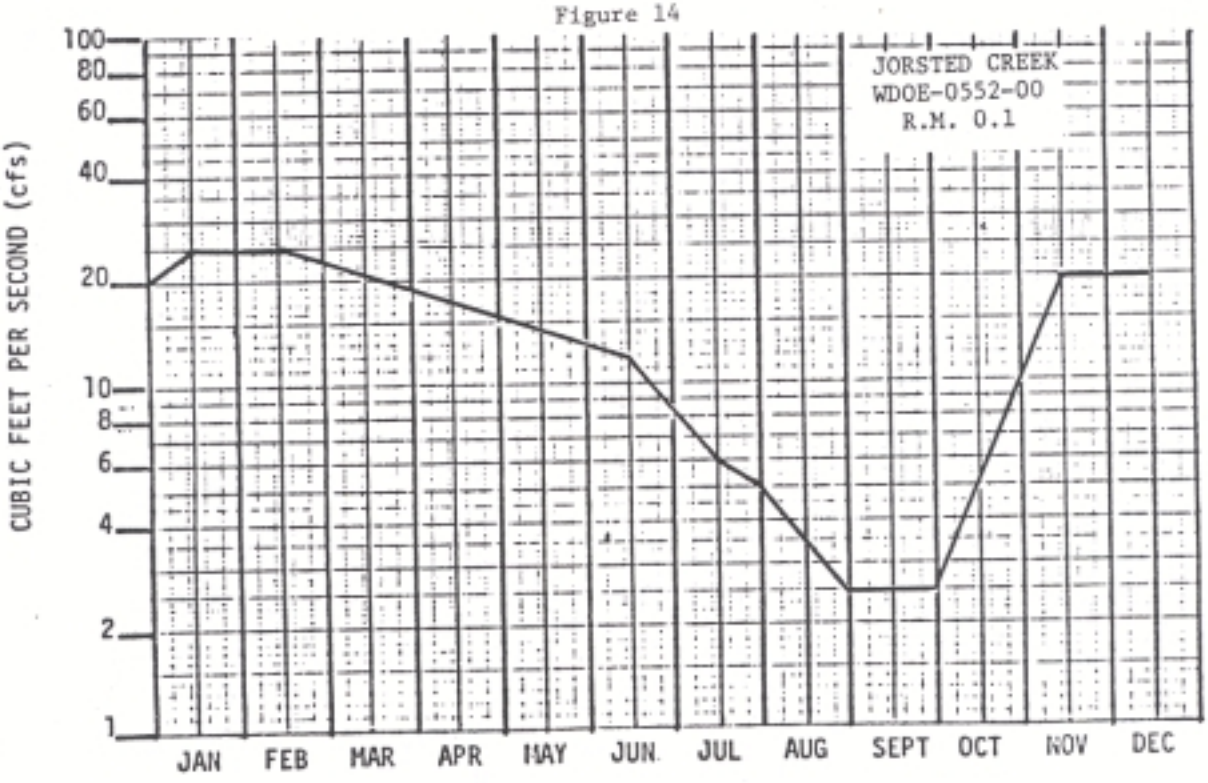


Figure 15

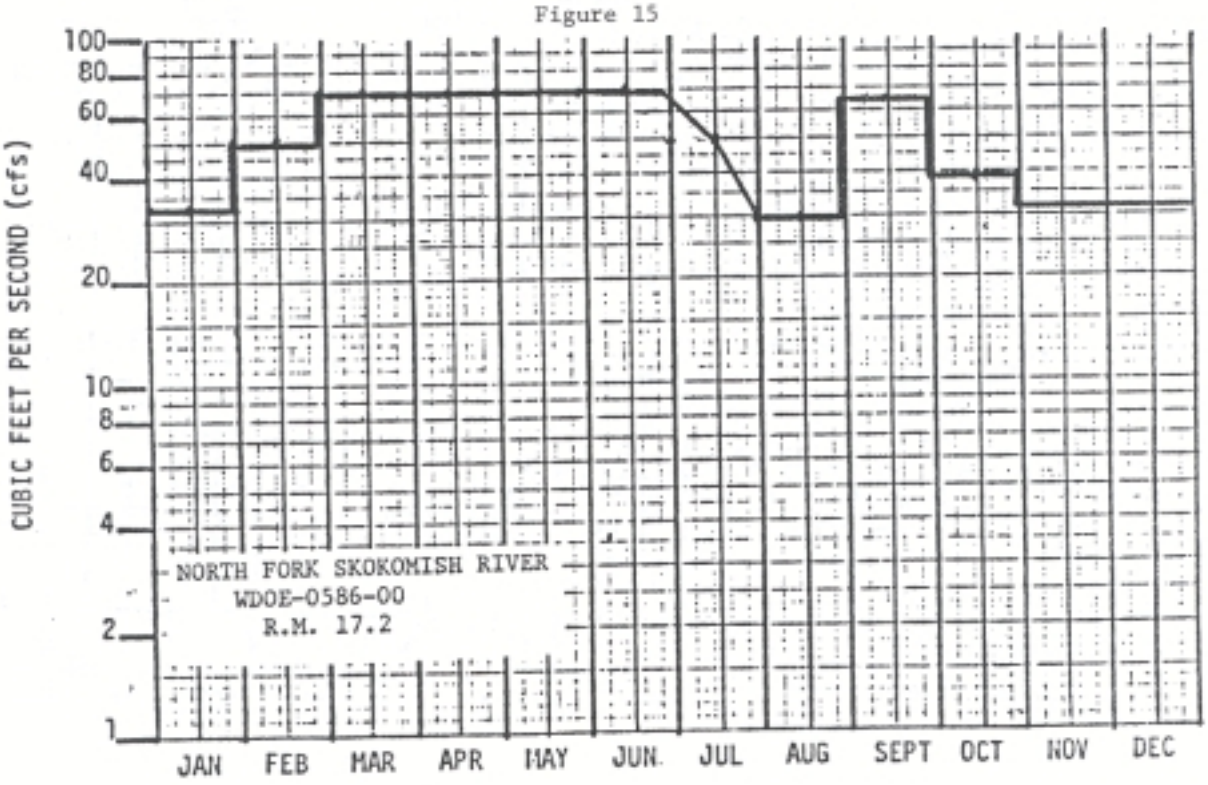

CUBIC FEET PER SECOND (cfs)
100
80
60
40
20
10
8
6
4
2
1
NORTH FORK SKOKOMISH RIVER
WDOE-0586-00
R.M. 17.2
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEPT
OCT
NOV
DEC

Figure 16

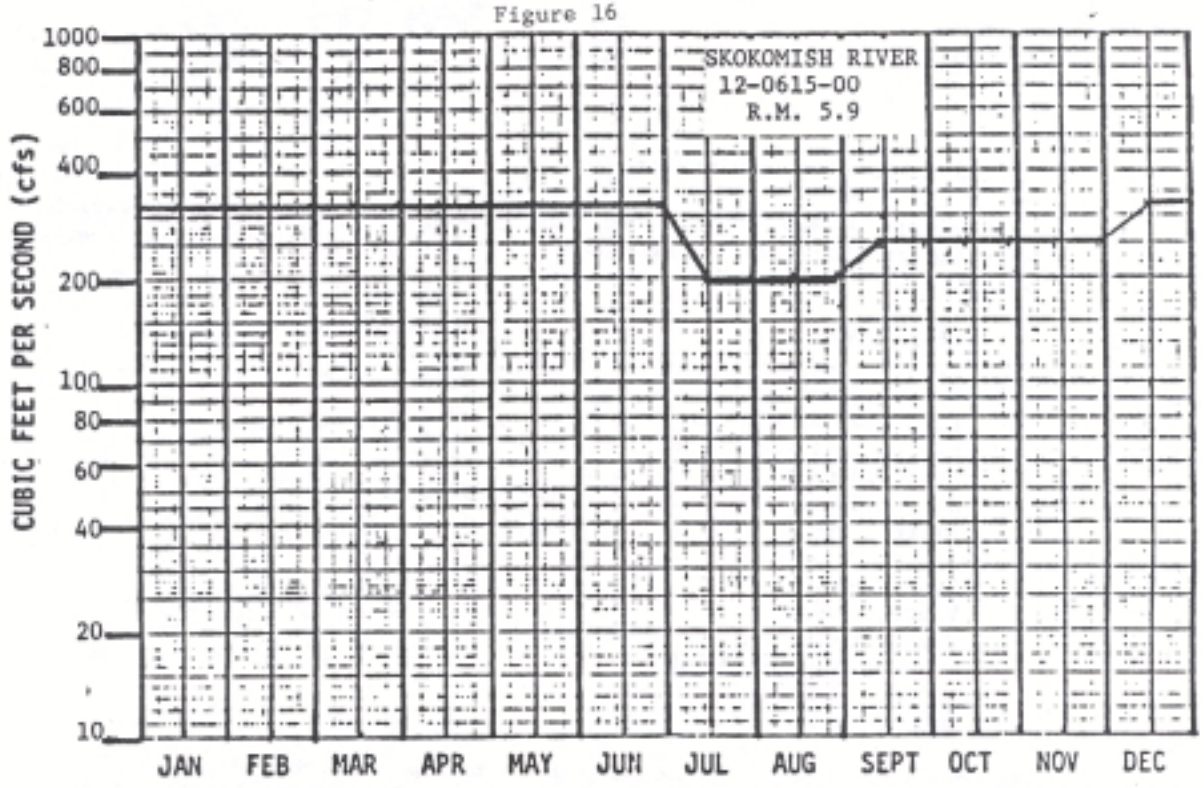
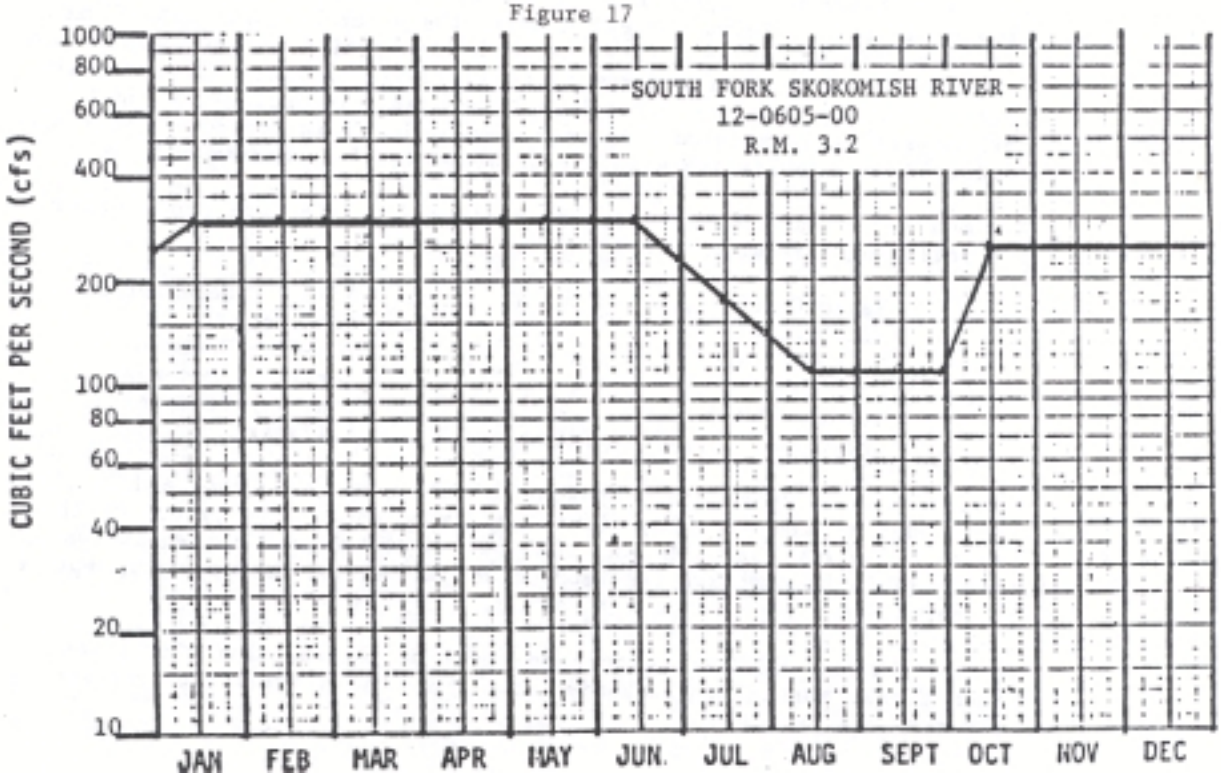


Figure 17



Proposed Stream Closures

The following small streams in WRIA 16 support viable anadromous fish runs and provide locally important recreational opportunities and aesthetic values:

Clark Creek	Unnamed Creeks:
Hill Creek	#0010
Hunter Creek	#0215
Lilliwaup Creek	#0216
Little Lilliwaup Creek	#0217
McDonald Creek	#0218
Miller Creek	#0439
Pierce Creek	
Schaerer Creek	
Sund Creek	
Vance Creek	
Waketickeh Creek	

Because of the small size of these streams, any significant future consumptive diversions, particularly during the annual low flow period, would be harmful to instream values. WDOE, therefore, proposes to close these streams to further appropriation of water for consumptive purposes from June 1 through December 31 to protect instream values. During this flow period, the minimum stream flow is the natural flow. Insufficient flow data are available during the high flow period on the streams to permit establishment of minimum instream flows. Minimum flows for any water right applications for consumptive uses only during the nonclosed period will be considered on a case-by-case basis in accordance with RCW 75.20.050 in consultation with the departments of Fisheries and Game.

Minimum flows and closures for the periods indicated are proposed for the following streams.

Eagle Creek . . . . . June 1 – December 31
Finch Creek . . . . . All year
Fulton Creek. . . . . June 1 – December 31
John Creek . . . . . April 1 – December 31
Jorsted Creek. . . . . June 1 – December 31
North Fork Skokomish River . . . . . All year

Partial year closures are proposed for Eagle, Fulton, John, and Jorsted creeks due to the very low flows they experience annually during the summer and early fall. During this period of the year inadequate water is available to preserve instream values and satisfy any new consumptive appropriation.

Due to current and past water use and hydrological characteristics, Finch Creek, North Fork Skokomish River, and Purdy Creek are proposed to be closed all year.

Finch Creek is proposed to be closed due to the diversion of water for the WDF Hood Canal Salmon Hatchery. The hatchery uses essentially the entire flow of Finch Creek (17.49 cfs) from May through November and dewaters the lower one-fourth mile of the creek. Any further consumptive appropriation from Finch Creek would negatively impact resident cutthroat trout and interfere with existing water rights.

The North Fork of the Skokomish River is proposed to be closed due to the diversion of virtually the entire flow through the Cushman hydroelectric facility. This effectively dewaters the river below the lower dam. Some seepage occurs at the lower dam and that combined with tributary inflow provides a minimal amount of water for supporting instream values. There is no remaining water available to appropriate from the North Fork or its tributaries.

Purdy Creek is proposed to be closed above the George Adams Fish Hatchery to protect existing rights, including those of the fish hatchery. It is proposed that Purdy Creek below the hatchery remain open to further consumptive appropriation subject to a case-by-case determination of minimum flow needs.

It is recognized that certain streams and rivers within this WRIA possess unique and pristine natural scenic, recreational, and aesthetic values of national significance. In the administration of future water rights on the Dosewallips, Duckabush, and Hamma Hamma rivers, it is the proposed policy of the department to retain these rivers substantially in their natural condition. Applicants for future water rights would have to provide information clearly demonstrating: consistency with this policy, need, lack of alternative sources, and maximum net benefits to citizens of the state.

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APPENDIX A
Chapter 173-516 WAC

INSTREAM RESOURCES PROTECTION PROGRAM--SKOKOMISH-DOSEWALLIPS WATER RESOURCE INVENTORY AREA (WRIA 16)

NEW SECTION

WAC 173-516-010. GENERAL PROVISION. These rules apply to waters within the Skokomish-Dosewallips Water Resource Inventory Area (WRIA 16.), as defined in WAC 173-500-040. This chapter is promulgated pursuant to Chapter 90.54 RCW (Water Resources Act of 1971), Chapter 90.22 RCW (Minimum Water Flows and Levels), Section 75.20.050 RCW (State Fisheries Code) and in accordance with Chapter 173-500 WAC (Water Resources Management Program).

NEW SECTION

WAC 173-516-020. PURPOSE. The purpose of this chapter is to retain perennial rivers, streams, and lakes in the Skokomish-Dosewallips Water Resource Inventory Area with instream flows necessary to provide protection for wildlife, fish, scenic, aesthetic and environmental values, recreation, navigation, and water quality. It is recognized that this inventory area possesses unique and pristine natural, scenic, recreational, and aesthetic values of statewide, regional, and national significance. Therefore, it is the further purpose of this chapter to establish policies and procedures to preserve and protect these values to the fullest extent allowed under the authorities cited in WAC 173-516-010 above.

NEW SECTION

WAC 173-516-030. ESTABLISHMENT OF INSTREAM FLOWS.

(1) Stream management units and associated control stations are established as follows:

Stream Management Unit Information

Control Station No. Stream Management Unit Name	Control Station by River Mile and Section, Township, and Range	Affected Stream Reaches) including Tributaries
12-0535-00 Dosewallips River	0.4 Sec. 2, T. 25 N., R. 2 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
12-0540-00 Duckabush River	4.5 Sec. 1, T. 25 N., R. 3 WWM	From influence of mean annual high tide at low instream flow levels to headwaters including all tributaries.

Stream Management Unit Information
(cont'd)

Control Station No. Stream Management Unit Name	Control Station by River Mile and Section, Township, and Range	Affected Stream Reaches) including Tributaries
WDOE 0555-00 Eagle Creek	0.01 Sec. 16, T. 23 N., R. 3 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
WDOE 0560-00 Finch Creek	0.2 Sec, 1l, T. 22 N., R. 4 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
WDOE 0541-50 Fulton Creek	0.1 Sec. 31, T. 25 N., R. 2 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
12-0550-00 Hamma Hamma River	0.5 Sec. 27, T. 24 N., R. 3 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
WDOE 0549-50 John Creek	0.03 Sec. 27, T. 24 N., R. 3 WWM	From mouth to head-waters, including all tributaries.
WDOE 0552-00 Jorsted Creek	0.1 Sec. 34, T. 24 N., R. 3 WWM	From influence of mean annual high tide at low instream flow levels to headwaters, including all tributaries.
WDOE 0586-00 North Fork Skokomish River	17.2 (from Hood Canal) Sec. 16, T. 22 N., R. 4 WWM	From confluence with South Fork Skokomish to headwaters, including all tributaries.
12-0615-00 Skokomish River	5.9 Sec. 15, T. 21 N., R. 4 WWM	From influence of mean annual high tide at low instream flow levels to the confluence of the North and South Forks, including all tributaries.
12-0605-00 South Fork Skokomish River	3.2 Sec. 2, T. 21 N., R. 5 WWM	From confluence with North Fork Skokomish to headwaters, including all tributaries.

(2) Instream flows are established for the stream management units in WAC 173-516-030(1) as follows:

Instream Flows in the Skokomish-Dosewallips WRIA
(Instantaneous cubic feet per second)

		12-0535-00 Dosewallips River	12-0540-00 Duckabush River	WDOE 0555-00 Eagle Creek
Jan	1	250	250	35
	15	250	250	35
Feb	1	400	300	35
	15	400	300	35
March	1	400	300	32
	15	400	300	30
April	1	400	300	27
	15	400	325	25
May	1	450	350	23
	15	450	350	22
June	1	450	350	20
	15	450	350	20 *
July	1	450	350	12 *
	15	360	270	10 *
Aug	1	300	200	8 *
	15	240	150	6 *
Sept	1	200	110	5 *
	15	160	110	5 *
Oct	1	160	110	5 *
	15	160	110	5 *
Nov	1	250	250	18 *
	15	250	250	35 *
Dec	1	250	250	35 *
	15	250	250	35 *

*Denotes closure period to all consumptive uses.

Instream Flows in the Skokomish-Dosewallips WRIA
(Instantaneous cubic feet per second) (cont'd)

Month	Day	WDOE 0560-00 Finch Creek	WDOE 0541-50 Fulton Creek	12-0550-00 Hamma Hamma River
Jan	1	25 *	50	250
	15	25 *	50	250
Feb	1	25 *	50	350
	15	25 *	50	350
March	1	25 *	44	350
	15	25 *	38	350
April	1	25 *	33	350
	15	25 *	30	375
May	1	25 *	26	400
	15	25 *	23	400
June	1	25 *	20 *	400
	15	25 *	14 *	400
July	1	25 *	10 *	400
	15	18 *	7 *	260
Aug	1	13 *	4 *	180
	15	13 *	3 *	130
Sept	1	13 *	2 *	90
	15	13 *	2 *	90
Oct	1	13 *	2 *	90
	15	13 *	2 *	160
Nov	1	18 *	18 *	250
	15	25 *	50 *	250
Dec	1	25 *	50 *	250
	15	25 *	50 *	250

*Denotes closure period to all consumptive uses.

Instream Flows in the Skokomish-Dosewallips WRIA
(Instantaneous cubic feet per second) (cont'd)

Month	Day	WDOE 0549-50 John Creek	WDOE 0552-00 Jorsted Creek	WDOE 0586-00 N.F. Skokomish River
Jan	1	20	20	33 *
	15	20	25	33 *
Feb	1	20	25	50 *
	15	17	25	50 *
March	1	15	22	70 *
	15	13	20	70 *
April	1	12 *	18	70 *
	15	10 *	17	70 *
May	1	9 *	15	70 *
	15	8 *	14	70 *
June	1	7 *	13 *	50 *
	15	6 *	12 *	50 *
July	1	4 *	8 *	50 *
	15	2.5 *	6 *	50 *
Aug	1	1.5 *	5 *	30 *
	15	1 *	3.5 *	30 *
Sept	1	1 *	2.5 *	65 *
	15	1 *	2.5 *	65 *
Oct	1	1 *	2.5 *	39 *
	15	3 *	5 *	39 *
Nov	1	7 *	10 *	33 *
	15	20 *	20 *	33 *
Dec	1	20 *	20 *	33 *
	15	20 *	20 *	33 *

*Denotes closure period to all consumptive uses.

Instream Flows in the Skokomish-Dosewallips WRIA
(Instantaneous cubic feet per second) (cont'd)

Month	Day	12-0615-00 Skokomish River	12-0605-00 S.F. Skokomish River
Jan	1	320	250
	15	320	300
Feb	1	320	300
	15	320	300
March	1	320	300
	15	320	300
April	1	320	300
	15	320	300
May	1	320	300
	15	320	300
June	1	320	300
	15	320	300
July	1	320	230
	15	200	175
Aug	1	200	140
	15	200	110
Sept	1	200	110
	15	250	110
Oct	1	250	110
	15	250	250
Nov	1	250	250
	15	250	250
Dec	1	250	250
	15	320	250

*Denotes closure period to all consumptive uses.

(3) Instream flow hydrographs, as represented in the document entitled "Skokomish-Dosewallips Instream Resources Protection Program, figs. 7-17, pgs. 38-43," shall be used for identification of instream flows on those days not specifically identified in WAC 173-516-030(2).

(4) Future consumptive water right permits issued hereafter for diversion of surface water from the stream management units listed above, shall be expressly conditioned with instream flows established in WAC 173-516-030(1) through (3) as measured at the appropriate control points) except for those exempted uses described in WAC 173-516-070(1) through (3).

(5) Projects that would reduce the flow in a portion of a stream's length (e.g. hydroelectric projects that bypass a portion of a stream) will be subject to instream flows as specified by the department. These flows may be those established in WAC 173-516-030 or, when appropriate, may be flows specifically tailored to that particular project and stream reach. When studies are required to determine such reach and project specific flow requirements, the department will require the proponent to conduct such studies.

(6) If department investigations determine that withdrawal of ground water from the source aquifers would not interfere significantly with stream flow during the period of stream closure or with maintenance of instream flows, then applications to appropriate public ground waters may be approved and permits or certificates issued without regard to the provisions of this chapter.

NEW SECTION

WAC 173-516-040. SURFACE WATER SOURCE LIMITATIONS TO FURTHER CONSUMPTIVE APPROPRIATION. (1) The department, having determined that additional consumptive use would harmfully impact instream values, closes the following streams including tributaries to further consumptive appropriation for the period indicated.

(a) Stream Name	Tributary to	Closure Period
Clark Creek	Hood Canal	June 1 - December 31
Hill Creek	Hood Canal	June 1 - December 31
Hunter Creek	Skokomish River	June 1 - December 31
Lilliwaup Creek	Hood-Canal	June 1 - December 31
Little Lilliwaup Creek	Hood Canal	June 1 - December 31
McDonald Creek	Hood Canal	June 1 - December 31
Miller Creek	Hood Canal	June 1 - December 31
Pierce Creek	Hood Canal	June 1 - December 31
Purdy Creek (Above George Adams Hatchery)	Skokomish River	All year
Schaerer Creek	Hood Canal	June 1 - December 31
Sund Creek	Hood Canal	June 1 - December 31
Vance Creek	South Fork Skokomish River	June 1 - December 31
Waketickeh Creek	Hood Canal	June 1 - December 31 '
Walcott Slough	Hood Canal	June 1 - December 31
Walker Creek	Hood Canal	June 1 - December 31
Weaver Creek	Skokomish River	June 1 - December 31
Unnamed Creek #0010	Skokomish River	June 1 - December 31

Unnamed Creek #0215	Hood Canal	June 1 - December 31
Unnamed Creek #0216	Hood Canal	June 1 - December 31
Unnamed Creek 40217	Hood Canal	June 1 - December 31
Unnamed Creek #0218	Hood Canal	June 1 - December 31
Unnamed Creek #0439	Hood Canal	June 1 - December 31

The minimum flow during the closure period for the streams listed above is the natural flow. Because insufficient data are available to develop instream flows outside the closure period, minimum flows for any water right application for consumptive use will be considered on a case-by-case basis in consultation with the departments of Fisheries and Game (RCW 75.20.050).

(b) Stream Name	Closure Period
Eagle Creek	June 1 through December 31
Finch Creek	All year
Fulton Creek	June 1 through December 31
John Creek	April 1 through December 31
Jorsted Creek	June 1 through December 31
North Fork Skokomish River	All year

Because sufficient hydrologic data are available for the above streams, a minimum flow is established during the closed and nonclosed period in WAC 173-516-030(2).

(2) Except as noted in the footnotes, the following existing surface water source limitations, previously established administratively under the authority of Chapter 90.03 RCW and RCW 75.20.050 are hereby confirmed and adopted for the period indicated:

Stream*/Tributary To	Action	Period
Waketickeh Creek*/Hood Canal	Low flow @ (0.60 cfs)	All year
McTaggart Creek*/North Fork Skokomish River	Low flow (2.0 cfs)	All year

* Closures and low flow limitations also apply to tributaries of these streams.

@ Superseded by a new action in this section.

(3) When a project (as described in WAC 173-516-030(5)) is proposed on a stream that is closed to further consumptive appropriation, the department shall not issue a permit valid for the closure period unless the project proponent can adequately demonstrate that the project will not conflict with the intent of the closure.

NEW SECTION

WAC 173-516-050 DOSEWALLIPS, DUCKABUSH, AND HAMMA HAMMA RIVERS.

(1) The highest and best uses of the waters in excess of the minimum instream flow of the Dosewallips, Duckabush, and Hamma Hamma Rivers and their tributaries; in order to achieve maximum net benefits to the citizens of the state; are fisheries, wildlife, public recreation, water quality maintenance, and aesthetic enjoyment.

(2) Therefore, in the administration of future water rights on the Dosewallips, Duckabush, and Hamma Hamma Rivers, including their tributaries, it is the policy of the department to retain these rivers and streams substantially in their natural condition. This provision is necessary to protect and preserve the instream values and public benefits provided by these waters in their natural state.

(3) Applicants for future water rights from these rivers shall provide information clearly demonstrating that:

(a) the proposed water resources development is consistent with this policy,

(b) the need for the water exists,

(c) no reasonable and feasible alternative source of supply is available, and

(d) maximum net benefits to the citizens of the state would be achieved.

NEW SECTION

WAC 173-516-060 LAKES. In future permitting actions relating to withdrawal of lake waters, natural lakes and ponds shall be retained substantially in their natural condition. Natural lake levels and the contribution of lake outflows to maintenance of downstream instream flows shall be preserved. Withdrawals of water which would conflict therewith shall be authorized only in those situations where it is clear that overriding considerations of the public interest will be served.

NEW SECTION

WAC 173-516-070 EXEMPTIONS. (1) Nothing in this chapter shall affect existing water rights, riparian, appropriative, or otherwise existing on the effective date of this chapter, nor shall it affect existing rights relating to the operation of any navigation, hydroelectric, or water storage reservoir or related facilities.

(2) Single domestic and stockwatering use, except that related to feedlots, shall be exempt from the provisions established in this chapter. If the cumulative impacts of numerous single domestic diversions would significantly affect the quantity of water available for instream uses, then only single domestic in-house use shall be exempt, if no alternative source is available.

(3) Nonconsumptive uses which are compatible with the intent of the chapter may be approved.

NEW SECTION

WAC 173-516-080 FUTURE RIGHTS. No rights to divert or store public surface waters of the Skokomish-Dosewallips WRIA 16 shall hereafter be granted which shall conflict with the purpose of this chapter.

NEW SECTION

WAC 173-516-090 ENFORCEMENT. In enforcement of this chapter, the Department of Ecology may impose such sanctions as appropriate under authorities vested in it, including but not limited to the issuance of regulatory orders under RCW 43.27A.190 and civil penalties under RCW 43.838.335.

NEW SECTION

WAC 173-516-100 REGULATION REVIEW. Review of the rules in this chapter shall be initiated by the Department of Ecology within five years of the date of adoption.

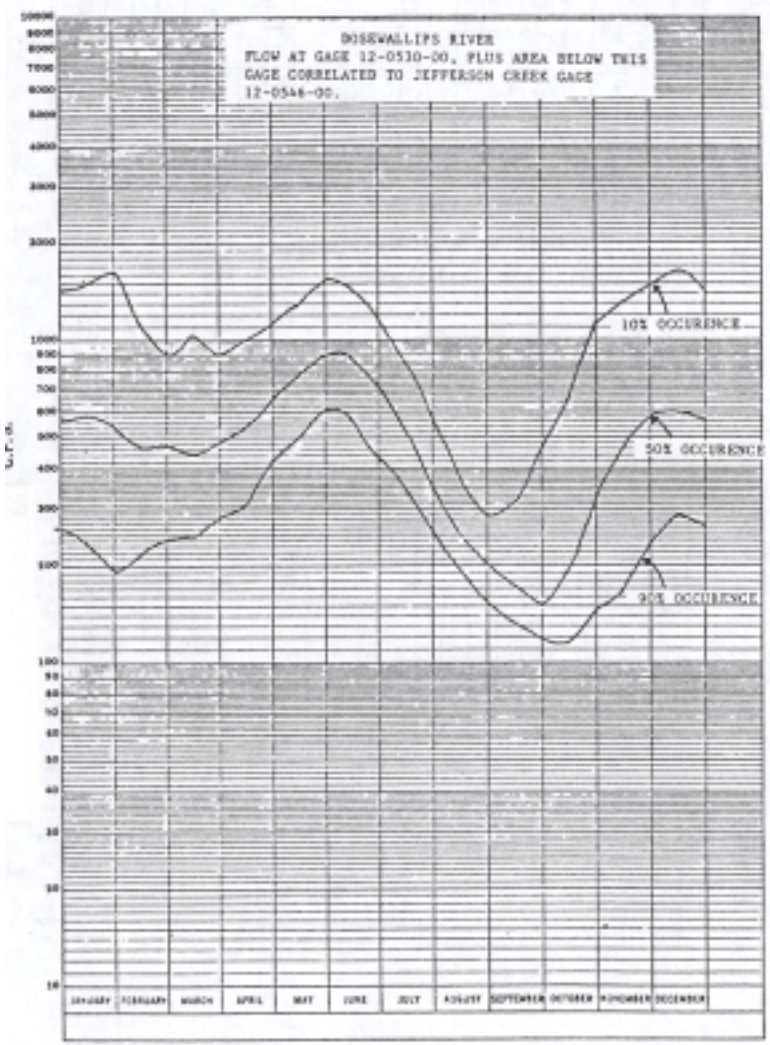
APPENDIX B
HYDROGRAPHS OF WRIA #16 STREAMS

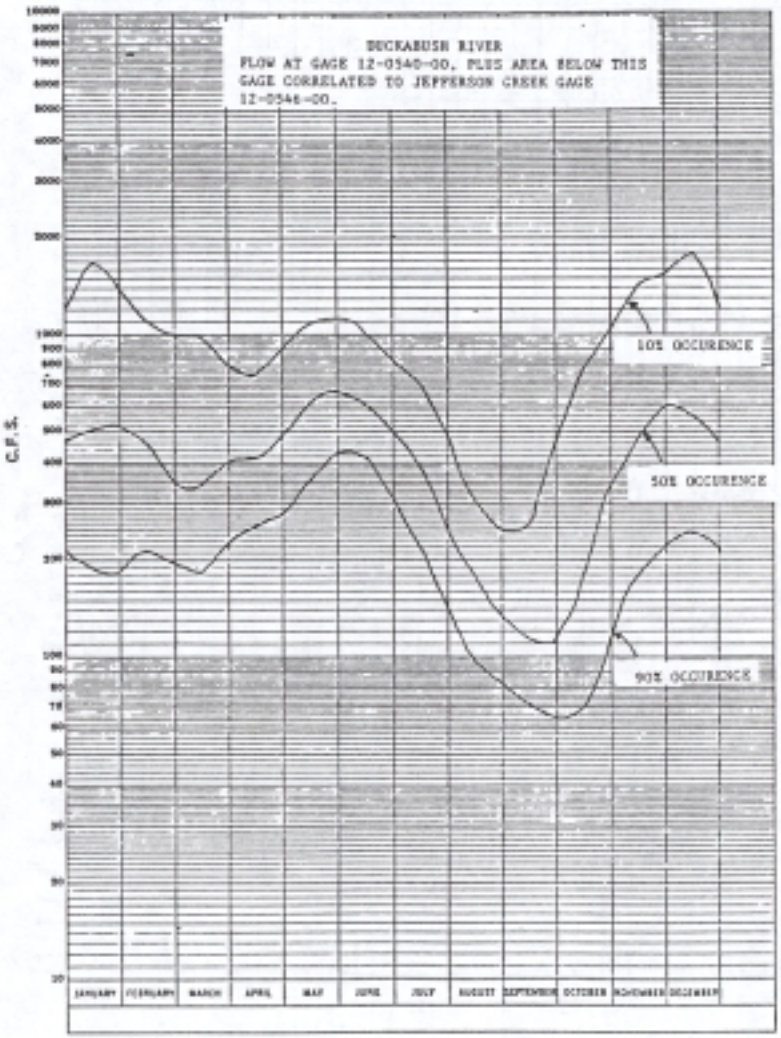
Note: Hydrographs in this appendix should be interpreted as follows:

Vertical axis: discharge in cubic feet per second (cfs)
Horizontal axis: time of year

- 10% occurrence flow: flow that is met or exceeded ten percent of the time during the period depicted
- 50% occurrence flow: flow that is met or exceeded fifty percent of the time during the period depicted
- 90% occurrence flow: flow that is met or exceeded ninety percent of the time during the period depicted
- 99% occurrence flow: flow that is met or exceeded ninety percent of the time during the period depicted

These hydrographs are based in some cases upon the long-term stream gaging records of the United States Geological Service and in other cases, (as indicated in the heading) upon correlation using standard engineering techniques. A complete set of hydrographs for WRIA 16 which were derived from USGS gages is in Office Report 74-B (See bibliography).


DOSEWALLIPS RIVER
FLOW AT GAGE 12-0510-00, PLUS AREA BELOW THIS GAGE CORRELATED TO JEFFERSON CREEK GAGE 12-0546-00.
10% OCCURENCE
50% OCCURENCE
90% OCCURENCE
C.F.S.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER


DUCKABUSH RIVER
FLOW AT GAGE 12-0540-00, PLUS AREA BELOW THIS GAGE CORRELATED TO JEFFERSON CREEK GAGE 12-0546-00.
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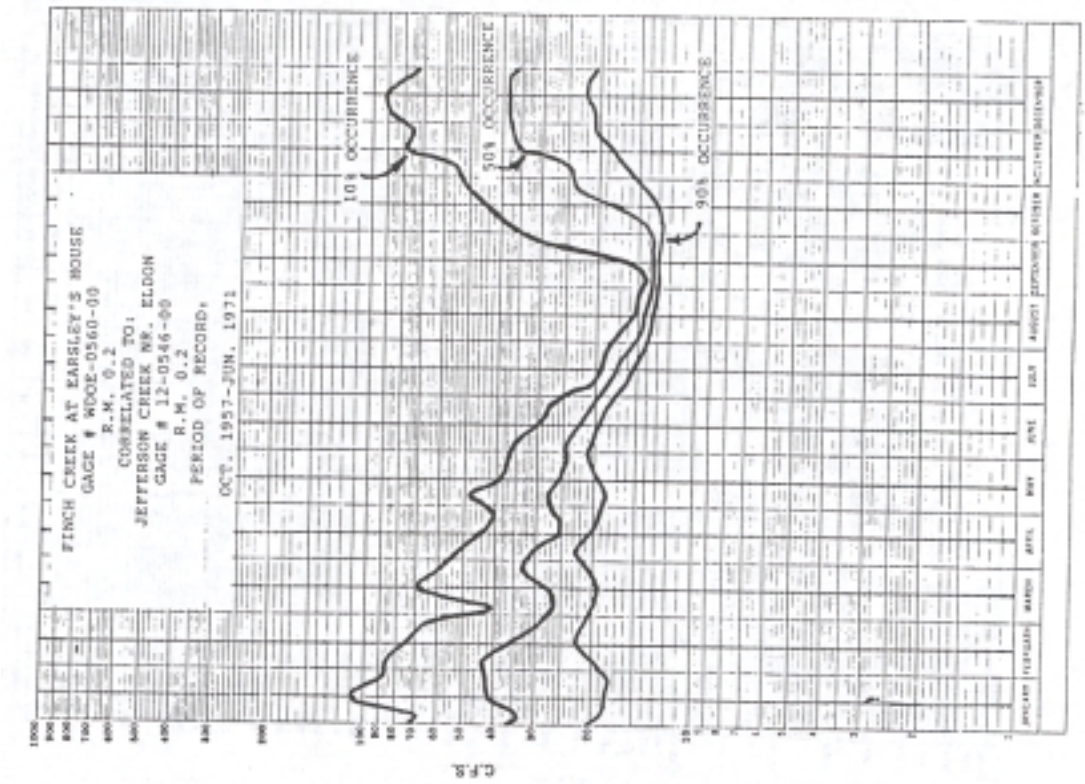
50% OCCURENCE
90% OCCURENCE
C.F.S.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER


FINCH CREEK AT EARSLEY'S HOUSE
GAGE # WOOE-0560-00
R.M. 0.2
CORRELATED TO:
JEFFERSON CREEK NR. ELDON
GAGE # 12-0546-00
R.M. 0.2
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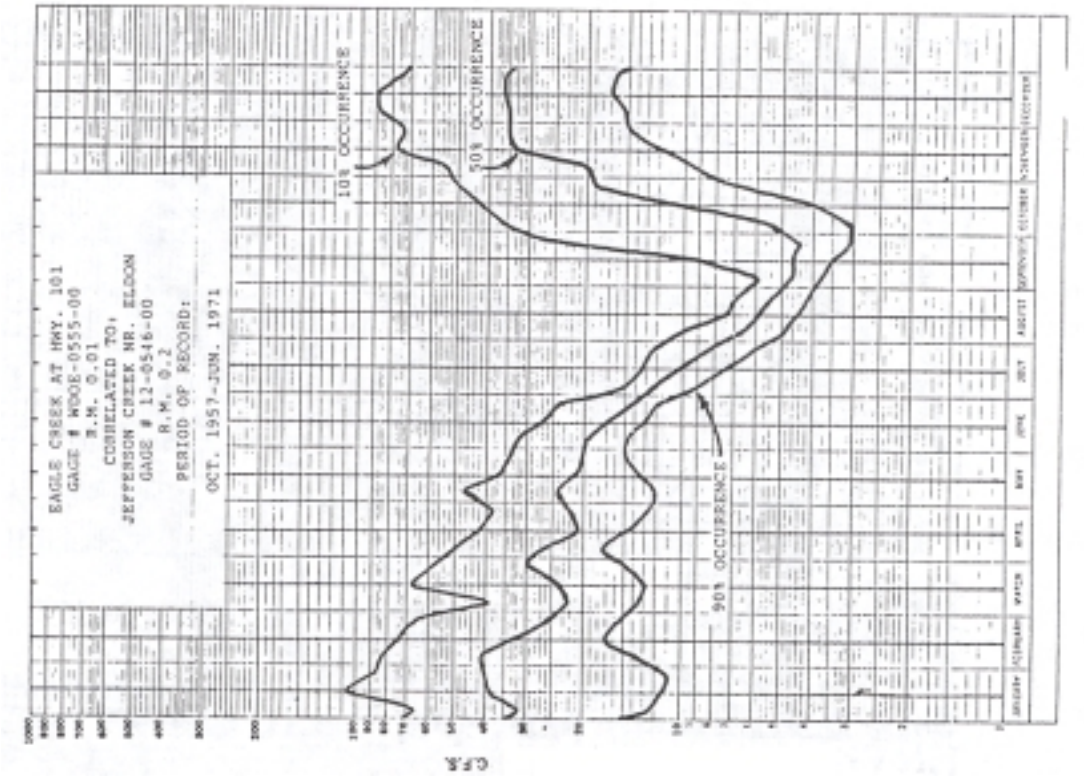
OCT. 1957-JUN. 1971
10% OCCURRENCE
50% OCCURRENCE
90% OCCURRENCE
C.F.S.


EAGLE CREEK AT HWY. 101
GAGE # WOOE-0555-00
R.M. 0.01
CORRELATED TO:
JEFFERSON CREEK NR. ELDON
GAGE # 12-0546-00
R.M. 0.2
PERIOD OF RECORD:
OCT. 1957-JUN. 1971
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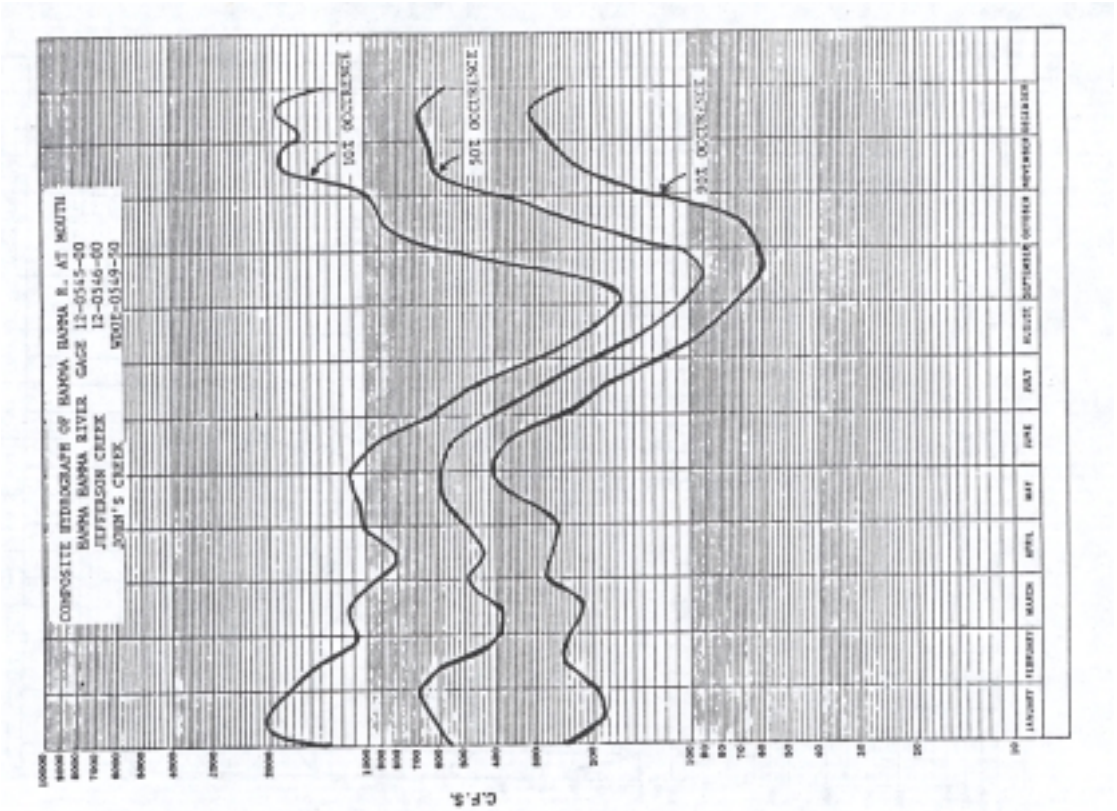
50% OCCURRENCE
90% OCCURRENCE
C.F.S.


COMPOSITE HYDROGRAPH OF RAMONA RAMONA R. AT MOUTH
RAMONA RAMONA RIVER GAGE 12-0545-50
JEFFERSON CREEK 12-0546-60
JOHN'S CREEK WDOE-0549-50
10% OCCURRENCE
50% OCCURRENCE
90% OCCURRENCE
C.F.S.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
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JULY
AUGUST
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OCTOBER
NOVEMBER
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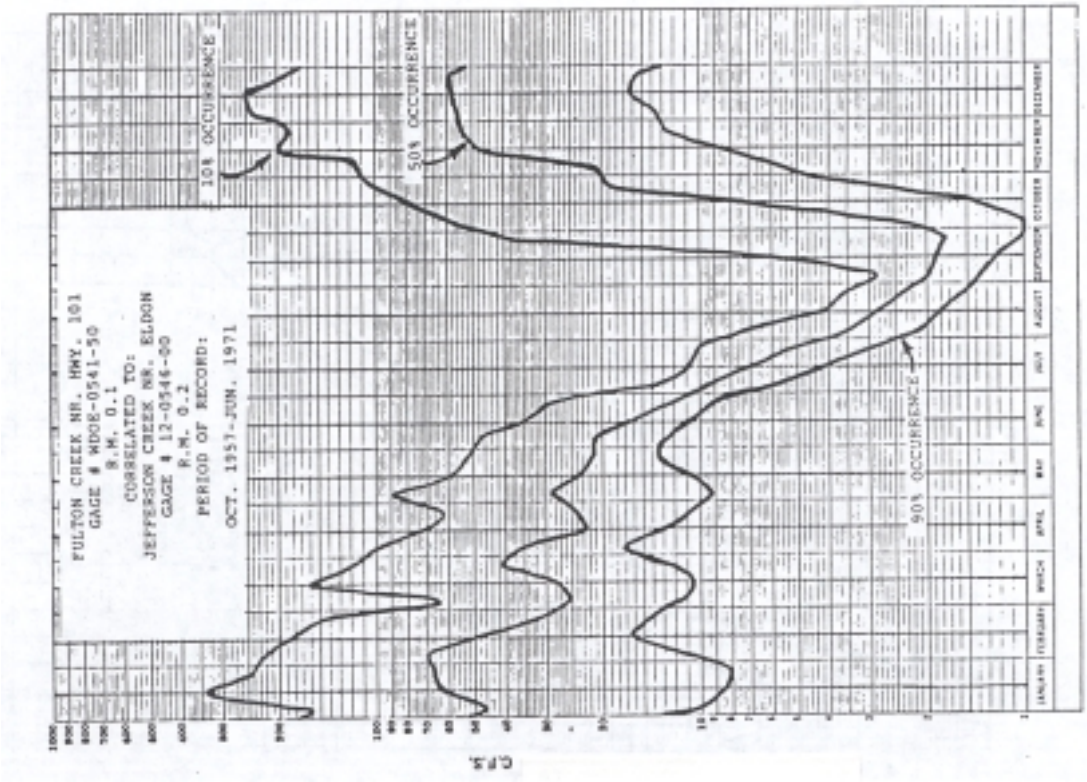
FULTON CREEK NR. HWY. 101
GAGE # WDOE-0541-50
R.M. 0.1
CORRELATED TO:
JEFFERSON CREEK NR. ELDON
GAGE # 12-0546-00
R.M. 0.2
PERIOD OF RECORD:
OCT. 1951-JUN. 1971
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50% OCCURRENCE
90% OCCURRENCE
C.F.S.
JANUARY
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AUGUST
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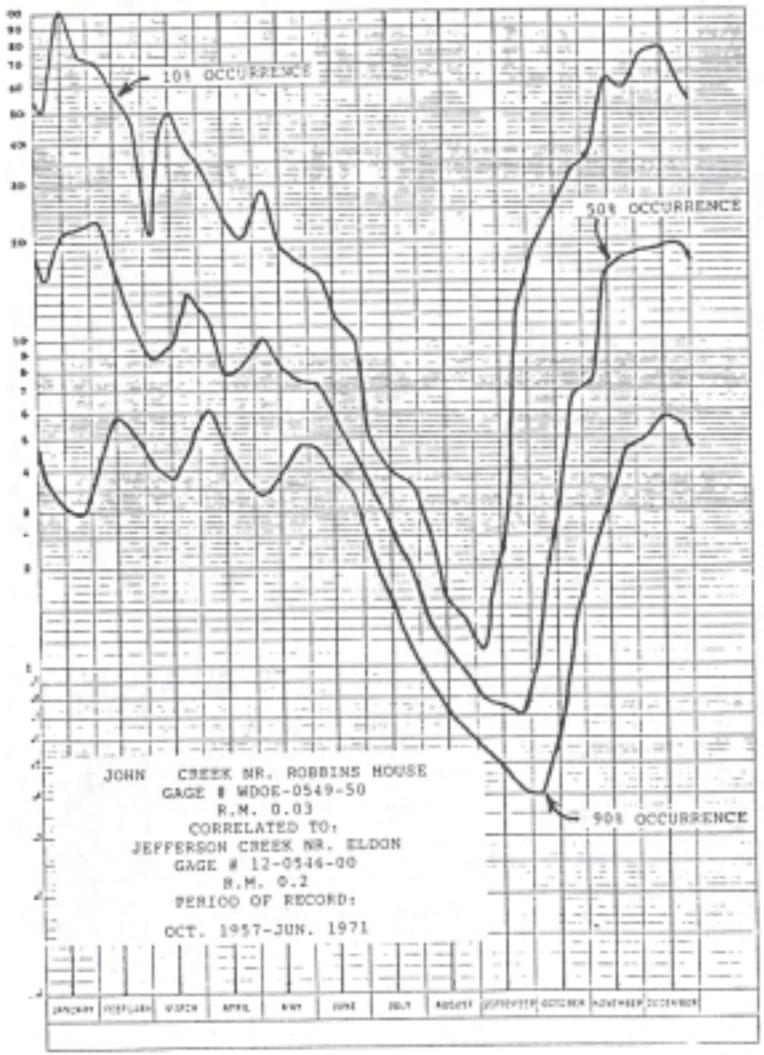
OCTOBER
NOVEMBER
DECEMBER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50% OCCURRENCE
90% OCCURRENCE
JOHN CREEK NR. ROBBINS HOUSE
GAGE # WDOE-0549-50
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GAGE # 12-0546-00
R.M. 0.2
PERIOD OF RECORD:
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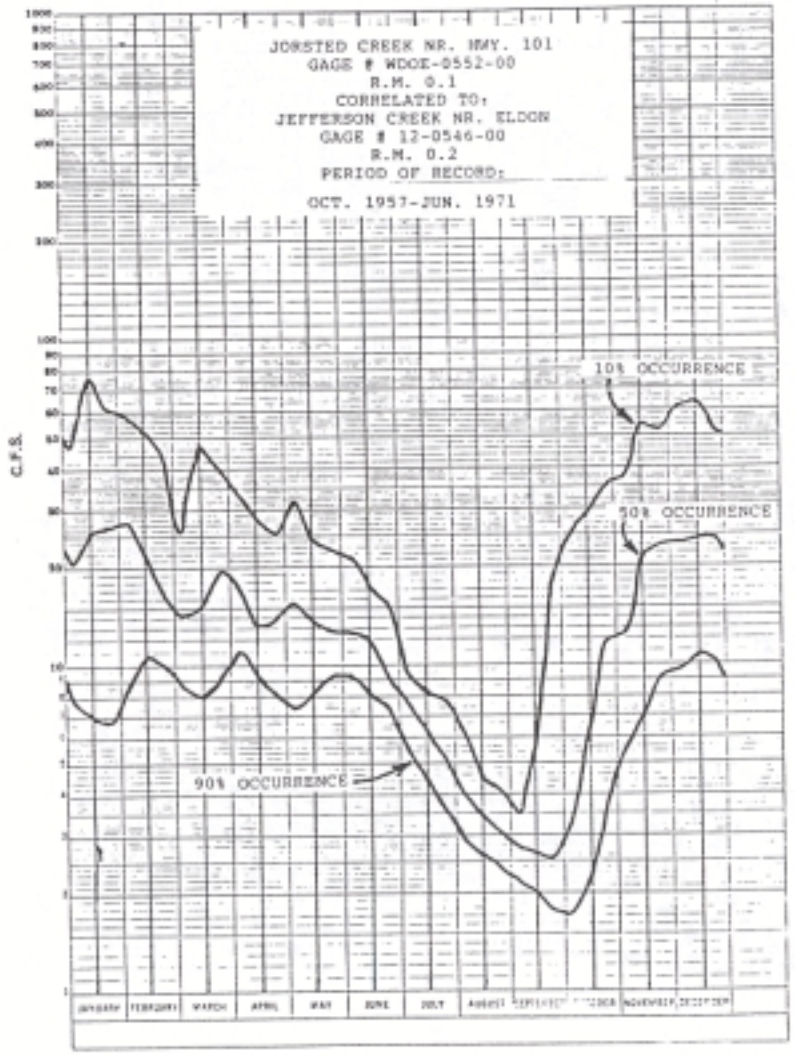
JORSTED CREEK NR. HWY. 101
GAGE # WDOE-0552-00
R.M. 0.1
CORRELATED TO:
JEFFERSON CREEK NR. ELDON
GAGE # 12-0546-00
R.M. 0.2
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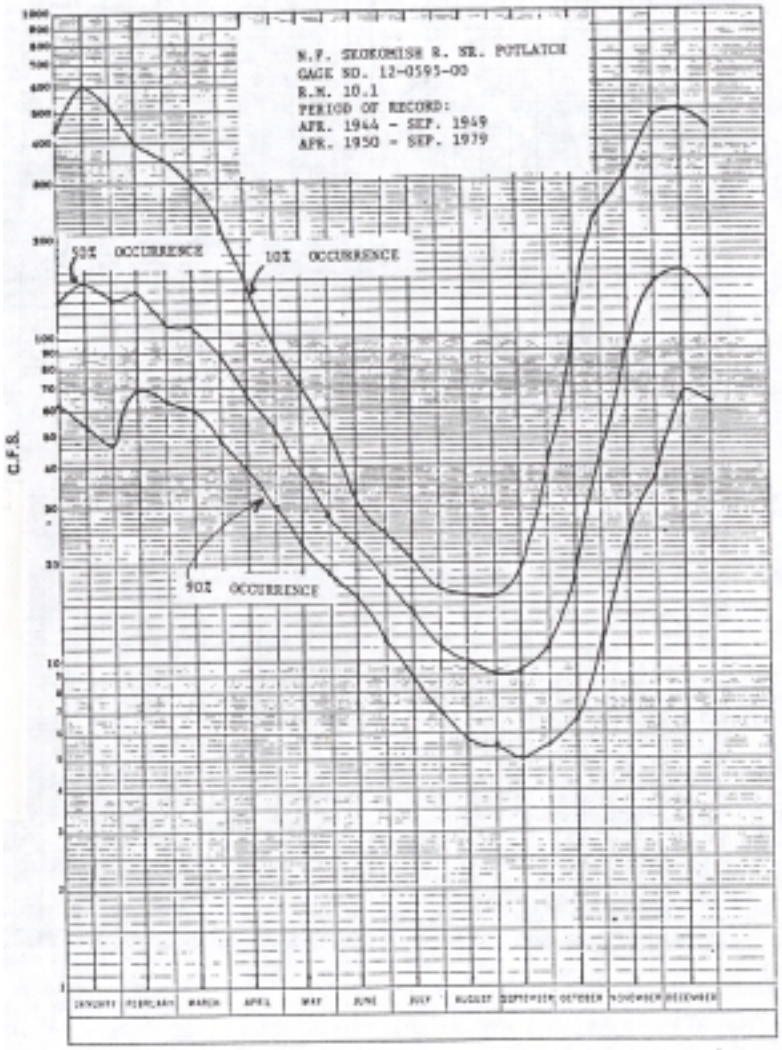
OCT. 1957-JUN. 1971
C.F.S.
10% OCCURRENCE
50% OCCURRENCE
90% OCCURRENCE


N.F. SKOKOMISH R. NR. POTLATCH
GAGE NO. 12-0595-00
R.M. 10.1
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APR. 1950 - SEP. 1979
50% OCCURRENCE
10% OCCURRENCE
90% OCCURRENCE
C.F.S.
JANUARY
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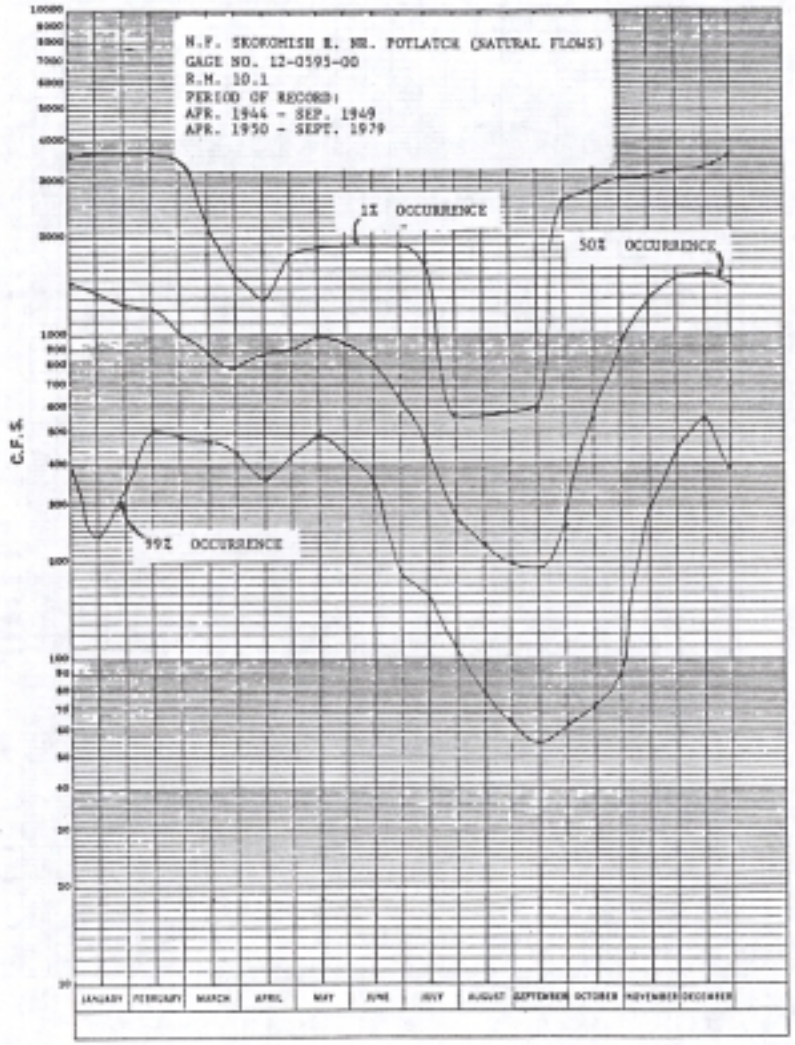
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GAGE NO. 12-0595-00
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APR. 1950 - SEPT. 1979
1% OCCURRENCE
50% OCCURRENCE
99% OCCURRENCE
C.F.S.
JANUARY
FEBRUARY
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NOVEMBER
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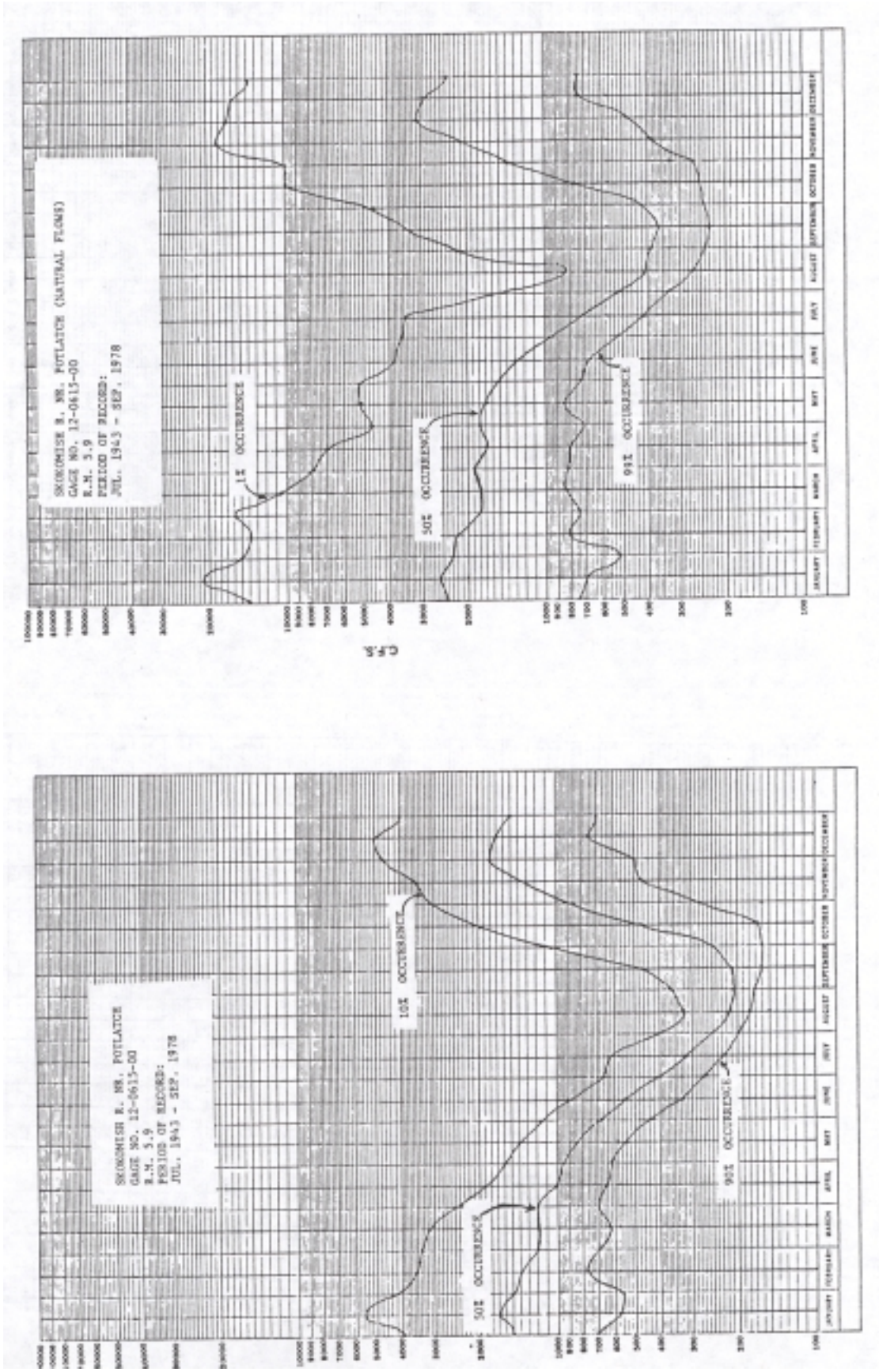
SKOKOMISH R. NR. POTLATCH (NATURAL FLOWS)
GAGE NO. 12-0615-00
R.M. 5.9
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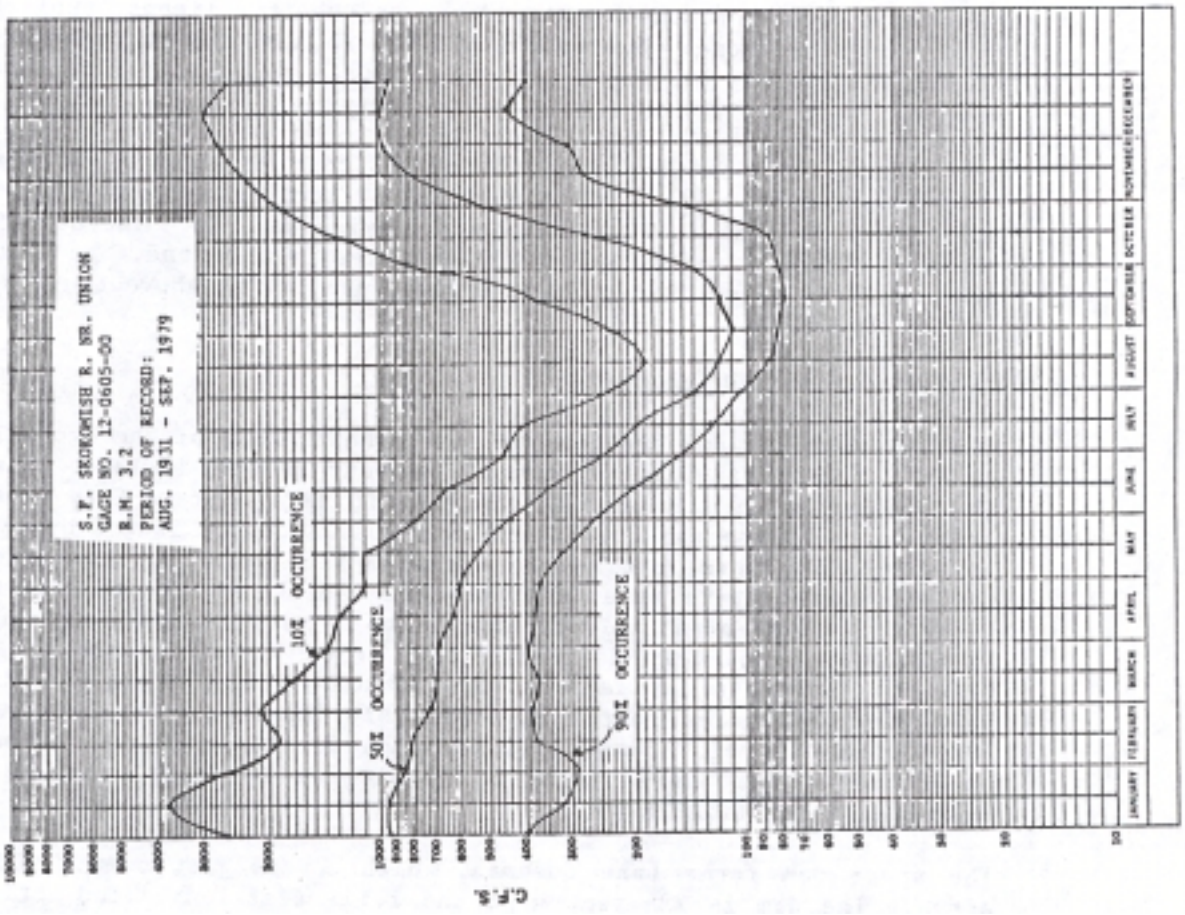
S.F. SKOKOMISH R. NR. UNION
GAGE NO. 12-0605-00
R.M. 3.2
PERIOD OF RECORD:
AUG. 1931 - SEP. 1979
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50% OCCURRENCE
90% OCCURRENCE
C.F.S.
JANUARY
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DECEMBER

APPENDIX C

Description of Hydropower (FERC*) Projects

1. Cabin Creek (FERC number 6151-000).

   The proposed Cabin Creek project is a less than five megawatt development on a tributary to the Hamma Hamma River, totally within Olympic National Forest. S.V. Hydrotech of Reston, Virginia has taken over the project from Rainsong, the original proponent. An order was issued by FERC granting an exemption from licensing of a small hydropower project. This exemption was subsequently withdrawn by FERC and the proponent was ordered to submit a license application. This was done. Subsequently, FERC requested more information, which was provided by the applicant. FERC is evaluating that information.

   The proposed project would consist of 60 foot long, six foot high diversion structure, a 7,000 foot long, 30-inch diameter pipeline, a powerhouse, and a 20,000 foot long transmission line. The quantity of water to be diverted would 45 cubic feet per second. No major problems were noted in the draft and the project is above the anadromous fish zone.

2. Cushman Plant (FERC number 460)

   The two Cushman Dams are located on the North Fork of the Skokomish River and were originally granted a 50-year license in 1924. Since the expiration of the original license in 1974, Tacoma City Light has been operating the facility with annual licenses issued by FERC. The current license requires no instream flow release; neither do the applicable state water rights. Because the lower dam diverts water to a power plant on Hood Canal, the North Fork Skokomish River is normally completely dewatered just below lower Cushman Dam, (except for some minor seepage and tributary inflow), consequently anadromous fisheries have been negatively impacted. In the late 1950s, the City of Tacoma provided funds for the construction and operation of the George Adams Fish Hatchery on Purdy Creek (a Skokomish River tributary).

   The upper dam forms Lake Cushman, which covers just over 4,000 acres. The dam is 235 feet high and 1,111 feet long. The active storage capacity of the Cushman reservoir is 453,300 acre feet. Tacoma holds a water right of 1,000 cfs for power production.

   The lower dam forms Lake Kokanee which is 70 acres and has a capacity of 8,000 acre-feet. This dam is 175 feet high and 460 feet long. Tacoma also holds a 1,000 cfs water right for power production for this development.

*Federal Energy Regulatory Commission.

Discussion between the various entities involved is needed to clarify the problems and work towards a solution regarding habitat loss, operations, and mitigation.

3. Elkhorn (FERC number 6002)

The proposed Elkhorn project is located on the Dosewallips River approximately one-half mile downstream from the boundary of Olympic National Park. Jefferson County PUD #1 is the proponent. A preliminary permit has been granted by FERC and studies are ongoing. The proponent is collecting data and intends to fit the project to the resource instead of modifying the resource to accommodate the project.

Although the project would include a six to ten foot high diversion structure and fish passage, WDG personnel feel even this would restrict anadromous fish movement up the only river on the Peninsula's east side in which anadromous fish reach Olympic National Park. A 10-foot diameter tunnel, about 6,000 feet long would carry water from the diversion to the powerhouse at river mile 12.5. Most of the specific design characteristics have not been determined pending the outcome of the various studies and evaluations.

4. Hamma Hamma River (FERC number 3178-002)

The proposed Hamma Hamma project is located at approximately river mile 2.8 on the Hamma Hamma River. Mason County PUD #1, the proponent, has filed a major license application and has completed a State Environmental Policy Act (SEPA), Environmental Impact Statement (EIS). Additionally, two scoping documents have been filed by FERC.

The revised, proposed project would consist of a 15-foot high diversion weir; a 6,000-foot long, 10-foot diameter lined tunnel and 3,000 feet of new access road.

The bypass reach would be 1,050 feet long. A reservoir of 6.8 acre-feet and maximum depth of 12 feet would be created. The bypass reach minimum flow would be 30 cfs or natural flow (the lesser of the two) and minimal and maximum machine flows are 120 and 800 cfs, respectively. General areas of concern expressed during the scoping process were: (1) need for project power, and (2) fish and wildlife protection, principally instream flow requirements for anadromous fisheries.

5. Jefferson Creek (FERC number 5901-000)

Jefferson Creek is a tributary of the Hamma Hamma River. The proposed project would be located approximately one-quarter mile downstream from Elk Lake (at river mile two). Mason County PUD #1 is the proponent of the project and has applied for a preliminary permit. Western hydro has filed an exemption application.

The proposed run-of-the-river project would consist of a 60-foot long, 15-20-foot high diversion structure; a 8,000-foot long, five-foot diameter penstock, and about four and one-half miles of transmission lines. Installed generating capacity of the facility would be 6.3 MW. The structure would be constructed with unregulated overflow in such a manner that would spill flow in excess of 185 cubic feet per second.

The proposed project is above the anadromous fish zone.

6. Jorsted Creek (FERC number 7673-000)

Jorsted Creek is an independent drainage flowing into Hood Canal approximately two miles south of the town of Eldon. Water Power, Inc. (WP, Inc.) is the proponent and has been granted a preliminary permit by FERC. The proponent has indicated the intent to surrender the permit.

The proposed project would consist of a ten-foot high diversion dam; a 6,250-foot long, 30-inch diameter penstock; a ten-foot diameter by 40-foot high surge tank; a 5,700-foot long penstock, 24 inches in diameter; a switch yard, and a three-tenths of a mile long transmission line. Capacity of the generator would be 590 KW. No data are currently available from the project proponent on diversion flows.

This project would be located within the anadromous fish zone and instream flow requirements will have to be addressed.

7. Lena Creek (FERC number 5549-000)

Lena Creek is a tributary of the Hamma Hamma River flowing out of Olympic National Park. Hydro Resource Company is the proponent and has applied for a preliminary permit.

The proposed project would consist of a diversion structure (of as yet unspecified dimensions); a 5,500-foot long, 36-inch diameter "diversion conduit"; a 1,500-foot long, 36-inch diameter penstock; a powerhouse; and a 12,000-foot long transmission line. Total rated capacity of the generator would be 4.0 MW. The proponent proposes a bypass flow of five cfs.

This project would be located above the anadromous fish zone.

Project evidently is in competition with project 6287-000).

8. Lena Creek (FERC number 6287-000)

The proposed Lena Creek project is a less than five megawatt development on a tributary of the Hamma Hamma River. Rainsong Company is the proponent and has filed a minor license application with FERC (for a project of 5 MW or less). The stream is subject to a minimum flow of five cfs.

The proposed project would consist of a diversion approximately 6 foot high and 40 feet wide; a 3,000-foot long, 42-inch diameter pipeline; a 3,500-foot long, 42-inch buried steel pipe penstock; a 1,296 square foot powerhouse; and 32,280 feet of underground transmission line along the Hamma Hamma River road. The impulse turbine would produce 5.0 MW. No diversion flow data are currently available from the proponent.

The project is located above the anadromous fish zone. Seven thousand feet of access road would be constructed for the facility and about six miles of underground transmission lines are proposed.

9. Lilliwaup Falls (FERC number 3482-001)

The existing Lilliwaup Falls project is privately-owned and is located on Lilliwaup Creek, a stream flowing directly into Hood Canal. A FERC order has been issued exempting the project from licensing because it is five megawatts or less. A water right has been issued for a maximum of 70 cfs.

The project is located at Lilliwaup Falls with the discharge being into the plunge pool at the base of the falls, thus minimizing disturbance to anadromous fish.

10. Rocky Brook Falls (FERC number 3783)

The Rocky Brook project is located on a tributary of the Dosewallips River. Rocky Brook Electric is the proponent. FERC has granted a minor exemption and the project is under construction.

The completed project would divert water around Rocky Brook Falls. Rocky Brook supports coho and chum salmon, and possibly pinks, but these fish are restricted to an area below the powerhouse. The project has minimum flow requirements of five cfs and a water right permit has been issued. No current diversion flow data are available from the proponent.

APPENDIX D

Acronyms

BPA - Bonneville Power Administration

CFS - cubic feet per second,

DSHS - Department of Social and Health Services

EIS - Environmental Impact Statement

FERC - Federal Energy Regulatory Commission

GPM - gallons per minute

IFIM - Instream Flow Incremental Method

IRPP - Instream Resources Protection Program

MW – megawatt

NMFS - National Marine Fisheries Service

PNPTC - Point-No-Point Treaty Council

PUD - Public Utility District

RM - River Mile

USFWS - U.S. Fish and Wildlife Service

USGS - U.S. Geological Survey

WDF - Washington Department of Fisheries

WDG - Washington Department of Game

WDOE - Washington Department of Ecology

WRIA - Water Resource Inventory Area

WUCC - Water Utility Coordinating Committee

WWIRPP - Western Washington Instream Resources Protection Program