

# Bureau of Fisheries Stream Habitat Surveys

## Cowlitz River Basin

**Summary Report**  
**1934 - 1942**



DOE/BP-02246-4

January 1990

This Document should be cited as follows:

*McIntosh, Bruce, Sharon Clarke, James Sedell, "Bureau of Fisheries Stream Habitat Surveys", Project No. 1989-10400, 407 electronic pages, (BPA Report DOE/BP-02246-4)*

Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views in this report are the author's and do not necessarily represent the views of BPA.

**SUMMARY REPORT FOR BUREAU OF FISHERIES STREAM  
HABITAT SURVEYS**

**COWLITZ RIVER BASIN, 1934-1942**

Prepared by:

Bruce A. McIntosh  
Sharon E. Clark  
James R. Sedell

Pacific Northwest Research Station  
USDA-Forest Service  
Oregon State University  
Corvallis, OR 9733 1

Prepared for:

U. S. Department of Energy  
Bonneville Power Administration  
Environment, Fish and Wildlife  
P. O. Box 3621  
Portland, OR 97208-3621

Project No. 89- 104  
Contract No. DE-AI79-89BP02446

TABLE OF CONTENTS

	<u>Page</u>
I. Introduction	i
II. Methods	iii
III. Literature Cited	ix
IV. Cowlitz River Basin	1
Ostrander Creek	1
S. Fk Ostrander Creek	6
Arkansas Creek	10
N. Fk Arkansas Creek	14
S. Fk Arkansas Creek	19
Monahan Creek	26
Toutle River	30
Outlet Creek	36
Silver Lake	40
S. Fk Toutle River	41
Bear Creek	50
Trouble Creek	53
N. Fk Toutle River	N/A
Green River	56
Devil's Creek	65
Cascade Creek	69
Elk Creek	72
Schultz Creek	75
Miners Creek	78
Alder Creek	81
Hoffstadt Creek	85
Bear Creek	91
Jackson Creek	95
Elk Creek	99
Mirada Creek	103
Castle Creek	107
Coldwater Creek	112
S. Fk Coldwater Creek	116
Studebaker Creek	120
Spirit Lake	124
Olequah Creek	126
Stillwater Creek	132
Becker Creek	136
La Camas Creek	138
Bear Creek	143
Salmon Creek	144
Cedar Creek	149
Winston Creek	150
Klickitat Creek	151
Tilton River	155
Cinnabar Creek	161
Bear Canyon Creek	162
Alder Creek	163

## TABLE OF CONTENTS

	<u>Page</u>
Tilton River (cont) .....	
N. Fk Tilton River .....	164
Jefferson Creek .....	167
Bromo Creek .....	168
Wallanding and Tumble Creeks .....	169
Otter Creek .....	174
Rockies Creek .....	175
Jesse Creek .....	176
Highland Creek .....	177
Davis Creek .....	178
Connelly Creek .....	179
Mines Creek .....	180
S. Fk and E. Fk Tilton River .....	181
Nineteen Creek .....	183
W. Fk Tilton River .....	184
Coon Creek .....	186
Snow Creek .....	187
Sulphur Creek .....	188
Shelton Creek .....	192
Landers Creek .....	193
Staffen Creek .....	198
Uden Creek .....	202
Frost Creek .....	204
Rainy Creek .....	209
Lunch Creek .....	214
N. Fk Rainy Creek .....	216
Goat Creek .....	217
Tumwater Creek .....	218
Cispus River .....	219
Copper Canyon Creek .....	229
Quartz Creek .....	230
Crystal Creek .....	234
Woods Creek .....	235
Iron Creek .....	236
Nash Creek .....	240
Falls Creek .....	241
Greenhorn Creek .....	242
Stump Creek .....	246
Dry Creek .....	247
Yellowjacket Creek .....	248
High Bridge Creek .....	253
Lambert Creek .....	254
Burley Creek .....	255
McCoy Creek .....	256
Kidd Creek .....	259
Camp Creek .....	260
Sunrise Creek .....	261
Pinto Creek .....	262
Badger Creek .....	263
Camp Creek .....	264

## TABLE OF CONTENTS

	<u>Page</u>
Cispus River (cont) .....	265
N. Fk Cispus River .....	271
Tyler Creek .....	272
Polk Creek .....	273
Irish Creek .....	274
Swede Creek .....	275
Midget Creek .....	276
Jackpot Creek .....	277
Siwash Creek .....	278
Yozoo Creek .....	279
Timonium Creek .....	280
Horse Creek .....	281
Smoothrock Creek .....	282
Blue Lake Creek .....	283
Juniper Creek .....	284
East Canyon Creek .....	288
Squaw Creek .....	289
Adams Creek .....	293
Orr Creek .....	294
Cat Creek .....	295
Mouse Creek .....	296
Pimlico Creek .....	297
Muddy Creek .....	298
Midway Creek .....	299
Chambers Creek .....	300
Elk Creek .....	301
Walupt Lake Creek .....	302
Goat Creek .....	303
Schooley Creek .....	304
Siler Creek .....	309
Squaw Creek .....	310
Kiona Creek .....	311
Mill Creek .....	312
Silver Creek .....	318
Purcell Slough and Hopkins Creek .....	319
Davis Creek .....	320
Cunningham Creek .....	321
Cougar Creek .....	325
Kilborn Creek .....	330
Garrett Creek .....	332
Burton Creek .....	337
E. Fk Burton Creek .....	341
Willame Creek .....	342
Dry Creek .....	343
Smith Creek .....	344
Johnson Creek .....	350
Hall Creek.....-	355
Skate Creek .....	360
Johnson Creek .....	361
Butter Creek .....	

TABLE OF **CONTENTS**

	<u>Page</u>
Lake Creek .....	366
Coal Creek .....	371
Purcell Creek .....	375
Clear Fork.....:~::~:	376
Darn Creek.....:~::~:	381
Cartright Creek.....	382
Ohanapecosh River .....	383
Summit Creek.....:~::~:	389
Carlton Creek.....:~::~:	390

## INTRODUCTION

This document contains summary reports of stream, habitat surveys, conducted in the Cowlitz River basin, by the Bureau of Fisheries (BOF, now National Marine Fisheries Service) from 1938-1942. These surveys were part of a larger project to survey streams in the Columbia River basin that provided, or had provided, spawning and rearing habitat for salmon and steelhead (Rich, 1948). The purpose of the survey was, as described by Rich, "to determine the present condition of the various tributaries with respect to their availability and usefulness for the migration, breeding, and rearing of migratory fishes".

Current estimates of the loss of anadromous fish habitat in the Columbia River Basin are based on a series of reports published from 1949-1952 by the U.S. Fish and Wildlife Service. The reports were brief, qualitative accounts of over 5000 miles of stream surveys conducted by the BOF from 1934-1946 (Bryant, 1949; Bryant and Parkhurst, 1950; Parkhurst, 1950a-c; Parkhurst et al., 1950). Despite their brevity, these BOF reports have formed the basis for estimating fish habitat losses and conditions in the Columbia River Basin (Fulton, 1968, 1970; Thompson, 1976; NPPC, 1986).

Recently, the field notebooks from the BOF surveys were discovered. The data is now archived and stored in the Forest Science DataBank at Oregon State University (Stafford et al., 1984; 1988). These records are the earliest and most comprehensive documentation available of the condition and extent of anadromous fish habitat before hydropower development in the Columbia River Basin. They provide the baseline data for quantifying changes and setting a benchmark for future restoration of anadromous fish habitat throughout the Basin. The summaries contained in this book are exact replicates of the originals. Due to discrepancies between the field data and the summaries, the database should be used to assess pool and substrate conditions. This data is available from the Bonneville Power Administration.

The Bureau of Fisheries survey is unique because it is the only long-term data set that quantifies fish habitat in a manner that is replicable over time; no other similar work is known to exist. Other surveys, such as Thompson and Haas (1960), inventoried extensive areas in a manner that was mostly qualitative, subjectively estimating physical characteristics like bank cover and stream shading. Spawning, rearing, and resting habitat were not systematically quantified to allow comparisons over time.

Knowledge of the past and present quantity and quality of anadromous fish habitat in the Columbia River Basin is essential to any effort to enhance fish populations. Habitat condition is a key element in monitoring and evaluating progress towards the doubling goal. Integration of this information into the Columbia River Fish and Wildlife Plan can provide the baseline information to greatly enhance understanding of past, present, and future habitat conditions in the basin to provide for improved management decisions.

## METHODS

This description of the survey is taken from Rich (1948). In cases where his meaning was unclear, we have clarified his descriptions where possible.

Most of the field work for the survey was accomplished by teams of two men. Each stream was examined on foot if warranted by its existing or potential value in a program of fishery maintenance. At times, horses and boats were used to conduct the surveys. It was customary to start at the mouth and work up to a point at which the stream ceased to be important. The survey was commonly terminated if the stream became too small to be of value, at total barriers, such as waterfalls, or wherever other conditions were such that the stream was of no present value and there was no reasonable hope of improvement. Beyond such points a more cursory inspection was frequently made although not always.

As the stream was traversed on foot, field observations were recorded on forms provided for the purpose--the "Observation Blank". Records were made at approximately 100-yard intervals. Distances were estimated by counting steps when conditions were favorable for pacing and, otherwise, by estimating short distances by eye. When possible, the sums of such estimated distances have been checked against maps, particularly when surveys were made by boat, and any substantial discrepancy has been noted on the survey record. At the upper end of each 100-yard section a record was made on the Observation Blank of such things as stream size, pools, character of the bottom, fish observed, etc. The location of barriers to upstream migration of fish, such as log jams, falls or dams was also recorded and an estimate made of the degree of obstruction.

Stations were designated, usually at intervals of several miles, at important landmarks or where stream conditions exhibited a marked change. At these stations special data were obtained and recorded on a "Station Blank" that included measurements of width, depth, flow and temperature. Record was also made of general conditions observed between stations that were not recorded on the observation blank. These included such items as the nature of the marginal vegetation (riparian), evidences of erosion and of fluctuations in water level, gradient, character of the valley, type and amount of cultivation and of forest utilization, source and extent of pollution, number and species of fish observed and other pertinent data.

Width was measured by a tape. Average depth was determined from a series of 10 or more actual measurements by a rule (for small streams) or a sounding line. Temperatures were determined by calibrated thermometers shaded from the direct rays of the sun and, immersed at least one inch. Flow, in cubic feet per second, was estimated by the usual method: average width times average depth

times **average** speed of water in feet per second times a constant correction for drag. The speed was determined by floats traversing a measured distance. The product of the first three factors was corrected for drag by multiplying by 0.8 if the bottom was rough and irregular, and by 0.9 if the bottom was fairly smooth. When available, stream flow records were taken from the Water Supply Papers of the U.S. Geological Survey.

A special blank for obstructions was provided on which to record data relative to obstructions, both natural and artificial. When dams were encountered, measurements were taken or obtained from the operators of the height, length of crest, spill, etc. In the case of power dams the type and speed of the power units was recorded, because these are important factors in the safe passage of downstream migrants. Especial attention was paid to the condition and adequacy of fish ladders and other fish protective devices installed at dams.

On a Diversions blank, data were recorded that included the type of each diversion, its location, description of the headworks, amount of water diverted, character of screens and other fish protective devices if present, etc.

For each stream surveyed, the following data was collected:

1. General

- a. name of river system
- b. name of stream
- c. date of survey and names of surveyors
- d. stream source
- e. general direction of flow
- f. total length
- g. length surveyed

2. Station Data

- a. station designation
- b. landmarks
- c. map locations
- d. distance above previous station
- e. distance above mouth of stream
- f. width
- g. average depth

3. Character of Watershed

- a. the general character of the watershed (mountainous, flat, etc.)
- b. character of the banks (slope, composition, etc)
- c. nature and composition of marginal vegetation
- d. extent of erosion (if any) of banks or watershed

4. Gradient

- a. station elevations
- b. distance between stations
- c. difference in elevation
- d. average slope in feet per mile
- e. source of data (when available, topographic or plan and profile maps were used to determine the gradients. In other cases the observers estimated the gradient.)

5. Stream Flow and Fluctuations

- a. location
- b. date
- c. observed flow
- d. fluctuation in water level as given by Water Supply Papers, the records of operators of dams, reports of local residents or as indicated by debris, erosion, marginal vegetation, etc.
- e. time and variation in seasonal runoff
- f. causes of variation
- g. effects of fluctuations on migratory fish (if published papers are used the reference is given).

6. Temperature

- a. station
- b. location
- c. date and hour
- d. air temperature
- e. water temperature
- f. weather conditions
- g. any observed influence of temperature on fish

7. Pools and Riffles

- a. pools were classified six different ways based on area and depth, the classes were:

S1: > 50-yd<sup>2</sup> and > 6 feet deep  
S2: 25- to 50-yd<sup>2</sup> and 3-6 feet deep  
S3: < 25-yd<sup>2</sup> and < 3 feet deep  
S4: 25- to 50-yd<sup>2</sup> and > 6 feet deep  
S5: 25- to 50-yd<sup>2</sup> and < 3 feet deep  
S6: small pools in cascades (pocket pools)

- b. riffles were classified as "Good", "Fair", and "Poor" on the basis of the observer's judgement as to the relative value for natural spawning purposes. Characteristics on which this classification was based were size, gradient, size of substrate, etc. To date, we have found this data to be of no use, as it is not replicable and highly qualitative.

8. Character of Bottom

In tables, station totals are given for:

- a. distance between stations
- b. total area of bottom
- c. area and percentage of bottom for substrate classes
- d. substrate classes were:

Large Rubble (LR) = > 6 inches  
Medium Rubble (MR) = 3 to 6 inches  
Small Rubble (SR) = 1/4 to 3 inches  
Mud and Sand (MS) = < 1/4 inches

9. Suitable Spawning Area Available

This is defined as that part of the medium and small rubble that possesses the water conditions and other characteristics that are necessary if the area is to be used for spawning purposes. The station totals are given for:

- a. distance between stations
- b. total area of bottom
- c. area and percentage of suitable spawning substrate available
- d. estimate of the total of suitable spawning area available at low water
- e. estimate of total available at high water only

10. Suitable spawning area not available

Station totals were given for:

- a. distance between stations
- b. total area of bottom
- c. area and percentage of suitable spawning substrate not available
- d. stages of water when the area is inaccessible
- e. reason for unavailability

11. Obstructions

The data recorded on the "obstructions" field form were recorded.

12. Diversions

The data recorded on the "diversions" field form were recorded.

13. Pollution

- a. portion of the stream polluted
- b. type of pollution
- c. source of pollution
- d. effect on fish
- e. recommendations

14. Salmon and Steelhead

The station. totals were given for:

- a. distance between stations
- b. date of each observation
- c. visibility at time of observation
- d. number of fish counted alive and dead
- e. number of redds counted that were occupied and unoccupied
- f. estimate of total number of fish present
- g. data on runs secured from local residents
- h. summary estimate of present populations and stream capacity for each species of fish (stream capacities are based on the observation that approximately 20 square yards of suitable spawning substrate is required for the average chinook salmon redd, allowing for the necessary spacing between redds).
- i. time of appearance for runs and approximate spawning periods
- j. information on juvenile fish

15. Fish Other Than Salmon and Steelhead

- a. species
- b. estimates of abundance
- c. observations based on the ecological relations of these fish to the salmon and steelhead
- d. extent of sport fishing

16. Tributaries

All direct tributaries are listed in upstream order by name. The location and size of each is given and any available information on **its** value as a fish stream.

17. General Remarks

Summaries and miscellaneous field observations not appearing in the other sections are given and the opinions of the surveyors as to the potential development of the fishery resources in the stream in question.

## LITERATURE CITED

- Bryant, F.G. 1949. A survey of the Columbia River and its tributaries with special reference to its fishery resources, no. 2, Washington streams from the mouth of the Columbia River to and including the Klickitat River (Area I). U.S. Fish and Wildlife Service, Special Scientific Report No. 62. 110 pp.
- Bryant, F.G. and Z.E. Parkhurst. 1950. Survey of the Columbia River and its tributaries. No. 4. Area III, Washington streams from the Klickitat and Snake Rivers to Grande Coulee Dam, with notes on the Columbia and its tributaries above Grande Coulee Dam. U.S. Fish and Wildlife Service. Special Scientific Reports on Fisheries No. 37. 108 pp.
- Craig, J.A., and R.L. Hacker. 1940. The history and development of the fisheries of the Columbia River. Bulletin of the Bureau of Fisheries, Vol. XLIX(32).
- Fulton, L.A. 1968. Spawning areas and abundance of chinook salmon (Oncorhynchus tshawytscha) in the Columbia River Basin--past and present. U.S. Fish and Wildlife Service Special Scientific Report: Fisheries, No. 571. 26 pp.
- Fulton, L.A. 1970. Spawning areas and abundance of steelhead trout and coho, sockeye, and chum salmon in the Columbia River Basin--past and present. National Oceanic and Atmospheric Administration Special Scientific Report: Fisheries, No. 618. 37 pp.
- Northwest Power Planning Council. 1986. Council staff compilation of information on salmon and steelhead losses in the Columbia River Basin. March 1986, Portland, OR. 252 pp.
- Parkhurst, Z.E. 1950a. Survey of the Columbia River and its tributaries, Part 6, Area V. Snake River from the mouth through the Grande Ronde River. U.S. Fish and Wildlife Service. Special Scientific Report, Fisheries No. 39. 58 pp.
- Parkhurst, Z.E. 1950b. Survey of the Columbia River and its tributaries, Part 7, Area VI. Snake River from above the Grande Ronde River through the Payette River. U.S. Fish and Wildlife Service. Special Scientific Report, Fisheries No. 40. 95 pp.
- Parkhurst, Z.E. 1950c. Survey of the Columbia River and its tributaries, Part 8, Area VIII. Snake River above Payette River to upper Salmon Falls. U.S. Fish and Wildlife Service. Special Scientific Report, Fisheries No. 57. 19 pp.

- Parkhurst, Z.E., F.G. Bryant, and R.S. Nelson. 1950. Survey of the Columbia River and its tributaries, Part 3. U.S. Fish and Wildlife Service. Special Scientific Report, Fisheries No. 36. 103 pp.
- Rich, W.H. 1948. A survey of the Columbia River and its tributaries with special reference to the management of its fishery resources. U.S. Fish and Wildlife Service. Special Scientific Report No. 51. 25 pp.
- Stafford, S.G., P.B. Alaback, G.J. Koerper, and M.W. Klopsch. 1984. Creation of a forest science data bank. Journal of Forestry 82(7):432-433.
- Stafford, S.G., G. Spycher, and M.W. Klopsch. 1988. Evolution of the forest science data bank. Journal of Forestry 86(9) :50-51.
- Thompson, R.N., and J.B. Haas. 1960. Environmental survey pertaining to salmon and steelhead in certain rivers of eastern Oregon and the Willamette river and its tributaries. Part I. Survey reports of eastern Oregon streams. Fish Commission of Oregon, Research Division, Clackamas, Oregon. 432 pp.
- Thompson, K. 1976. Columbia Basin fisheries; past, present, and future. Columbia River Fisheries Project Report. Pacific Northwest Regional Commission. 41 pp.

**Ostrander Creek**

River System: Cowlitz River  
Stream Surveyed: Ostrander Creek

Date of Survey: 10/31 - 11/1-2/36

Source: Hills south of Silver Lake, Cowlitz County Washington.  
Discharges into Cowlitz River at Ostrander, Washington.

Direction of Flow: Southwest

Total Length: 10 miles, 7.2 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---		---		S11,T8N,R2W	12'	3.5"
B Hwy br abv S Fk		1.2		1.2	S12,T8N,R2W	16'	9.0"
C RR br, 3 mi post		3.4		4.6	S32,T9N,R1W	17'	8.5"
D 1,790 yds above Frye Place		2.6		7.2	S28,T9N,R1W	6'	4.3"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0008	0.00
B	17080005	0008	0.94
C	17080005	0008	2.98
D*	17080005	0008	2.98

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area ( $\text{yd}^2$ )		L.R.		M.R.		S.R.		M&S	
		%		%		%		%		%
A-B		8.0		11.0		37.0		45.0		
B-C		66.0		18.0		11.0		5.0		
C-D		32.0		23.0		33.0		12.0		
Total		35.3		52.0		81.0		20.7		

Classification of stream based on amount of usable spawning rubble  
and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
A-B	2,100	6,595		47.0	
B-C	5,915	9,200		29.0	
C-D	4,680	10,395		56.5	
Total	12,695	26,190		44.2	

Spawning Area Unavailable and Unusable:

Cause of Unavailability: At high water, 21 beaver dams and 10 log jams believed barriers at low water and therefore cutting off most of spawning area to fall run fish.

Character of Watershed:

	A-B	B-C	C-D
Mountainous	X	X	X

Hilly

Rolling

Swampy

	A-B	B-C	C-D
Wooded	X	X	X

Open

	A-B	B-C	C-D
Cultivated	1%	1%	1%

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks

b) Watershed

## Diversions:

Diversion 1: 685 paces above Sta. B, diverts small amount of water to farm house.

## Artificial Obstructions:

1. 685 paces above Sta. B, diversion dam 6' high.
2. 21 beaver dams (see card 8A).
3. 10 log jams (see card 8A).

Note: The dam is located at the top of a cascade and forms a barrier at very low water. It is made of rock and is of a rather temporary nature. Flume is so located as to not need a dam at higher water. Beaver dams impassable at low water and are located as follows: 343,400 and 660 paces above Sta. A; 3,510, 4,360, and 4,420 above Sta. B; 4,100 paces above Sta. C. Other beaver dams are located as follows: 4,175, 4,455, 4,470, 4,980, 5,050, 5,090, 5,117, 5,160 paces above Sta. B; 1,190, 2,370, 3,735 (2), 3,790, 3,800, 3,960, and 4,045 paces above Sta. C.

Log jams that possibly are barriers are located at : 434 paces above Sta. A; 1,410, 3,940, 4,005, 4,435 and 5,060 paces above Sta. B; 640, 2,470, 2,580 and 3,775 paces above Sta. C.

## Natural Obstructions:

1. 1,920 yds above Sta. B, 6' in 8' falls, impassable at low water.
2. 1,925 yds above Sta. B; 4' in 10' falls, passable with difficulty at low water.
3. 3,540 yds above Sta. B, slide, probable barrier at low water.

Fluctuation in Water Level: 3' to 5'

Cause of Variation: Heavy rains and melting snow in hills at headwaters.

Stream Volumes: Sta. B 10/31/36 4.02 cfs  
 Sta. D 11/2/36 2.2 cfs  
 Amount of stream bed under water: 3/4 at time of survey.

Pollution: From mouth to just above Sta. B and two farms near center of stretch between Sta. C and D; barnyard and domestic sewage; the extent of pollution is very moderate, probably far below the level required to make the stream unsuitable for fish.

Fish (salmon): None seen. Silver and dog salmon and sea-run cutthroats reported.

Fish (other than salmon): None, trout reported in upper part of stream.

General Remarks:

Survey:

7.2 miles beginning at mouth.

Tributaries:

South Fork for two miles above confluence.

Tonography:

Ostrander Creek forks 2,100 paces above the mouth into two branches. At the time of this survey, the north fork only was contributing to the flow below Sta. B. Hence, this fork is considered as the main stream in this report.

The valley drained is limited in extent, and is mostly hilly, although the region above that surveyed rapidly becomes mountainous. The hills are covered with a good stand of second growth cedar, fir, alder and miscellaneous underbrush. Scattered portions of the upper valley do not as yet support any timber. Practically the entire area below Sta. B, and a small portion of the area between Sta. C and D are devoted to agricultural purposes. The area cultivated is estimated to be 1% of the watershed.

Character of Stream:

The stream was very low at the time of survey, flowing only 4 cfs at Sta. B, and only 2 cfs at Sta. D. Water temperatures of 49.0, 48.0 and 38.0 F were obtained when the air temperatures were 48.0, 50.0 and 36.0 F, respectively. The spawning areas are confined, for the most part, to the upper half of the distance between Sta. A and B, and the region above Sta. C. The 14% of mud and sand is found, mostly, in the lower part of the creek, the bottom of the first 1000 yds above the mouth being entirely mud and

## General remarks (cont):

sand. The major part of the bottom between Sta. B and C is composed of large rubble, and the greater part of the 55% of this type of bottom is found in this area.

Fish Population:

A small run of dog (?) salmon is reported to ascend the creek late in the fall. There is also a fair run of fall cutthroats. Trout are caught occasionally in the upper reaches, but they are quite scarce.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	10/31/36	10:30 AM	48.0 F	49.0 F	Overcast
B	10/31/36	11:40 AM	50.0	48.0	"
C	11/01/36	1:45 PM			Clear
D	11/02/36	2:00 PM	36.0	38.0	Clear and cold
A-B	04/19/37	1:00 PM	50.0	45.5	Cloudy

Pool Grade: Total distance = 7.2 miles  
 Total pools = 163  
 Average Frequency: 22 resting and 11 S6 pools/mile.  
 S1T1(19)8%; S1T2(3)1%; S1T3(2).8%; S2T1(76)31%;  
 S2T3(6)3%; S3T1(13)5%; S3T2(3)1%; S3T3(1).4%;  
 S5T1(15)6%; S5T2(3)1%; S5T3(10)4%; S6(80)33%.  
 Note : Numbers in parentheses are number of pools  
 observed.

## Gradient:

Station	Distance (Miles)	Total Drop
A-B	1.2	moderate
B-C	3.4	moderate
C-D	2.6	moderate

**South Fork Ostrander Creek**

River System: Cowlitz River

Stream Surveyed: South Fork Ostrander Creek, tributary to  
Ostrander Creek

Date of Survey: October 31, 1936

Source: Cowlitz County, WA. Main branch: NW1/4, S10-T, SN-R1W

Direction of Flow: Northwest

Total.Length: 6 miles, 2 miles surveyed

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Man Location
	Yds	Miles	Yds	Miles	
A Confl w/Ostrander	---		---		S12,T8N,R2W
B End of survey		2.0		2.0	S18,T8N,R1W

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0111	0.00
B*	17080005	0111	0.00

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
M-285 yds					DRY				
285-3500 yds			26.0		43.0		21.0		10.0

Classification of stream based on amount of usable spawning rubble  
and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )
Total	3,500		6,155	64.0	

spawning Area Unavailable and Unusable: None in high water.  
Entire stream unavailable at time of survey.

## Character of Watershed:

	A-B
Mountainous	
Hilly	X
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

## Diversions:

Diversion 1: 285 paces above mouth. Entire flow at low water diverted.

## Artificial Obstructions:

1. 285 paces above mouth; 2' high rock dam.
2. 360 paces above mouth, small log and debris jam.
3. Above falls, numerous beaver dams, 1-4' high, barriers at low water. Rock dam diverts water for town of Ostrander water supply and for sawmill pond.

## Natural Obstructions:

1. 1065 yds above mouth, falls, 8' in 12' high, impassable at low water.

Fluctuation in Water Level: 3-4'

Cause of Variation: Heavy rains in this region

Amount of stream bed under water: 1/2 at time of survey

Pollution: None

Fish (salmon): Fingerlings (a few) seen in lower pools. Dog salmon reported to falls.

Fish (other than salmon): Fair number of cutthroat.

General Remarks:

Survey:

3500 yds up from mouth, October 31, 1936.

General remarks (cont):

Tributaries:

None of a size to accomodate fish.

Topography:

The South Fork of Ostrander Creek drains a small hilly watershed, the slopes of which now support a good growth of fir, pine, cedar, alder and miscellaneous underbrush. The gradient is moderate to steep throughout, water velocity of 2.17 cfs in diversion flume. Falls of 40' were reported within the part surveyed.

Character of Stream:

This small stream was flowing only 2 cfs at the time of the survey. The greatest obstacle to migratory fish is the complete diversion of water during drought periods, and the flume is unscreened. The creek is crooked and brushy, and affords good spawning areas. 64% of the bottom was composed of medium and small rubble, 26% large rubble, and only 10% was mud and sand. The different types of bottom are rather equally distributed.

Temperature Data: Undetermined

Pool Grade:

Sta	Dist (mi)	Res Pls	Res Pl/Mi	S1T1 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T3 %	S5T1 %	S5T2 %	S5T3 %
A-B	2.0	82	41	7	1	27	6	5	6	6	12	2	10
				9.0	1.0	33.0	7.0	6.0	7.0	7.0	15.0	2.0	12.0

Gradient:

Station	Distance (Miles)	Total Drop
A-B	2.0	moderate

**Arkansas Creek**

River System: Cowlitz River  
 Stream Surveyed: Arkansas Creek

Date of Survey: 5/22/37 by Lobell and ,Hanavan

Source: confluence of North and South Forks of Arkansas Creek 2 miles above mouth. Cowlitz County 3 miles west of Castle Rock, WA.

Direction of Flow: Flows east from confluence to L.B. Cowlitz River near Castle Rock, WA.

Total Length: 1.9 miles, all surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Hwy Xing br	---		0.5		S15,T9N,R2W	63'	8'
B Confl N & S Fk		1.4	1.9		S16,T9N,R2W	all	slough

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0077	0.09
B	17080005	0078	0.00

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B			0		0		0		100.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MRTSR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B	3,252	56,420				

Spawning Area Unavailable and Unusable: None

Character of Watershed:

A-B

Mountainous

Hilly

Rolling           X

Flat               X

Swampy

Wooded           X 2nd growth and brush on hills

Open              X pasture lands

Cultivated       15% farms and pasture

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks

      b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: 8-10'

Cause of Variation: Seasonal rains

Pollution: Farms, domestic and barnyard drainage.

Fish (salmon): None

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
O.Kisutch Fry	5/22/37			X	
Suckers			X		

General Remarks:

Survey:

Arkansas Creek was surveyed on 5/22/37 by Lobell and Hanavan from 1/2 mile above the mouth to the confluence of the North and south Fork about 1 mile upstream.

Tributaries:

The North and South Forks of Arkansas Creek are the only tributaries and they were both surveyed.

Topography:

Low rolling hills surrounding a flat valley from 1/2 to 2 miles in width compose the watershed of Arkansas Creek. The valley is intensively used for pasturage and for growing crops. The low rolling hills are covered with second growth conifer, brush, alder and maple. About 15% of the valley surface is utilized for agriculture.

General remarks (cont):

Character of Stream:

The entire stream is a slough with mud and sand bottom. Banks of mud and dirt are from 6-20' in height. Most of the banks are cut and show evidence of serious erosion during high water. Water fluctuation is from 8-10' during heavy, prolonged rains. There is practically no drop in the stream but a fairly perceptible current is present. A dense marginal growth of willows, alders and miscellaneous brush occurs throughout and becomes dense in places. There is no spawning gravel or riffles. Although there is no spawning area in this section, the stream forms an excellent nursery stream for young salmonoids. Numerous deep sections and an abundance of cover offer good protection for many fry and the mud bottom should produce a wealth of natural food. Both the North and South Forks have areas of very good spawning gravel and are easily accessible to fish.

Fish Population:

Numerous silver salmon and steelhead trout fry were observed feeding. Residents report a good run of both species. Rainbow trout occur in fair numbers and are intensively fished. Suckers and lampreys were observed in considerable abundance also.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air</u> <u>Temp</u>	<u>Water</u> <u>Temp</u>	<u>Skv</u>
A	5/22/37	10:30 AM	61.0 F	52.0 F	Cloudy

Pool Grade:. All slough

Gradient: Flat

**North Fork Arkansas Creek**

River System: Cowlitz River

**Stream** Surveyed: North Fork Arkansas Creek, tributary to Arkansas Creek

Date of Survey: 5/24/37 by Lobell and Hanavan

Source: 1 1/2 miles SE of Ryder-wood, WA, S11-12, T10N, R3W.

Direction of Flow: Southeast from source to confluence South Fork, S16, T9N, R2W, Cowlitz County.

Total Length: 10 miles, 6.4 miles surveyed (11,262 yds).

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
M Confl w/Arkansas	--		--		S16,T9N,R2W	--	--
A Rd br Xing	--		3.8		S5,T9N,R2W	17'	34"
B 3rd br Xing		2.6	6.4		S31,T10N,R2W	24'	29"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
M	17080005	0078	0.00
A	17080005	0078	2.53
B*	17080005	0078	4.74

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		M.R.		S.R.		M&S	
	L.R.	%	%	%	%	%	%	
M-A		1.0	1.0		2.0		96.0	
A-B		<u>12.0*</u>	<u>22.0"</u>		<u>29.0"</u>		<u>12.0*</u>	
Total		6.5	11.5		15.5		54.0	

\* These percentages do not add up to 100%; therefore, the total will not be 100% as well.

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning Area Usable **and** Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )
M-A	6,762		1,212	2.0	
A-B	<u>6,762</u>		<u>23,000</u>	51.0	
Total	13,524		24,212	26.5	

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	<u>Total</u>
Mountainous	
Hilly	X
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	6%
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 3900-4400 paces above Sta. B, 5-6' high log brush jams, passable with difficulty.

Fluctuation in Water Level: 10-15', variation caused by seasonal rains, snow rarely

Pollution: Entire upper watershed, silt from erosion. Good spawning areas silted, cut banks.

Fish (salmon): Silver fry in fair numbers.

Fish (other than salmon): On 5/24/37, abundant suckers observed, spawning on riffles

General Remarks:

Survey:

The North Fork of Arkansas Creek was surveyed on 5/24/37 from its confluence with the South Fork to a point 6.4 miles upstream by Lobell and Hanavan. Access to the stream is easy by county road to the end of the road 5 miles from the source of the creek.

Topography:

The North Fork flows through a river valley bottom from 1/4 to 1 1/2 miles in width. Hills up to a height of 1000 feet bound the valley. In the lower part, the hills are rolling. Upstream the ridges become rougher. Most of the watershed has been logged off. A fair second growth of Douglas Fir has showed on the hills in the lower watershed. However, but to indiscriminate logging in the upper section, there is no regrowth except vine maples and brush. Most of the flat valley is utilized for pasturage and small farms. Forage crops are also cultivated. Considerable erosion of the watershed due to uninhibited runoff was observed. Practically the entire watershed is covered with dirt and rubble. There are very few or no areas of bedrock.

General remarks (cont):

Character of Stream:

From Sta. A to Sta. B the entire stream is slough-like with mud and sand bottom. There is just 1212 sq. yds. of spawning gravel which amounts to 2% of the total bottom area. Large pools affording good protection are numerous and there are several bedrock riffles. A dense marginal growth of alders, maples, and vines form fine cover for fish. Banks of earth, 10-15' high, have been seriously cut by the stream. Although there is a moderate velocity in the stream, the gradient is very slight. Four small tributaries, each flowing less than 1 cfs, join the main stream in this section. Although this section has no spawning area, it should be a good nursery ground for small fish.

From Sta. B to the terminus of the survey, 23,000 sq. yds. or 51% of the bottom is good spawning gravel. Numerous good C1 riffles are present and available to spawners. Pools are numerous and of good size. Although many of the banks are cut, marginal vegetation of alder, maple, willow and brush afford good cover. Most of the banks are of dirt but there is some bedrock. The height of the banks varies from 3-25'. A water fluctuation of 10-15' was estimated in some of the narrower channels. The gradient becomes moderate and flow is also moderately fast. An old log jam 500 yds long above Sta. B is probably a barrier to fish except at very high water. The survey was concluded just above the log jam.

Fish Population:

Silver fry in fair numbers were seen in the section above Sta. B. There were very few between Sta. A and B. Suckers spawning on riffles in some abundance were noted. Trout are rare, due to intensive angling. Residents report silvers and some steelhead enter the stream. It is doubtful whether a large run of salmonoids could be supported even if the log jam were removed since there is no great amount of spawning area and because silting is so widespread.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	5/25/37	9:15 AM	56.0 F	54.0 F	Rain
B	"	8:30 AM	54.0	53.0	Overcast-rain during night

Pool Grade:

	Dist	Rest	Rest	S1T1	S1T2	S1T3	S2T1	S2T2	S2T3	S3T3
Sta	(mi)	Pls	Pl/Mi	%	%	%	%	%	%	%
A-B	3.8	115	30.3	61	2		50	2		
				53.0	2.0		43.0	2.0		
B-C	2.6	98	37.7	11	5	8	48	12	11	3
				11.2	5.1	8.2	49.0	12.2	11.2	3.1
Tot	6.4	213	33.3	72	7	8	98	14	11	3
				33.8	3.3	3.8	46.0	6.6	5.2	1.3

Gradient:

Station	Distance (Miles)	Total Drop
M-A	3.8	<b>flat-moderate-slough</b>
A-B	2.6	moderate

Tributaries:

1. Baxter Creek, 3-4 cfs. Not surveyed because of its precipitous nature. Several small streams all under 1 cfs were noted.

### South Fork Arkansas Creek

River System: Cowlitz River

Stream surveyed: South Fork Arkansas Creek, tributary to Arkansas Creek

Date of Survey: 5/22-23/37 by Lobell and Hanovan

Source: Cowlitz County, WA. S5, T9N, R3W, 5 miles south of Ryderwood, WA.

Direction of Flow: Flows southeast to confluence of North Fork and Arkansas Creek in S16, T9N, R2W, Cowlitz County, WA.

Total Length: 9 miles, 7.3 surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
M Confl w/Arkansas Cr	--	--	--	--	--	---
A 1st rd bridge above confl w/N Fk	0.4		0.4		32'	2.0'
B 1st bridge above Monohan Creek .	3.1		3.5		23'	0.5'
C End of survey	3.8		7.3		--	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
M	17080005	0079	0.00
A	17080005	0079	0.00
B	17080005	0079	0.00
c*	17080005	0079	0.00

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
	Yds	%	%	%	%	%	%	%	%	%
M-A		0		0		6		94		
A-B		7		13		35		45		
B-C		46		29		21		4		
Total		17.7		14.0		20.6		47.7		

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
M-A	739	6,190	369	6.0	
A-B	5,426	44,302	21,112	48.0	
B-C	<u>6,628</u>	<u>48,808</u>	<u>24,305</u>	50.0	
Total	12,793	99,300	45,786	34.7	

Spawning Area Unavailable and Unusable: None

Character of Watershed:

	A-B	B-C
Mountainous		
Hilly	X	X
Rolling		
Flat		
Swampy		
Wooded	X along margins and on hills	
Open		
Cultivated	About 5%	
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		

## Character of Watershed (cont):

	A-B	B-C
Erosion		
a) Banks		
b) Watershed		

Diversions: None

Artificial Obstructions: None

## Natural Obstructions:

1. 645 yds above Sta. A, log and brush jams, 1-3' high, all passable.
2. 1,800 yds above Sta. A, log and brush jams, 1-3' high, all passable.
3. 1,900 yds above Sta. A, log and brush jams, 1-3' high, all passable.
4. 2,500 yds above Sta. A, log and brush jams, 1-3' high, all passable.
5. 3,161 yds above Sta. A, log and brush jams, 1-3' high, all passable.
6. 5,303 yds above Sta. A, log and brush jams, 1-3' high, all passable.

Fluctuation in Water Level: 8-10' floods surrounding valley

Cause of Variation: Seasonal rains

Stream Flow: Sta. B 5/24/37 17 cfs

Pollution: None

Fish (salmon): Silvers good run

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Steelhead	5/23/37				3 observed
Silver Fry	"		X		
Steelhead Fry	"		X		
Lampreys	"			X	
Rainbow Trout	"			X	

General Remarks:

Survey:

The South Fork of Arkansas Creek was surveyed from the confluence of the North Fork of Arkansas Creek to a point 7.5 miles upstream. At this point the stream gradient becomes steep with cascades. The survey was made on 5/22-23/37 by Lobell and Hanavan. Although the lower part of the stream is easily accessible by road, the upper portion is devoid of any roads or trails and is difficult to reach.

Tributaries:

The only important tributary, Monohan Creek, was surveyed from its mouth to an impassable falls. Several small creeks 2 cfs or less and some small springs also augment the flow.

Topography:

The watershed of the South Fork is a flat u-shape river valley from 1/2-1 1/2 miles in width. It is surrounded by low hills, rolling in the lower part and becoming rough upstream. In the valley, a considerable part of the land is used for pasturage and for growing forage crops. The surrounding hills have been partially logged off but a good second growth has been started. The majority of the trees are douglas fir but alder, maple and brush are found throughout in some abundance. Practically the entire valley is covered with a considerable depth of soil and humus. There are almost no areas of scab or bedrock. Although the runoff is well controlled by vegetation in the lower valley and watershed, the trees in the upper part have been ruthlessly cut for pulpwood and reforestation has not been practiced. Consequently, serious erosion occurs and is marked by deposits of mud and sand in the lower river. Numerous cut banks occur in the entire stream due to lack of control in the flood times during the spring and fall.

General remarks (cont):

Character of Stream:

In the lower 1/3 of the South Fork, the stream can be generally regarded as a slough with a predominance of mud and sand bottom. The flow is slow and the river is quite deep. Pools occur mostly as backwaters. Riffles are scarce but an occasional poor C1 and very rarely a good C1 can be found. The average width is about 18' and the average depth about 18". Mud and dirt banks from 5'-20' high are mostly sharply cut and in some places are densely grown up with willows, alders, and brush. Numerous old snags and some log and brush jams provide sheltered resting places for young fish. Because of the cut nature of the banks, the entire bottom is covered with water. In flood stages the water level rises considerable and often floods the surrounding flat valley.

The middle 1/3 of the stream is the best section as regards spawning areas for salmonoids. The bottom is composed entirely of rubble and the majority of the rubble is good spawning gravel. Extensive areas of good C1 riffles are present and are covered with water during the entire year. The flow is moderate and, although the depth is not great, numerous pools are scattered throughout. The average width of the stream is about 30' and the average depth 6". Dirt banks are usually not cut although they have a steep pitch. The height varies from 6-30'. A profusion of marginal vegetation serves to anchor the banks in many places and also provides excellent cover for fishes. Since the gradient is somewhat steeper than in the lower areas, flood waters do not affect the character of the bottom to as large an extent as they do below. Many excellent spawning riffles are covered only during fairly high water. The river valley, although still extensive, becomes progressively narrower upstream.

In the upper third, the stream becomes considerably steeper. C1 and C3 riffles are replaced by cascades. The large pools are supplanted by S6 and small resting pools. The size of the rubble becomes larger and good spawning areas, while still abundant, decrease markedly in size. Although there is some marginal cover, large stretches are almost bare. Pulpwood operations have denuded most of the surrounding hills and the valley is full of debris. Considerable river banks are steep and composed of rubble and dirt. Considerable erosion exists in the watershed and on the stream. Because of the steeper gradient, the average width decreases to about 12' and the average depth to 3-4".

Fish Population:

Throughout the entire stream, but particularly in the middle third, a great abundance of silver and steelhead fry were seen. Several adult steelhead were noticed in the upper part of the surveyed portion. Residents report a good run of silvers and

## General remarks (cont):

steelhead. This seems to be verified by the observed presence of numerous fry of both species. The center of abundance seemed to be in the middle third of the stream. Extensive, excellent riffles, an abundance of cover, numerous pools and a comparative stability in physical factors, tend to make this section an ideal fish producing locality. Since there are no obstructions to upstream migrants and no traps for downstream migrants, fish production is probably almost as great as can be expected. As the stream is fished intensively by anglers, the trout population is small. However, small trout are fairly numerous and large specimens are sometimes caught.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	5/24/37	11:30 AM	66.0 F	55.0 F	Partly cloudy
B	"	11:00 AM	65.0	55.0	" "

## Pool Grade:

Sta	Dist (mi)	Res Pls	Rest Pl/Mi	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T3 %
M-A	0.4	2	5.0			2				
						100.0				
A-B	3.1	50	16.1	25		18		1	5	1
				50.0		36.0		2.0	10.0	2.0
B-C	3.8	137	36.1	8	1	92	5	8	18	3*
				5.8	0.7	67.2	3.7	5.8	13.1	2.3
Tot	7.3	189	25.9	33	1	112	5	9	23	4
				17.5	0.5	59.3	2.6	4.8	12.2	2.1

\* = There are more pools for station B-C. They are as follows:

Sta	S5T1 %	S5T3 %	S6
B-C	1	1	90
	0.7	0.7	

The grand total percentage would be S5T1 (1)= 0.5% and S5T3 (1)= 0.5%. All the other columns have already integrated these pools.

Gradient:

Station	Distance (Miles)	Total Drop
M-A	0.4	flat
A-B	3.1	flat
B-C	3.8	moderate

Tributaries:

1. Monohan Creek

**Monahan Creek**

River System: Cowlitz River

Stream Surveyed: Monahan Creek, tributary to South Fork Arkansas Creek

Date of Survey: 5/24/376 by Lobell and Hanavan

Source: Cowlitz County S9, T9N, R3W.

Direction of Flow: Flows east to confluence South Fork Arkansas Creek, in S17, T9N, R2W, L.B. 3 miles west of Castle Rock, WA.

Total Length: 7 miles, 0.5 miles surveyed from mouth to impassable falls.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
M Conf w/S Fk Arkans	--	--	--	--	---	---
A Lower hwy bridge	0.2		0.2		19'	4.5"
B Impassable falls	0.3		0.5		---	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
M	17080005	0080	0.00
A	17080005	0080	0.00
B*	17080005	0080	0.00

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
M-A			0.0		17.0		27.0		56.0
A-B			0.0		0.0		56.0		44.0
Total			0.0		8.5		41.5		50.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance yds/miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> )		Usable Spawning Area (yd <sup>2</sup> )
			(MR&SR)	% Avail	
M-A	339		800	44.0	
A-B	600		<u>1,960</u>	56.0	
Total	939		2,760	50.0	

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

A

---

Mountainous

Hilly X

Rolling

Flat

Swampy

Wooded X

Open

Cultivated Less than 5%

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks  
b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 605 paces above Sta. A, bedrock fall 18-20' high, impassable at all times.

Fluctuation in Water Level 3-5'

Cause of Variation: Rains

Stream Flow: Sta.A 5/24/37 148 cfs

Pollution: None

Fish (salmon): None, silver fry in fair numbers

Fish (other than salmon): None

General Remarks:

Survey:

Monahan Creek was surveyed from the mouth to an impassable 939 yds upstream on 5/24/37 by Lobell and Hanavan. A station was established at a road bridge near the mouth.

Tributaries:

None found in the surveyed section.

Topography:

The watershed of Monahan Creek is a hilly, wooded region with narrow valley near the mouth. Further upstream the valley opens out with low rolling hills bounding it. There are a few small farms in the valley and some pastureland. A second growth of conifers and brush is dense along the stream and on the hill. The upper watershed has been logged off and there is little second growth. There is considerable erosion in the upper region.

Character of Stream:

Monahan Creek flows through a steep ravine with dirt banks near the mouth. The immediate banks are from 3-10' high, of dirt and some are watercut. Marginal vegetation is very dense and

General remark (cont):

offer good protection to salmon and other fish. This brush is composed of alder, maple, willow and blackberry vines and it forms covers throughout the fields.

Areas of good gravel are found throughout, with spawning riffles common. Pools are common and of good size. The volume of water was 14.9 cfs on the date of the survey at Sta. A. Water fluctuation was estimated at about 3'. The gradient, as a whole, is **flat-moderate**. In places it is almost a slough. A bedrock fall 18-20' high of lava formation was judged to be impassable at all times. The survey was terminated at this point, 605 paces above Sta. A. Above the falls, the stream has areas of good spawning gravel, sufficient pools and riffles. It divides into several small tributaries upstream from the falls.

Fish Population:

Silver fry in fair numbers were observed throughout the area surveyed. Intensive fishing is carried on for trout and the abundance of trout is at a low point. Due to the impassable falls, the stream could not support much of a salmon run. However, above the falls much good trout water is present. The stream could probably be built up considerably by an intensive stocking policy.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Sky</u>
A	5/24/37	10:30 AM	61.0 F	52.0 F	Cloudy

Pool Grade:

<u>Sta</u>	<u>Dist (mi)</u>	<u>Rest Pools</u>	<u>Rest Pl/Mi</u>	<u>S1T1 %</u>	<u>S1T2 %</u>	<u>S2T1 %</u>	<u>S2T2 %</u>	<u>S2T3 %</u>
M-A	0.2	10	50.0		2	7		1
					20.0	70.0		10.0
A-B	0.3	15	50.0	3		9	3	
				20.0		60.0	20.0	
Tot	0.5	25	50.0	3	2	16	3	1
				12.0	8.0	64.0	12.0	4.0

Gradient: Slight to moderate throughout in .53 miles surveyed.

Tributaries none

## Toutle River

River System: Cowlitz River  
Stream Surveyed: Toutle River

Date of Survey: 9/13-19/36

Source: Spirit Lake, Skamania County NE1/4, S15, T9N, R5E

Direction of Flow: Cowlitz and Skamania Counties Wa, discharges  
Cowlitz Rive NW1/4, s34, T10N, R2W.

Total Length: 52.5 miles, all surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Hwy bridge		0.9	0.9	0.9	S10,T10N,R2W	135'	5.0'
B	Tower bridge		3.8	4.7	4.7	S20,T10N,R1W	118'	3.3'
C	Coal Bank br		10.0	14.7	14.7	S19,T10N,R1E	93'	---
D	Br abv Coal Bank		7.0	21.7	21.7	S12,T10N,R1E	125'	.6'
E	Weyerhauser br		4.4	26.1	26.1	S8,T10N,R2E	80'	1.4'
F	St. Helens br		3.4	29.5	29.5	S22,T10N,R2E	40'	2.2'
G	Elk Creek Confl		12.2	41.7	41.7	S7,T9N,R4E	48'	---
H	Coldwater Confl		3.8	45.5	45.5	S11,TSN,R4E	251'	---
I	Spirit Lake br		3.7	49.2	49.2	S13,T9N,R5E	18'	.8'
J	Outlet Spirit Lk		3.3	52.5	52.5	S15,T9N,R5E	150'	6.8'

EPA River Reach Codes:

Station	HUC	SEG	Rmi
<b>M</b>	17080005	0011	0.00
A	17080005	0011	0.00
B	17080005	0011	5.69
C	17080005	0018	0.00
D	17080005	0020	6.05
E	17080005	0020	9.03
F	17080005	0023	0.00
G	17080005	0023	11.31
H	17080005	0025	0.08
1*	17080005	0026	3.85
J	17080005	0026	5.02

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
M-A			59.0		23.0		21.0		
A-B			48.0		29.0		22.0		2.0
B-C			61.0		23.0		12.0		4.0
C-D			43.0		31.0		25.0		1.0
D-E			58.0		28.0		12.0		2.0
E-F			56.0		31.0		13.0		
F-G			61.0		25.0		11.0		3.0
G-H			77.0		17.0		1.0		4.0
H-I			64.0		2.5.0		12.0		.1
I-J			<u>19.0</u>		<u>15.0</u>		<u>38.0</u>		<u>28.0</u>
Total			54.5		24.6		16.6		4.3

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MRTSR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
M-A	1,570		26,945	50.0	
A-B	6,700		115,225	50.0	
B-C	17,635		242,385	35.0	
C-D	12,320		208,156	56.0	
D-E	7,700		93,735	40.0	
E-F	6,080		40,520	44.0	
F-G	20,860		113,174	36.0	
G-H	6,727		15,102	18.0	
H-I	6,171		21,799	36.0	
I-J	<u>5,748</u>		<u>35,219</u>	53.0	
Total	91,511		921,160	41.8	

Spawning Area Unavailable and Unusable: No data available

## Character of Watershed:

	A-B	B-C	C-D	D-E	E-J
Mountainous	X	X	X	X	X

## Character of Watershed (cont):

	A-B	B-C-	C-D	D-E	E-J
Hilly					
Rolling					
Flat					
Swampy					
Wooded	X	X		X	X
Open					
Cultivated	1%				

Diversions: None

Artificial Obstructions:

1. 5,526 yds above Sta. I 7' high dam.

Natural Obstructions: None

Fluctuation inrWate Level: 20'

Cause of Variation: Heavy rains and melting snow

Amount of Stream Bed Under Water: 1/2 at time of survey

Pollution: None

Fish (salmon): Silver Salmon

Sta. A-B, a good run, individuals not counted.

Sta. B-C, spring chinook present. Mostly spawned out by Oct. 1, Coldwater Creek, 1940.

Sta. D-E, fall run chinook also use the stream.

Sta. E-F, stream well fished in vicinity of Green River Mt.

Fish (other than salmon): Catches indicate a fair population of rainbow and cutthroat trout. Chubs and suckers also present.

General Remarks:

Survey:

Mouth to Spirit Lake, Sept. 13-19, 1936

Tributaries:

South Fork, Green River, Coldwater Creek and Outlet Creek (surveyed).

Topography:

The Toutle River flows through a narrow, rugged mountain valley being in a precipitous canyon much of the time below Sta. C. The watershed is densely covered with pine, cedar, and fir. Practically the entire area has been, or is being, logged off. Alder, vine maple and miscellaneous underbrush grow thick on the slopes not as yet supporting second growth timber. Practically no farming is carried on in this valley.

Character of Stream:

The gradient is rather steep and much of the stream bed having been dredged to allow for a faster runoff. Heavy rains and melting snow cause a 20' raise in water level during the spring season. This tremendous volume of water has scoured out the bottom so that good pools are few. Log jams are numerous but none are barriers to migrating fish. Instead, they afford considerable protection to fish. The best spawning area is found in the first 1/2 mile above Sta. C, although considerable amounts of medium and small rubbles are found throughout all of the stream. Mud is scarce except in the upper 800 yds. Just below this area, the stream is shallow, broken into numerous channels with good, small pools. Food is abundant in this particular area, affording an excellent nursery ground for salmon fingerlings. Silver salmon fingerlings were abundant here at the time of the survey.

General remark (cont):

Fish Population:

Silver and fall chinook salmon and some steelheads run this stream. The 1936 run of silvers was reported as being the largest run in years. Old residents believe the runs are increasing in size since the practice of running logs on the river was discontinued. They believe that dynamiting to break up jams was largely responsible for reducing the fish population. Rainbow and cutthroat trout are the game fish, catches indicating fair population. Other fish living in the river and chubs and sucker.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	9/14/36	10:00 AM	55.0 F	51.0 F	Ptly cloudy
B	"	9:30 AM	55.0	51.0	"
C	9/16/36	4:30 PM	63.0	54.0	Fair
D	9/16/36	4:00 PM	63.0	54.0	"
E	9/17/36	4:30 PM	59.0	50.0	Fair
F	"	4:20 PM	62.0	54.0	"
G	9/18/36	4:45 PM	62.0	51.0	"
H	"	9:50 AM	56.0	48.0	Clear
I	"	10:50 AM	66.0	53.5	Clear
J	9/19/36	3:30 PM	59.0	60.5	Clear, shaded
HWY	9/19/37	12:45 PM	50.0	45.0	Cloudy

Pool Grade:

Sta	Dist (mi)	Res Pls	Re P/Mi	Slt1 %	Slt2 %	Slt3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S3T3 %
M-A	0.9	2	2.2		2							
				100.0								
A-B	3.8	9	2.4	2	2	2		2	1			
				22.2	22.2	22.2		22.2	11.2			
B-C	10.0	42	4.2	15	16	1		10				
				35.7	38.1	2.4		23.8				
C-D	7.0	26	3.7	9	10		3	4				
				34.6	38.5		11.5	15.4				
D-E	4.4	18	4.1	4	7			6			1	
				22.2	38.9			33.3			5.6	
E-F	3.4	6	1.8		2		2	2				
					33.3		33.3	33.4				
F-G	12.2	57	4.7	3	1	5	28	2	13	2		3'
				5.3	1.8	8.7	49.1	3.5	22.8	3.5		5.3

Pool Grad (cont):

Sta	Dist (mi)	Res Pl	Re P/Mi	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S3T3 %
G-H	3.8			No Pools								
H-I	3.7	3	0.8				1		1	1		
							33.3		33.3	33.4		
I-J	3.3	8	2.4				1		2	2		3
							12.5		25.0	25.0		37.5
Tot	52.5	171	3.3	33	40	8	35	26	17	5	1	6
				19.3	23.4	4.7	20.5	15.2	9.9	2.9	0.6	3.5

\* There were 514 S6.pools throughout the entire survey

Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
M-A	0.9			
A-B	3.8	290'	20'	Columbia Nat'l Forest
B-C	10.0			
C-D	7.0			
D-E	4.4	380'	33'	
E-F	3.4	157'	46'	
F-G	12.2	820'	67'	Mt. St. Helens Quad.
G-H	3.8	400'	105'	
H-I	3.7	600'	162'	
I-J	3.3	499'	151'	
Total	52.5	3,146'	60'	

Tributaries:

1. South Fork
2. Green River
3. Coldwater Creek
4. Outlet Creek

## Outlet Creek

River System: Cowlitz River

stream Surveyed: Outlet Creek, tributary to Toutle River

Date of Survey: 9/14/36

Source: Silver Lake. SE1/4, T10N, R1W. Cowlitz County, WA.

Direction of Flow: Northeast to Toutle River. SE1/4, S19, T10N, R1E.

Total Length: 2 miles, 1 1/8 surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Conf w/Toutle R	---	---	---	---	S1g,T10N,R1E	11'	4.3"
B	1335 yds above A	0.8		0.8		S36,T10N,R1W	21'	5.0"
C	End of survey		0.4		1.2	-----	---	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0012	0.00
B*	17080005	0012	0.00
C	17080005	0012	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		M.R.		S.R.		M&S	
	L.R.	%	%	%	%	%	%	
A-B		35.0	28.0		34.0		2.0	
B-C		32.0	32.0		36.0		0.0	
Total		33.5	30.0		35.0		1.0	

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
A-B	1,335		1,928	62.0	
B-C	740		<u>1,077</u>	<u>69.0</u>	
Total	2,075		3,005	65.5	

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

A-B	
Mountainous	
Hilly	X
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

## Artificial Obstructions:

1. 300 yds above mouth, log jam. Probably passable at high water.

Natural Obstructions: None

Fluctuation in Water Level: 5-6'

Cause of Variation: Heavy rains in this region

Amount of Stream Below Water: 1/3 at time of survey.

Pollution: None

Fish (salmon): None seen, silvers reported.

Fish (other than salmon): no data available

## General Remarks:

Survey:

Mouth to swamp below Silver Lake, September 14, 1936.

Tributaries:

None

Topography:

Outlet Creek flows from Silver Lake to the Toutle River. The valley is short and narrow. For most of its length the stream flows through a rather narrow, low, v-canyon. The hills have been logged off and burned so that the vegetation now is chiefly alder and miscellaneous brush.

Character of Stream:

The gradient is moderate throughout. Except for periods of runoff following heavy rains, the flow is controlled by the water level in Silver Lake. Abundant spawning areas are available. The temperature is favorable to salmon, being 56.0F, the air was 58.0F.

Fish Population:

No fish observed. Silver salmon reported to enter seldom.

## Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Sky</u>
A	9/14/6	2:00 PM	58.0 F	56.5 F	pty cloudy
B	"	3:00 PM	"	56.0 F	" "

Pool Grade: Sta A-B: S3T2  
 Sta B-C no pools  
 Tot distance: 1.2 miles, 0.8 pools/mile

## Gradient:

<u>Station</u>	<u>Distance (Miles)</u>	<u>Total Drop</u>
Total	1.2	moderate

Tributaries: none

## Silver Lake

River System: Cowlitz River  
 Name of Lake: Silver Lake  
 Discharge Into: Toutle River

Date Examined: 12/19/34

Location: Cowlitz County

Approximate Length: 4 miles  
 Approximate Width: 1.5 miles  
 Depth At: Stations 1 = 2m; 2 = 3m; 3 = sm; 4 = 3m; 5 = 2.5m;  
 6 = 2.5m; 7 = 2.5m; 8 = 2m

Temperatures: Outlet - 5.6C Surface - 5.6 C Bottom - 5.6 C  
 Hour Taken 9:30 am and 10:30 am  
 Weather - Rain  
 Air - 45.0 F

Color and Turbidity: Brown

Principal Tributary Streams: 1. Burke Creek  
 2. Hemlock Creek

Character of Watershed 1. Hilly  
 2. Wooded

General Remarks (Shoreline and Littoral Zone):

Silver Lake is situated in a shallow basin of a very uniform nature. The immediate area surrounding the lake is boggy and covered with willows and other water tolerant plants. The bottom is composed of fine silt and organic muds throughout. There is luxuriant growth of myriophyllum, sedges, potomagenton and elodea. The entire area is of shoal type.

Many food organisms were observed such as shrimp copepods and abundant other planktons. From all general appearances, there would be at no time any thermal or chemical stratification but uniform conditions throughout. No doubt summer temperatures are high and the whole lake reaches pond conditions.

A run of silver salmon passes through the upper end of the lake from Outlet Creek to Hemlock Creek. A rancher on Hemlock Creek stated the salmon come up river during the latter part of October to spawn ascending the river to an impassable falls about four miles from its mouth. In 1933 a good run of silvers entered Hemlock Creek but in 1934, the run was very light.

South **Fork** Toutle River

River System: Cowlitz River  
 stream Surveyed: South Fork Toutle River, tributary to Toutle River

Date of Survey: 5/22-27/41 by Frey and Bryant

Source: Arises by two branches from the west side of Mt. St. Helens in T8N, R5E.

Direction of Flow: Flows in a general west northwest direction to its confluence with the main Toutle in T10N, R1E. Drainage area lies between those of the upper Toutle and the Coweman rivers.

Total Length: 28 miles of which 23 miles were surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Man Location
	Yds	Miles	Yds	Miles	
A Confl w/Toutle	---	---	---	---	NE4,S20,T10N,R1E
B Confl w/Jordan Cr	5.1		5.1		NE4;S11;T9N,R1E
C Confl w/Twent Cr	3.1		8.2		NE4,S20,T9N,R2E
D Confl w/Bear Cr	5.1		13.3		SW4,S29,T9N,R3E
E Confl w/Trouble Cr	3.1		16.4		N2,S36,T9N,R3E
F* Confl w/N&S Fks	3.5		19.9		N2,S4,T8N,R4E
G Toulte Trail Xing	3.4		23.3		S2,T8N,R4E

\* A big flood in 1934 changed the location of the stream channel in many places. Judging from our paced distances between Sta. G & F, it appears that Sta. F probably occurs in S3 instead of S4.

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0019	0.00
B	17080005	0019	4.15
C	17080005	0019	10.84
D	17080005	0016	16.82
E	17080005	0019	21.89
F	17080005	0019	25.80
G	17080005	0019	27.98

## Character of Bottom Between Stations:

Station	Area ( $\text{yd}^2$ )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B	227,080	49,538	21.8	87,210	38.4	59,064	26.0	31,268	13.8
B-C	121,800	45,390	37.3	39,870	32.7	24,360	20.0	12,180	10.0
C-D	138,800	63,050	45.4	41,260	29.7	19,690	14.2	14,800	10.7
D-E	75,200	28,280	37.6	24,080	32.0	14,880	19.8	7,960	10.6
E-F	46,700	18,810	40.3	14,080	30.1	9,140	19.6	4,670	10.0
F-G	<u>15,450</u>	<u>6,400</u>	41.4	<u>4,925</u>	31.9	<u>2,550</u>	16.5	<u>1,575</u>	10.2
Total	625,030	211,468	33.8	211,425	33.8	129,684	20.7	72,453	11.6

Classification of stream based on amount of usable spawning rubble and area present:

	Area ( $\text{yd}^2$ )	Usable Spawning Quality ( $\text{yd}^2$ )				
		Area ( $\text{yd}^2$ )	Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excellent (70.6- -100%)
Estimated usable rubble	625,030	92,546	30,549	32,305	29,642	
Spawning rubble (MR + SR)	625,030	341,109		10,690	310,265	20,154

## Spawning Area Usable and Available:

Station	Distance vds miles	Area ( $\text{yd}^2$ )	Available Spawning Area ( $\text{yd}^2$ ) (MR&SR)	% Avail	Usable Spawning Area ( $\text{yd}^2$ )	% Usable
A-B	8,970 5.1	227,080	146,274	64.4	51,842	22.8
B-C	5,500 3.1	121,800	64,230	52.7	12,165	10.0
C-D	9,000 5.1	138,800	60,950	43.9	17,160	12.4
D-E	5,200 3.0	75,200	38,960	51.8	7,591	10.1
E-F	6,200 3.5	46,700	23,220	49.7	2,023	4.3
F-G	<u>6,050</u> 3.7	<u>15,450</u>	<u>7,475</u>	48.4	<u>1,765</u>	<u>11.4</u>
Total	40,920 23.5	625,030	341,109	54.5	92,546	14.8

spawning Area Unavailable and Unusable: None

Cause of Unavailability: A few low falls occur in the upper portion of the stream and small log jams were fairly common along the entire length of the stream. All of these obstructions were judged passable at all times.

## Character of Watershed:

	A-B	B-C	C-D	D-E	E-F	F-G
Mountainous		X	X	X	X	X

Hilly            X            .X

Rolling

Flat

Swampy

Wooded

A-B: Cutover and second growth fir

B-C: Second growth fir, hemlock & cedar

C-D: Fir, hemlock & cedar

D-E: Fir, cedar & hemlock

E-F: Fir, cedar, hemlock & spruce

F-G: Spruce, hemlock, silver fir, lodgepole & white pine

Open

Cultivated 1-5            0            0            0            0

Character  
of Valley

A-B: Saucer-shaped 1/4 - 2 miles

B-C: U-shaped, steep walls. 200 yd - 1/2 mile

C-D: U-shaped, 200 yds to 1/2 mile

D-E: V to U-shaped, 50 yds to 1/2 mile

E-F: 1/4 mile, u-shaped across bottom

F-G: U-shaped, 200 yds wide at bottom

Character  
of Banks

A-B: 2-200' bedrock & rubble

B-C: up to 200' on cutaways. Usually 5' bedrock

C-D: up to 200' on cutaways. Usually 5' bedrock

D-E: 2-200' mostly bedrock, steep

E-F: 2-30' AVERAGE, 5-8' gravel, earth, moderately steep

F-G: 5' high, rubble broad alluvial fan

Density of  
Marginal  
Vegetation

A-B: Moderate, berries, willows, alder, devil's club

B-C: Fairly dense, alder, cottonwood, berries, vine maple

C-D: Fairly dense, alder cottonwood, berries, vine maple

D-E: Moderate, vine maple, alder, cottonwood

E-F: Moderate, willow, alder, devil's club

F-G: Mainly alders, vine maple dense in patches

## Character of Watershe (cont):

	A-B	B-C	C-D	D-E	E-F	F-G
--	-----	-----	-----	-----	-----	-----

## Erosion

## a) Banks

A-D:	Extensive					
D-E:	Moderate					
E-F:	Quite extensive					
F-G:	Extensive					

## b) Watershed

A-D:	Moderate					
D-E:	Severe in past					
E-F:	Quite extensive					
F-G:	Moderate					

Diversions: None

Artificial Obstructions:

Natural Obstructions: None that are barriers. A few small falls in the upper surveyed portion and several log jams are passable at all times.

## Fluctuation in Water Level:

Sta	Ft. Variation	% Stream Bed Covered
A-B	3-10	35.0
B-C	5-8	75.0
C-D	5-8	80.0
D-E	3-10	70.0
E-F	3-5	80.0
F-G	5-8	*60.0

\* The North and South branches of the South Fork flow through a broad gravel alluvial plain between Sta. F and G.

Cause of Variation: Variation in stream flow and fluctuation in water level are produced mainly by seasonal precipitation and melting of snow on St. Helens in spring.

Stream Volumes: A flow of 317 cfs was measured on 6/2/41, at the highway bridge ca. 3/4 mile above the mouth of the stream.

A U.S.G.S. gauging station has recently been established near the mouth of the South Fork, but flow records are not yet available in the water supply papers. One isolated record of 81.7 cf was reported for 9/10/28 at a steel highway bridge on Spirit Lake Road near Silver Lake (Water Supply Paper #674).

Pollution: None, except glacial silt from Mt. St. Helens in summer.

Fish (salmon): No adult salmon were seen at the time of survey and only small numbers of salmonid fingerlings which might have been salmon were observed. There is reported to be a run of silvers in the fall and a small run of fall chinooks. One native also reported a run of spring chinooks, but his bright red, fish may have been steelheads instead.

Fish (other than salmon): The part of the river above Sta E seems almost too steep and fast for fish. Bryant and Wyman tried fishing here but had no luck whatsoever but there were fish in every pool below this point (P.S. yes, we caught some!).

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Steelhead	5/22/41		9 observed between C-E	
Rainbow	"		Adults below E	
Cutthroat			Reported	

#### General Remarks:

South Fork Toutle arises on the west slope of Mt. St. Helens and flows through mountainous country to Sta. B, below which the valley is broader and the topography more rounded. Above Eighteen Creek, between Sta. B and A, the river is now accessible only by trail, although Weyerhaeuser has surveyed above this point for a railroad grade.

Above Sta. F, the river consists of two branches flowing through a gravelly outwash plain several hundred yards wide. The plains are quite bare of rail and vegetation, willows, beginning to appear along the edges and in isolated patches. Here the gradient is almost too steep for fish.

From Sta. F to D, the valley is broader and has a shallower gradient, permitting good spawning areas to occur. Seven of the nine steelheads observed during the survey of the stream were seen in this portion of the river.

From Sta. D to below Sta. B for a short distance the stream flows through a deep and narrow valley. Each major bend of the river has a cutaway cliff up to 200' high with a gS1 or gS2 pool at the base. Usually the pool shallows on the downstream side to form a smooth-surfaced riffle excellent for spawning. The only way to get through the canyon was to cross from one side of the stream to the other on the riffle just upstream from each cliff. This part of the stream ought to be able to support a good run of spring

General remark (cont):

chinooks. Resting pools and good spawning areas are adequate and well interspersed.

The stream has not yet suffered much from man. There are no diversions, no dams, no pollution. Lumbering has been pursued only along the lowermost 8 miles of the stream, and much of this area is now in desirable second growth. A small amount of agriculture is practiced along the lowermost 4 miles. Fishing is rather restricted because of the inaccessibility of the stream.

On the other hand, man sometimes suffers from the stream during flood stages. A severe flood in 1934 changed the course of the river in several places and caused considerable damage in the agricultural region.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
1 mi above A	6/2/41	3:35 PM	66.0	59.0	20% cumulus clouds
? mi above A	<b>5/27/41</b>	2:30 PM	57.0	52.0	Overcast
<b>St</b> 2 mi D below B	5/27/41	11:30 AM	56.0	50.0	Overcast
	5/25/41	7:15 AM	46.0	46.0	Few cirrus clouds
St D	5/24/41	2:30 PM	63.0	57.0	Clear
2 mi below E	5/23/41	1:00 PM	82.0	56.0	
St F (N Fk)	5/22/41	11:15 AM	75.0	52.0	Clear
St F (S Fk)	5/22/41	11:15 AM	75.0	50.0	Clear
St G (N Fk)	5/22/41	8:45 AM	64.0	46.0	Clear
St G (S Fk)	<b>5/21/41</b>	4:00 PM		57.0	Clear

Pool Grade:

Sta	Dist (mi)	Rest Pool	Rest Pl/Mi	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
A-B	5.1	94	18.4	14	15	32	33	7
				14.9	16.0	34.0	35.1	
B-C	3.1	60	19.4	5	6	5	44	1
				8.3	10.0	8.3	73.3	
C-D	5.1	76	14.9	10	11	4	51	50
				13.2	14.5	5.3	67.1	
D-E	3.1	44	14.2	1	2	7	34	75
				2.3	4.5	15.9	77.3	
E-F	3.5	35	10.0				35	164
							100.0	
F-G	3.4	8	2.4			2	6	249
						<b>25.0</b>	<b>75.0</b>	
To	23.3	317	13.6	30	34	50	203	556
				9.5	10.7	15.8	64.0	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	5.1	300	59	Columbia Nat'l Forest Contour Map
B-C	3.1	170	55	" "
C-D	5.1	270	53	" "
D-E	3.0	380	127	" "
E-F	3.5	500	143	" "
F-G	<u>*1.8</u>	916	509	<u>" "</u>
Total	21.6	2,356	117	

\* Distance along North Branch.

Note: The station elevations, except that for Sta. G, which is exactly given, are interpolated roughly from a map with 100' contour intervals.

## Tributaries:

1. 2,400 yds above Sta. A, left bank, 1 cfs; too small for salmon.
2. 3,400 yds below Sta. B, left bank 7' wide 2" deep; flow 3-5 cfs.
3. Johnson Creek, 2,900 yds below Sta. B, left bank, ca. 15 cfs; channel badly choked with logs.
4. Jordan Creek, at Sta. B, right bank 15' wide, ca 15 cfs; largely bedrock and sand. No value to salmon.
5. Thirteen Creek, 2,700 yds above Sta. B, right bank 8' wide, 6" deep, ca. 10 cfs; flows in narrow v-shaped valley. Little value to salmon. Steep.
6. Eighteen Creek, 3,400 yds above Sta. B, right bank 6' wide, 3" deep, 5-8 cfs; impassable falls 50 yds above mouth. No value.
7. 4,300 yds above Sta. B, right bank, less than 1 cfs; steep; inaccessible.
8. 4,700 yds above Sta. B, left bank; spring feeder, ca. 1 cfs.
9. 5,100 yds above Sta. B, left bank 4' wide, 3" deep, ca. 1 cfs; 12' bedrock chute falls 50 yds upstream impassable at all times.

## Tributaries (cont):

10. Twenty Creek, at Sta. C, right bank 6-7' wide 3-4" deep; ca. 5 cfs; enters over 6' falls.
11. Big Wolf Creek, 400 yds above Sta. C, right bank 6' wide 4" deep; ca. 5 cfs. Little value.
12. 1,100 yds above Sta. C, right bank, spring feeder, ca. 1 cfs.
13. 1,500 yds above Sta. C, right bank; less than 1 cfs; no value.
14. 2,400 yds above Sta. C, left bank; spring feeder. Less than 1 cfs.
15. 2,900 yds above Sta. C, left bank 4' wide 2-3" deep; 1-2 cfs.
16. 3,140 yds above Sta. C, right bank 6' wide 4-7" deep, ca. 8 cfs. Enters mainstream by cascade over 4' boulder bank.
17. 3,630 yds above Sta. C, right bank; less than 1 cfs.
18. 4,330 yds above Sta. C, right bank, less than 1 cfs. Drops into river over 25' bedrock ledge.
19. 5,000 yds above Sta. C, left bank 3' wide, less than 1 cfs.
20. 2,910 yds below Sta. D, right bank, ca. 1 cfs. Enters over 70' bedrock falls.
21. Whitten Creek, 2,830 yds below Sta. D, right bank 8' wide, ca. 5 cfs; 35' impassable falls 250 yds above mouth.
22. 1,500 yds below Sta. D, left bank, 1-2 cfs.
23. 820 yds below Sta. D, right bank 5' wide 2" deep, 1-2 cfs.
24. Bear Creek, at Sta. D, right bank 15' wide. Flow 15-20 cfs, surveyed upstream 1/4 mile to impassable 10' falls with elbow in center.
25. 600 yds above Sta. D, right bank 5' wide 2" deep, 1-2 cfs.
26. 1,200 yds above Sta. D, left bank, ca. 10 cfs. Steep with boulder bed.
27. Herrington Creek, 2,200 yds above Sta. D, left bank 9-12' wide 6-12" deep, 15-18 cfs. Soon breaks up into small tribs; steep; little value to salmon.

## Tributaries (cont):

28. 400 yds below Sta. E, left bank, 6' wide, 5" deep, 5-8 cfs; too small for salmon.
29. Trouble Creek, at Sta. E, right bank 12' wide, 10-15 cfs; too small for salmon.
30. 2,200 yds above Sta. E, right bank 15' wide, ca. 15-20 cfs; has series of small log jams, dams, and cascades in first 100 yds; passable with difficulty.
31. 4,100 yds above Sta. E, left bank, ca. 1 cfs; almost sheer 20' drop over gravel bank. Inaccessible at all times.
32. 1,000 yds below Sta. F, left bank, ca. 10-15 cfs; steep, shallow, little value.

North Branch

33. 1,970 yds below Sta. G, left bank, ca. 1 cfs; steep.
34. 1,180 yds below Sta. G, left bank, ca. 3 cfs.
35. 1,050 yds below Sta. G, left bank, ca. 2 cfs.
36. 930 yds below Sta. G, right bank, ca. 1 cfs.
37. 895 yds below Sta. G, left bank, less than 1 cfs.
38. 890 yds below Sta. G, left bank, less than 1 cfs.

South Branch

39. 2,200 yds below Sta. G, right bank, ca. 1 cfs.
40. 400-1,800 yds below Sta. G, left bank; several small streams 6"-1' wide some with heavy yellow deposits of algae or iron on the rocks.
41. 300 yds below Sta. G, right bank; small. Falls at 200 yds impassable at all times.

**Bear Creek**

River System: Cowlitz River  
 Stream Surveyed: Bear Creek, tributary to South Fork Toutle

Date of Survey: 5/24/41 by Frey

Source: Some hills in the east-central part of Cowlitz County, WA, near the headwaters of the Coweman River. The river is small and lies entirely within T8N, and T9N of R3E.

Direction of Flow: The stream flows northwest for half of its length, then bends gradually until it is flowing almost directly north by the time it joins the South Fork Toutle.

Total Length: 5 miles of which 1/4 mile was surveyed to an impassable falls.

Station Location: No stations taken. Stream surveyed only 460 yds upstream from confluence with South Fork Toutle in SW4, S29 T9N, R3E.

EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth	17080005	0086	0.00
End of survey*	17080005	0086	0.00

\*This location is not definite and has been estimated

Character of Bottom Between Stations:

	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
M-Falls	2,800	1,610	57.5	630	22.5	190	6.8	370	13.2

classification of stream based on amount of usable spawning rubble and area present: N/A

spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
M-Falls	460	2,800	820	29.3	305	10.9

Spawning Area Unavailable and Unusable:

Cause of Unavailability: An impassable falls was found 460 yds above the stream. None of the region above this barrier is accessible to salmon or steelhead at any time.

Character of Watershed:

Hilly to mountainous, covered-with douglas fir, forest burned over in upper portion. No cultivation. 300 yds above mouth begins a narrow box canyon with 25' vertical bedrock walls. Marginal vegetation is dense and consists of vine maple, berry bushes, devil's club, few alders, ferns. Erosion -- quite extensive.

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 460 yds above the mouth of the stream, occurs a falls which constitutes a barrier at all times. The falls is only about 10' high but has a ledge 4' from the top which directs the water away from the base of the drop. There is a bend in the falls at the bottom and another at the top, making it impossible for fish to jump. Several logs across the top of the falls increase the difficulty. A small pool is present at the base of the falls, but there is a continuous bad boil in it.

Fluctuation in Water Level:

Cause of Variation: Only 2' in region of falls. Estimated stream flow was 15-20 cfs on May 24, 1941. The burn in the upper portion of the river has probably increased the rate of runoff. All the stream bed was covered at the time of survey.

Pollution: None

Fish (salmon): None observed. The accessible portion of the stream could accomodate only a few salmon.

Fish (other than salmon): None observed. A few steelheads were seen in the South Fork Toutle a short distance below the mouth of Bear Creek but none were observed in the tributary stream itself.

General Remarks:

Bear Creek possesses scarcely any value to salmon or steelheads. In the lowermost 460 yds, the only portion accessible to migratory fish, there are few satisfactory spawning riffles and little useable rubble. For the most part, the rubble averages too large in size. Not more than a few salmon or steelheads could use the stream. The upper part of the river is inaccessible because of a falls at 460 yds.

Temperature Data: None

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
M-Falls	.26	8	30.7	1	1	2	4	9
				12.5	12.5	25.0	50.0	

Gradient: (Data from Columbia National Forest Map, 1940).  
Elevation at mouth -- ca. 1,095; gradient in lowest 1.5  
-- ca. 270'/mile.

Tributaries: None

## Trouble Creek

River System: Cowlitz River

Stream Surveyed: Trouble Creek, tributary to South Fork Toutle

Date of Survey: May 23, 1941 by Frey

Source: Drains a small area on the south side of the South Fork Toutle River near the eastern edge of Cowlitz County. The river arises on Big Bull Mountain in T8N of R3E, drains most of the NE4 of this township and a small part of the SE4 of T9N.

Direction of Flow: The stream flows in a general northerly direction from source almost to the confluence with the main river, then turns west for the last 3/4 mile and enters the South Fork Toutle from the right bank in NW4, S36 T9N, R3E.

Total Length: 4 miles of which 500 yds were surveyed.

Station Location: None taken; confluence with South Fork Toutle NW4, S36, T9N, R3E.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080005	1067	0.00
End of survey*	17080005	1067	0.00

\* This location is not definite and has been estimated

## Character of Bottom Between Stations:

<u>Station</u>	<u>Area (<math>\text{yd}^2</math>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	2,700	1,310	48.5	880	32.6	240	8.9	270	10.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	Usable
Total	500	2,700	1,120	41.5	515	19.1

Spawning Area Unavailable and Unusable: None in portion surveyed

## Character of Watershed:

Mountainous, covered with a dense douglas fir association in the lowlands, silver fir and spruce on the tops of the mountains. No cultivation. The valley is v-shaped, 200-800 yds wide. Banks for the most part are continuous with the valley walls. The dense marginal vegetation consists of devil's club, vine maple, alder and salmon berry. Recent erosion is not much in evidence.

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: Estimated 2-5'.

Stream Volumes: The flow on 5/23/41 was 10-15 cfs. Approximately 80% of the stream bed was covered at this time.

Pollution: None

Fish (salmon): None observed or reported.

Fish (other than salmon): None observed. It seems likely that a few steelheads enter the river.

## General Remarks:

The stream is small, has a moderate gradient for the first 1/4 mile, but then becomes considerably steeper. The stream could probably support only a few steelheads or salmon in the lower portion because of the preponderance of large rubble and the fast water.

## Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Skv</u>
Mouth	5/23/41	8:30 AM	52.0F	.45.0 F	Clear

## Pool Grade:

<u>Sta</u>	<u>Dist (mi)</u>	<u>Resting Pools</u>	<u>Resting Pools/Mile</u>	<u>S1T1 %</u>	<u>S1T2 %</u>	<u>S2T1 %</u>	<u>S2T2 %</u>	<u>S6</u>
Tot	.28	3	10.7			1 33.3	2 66.7	6

Gradient: Data from Columbia National Forest Map, 1940. Elevation at mouth -- ca. 1,480; gradient for lowest 1.5 miles -- ca. 350'/mile.

Tributaries: None in portion surveyed.

Green River

River System: Cowlitz River  
 Stream Surveyed: Green River, tributary to North Toutle River

Date of Survey: May 13-17, 29-30, 1941 by Frey and Bryant

Source: Green River arises in the region immediately north of Spirit Lake in west Skamania County, draining low mountains and the area between the Cowlitz and North Toutle rivers.

Direction of Flow: From its ultimate source in Norway Pass, the river flows north for three miles, then northwest for seven miles. From here to the confluence with the North Toutle, the stream flows in a general westerly direction, roughly following the boundary between Lewis County and Cowlitz County. The area drained includes most of T10N, T11N to R2E to R6E.

Total Length: 32 miles of which 26.3 were surveyed

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Max. Location	Width
	Yds	Miles	Yds	Miles		
A Conf w/Cowlitz	---	---	---	---	S8,T10N,R2E	92'
B Conf w/Devil Ck		4.2		4.2	S2,T10N,R2E	70'
c Conf w/Cascade Cr		8.1		12.3	S1,T10N,R3E	60'
D Conf w/Schultz Cr		2.8		15.1	S4,T10N,R4E	50'
E Green R. G.S.		4.2		19.3	S31,T11N,R5E	60'
F Black Falls		7.0		26.3	S18,T10N,R6E	35'

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0029	0.00
B	17080005	0029	4.69
C	17080005	0030	8.86
D	17080005	0032	0.00
E*	17080005	0032	2.93
F*	17080005	0032	11.05

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area ( $vd^2$ )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B	231,000	94,050	40.7	67,990	28.4	45,896	19.9	23,100	10.0
B-C	325,000	165,190	50.8	89,570	27.6	37,050	11.41	33,190	10.2
C-D	99,800	50,070	50.2	29,950	30.0	7,490	7.5	12,290	12.3
D-E	149,800	53,420	35.7	46,340	30.9	32,660	21.8	17,380	11.6
E-F	<u>212,100</u>	<u>67,680</u>	31.9	<u>61,390</u>	29.0	<u>32,950</u>	15.5	<u>50,080</u>	23.6
Tot	1,017,700	430,410	42.3	295,240	29.0	156,010	15.3	136,040	13.4

	Estimate	Useable %
A-B	23,925	10.4
B-C	18,535	5.7
C-D	9,875	9.9
D-E	19,320	12.9
E-F	<u>19,355</u>	9.1
Total	.91,010	8.9

Classification of stream based on amount of usable spawning rubble and area present:

	Area ( $vd^2$ )	Usable Spawning Area ( $vd^2$ )	Quality ( $vd^2$ )			
			Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excellent (70.6- -100%)
Estimated usable rubble Spawning rubble (MR + SR)	1,017,700	91,100	53,285	28,685	9,040	
	1,017,700	451,250	980	46,560	403,710	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area ( $vd^2$ )	Available Spawning Area ( $vd^2$ ) (MR&SR)	% Avail	Usable Spawning Area ( $vd^2$ )	% Usable
A-B	7,400	231,000	113,850	48.3	23,925	10.4
B-C	14,260	325,000	126,620	39.0	18,535	5.7
C-D	4,920	99,800	37,440	37.5	9,875	9.9
D-E	7,400	149,800	79,000	52.7	19,320	12.9
E-F	<u>2,300</u>	<u>49,600</u>	<u>24,560</u>	49.5	<u>2,080</u>	4.2
Total	36,280	855,200	381,470	44.6	73,735	8.6

## Spawning Area Unavailable and Unusable:

Station	Distance	Area (Yd <sup>2</sup> )	Area Unavail (Yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (Yd <sup>2</sup> )	% Usable Unavail
E-F	10,000	162,500	69,780	42.9	A.T.	17,275	10.6

Cause of Unavailability: 2,300 yds above the Green River Guard Station is "Big Falls," a 12-15' falls which forms a barrier to salmon and steelheads at all times.

## Character of Watershed:

	A-B	B-C	C-D	D-E	E-F
Mountainous		X	X	X	X
Hilly	X		X		
Rolling					
Flat					
Swampy					
Wooded	Cut over	Cut over	Cut over	Forest	Virgin
Open			Burn over		
Cultivated	None	None	None	None	None
Character of Valley	U-V more open than above 1/8 1/4 mile	V canyon up to 1/2 mile w.	U some flat land 1/4-1 mile	u 1/2-1 mile	v-u 1/4-1 mile
Character of Banks	2-400' 8' av. bedrock, gravel	Con. with val. walls to 2,000'	Ave. 4' earth, gravel, bedrock	3-150' earth, gravel, bedrock Av. 4-8'	5-300' av 4' rock, some gravel
Density of Marginal Vegetation	Alder, willow, vines fairly dense	Vine maple, devilsclub, shrubs, very dense	vine maple, alder, dog-wood, fern, very dense	alder, vine, maple, cedar, devilsclub, dense	devils club, vine maple, huckle berry, dense

## Character of Watershe (cont):

	A-B	B-C	C-D	D-E	E-F
Erosion					
a) Banks	Considerable	Moderate	Extensive	Considerable	Moderate
b) Watershed "		Extensive	Moderate	Extensive	"

Diversions: None

## Artificial Obstructions:

1. Numerous small log jams in upper portion, but all were judged passable.

## Natural Obstructions:

1. 4,800 yds above Devil's Creek, Sta. B, falls with a total drop of 8'. The river channel is split by a large piece of bedrock, forming a channe 6' wide on the right and 8-10' wide on the left. Most of the water was flowing through the left channel, where there is an upper falls of 2' and a lower one of 6', the two being separated by 15' of boiling water. Below the 6' drop is a boil in adgoo Sl pool. Passable at high water. Passable with considerable difficulty at low water. This would make an excellent place to count the run of salmon and steelheads in Green River.

2. 2,300 yds above Green River Guard Station, Sta. E, 15' falls impassable at all times. Extreme water rise of 2-3' indicated which would be insufficient to make falls passable. Known locally a "Big Falls."

3. Black Falls at Sta. F, impassable at all times. The falls is really a bad cascade with a total drop of c 60' over a horizontal distance of c 80'. The river enters a narrow gorge below the falls in which only c 60' below the first falls there is another cascade falls almost equally as bad and only half as wide as the first. See picture.

## Fluctuation inrWater Level:

Sta	Ft. Variation	% Stream Bed Covered
A-B	5-10	90.0
B-C	2-6	99.0
C-D	2-5	85.0
D-E	3-5	90.0
E-F	2-5	97.0

## Fluctuation in Water Level (cont):

Cause of Variation: The variation in water level is produced by the melting of snow in the headwaters in spring and increased runoff from seasonal precipitation. Runoff is probably more rapid in the cutover lower half of the watershed. A big flood in 1934 washed out several Weyerhauser railroad tressels.

Stream Volumes: A flow of 241 cfs was measured 200 yds above the mouth of the stream on 6/2/41.

Pollution: None except silt and vegetable colloids during the periods of rapid runoff. No deteriorous effects.

Fish (salmon): None observed. Fair numbers of fall chinooks and silver salmon are reported to ascend the stream up to Big Falls, Fry, 2" long was fairly abundant between Sta. D and E and may have been salmon in part.

Fish (other than salmon): 15 adult steelheads and three redds were counted above Sta. B. One dead male sampled on 5/15/41, was already spent.

Remarks: Bryant caught 14" blackspot on 5/15/31. Men at the Weyerhauser Camp #7 catch rainbows and cutthroat. Whitefish are reported from the lower portion of the stream. In general, fishing was poor above the Soda Springs Ranger Station.

## General Remarks:

Green River is accessible to large migratory fish at all seasons up to Big Falls. For the most part, the gradient is steep and the rubble a little too large to form good spawning locations for salmon. Estimated useable rubble for the entire accessible portion of the stream is 8.6% and the available spawning rubble (MR & SR) comprises only 44.6%.

The river is inaccessible by public roads except at the mouth which lies close to the Spirit Lake highway. Weyerhauser railroad lines follow the river to S9, T10N, R3E. On the north side of the river, old railroad lines extend almost to Cascade Creek, but above this point the stream can be reached only by forest trails.

For the most of its length, the river flows in a rather narrow valley, which becomes a narrow canyon between Cascade Creek and W.T.C. camp #7. Above the canyon from Cascade Creek to the Green River Guard Station, the valley is broader usually with some flat

## General remark (cont):

land in the bottom, allowing some fairly good spawning riffles to occur. Most of the steelheads were found in this portion of the stream. Below the canyon, the valley again broadens somewhat. Surrounding hills are lower and there is more flat land. Gravel beaches occur in places, but the rubble still averages too large for good salmon territory.

According to plans, all the land west of the Columbia National Forest boundary will eventually be logged over by the Weyerhaeuser co. At the time of the survey the virgin forests of douglas fir, hemlock and cedar extended downstream to the Soda Springs Ranger Station and occurred in isolated sections below here.

The river runs clear most of the time. Heavy rains, however, of sufficiently long duration can make the stream so turbid with fine silt and vegetable colloids that the bottom cannot be seen in fairly shallow riffles. Such was the case on May 17 after three days of steady rain, although the stream had been very clear previously.

Near W.T.C. Cam #7 isna 8' bedrock falls separated into two channels by a large boulder. Men from the camp watch salmon and steelheads go over these falls and it appears to be an excellent place to establish a counting station if such is ever desired on Green River.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
2.3 mi above B	5/30/41	8:00 AM	48.6	F 45.0	F Few cirruss cloud
5.0 mi above B	5/29/41	11:00 AM	50.0	45.0	Overcast; drizzle
1.2 mi above C	5/17/41	2:00 PM	46.0	44.0	Overcast; showers
1.2 mi above C	5/15/41	3:30 PM	49.0	45.0	Overcast
Sta. D	5/15/41	12:30 PM	49.0	44.0	Overcast
Sta. F	5/13/41	9:30 AM	49.0	41.0	Overcast

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	S2T1 %	S2T2 %	S6
A-B	4.2	71	16.9	11	12	6	42	2
				15.5	16.9	8.5	59.1	
B-C	8.1	71	8.8	6	6	13	46	199
				8.5	8.5	18.3	64.8	
C-D	2.8	60	21.4	4	3	25	28	167
				6.7	5.0	41.7	46.6	

## Pool Grad (cont):

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	S2T1 %	S2T2 %	S6
D-E	4.2	131	31.2	6	9	27	89	106
E-F	7.0	149	21.3	6	9	35	99	220
Tot	26.3	482	18.3	33	39	106	304	694
				6.8	8.1	22.0	63.1	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	4.2	140'	33'	Col. Nat. Forest Map 1940
B-C	8.1	520'	64'	"
C-D	2.8	160'	57'	"
D-E	4.2	410'	98'	"
E-F	7.0	<u>760'</u>	<u>109'</u>	"
Total	26.3	1,990'	76'	"

## Tributaries:

1. Devil's Creek at Sta. B, left bank, 7,400 yds above mouth. 15' wide, 10-15 cfs, surveyed 5/30/41.
2. 1,860 yds above Sta. B, right bank, 2-3 cfs, steep channel full of logs and brush. No value.
3. 2,610 yds above Sta. B, right bank, 2-3 cfs, steep, no value.
4. 3,660 yds above Sta. B, left bank, ca 3 cfs, very steep, many logs in channel, no value to salmon.
5. 3,900 yds above Sta. B, left bank, ca 5 cfs, very steep inaccessible.
6. 4,200 yds above Sta. B, right bank, ca 3 cfs, steep, little value.
7. 5,900 yds above Sta. B, right bank, 3-5 cfs, 60' falls, 250 yds above mouth. Inaccessible. Picture.
8. 7,200 yds above Sta. B, left bank, 3-5 cfs, very steep, inaccessible.

## Tributaries (cont):

9. 9,360 yds above Sta. B, right bank 3' wide, 204" deep, ca 3-4 cfs, choked with logs and brush, inaccessible A.T.
10. 9,460 yds above Sta. B, right bank, ca 3 cfs, gulley filled with lumbering debris. Too small.
11. 9,860 yds above Sta. B, left bank 6' wide 3-5" deep, ca 5 Cfs Too steep and shallow, full of boulders.
12. 10,460 yds above Sta. B, right bank, ca 3 cfs, too steep and small.
13. Cascade Creek at Sta. C, left bank, 14,260 yds above Sta. B, 15' wide, ca 10-15 cfs. Water coffee colored with vegetable colloids. Gradient steep. Air temp. 46.0, water temp 45.0 at 3:30 pm on 5/17/41, surveyed 5/17/41.
14. 1,750 yds above Sta. C, left bank 5' wide, ca 1 cfs, appears to be intermittent, no value.
15. Elk Creek, 2,160 yds above Sta. C, left bank 12' wide ca 10 cfs. Water dark in color. Air temp 49.0 F, water temp 47.0 F at 3:30 pm 5/15/41 surveyed 5/17/41.
16. Schultz Creek at Sta D, right bank, 4,920 yds above Sta. C, 20' wide, ca 0 cfs. Air temp 50.0 F, water temp 45.0 F at 10:45 am on 5/15/41, surveyed 5/15/41.
17. Trade Dollar Creek 1,600 yds below Sta. E, right bank, ca 10 cfs, not surveyed.
18. 1,500 yds below Sta. E, left bank, too small.
19. Miners Creek 800 yds above Sta. E, right bank 25' wide, ca 30 cfs. Surveyed 5/14/41. Good salmon and steelhead stream.
20. 1,000 yds above Sta. E, left bank, small.
21. 1,600 yds above Sta. E, left bank, 1 cfs, steep.
22. 2,400 yds above Sta. E, left bank, 1-2 cfs, too steep.
23. 2,700 yds above Sta. E, left bank, 5-10 cfs.
24. 3,000 yds above Sta. E, left bank, 1-2 cfs.
25. 2,700 yds above Sta. E, left bank, ca 2 cfs.
26. 4,400 yds above Sta. E, left bank, ca 1 cfs.

## Tributaries (cont):

27. Deadman's Lake Creek (?) 5,400 yds above Sta. E, left bank 6' wide, 2-3 cfs. Steep, inaccessible.
28. 5,700 yds above Sta. E, left bank 4' wide, 102 cfs, not useable.
29. 7,480 yds above Sta. E, left bank 6' wide, 3-5 cfs, channel choked with debris.
30. 7,920 yds above Sta. E., right bank 3' wide, ca 1 cfs. Impassable falls 250 yds above mouth.
31. 9,220 yds above Sta. E, right bank 3' wide, ca 1 cfs. Steep, impassable log jam 15 yds above mouth.
32. 10,400 yds above Sta. E, right bank 3' wide (1 cfs probably intermittent). Enters Green River over 8' falls.
33. 10,890 yds above Sta. E, left bank 8' wide, ca 2 cfs. Steep channel choked with brush and logs.
34. Venus Lake Creek 11,000 yds above Sta. E, right bank 10' wide, 5-8 cfs. Steep, channel choked with logs and brush.
35. Panhandle Lakes Creek 11,120 yds above Sta. E, right bank 15' wide, 15-20 cfs. Rubble 60-10-0-30. Steep. Fairly big snag on a cascade only 30 yds from mouth. Doubtful if salmon could get very far. Air temp 51.0 F, water temp 40.0 F at 11:15 am on 5/13/41.

## Devil's Creek

River System: Cowlitz River

Stream Surveyed: Devil's Creek, tributary to Green River

Date of Survey: May 20, 1941 by Frey

Source: Devil's Creek is formed by several small tributaries arising in the low mountains in the south half of T11N, R3E in the eastern portion of Cowlitz County. The stream flows west for four miles then southwest for three miles to its confluence with the left side of Green River. Slightly more than a mile from the mouth of Devil's Creek is joined by a fair size tributary draining part of the southeast corner of T11N, R3E.

Direction of Flow: West, southwest

Total Length: Approximately 5 miles, about .5 miles surveyed.

Station Location: None taken. Devil's Creek joins Green River in NE4, S2, T10N, R2E. Here the estimated width of the creek is 15'.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth, Confl w/Green R	17080005	0033	0.00
End of survey*	17080005	0033	0.00

\* This location is not definite and has been estimated

## Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	4,200	2,430	57.8	1,050	25.0	150	3.6	570	13.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )
Total	300	1,600	320	20.0	

## spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Unavail
Total	500	2,600	880	33.9	L.W.	75	2.9

## Character of Watershed:

Hilly to mountainous, covered with a dense douglas fir forest which has been logged off in the upper portion of the watershed. No cultivation. The river flows through a valle 1/4 to 1/2 mile wide with steep hills at the sides and not much flat land at the bottom. Banks average 3' in height, one mostly nearly vertical and composed of bedrock, dirt and some rubble. Alder, vine maple, devil's club, berry bushes, brackens and skunk cabbage form a very dense marginal vegetation. Recent erosion is not much in evidence.

Diversions: None

Artificial Obstructions: None

## Natural Obstructions:

1. 360 yds above mouth is a bedrock chute with a total drop of 6' over a 45 degree slope. The chute is considerably wider than the normal stream and in no place was the water deeper than 2-3". There is a good S2 resting pool below the chute. Nevertheless, the chute was considered to be a low water barrier.

Fluctuation in Water Level:

Stream Volumes: Water level fluctuation appeared to be c 2' at the most. Estimated stream flow o 5/30/41 was 10-15 cfs. Approximately 95% of the stream bottom was covered by water.

Pollution: At the time of the survey, the water was somewhat opalescent and dank in color from vegetable colloids.

Fish (salmon): None observed. A small run of silver salmon is reported from the stream.

Fish (other than salmon): None observed. Some steelheads are reported to ascend the stream.

General Remarks:

The first half mile of Devil's Creek does not appear to be of much value to salmon or steelheads. In the first 400 yds, a preponderance of large rubble reduces the spawning rubble to a very small percentage. At 6 yds occurs a bedrock chute which was judged to be a barrier at low water. Above the chute large rubble still comprises more than half the bottom, although the percentage decreases as one proceeds upstream. Only a small amount of useable rubble was observed. Natives report a small run of steelheads and silver salmon in the stream.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
Mouth	5/30/41	10:50 AM	59.0 F	49.0 F	Clear

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	.45	7	15.5				7	5
							100.0	

Gradient: Data from Columbia National Forest Map, 1940.  
Elevation at mouth c 890', gradient for lowest 1/2  
milesac 900'/mile.

Tributaries: None in portion surveyed.

### Cascade Creek

River System: Cowlitz River  
 Stream Surveyed: Cascade Creek, tributary to the Green River

Date of Survey: 5/17/41 by Bryant

Source: The stream drains the SW4 of T11N, R4E, in the eastern part of Cowlitz County, WA.

Direction of Flow: Arising on the southwest slope of Winters Mt. it flows south for the first two miles then southwest to its confluence with Green River in SE4, S32, T11N, R4E.

Total Length: 4 miles of which 500 yds were surveyed

Station Location: None taken; mouth in SE4, S32 T11N, R4E was estimated to be 12' wide.

#### EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth, conf w/Green R	17080005	0089	0.00
End of survey*	17080005	0089	0.00

\* This location is not definite and has been estimated

#### Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	2,100	940	44.8	630	30.0	320	15.2	210	10.0

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )						
		Use Spawn Area (yd <sup>2</sup> )	Poor	Fair	Good	Excel		
Estimated usable rubble Spawning rubble (MR + SR)	2,100	20	20	(10.6-30.6-70.6-100%)	(0-5%)	(-30.5%)	(-70.5%)	(-100%)
	2,100	950	150	800				

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
Total	500	2,100	950	45.2	20	1.0

spawning Area Unavailable and Unusable: None in area surveyed

## Character of Watershed:

Mountainous, covered with douglas fir, hemlock and cedar forest. No cultivation. Valley narrow, v-shaped. Banks mostly continuous with valley walls. Brushy along banks. Moderate erosion.

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in **Water** Level 2-4'. Stream at small flood stage when surveyed. Estimated wflo 10-15 cfs. All of stream bed covered.

Pollution: The water was coffee colored with bunic acids bleached out with rains of four previous days.

Fish (salmon): None observed or reported

Fish (other than salmon): None observed. Conditions (flood stage and color of water), were very poor for observing fish.

## General Remarks:

Cascade Creek has little value for salmon. The gradient is steep, really a series of cascades among boulder 6"-2' in diameter. There is very little spawning area for steelheads or salmon, only small patches at the lower edges of the larger pools. It is doubtful if the stream is passable at low water.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
Mouth	5/17/41	3:30 PM	46.0	45.0	Clear in

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	.28	4	14.3			3	1	12
						75.0	25.0	

Gradient: Data from Columbia National Forest Map, 1940.  
Elevation at mouth - ca 1,380'; gradient for lowest 2 miles - 210'/mile.

Tributaries: None in portion surveyed

**Elk Creek**

River System: Cowlitz River

Stream Surveyed: Elk Creek, tributary to Green River

Date of Survey: 5/17/41 by Frey

Source: The stream lies on the eastern side of Cowlitz County, WA entirely within T11N of R4E. Immediately to the north is the drainage of the main Cowlitz River.

Direction of Flow: In a general southwest direction. One mile from the mouth, the stream turns northwest for 1/2 mile then bends once again and continues to flow southwesterly.

Total Length: 6 miles of which only the first 500 yds were surveyed.

Station Location: No stations were taken. Elk Creek joins Green River from the left side in SW4, S31 T11N, R4E. Estimated width, 15'.

EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth, conf w/Green R	17080005	0093	0.00
End of survey*	17080005	0093	0.00

\* This location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	3,200	1,390	43.4	560	17.5	310	9.7	940	29.4

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
Total	500	3,200	870	27.2	295	9.2

## Spawning Area Unavailable and Unusable:

Cause of Unavailability: None in area surveyed. Samuelson, the ranger at the Spirit Lake Station reports that there is an impassable falls ca 1 mile above the mouth.

## Character of Watershed:

Mountainous, covered with a dense douglas fir, hemlock, cedar forest, containing a sprinkling of large leaf maples and yews. No cultivation. Sixty yds above the mouth begins a narrow canyon, 40-150 yds wide. The immediate banks of the stream are 2-4' high, or rubble and earth. Marginal vegetation consisting of vine maple, dogwood, devil's club, raspberry and salmonberry is very dense. Recent erosion is not much in evidence.

Diversions: None

## Artificial Obstructions:

1. Four log jams in the portion surveyed are passable, though ~~on~~ with considerable difficulty.

## Natural Obstructions:

1. A 7' high falls at 130 yds is ~~passable~~ with some difficulty. Samuelson, the resident ranger at Spirit Lake reports an impassable falls ca one mile above the mouth.

Fluctuation in Water Level: Estimated to be 2-4'. Flow on 5/17/41 was estimated at 15 cfs.

Pollution: None, except bunic acids making water coffee colored.

Fish (salmon): None seen or reported.

Fish (other than salmon): No steelheads were observed in portion of stream survey. A few small trout fry 1 1/2" long were seen, but the species was not determined.

General Remarks:

Elk Creek does not appear to be of much importance to salmon or steelheads. The gradient is fairly steep and in the 500 yds surveyed there were four log jams and 1-7' falls, all of which were passable with some difficulty. About one mile above the mouth, Samuelson, the Spirit Lake Ranger, reports there is an impassable falls. As the stream had so little value for salmon, it did not appear worthwhile to continue the survey to this barrier.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
Mouth	5/15/41	3:30 PM	49.0 F	47.0 F	Overcast
					(Water quite dark brown)
Mouth	5/17/41	12:30 PM	46.0	46.0	Overcast, drizzle
					(Water much darker than previously. Somewhat muddy as well)

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	.28	4	14.9			2	2	20
						50.0	50.0	

Gradient: Elevation at mouth ca 1,460; gradient for lowest four miles 75'/mile.

Tributaries: None in section surveyed.

**Schultz Creek**

River System: Cowlitz River  
 Stream Surveyed: Schultz Creek, tributary to Green River

Date of Survey: 5/15/41 by Frey

Source: Drains the eastern half of T10N, of R4E along the eastern edge of Cowlitz County, ca 1/2 mile above the mouth.

Direction of Flow: The stream splits into two large branches, one of which continues south for several miles while the other bends southeast for two miles then south paralleling the other branch. Tributaries enter this branch from Elk Lake, Hanaford Lake and Fawn Lake.

Total Length: 5 miles in east branch of which 500 yds were surveyed.

Station Location: None taken. The stream enters Green River from the right in S4, T10N, R4E. Estimated width 20'.

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Confl w/Green R	17080005	0031	0.00

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	3,500	890	25.4	1,610	46.0	650	18.6	350	10.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> )	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Total	500	3,500	2,260	64.6	770	22.0

Spawning Area Unavailable and Unusable: None

Cause of Unavailability: A bad log debris jam at 200 yds was considered impassable until a steelhead skeleton was found a short distance further upstream.

## Character of Watershed:

Mountainous, covered with a dense fir, hemlock, cedar forest. No cultivation. The valley is fairly steep sided, 200 yds to 1/2 mile broad. Banks vary from 2-8' in height, steep of earth and rubble. Marginal vegetation is dense, consisting of vine maple, alders, salmon berry and devil's club. Erosion is fairly extensive in places.

Diversions: None

## Artificial Obstructions:

1. A bad log and debris jam at 200 yds is passable with considerable difficulty.

Natural Obstructions: None

Fluctuation in Water Level: Estimated to be 2-5'. Estimated stream flow was 20 cfs on 5/15/41. Approximately 75% of the stream bed was covered with water on this date.

Pollution: None

Fish (salmon): None observed or spotted.

Fish (other than salmon): A steelhead skeleton was found 300 yds above the mouth. No other fish were observed.

General Remarks:

Schultz Creek appears to be of little value to salmon or steelheads. Although there was considerable medium and small rubble in the portion surveyed, steep gradient and fast water prevented much of it from occurring in satisfactory spawning situations. A bad log and debris jam at 200 yds was, at first, considered to be a temporary total barrier, but in the next 200 yds a steelhead skeleton was found, indicating the barrier did not entirely stop upstream migration. There is little possibility of better spawning areas occurring farther upstream because of the continuous steep gradient shown on the map.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
Mouth	5/15/41	10:45 AM	50.0 F	45.0 F	Overcast

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	.28	5	18.9			1	4	15
						20.0	80.0	

Gradient: Elevation at mouth ca 1,530'; gradient for lowest 2 1/2 miles ca 310'/mile.

Tributaries: None in portion surveyed

## Miners Creek

River System: Cowlitz River  
 Stream Surveyed: Miners Creek, tributary to Green River

Date of Survey: 5/14/41 by Frey

Source: Arises in S22, T10N, R5E on the north side of Minnie Peak along the western side of Skamania County, WA. Except for the lowest 1/2 mile the stream lies entirely within T10N of R5E, draining most of the NE4 of that township.

Direction of Flow: The stream flows northwest for 2 1/2 miles, north for 1 1/2 miles and northwest again for another 1 1/2 miles to its confluence with Green River in SE4, S31, T11N, R5E.

Total Length: Six miles of which 1 4. miles were surveyed.

Station Location: None taken. Mouth in SE4, S31, T11N, R5E. Terminus of survey at trail crossing in SE4, S5, T10N, R5E.

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth, conf w/Green R	17080005	0104	0.00
End of survey	17080005	0104	0.00

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	24,600	9,720	39.5	9,060	36.8	2,650	10.8	3,170	12.9

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
Total	2,490	24,600	11,710	47.6	5,335	21.8

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

Mountainous covered with douglas fir association. No cultivation. Valley rather narrowly v-shaped, canyon beginning 300 yds above mouth 100 yds to 500 yds wide. Banks average 3' high - rubble, earth and bedrock. Dense marginal vegetation consisting of alder, vine maple, devil's club, salmonberry. Erosion underneath.

Diversions: None

## Artificial Obstructions:

1. Numerous log jams and snags, but all were found to be passable.

## Natural Obstructions:

1. Several cascades and low falls, but all passable.

Fluctuation in Water Level: Estimated at 2-5' ca 70% of the stream bed was covered with water at time of survey. Flow ca 30 cfs.

Pollution: None

Fish (salmon): None observed. It seems likely, however, that part of the run of fall chinooks and silvers in Green River would find their way to this stream.

Fish (other than salmon): 11 adult steelheads were counted and six steelhead redds. Some of the fish were working the gravel when observed. Trout fry (sp) were moderately abundant in back waters and eddies.

General Remarks:

Miners Creek is the best tributary stream for salmon and steelheads in the upper portion of Green River. There are numerous small cascades and falls, small log jams and single log snags in the river, some of which appeared to be barriers when they were encountered; but in every case steelheads were encountered above the supposed barriers. Many fairly good resting pools (old S2 type) occurred in association with the log jams and snags. Some good spawning areas were noticed.

The survey was terminated at the trail crossing because of the lateness of the hour. It seems evident, however, that salmonids use the stream above the trail crossing as the gradient appeared to be lessening.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
Mouth	5/14/41	11:15 AM	47.0 F	42.0 F	Overcast:rain
Trail Crossing	5/14/41	2:30 PM	49.0	41.0	Overcast

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	1.4	78	55.7			30	48	95
						38.5	61.5	

Gradient: The gradient for the next 1 1/2 miles upstream from the trail crossing is ca 260', approximately the same as that in the stream below the trail crossing.

Tributaries: None in surveyed portion

**Alder Creek**

River System: Cowlitz River  
 Stream Surveyed: Alder Creek, tributary to North Fork Toutle River

Date of Survey: 5/28/37

Source: Cowlitz County, WA. Enters Toutle River in NW 1/4, SE 1/4, S15, T10N, R2E.

Direction of Flow: Northwest

Total Length: 6 miles, 3.35 miles surveyed

## Station Location:

<u>St</u>	<u>Location</u>	<u>Distance Above Prev. Station</u>		<u>Distance Above Mouth</u>		<u>Map Location</u>	<u>Width</u>	<u>Depth</u>
		<u>Yds</u>	<u>Miles</u>	<u>Yds</u>	<u>Miles</u>			
A	Conf w/ Toutle R	---	---	---	---	S15,T10N,R2E	20'	13.7"
B	5,900 yds above A	3.4		3.4		S35,T10N,R2E	7'	3.4"

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
A	17080005	0022	0.00
B	17080005	0022	2.36

## Character of Bottom Between Stations:

<u>Station</u>	<u>Area (vd<sup>2</sup>)</u>		<u>L.R.</u>		<u>M.R.</u>		<u>S.R.</u>		<u>M&amp;S</u>	
	<u>Yds</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	<u>%</u>	
A-B			15.0		24.0		44.0		18.0	

classification of stream based on amount of usable spawning rubble **and** area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
A-B	5,900	26,545		68.0	

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	A-B
Mountainous	
Hilly	X
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	Less than 1%
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None. Great numbers of logs and brush in and across stream.

Fluctuation in Water Level: Lower 1/3 - 3'; Middle 1/3 - 18";  
Upper 1/3 - 4'.  
Cause of Variation: Heavy rains  
Strm Volumes: St A 24.6 cfs 5/28/37

Pollution: None

Fish (salmon): Silver fingerlings

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Silver					
Salmon fingerlings			X		
Marine Lampreys				X	

General Remarks:

Survey:

3.35 miles on May 28, 1937

Topography:

The lower part of Alder Creek flows through a wide, shallow valley. As progress is made upstream, the valley narrows and the hills become higher until the mountains of the headwaters are reached. The lower part of the valley is flooded during periods of high water. Second growth conifers, mostly fir, are dense throughout the entire watershed. Logging operations are now under way near the forks, where this second growth timber is being removed.

Character of Stream:

Although the stream is rather small excellent spawning areas, pools and shade were found throughout practically all of the distance surveyed. Fallen logs practically form a network over the stream for the entire distance. However, few of these

## General remarks (cont):

appear to be any obstruction to migrating salmonids, and none are believed to be barriers. Along the lower reaches, the banks are from one to two feet in height. Here they are flat and composed of earth and gravel. Further upstream, one bank is frequently from 15-30' high and largely of rock, but the other is always low and composed of gravel with considerable earth.

The gradient is moderate, estimated as being 70-90' per mile. All of the spawning gravels are suitable for use by salmonids with one possible exception of that found in the upper 700 yds of the survey. Here the bottom is about 70% large rubble with spawning gravels forming only small pockets in the cascades.

Fish Population:

Silver salmon fingerlings were observed in great abundance throughout the distance surveyed. A moderate spring run of steelheads is reported, but none were seen. A few marine lampreys were observed spawning.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	5/28/37	10:15 AM	51.0 F	48.0 F	Cloudy
		1:30 PM	55.0	47.0	Partly cloudy

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S2T1 %	S2T2 %	S3T1 %	S5T1 %	S6
A-B	3.4	134	39.4	16	76	1	33	8	40
				11.9	56.7	0.7	24.7	6.0	

Gradient: The survey crew estimated the gradient to be 70-90' per mile. Topographic maps not available.

Tributaries: Numerous, but all small and unnamed

## Hoffstadt Creek

River System: Cowlitz River  
 stream Surveyed: Hoffstadt Creek, tributary to North Fork Toutle River

Date of Survey: May 7-8, 1941 by Frey and Bryant

Source: Drains a small area in the northeast corner of Cowlitz County, WA north of the Toutle River. The stream arises in T10N of R4E.

Direction of Flow: Flows almost due west for its entire course to its confluence with the Toutle River in S23, T10N, R2E.

Total Length: 13 miles of which 7 were surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/N Fk Toutle	---	---	---	---	S23,T10N,R2E	35'	12.5"
B Conf w/Bear Cr	1.9	---	1.9	---	S24,T10N,R3E	33'	---
C Conf w/unnamed	3.7	---	5.6	---	S28,T10N,R3E	15'	---
D 5' falls	1.4	---	7.0	---	S22,T10N,R3E	18'	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0844	0.00
B	17080005	0844	0.00
C	17080005	0862	0.00
D*	17080005	0862	0.00

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
A-B	42,500	8,610	20.3	15,380	36.2	13,870	32.6	4,640	10.9
B-C	58,550	12,870	22.0	19,450	33.2	13,525	23.1	12,705	21.7
C-D	15,660	5,880	37.7	4,380	28.1	3,990	25.6	1,350	8.7
Total	116,650	28,360	23.5	39,210	33.6	31,385	26.9	18,695	16.0

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Use Spawn Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )			
			Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excel (70.6- -100%)
Estimated usable rubble Spawning rubble (MR + SR)	116,650	37,080	1,970	9,465	21,845	3,800
	116,650	70,595		1,710	48,965	9,920

spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
A-B	3,400	42,500	29,250	68.8	12,360	29.1
B-C	6,450	58,550	32,975	56.3	20,005	34.2
C-D	<u>2,500</u>	<u>13,100</u>	7,870	60.1	<u>4,640</u>	35.4
Total	12,350	114,150	70,095	61.4	37,005	32.4

spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Usable
<u>Unavail</u> C-D		300	1,300	260	20.0		L.W43.5
C-D	200	1,200	240	20.0	A.T.	30	2.5

1. The low water barrier occurring 2,000 yds above Sta. C consists of a cascade falls dropping 8' over a pile of big boulders. Channels between the boulders are narrow and there is little depth from which to jump.
2. The barrier at all times is temporary. The uppermost falls of a series of 3-2,300 yds above the mouth has a large log projecting into it from the right bank, constricting the channel. The water flows over a large boulder forming a chute 2' wide and 5' high. Snags increase the difficulty of the jump.

Character of Watershed:

	A-B	B-C	C-D
Mountainous	X	X	X

Character of Watershed (cont):

## Character of Watershed (cont):

	A-B	B-C	C-D
Hilly			
Rolling			
Flat			
Swampy			
Wooded	Fir, cedar, hemlock	Douglas fir	Fir, cedar
Open			
Cultivated	0	0	0
Character of Valley	U-shaped in Toutle valley 1/2 mile	U-shaped in Toutle valley 1/2 mile	U to V-shaped 30-500 yds
Character of Banks gravel	2-10' earth and gravel	1-3' earth-some rubble	2-5' below 150' in canyon, earth &
Density of Marginal Vegetation	Alder, vine maple, devil's club, ferns. Moderate	Alder, vine maple, devils club Dense.	Vine maple, devils club Dense.
Erosion			
a) Banks	Moderate	Moderate- Severe	Moderate-Severe
b) Watershed	Moderate -Severe	Moderate	Severe

Diversions: None

## Artificial Obstructions:

1. There are numerous small log jams along the entire surveyed portion of the stream. All were judged to be passable, some with difficulty. Individually, none was a barrier but collectively they might hinder upstream migration.

## Natural Obstructions:

1. Above Sta. C as the gradient becomes steeper, low falls appear at rather frequent intervals. Most could be, jumped by salmon and steelheads but at 2,000 yds above Sta. C there was found an 8' cascade--falls judged to be of low water barrier, and at 2,300 yds a series of three falls, the uppermost of which is a temporary total barrier. Removal of the log and snags here would make the falls passable.

## Fluctuation in Water Level:

Sta	Ft. Variation	% Stream Bed Covered
A-B	3-5'	93.0
B-C	2-4'	75.0
C-D	2-5'	99.0

No stream flows are listed in the Water Supply Papers through 1938. A flow of 97 cfs was measured on 5/5/41 at the highway bridge on Spirit Lake road.

Pollution: Humic acid pollution was observed at the time of the survey. The water resembled a solution of tea after some heavy rains. A few small tributaries draining a marsh were especially dank. There are probably no pronounced harmful effects on the fish.

Fish (salmon): No salmon were observed at time of survey.

Fish (other than salmon):

Seven adult steelheads were observed. Brook trout (?) and rainbow fry occurred in fair numbers below the canyon near Sta. D, but were very scarce in the canyon. A few larger fingerlings may have been steelheads. Probably more adult steelheads were present as visibility was very bad. Three good redds and ten more possible redds were counted.

## General Remarks:

For all except the uppermost few hundred yards of the distance surveyed, Hoffstadt Creek flows in a flat flood plain continuous with that of the Toutle River. Steep hills occur almost immediately to the north of Hoffstadt Creek and a short distance to the south of the Toutle. Above Sta. C, the river turns into the former hills through a canyon, in which the gradient becomes considerably steeper than below. As the map shows the steep gradient continuing above this point, there seemed to be no need to survey any farther.

Numerous small log jams and snags were found in the stream, but all appeared passable by migratory fish. Some very good spawning riffles were observed between Sta. B and C and a few between Sta. C and D below the canyon. Fair resting pools occur in association with the log jams and snags.

The river appeared fair for salmon and steelheads, except for the numerous snags and small log jams. These might tend to reduce the accessibility and usability of the stream.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
.3 mi above A	5/5/41	12:30 PM	52.0 F	47.0 F	Partly cLear
Sta. B	5/8/41	5:30 PM	53.0	48.0	Clear
Sta. C	5/8/41	10:30 AM	47.0	44.0	60% clear

## Pool Grade:

Sta	Dist ((mi))	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
A-B	1.9	51	26.8	1	2.0	50	98.0	
B-C	3.7	133	35.9	1	0.8	a4	48	5
C-D	1.4	31	22.1			31	36.1	151
Total	7.0	215	30.7	2	1.0	165	48	156
						76.7	22.3	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	1.9	50'	26'	Col.Nat'l Forest Map 1940
B-C	3.7	270'	73'	"
C-D	1.4	<u>300'</u>	<u>214'</u>	"
Total	7.0	620'	89'	"

## Tributaries:

1. Bear Creek, 3,400 yds above mouth, right bank, surveyed.
2. 1,340 yds above Sta. B, right bank, 1 cfs, probably intermittent.
3. 3,140 yds above Sta. B, right bank, 3' wide, 3" deep, ca 1 cfs, steep, inaccessible.
4. 3,380 yds above Sta. B, right bank, 3' wide, 3" deep, ca 1 cfs.
5. cow Creek, 3,790 yds above Sta. B, left bank, 6' wide, 5" deep, ca 3-5 cfs, water quite brown in color, air temp. 56F, water temp. 47.0 F, rubble 30-50-10-10. A few fish might be able to use creek, but did not appear worth surveying.
6. 3,990 yds above Sta. B, left bank, 3' wide, 3" deep, ca 1 cfs, badly choked with brush and mossy rocks.
7. 6,050 yds above Sta. B, right bank, 2 small tributaries together only 1 cfs, water very dark brown in color.
8. 6,380 yds above Sta. B at Sta. C, right bank, 8' wide, ca 3 cfs, shores marshy and water brown in color, little value.

## Bear Creek

River System: Cowlitz River

Stream Surveyed: Bear Creek, tributary to Hoffstadt Creek

Date of Survey: 5/7/41 by Frey and Bryant,

Source: Drains a small area in the northeast corner of Cowlitz County, WA lying between Hoffstadt creek and the Toutle River. For all except the uppermost two miles of its length, the stream parallels the Toutle River 1/2 to 3/4 mile to the northeast.

Direction of Flow: Southwest for the uppermost two miles then northwest to the confluence with Hoffstadt Creek in S23, T10N, R2E.

Total Length: 9 miles of which 3.8 miles were surveyed

Station Location:

<u>St Location</u>	<u>Distance Above Prev. Station</u>		<u>Distance Above Mouth</u>		<u>Width</u>
	<u>Yds</u>	<u>Miles</u>	<u>Yds</u>	<u>Miles</u>	
A Conf w/Hoffstadt	---		--S		20'
B Trail bridge		3.8		3.8	15'

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
A	17080005	0913	0.00
B*	17080005	0913	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
A-B	43,200	5,430	12.6	12,400	28.7	14,070	32.6	11,300	26.1

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Use Spawn Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )			
			Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excel (70.6- -100%)
Estimated usable rubble Spawning rubble (MR + SR)	43,200	9,070	1,950	3,960	3,260	6,160

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	Usable
A-B	6,700	43,200	26,470	61.3	9,070	21.0

Spawning Area Unavailable and Unusable: None

Character of Watershed:

Flat valley 1/8 to 1/4 mile wide between mountains to north and Toutle River to south, with mountains on other side of Toutle. Covered with fir, cedar, hemlock forest on mountains and on much of flat valley. No cultivation at present; one abandoned farm. Banks 2-10' high, averaging ca 4-5. Dense marginal vegetation of alder, vine maple, devils club, ferns, skunk cabbage. Erosion of banks is moderate, or watershed considerable.

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Note: Log jams and brush jams are very numerous in the entire portion surveyed. Although some were said to be impassable at low water, it seems likely that all are passable with some difficulty. At least 30 log and brush jams were encountered, 14 of which were listed as possible low water barriers.

Fluctuation in Water Level: Estimated to be 3-5'. Flow at time of survey was ca 25 cfs at which time the entire stream bottom was covered with water.

Pollution: None, except vegetable colloids which make the water quite brown.

Fish (salmon): None observed or reported.

Fish (other than salmon):

one adult steelhead and two redds were found in the lower part of the river. Three brooks lampreys 12-14" long were observed working on two redds near the terminus of the survey. Three other redds were observed, which might have been formed by lampreys. Scatterings of trout fry up to 5" long occurred along the entire stream. May have been brook trout because of white edging on dorsal and ventrals bordered proximally by black.

General Remarks:

For most of its length, Bear Creek flows in a flat valley between Hoffstadt Creek and the North Toutle. As might be expected in consequence thereof the gradient is somewhat shallow and the rubble tends to be small. Often the shores are swampy. Marginal vegetation is dense. Log jams and snags are very abundant in the stream, often occurring every 30-50'. Many are quite obviously passable, but others may offer considerable difficulty to upstream migration and a few may even be low water barriers.

Only one steelhead was observed in the lowermost portion of the stream. Others may have been fished out as the stream is readily accessible from the Spirit Lake highway. It was believed rather unusual that three lampreys 12-14" long were observed building redds near the terminus of the survey.

There are a number of good spawning areas in the stream. Pools, however, tend to be small and shallow.

Some beaver work was observed in the upper portion of the stream.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	5/8/41	5:30 PM	53.0 F	48.0 F	Clear
2.2 mi abv A	5/7/41	10:00 AM	52.0 F	45.0 F	Overcast

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
A-B	-3.8	147	38.7			112	35	43
						76.2	23.8	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	3.8	350'	92'	Columbia Nat. Forest
Next 3 mi	3.0	270'	90'	" " "
Next 2 mi	2.0	1,670'	835'	" " "

## Tributaries:

1. 2,200 yds above mouth, right bank, ca 2 cfs.
2. 4,050 yds above mouth, right bank, 2' wide, 1 cfs.
3. 4,970 yds above mouth, right bank, 5' wide, 1-2 cfs.
4. 5,050 yds above mouth, left bank, 3' wide, ca 1 cfs.

## Jackson Creek

River system: Cowlitz River  
 Stream Surveyed: Jackson Creek, tributary to North Fork Toutle River

Date of Survey: 6/1/41 by Frey

Source: The creek arises on east slope of Spud Mountain, flows north one mile, northwest 1 1/2 miles, west 1 mile and northwest 1/4 mile to its confluence with the North Toutle. The area drained lies in the NW4 of T9N, R4E in the eastern portion of Cowlitz County, WA.

Direction of Flow: northwest

Total Length: 4 miles of which 1,800 yds were surveyed.

Station Location: None taken. Jackson Creek enters the North Toutle from the right bank in W2, S7, T9N, R4E. Estimated width 12'.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080005	0097	0.00
Trail Crossing*	17080005	0097	0.44

\* station location is not definite and has been estimated

## Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	9,250	1,110	12.0	2,705	29.2	3,075	33.3	2,360	25.5

classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area ( $\text{yd}^2$ )	Available Spawning Area ( $\text{yd}^2$ ) (MrtSR)	% Avail	Usable Spawning Area ( $\text{yd}^2$ )	% Usable
Total	1,790	9,250	5,780	62.5	3,455	37.4

spawning Area Unavailable and Unusable: None

## Character of Watershed:

Hilly in lower portion, mountainous in upper portion. Covered with a rather dense douglas fir forest which suffered a severe blow down a few years previous. Valley is fairly flat in lower portion merging with old Toutle flood plain. Farther upstream where the creek turns into the mountains the valley is quite narrow and v-shaped. Banks average 2' high of earth and rubble. Dense original vegetation consists of salmon berry, thimble berry, devil's club, alders, vine maple, and corydalis. Erosion is moderate.

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: ca 2'. Stream flow on 6/1/41 was estimated at 5-8 cfs. Approximately 75% of the stream bed was covered with water.

Pollution: None

Fish (salmon): None observed. Salmon silvers and/or fall chinooks are reported to use the lower portion of the stream. Salmonid fry, abundant in small pools and backwaters, looked very much 'like young silvers.

Fish (other than salmon): None observed, except the salmonid fry mentioned previously, which may have been trout. Steelheads are reported to use the lower portion of the stream.

General Remarks:

The lowest two miles of Jackson Creek and 1 1/2 miles of a tributary flow in a broad flat valley almost at the same level as the Toutle floodplain. Conditions for salmon and steelheads appear quite favorable in these portions. The gradient is moderate and there is a large amount of excellent spawning rubble beginning 1/4 mile above the mouth. As with other streams in this region, however, the scarcity of good resting pools is very noticeable, those present being suitable for not more than 2-4 fish each.

After the stream leaves the flat valley and enters the hills, it is unlikely it would have any further value to salmon as the gradient increases almost immediately to 700' or more per mile.

The stream is said to support a small run of salmon and steelheads and according to natives the run was formerly much heavier. One of the old timers told how the bears wear paths along the stream to get at the numerous dead salmon. It is likely that this stream represents one of the important tributaries for salmon in the North Toutle region.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
.7 mi abv mth	6/1/41	10:30 AM	53.0 F	45.0 F	Overcast, rain

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	1.0	49	47.9			14	35	9
						28.5	71.5	

Gradient: Data from Columbia National Forest Map, 1940.  
Elevation at mouth - ca 1,570. Gradient of first 2  
1/2 miles - ca 120'/mile. Beginning 1/2 mile above  
the mouth, the gradient is shallow enough to permit  
the stream to meander considerably, producing some  
excellent spawning riffles.

Tributaries:

1. 660 yds above mouth, right bank, 8' wide, 5" deep, flows 2-5  
cfs. Probably of little value to salmon as the map shows  
the gradient becoming steep almost immediately.

## Elk Creek

River System: Cowlitz River

Stream Surveyed: Elk Creek, tributary to North Fork Toutle River

Date of Survey: 6/1/41 by Bryant

Source: Drains a small area just north of the North Toutle river towards the eastern edge of Cowlitz County, WA.

Direction of Flow: The creek arises two miles north of the Toutle, flows south for 1 1/2 miles picking up several small tributaries, then flows southwest for 1 1/4 miles paralleling the North Toutle and at a distance of less than 1/4 mile from this stream.

Total Length: 3 miles of which 1,400 yds were surveyed

station Location: None taken. Confluence with North Toutle in NE4, S7, T9N, R4E.

EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth, conf w/N Fk Toutle	17080005	0936	0.00
End of survey*	17080005	0936	0.00

\* Station location is not definite and has been estimated

character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	4,200	1,330	31.7	1,520	36.2	930	22.1	420	10.0

Classification of stream based on amount of usable spawning rubble-and area present:

	Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )				
		Use Spawn Area (yd <sup>2</sup> )	Poor (0-10.5%)	Fair (10.6-30.5%)	Good (30.6-70.5%)	Excel (70.6-100%)
Estimated usable rubble	4,200		400	280	120	
Spawning rubble (MR + SR)	4,200	2,450			2,450	

spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Total	800	2,800	1,610	57.5	260	9.3

spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Unavail
Total	600	1,400	840	60.0	L.W.	140	10.0

cause of Unavailability: Beginning 800 yds above the mouth the stream is so shallow that salmon or steelheads could not get through at low water. Brush jams increase the difficulty.

character of Watershed:

Hilly, becoming mountainous in upper portion. Covered moderately with douglas fir, cedar, hemlock forest. The lowest mile of the creek flows in a channel 20-30' wide and 5-6' deep incised into the Toutle valley bottom. Farther upstream the creek enters the mountains and flows in a v-shaped valley of its own making. Banks average 5-6' high. Marginal vegetation is moderately dense consisting of devil's club, willow, alder, shrubs and some evergreens. Erosion of banks is moderate, of the watershed, considerable.

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Above 800 yds the stream is too shallow in low water to permit the passage of large fish. The stream becomes only 3-4' wide, and the gradient increases. Boulders project from the surface of the water, interrupting the continuity of the small spawning areas which are present.

## Fluctuation in Water Level:

Stream Volumes: Varies from 2-4' in the lower portion, to 1-2' in the upper portion of the section surveyed. The estimated flow on 6/1/41 was 5-6 cfs. Approximately 85% of the bottom was covered with water.

Pollution: None

Fish (salmon): None seen or reported. There may have been a few silver fry in the first 1,000 yds.

Fish (other than salmon): Fair numbers of brook trout and rainbow fry were observed in the lower portion of the creek. Steelheads are not reported to ascend the stream.

## General Remarks:

Elk Creek is relatively unimportant for salmon and steelheads, though a small run could possibly be supported by the lowest 1,000 yds. Above 800 yds the stream is too small and shallow for large fish to navigate in low water. Even near the mouth of the stream the riffles are broken up by small boulders projecting above the surface of the stream.

The stream becomes nearly dry at times during the summer. At the time of the survey, in spite of hard rains during the previous six weeks, large fish would have had considerable difficulty proceeding any distance up the stream. The best pools found were not more than 18" deep nor longer than 10' with little cover for fish.

## Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Skv</u>
Mouth	6/1/41	9:00 AM	56.0 F	46.5 F	

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	0.8	12	15.0			6	6	41
						50.0	50.0	

Gradient: Data from Columbia National Forestt Map, 1940.  
Elevation at mouth -- ca 1,660'; **gradient for** first  
1.5 miles -- ca 230'/mile.

## Tributaries:

1. 800 yds above the mouth, right bank, .2 cfs raises from a group of springs not far away, no value to 'salmon.

## Mirada Creek

River System: Cowlitz River  
 Stream Surveyed: Mirada Creek, tributary to North Fork Toutle River

Date of Survey: 6/1/41 by Frey

Source: Drains a small circular area in the SE4 of T10N and the NE4 of T9N of R4E.

Direction of Flow: The stream flows southwest for a mile, south for a mile picking up four tributaries, then southwest for another mile to its confluence with the North Fork Toutle. The creek enters from the left about 1 1/2 miles below the mouth of Coldwater Creek.

Total Length: 3 miles of which the first 1,300 yds were surveyed

Station Location: None taken. The mouth of the creek lies in NW4, T9N, R4E, at which place the creek was estimated to be 12' wide.

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth, conf w/N Fk Toutle	17080005	0931	0.00
End of survey*	17080005	0931	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	5,200	1,650	31.7	1,850	35.6	850	16.4	850	16.4

Classification of stream based on amount of usable spawning rubble and area present:

	<u>Area (yd<sup>2</sup>)</u>	<u>Use Spawn Area (yd<sup>2</sup>)</u>	<u>Poor (-10.5%)</u>	<u>Fair (10.6-30.5%)</u>	<u>Good (30.6-70.5%)</u>	<u>Excel (70.6-100%)</u>
Estimated usable rubble	5,200	1,130	180	700	250	
Spawning rubble (MR + SR)	5,200	2,700			2,700	

## Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available	% Avail	Usable	% Usable
	yds	miles		Spawning Area(yd <sup>2</sup> ) (MR&SR)		Spawning Area(yd <sup>2</sup> )	
Total	1,300		5,200	2,700	52.0	1,130	21.7

spawning Area Unavailable and Unusable: None

## Character of Watershed:

Mountainous, covered with a moderately dense stand of douglas fir, hemlock, cedar, noble spruce. There is a big blow down area near the terminus of the survey. No cultivation. The valley is broad for the first 1/2 mile, then becomes rather narrowly v-shaped 200-600 yds wide. Banks average 2' high in the lowest 1/4 mile and merge with the canyon walls in the upper portion. Vine maple, salmon berry, thimble berry, corydalis and brocheus form the marginal vegetation, rather sparse in the lower portion of the stream but moderately dense further upstream, No extensive recent erosion.

Diversions: None

## Artificial Obstructions:

1. A log jam at 1,100 yds is passable with some difficulty at low water.

Natural Obstructions: None

## Fluctuation in Water Level:

Stream Volumes: Stream flow at the time of the survey was 7-10 cfs. Approximately 90% of the stream bed was covered with water. The fire warden at the Elk Creek G.S., states that Mirada Creek gets quite low in summer but never completely dries up.

Pollution: None

Fish (Salmon): None seen. Salmon (fall chinooks and/or silvers) are reported to use the lowermost part of the stream.

Fish (other than salmon): Trout fry (sp.) were rather scarce. No large fish seen. Steelheads reported to ascend stream in small numbers.

General Remarks:

Mirada Creek can and does support a small run of salmon and steelheads in the lowermost portion. As with other creeks in this region, one of the chief factors limiting the size of the runs is the scarcity of good resting pools. With more of these the stream could take care of a large run (fall fish would run direct from Toutle to spawning beds of predators rather than pool ??, the most limiting factor ? spawning area.)

Near the mouth the gradient is rather steep. Shortly above the mouth the stream flows through an 8' culvert beneath the Spirit Lake Highway and runs along the road for several hundred feet, after which it flows into the hills and again parallels the road at a distance of 100 yds.

The first 400 yds are in a broad valley continuous with that of the main Toutle River. From here on, the valley is narrowly v-shaped and the gradient somewhat steeper. A big blowdown has resulted in many logs lying in and across the channel.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
Mouth	6/1/41	3:30 PM	58.0 F	45.0 F	Overcast

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	.74	14	18.9			5	9	20
						35.7	64.3	

Gradient: Data from Columbia National Forest Map, 1940.  
Elevation at mouth -- ca 1,940'; gradient in lowest  
1.5 -- ca 370'/mile.

Tributaries: None in section surveyed.

Castle Creek

River System: Cowlitz River  
 Stream Surveyed: Castle Creek, tributary to North Fork Toutle River

Date of Survey: 5/9/41 by Bryant

Source: Castle Creek arises near the northwest slope of Mt. St. Helens in S36, T9N, R4E almost on the boundary line between Cowlitz and Skamania counties in Washington. The stream lies entirely within the eastern half of T9N of R4E.

Direction of Flow: From its place of origin, Castle Creek flows north for 1 1/2 miles then northwest to its confluence with the North Toutle River.

Total Length: 5 miles of which 4.7 were surveyed

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width
	Yds	Miles	Yds	Miles		
A Conf w/N Fk Toutle	---	---	---	---	S10,T9N,R4E	30'
B 4700 yds abv mouth	2.1	---	2.1	---	T9n,R4E	---
C 600yds W of S Fk trail	2.6	---	4.7	---	S14,T9N,R4E	3-6'

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0024	0.00
B	17080005	0024	0.00
c*	17080005	0024	2.13

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
	Yds	%	%	%	%	%	%	%	%	%
B-Bnd	34,000	32.8	12,840	37.8	10,980	32.3	6,780	19.9	3,400	10.0
Total	47,600	36.2	17,260	36.2	3,880	28.5	3,760	27.7	1,540	11.3
					14,860	31.2	10,540	22.2	4,940	10.4

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Use Spawn Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )			
			Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excel (70.6- -100%)
Estimated usable rubble	47,600	8,265	1,995	4,970	1,300	
Spawning rubble (MR + SR)	47,600	23,400			40	23,400

spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Use
A-B	3,750	34,000	17,760	52.2	6,240	18.3
<del>Total</del>	<del>3,750</del>	<del>46,000</del>	3,360	56.0	920	15.3
			21,120	52.8	7,160	17.9

spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Usable
<u>Unavail</u> Falls-C		3,100	7,600	4,280	56.3		A,T05.5

character of Watershed:

Mountainous on foot of slope to Mt. St. Helens. Covered with douglas fir, hemlock, cedar forest. No cultivation. Valley narrow u to v-shaped, 200-400 yds wide. Banks average 1-2' high towards upper end of survey. 4-100' near lowest portion composed of earth and gravel, occasionally bedrock. Marginal vegetation of alder, huckleberry, devil's club, is thin above the falls, but dense below, especially in the lowest mile. Erosion of banks varies from slight in upper mile to considerable in lowest portion. Erosion of watershed varies from considerable to severe.

Diversions: None

## Artificial Obstructions:

1. Eight log jams were observed below the falls, some of them offering little hindrance to migration, others passable with considerable difficulty. All were judged passable.

## Natural Obstructions:

1. 3' falls 150 yds above mouth. Big log has been filled in behind and has dug a big hole below. Good place to jump from, but poor place to land. Passable with considerable difficulty.
2. 30' perpendicular falls over bedrock cliff at 5,250 yds. Barrier.
3. 40 yds above the 3' falls, series of 2 falls, 3' high and 5' high, respectively, and 3 cascades above the second falls, 2', 3' and 4' respectively. The channel is greatly narrowed and tortuous here, plowing through bedrock. A bedrock chute for 8' complicates matters. The entire mess constitutes a barrier at low water.

## Fluctuation in Water Level:

Stream Volumes: Varies from 1' in the upper portion of the stream to 2-4' in the lower portion. Flow ca 50 cfs at time of survey. The entire stream bottom was covered with water at the time of survey.

Pollution: None

Fish (salmon): None observed. It seems likely that some silvers and fall chinooks use the lower portion of the stream.

Fish (other than salmon):

Ten adult steelheads and eight redds in lowest two miles. Above the falls, no fish of any kind were observed. Almost immediately below the falls, small numbers of trout fry (rainbow and/or brook) began to appear. A few almost legal size trout were noticed.

## General Remarks:

Three miles above the mouth of Castle Creek occurs an impassable 30' falls which restricts all migratory fish to the portion of the stream below. A few steelheads were found in the lowest two miles, and it appears likely that this portion of the stream is also used by a few fall chinooks and silvers.

At Sta. B, a large tributary coming in from the right would be useable except that the water is too shallow for spawning. The Columbia National Forest Map shows this tributary running through a swamp for more than a mile.

The character of the watershed changes quite abruptly at the falls. Below the falls marginal vegetation and the fir hemlock forest are very dense, numerous log jams and small falls occur in the stream, erosion is severe and the banks are higher and steeper than further upstream. Above the falls, the valley is much like a park with little understory in the forest, allowing one to see several hundred feet in any direction. The trees are considerably smaller than further downstream. No trace of a fish was seen above the falls, but they appeared almost immediately below.

Temperature Data: None, water seemed very cold above the falls.

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
A-B	2.1	28	13.3		1	18	9	101
					3.6	64.3	32.1	
B-C	2.6	6	2.3			4	2	138
						66.7	33.3	
Total	4.7	34	7.2		1	22	11	239
					2.9	64.7	32.4	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	2.1	360'	170'	Col. Nat'l Forest Map
B-2 mi up	2.0	800'	400'	II II II II
Total	4.1	1,160'	280'	

## Tributaries:

1. 2,050 yds above mouth, right bank, 4' wide, ca 3 cfs, inaccessible at all times.
2. 3,350 yds above mouth, left bank, ca 2-3 cfs, inaccessible at all times by salmon.
3. 3,750 yds above mouth, right bank at Sta. B, ca 10 cfs, many logs across brook and along sides, impassable for any great distance because of shallow water.
4. 4,470 yds above mouth, right bank, ca 5 cfs, very shallow, inaccessible at low water.
5. 7,300 yds above mouth, right bank, 8-10 cfs, nearly same width as main stream.
6. 7,550 yds above mouth, left bank, ca 4 cfs, 6' falls ca 100 yds above mouth, too shallow for salmon to jump, impassable at all times.
7. 7,750 yds above mouth, right bank, ca 2 cfs.
8. 8,150 yds above mouth, right bank, 3-4 cfs, stream running under mossy banks part of the time.

**Coldwater Creek**

River System: Cowlitz River  
 Stream Surveyed: Coldwater Creek, tributary to North Fork Toutle River

Date of Survey: May 2-9, 1941 by Frey

Source: Arises on the west slope of Mt. Whittier about 2 miles north of Spirit Lake in Skamania County, WA. It drains the south third of T10N, R5E; parts of sections 35+36 in T10N, R4E; and parts of sections 1+2 in T9N, R4E.

Direction of Flow: From its source on the boundary between S24+25, T10N, R5E, the stream flows west for 4 miles making a small bend towards the south and back again. Then flows southwest to its confluence with the North Toutle River.

Total Length: 8 miles of which 1.5 were surveyed.

Station Location: None taken, width approximately 15'.

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Conf w/ N Fk Toutle	17080005	0028	0.00
End of survey*	17080005	0028	0.76

\* This location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (vd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	29,600	3,010	10.2	2,795	9.4	2,835	9.6	20,960	70.8

classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Total	1.5	29,600	5,630	19.0	2,170	7.3

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

Mountainous, covered with fairly dense stand of douglas fir, hemlock, cedar, noble fir. No cultivation. Valley varies from v-shaped in lower position to u-shaped above forks, where extensive swamps occur; 200 yds 3/4 mile wide. Banks average 2-4' high, composed of rubble and sand. Very dense marginal vegetation in marsh consisting of willow, alder, vine maple, devil's club, salmon berry, ferns, moss, skunk cabbage. Erosion slight.

Diversions: None

## Artificial Obstructions:

1. Numerous log jams and snags, but all appeared to be passable.

Natural Obstructions: None

**Fluctuation** in Water Level: 2-4'

Stream Volumes: All the stream bed was covered with water at the time of survey. Est. 25 cfs.

Pollution: None

Fish (salmon): None observed. There is a good run of fall chinooks in the stream and supposedly a small run of silvers. On 9/4/40, Parkhurst and Bryant counted over two day dead spawned out chinook below the forks. These were pretty much decomposed and matted with fungus, indicating that they must have spawned in early September. This would indicate that they were spring run chinook that had probably summered in the main Toutle and entered Coldwater Creek in early September. Fall run fish normally arrive later and would not have been in such poor and badly fungused condition that early. could have run directly through in July.

Fish (other than salmon):

13 adult steelheads counted of which 12 occurred below the forks. salmonid fry (steelheads and chinooks) were abundant below the forks and fairly abundant above the forks, especially in the sandy area. Some fry appeared to be brook trout with white edgings on dorsal and ventral.

General Remarks:

Coldwater Creek is probably the most important tributary for salmon and steelheads in the upper Toutle River. One would not get this impression from a cursory examination, however, because of the preponderance of sand and the small amount of **useable** spawning rubble.

For most of the distance below the South Fork confluence the stream flows through a rather narrow valley with little fiat land at the bottom. Above the forks the creek meanders through a broad elk marsh, heavily overgrown with marginal vegetation, often in several channels instead of one. The gradient is comparatively shallow, and the bottom consists almost entirely of sand. Numerous logs and snags in the channel have excavated many excellent, though rather shallow resting pools.

It is evident that steelheads and salmon pass through this sandy area to spawning grounds upstream, as chinook fry were fairly abundant in the pools and one adult steelhead was observed. An attempt made to get above the sandy region was unsuccessful, sand being found in S36, T10N, R4E (according to Weyerhauser survey markers) approximately 2 miles above the mouth. According to the topographic map, this shallow gradient, and probably the sand bottom as well, persists for another mile

## General remarks (cont):

upstream at which place it seems likely good spawning rubble would begin to appear. This upper part of the watershed is all but inaccessible. The stream lies at the bottom of a steep v-shaped valley up to 2,000' deep. A trail follows the ridge on either side at a distance of a mile or more from the stream, but it would be quite difficult to climb down to the stream and follow it to the mouth.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
Mouth	5/2/41	9:00 AM	44.0 F	41.0 F	Overcast

## Pool Grade:

Sta (mi)	Dist Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total 1.5	36	24.0			25	11	71
					69.4	30.6	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
M-2 mi	2.0	270'	135'	Col.Nat. Forest Map
2-4 mi	2.0	220'	110'	" " " "
4-6 mi	2.0	800'	400'	" " " "

## Tributaries:

1. 1,040 yds above mouth, right bank, South Coldwater Creek, 15' wide. Surveyed by Bryant 5/2/41.

## South Fork of Coldwater Creek

River System: Cowlitz River  
 stream Surveyed: South Fork Coldwater, tributary to Coldwater Creek

Date of Survey: 5/2/41 by Bryant

Source: A circle of low mountains directly west of Spirit Lake in Skamania County, WA. The creek drains a small area in the NW4 of T9N, R5E, and in the NE4 of T9N, R4E, lying partly in Cowlitz and partly in Skamania counties.

Direction of Flow: Flows west northwest for 2 1/2 miles, southwest for 1 1/2 miles and northwest for one mile to its confluence with Coldwater Creek.

Total Length: 5 miles of which one mile was surveyed.

Station Location: None taken. Confluence with Coldwater Creek in SE4, S2, T9N, R4E. 15' wide.

**EPA River Reach Codes:**

Station	HUC	SEG	Rmi
Conr w/Goldwater Cr	17080005	0110	0.00
End of survey*	17080005	0110	2.68

\* This location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	7,600	1,570	20.5	1,710	55.4	2,240	29.7	2,060	27.1

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Use Spawn Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )			
			Poor (0-10.5%)	Fair (10.6-30.5%)	Good (30.6-70.5%)	Excel (70.6-100%)
Estimated usable rubble	7,600	1,070	230	840		
spawning rubble (MR + SR)	7,600	3,970		100	3,870	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
Total	1,300	5,900	3,270	55.4	1,010	17.1

## spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Unavail
Total	400	1,700	700	41.2	,L.W.	60	3.5

1,300 yds above the mouth of the creek is a cascade falls with a 6' drop, over which the water is no place more than 3" deep. Low water barrier.

## Character of Watershed:

Hilly to mountainous, covered with a dense fir, cedar, hemlock forest. No cultivation. Valley is saucer shaped, fairly open except for trees, 200 to 400 yds wide. Banks 3-100' high, most 5-15', fairly steep of earth and gravel. Marginal vegetation consisting of fir, hemlock, cedar, maple and devil's club is moderately dense. Little erosion of banks, moderate erosion of watershed.

Diversions: None

## Artificial Obstructions:

1. Several beaver dams near terminus of survey were passable.

## Natural Obstructions:

1. 1,300 yds above mouth is a cascade falls with a total drop of 6'. The water spreads out in a thin sheet, being no deeper than 3" anywhere. Although steelheads could probably get past the barrier at present water level, it seems that the falls is a low water barrier. The pool below is too shallow for jumping.

Fluctuation in Water Level:

Stream Volumes: Estimated 1-5'. All of the stream bed was under water at time of survey. Flow 10-15 cfs.

Pollution: None

Fish (salmon): None observed. Small numbers of fall chinooks and silvers are reported to use the stream in the fall.

Fish (other than salmon):

3 adult steelheads and 3 redds were observed below the falls. Fair numbers of rainbow or steelhead fry 1 1/2" long below the falls, none seen above.

General Remarks:

South Fork Coldwater is a small, cold stream that is fairly steady in flow; used by small numbers of steelheads in spring and chinooks in fall. A 6' falls 1,300 yds above the mouth appears to limit spawning activities of the large fish to the region below. A short distance above the falls, the stream flows through a beaver flat 3/4 mile long by 1/4 mile wide, covered with a heavy growth of new willow 6-10' high. The gradient is shallow and there are several channels. Beavers have constructed dams across the channel, although the lower ones appeared passable without much difficulty.

Temperature Data: None

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	1.0	45	45.0			17	28	48
						37.8	62.2	

Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
M-2 mi	2.0	260'	130'	Col. Nat'l Forest Map
2-4 miles	2.0	600'	300'	Col. Nat'l Forest Map

Tributaries: None in portion surveyed

**Studebaker Creek**

River System: Cowlitz River  
 stream Surveyed: Studebaker Creek, tributary to North Fork  
 Toutle River

Date of Survey: 6/1/41 by Bryant

**Source:** Studebaker creek arises on the northwest slope of Mt.  
 St. Helen's.

Direction of Flow: Flows in a general northerly direction to its  
 confluence with the North Toutle, left bank.

Total Length: 3-1/2 miles, of which 1,300 yds were surveyed.

station Location: None taken. Confluence with North Toutle in  
 NW4, S18, T9N, R5E. Width at mouth ca. 9'.

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Conf w/N Fk Toutle	17080005	1014	0.00
End of survey*	17080005	1014	0.00

\* This location is not definite and **has** been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R. %</u>	<u>M.R. %</u>	<u>S.R. %</u>	<u>M&amp;S %</u>
Total	2,600	730 28.1	830 31.9	760 29.2	280 10.8

Classification of stream **based** on amount of usable spawning  
**rubble and area present:**

	Area (yd <sup>2</sup> )	Use Spawn Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )			
			Poor (0- -10.5%)	Fair (10.6- -30.5%)	Good (30.6- -70.5%)	Excel (70.60 -100%)
Estimated usable rubble	2,600	560	50	330	180	
Spawning rubble (MR + SR)	2,600	1,590			1,350	240

## spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )
Total	100	300	150	50.0	

## Spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Unavail Avail	Usable (yd <sup>2</sup> )	% Unavail
Total	1,200	2,300	1,440	62.6	L.W.	5.60	24.3

## Character of Watershed:

Mountainous. Creek runs up slope leading to Mt. St. Helens, flowing through a bench part of the way. Covered moderately dense with douglas fir, cedar, hemlock forest. No cultivation. The valley is u-shaped, ca. 1/8 mile wide. The immediate channel is 20-80' wide and 6-10' deep. Banks composed of earth and gravel. Alder, devil's club, few shrubs and conifers form a sparse marginal vegetation. Region is much like a park. Erosion is considerable.

Diversions: None

## Artificial Obstructions:

1. A series of debris jams within the first 100 yds is impassable at low water. B.L.W.
2. 560 yds above mouth is a 3' log and boulder dam filled in behind with sand. All the water is flowing through a 2" opening between the logs at the right end. The water is only 4" deep for a distance of 10' below the dam, preventing fish from jumping the barrier, at least during low water. B.L.W.

Natural Obstructions: None

## Fluctuation in Water Level:

Varies from 2-4' in the lower portion to 1-2' in the upper. Estimated flow on 6/1/41 was 10-15 cfs. Approximately 95% of the stream bottom was covered with water.

Pollution: A small seepage tributary 1,000 yds upstream from the mouth has carried a yellowish-red precipitate into the main creek, discoloring the rubble for a distance of 300 yds downstream.

Fish (salmon): None seen or reported.

Fish (other than salmon): None seen or reported.

## General Remarks:

Studebaker Creek derives its water from Mt. St. Helens. Hence, there could be expected a considerable fluctuation in water level.

In the first 100 yds above the mouth is a stepladder effect 25' high produced by brush, logs and boulders which would be very difficult to pass at any time and is certainly a low water barrier. This and a small dam at 560 yds could be easily cleaned out, making the stream accessible at all times.

At 320 yds above the mouth the stream forks, the two branches being nearly the same size. The rubble is mostly fine gravel with small boulder cascades at intervals. If the flow were only 2" deeper than at the time of survey, there would be a mile of good spawning area available. Pools are small and infrequent. Rocks and other shelter large enough for fish 2" long and greater, are scarce. No fish were observed.

About 1,000 yds above the mouth the stream flows through a swampy bench with many small feeders coming in from the left.

In its present condition, the stream could accommodate a small run of salmon at high water. Spawning area is good but lack of resting pools would keep size of run down and present barriers probably keep them out of the stream entirely. Higher water during fall low water period could not be depended on, stream no good until improved stocked ?

Temperature Data: no data available

Pool Grade: Only pools present in .74 miles or the entire stream surveyed were 42 S6.

Gradient: Elevation at mouth ca 2,550; gradient for first 2 miles ca 380'/mile. Data from Columbia National Forest Map, 1940.

Tributaries:

1. 320 yds above mouth, left bank, ca 5-10 cfs, about same volume as main stream.
2. 1,000 yds above mouth, right bank, less than 1 cfs. Water a reddish yellow and stains rubble in main stream for several hundred yards.

## Spirit Lake

River System: Cowlitz River  
Stream Surveyed: Spirit Lake, discharges into Toutle River

## General Remarks:

Entirely without broad shoals, the bottom dropping sharply from the water line along most of the shore. Such shoals as are present are pumice stone, and are confined to narrow banks of no considerable length (see shaded area on illustration). The outer slope of the shoals is as sharp as the rather loose pumice will lay.

The entire shoreline is heavily wooded with pine and fir, most of which is large second growth timber. The shores are so precipitous that the trees grow almost to the water's edge. Lumbering operations in the past and falls from wind and other natural causes, have left a large number of submerged, or partially submerged, trees. These are rather equally distributed over most of the shoreline. However, their distribution is such that, coupled with the depth of water in which they lie, they afford little protection for fish.

The depth of the lake is rather great. Soundings at Sta. S, A, B, C, D (see illustration) gave depths of 136, 125, 103, 190 and 187' respectively.

Six small creeks flow into Spirit Lake. Donnybrook, Cedar Creek, harmony Falls Creek, and Margaret Creek flow into the norther part of the east arm, while Bear Creek flows into the northern tip of the west arm. None of these creeks are especially well suited to salmonid spawning. The Toutle River, flowing out of the southwest tip of the lake, is the only outlet. An old dam located a short distance downstream from the lake is an obstruction to upstream migrants during low water periods.

Bioloical Features:

Two bottom samples were obtained, these being taken with an Eckman dredge at Sta. S and D (see illustration). Both samples were composed entirely of black ooze. Preliminary examination indicates that there is an almost complete lack of bottom organisms at these depths.

Surface plankton samples were make September 15 at Sta. 1, B, C and D. At each of these stations, a #6 silk balting cloth plankton net was turned at slow speed for a distance of approximately 200 yds. Although microscopic examination of the collections has not been made, the zooplankton occurred in

General remarks (cont):

abundance and was rather evenly distributed over the entire lake.

The fish population consists of suckers, squawfish, rainbow trout, cutthroat trout and land-locked sockeye salmon. It was reported that during some years, silver salmon were seen in abundance in Bear creek. Because of the low water, the above-mentioned dam was an effective barrier to the silver salmon that were migrating at the time of this investigation.

The size of the fish inhabiting the lake throws some light on the abundance of food present to supplement the data obtained. The large size of the suckers seems to indicate that bottom organisms are abundant throughout the year in the shallower portions of the lake. Rainbow trout are reported to grow to a good size and five pound cutthroats are reported as not being uncommon. Rapid fish growth in the relatively cold water (surface 15.1-15.3C; bottom 4.5 - 4.8 C) must mean that there is a continuously abundant food supply.

With the exception of the lack of good spawning tributaries, Spirit Lake appears to be well suited to sockeye salmon.

Investigation and report by A.G. Snowmela and Frank W. Goben.

## Olequah Creek

River System: Cowlitz River  
Stream Surveyed: Olequah Creek

Date of Survey: May 26, 1937 by Investigators Lobell and Hanavan

Source: Western Lewis County. Five forks near Winlock, WA. The largest fork near Jackson Prairie T12N,R1W. Mouth at left bank of Cowlitz River in NW Cowlitz County near Olequa, WA.

Direction of Flow: Creek flows south through Winlock, WA and Vader, WA, T10,11,12N,R2W.

Total Length: 20 miles; 14.9 miles (26,297 yards) surveyed.

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
M Mouth	---		---		-----	--	--
A County rd bridge	0.5		0.5		S29,T11N,R2W	70'	27.0"
B Vader, WA bridge	3.7		4.2		S29,T11N,R2W	25'	5.0"
C Bridge blw Winlock	5.6		9.8		S8,T11N,R2W	66'	35.5"
D Winlock mill dam	5.2		15.0		-----	<b>21'</b>	-----

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0072	0.00
B	17080005	0073	0.00
C	17080005	0073	4.29
D*	17080005	0073	6.31

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
		%		%		%		%		%
M-A		4		3		6		87		
A-B		45		13		16		26		

## Character of Bottom Between Stations (cont):

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
B-C			41		23		15		21
C-D			37		21		19		23
Total			31.8		15.0		14.0		39.2

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% A v a i	Usable Spawning Area (yd <sup>2</sup> )	% Usable
M-A	863 0.5	1,695		8		
A-B	6,480 3.7	25,980		30		
B-C	9,854 5.6	46,370		38		
C-D	9,100 5.2	<u>32,490</u>		40		
Total	26,297 15.0	106,535		34		

Heavily silted due to organic debris and operation of gravel crusher.

Note : estimated 20,000 sq. yds. of available to 8,000 of usable added by State opening Winlock Dam by new ladder. - Jan 1947.

spawning Area Unavailable and Unusable: None

## Character of Watershed:

	Total
Mountainous	
Hilly	
Rolling	X
Flat	
Swampy	
Wooded	X
Open	
cultivated	30%

Diversions: None

Artificial Obstructions:

1. 4,613 yds. above Station C, old mill dam, 3' high, no protection devices, portions washed out and bypass.
2. 1,000 ft. below Station C, log jam, partial barrier, should be removed.
3. Station D, mill dam, 25' high, timber protection device, no ladder, impassable any time, 52' crest.

Natural Obstructions:

1. 1,600 yds. above Station B, bedrock falls, 1'-3.5' high, all passable except difficult at extreme low water.
2. 4,679 yds. above Station C, log and brush jam, 3'-4' high, impassable, passable with difficulty at low water.

Fluctuation in Water Level:

Cause of Variation: Seasonal rains, partial control by mill dam at Station D.

Feet Variation: 5'-6' in gorges.

Pollution:

Towns of Winlock, Vader, Ryderwood produce domestic raw sewage, garbage. Farms in valley produce barnyard drainings, sawmill pollution. Gravel crusher near Station C and gravel crusher on stilwater Creek (trib. to Olequa) create silting from gravel crushers. Pollution is very rank. Water in deep pools is foul and oily looking.

Fish (salmon): None

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Steelhead	5/26/37			one skeleton	
Lamprey				several spawning	

## Fish (other than salmon) (cont):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Cyprinids	"		X		
Trout fry	"			X	
Suckers	"		X	considerable spawning	

## General Remarks:

Survey

Olequa Creek was surveyed on 5/26/37 by Investigators Lobell and Hanavan from the mouth to an impassable mill dam at Winlock, WA. The stream is accessible by road throughout.

Tributaries

Stillwater Creek is the only tributary of any importance and has about three times the volume of Olequa Creek. The upper part surveyed; the lower part impassible due to gravel crusher. Numerous tributaries up to 2 cfs enter, but none are of use to salmonids.

Topography

Olequa Creek flows through a narrow river valley varying from 0.25 wide at the mouth to about one mile wide near Winlock. The watershed is hilly but the majority of the hills are rolling. Practically the entire region has been logged off; and, where the land was not cleared for agriculture, second growth conifers have appeared. The river valley is quite densely populated and has two towns in it. Numerous poultry and dairy farms are found throughout the region. The river itself flows through a narrow gorge with walls from 6'-60' in height. The gorge is mostly in a U-shape but opens out into a narrow V-shape in places. It's width varies from 301-300' across the top. Much bare rock is found below the top soil and in the river gorge. The foundations are entirely sedimentary being composed of sandstone and soapstone. Large deposits of gravel are found in places and are being utilized for road surfacing.

Characteristics of Stream

At the time of survey, Olequa Creek had an estimated volume of 20 cfs above Stillwater Creek. In almost the entire distance, the creek runs through a deep, narrow channel cut into the valley floor. Dense growths of willow, alder, maple and brush serve to provide excellent cover. The stream is shaded practically throughout its length. Numerous large pools are found in which

## General remarks (cont):

the water barely moves. Although there is a very large percentage of bedrock and mud and sand, good spawning riffles are fairly common in the middle section. Practically all of the gravel, however, was heavily silted over. Some of the gravel, too, was in potholes and narrow channels of bedrock bottom where it would be difficult to use by salmonids. Because of the narrow channel, Olequah Creek is subject to a great fluctuation in water level. In some areas, extensive cutting of the banks takes place. The dirt washings add to the silting of gravel. No outstanding obstructions are found except an abandoned mill dam below Winlock which may be impassible at low water and a mill dam at Winlock which is a barrier at any time. The stream above Winlock does not offer much in the way of salmon spawning grounds, but could be good for trout. The gradient of Olequah Creek is generally flat to moderate. Pollution is an important limiting factor. Beside a rank pollution due to dumping of domestic sewage from the towns of Winlock, Vader, and Ryderwood, farms throughout the valley also contribute their share. Water in the deep pools is smelly and has an oily quality. Banks are covered with sludge and algae. Garbage is dumped in many places. Although there are areas of good spawning gravel, the activity of gravel crushers has overlaid most of the bottom with a dense layer of silt. One gravel crusher is located just below Winlock on Olequah Creek and another near Ryderwood on Campbell Creek, a branch of Stillwater Creek which is the principal tributary of Olequah Creek. At times, both streams are densely clouded with gravel washings.

Fish Population

Although a few small trout were seen, the majority of fish seen were cyprinids. Suckers were seen in some abundance and dace were also numerous. Lampreys were observed spawning in several localities. One steelhead skeleton was found and reports of resident fishermen mentioned a small run. There is possibly also a small run of silvers or dogs, although no fry were seen. With pollution conditions as they are it is doubtful if much of a run could be maintained.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	5/27/37	8:45 AM	54 F	51 F	Clear
B	5/27/37	9:10 AM	58	51	Clear
C	5/28/37	10:00 AM	54	57	Partly cloudy

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	SlT3 %	S2T1 %	S2T2 %	S2T3 %
M-A	0.5	1	2.0		100.0				
A-B	3.7	63	17.0	31			28	4	
				49.2			44.4	6.4	
B-C	5.6	152	27.1	20		32	76	8	16
				13.1		21.1	50.0	5.3	10.5
C-D	5.2	87	16.7	15	7.		48	14	3
				17.1	8.1		55.2	16.1	3.5
Tot	15.0	303	20.2	66	8	32	152	26	19
				21.8	2.6	10.6	50.2	8.6	6.2

## Gradient:

Station	Distance (Miles)	Total Drop	Source of Data
Mouth-D	15.0	Flat to moderate	No topographic maps

**Stillwater Creek**

River System: Cowlitz River  
 Stream Surveyed: Stillwater Creek, tributary to Olequah Creek  
 Date of Survey: May 27, 1937 by Baltzo and Jobes  
 Source: Hills in west-central portion of T10N,R3W. Lewis and Cowlitz Counties, Washington. Mouth in SW1/4,Sec.34,T11N,R3W.

Direction of Flow: Southeast

Total Length: No data on total length, approximately 5 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
M Conf w/Capbell Cr	---	---	---	---	13'	0-16"
A Conf w/Stillwater	0.6	0.6	0.6	0.6	--	--
B RR trestle	4.7	4.7	5.3	5.3	7'	4"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
M	17080005	0075	0.00
A	17080005	0075	0.00
B	17080005	0075	3.34

Character of Bottom Between Stations: No data available

spawning Area Usable and Available: No data available

Spawning Area Unavailable and Unusable:

A-B All good  
 B-C Silting throughout, except on riffles.

## Character of Watershed:

	M-A	A-B
Mountainous		
Hilly	high hills	high, rolling hills
Rolling		
Flat		
Swampy		
Wooded	logged off	
Open		
Cultivated	pasture	pasture
Character of Valley	flat, 0.5-1 mi wide	u to v, 0.25 mi to ravine at end of survey
Character of Banks	low to moderate	2'-15', mostly cut, dirt and hardpan
Density of Marginal Vegetation	alders in most places	maple, willow, brush scattered, thick in some areas
Flora of Watershed	Douglas fir logged off; brush fairly thick	maples, brush, vines logged off; dense undergrowth, no high trees
Erosion		
a) Banks	fields cut into in places	many cut banks; some falling
b) Watershed	little	considerable; gullied in places

## Natural Obstructions:

1. Log jam, 806-826 paces above Station A, passable at all times.

Fluctuation in Water Level: High flood stage; 3' in lower 5' in middle, and 10' in upper area;.

Pollution: None between Stations M-A. Silt from eroded hills, gravel silted over except on fast riffles between Stations A-B.

Fish (salmon): None

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Steelhead	5/27/37	steelhead & silver fry		numerous	
Lamprey	II	4 spawners,		fry numerous	

#### General Remarks:

Creek is accessible by road for 2.6 miles, surveyed from confluence with Olequah to water-supply dam.

#### Tributaries

Several small, unnamed ones; all unimportant to fish. The largest one is diverted through the county rock crusher at Ryderwood and is thereby blocked to fish.

#### Topography

Campbell Creek flows through a shallow, wide valley that gradually narrows and deepens as progress is made up stream. The surrounding country is rolling, being open and logged off land that is now covered only with a dense growth of brush. Willows and alders grow in moderate density along the banks, affording adequate shade for fish.

#### Characteristics of Stream

The lower 2,000 yds. are heavily polluted by cesspool effluent and muddy water from the rock crusher. Above this the stream is clean and has fair to good spawning riffles. The banks show considerable erosion. However, the watershed is only slightly eroded. The lower banks are low and sloping, but above they are steep and cut. Along the entire distance the banks are of earth and gravel.

#### Fish Population

Only a few silver salmon fingerlings were seen, all above the polluted area. It would appear that the undesirable conditions found in the lower mile serve as an effective barrier

## General remarks (cont):

in keeping most of the migratory salmonids from entering the creek. Occasionally fair trout fishing is reported above the dam.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
<del>B</del>	<del>5/25/37</del>	<del>12:30</del> AM	53 F	49 F	Cloudy
A-B	5/28/37	12:00 PM	53	49	Cloudy
		PM	65	54	Partly cloudy

## Pool Grade:

Sta	Resting Pools	S1T1 %	S1T3 %	S2T1 %	S2T2 %	S3T1 %	SST1 %
A-B	45	4	2	28	2	8	1
		8.9	4.4	62.2	4.4	17.8	2.2

## Gradient:

Station	Total Drop	Source of Data
A-B	50'-75'	Est. by survey crew

## Tributaries:

1. Becker Creek, 100 paces above Station B, 3+ cfs.
2. Unnamed, 602 paces above Station B, LB, est. 2 cfs.
3. Unnamed, 3,754 paces above Station B, LB, est. 6 cfs.

## Becker Creek

River System: Cowlitz River  
 Stream Surveyed: Becker Creek, tributary to Stillwater Creek

Date of Survey: 5/28/37

Source: No data available

Direction of Flow: Northeast

Total Length: Total creek length unknown

EPA River Reach Code: No data available

Spawning Area Unavailable and Unusable: Many beaver pools

## Character of Watershed:

	Total
Mountainous	
Hilly	X
Rolling	
Flat	
Swampy	
Wooded	logged off
Open	
Cultivated	none
Character of Valley	narrow V-shape
Character of Banks	moderate height
Density of Marginal Vegetation	alder, brush thick, some fir
Erosion	
a) Banks	
b) Watershed	none

Natural Obstructions:

Several beaver dams on lower two miles of stream, passable at high water.

Fluctuation in Water Level: Small flow except during rainy season.

Pollution: None

Fish (salmon): Small run of steelhead & silvers reported to run as far as two miles.

Fish (other than salmon): Good trout stream.

General Remarks: Suitable for brook trout or rainbows; steelhead and silver runs reported to be small.

Gradient: Moderate to steep.

---

## La Camas Creek

River System: Cowlitz River  
Stream Surveyed: La Camas Creek

Date of Survey: May 25-26, 1937 by Jobes and Baltzo

Source: Hills north of Salkum, Washington. Lewis County,  
Washington.

Direction of Flow: South, southwest

Total Length: 22 miles; 16.13 miles surveyed

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Mouth	a--		---		S27,T11N,R2W	74'	37.5"
B	Lower Toledo Winlock Bridge		4.4		4.4	S12;T11N. R2W	52'	16.7"
C	Upper Toledo Winlock Bridge		1.7		6.1	S1,T11N R2W	11'	3.8"
D	Pac Hwy Bridge		4.6		10.7	S21,T12N,R1W	10'	10.7"
E	Ethel Hwy Bridge		5.4		16.1	S13,T12N,R1W	11'	1.9"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0071	0.00
B	17080005	0071	0.76
C	17080005	0071	4.94
D	17080005	0071	8.93
E	17080005	0071	12.75

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
		%		%		%		%	
A-B		9		33		43		15	
B-C		16		37		37		10	
C-D		1		10		35		54	
D-E		2		5		40		53	
Total		7.0		21.3		38.8		33.0	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	Usable
A-B	7,900 4.4		54,885	76		
B-C	2,950 1.7		18,310	74		
C-D	8,060 4.6		14,796	45		
D-E	<u>9,475</u> 5.4		<u>22,093</u>	45		
Total	28,385 16.1		110,084	60		

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

---

Mountainous

Hilly X (below Station C)

Rolling

Flat X (above Station C)

Swampy X (between Stations B-C)

Wooded X (below Station C)

Open X (above Station C)

Cultivated 5% below Station C  
25% above Station C

## Diversions:

- 1: 6,890 yds. above Station D, diversion for small light plant used on farm. Water flows over wheel. Dam 6' high, 18' at crest. Log and timber. Lack of adequate pool makes it appear, at best, passable with difficulty during low water.
- 2: 7,400 yds. above Station D, hydraulic ram provides water for use on farm; part of flow over wheel for electric light plant. Dam 4' high, 15'.crest. Log and timber. Lack of adequate pool makes it appear, at best, passable with difficulty during low water.

## Artificial Obstructions:

1. 6,890 yds. above Station D. Power dam; 6' high. No protection device.
2. 7,400 yds. above Station D. Power dam; 4' high. No protection device.

Natural Obstructions: None

## Fluctuation in Water Level:

Sta	Ft. Variation	Cause	Stream Volume	% Stream Bed Covered
B	2-8'	Heavy rainfall	5.49 cfs	

Pollution: Barnyard sewage and clay deposits scattered along entire course. Pollution not detrimental to fish life.

Fish (salmon): Silver run

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Silver salmon fingerlings	5/25/37		X		
Dace					X
Marine lampreys					X
Trout (sp?)					X

## General Remarks:

La Camas Creek enters the Cowlitz River approximately 27 miles above its mouth. It has two tributaries, Bear and Mill Creeks, both small and unsurveyed.

Topography

The topography changes rather abruptly at Station C. From the mouth to Station C the valley is rather narrow and V-shaped, with the watershed being hilly and covered with second growth conifers, mostly fir. Above Station C, the country is flat with

## General remarks (cont):

much uncleared, logged-over land but with few trees except along the creek. The gradient is moderate to almost flat.

Character of Stream

The better spawning areas are located below Station C. Here the gradient is somewhat steeper, the bed less meandering, and the resting places are better. Above Station C, the gradient decreases, the bed meanders to quite an extent, and large areas of mud and silted over areas occur. The relatively high temperatures observed at the Ethel bridge presumably are due to the slow current and lack of sufficient shade in the stretches above this point. Swampy areas occur between Stations C and D. During high water the Cowlitz River backs up La Camas Creek for 600 yds. The bottom in this area is heavily silted over. Also, the entire distance between Stations D and E is heavily silted over. A considerable portion of the gravel in this area is unsuited to fish because of the mud deposits.

Fish Population

There is usually a good run of silver salmon in this creek. The fall of 1936, however, was an exception as the run was unusually late and relatively small. Silver salmon fingerlings were seen in abundance up to Station D. Dace, marine lampreys and trout were scarce. Above Station D, silver fingerlings were not seen. The factors for this absence are unknown, but probably include high water temperatures and much mud, and the two dams.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	5/23/37	10:15 AM	64 F	56 F	Clear
B	"	11:05 AM	62	59	Clear
C	"	11:45 AM	63	55	Clear
D	"	12:20 PM	65	62	Clear
E	"	12:45 PM	64	67	Clear
F	"	2:30 PM	58	62	Partly cloudy

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %
A-B	4.4	114	25.9	19		3	55	5	7
				16.7		2.6	48.3	4.4	6.1

## Pool Grade (cont):

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %
B-C	1.7	37	21.8	2	1	0	19	5	1
				5.4	2.7		51.4	13.5	8.1
C-D	4.6	96	20.9	17			27	2	2
				17.7			28.1	2.1	2.1
D-E	5.4	97	18.0	1			16	1	2
				1.0			16.5	1.0	2.1
Tot	16.1	344	21.4	39	1	3	117	13	12
				11.3	0.3	0.9	34.0	3.8	3.5

This table continues the pool grade. The resting pool column above contains these pools.

Sta	S3T1 %	S3T2 %	S3T3 %	S5T1 %	S5T2 %	S5T3 %	S6
A-B	18			5		2	114
	15.8			4.4		1.8	
B-C	7			2			37
	18.9			5.4			
C-D	34	9		5			96
	35.4	9.4		5.2			
D-E	42	3		30	1	1	97
	43.3	3.1		30.9	1.0	1.0	
Tot	101	12		42	1	3	344
	29.4	3.5		12.2	0.3	0.9	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	4.43		40'	Est. by survey crew
B-C	1.68		50'	Est. by survey crew
C-D	4.58		30'	Est. by survey crew
D-E	5.38		25'	Est. by survey crew

**Bear Creek**

River System: Cowlitz River

Stream Surveyed: Bear Creek, tributary to La Camas Creek

**Date** of Survey: May 23, 1937

**Description:**

Enters the left bank of La Camas Creek, 0.5 mile above its mouth. Moderate gradient and good spawning rubble in its lower reaches. Flowing about 3 cfs May 23, 1937. Flows through logged-off land.

**Remarks:**

Although a resident reports that a few salmon 'ascend this brook every fall, it is too small to offer much spawning area.

**Salmon Creek**

River System: Cowlitz River  
 Stream Surveyed: Salmon Creek

Date of Survey: May 22-24, 1937 by Baltzo and Jobes.

Source: T11N,R2E in Lewis County, Washington. Low hills south of Mayfield, Washington

Direction of Flow: Lewis County, Washington. Discharges into Cowlitz River. NE1/4,S19,T11N,R1W opposite Toledo, Washington.

Total Length: 35 miles; 15.3 miles surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Mouth	---	---	---	---	S1S,T11N,R1W	75'	--
B	Ex-road br		4.4		4.4	S27,T11N,R1W	48'	8"
C	Conf w/Cedar Cr		6.7		11.1	S36,T11N,R1W	24'	7"
D	Upstream rd Xing		4.1		15.2	S33,T11N,R1E	24'	6"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0037	0.00
B*	17080005	0037	3.40
C	17080005	0037	11.40
D*	17080005	0038	4.71

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
A-B			9		25		26		41
B-C			21		24		30		25
C-D			23		25		37		15
Total			17.7		24.7		31.0		27.0

Spawning Area Usable and Available:

Station	Distance vds miles	Area (vd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
A-B	7,700	4.4	70,300	50	
B-C	11,900	6.7	87,695	54	
C-D	<del>7,300</del>	4.1	<del>40,600</del>	62	
Total	26,900	15.2	198,595	55	

Character of Watershed:

---

Mountainous

Hilly

Rolling X

Flat

Swampy

Wooded X

Open X (large logged-off areas)

Cultivated Less than 1%

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level:

Cause of Variation: Heavy rainfall in winter and spring

Feet Variation: 2'-6'

Stream Volumes: Station B 5/22/37 -13.8 cfs  
 Station D 5/24/37 12.0 cfs (est.)

% Bottom Covered: All near mouth to 70% above; pools filled bank but riffles only half-covered.

## Pollution:

Clay and earth banks along stream discolor water and covers bottom with layer of silt wherever there is not an appreciable current. Warm water causes heavy algal growth on bottom. Only riffles open enough for spawning. Slight gradient results in but few riffles fast enough to keep bottom clear. Very little good spawning area below Station C.

Fish (salmon): None

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Silver salmon fingerlings					X
Marine lampreys			X		
Suckers					X
Dace					X
Cyprinids (minnows)				X	

## General Remarks:

The lowest 15.3 miles were surveyed up to the furthest road crossing; stream unimportant above that point.

Tributaries

Little Salmon Creek on left bank 3 miles above mouth, carrying 2 cfs. Cedar Creek on left bank at Station C, 11 miles above mouth, carrying 4 cfs. Several unnamed and isolated small tributaries flowing about 2-3 cfs apiece. None of importance as spawning streams.

Topography

The watershed of Salmon Creek is comparatively flat, the stream flowing through a wide valley between low, rolling hills. Most of the watershed on the left side of the creek was logged 40 years ago and except for a few areas of standing timber, is now densely overgrown with young alder, brush and blackberry vines. The right side is still heavily forested with large fir and alder. Small areas of truck farming occur in scattered locations, but there is no cultivation of habitation along the stream itself. In fact, the creek is quite isolated and is touched by roads at only four scattered points.

General remarks (cont):

Character of Stream

Salmon Creek throughout its lowest 15 miles is characterized by its slight gradient, brushy margins, silted bottom and extremely meandering course. The clay and earth banks are being continually cut away, which results in a discoloration of the water and a heavy silting of the bottom in quiet areas. Inasmuch as a very high percentage of the stream consists of long pools and sluggish, deep riffles, there is probably only about 25% of the bottom at most where the current is fast enough to wash the gravel clean. However, the bottom of most of these faster stretches is usually all good spawning rubble.

The dense marginal vegetation overhangs the water in the quiet areas, affording plenty of food and protection for fish. However, the cutting of the timber on the left bank along the lower reaches exposed much of this sluggish surface to the sun, with the result that during the low summer flow the water temperature becomes quite high. This accounts for a heavy layer of algae which covers the bottom everywhere the current is too slow to wash it away.

The banks are typically quite flat, but are continually being cut to varying depths in certain channels and on the numerous bends. The water fluctuation seemed to be about six feet in the lower reaches and somewhat less above where the gradient is steeper. Several old log jams indicated that flood stages had raised the level as much as 10-12 feet. There are no obstructions to fish and the stream is free from any human interference, except the old logging remains.

Fish Population.

The trout fishing was reported to be good 10 years ago, but probably due to the high summer water temperatures, it is very poor now. A formerly large fall run of silver salmon nearly disappeared for a few years while the stream was being used to drive shingle bolts. Since 1932, however, the number of silver spawners has been gradually increasing. A few steelhead ascend to the colder, faster headwaters in the spring. A large run of marine lampreys ascends in May. Suckers are scarce, but dace and other small cyprinids are numerous.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Skv</u>
A	5/22/37	10:00 AM	55 F	54 F	Partly cloudy
B	5/22/37	3:05 PM	63	58	Partly cloudy
C	5/24/37	11:45 AM	60	56	Partly cloudy
D	5/24/37	5:15 PM	58	55	Cloudy

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	SlT3 %	S2T1 %	S2T2 %	S2T3 %
A-B	4.4	78	17.7	22	2	2	25	10	3
B-C	6.7	106	15.8	28.2	2.6	2.6	32.0	12.8	3.8
C-D	4.1	94	22.9	47	3	9	24	4	6
Tot	15.2	278	18.3	50.0	3.2	9.5	25.5	4.3	6.4
				44.6	1.8	11.1	24.1	5.8	6.5

This pool table is a continuation of the pool grade table above. The "resting pools" column above incorporates these following pools.

Sta	S3T1 %	S3T2 %	S5T1 %	S5T2 %	S5T3 %	S6
A-B	4	1	6	2		
	5.1	1.3	7.7	2.6		
B-C					2	
					1.9	
C-D	2					15
	2.1					
Total	6	1	6	2	2	15
	2.2	0.4	2.2	0.7	0.7	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	4.4		25'-30'	Est. by survey crew
B-C	6.7		35'	Est. by survey crew
C-D	4.1		50'-90'	Est. by survey crew

No topographic survey made of this region.

## Tributaries:

1. Little Salmon Creek

**Cedar Creek**

River System: Cowlitz 'River  
Stream Surveyed: Cedar Creek, tributary to Salmon Creek

Date of Survey: May 24, 1937

## Description:

Cedar Creek flows southeast to confluence with Salmon Creek, 11 miles above its mouth. Discharging about 5 cfs. This stream has but a slight gradient, deep, protected pools being common. It flows through a small ravine, which winds about through pasture and logged-off land. Logs and debris add further shelter to that provided by a dense border of marginal brush. The riffles are good for spawning but are very limited in extent. The clay soil through which the stream flows keeps the water more or less discolored and the bottom silted over. A couple miles above the mouth of Cedar Creek it flows over a 25 ft. sheer falls.

## Remarks:

Although a few salmon probably spawn in Cedar Creek, it is too small to warrant a survey.

## Additional Remarks:

Reported by storekeeper at Slocum on 4/30/41 to have impassable 20 ft. falls in canyon about one mile above mouth. Creek is in a deep V Mayfield canyon below general level several hundred feet through here.

## Winston Creek

River System: Cowlitz River  
Stream Surveyed: Winston Creek

Date of Survey: April 36, 1941 by Frey and Bryant

## General Remarks:

Winston Creek enters the Cowlitz River near the village of Mayfield, Washington, in SE4,S20,T12N,R2E. The creek would appear from a map to be of value to salmon, as it is about 15 miles long and has several fair-sized tributaries; however, 250 yds. above the mouth of the stream is an impassable 40' falls, and several smaller passable falls occur below. There is little usable rubble below the falls, most of it being jagged pieces of bedrock and large rubble. Two fish about 14" long (trout sp.) were observed on a redd a short distance below the falls. No detailed survey was made because of the small possible value of the stream for salmon and steelheads.

**Klickitat Creek**

River system: Cowlitz River  
 stream Surveyed: Klickitat Creek

Date of Survey: April 30, 1941, 'by Frey

Source: Drains part of the NE4 of T12N,R2E in Cowlitz County, Washington. The stream is small; it arises near the village of Mossyrock, flows west two miles and northwest one mile to its confluence with the Cowlitz River in SW4,S10,T12N,R2E, entering from the right side.

Direction of Flow: West, northwest

Total Length: 3.5 miles, of which 800 yds. were surveyed.

Station Location: None taken. Mouth of stream lies in SW4,S10,T12N,R2E. Estimated width is 18'.

EPA River Reach Codes:

Station	HUC	SEG	Rmi
Mouth	17080005	0100	0.37
End of survey*	17080005	0100	0.37

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
Total	3,900	2,000	51.3	850	21.8	80	2.0	970	24.9

Classification of stream based on amount of usable spawning rubble and area present:

	Area (yd <sup>2</sup> )	Quality (yd <sup>2</sup> )				
		Use Spawn Area (yd <sup>2</sup> )	Poor (0-10.6-10.5%)	Fair (10.6-30.6-30.5%)	Good (30.6-70.6-70.5%)	Excel (70.6-100%)
Estimated usable rubble	3,900	40	40			
Spawning rubble (MR + SR)	3,900	930	40	730	160	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Total	800	3,500	890	25.4	40	1.1

## Spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Unavail
Total	.100 yd.	400	40	10.0	--	--	A.T.

Note : 700 yds. above the mouth of the creek occurs a bedrock chute with a 10' drop and a 6' falls at the top of the chute, forming together a total barrier.

## Character of Watershed:

Low mountains, formerly covered with a Douglas fir forest, but not largely cut-over and burned over. No cultivation. From the mouth upstream for several hundred yards is a narrow box canyon, which broadens out into a narrow valley 0.5 mile wide at the top. Banks are 10-70' high, composed of earth and bedrock. Marginal vegetation, consisting of salmon berry, devil's club, ferns, moss, vine maple, and alder is very dense, almost impassable. Erosion is extensive in the burned and cut-over area.

Diversions: None

## Artificial Obstructions:

1. A bad log jam at 630 yd. appeared to be a barrier at all times.

## Natural Obstructions:

1. The gradient is so steep in the box canyon at the mouth it is doubtful if salmon or steelheads could enter during low water.

## Natural Obstructions (cont):

2. From 720 to 735 yds. is a bedrock chute with a 10' drop and a 6' falls at the top of the chute, forming a total barrier.
3. At 800 yds. is a 14' falls with a bend in the middle and rocks at the bottom. The channel here is only 3' wide, and heads into a narrow gorge. The falls is a barrier at all times.
4. Within 300 yds. of where the survey was terminated are two more impassable falls, the lower one of which has a large log jam at its head.

## Fluctuation in Water Level:

Fluctuation in Water Level: Estimated at 2-5'  
 Stream Volumes: 8 cfs on April 30, 1941.  
 An estimated 95% of the stream bed was covered by water.

Pollution: None, except silt from rapid run-off in cut-over area.

Fish (salmon): None observed or reported.

Fish (other than salmon): None observed or reported.

## General Remarks:

The stream is incapable of supporting a run of salmon or steelheads. In the first place, it is doubtful if fish could even enter the stream during low water because of the steep gradient in the box canyon near the mouth. Furthermore, within the first 1100 yds. there are 5 total barriers, 4 of which are falls complicated by bedrock chutes, dog-legs, or log jams. And finally, there is scarcely any usable rubble in the portion surveyed. All the medium and small rubble comprised only 23.8% of the total bottom, and the estimated usable rubble was only 1% of the total bottom.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
Mouth	4/30/41	2:30 PM	61 F	56 F	Overcast

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6
Total	0.5	14	28.0	1		8	5	14
				7.1		57.2	35.7	

## Gradient:

Station	Distance (Miles)	Avg Drop Per Mile	Source of Data
Mouth	0.5	220'	Columbia Nat'l Forest Map, 1940
Elevation at mouth approx. 330'.			

Tributaries: None is portion surveyed

## Tilton River

River System: Cowlitz River  
Stream Surveyed: Tilton River

Date of Survey: June 9, 1936 and October 16-20, 1936

Source: Sec.30,T14N,R5E, Lewis County, Washington

Direction of Flow: Southwest

Total Length: 26 miles; 23 miles surveyed

Station Location:

St	Location	Distance		Map	Location	Width	Depth
		Above Prev. Station	Above Mouth				
		Yds	Miles				
A	Rd bridge		0.3		S3,T12N,R2E	48'	77.5"
B	Near Bremer		8.0		S27,T13N,R4E	91'	11.0"
C	Conf w/N Fk Tilton		3.7		S30,T13N,R4E	58'	13.0"
D	Brdg below Morton		4.8		S3,T12N,R4E	35'	8'.0"
E	Br near W Fk confl		4.7		S18,T13N,R5E	18'	6.0"
F	18' Falls		1.6		S32,T14N,R5	15'	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	presently	inundated	
B	17080005	0061	4.23
C	17080005	0062	0.00
D	17080005	0062	4.49
E*	17080005	0064	1.15
F*	17080005	0064	1.15

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
		%		%		%		%	
Mouth-A		42		29		29			1
A-B		53		27		17			3
B-C		38		33		25			4
C-D		34		33		22			11
D-E		35		33		27			4
E-F		13		35		42			9
Total		35.8		31.7		27.0			5.3

## Spawning Area Usable and Available:

Station	Distance vds miles		Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )
Mouth-A	480	0.3		6,180	57	
A-B	14,209	8.0		124,388	44	
B-C	6,613	3.7		126,700	59	
C-D	8,449	4.8		98,888	55	
D-E	8,350	4.7		62,213	61	
E-F	<u>2,960</u>	1.6		<u>19,950</u>	78	
Total	41,061	23.1		438,319		

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	2%

Diversions: None

## Artificial Obstructions:

1. Power dam, 3.6 miles above Station C, 10' high, ladder.\*
2. Three log jams (not barriers), between Stations C and D.
3. Beaver dam, 103 yds. below Station D.

## Artificial Obstructions (cont):

\*Note : The power dam was formerly owned by the Western Gas & Electric Co. and was known to have held up runs in some years. Recently a P.U.D. was setup in the area and required the dam. It was no longer of use to the P.U.D. and with the cooperation of the U.S. Engineers, the State of Washington Fisheries Dept. obtained permission to blast it out. This was done on 9/24/44, opening the upper river to spawning runs for the first time in years. (data from Claussen, W.S.F.D., Spring of 1945).

## Natural Obstructions:

1. Falls at Station F, 18', impassable at all times.

## Fluctuation in Water Level:

Cause of Variation: heavy rains in region, and melting snow

Feet Variation: 6' to 8'

Stream Volumes: 0.5 of stream bed under water at time of survey

Pollution: Domestic animal and household refuse. Pollution is not extensive. Except for domestic animals, the only potential source of extensive pollution is between Stations D and E (towns of Morton and Lindberg).

Fish (salmon): Silvers and fall chinooks.

Station	Chinooks		Silvers	
	Date	Number	Date	Number
Mouth-A	10/16/36	1		
A-B	10/19-20/3	175	10/19-20/36	151
B-C	10/18/36	5	<b>10/18/36</b>	26
C-D	10/18/36	17	10/18/36	60
D-E	10/17/36	14	10/17/36	170
Total		212		407

## Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Cutthroats	10/19-20/36				X
Salmonid fingerlings	10/17/36		X		
	10/18/36			X	
	6/9/36			X	

## General Remarks:

Topography

The Tilton River flows through a rather wide valley, except for the distance from Station A to Station B, where the valley narrows down to form box canyons. The mountains are covered with dense covering of second growth fir, cedar, alder, maple and willow. A small part of the hills is still barren, following recent logging operations.

Character of Stream

The Tilton was extremely low during the October part of the survey, the flow being only 55.7 cfs at a velocity of 1.8 cfs (flow taken just below Station B, October 20, 1936). Below Station A and above Station B, the river flows through a wide bed having numerous gravel bars. Excellent spawning areas are available throughout the entire length surveyed, except for approximately two miles between Cinnabar and Bear Creeks. However, the spawning areas are more frequent above Station B. The gradient is moderate throughout, with the steepest gradient being in the canyons (Station A to Station B). Even there the water is not particularly fast.

Three log jams between Stations C and D are the only jams present. Although the upper jam (900 yds. long) appears to be impassable in places, migrants pass in considerable numbers. The only dam (about 1 mile below Morton) is about 10 ft. high. The fish ladder appears to work efficiently even in low water.

Note: Picture shows bad leak at side of ladder and small flow in fall. Original field notes say that "it doesn't look good but seems to work efficiently." Then it adds that its a "possible barrier to fall chinook at low water."

Later note: Dam out. 1944.

Fish Population

Silver salmon, fall chinooks, steelheads, and sea-run cutthroats run the Tilton. Residents consider the steelhead run as being of fair size. No reports or other evidence of a large cutthroat run. The 1936 run of silvers was unusually large, while the fall chinook run was small but about average. Salmonid fingerlings (species?) were seen in fair abundance in the upper part of the river.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv	pH
A	10/16/36	12:00 PM	62 F	54 F	Clear	--
B	10/18/36	9:30 AM	54	51	Clear	7.1
C	10/18/36	12:30 PM	64	53	Clear	7.2
D	10/17/36	9:00 AM	50	50	Clear	7.1
E	10/17/36	2:30 PM	76	54	Clear	7.1
F	6/09/36	3:10 PM	71	51.5	Clear	--

## Pool Grade:

Sta	Dist (mi)	Rest Pool	Rest Pl/Mi	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S5T1 %
M-A	0.3	14		1								
			100.0									
A-B	8.0	49	6	15	17	9	3	2	3			
				30.6	34.7	18.4	6.1	4.1	6.1			
B-C	3.7	34	9	10	11	8	2	3				
				29.4	32.4	23.5	5.9	8.8				
C-D	4.8	66	12	19	10	7	15	10	5			
				28.8	15.2	10.6	22.7	15.2	7.5			
D-E	4.7	54	11	9	9	5	15	10	5	1		
				16.6	16.6	9.3	27.8	18.5	9.3	1.9		
E-F	1.6	17	11				3	2	1	2	2	7
							17.7	11.7	5.9	11.7	11.7	41.3
To	23.0	221	9	53	47	29	34	23	14	3	2	7
				24.0	21.3	13.1	15.4	10.4	6.3	1.4	0.9	3.2

The following stations had S6 pools:

A-B = 42                      B-C = 3  
 C-D = 6                      E-F = 10

## Gradient:

There are no available data for computing the gradient of the Tilton River. It has a moderate rate of flow, riffles and pools being common and evenly spaced. Steep gradient through box-canyons between Stations A and B.

## Tributaries:

1. Cinnabar Creek

## Tributaries (cont):

2. Bear Canyon
3. Alder Creek
4. North Fork Tilton
5. Highland Creek
6. Davis Creek
7. Connelly Creek
8. Mines Creek
9. South and East Fork Tilton
10. Nineteen Creek
11. West Fork Tilton

Cinnabar Creek

River System: Cowlitz River

Stream Surveyed: Cinnabar Creek, tributary to Tilton River

Date of Survey: October 19, 1936

Description:

Flows 5 miles south to confluence with the Tilton, three miles above its mouth. Watershed densely covered with second-growth evergreens and some pasture lands. Flowing 3 cfs. on 10/19/36. Very steep gradient and 100% large rubble in lowest 2 miles. Enters Tilton over 75' sheer rock cliff.

Remarks: Inaccessible to all migrants

**Bear Canyon Creek**

River System: Cowlitz River

Stream Surveyed: Bear Canyon Creek, tributary to Tilton River

Date of Survey: October 20, 1936

## Description:

Short stream flowing into left bank of the Tilton, 6 miles above its mouth. Flowing 3 cfs. on 10/20/36. Flows through narrow ravine and has very steep gradient its entire length.

## Remarks:

Impassible at mouth, due to fast cascades and spreading out of stream through boulders. Picture taken of mouth.

**Alder Creek**

River System: Cowlitz River

Stream Surveyed: Alder Creek, tributary to Tilton River

Date of Survey: October 20, 1936

Description:

Short, steep brook flowing into the Tilton, 7 miles above its mouth. Flowing 1 cfs. on 10/20/36.

Remarks: Impassable windfall at mouth.

## North Fork Tilton River

River System: Cowlitz River  
 stream Surveyed: North Fork Tilton River, tributary to Tilton River

Date of Survey: 7/20-21/37

Direction of Flow: Southeast

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
A Mouth		---		---	36'	10"
B Conf w/Tumble Cr	2.5		2.5		8'	18"
C Conf w/Rockies Cr	2.2		4.7		26'	10"
D .6mi abv Jesse Cr	1.5		6.2		15'	8"

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0065	0.00
B	17080005	0065	2.08
C	17080005	0067	2.37
D*	17080005	0067	3.08

\* Station location is not definite and has been estimated

## Chararcter of Watershed

Between station A-B, high ridges up to 3000', covering was a virgin forest, no cultivation. The valley was U to V shaped and box in places. Banks up to 200' of bedrock and fine cut dirt. Vine maple, alder, salmon berry dense in some places. For station B-C, mountainous, thickly wooded no cultivation. The valley was narrow and V shaped. Banks were 5-80' and steep. The last station, C-D, watershed hilly and heavily wooded. Valley was narrow, steep-sided, and 200-300'deep. Moderate density of conifers, maple, alder, and patches of brush.

Diversions: no data available

Artificial Obstructions: no data available

Natural Obstructions: Falls between A-B, passable

Fluctuation in Water Level: no data available

Pollution: None

Fish (salmon): Silver fry abundant throughout survey

Fish (other than salmon): Rainbow trout (4-6") numerous from station B-D

General Remarks:

The North Fork joins the main Tilton River in S30,T13N, R4E. Approximately 11,472 yds. of this stream was surveyed 7/20-21/37.

The stream flows through rather mountainous, thickly wooded terrain. The gradient is moderately steep throughout. There are four falls ranging in height from 3' to 9' but they are all passable. Measured flow at 0.5 mi above the confluence of Tumble Creek was 48 c.f.s. 7/20/37.

Good resting pools are quite plentiful all along the stream. Medium and small rubble was found to be 55,330 yds<sup>2</sup> or 40.2% of the entire bottom of 137,800 yds<sup>2</sup>. Under the method used for classifying the rubble 11,770 yds<sup>2</sup> found to be "fair" and 48,500 yds<sup>2</sup> "good".

Silver salmon fry were numerous all along the stream but none were observed above Winnie Creek. Rainbow trout were quite numerous in the upper stations of the stream.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	7/20/37	10:30 AM	71 F	57 F	Clear
B	7/21/37	1:15 PM	61	55	Clear
C	7/21/37	11:30 AM	62	54	Cloudy
D	7/21/37	2:00 PM			Cloudy

## Pool Grade:

Sta	Dist (mi)	Res Pls	Rest Pl/Mi	SIT1 %	SLT2 %	SLT3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S5T1 %	S5T2 %
A-B	2.5	69	27.6	17	2	4	35		4		5	2
				24.6	2.9	5.8	50.7		5.8		7.3	2.9
B-C	2.2	61	27.7	.9			35	4			11	2
				14.8			57.4	6.5			18.0	3.3
C-D	1.5	53	35.3	4	3	5	18	7	4	5	7	
				7.5	5.8	9.4	34.0	13.2	7.5	9.4	13.2	
Tot	6.2	183	29.5	30	5	9	88	11	8	5	23	4
				16.4	2.7	4.9	48.1	6.0	4.4	2.7	12.6	2.2

The following stations had S6 pools:

A-B = 72                      B-C = 109                      C-D = 66

## Tributaries:

1. Fisher Creek, 4.6 cfs.
2. Tumble Creek, 5 cfs.
3. Rockies Creek, 3 cfs, falls, no fish.
4. Otter Creek, 5 cfs.
5. Jessie Creek, est. 5 cfs.
6. Winnie Creek, 12 cfs.
7. Highland Creek, 1 cfs.

Jefferson Creek

River System: Cowlitz River

Stream Surveyed: Jefferson Creek, tributary to North Fork Tilton  
River

Date of Survey: July 20, 1937

Description:

Flows into the right bank of the North Fork of the Tilton  
River, one-half mile above its mouth. Flowing about one cfs on  
7/20/37. Unimportant as a fish stream.

Bromo Creek

River System: Cowlitz River  
Stream Surveyed: Bromo Creek, tributary to North Fork Tilton  
River

Date of Survey: July 20, 1937

Description:

Flows (when it does) into the right bank of the North Fork  
of the Tilton, 2 miles above its mouth. Dry on 7/20/37.

## Wallanding &amp; Tumble Creeks

River System: Cowlitz River  
 Stream Surveyed: Wallanding and Tumble Creeks, shown on Forest Service map as Wallanding Creek, tributary to Tilton River

Date of Survey: July 21, 1937 by Baltzo

Source: Foothills to southwest of Mt. Rainier, R4E,T13N

Direction of Flow: Flows southwest to confluence with right bank of the North Fork of the Tilton River, three miles above its mouth

Total Length: 4 miles

Note: The original survey describes Wallanding Creek as a tributary to Tumble Creek. However, Tumble Creek is shown as tributary to Wallanding Creek on the map. This data apparently includes the lower Wallanding and then up Tumble Creek.

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/N Fk Tilton					S13,T13N,R3E	19'	5.5"
B Impassable 12' falls 100 yds. below Wallanding Cr		0.7		0.7	S12;T13N' R3E	4'	5.0"

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0066	0.00
B*	17080005	0066	0.00

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )							
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B	63		25		9		2	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )
A-B	1200 0.7	2750		35	
Remarks: About half of this spawning area is unusable because of the swift current.					

## Spawning Area Unavailable and Unusable:

Stream not surveyed above impassable falls at Station bb. Better and more spawning areas above falls.

## Character of Watershed:

---

Mountainous

Hilly	X
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None

Diversions: None

Artificial Obstructions: None

## Natural Obstructions:

1. Cascades and small falls, 200 yds. above Station A to Station B, 200' high, impassable to salmon, passable with difficulty to trout and steelhead.
2. Sheer falls, Station B, 12' high, impassable all times.

Fluctuation in Water Level:

Feet Variation: 4 ft. at mouth to 8 ft. above.  
 Cause of Variation: heavy winter rains and moderate snowfall.  
 Stream Volumes: Estimated 15 cfs normal flow, about 70% stream bed covered.

Pollution: None

Fish (salmon): No salmon spawners observed; too early in year.

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Silver fingerlings	7/21/37		X (lowest 200 yds)		
Rainbow trout	7/21/37		X		

Remarks: Inaccessibility of stream keeps fishing intensity low. Creek originally barren above falls at Station bb, but has now been stocked.

General Remarks:

Tributaries

Tumble Creek joins Wallanding Creek 100 yds. above the falls at Station B. Flowing about 6 cfs., but inaccessible to salmon or steelhead.

Topography

Watershed hilly and densely forested with alder and moderate-sized second growth fir and cedar. Tumble Creek flows through a narrow, steep-sided V-valley about 300-400 ft. deep.

Character of Stream

Wallanding Creek is characterized by its steep gradient. The cascades are almost continuous from 200 yds. above the mouth to the impassable falls 1000 yds. higher. Resting pools are fairly numerous, however, and the small patches of gravel at the tail end of each comprises about all the spawning area present. In the swift current only large rubble occurs. There are no cut banks, the valley walls starting up immediately from the edge of the fairly open wash. The margins are lined with a moderate

## General remarks (cont):

growth of alder and conifers, with a heavy blanket of moss on the trees and ground. The open part of the wash is composed chiefly of large boulders and bedrock.

Fish Population

Silver salmon fingerlings were present in any numbers only in the lowest 200 yds. of Wallanding Creek, so it is doubtful if the adults fight the cascades very far upstream when the spawning area is very limited. Inasmuch as it is a three-mile hike in to the mouth of Tumble Creek and as progress is very difficult up along the stream, few anglers bother to fish it. Consequently, rainbow trout up to 8 inches in length are abundant. The creeks above the falls were barren until stocked a while back.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	7/21/37	1:10 PM	61 F	53 F	Clear
B	7/21/37	3:00 PM	62	53	Clear

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S2T1 %	S3T1 %	S5T1 %	S6
A-B	0.7	56	80.0	12 21.4	21 37.5	17 30.4	6 10.7	many

Gradient: No topographic survey made of this region. Gradient very steep--estimated at 200 ft. per mile.

Appendix:

stream Surveyed: Tumble Creek, tributary to Wallanding Creek,  
tributary to Tilton River

Date of Survey: July 20, 1937 by Baltzo

## Appendix (cont):

## Description:

Flowing an est. 5 cfs, about equal in size to Wallanding Creek above their confluence. Hilly, forested watershed. Moderate gradient and fair spawning areas. Originally barren of fish, but rainbows have since been planted.\*

## Remarks:

Only 100 yds. below the mouth of Tumble Creek on Wallanding Creek is a 12' impassable falls, rendering this stream inaccessible to upstream migrants.

\*Note: Original survey has Tumble Creek listed as Wallanding Creek, and vice versa, but actually Wallanding enters the north fork of the Tilton instead of Tumble Creek. Tumble Creek, as a tributary, is inaccessible above the 12 ft. falls on Wallanding. Therefore, the lower Wallanding, instead of Tumble Creek, has the silvers in it.

## Otter Creek

River System: Cowlitz River  
Stream Surveyed: Otter Creek, tributary to North Fork of the  
Tilton River

Date of Survey: July 20, 1937 by Jones

## Description:

A small creek carrying only 5 cfs. Flows through a narrow V-valley between 2'-6' earth and gravel cut banks. Margins densely overgrown with brush; watershed heavily wooded and hilly. The lowest 100 yds. of stream affords pretty good spawning conditions, but above this the gradient is steep and the bottom is chiefly large rubble. In addition fallen logs in the creek are partial barriers because of the small flow. Heavy winter rains sometimes cause as high as a 5 ft. fluctuation.

A few silver fingerlings were observed near the mouth. The air and water temperatures on the above date were 67F and 51F respectively at 1:30 pm.

## Rockies Creek

River System: Cowlitz River

Stream Surveyed: Rockies Creek, tributary to North Fork Tilton River

Date of Survey: July 21, 1937 by Baltzo

Description:

Small tributary to the right bank of the North Fork of the Tilton two miles above Tumble Creek. Discharging an estimated 3 cfs. Hilly and heavily forested watershed. Flows through a narrow but deep valley. Considerable raise in volume during spring run off. Steep gradient, and a predominance of large rubble and bedrock.

Remarks:

A broken, 10 ft. falls over and through a log jam, located only 100 ft. above the mouth of Rockies Creek, forms an impassible barrier at all times except extreme flood stages.

---

**Jesse Creek**

River System: Cowlitz River  
Stream Surveyed: Jesse Creek, tributary to North Fork Tilton  
River

Date of Survey: July 21, 1937 by Baltzo

## Description:

A small tributary to the left bank of the North Fork of the Tilton River, three miles above Tumble Creek. Discharging an est. 5 cfs. Hilly and heavily-forested watershed. Flows through a narrow but deep and steep-sided valley. Moderate gradient in lower reaches. Predominance of bed rock and large rubble, with scattered areas of excellent spawning gravel. 3"-6" rainbows numerous below falls, but no fish, observed above. Fluctuation of 6-8 ft. during heavy runoff.

## Remarks:

Some 300 yds. above the mouth, Jesse Creek falls 20 ft. in a thin sheet over a very steep, bedrock slope. This is further complicated by a log jam, and is no doubt impassible at all times.

Highland Creek

River System: Cowlitz River

Stream Surveyed: Highland Creek, tributary to Tilton River

Date of Survey: October 16,.1936

Description:

Short stream flowing down shallow valley and into right bank of the Tilton near Morton.

Remarks: Flowing less than one cfs.

**Davis Creek**

River System: Cowlitz River

Stream **Surveyed:** Davis Creek, tributary to Tilton River

Date of **Survey:** October 16, 1936

**Description:**

Flows 2 miles northwest from source at Davis Lake to confluence with Tilton River near Morton. Flowing est. 8 cfs. Creek of moderate gradient through underbrush lowland. Appears to be fair spawning stream. Davis Lake is a shallow, muddy pond with heavy growth of tules and rushes. Principal fish in lake are catfish. Two small brooks tributaries to lake.

**Remarks:**

Davis Creek not surveyed because the water is always highly discolored by mud from the lake.

Connelly Creek

River System: Cowlitz River

Stream Surveyed: Connelly Creek, tributary to Tilton River

Date of Survey: October 21, 1936

Description:

Flows 5 miles southeast from Bergen Mt. to confluence with Tilton one mile above Morton. Reforested, hilly watershed. Flowing less than 1 cfs. Probably contains considerably more water during the wet season. The local Game Protector claims that a few steelhead ascend the stream in the spring.

Remarks: Considered too small to survey.

## Mines Creek

River System: Cowlitz River  
 Stream Surveyed: Mines Creek, tributary to Tilton River  
 Date of Survey: October 21, 1936

## Description:

Small brook entering Tilton near Lindberg. Heavy annual fluctuation. Nearly dry on 10/21/36. Falls and dam 0.5 mile above mouth; barrier.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080005	0604	0.00
End of survey*	17080005	0604	0.00

\* Station location is not definite and has been estimated

**South and East Forks of Tilton River**

**River System:** Cowlitz River  
**Stream Surveyed:** South Fork and East Fork Tilton River,  
 tributary to Tilton River

**Date of Survey:** 7/16-17/37

**Location:** The East Fork enters the South Fork 1 mi above the  
 confluence to the main Tilton River at Sec 30, T 13N,  
 R 5E.

**Direction of Flow:** Southwest

**Note:** There were no technical reports or cards written up on  
 these two streams. However, some stations were noted, EPA  
 river reach codes were determined, and a brief summary of  
 each creek was found in the historical data.

**Station Location:**

St	Location	Distance		Yds	Miles	Width	Depth
		Above Prev. Station	Distance Above Mouth				
M	Conf w/Tilton R	---	---	---	---	27'	8"
A	Conf E&S Fks	1.8	1.8	---	---	24'	5"
A'	Conf E&S Fks	1.8	1.8	---	---	10'	5"
B	End of survey E Fk	3.7	5.5	---	---	12'	8"
B'	End of survey S Fk	2.8	4.6	---	---	8'	3"

**EPA River Reach Codes:**

Station	HUC	SEG	Rmi
M	17080005	0063	0.00
A	17080005	0063	1.07
A'	17080005	0112	0.00
B*	17080005	0063	4.30
B'*	17080005	0112	0.00

\* Station location is not definite and has been estimated

**General Remarks:**

East Fork:

The East Fork enters the South Fork of the Tilton in S30,  
 T13N, R5E. Approximately 9,788 yds was surveyed 7/16-17/37. The  
 stream flows through quite mountainous terrain. The lower

## General remarks (cont):

section has been pretty well logged off but the upper parts are still in fairly dense forests. The gradient is quite steep and bedrock and large boulders are very much in evidence along the entire stream. Spawning areas are quite small and very much scattered. There are several log jams and falls in the part of the stream surveyed but they are all passable. The survey was terminated 1.5-2 miles below an impassable falls. It was reported that this falls is a complete barrier to salmon. Trout have been planted above the falls, according to reports. The flow at the end of the survey was estimated to be 10-12 c.f.s.

Silver salmon fry are abundant in the stream. Cutthroats and rainbow trout are quite common. It was reported that the silver salmon run in 1936 completely filled the stream at its peak.

Medium and small rubble amounted to 45,980  $\text{yds}^2$  or 48.0% of the 95,800  $\text{yds}^2$  of the entire bottom surveyed. Under the method used for classifying the spawning rubble, the entire 45,980  $\text{yds}^2$  is shown as "good".

South Fork:

Enters the Tilton River in S25, T13N, R4E, on right bank. It is roughly about 10 miles long, surveyed 7/16/37.

The terrain through which the stream flows is semi-mountainous. It has been recently logged-off and second growth is covering the hillsides.

Of the 22,700  $\text{yds}^2$  of bottom surveyed, 13,100  $\text{yds}^2$ , or 57.7% was medium and small rubble. Under the method used for classifying the material, 13,100  $\text{yds}^2$ , or the entire medium and small rubble, was considered as "good".

Silver salmon fry were very numerous throughout the area surveyed. Cutthroat trout were scattered.

Estimated flow at the end of the survey was 5-7 c.f.s. Principle tributary is the East Fork.

## Nineteen Creek

River System: Cowlitz River  
 Stream Surveyed: Nineteen Creek, tributary to Tilton River  
 Date of Survey: October 21, 1936

## Description:

Enters right bank Tilton, 0.5 mile above Lindberg. Flowing less than 1 cfs., but is considerably larger in the spring.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080005	0590	0.00
End of survey*	17080005	0590	0.00

\* Station location is not definite and has been estimated

## Remarks:

Impassible 12 ft. falls and log jam 0.75 mile above its mouth.

## West Fork Tilton River

River System: Cowlitz River  
 Stream Surveyed: West Fork Tilton River, tributary to Tilton River

Date: 7/17-19/37, Lobell

Location: s 19, T 13N, R 5E

Direction of Flow: Southeast

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
A Mouth	---		---		40'	9"
B River forks		4.2		4.2	13'	4"
C End of survey(L Fk)		0.5		4.7	--	--
C' End of survey(R Fk)		1.1		5.3	--	--

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0113	0.00
B	17080005	0113	1.95
c*	17080005	0113	3.71
C'*	17080005	0559	0.00

\* Station location is not definite and has been estimated

General Remarks:

The West Fork enters the main river in S19, ~~T13N~~, R5E. Approximately 7,386 yds was surveyed up to the **junction** of the right and left forks. 915 yds of the left fork, and 1,879 yds of the right fork was surveyed. The survey was conducted 7/17-18/37.

The terrain is quite mountainous and is logged off in most instances. Marginal vegetation of alder, willow, devil's club, and maple, is quite thick. The gradient is moderately steep and spawning areas are scattered throughout. Bedrock is very much in evidence.

From the mouth to the junction of the right and left forks, medium and small rubble amounted to 30,810 **yds<sup>2</sup>**, or 36.8% of the

## General remarks (cont):

entire bottom of 83,700 **yds<sup>2</sup>**. Under the **system** used for classifying the spawning rubble 30,810 **yds<sup>2</sup>** was considered as "good".

On the right fork, medium and small rubble amounted to 2,010 **yds<sup>2</sup>** or 20.5% of the total of 9,800 **yds<sup>2</sup>** surveyed. At the end of the 1,879 yds is an 8' falls that is a complete barrier. There are numerous 3-4' falls all along this stream. No fry were seen above the 8' falls but below it silver salmon fry were abundant. Estimated flow  $\pm$  5 c.f.s 7/19/37.

On the left fork, medium and small rubble amounted to 2,530 **yds<sup>2</sup>** or 55.0% of the total of 4,600 **yds<sup>2</sup>** surveyed. At the end of the 915 yds surveyed is a 9' log jam and falls. No fry were found above this barrier. Several trout 5-10" were found in a hole above the falls, however. Silver salmon were very numerous along the stream up to the barrier.

## Coon Creek

River System: Cowlitz River  
 Stream Surveyed: Coon Creek, tributary to West Fork of Tilton  
 River

Date of Survey: July 19, 1937

## Description:

Enters the West Fork of the Tilton in S12,T13N,R4E. It is roughly about 8 miles long, of which 2000 yds. was surveyed 7/19/37.

The terrain is quite hilly and virgin conifers covers the ridges. There is considerable bedrock with cascades and small falls all along the stream. The spawning rubble is scattered in small patches all along the stream. Of the 8,000 sq. yds. of bottom surveyed, 2,560 or 32% of the area, is medium and small rubble. Under the method used for classifying the material 2,560 sq. yds. of the medium and small rubble present was considered as "good."

silver salmon fry were very numerous all along the stream.

## EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080005	0575	0.00
End of survey	17080005	0575	0.00

**Snow Creek**

River System: Cowlitz River  
Stream Surveyed: Snow Creek, tributary to Coon Creek  
Date of Survey: July.19, 1937 by Lobell

## Description:

Empties into the right bank of Coon Creek, 2,000 yds. above the confluence of the latter with the West Fork of the Tilton. Mountainous and heavily-forested watershed. Its lower reaches flow through a bedrock canyon some 200 ft. deep in a continuous series of cascades over a large rubble bottom. Spawning gravels are limited to occasional small patches. The flow was estimated at 5-6 cfs; the annual fluctuation is only 1-2 ft.

## Obstructions:

250 yds. above the mouth of Snow Creek is a 15 ft. sheer falls, which appears impassable to salmon and probably steelhead. Fair numbers of silver fingerlings were observed below the falls.

**Sulphur Creek**

River System: Cowlitz River  
Stream Surveyed: Sulphur Creek

Date of **Survey**: April 30, 1941 by Frey and Bryant

Source: Arises on northeast slope of Green Mountain in the SE4 of Cowlitz County in Washington. The stream drains the SE4 of T12N,R3E and S31 of T12N,R3E.

Direction of Flow: From its source in SS,T11N,R4E, Sulphur Creek flows northwest, bending gradually until it flows due west. Slightly more than 3 miles from the source, the creek makes a right-angle bend and flows north for 1.5 miles to its confluence with the Cowlitz.

Total Length: 6.5 miles, of which 1.8 miles were surveyed

Station Location: None taken. Mouth in NE4,S15,T12N,R3E. Terminus in S14 or S15 of T12N,R3E. At road bridge, 2800 yds. above mouth, the width was 12' and the average depth 5.5".

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth inundated	a--	---	---
End of survey*	17080005	0687	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total	10,700	1,910	17.9	2,330	21.8	2,430	22.7	4,030	37.6

Classification of stream based on amount of usable spawning rubble and area present:

	<u>Quality (yd<sup>2</sup>)</u>					
	<u>Use Spawn</u>	<u>Poor</u>	<u>Fair</u>	<u>Good</u>	<u>Excel</u>	
<u>Area (yd<sup>2</sup>)</u>	<u>Area (yd<sup>2</sup>)</u>	<u>(0-</u>	<u>(10.6-</u>	<u>(30.6-</u>	<u>(70.6-</u>	
		<u>-10.5%)</u>	<u>-30.5%)</u>	<u>-70.5%)</u>	<u>-100%)</u>	

Estimated usable rubble	10,700	950	530	300	120	0
Spawning rubble (MR + SR)	10,700	4,760	0	780	3980	0

## Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning		Usable	
	yds	miles		Area(yd <sup>2</sup> )	% Avail	Spawning Area(yd <sup>2</sup> )	Usable
M-End	2,800	1.6	9,000	4,200	46.7	810	9.0

## Spawning Area Unavailable and Unusable:

Sta	Distance	Area (yd <sup>2</sup> )	Area		When Avail	Usable Unavail (yd <sup>2</sup> )	% Usable Unavail
			Unavail (yd <sup>2</sup> )	% Unavail			
M-End	400 yd.	1,700	460	32.9	A.T.	140	8.2

Cause of Unavailability: 2800 yds. above the mouth of the stream is a 12' bedrock chute with an old mill dam 6'4" high on top.

## Character of Watershed:

Hilly to low mountains, covered with a partly logged-over forest of Douglas fir, cedar, and hemlock. Some cultivation along lower part of stream. Lower valley quite flat, merging with Cowlitz floodplain, 3/4 mile wide below to 1/8 mile wide in upper surveyed portion. Very dense marginal vegetation of willow, alder, blackberries, devil's club, moss, ferns, salmonberry, vine maple, etc. Erosion is moderate.

## Diversions:

Diversion 1: 3,000 yd. above mouth, right bank. Diversion to old planer mill. Used to take entire flow of stream, but no longer operating. Water backs up and spills under edge of sluice. No screens.

## Artificial Obstructions:

1. 3,000 yds. above mouth. Dam on top of 12' bedrock chute. 6'4" high, 30' crest. Series of permanent wooden braces supporting upstream facing of boards, filled in behind with silt. Diversion to abandoned planer mill takes off at right. No fishway. Barrier at all times.
2. 3,090 yds. above mouth. Log jam. Low water barrier.

## Artificial Obstructions (cont):

3. 3,150 yds. above mouth. Log jam. Low water barrier.
4. approx. 4,500 yds. above mouth. Old reservoir dam on top of 30' falls. Barrier at all times. Not visited during survey.

## Natural Obstructions:

1. 3,000 yds. above mouth. Bedrock chute 12' high, with 6'4" diversion dam on top. Total barrier.
2. approx. 4,500 yds above mouth. 30' falls with old reservoir dam on top. Total barrier.

## Fluctuation in Water Level:

Fluctuation approximately 1-3 feet. Flow at time of survey, approximately 5 cfs. 95% of stream bed covered with water.

Pollution: None

## Fish (salmon):

None seen during survey. A man living near the mill reported that a few salmon (spring chinooks?) get up to the lower falls, and even spawn under the highway bridge, where there is a fair riffle.

## Fish (other than salmon):

No steelhead observed and none reported. Fair numbers of trout fingerlings (rainbow?) 2-4" long were noticed below the falls. Trout (sp.) are said to occur even above the upper falls.

## General Remarks:

The lowest two miles of Sulphur Creek courses in the Cowlitz floodplain and climbs gradually away from the river. Then the stream abruptly climbs the steep bank cut by the Cowlitz, climbing 300 ft. in less than a quarter mile. Above this sharp climb the gradient again levels off, but this portion is unavailable to any migratory fish.

## General remarks (cont):

The creek is accessible to fish only up to the lower bedrock chute and mill dam, a distance of 1.7 miles above the mouth. Above the falls the gradient increases sharply, forming numerous cascades. Several log jams forming low-water barriers occur in this region. About 3/4 mile above the first falls and dam occurs a second, with a 30' drop and an old reservoir dam on top. The falls above constitutes an impassible barrier and the dam accentuates this condition. Even if fish could get over the lower dam and falls they would have a hard time reaching the upper because of steep gradient and log jams.

A few beaver dams were noticed in the lower portion of the stream--passible, but yet causing **some** hindrance to fish.

Although a small run of **salmon** (spring chinooks?) is said to use the stream, Sulphur Creek does not have a great deal to offer salmon or steelheads. Pools are **small** for the **most** part, and estimated usable rubble was small in amount, there being too great a proportion of mud and sand in the stream bottom.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
Hwy br-2800 yds abv mth	4/30/41	9:45 AM	58 F	53 F	Overcast

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	S2T1 %	S2T2 %	S6'
M-End	1.8	48	26	2	4.2	39	7	76
						81.2	14.6	

## Gradient:

Sta	Dist (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
M-3	mi 3.0	570	190	Columbia Nat'l Forest Map, 1940
3-3.2	mi 0.2	300	1500	Columbia Nat'l Forest Map, 1940
3-6.3	mi 3.1	700	230	Columbia Nat'l Forest Map, 1940

## Tributaries:

1. 1.700 yds. above mouth, RB, 2-3 cfs.

## Shelton Creek

River System: Cowlitz River

Stream Surveyed: Shelton Creek, tributary to Cowlitz River

Date of Survey: July 15, 1937

Description:

Shelton Creek enters the left bank of the Cowlitz River in S34,T12N,R4E. 864 yds. of this stream were surveyed on 7/15/37. The stream is practically all cascades and falls with small pools scattered.

Under the method used for classifying the rubble 2,120 sq. yds. or 41.6% of the entire bottom was considered "good" spawning rubble.

The stream flows through very mountainous, heavily forested terrain. The valley is canyonous and bedrock and boulders are very much in evidence.

Silver salmon fry were found to be very abundant. There is an impassible 9' falls 810 paces above the mouth, and a 13' falls at 864 paces above the mouth. The estimated flow on 7/15/37 was about 76 cfs.

## Landers Creek

River System: Cowlitz River

Stream Surveyed: Landers Creek, tributary to Cowlitz River

Date of Survey: July 15, 1937

Source: Lewis County, Washington. NW4,S22,T11N,R5E. Mt. St. Helens Quad. U.S. Geological Survey.

Direction of Flow: In Lewis County, flowing northwesterly to confluence with Cowlitz River in NW4,S1,T11N,R4E (Columbia National Forest Map).

Total Length: 6 miles, of which 2.9 miles were surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Confl w/Cowlitz	---		--e		S1,T11N,R4E	18'	3"
B	5,200 yds. abv		2.9		2.9		12'	6"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080005	0723	0.00
B*	17080005	0727	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
		%		%		%		%	
A-B	-	22.6		21.5		27.0		28.8	

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning **Area Usable** and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
A-B	5,200 2.9		16,450	48.5		

Spawning Area Unavailable and Unusable: None

character of Watershed:

	Total
Mountainous	upper portion
Hilly	
Rolling	
Flat	on Cowlitz flood plain
Swampy	
Wooded	X
Open	
cultivated	None

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 3,700 yds. above Station A, log jam, 20' long, 20' high, passable with difficulty.
2. 3,840 yds. above Station A, bedrock falls, 30' high, 15' drop in 45 degree angle, passable with difficulty.

## Natural Obstructions (cont):

3. 4,112 yds. above Station A, log jam and falls, 8' high, passable with difficulty.
4. 4,389 yds. above Station A, bedrock falls, 8' high, passable with difficulty.
5. 4,468 yds. above Station A, bedrock falls, 9' in 15', passable with difficulty.
6. 4,700 yds. above Station A, log jam and falls, total drop 15' passable with difficulty.
7. 4,982' yds. above Station A, bedrock falls, 10' high, passable at high water.

Remarks: All of the above obstructions passable except the series of falls and log jam at Station B.

## Fluctuation in Water Level:

Feet Variation: two feet on flat wash of Cowlitz River, increasing to 5-10 feet in canyon area above.

Cause of Variation: melting snow on the mountainous watershed causes-increased runoff during early spring.

Stream Volumes: estimated 5 cfs on 7/15/37, 90% stream bed covered.

Pollution: None

Fish (salmon): No adults observed; silver fry numerous throughout.

Fish (other than salmon): Trout scarce (7/15/37)

## General Remarks:

Tributaries

Wakeawasa Creek, left bank, was not located during the survey but is approximately 1.5 miles above the mouth.

General remarks (cont):

### Topography

The course of Landers Creek for the lowest mile is on the flat bottom of the Cowlitz River in the same general direction as the River. As it leaves the Cowlitz flood plain there is a gradual increase in gradient as it enters the mountainous watershed above. The wide flat valley below gradually narrows so that in the mile below Station B it is a V-shaped canyon 500 to 2,000 feet deep. The entire watershed is covered with virgin conifer forest. This dense forest covering prevents rapid runoff and there is no apparent erosion of the watershed.

### Character of the Stream

The slight gradient of the Cowlitz flood plain causes Landers Creek to have a very low velocity in this section. The stream varies in width, spreading in places to as much as 60'. The banks are low (usually 2 to 5') and flat above the cut portion, and composed of gravel and earth. Bank vegetation is maple, alder, cottonwood, conifers and brush, affording adequate shade and protection to fish. This area of stream has remarkable spawning gravel and excellent riffle. Above the Cowlitz flood plain the gradient increases rapidly with the stream occupying the floor of a narrow V-shaped canyon 500 to 2,000 feet deep. The stream banks in this section vary from 5 to 100' in height, are mostly vertical and composed of bedrock or earth. There is usually a good growth of alder, maple and brush close to the stream, with conifers above. The bottom in this section has a large percentage of large rubble and cascades. Log jams and falls are numerous but all up to Station B are passable. A slight erosion is indicated by silting behind log jams. There is a fair distribution of resting pools.

### Fish Population

Silver salmon fry were present in large numbers on the date of survey showing that this creek supports a sizable run of this species. Forty-eight percent of the stream bottom is composed of suitable spawning gravels, most of which are located in the lowest mile. No salmon fry were observed above the falls and log jams at Station B. A few trout were observed but the small size of the creek would prohibit a large population of resident fish. A lack of fishermen trails indicated that the creek is seldom fished by sportsmen.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	7/15/37	10:30 AM	66 F	53 F	Clear
B	7/15/37	2:30 PM	68	52	Clear

## Pool Grade:

Sta	Resting Pools	Resting Pools/Mile	S1T1 %	S2T1 %	S2T3 %	S5T1 %	S5T2 %	S6	Total
A-B	88	30	9	36	1	37	5	117	205
			4.4	17.6	0.5	18.0	2.4	57.1	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B (gradient slight to steep)			290'	USGS Map, Mt. St.
Helens, Washington				

## Staffen Creek

River System: Cowlitz River  
 Stream Surveyed: Staffen Creek, formed by the union of Uden  
 Creek and Frost Creek, tributary to Cowlitz  
 River

Date of Survey: June 11, 1936

Source: Lewis County. Uden Creek, SW4,S10,T12N,R5E. Frost  
 Creek, SE4,S3,T12N,R5E. Their junction and the source  
 of Staffen Creek, SE4,S22,T12N,R5E.

Direction of Flow: **Flows** southwest from source to Cowlitz River  
 at SE4,S29,T12N,R5E, near Kosmos, Washington

Total Length: 4,560 yds or 2.6 miles surveyed

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---	---	---	---	S29,T12N,R5E	15'	10"
B Conf Uden&Frost Cr	2.6			2.6	S22,T12N,R5E	14'	21"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A*	17080005	0059	0.00
B*	17080005	0680	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B				5		33		55		7

Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)		%	Usable Spawning Area(yd <sup>2</sup> )	
	vds	miles			Avail			Usable
A-B	4,560	2.6		26,134	89			

Spawning Area Unavailable and Unusable: None

Character of Watershed:

	<u>Total</u>
Mountainous	
Hilly	
Rolling	
Flat	X
Swampy	
Wooded	X
Open	
Cultivated	30%

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level:

Cause of Variation: rains and run-off  
Stream Volumes: unknown

Pollution: None

Fish (salmon): Many small salmonid fingerlings seen; identified silver fingerlings seen in Uden Creek above.

Fish (other than salmon): None

## General Remarks:

Survey

Staffen Creek is composed of the combined discharges of Frost Creek and Uden Creek. From their junction to the confluence with the Cowlitz, the stream is called Staffen Creek. The total length from the mouth to the end of Frost Creek is about 6 miles. Of this distance, 4,560 yds. or 2.6 miles were surveyed. The survey commenced at the mouth and continued upstream to the junction of Frost and Uden Creeks.

Topography

For about the first mile, the stream runs through a dirt-walled ravine 20'-30' deep. The shade and cover is good. Above the town of Kosmos, Washington, it meanders through a flat valley floor which is 30% cleared and used as pasturage.

Character of Stream

In the first mile of stream, there are numerous good large cascades (GC3) and some pools with good cover. Above Kosmos, pools are infrequent, but the gradient is very low and the current slight. Of a total 29,460 sq. yds. of bottom, 26,134 sq. yds. or about 89% is composed of SR or MR. The rest is about equal proportions of LR and M&S. On 6/11/36, the average air temperature was 70F and the average water temperature was 55F. The weather was cloudy.

Fish Population

Many salmonid fry were observed in the creek. They were not identified, but occurred in large numbers.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	6/11/36	1:10 PM	67.0 F	54.5 F	Clouded
B	6/11/36	11:15 AM	72.0	55.0	Clear

## Pool Grade:

Sta	Resting Pools	Resting Pools/Mile	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S3T3 %	S6	Total
A-B	20	7	5	2	5	1	4	3	0	20
			25	10	25	5	20	15		

Gradient:

Slight gradient for 2.6 miles surveyed. No topographic map of this area available.

**Uden Creek**

River System: Cowlitz River  
Stream Surveyed: Uden Creek, tributary to Staffen Creek,  
tributary to Cowlitz River

Date of Survey: June 12, 1936

## Description:

Survey

Uden Creek is one of the upper forks which combine to form Staffen Creek. The survey started at the junction of Frost Creek and Uden Creek (the junction is regarded as the source of Staffen Creek) and continued upstream for about 1.5 miles (2,553 yds). Total length of Uden Creek is from 2 to 2.5 miles.

Tributaries

There are a few small tributaries, but they were not of sufficient importance to warrant survey.

Topography

In the lower 300 yds, the stream is well protected by alders, maples, etc., and runs in a swampy area. Above this for about 0.5 mile, it is in semi-open pasture land, with shade only fair in amount.

Character of Stream

The spawning rubble in the above mentioned stretch is excellent. Next the stream enters a narrowing valley and large rubble predominates. The upper 3/4 mile is well shaded, but the rubble is poor. About 1.5 miles above its mouth, the stream enters a narrow V-shape canyon, and ascends in sharp cascades. In the final 300 yds. surveyed, the stream is choked with logs, stumps, and brush, which form a probable barrier. The upper portion is logged off. Of a total 9,412 sq. yds. surveyed, 6,761 sq. yds. or 72% was available spawning rubble. Good cascades were numerous but pools few and small. Two stations were taken, Station A at the mouth (confluence with Frost Creek) and Station B (1,500 paces above the county road). The average width is 10' and the average depth 7". The flow was found to be about 8.5 cfs on the day surveyed. At Station A, the air and water temperatures were 72F and 54F respectively. At Station B they were 67F and 52F.

Description **(cont)**:Fish Population

Silver fry were extremely numerous in the lower 0.5 mile, a few above this point, but none above 0.75 mile upstream. No other fish were observed.

Gradient

The gradient was moderate for 1.5 miles, and becomes steep above the terminus of the survey. No topographic maps of this area are present so detailed gradient analysis is impossible.

Pool Grade

A total of 2 resting pools, 1 S3T1 and 1 S3T2, were observed in the 1.5 miles surveyed, giving an average of 1 resting pool per mile.

## Remarks:

See Staffen Creek for further data.

**Frost Creek**

River System: Cowlitz River  
 Stream Surveyed: Frost Creek, joins Uden Creek to form Staffen  
 Creek, tributary to Cowlitz River

Date of Survey: June 11, 1936

Source: SE1/4, Sec.3, T12N,R5E. 5 miles east of Morton,  
 Washington, Lewis County.

Direction of Flow: Flows south from source to join Uden Creek at  
 SE1/4, Sec.22, T12N,R5E.

Total Length: 4 miles; 5,880 yds. (3.3 miles) surveyed

Station Location:

<u>St Location</u>	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/Uden Cr	---		---			15'	13 "
B 2,780 paces abv A	2,780	1.6		1.6		11'	9"
C 3,100 paces abv B	3,100	1.7		1.7		6'	2"

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
A	17080005	0669	0.00
B*	17080005	0669	0.00
c*	17080005	0669	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station (vd<sup>2</sup>)</u>	Area		Area		Area		Area	
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B	0.0		0.3		6.0		94.0	
B-C	5.0		10.0		25.0		60.0	
Total	2.5		5.2		15.5		77.0	

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B	2,780	1.6	811	6		
B-C	<u>3,100</u>	1.7	<u>2,250</u>	35		
Total	5,880	3.3	3,061	21		

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	Total
Mountainous	
Hilly	
Rolling	
Flat	X
Swampy	X
Wooded	
Open	
Cultivated	40%

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: Feet Variation: Unknown  
Cause of Variation: Run-off/rains  
Stream Volumes: St B 10.4 cfs  
St c 3.0 cfs

Pollution: None

Fish (salmon): None

Fish (other than salmon): None

General Remarks:

Survey

Frost Creek joins with Uden Creek at SE4,S22,T12N,R5E to form Staffen Creek which flows into the Cowlitz near Kosmos, Washington. It rises in Lewis County, 5 miles east of Morton, Washington, and its course is southerly for about 4 miles, of which 5,880 yds. (3.3 miles) were surveyed

Tributaries

Several small tributaries were noted, but none of sufficient size to survey.

Topography

Practically the entire course of Frost Creek lies within a flat valley. The lower part is quite swampy and flat and the upper portion is land under cultivation or in pasture. Alders, maples, cottonwoods, and miscellaneous brush are found in some abundance, especially along the stream. Above the survey terminus, the stream descends in rapid cascades from a narrow gorge.

Character of Stream

From Station A (confluence with Uden Creek) to Station B, the creek bed is almost 100% mud and sand. The current is very slight and real pools are scarce. A few good cascades are found near the mouth. Spawning gravels amount to only 6% of bottom in this area. The gradient is very slight and the immediate surroundings are swampy. There is good cover provided, fringes of brush and trees along the banks. At Station A, the stream is 15' wide and has an average depth of 13". The air temperature was 72F and the water temperature was 55F. The station was established 6/11/36 at 11:10 am during clear weather. Above Station B, the surrounding country is all under cultivation or pasturage. The creek is often ditched to prevent swamp formation. About 0.8 mi. above B, a tributary enters from the

## General remarks (cont):

right, draining swamps. Above this tributary, the bottom changes suddenly from M&S to excellent small and medium rubble and continues to the end of the survey. All spawning in the stream is reported to occur in this section. Good C3 cascades are found in numbers, but pools are lacking. This, however, is compensated somewhat by the sluggishness of the stream. Good cover is found all along the banks. Station C was established at the entrance to a V-canyon, 3,100 paces above B. Here, the width was 5'6" and the average depth 1.5". The date was 6/11/36, the hour 5:00 pm and the weather clouded.

Air Temperature

Air temperature was 73F and water temperature was 54.5F. At Station B, the flow was computed at 10.4 cfs. At and above Station C, the stream is small, about 3 cfs, and descends rapidly through a narrow canyon.

Fish Population

Salmonid fry were observed in sheltered places in the upper end of the survey. The species is unknown. With only about 3,000 sq. yds. of available spawning area of a total 19,520 sq. yds., it would appear that this stream is not capable of maintaining a sizable run of migrating salmonids. The lack of good pools is balanced by the sluggish character of the stream. C3 cascades are numerous and cover is good in places. The lower half of the middle area (B-C) is partially ditched in an artificial bed, thereby ruining it for spawning. The lower half of the middle area (B-C) is partially ditched in an artificial bed, thereby ruining it for spawning. The good spawning area occurs in the last 1,600 paces of the section from B to C.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	6/12/36	11:10 AM	72 F	55.0 F	Clear
B	6/11/36	5:00 PM	73	54.5	Clouded

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S6	Total
A-C	3.3	7	2	1	5	1	0	7
				14.2	71.4	14.2		

## Gradient:

Gradient moderate throughout 3.3 miles surveyed; steep above survey. Since no topographic maps of this area exist, detailed gradient analysis is not possible.

## Rainy Creek

River System: Cowlitz River

Stream Surveyed: Rainy Creek, tributary to Cowlitz River

Date of Survey: June 10-12, 1936 by Kolloen and Sherman

Source: Lewis County, SE4,S29,T13N,R6E

Direction of Flow: Flows southwest from source to confluence  
with Cowlitz, SE4,S29,T12N,R5E

Total Length: 10 miles, of which 9 miles (15,925 yds.) surveyed

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	M o u t h	---		---		S29,T12N,R5E	35'	42"
B	Rd br abv Kosmos	1.9		1.9			23'	18"
C	5,164 paces abv B	2.9		4.8			24'	14"
D	At Forks	4.2		9.0			10'	3"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	Not available		
B	17080005	0059	1.18
c*	17080005	0059	2.33
D	Not available		

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area ( <u>yd<sup>2</sup></u> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
A-B	24,932		9		26		48		17
B-C	42,612		0		3		49		48
C-D	<u>41,010</u>		1		8		56		36
Tot	108,554		3		12		51		34

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B	3,276 1.9	24,932	18,331	74		
B-C	5,164 2.9	42,612	21,974	52		
C-D	7,485 4.2	41,010	26,275	64		

## Spawning Area Unavailable and Unusable:

None, if log jam is not impassable (said to be impassable)

## Character of Watershed:

	Total
Mountainous	
Hilly	
Rolling	
Flat	X
Swampy	(River valley about 1 mi. wide)
Wooded	Brushy
Open	
Cultivated	25%

Diversions: None

## Artificial Obstructions:

1. 845 yds. above B, log jam, no protection device, impassable.
2. 2,503 yds. above B, log jam, no protection device.
3. 4,537 yds:above B, log jam, no protection device.

## Artificial Obstructions (cont):

4. 5,050 yds. above C, log jam, no protection device.

Natural Obstructions: None

## Fluctuation in Water Level:

Feet Variation: Not known - but flood stages not serious

Cause of Variation: Seasonal rains and spring run-off

Stream Volumes: 800 yds. above A on 6/12/36 = 73.6 cfs

Conf w/ North Fork 6/12/36 = 11.6 cfs

Pollution: None

Fish (salmon): None

**Fish** (other than salmon): None

## General Remarks:

Survey

Rainy Creek is one of the largest of the numerous streams tributary to the Cowlitz River. Its source is in the highlands between Morton and Randie, Washington, and its mouth is near Kosmos, Washington. Of a total 10 miles of stream, 9 miles were surveyed,, including the stream from the mouth to the last forks. The two largest tributaries, Lunch Creek and the North Fork of Rainy Creek were noted and surveyed.

Topography

Throughout most of its course., Rainy Creek flows through a flat river valley from 0.5 to 1.0 mile wide. Most of the large timber has been cut and small trees, second growth conifers, and typical lowland brush are all that remain. In the lower part of the valley most of the cleared land is used for pasture. Further upstream, hay and truck-gardens are found. The total cultivated area is about 25% of the surrounding watershed. In no place is the gradient of the valley floor steep.

General remarks (cont):

Character of Stream

Although Rainy Creek is 30' wide at the mouth, it immediately widens out upstream and flows through several channels. From **the** mouth (Station A) to 706 yds. above A, the stream flows through a gorge in the valley floor. Logging operations have removed most of the stream cover in this area. Of a total 24,932 sq. yds. of bottom (Station A to B), 18,331 sq. yds. are available spawning gravels. However, the lack of cover and large pools are a drawback. The cascades are large and of good size (GC3). The rest of the stretch to Station B is well protected by brushy growth and has a good percentage of spawning rubble. Cascades continue good and pools are more frequent and larger. Above Station B, the country becomes flatter. **There are** a few dairy farms on the **north** side of the stream. On the south side are woods of alder, maple and cottonwood. **After 1,500** paces, **the** stream is fringed with overhanging vegetation. The stream becomes marshy and there is quite a large percentage of mud and sand. Several log jams occur between Station B and Station C. One is labelled impassable at 845 paces above B. Of a total 42,612 sq. yds. between Station B and Station C, 20,638 sq. yds. or 48% is M&S, and 21,974 sq. yds. or 52% is spawning rubble. Good cascades continue and pools are frequent, large, and well shaded. From Station C to the end of the survey there is an excellent amount of spawning area. The current is medium fast, and although pools are not numerous, many backwaters afford refuge for fry. The cascades remain good to the end of the survey. In the last stretch (Station C - Station C), a total of 41,010 sq. yds. of bottom included 26,275 sq. yds. or 64% of good spawning rubble. Although the variation of flow in the stream is not known, flows were taken on 6/12/36 in two localities. 800 paces above A, the flow was found to be 73.6 cfs. At the confluence with the north fork, the volume was 11.6 cfs. Flood stages on this stream are not serious. according to survey notes.

Fish Population

At the time of survey numerous, small salmonid fry were observed but not identified. They were found in great numbers above Station C especially. A good fall run of fish is found in Rainy Creek and its tributaries. Steelheads are present in the early spring, but are reported to spawn only in the tributaries. Trout, once abundant, are now reported to be rare.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	6/10/36	10:25 AM	61.0 F	52.0 F	Cloudy
B	6/10/36	11:50 AM	74.0	50.5	Clouded
C	6/10/36	1:05 PM	74.0	50.5	Clouded
D	6/11/36	11:00 AM	61.0	50.0	Cloudy

Pool Grade:

St	Rest Pls	Rest Pl/Mi	S2T1 %	S2T2 %	S3T1 %	S3T2 %	S4T2 %	S5T1 %	S5T2 %	S5T3 %	S6	Ttl
A-B	13	7	3			1		6		3	3	16
			18.7			6.2		37.5		18.7	18.7	
B-C	38	13	a	9	13	4	1		3		1	39
			20.5	23.0	33.3	10.2	2.5		7.6		2.5	
C-D	33	a	3			1		28		1		33
			9.2			3.0		84.8		3.0		
Tot	84	9	14	9	13	6	1	34	3	4	4	88
			15.8	10.2	14.7	6.8	1.1	38.6	3.4	4.5	4.5	

Gradient:

Moderate for 9 miles surveyed. No topographic maps available.

## Lunch Creek

River System: Cowlitz River  
stream Surveyed: Lunch Creek, tributary to Rainy Creek

Date of Survey: June 11, 1936

## Description:

Survey

Lunch Creek enters Rainy Creek about 1 mile above Station C (or about 5.2 miles above the mouth), from the north. Of a total length of perhaps 1.5 miles, 1800 paces (1 mile) was surveyed from the mouth to a 15' impassable falls.

Tributaries

One tributary, the East Fork, was surveyed.

Topography

Flowing through a flat valley for a distance of a mile, the stream is well protected by willows, alders, and miscellaneous brush. Pools are not numerous, but the current is sluggish. The upper 300 paces surveyed was very swift and enters a narrow canyon. The lower valley is entirely farmland. In the upper part the country is rugged and forested.

Character of Stream

A very narrow stream, Lunch Creek averages about 7'. Its average depth is 5". The flow was 7.3 cfs when surveyed. Of a total 4,900 sq. yds. of bottom, 2,150 sq. yds. or 44% was available spawning gravel. The remainder was practically all M&S. The riffles are uniformly good, becoming cascades in the upper survey. Pools are infrequent. Two stations were established. Station A was taken at the mouth (confluence with Rainy Creek) and Station B was taken at the falls (800 paces above the highway). At Station A, the air and water temperatures were 60.5F and 53.0F respectively at 8:30 am. At Station B they were 72.0F and 50.5F at 10:10 am.

Fish Population

Numerous salmonid fry were observed in the stream. They were from 1.5" to 2.0" in length. A fall run of silver (chinooks?) is reported and also a small spring steelhead run. Trout have been entirely depleted, none were observed. A few fish enter the East Fork which is a very small trickle about 4' side. It was surveyed for only 200 yds. Above this point is an

General remarks (cont):

impassable falls and series of cascades. The East Fork comes in from the east 1,600 paces above the mouth of the main stream. Many small fry were observed in the 200 yds. surveyed.

Pool Grade

Between stations A and B, a distance of 1 mile, there were 2 S5T1 resting pools.

Gradient

The gradient was moderate for the mile between stations A and B; the 300 yds. to terminus and above is steep.

**North Fork of Rainy Creek**

River System: Cowlitz River  
Stream Surveyed: North Fork of Rainy Creek, tributary to Rainy  
Creek

Date of Survey: June 10, 1936

**Description:**

This stream is a small tributary to Rainy Creek, entering from the north, 8 miles above the mouth.

**Topography**

It lies in hilly country and flows through a narrow canyon for most of the course.

**Character of Stream**

After the first 300 yds. spawning areas are very meager and poor. The creek has a steep gradient and cascades in jumps. There is an impassable falls less than 1 mile from the mouth. In 4,100 sq. yds., 1,110 sq. yds. or 27% might be used for spawning, except that the stream is so swift that pools are absent. The flow was found to be 12 cfs on 6/12/36. Two stations were taken--one at the mouth (A) and one at the terminus of the survey (entrance to gorge 1,200 paces above A). The average width at A was 18'8", at B 11'. The average depth at A was 7", at B it was 6". At station A, the air temperature was 72F and the water temperature 51F. At station B, the air temperature was 65F and the water temperature was 49F.

**Fish Population**

Steelhead are the only fish utilizing this stream and they do so only to a very small extent.

**Pool Grade**

In the 0.68 mile between stations A and B, there were 16 S6 pools, a frequency of 24 pools per mile.

**Gradient**

The gradient is steep. No topographic maps were available (Columbia National Forest Map).

**Goat Creek**

River System: Cowlitz River  
stream Surveyed: Goat Creek, tributary to Cowlitz River

Date of Survey: July 31, 1937

## Description:

Goat Creek enters the right bank of the Cowlitz River about four miles below the confluence of the Cispus River. A fair-sized stream flowing about 15 cfs when observed on 7/31/37. Mountainous watershed covered with large, virgin timber. Considerable fluctuation due to heavy fall and winter rains. The stream valley is 300 ft. deep and the rockwall banks are virtually canyonous.

The gradient is very steep, being almost a continuous series of cascades and small falls, and the bottom is 61% large rubble. Only 100 yds. of the 530 available to fish were suitable for spawning. Nevertheless, silver salmon fingerlings were quite numerous in the pools and pockets. When the air temperature was 60F on the above date, the water was 52F. The average width was 18 ft.

## Obstructions:

Only 530 yds. above its mouth, Goat Creek falls over a 35 ft. sheer drop. This is an impassable barrier at all times, the creek having originally been barren above it. When the Cowlitz River is below its normal level, the mouth of Goat Creek is dissipated through a big gravel bar on its bank, thus effectively keeping any fish out of the creek. Pictures of both the falls and the bar are in the files.

**Tumwater Creek**

River System: Cowlitz River

Stream Surveyed: Tumwater Creek, tributary to Cowlitz River

Date of Survey: July' 31, 1937

Description:

A short, small stream flowing into the right bank of the Cowlitz near Cowlitz Falls, 1 mile below the confluence of the Cispus River. Flowing less than 1 cfs. on 7/31/37. The gradient was steep and **very** brushy.

**Cispus River**

River System: Cowlitz River

Stream Surveyed: Cispus River, tributary to Cowlitz River

Date of Survey: April 23-28, 1941

Source: West slope of Cascades in SE portion of Lewis County and NE portion of Skamania County, between the Cowlitz River drainage on the north and the Lewis River drainage on the south. The river originates on the southwest slope of the crest between Goat Rocks and Old Snowy Mt. in SW1/4,T12N,R11E. Some distance downstream it is joined by Adams Creek from Mt. Adams.

Direction of Flow: Flows southwest 15 miles, northwest 12 miles, west 10 miles, and northwest 9 miles. The general direction of flow from the source to Adams Creek confluence is southwest, and northwest from there to the confluence with the Cowlitz.

Total Length: 50 miles, of which 33.6 miles were surveyed to an impassable falls just below the confluence with Cat Creek.

**Station Location:**

St	Location	Distance		Map	Location	Width	Depth
		Above Prev. Station	Above Mouth				
		Yds	Miles				
A	Mouth	---	---	SG,T11N,R6E	120'	-	
B	Conf w/Quartz Cr	3.7		S10,T11N,RGE	110'	-	
C	Conf w/Iron Cr	4.3		S19,T11N,R7E	90'	-	
D	Conf w/Greenhorn C	3.6		S1S,T11N,R7E	110'	-	
E	CCC Bridge	3.2		S12,T11N,R7E	143'	2.1'	
F	Conf w/N Fork	3.4		S1,T11N,R8E	80'	-	
G	Juniper Peak Br	5.1		S36,T11N,R8E	70'	-	
H	E Canyon Cr Br	5.3		S17,T10N,R9E	46'	4.7'	
I	Conf w/Adams Cr	3.1		S23,T10N,R9E	56'	2.4'	
J	Gail Falls	1.9		S24,T10N,R9E	24'	-	

**EPA River Reach Codes:**

Station	HUC	SEG	Rmi
A	17080004	0001	0.00
B	17080004	0003	0.00

## EPA River Reach Codes (cont):

Station	HUC	SEG	Rmi
C	17080004	0003	3.71
D	17080004	0005	2.97
E	17080004	0005	6.52
<b>F</b>	17080004	0011	2.33
G*	17080004	0012	6.04
H*	17080004	0012	8.89
I	17080004	0014	2.15
J*	17080004	0016	0.89

\* Station location is not definite and has been estimated

## Character.of Bottom Between Stations:

Sta	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B	211,600	76,830	36.3	68,680	32.5	48,350	22.8	17,740	8.4
B-C	304,200	167,290	55.0	98,760	32.5	2,640	0.9	35,510	11.7
C-D	195,300	68,090	34.9	65,100	33.3	47,970	24.6	14,170	7.2
D-E	238,200	60,560	25.4	134,270	56.4	16,460	6.9	26,910	12.2
E-F	180,600	72,990	40.4	62,310	34.5	25,330	14.0	19,970	11.1
F-G	244,050	129,915	53.2	59,920	24.6	28,970	11.9	25,245	10.3
G-H	232,080	123,470	53.2	59,404	25.6	25,538	11.0	23,668	10.2
H-I	69,600	51,780	74.4	11,090	15.9	780	1.1	5,890	4.3
I-J	<u>62,600</u>	<u>35,660</u>	57.0	<u>10,850</u>	17.3	<u>9,930</u>	15.9	<u>6,160</u>	9.8
To	1,738,23	786,585	45.3	570,384	32.8	205,968	11.8	715,293	10.1

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable, and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> )		Usable Spawning Area (yd <sup>2</sup> )	% Usable
	vds	miles		(MR&SR)	Avail		
A-B	6,500	3.7	211,600	117,030	55.3	27,365	12.9
B-C	7,500	4.3	304,200	91,400	33.4	40,802	13.4
C-D	6,400	3.6	195,300	113,070	57.9	44,765	22.9
D-E	5,590	3.2	238,200	150,730	63.3	100,610	42.2
E-F	5,900	3.4	180,600	87,640	48.5	25,825	14.3
F-G	8,950	5.1	244,050	88,890	36.5	26,900	11.0
G-H	9,260	5.3	232,080	84,942	36.6	17,462	7.5
H-I	5,400	3.1	69,600	11,870	17.0	3,000	4.3
I-J	<u>3,400</u>	1.9	<u>62,600</u>	<u>20,780</u>	33.2	900	1.4
Total	58,900	33.6	1,738,230	776,352	44.6	287,629	16.5

## Spawning Area Unavailable and Unusable:

The entire portion of the stream surveyed is available at all times, but everything above Station J is unavailable at all times because of the impassable falls located there.

## Character of Watershed (Station A-F):

	A-B	B-C	C-D	D-E	E-F
Mountainous	X	X	X	X	X
Hilly					
Rolling					
Flat					
Swampy					
Wooded	X	X	X	X	(burn Ever)
Open					
Cultivated	1%	0%	1%	0%	0%
Character of Valley	V 1/4-1 mi	V 1/4-1 mi	V 1/8-1/2 mi	u-v 1/4-1 1/2 mi	U 1/8-1/2 mi
Character of Banks	gravel bedrock 8-90	gravel bedrock up to 50'	gravel boulders 10-70	earth rubble ave. 5'	gravel boulders 5-20'
Density of Marginal Vegetation	cottonwood, maple, cedar, very dense	vine maple, alder, fir, dense	cottonwood, maple, fir cedar, very dense	vine maple, cottonwood, willow, dense	cottonwood alder, maple, mod. dense
Erosion:					
a) banks	cons.	slight	moderate	moderate	cons.
b) watershed	moderate	slight	cons.	moderate	extensive

## Character of Watershed (Station F-J):

	F-G	G-H	H-I	I-J
Mountainous	X	X	X	X
Hilly				
Rolling				

## Character of Watershed (Station F-J cont):

	F-G	G-H	H-I	I-J
Flat				
Swampy				
Wooded	X (burn over)	X (burn over)	X	X
Open				
Cultivated	0%	0%	0%	0%
Character of Valley	U 3/4-1 mi	v - u upper 1 1/2 mi 150' deep broader below	narrow canyon	V-canyon 1/8-1/4 mi wide at road
Character of Banks	same	gravel vol. bedrock 5-250'	bedrock nearly vertical up to 200'	gravel bedrock 10-200'
Density of Marginal Vegetation	cottonwood, alder, maple, bracken, mod. dense	vine maple, willow, dogwood, dense	mass ferns, vine maple, mod. dense	vine maple, fir, cedar, very dense
Erosion:				
a) banks	cons.	cons.	little	extensive
b) watershed	extensive	moderate	recent erosion	cons.

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

Gail Falls at Station J is a barrier at all times. The falls itself is about 30' high, and in the first hundred yards downstream there is an additional drop of 40' or more. Large boulders, white water, and several smaller falls would make it difficult for fish to approach the base of the falls.

## Fluctuation in Water Level:

<u>Stations</u>	<u>Estimated Fluctuation in Water Level</u>	<u>Estimated % Stream Bed Bed Covered</u>
A-B	8-15	85
B-C	10	93
C-D	5-8	97
D-E	5	80
E-F	5-10	75
F-G	5-10	40
G-H	8-10	85
H-I	10	99
I-J	8-10	99

Flow Records: Flow records for Cispus River (Water Supply papers 292, 313, 332) on staffgauge spiked to stump in S18,T11N,R8E, approximately the location of Station E of this survey:

10/25/10	977 cfs
11/28/10	1,650 cfs
12/29/11	736 cfs
6/11/12	2,450 cfs

Cause of Variation: Fluctuation in water level results mainly from melting snow in the spring months, and runoff from winter rains and snows. In the past some rather bad floods have occurred from Station G to below E a ways where the valley broadens out.

Stream Volumes: For the calendar year 1911, a maximum flow of 3,890 cfs occurred in May, a minimum of 295 cfs in October and November. The average flow for the year was 1,130 cfs.

## Pollution:

None except glacial silt from Mt. Adams during the summer months.

## Fish (salmon):

No salmon were observed during the survey of the main stream. Several of the tributaries (East Canyon Creek, North Fork) were found in the 1937 survey to have a fairly good run of silver salmon. Fingerlings were especially abundant in North Fork. A small run of spring chinooks is said to ascend the stream.

## Fish (other than salmon):

During the period of the survey five adult steelheads were observed in the river, 4 of them being on redds. Three additional redds were noted without fish on them. One skeleton (presumably of a steelhead) was found on shore.

Brook trout and rainbow trout occur in the stream. Bryant caught two brook trout a short distance below Station J and had several rainbows follow the bait. Fair numbers of trout fry, 1 1/2" - 2" long were observed throughout the surveyed portion of the stream, except immediately below Gail Falls at Station J. At times the fry were quite abundant in back waters and eddies.

One whitefish was caught between Stations F and G.

Much of the stream is not easily accessible because of the terrain, hence not overfished. However, in some places where the road follows the river fishing is heavy during the summer.

## General Remarks:

The Cispus River lies entirely within mountainous country. There is little flat land in the valley except between Stations C and F, where the best spawning areas in the stream occur. From Station G to the terminus of the survey the river flows through a narrow canyon, at times very deep, in which the gradient is steep and there is little usable rubble. Below Station C the valley likewise closes in and the gradient increases somewhat. The shallowest gradient occurs between Stations D and E.

Most of the country was originally covered with a dense Douglas fir - hemlock - cedar forest, part of which remains below Station E and above Station J. A bad fire destroyed much of the timber between these two points, leaving desolate hillsides with numerous fire-scarred trunks projecting above the brush and second growth.

Logging is being carried out along the lowest six miles of the stream. None is permitted above here in the area within the boundaries of the Columbia National Forest. There is a small amount of placer mining and some farming--chiefly cattle raising. Fern pickers reap a rick harvest of sword ferns for eastern markets.

At the time of the survey the stream was clear. In summer, however, it becomes very turbid with glacial silt from Mt. Adams brought to the stream by Adams Creek. This prevented a survey of the main stream when the tributaries were surveyed several years previous.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
C	4/23/41	9:00 AM	53.0 F	42.0 F	
D	4/23/41	12:15 PM	67.0	48.5	cirrus clouds
E	4/23/41	8:15 AM	48.0	45.0	Overcast
G	4/23/41	8:45 AM	59.0	43.0	Clear
2,100 yds below H	4/27/41	10:45 AM	54.0	44.0	80% cloudy

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	SlT1 %	SlT2 %	S2T1 %	S2T2 %	S6	Total
A-B	3.7	32	8.7	6	6	11	9	0	32
B-C	4.3	35	8.2	11	1	21	2	196	231
C-D	3.6	34	9.4	6	8	8	12	0	34
D-E	3.2	20	6.3	6	2	9	3	142	162
E-F	3.4	30	8.9	8	2	10	10	4	34
F-G	5.1	43	8.5	7	6	19	11	47	90
G-H	5.3	50	9.5	2	4	12	16	34	84
H-I	3.1	27	8.8	12	0	13	2	135	162
I-J	1.9	10	5.2	1	0	7	2	0	10
Grand Total	33.6	281	8.4	59	31	124	67	558	839
				21.0	11.0	44.1	23.8		

## Gradient:

Sta	Elevation	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	960 (A)	4.0	115	28.8	Water Supply Paper 313
B-C	1075 (B)	4.3	125	29.1	Water Supply Paper 313
C-D	1200 (C)	4.3	92	24.2	Water Supply Paper 313
D-E	1292 (D)	3.3	74	22.4	Water Supply Paper 313
E-F	1366 (E)	3.9	125	32.1	Water Supply Paper .313
F-G	1491 (F)	5.2	237	45.6	Water Supply Paper 313
G-H	1728 (G)	5.6	392	70.0	Water Supply Paper 313
H-12120	(H)	2.7	404	149.6	Water Supply Paper 313

## Gradient (cont):

Sta	Elevation	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
I-J2524 (I)		1.9	276	145.3	Water Supply Paper 313
Totals		34.7	1,840	53.0	

Note : The paced distance from the mouth of the river to the falls was 33.5 miles, a difference of 1.2 miles of 3.6%. The variation for individual stretches however varied from -14.1% to +13.7%. All except two of the paced distances were less than the measured distances.

## Tributaries:

1. copper Canyon Creek, 1500 yds above Station A, r.b., approx. 5 cfs. too steep for salmon.
2. Quartz Creek at Station B, r.b., surveyed previously.
3. Crystal Creek, 260 yds above Station B, r.b., 10' wide, 10-12" deep, approx. 5 cfs, surveyed previously.
4. Woods Creek, approx. 2000 yds above Station B, l.b., surveyed.
5. Unnamed, 5570 yds above Station B, r.b., 1-2 cfs, 250' falls and cascade at mouth, no value.
6. Unnamed, 6110 yds above Station B, r.b., approx 1 cfs, too small for salmon.
7. Iron Creek, at Station C, r.b., enters by rather steep cascade, 20-30 cfs., surveyed previously.
8. Nash Creek, at 2500 yds above Station D, r.b., small, steep, inaccessible.
9. Falls Creek, 1400 yds above Station D, r.b., small, no value to salmon.
10. Greenhorn Creek, at Station D, steep cascade at mouth, 7-10 cfs, previously surveyed.
11. Unnamed, 3530 yds below Station E, r.b., 10' wide, 8" deep, approx 5-7 cfs.
12. Stump Creek, 1820 yds below Station E, l.b., 6' wide, 2" deep, approx 1 cfs.

## Tributaries (cont):

13. Unnamed, 420 yds above Station E, l.b., 8' wide, 4" deep, approx 2 cfs.
14. Dry Creek, 1170 yds above Station E, l.b., 5' wide,, 4" deep, 1-2 cfs.
15. Unnamed, 1990 yds above Station E, l.b., 8' wide, 4" deep, approx 2 cfs.
16. Yellowjacket Creek, 2310 yds above Station E, r.b., 15' wide, 5" deep, approx 10 cfs, previously surveyed.
17. Camp Creek, 2700 yds above Station E, l.b., 10' wide, 8" deep, approx 2-3 cfs.
18. North Fork, at Station F, l.b., approx 30 cfs., previously surveyed.
19. Horse Creek, 4750 yds below Station G, l.b., small, steep, no value.
20. Slickrock Creek, 3960 yds below Station G, l.b., approx 1 cfs, very steep, probably intermittent.
21. Unnamed, 2970 yds below Station G, l.b., 3' wide, 5" deep, 1 cfs, no value to salmon.
22. Blue Lake Creek, 480 yds below Station G, l.b., 6' wide, 3" deep, 2-4 cfs, five foot falls at mouth.
23. Juniper Creek, 2400 yds above Station G, r.b., approx 8 cfs.
24. Unnamed, 4090 yds above station G, l.b., 4' wide, 3" deep, approx 1 cfs, no value.
25. Unnamed, 6440 yds above Station G, r.b., 10' wide, approx 5 cfs, enters over steep cascade.
26. East Canyon Creek, 400 yds below Station H, r.b., runs in deep canyon, falls short distance from mouth, appears impassable.
27. Squaw Creek, 2060 yds below Station L, r.b., 10' wide, 10-12" deep, 5-7 cfs, gradient too steep.
28. Adams Creek, at Station I, r.b.
29. Orr Creek, 2000,yds below Station J, r.b., approx 20 cfs.

## Tributaries (cont):

Note: the following tributaries enter Cispus above impassable Gail Falls (Cat Creek) and are of no value to salmon.

30. Cat Creek, .5 mile above Gail Falls, impassable falls above mouth.
31. Muddy Creek, 4 miles above Gail Falls.
32. Pimlico Creek, approx .5 mile above Muddy Creek.
33. Midway Creek, approx 1/3 mile above Pimlico Creek.
34. Elk Creek, approx 4 miles above Midway Creek.
35. Chambers Creek, approx 1/3 mile above Elk Creek.
36. Walupt Lake Creek, approx 4 miles above Chambers Creek.
37. Goat Creek, approx 2 miles above Walupt Lake Creek.

**Copper Canyon Creek**

River System: Cowlitz River

Stream Surveyed: Copper Canyon Creek, tributary to Cispus River

Date of Survey: July 31, 1937

Description:

Short, small stream flowing into the right bank of the Cispus River, one mile above its mouth. Flowing about 1 cfs on 7/31/37. Sustained flow of clear, cold water. Slight gradient and moderate brush along lower reaches in virgin forest. Numerous silver fingerlings observed in lower reaches, although stream is too small to have spawning area for more than a few adults.

April, 1941, survey of Cispus found approx. 5 cfs flow, but stream has several steep shallow sections as it enters the Cispus, and it is doubted if more than an occasional fish of any size could get into the stream.

## Quartz Creek

River System: Cowlitz River

Stream Surveyed: Quartz Creek, tributary to Cispus River

Date of Survey: October 22, 1936

Source: Northwest Skamania County, about 6 miles NE of Spirit Lake. Main source in Sec.15,T10N,R6E. Confluence with Cispus right bank NE1/4,Sec.10,T11N,R6E.

Location: Entire stream in T10N and T11N,R6E. NW Skamania County and SW Lewis County.

Total Length: 9 miles; 5,900 yds. or almost 3.4 miles were surveyed.

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---		---		S10,T11N;R6E	15'	9"
B Log jam		3.4		3.4	S10,T11N,R6E	12'	4"

## EPA River Reach Codes:

Station	'HUC	SEG	Rmi
A	17080004	0002	0.00
B*	17080004	0002	3.15

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )							
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B		69		.19.		13		0

## Spawning Area Usable and Available:

<u>Station</u>	<u>Distance vds miles</u>	<u>Area (yd<sup>2</sup>)</u>	<u>Available Spawning Area(yd ) (MR&amp;SR)</u>	<u>% Avail</u>	<u>Usable Spawning Area(yd<sup>2</sup>)</u>	<u>Usable</u>
A-B	5,900 3.4		a,345	31		

## Spawning Area Unavailable and Unusable:

None. Probably area above falls; no steelhead reported above it.

## Character of Watershed:

	<u>Total</u>
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
cultivated	

Diversions: None

## Artificial Obstructions:

1. 1,100-1,200 paces above Station A, bad log jam, no protection device, probably passable.
2. 6,000 paces above Station A, log jam, passable.

## Natural Obstructions:

1. 2,900 paces above Station A, falls, series of rapids, 6' high, passable.
- 2, 4,700 paces above Station A, falls, 10' high, impassable during low water, possibly passable with difficulty during high water.

## Fluctuation in Water Level:

Feet Variation: 6'-8'

Cause of Variation: spring run-off and rains; fall rains.

Stream Volumes: 9.5 cfs at Station A on 10/22/36

Pollution: None

Fish (salmon): None

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Steelhead	10/22/36		Reported		

## General Remarks:

Tributaries

several were listed, but none were surveyed.

Topography

The country surrounding the creek is very rugged and is heavily forested with conifers. The stream bed runs through a narrow canyon for the entire distance surveyed.

General remarks (cont):

Character of Stream

All the spawning area occurs in the lower portion of the stream. LR comprises 69% of the bottom (18,355 sq. yds.). Spawning gravels comprise 31% (8,345 sq. yds.). The stream is subject to a 6'-8' variation due to rains and run-off.

At Station A on 10/22/36 at 9:35 am in fair weather, the air temperature was 44 F and water temperature was 45 F. At Station B on 10/22/36 at 1:30 pm in fair weather, the air temperature was 51F and water temperature was 44F.

Volume of flow was 9.5 cfs, velocity 1.3 fps. There is an exceptional number of windfalls in the canyon.

Fish Population

No fish except steelheads have been reported--no fish were observed. Steelhead are reported to spawn up to the falls (2,900' above A). A mineral. (iron) spring occurs at 3,976 paces from A. Its volume is estimated at 0.5 cfs. This stream could not support a sizable run of migrating salmonids due to the small area of available spawning grounds.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Sky</u>
A	10/22/36	9:35 AM	44 F	45 F	Fair
B	10/22/36	1:30 PM	51	44	Fair

Pool Grade:

<u>Sta</u>	<u>Resting Pools</u>	<u>Resting' Pools/Mile</u>	<u>S1T1 %</u>	<u>S2T1 %</u>	<u>S3T1 %</u>	<u>S3T2 %</u>	<u>S3T3 %</u>	<u>S6</u>	<u>Total</u>
A-B	15	4	1	2	4	4	4	215	230
			0.6	0.9	2.0	2.0	2.0	93.0	

Gradient:

<u>Station</u>	<u>Distance (Miles)</u>	<u>Total Drop</u>	<u>Avg Drop Per Mile</u>	<u>Source of Data</u>
A-B	3.4	600'	176'	USGS Mt. St. Helens Quad

**Crystal Creek**

River System: Cowlitz River

Stream Surveyed: Crystal Creek, tributary to Cispus River

Date of Survey: October 22, 1936

Description:

Flows 5 miles north to confluence with Cispus, 4.5 miles above its mouth. Small, with exceptionally steep gradient.

Remarks:

It was observed on 10/22/36 that it is impossible for fish to ascend this stream.

## Woods Creek

River System: Cowlitz River

Stream Surveyed: Woods Creek, tributary to Cispus River

Date of Survey: October 22, 1936

## Description:

Flowing 1 cfs on 10/22/36, Woods Creek is a tributary to the left bank of the Cispus 5 miles above its mouth. Ames Creek is its only tributary. The area is heavily forested.

## Remarks:

Surveyed by Frey in April, 1941, Woods Creek was found to be too small and rough to be of any value, except to native trout. Its doubtful if fish can get into it at all during the period April to heavy fall rains.

Iron Creek

River System: Cowlitz River

Stream Surveyed: Iron Creek, tributary to Cispus River

Date of Survey: August 2, 1937 by Hanavan and Lobell

Source: Skamania County, Columbia National Forest, S33,T10N,R7E

Location: Lewis County, S19,T11N,R7E

Total Length: 11 miles; 2.73 miles to impassable falls surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---		---		S19,T11N,R7E	28'	13"
B End of survey		2.7		2.7		--	--

EPA River Reach Code:

Station	HUC	SEG	Rmi
A	17080004	0004	0.00
B*	17080004	0004	2.29

\* Station location is not definite and has been estimated

character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )				%			
	L.R.	M.R.	S.R.	M&S	L.R.	M.R.	S.R.	M&S
Total	56,600	28,360	11,340	9,280	50.0	20.0	13.5	16.4

spawning Area Usable and Available:

Between mouth and terminus, the total medium and small rubble was 18,960 sq. yds., or 33.5%.

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	<u>Total</u>
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 4,800 paces above mouth, falls, 30'-35', impassable.

Fluctuation in Water Level:

Feet Variation: 20' rise in canyons during 1934 flood

Cause of Variation: snow runoff, seasonal rains

Stream Volumes: At Station A on a/2/37, 36.1 cfs.

Pollution: None

Fish (salmon): None seen

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Trout	8/2/37		X		
Rainbow or Cutthroat	8/2/37		6"-10"		

Remarks: silver fingerlings

General Remarks:

#### Tributaries

Several 2-3 cfs tributaries seen, not fish streams.

#### Topography

The entire watershed is mountainous. Nearly 90% of it is covered by a virgin fir forest. The remaining 10% includes a brushy, burned-over ridge.

#### Character of Stream

The stream gradient is steep throughout, canyonous except in the lower mile. The heavy floods of 1934 scoured out much of the marginal vegetation leaving several log jams, a wide boulder and debris-strewn flood plain in the lower mile, and rock slides in the upper section.

Spawning areas are generally limited to the lower mile section. Above, the steep gradient, with a large percentage of boulders and sand, result in few areas widely scattered.

#### Fish Population

Iron Creek supports a fall silver salmon run which probably spawns within 1.5 miles of the mouth. Fry were common in this lower section. Trout, Cutthroat or Rainbows 6"-12" were abundant to the falls. As the entire stream lies in a closed fire area the stream is open to fishermen for a very short period.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv	pH
A	8/2/37	11:25 AM	73.5 F	52.0 F	Clear	7.6

## Pool Grade:

Sta	Resting Pools	Resting Pools/Mile	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S3T3 %	S6	Total
Tot	213	78	49	1	46	21	42	54	199	412
			11.9	0.2	11.2	5.1	10.2	13.1	48.3	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
Mth-fls	2.73	440'	161'	USGS Steamboat Mt.
Total	11.0	2,970'	270'	USGS Steamboat Mt.

**Nash** Creek

River System: Cowlitz River

Stream Surveyed: Nash Creek, tributary to Cispus River

Description:

A small steep inaccessible stream tributary to the right bank of the Cispus River between Iron and Greenhorn Creeks. There is no value to salmon or steelhead. Inspected April 1941 by Frey & Bryant.

**Falls Creek**

River System: Cowlitz River

Stream Surveyed: Falls Creek, tributary to Cispus River

Description:

A very small trickle tributary to Cispus River right bank between Nash Creek and Greenhorn Creek. It is very precipitous and of no value to salmon or steelhead. Inspected April 1941 by Frey and Bryant.

**Greenhorn** Creek

River System: Cowlitz River

Stream Surveyed: Greenhorn Creek, tributary to Cispus River

Date of Survey: October 23, 1936

Source: Skamania County, NW1/4, Sec.15, T10N, R7E

Location: Skamania and Lewis Counties. T10N and, T11N, R7E. Joins  
Cispus River, right bank in the NW1/4, Sec.15, T11N, R7E.  
Flows almost due north from source.

Total Length: 7 miles; 3,350 yds. or about 2 miles surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Mouth	---	---	---	---	S15, T11N, R7E	9'	6"
B	Falls		1.9		1.9		7'	5"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0090	0.00
B*	17080004	0090	1.88

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B				75		17		a		1

Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)		%	Usable Spawning Area (yd <sup>2</sup> )		%
	vds	miles			Avail			Usable	
A-B	3,350	1.9		3,600	25				

Spawning Area Unavailable and Unusable: None

Character of Watershed:

	<u>Total</u>
Mountainous	100%
Hilly	
Rolling	
Flat	
Swampy	
Wooded	
Open	
Cultivated	

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 3,350 yds. above Station A, falls, 60' high, impassable.

Fluctuation in Water Level:

Feet Variation: 20'

Cause of Variation: melting snow and rainfall

Stream Volumes: no flow taken

Pollution: None

Fish (salmon): None

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Rainbow trout fry	10/23/36		X		
Steelhead	10/23/36	reported			

General Remarks:

Tributaries

Although there are some important tributaries, none occurred within the surveyed distance.

Topography

The stream lies in a narrow canyon for the entire surveyed length. The surrounding terrain is very rugged and heavily forested with conifers. The gradient of the stream is very steep.

Character of Stream

Of 14,400 sq. yds. of bottom, LR constituted 10,780 sq. yds. or 75%; MR 2,420 sq. yds. or 17%; SR 1,180 sq. yds. or a%; M&S 20 sq. yds. or less than 1%. Total spawning area was 3,600 sq. yds. or 25%.

At Station A, the mouth, at 9:30 am on 10/23/36, the air temperature was 44F and water 43F. At Station B, terminus, at 12:30 pm on 10/23/36 the air temperature was 50F and water 45.5F.

The stream is subject to large fluctuations due to spring runoff and fall rains. The stream is very much cluttered with down logs and debris.

Fish Population

Steelheads are reported in this stream. The steep gradient would act as a definite hindrance to spawners and there is a limited area of suitable spawning gravels. Rainbow trout fry were observed in large numbers.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Sky</u>
A	10/23/36	9:30 AM	44.0 F	43.0 F	Fair
B	10/23/36	12:30 PM	50.0'	45.5	Fair

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S3T1 %	S6	Total
A-B	1.9	3	1	3	131	134
				2	98	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	1.9	500'	263'	USGS Steamboat Mt. Quad

**Stump Creek**

River System: Cowlitz River  
Stream Surveyed: Stump Creek, tributary to Cispus River

## Description:

A short and very steep intermittent stream, flowing directly into the Cispus above Tower Rock. Flows over about 100% bedrock and large rubble. Numerous high falls. Almost dry wash except at times of heavy run-off.

Other similar tributaries above Stump Creek are Dry, Camp, Horse; Blue Lake, Juniper, Twin, Squaw, Pimlico and Elk Creeks.

## Remarks:

None contain any available spawning area. Blue Lake is inaccessible to fish.

Dry creek

River System: Cowlitz River

Stream Surveyed: Dry Creek, tributary to Cispus River

Description: see Stump Creek

**Yellowjacket Creek**

River System: Cowlitz River  
 Stream Surveyed: Yellowjacket Creek (aka Niggerhead Creek),  
 tributary to Cispus River

Date of Survey: October 22, 1936

Source: Hat Rock and Craggy Peak

Location: Lewis and Skamania Counties, Washington.  
 SW1/4, SW1/4, Sec. 17, T11N, R8E.

Total-Length: 13 miles; 8,945 yds (5.1 miles) surveyed

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Width	Depth
	Yds	Miles	Yds	Miles		
A Mouth	---		---		20'	6.0"
B McCoy Rd Br		1.6		1.6	35'	5.6"
C Terminus		3.5		5.1	--	---

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0006	0.00
B*	17080004	0006	1.21
C	17080004	0006	4.24

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area		M.R.		S.R.		M&S	%
	(yd <sup>2</sup> )	%	%	%	%	%		
A-B		34		38		26		1
B-C		68		21		9		2
Total		51		30		18		1

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	Usable
A-B	2,745 1.6		19,540	65		
B-C	6,200 3.5		22,755	30		

## Spawning Area Unavailable and Unusable:

Log jam at 3,100 yds. above Station B stops all migrants and renders the 200 lineal yds. of excellent spawning gravel immediately above useless.

## Character of Watershed:

	Total
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None

Diversions: None

## Artificial Obstructions:

1. 3,100 yds. above Station B, log jam, 25' high, probable barrier.

## Artificial Obstructions (cont):

Note : The log jam located 3,100 yds. above Station B is 100 yds. long, 250 ft. wide at the upper end, tapering to 40 ft. at the lower end, and 25 ft. high. The logs are jammed into a narrow canyon with 80 ft. sheer sides. Although it was impossible to see any water below the jam, sounds indicated that there was cascading water. It is assumed that the logs are so placed that certain of them act as dams. In all probability these would not be large enough to serve as barriers to migrants, but other logs, no doubt, prevent any jumping. The jam is considered a barrier to fish because of the following observations: occasional adult silvers were seen throughout the stream up to this point; some 50 adult silvers were in the pool immediately below; silver fingerlings were numerous in places a short distance below; no migratory fish or nests were seen above the jam; and the small gravel bar immediately above appeared to have been deposited because of a slowing up of the water.

## Natural Obstructions:

1. 1,715 yds. above Station B, falls, 5' high, passable with difficulty during low water.
2. 6,200 yds. above Station B, falls, 25' high, impassable at all times.
3. 5,175 yds. above Station B, falls, 6'-20' high, impassable during low water.

## Fluctuation in Water Level:

Feet Variation: 20' in canyons.

Cause of Variation: heavy rains and melting snow.

Stream Volumes: on 10/23/36 at 1,900 paces above mouth, stream flow was 26.3 cfs.

Pollution: None

## Fish (salmon):

Species: silvers, chinooks

Estimated Number of Spawners on 10/22/36:

Stations A-B	4 silvers	1 chinook
Stations B-C	81 silvers	1 chinook

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Eastern <b>Brook Trout</b> (upper end of survey)	10/22/36		X		

General Remarks:

Tributaries

McCoy Creek surveyed, other small tributaries inspected.

Topography

Yellowjacket Creek flows through a narrow, rugged canyon except for the lower 1.75 miles which traverses a broad, flat valley. The vegetation of the watershed is composed chiefly of alder and second growth fir.

Character of Stream

The gradient is slight for the first 1.75 miles above the **mouth**. Above that, the gradient becomes steeper as one progressed up stream. The channel apparently changes its course frequently in the lower part of the **creek**. Good spawning areas are frequent below Station B, with occasional spawning areas within **the** first 3,300 yards above Station B. A large part of the bottom is bedrock and large boulders.

The log jam at 3,100 yds. above Station B stops all migrants, and renders the 200 lineal yards of excellent spawning gravel immediately above useless. This particular stretch of gravel appears to have been deposited as a result of the retarding effect of the log jam. The jam appears to be an effective barrier to fish because some 50 silvers were in the pool immediately below the jam, but no migrants or nests were seen above. **At the time of the** survey, the creek was flowing 26.3 cfs at a velocity of 0.95 fps (flow taken 1,900 yards above mouth in the flatter part of the stream).

Fish Population

A small run of spring chinooks was reported, and two cascades were found. A fair run of silvers occurs, the 1936 run being about average (85 silvers seen). Eastern brook trout **of** large size were seen in the pool below the falls that terminated the survey.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	10/22/36	9:30 AM	49 F	40 F	Clear
B	10/22/36	10:45 AM	46	44	Clear

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %
A-B	1.6	34	21	7	2	2	17	1	4
B-C	3.5	94	27	19	19	30	2	10	8
Grand Total	5.1	128	25	16.0	16.0	25.0	2.0	8.5	7.0
				17.0	14.0	21.0	12.0	7.0	8.0

  

Sta	S3T1 %	S3T3 %	S4T2 %	S4T3 %	S6	Total
A-B	1	0	0	0	0	34
B-C	0	1	1	4	23	117
Grand Total	1	1	1	4	23	151
	0.6	0.8	0.8	2.0	15.0	

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	1.6	75'	47'	USGS Steamboat Mt. Quad
B-C	3.5	440'	126'	USGS Steamboat Mt. Quad
A-Terminus	5.1	515'	101'	USGS Steamboat Mt. Quad

**High Bridge Creek**

River System: Cowlitz River  
stream surveyed: High Bridge Creek, tributary to Yellowjacket  
Creek

## Description:

Small tributary to Yellowjacket Creek, approximately 3 miles  
up. No spawning area, small and of no importance to salmon.

Lambert Creek

River System: Cowlitz River

Stream Surveyed: Lambert Creek, tributary to Yellowjacket Creek

Description:

Small tributary to Yellowjacket Creek, approximately 0.5 mile above High Bridge Creek. Steep, small flow, and not enough spawning area to be of any importance to salmon.

**Burley Creek**

River system: Cowlitz River

Stream Surveyed: Burley Creek (Galena Creek on Columbia National Forest Map 1941) tributary to Yellowjacket Creek

## Description:

The stream survey called this stream Burley Creek. It is named Galena Creek on the Columbia National Forest map 1940.

It is a small steep tributary to Yellowjacket Creek next above Lambert Creek. It rises on Burley Mt. and has little spawning area, and is of no importance to salmon.

## Remarks:

The tributaries to Yellowjacket Creek in upstream order are: High Bridge, Lambert, Burley, McCoy, Pinto and Badger Creeks. Tributaries to McCoy Creek are: Kidd, Camp and Sunrise Creeks. Niggerhead and McCoy Creeks have been surveyed, but all the others are small and fall over rock cliffs for a great part of their length. None of these tributaries contain any available spawning area.

**McCoy Creek**

River System: Cowlitz River  
 Stream Surveyed: McCoy Creek, tributary to Yellowjacket Creek  
 'Date of Survey: October 23, 1936

Source: Mountains near Hat Rock

Location: Lewis and Skamania Counties, Washington.  
 SE1/4,SE1/4,T11N,R8E, Columbia National Forest Map.

Total Length: 10 miles; 0.37 miles surveyed

Station Location: None

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
Mouth	17080004	0010	0.00
End of survey*	17080004	0010	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Total		87		6		7		0	

Spawning **Area** Usable and Available:

<u>Station</u>	<u>Distance</u>	<u>Area</u>	<u>Available</u>	<u>%</u>	<u>Usable</u>	<u>%</u>
	<u>yds</u> <u>miles</u>	<u>(yd<sup>2</sup>)</u>	<u>Spawning</u>	<u>Avail</u>	<u>Spawning</u>	<u>Area (yd<sup>2</sup>)</u>
			<u>Area (yd<sup>2</sup>)</u>		<u>Area (yd<sup>2</sup>)</u>	<u>Usable</u>
			<u>(MR&amp;SR)</u>			
Total	650 0.37		680	13		

Spawning **Area** Unavailable and Unusable: None

## Character of Watershed:

	Total
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None

Diversions: None

## Artificial Obstructions:

1. 572 yds. above mouth, log jam, 15' high. Log jam on cascades; fish could ascend even in low water if logs were removed. Impassable now.

**Natural** Obstructions:

1. 90 yds. above mouth, falls, 5' in 10', impassable during low water.
2. 520 yds. above mouth, falls, 15' in 1.5', impassable during low water.
3. 650 yds. above mouth, falls, 50' in 50', impassable all times.

**Fluctuation in Water Level:**

Feet Variation: 10' to 15'

Cause of Variation: heavy rains and melting snow

Stream Volumes: estimated 7-8 cfs.

Pollution: None

Fish (salmon): None

Fish (other than salmon): None

General Remarks:

Topography

McCoy Creek flows through a narrow canyon with a steep gradient. Second growth fir and alder cover most of **the** mountain sides.

Character of Stream

The stream bed is mostly bedrock, the greater part of the spawning gravel coming from a small rock slide. The small amount of water (est. 7-8 cfs) has a fast flow.

Fish Population

No fish seen. Good trout (species?) fishing reported further back in the mountains.

Temperature Data: Undetermined

Pool Grade:

Rest Pools	Resting Pools/Mi	S1T1 %	S1T2 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %	S4T3 %	S6	Total
Tot 9	24	2	1	1	1	1	2	1	3	12
		16	8	a	a	a	16	a	25	

Gradient:

Moderate to steep in 0.37 mile. Surveyed to impassable falls. Drop about 100' in 0.37 mile. According to topographical map, McCoy Creek falls 2,650 ft. in its 10 mile length, average gradient of 265' per mile.

**Kidd** Creek

River System: Cowlitz River

Stream Surveyed: Kidd Creek, tributary to McCoy Creek

Description:

Tributary to lower McCoy Creek. Small, steep, inaccessible to salmon and steelhead due to 60' falls, total barrier on McCoy Creek below the mouth of Kidd Creek.

See Burley Creek.

**Camp Creek**

River System: Cowlitz River

Stream Surveyed: Camp Creek, tributary to McCoy Creek

Description:

A small tributary to McCoy Creek, next above Kidd Creek. Rendered inaccessible at all times by 60' falls in McCoy Creek below mouth of Camp Creek.

Sunrise Creek

River System: Cowlitz River  
stream Surveyed: Sunrise Creek, tributary to McCoy Creek

Description:

Small tributary to upper McCoy Creek. Rendered inaccessible at all times by 60' falls, total barrier in lower McCoy Creek.

**Pinto Creek**

**River System:** Cowlitz River

**Stream Surveyed:** Pinto Creek, tributary to Yellowjacket Creek

**Description:**

**Small** tributary to upper Yellowjacket Creek above McCoy Creek. It is of no value as its mouth is above a total barrier on Yellowjacket Creek.

**Badger** Creek

River System: Cowlitz River

Stream Surveyed: Badger Creek, tributary to Yellowjacket Creek

## Description:

Small tributary to upper Yellowjacket Creek and of no value to salmon because its mouth is above a total barrier on Yellowjacket Creek.

See Burley Creek.

**Camp Creek**

River System: cowlitz River

Stream Surveyed: Camp Creek, tributary to Cispus River

Description:

Small steep tributary to Cispus River between Yellowjacket and North Fork. No value to salmon or steelhead.

North **Fork** Cispus River

River System: Cowlitz River  
 stream Surveyed: North Fork Cispus River

Date of Survey: 8/1-2/37

Source: Elk Peak, high on western slope of the cascades range in  
 S21,T11N,R10E.

Direction of Flow: Flows west on cascade slope to confluence with  
 Cispus River in S1S,T11N,R8E.

Total Length: 15 miles, 6 miles surveyed.

Station Location:

St	Location	Distance		Map	Location	Width	Depth
		Above Prev. Station	Above Mouth				
		Yds	Miles				
A	Conf w/Cispus R.	---	---		S1S,T11N,R8E	19'	11"
B	Conf w/Irish Cr	1.5			S11;T11N;R8E	33'	14"
C	Conf w/Midget Cr	2.3			S8,T11N,R9E	20'	13"
D	.3 mi abv Timonium	2.2			S23,T11N,R9E	* *	2"
**	Width of Sta. D: 20 to 25' over chute						

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0029	0.00
B	17080004	0029	1.42
C	17080004	0029	4.19
D	17080004	0029	8.42

Character of Bottom Between Stations:

Station	Area		M.R.		S.R.		M&S	%
	( $yd^2$ )	%	%	%	%	%		
A-B		36.6		38.1		22.6		2.7
<del>B-D</del>		<del>36.2</del>		<del>34.0</del>		<del>24.0</del>		<del>4.9</del>
Total		34.6		37.0		24.8		3.6

classification of stream based on amount of usable spawning rubble  
**and** area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> ) Usable
A-B	1.5		17,470	60.7	
B-C	2.3		29,330	66.5	
C-D	2.2		<u>23,390</u>	58.9	
Total	6.0		70,190	62.0	

Spawning Area Unavailable and Unusable:

Cause of Unavailability: Not surveyed above bedrock falls at Sta. D. Falls impassable at all times. Gradient above falls is steep with only a small amount of good spawning gravel, mostly bedrock bottom with large pools.

Character of Watershed:

	A-B	B-C	C-D	D-E
Mountainous			X	
Hilly	X	X		
Rolling				
Flat				
Swampy				
Wooded	X	X	X	
Open				
Cultivated				
Character of Valley				
Character <b>of</b> Banks				
Density of Marginal Vegetation				

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Sta. D, bedrock chute, series of falls above, 25' drop in 60', impassable. Creek flow over bedrock chute with a drop of 25' in 60' covered. Current very swift and only 2" deep. No silver fingerlings above this but numerous below. At the head of this impassable bedrock chute is an 8' falls below which is a large pool. Creek enters narrow bedrock gorge above and two 6' falls occur a short distance upstream. See files for picture.

Fluctuation in Water Level: 1-5'

Cause of Variation: The seasonal fluctuation in water level on this river is very moderate caused wholly by the melting snow in the mountains of its source during the spring months. The watershed is heavily forested throughout so that the runoff is gradual and sustained.

Stream Volumes: Sta. A - 8/1/37 - 72 cfs - good.  
Sta. B - 8/2/37 - 77 cfs - rough.  
Sta. C - 8/2/37 - 43 cfs - rough.

Stream normal on date of survey.

Percent of stream bed covered: 70%. Considerable areas of suitable gravel.

Pollution: None

Fish (salmon): Species - Silver Salmon. No spawners observed. Silver fingerlings were abundant throughout entire distance surveyed. Variation in size indicates presence of two age classes.

---

Fish (other than salmon):

The rainbow trout observed did not exceed 7". Fished out for a distance of a mile above mouth; but numerous above. Cutthroat larger but scarce. Steelhead nests observed in lowest mile. Trout observed in unsurveyed section above falls at Sta. D.

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Steelhead					
Rainbow	8/1/37		X		
Cutthroat	8/2/37				X

General Remarks:

Survey

6 miles to impassable falls at Sta. D.

Topography

The North Fork flows through mountainous country throughout, having its source on Elk Peak and converging with the Cispus River at an elevation of 1,500 feet. The watershed is heavily wooded with large second growth cedar and fir, relatively clear of underbrush.

The stream valley is generally u-shaped. In the lowest 1/2 mile, the North Fork traverses the flood plain of the Cispus River, from which it abruptly enters a canyon which continues for the next 1 1/2 miles. This is a box canyon with vertical bedrock walls and an average depth of 200 feet. From the canyonous area to Sta. D, the valley is u-shaped of narrow but moderate sloping sides, becoming canyonous only in the last mile. The valley depth in this section ranges from 500 to 1000 feet.

Character of Stream

The river occupies the entire valley floor in the canyon sections and here the banks are of vertical bedrock 100-200' in height. The remaining areas have flat banks usually of 2-3' in height increasing to as much as 8' on bends. Marginal vegetation in the lowest two miles consists mainly of a moderate growth of conifers with some underbrush. Alder, maple and conifers occur along the stream in the upper four miles with a more abundant growth of brush. Good shade and protection is available throughout.

## General remarks (cont):

This stream affords much ideal spawning area with 62% of its bottom consisting of small and medium rubble; with resting pools numerous and well distributed. These conditions make it capable of supporting a good run of salmon.

The actual paced distances and those measured on the topographical map do not agree on this stream. The distance from the mouth to Timonium Falls was paced at six miles in contrast to the eight miles as shown on the map. (U.S. Geological Survey, Stemboat Mt., Washington, 1931). However, the U.S. Forest Service trail which has numerous turns and is not as direct as the stream is also measured at eight miles. It is probable that the stream distance of six miles as paced on survey is approximately correct.

Fish Population

That a considerable run of silver salmon run in this river is indicated by the abundance of this species, fry. It is interesting to note the presence of two distinct age groups as indicated by the two sizes of fry. No adult salmon were observed during the survey. Rainbow trout up to 7" long are numerous and also a few cutthroat generally of larger size. Trout fingerlings were noted above the falls at Sta. D. Steelhead nests were observed near the mouth.

The lowest mile is well fished out due to its nearness to the road and North Fork forest camp. Above here, however, rainbow fishing is good. A good trail follows the stream along the right bank.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	8/1/37	12:30 PM	63.0 F	51.0 F	Cloudy
B	8/2/37	10:30 AM	57.0	50.0	Clear
C	II	3:00 PM	63.0	51.0	"
D	8/3/37	12:00 PM	66.0	49.0	Clear

## Pool Grade:

St	Dist (mi)	Rest Pls	SlT1 %	SlT2 %	SlT3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %	S3T2 %	S3T3 %
A-B	1.5	71	14	1	3	7	9	4	10	1	28
			18.2	1.3	3.9	9.1	11.7	5.2	13.0	1.3	36.4
B-C	2.3	35	13	3	2	10	6	7	16	12	9
			16.0	3.7	2.5	12.3	7.4	8.6	19.7	14.8	11.1
C-D	2.2	49	10	6	12	10	6	10	11	11	22
			9.2	5.5	11.0	9.2	5.5	9.2	10.1	10.1	20.2

## Pool Grade (cont):

Resting pools unable to be incorporated into table:

For Station B-C, 3 S5T2 (3.7%)

For Station C-D, 5 S5T1 (4.6%), 4 S5T2 (3.7%), and 2 S5T3 (1.8%)

Totals: Distance= 6.0 mi

37 S1T1, 10 S1T2, 17 S1T3 27 S2T1, 21 S2T2 21 S2T3,  
37 S3T1, 24 S3T2, 59 S3T3, 5 S5T1, 7 S5T2, 2 S5T3

S6 pools numerous throughout entire distance.

## Gradient:

Station	Distance (Miles)	Avg Drop Per Mile	Source of Data
A-B	1.5	50-125'	Estimated
B-C	2.3	75'	"
C-D	2.2	75-125'	"

## Tributaries:

1. Tyler Creek, left bank, 1,800 yds above Sta. A, less than 1 cfs.
2. Polk Creek, left bank, 2,300 yds above Sta. A, less than 1 cfs.
3. Irish Creek, left bank, 2,700 yds above Sta. A, less than 1 cfs.
4. Swede Creek, left bank, 700 yds above Sta. B, 1 cfs.
5. Midget Creek, right bank, at Sta. C.
6. Jackpot Creek, left bank, 300 yds above Sta. C, 1-2 cfs.
7. Siwash Creek, left bank, 1,000 yds above Sta. C, 1-2 cfs.
8. Yozoo Creek, right bank, 2,100 yds above Sta. C, 1-2 cfs.
9. Timonium Creek, right bank, 3,500 yds above Sta. C, 1-2 **cfs.**

**Tyler Creek**

River System: Cowlitz River

Stream Surveyed: Tyler Creek, tributary to North Fork Cispus

Description: Small stream tributary first above mouth of North Fork of Cispus. little or no value to salmon.

## Polk Creek

**River System:** Cowlitz River  
stream Surveyed: Polk Creek, tributary to lower North Fork Cispus.

Description: Small, steep unimportant tributary to North Fork of Cispus River 2,300 yds above mouth. Less than 1 cfs. August 1, 1937. Trib. enters on left bank, no value to salmon.

---

## Irish Creek

River System: Cowlitz River

Stream Surveyed: Irish Creek, tributary to North Fork Cispus

Description: tributary to left bank of North Fork Cispus 2700 yards above mouth. Small steep, of no importance. Flow 1 cfs. August 1, 1937. No value to salmon.

Swede Creek

River System: Cowlitz River

Stream Surveyed: Swede creek, tributary to North Fork Cispus

Description: tributary to left bank of North Fork Cispus 3400 yards above mouth. Small, steep, unimportant to salmon. Flow 1 cfs. August 1, 1937

**Midget Creek**

River System: Cowlitz River

Stream Surveyed: Midget Creek, tributary to North Fork Cispus

Description: small precipitous trib to rt bank of n. fk. Cispus R.  
above Swede Cr. Not named on Col. N.F. map. flow  
only 1 cfs. August 2, 1937. No value to salmon.

## Jackpot Creek

River System: Cowlitz River

Stream Surveyed: Jackpot Creek, tributary to North Fork Cispus

Description: small trib to Rt. bank of N.Fk. Cispus R. 300 yds above Midget Cr. Steep, and little importance to salmon.

Siwash Creek

River System: Cowlitz River

Stream Surveyed: Siwash Creek, tributary to North Fork Cispus

Description: small tributary to left bank of North Fork Cispus River, 1,000 yds above Midget Creek, flow 1-2 cfs, 8/2/37, little value to salmon.

Yozoo Creek

River System: Cowlitz River

Stream Surveyed: Yozoo Creek, tributary to North Fork Cispus

Description: small tributary to right bank of North Fork Cispus, 2,100 yds above Midget Creek. Small, steep and little or no value to salmon, flow 1-2 cfs, 8/2/37.

## Timonium Creek

River System: Cowlitz River

Stream surveyed: Timonium Creek, tributary to North Fork Cispus

## Description:

Flows into right bank of the North Fork of the Cispus, 7.5 miles above its mouth. Enters North Fork in series of falls totalling 75', flowing 2 cfs, 8/2/37, but has a terrific flood stage in the spring. Flows through large gorge gouged out of bedrock. Mountainous and heavily wooded watershed (see picture in file).

Enters North Fork just below the impassable falls on the latter. Other tribs to the North Fork below these falls, in downstream order, are: Yozoo, Siwash, Jackpot, Midget, Swede, Irish and Heno Creeks. All of these have steep gradients, narrow valleys and flows of less than 1 sec. ft. during the summer and fall. None of importance to fish.

Horse Creek

River System: Cowlitz River

Stream Surveyed: Horse Creek, tributary to Cispus River

Description: small tributary to Cispus River, left bank above the North Fork, small, steep and no value to salmon or steelhead. Inspected by Frey and Bryant April 1941.

Smoothrock Creek

River System: Cowlitz River

Stream Surveyed: Smoothrock Creek, tributary to Cispus River

Description: tributary to Cispus River above North Fork on left bank. Very steep and small; flow possibly intermittent, flow estimated at 1 cfs by Bryant and Frey, April 1941.

**Blue Lake Creek**

River System: Cowlitz River

Stream **Surveyed:** Blue Lake Creek, tributary to Cispus River

Description:

small unimportant stream tributary to left bank Cispus River between North Fork and East Canyon Creek. Inspected April 1941 by Frey and Bryant. 5' wide, 3" deep at mouth. Flow 2-4 cfs, 5' falls at mouth, probably little or no value to salmon or steelhead (see Stump Creek).

**Juniper Creek**

River System: Cowlitz River

Stream Surveyed: Juniper Creek, tributary to Cispus River

## Description:

fairly small creek tributary to right bank of Cispus River below east Canyon Creek. Flow estimated at 8 **cfs**, April 1941. Small value. Not known whether or not any salmon or steelhead enter but would handle few at most. Inspected by Frey and Bryant (see Stump Creek).

**East Canyon Creek****River System:** Cowlitz RiverStream Surveyed: East Canyon Creek, tributary to Cispus right bank  
southeast corner S17,T10N,R9E.**Date of Survey:** 10/25/36Source: Council Lake near Baby Shoe Guard Station, 6.5 miles  
northwest of Mt. Adams. Skamania County (NW1/4, S13, T9N,  
R9E).

Direction of Flow:

Total Length: 10 miles, 300 yds surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth					S17,T10N,R9E	18'	8"
B End of survey	0.2		0.2		S17,T10N,R9E	-	-

EPA River Reach Codes:

Station	H	U	C	SEG	Rmi
A	17080004			0013	0.00
B*	17080004			0013	0.00

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area ( $yd^2$ )		L.R.		M.R.		S.R.		M&S	
Total		%		%		%		%		%
Total		45.0		25.0		27.0		3.0		

Classification **of** stream based on amount **of** usable spawning rubble  
and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Total			510	52.0		

Spawning Area Unavailable and Unusable:

Station	Distance	Area (yd <sup>2</sup> )	Area Unavail (yd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (yd <sup>2</sup> )	% Unavail
Total			420	70.0			

Character of Watershed:

	Total
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

Artificial Obstructions:

1. 200 paces above Sta. A, log jam, 30' high.

Natural Obstructions:

1. 300 paces above Sta. A, falls, 40' high, impassable.

Fluctuation in Water Level: 30' variation in flow (estimated)

Cause of Variation: Melting snow and heavy rains.

Stream Volumes: Estimated flow 8 cfs, 10/25/36.

Pollution: None

Fish (salmon): Species: Coho (O. Kisutch). 200 paces above Sta. A, four counted, 10/25/36.

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Cutthroat	10/25/36	Planted	above	falls	

General Remarks:

Survey

Of a total 10 miles, 300 yds were surveyed.

Tributaries

None of the tributaries were worked since an impassable falls occurs below where tributaries enter.

General remarks (cont):

Topography

This stream flows through a very rugged, forested, region. The terrain is heavily forested with conifers. From mouth to falls, the creek flows through a sheer canyon 30-40' high.

Character of Stream

The surveyed portion of the stream contains only 510 sq. yds of available spawning area, 420 sq. yds of unavailable spawning area. L.R. 45%, M.S. 25%, S.R. 27%, M&S 3%.

At the mouth, width 18'; average depth 8"; air temperature 44.0 F; water 44.0 F; at 10:00am; fair weather (10/25/36).

Estimated flow of 8 cfs.

Fish Population

In spite of the limited spawning area, four coho salmon (0. kisutch) were observed. Cutthroat trout have been planted above the falls. This stream appears to be of little importance to migrating salmon.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	10/25/36	10:00 AM	44.0 F	44.0 F	Fair

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6	Total
A- 300 yds		5	29	1				5	
Terminus				17.0				83.0	

Total number of pools: 6 - 1 resting and 5 S6.

Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
Total	.17	100'	588'	U.S.G.S. Steamboat Mt. Quad.

**Squaw Creek**

River System: Cowlitz River

Stream Surveyed: squaw Creek, tributary to Cispus River

Description: tributary to right bank of Cispus River, 2,060 yds below Adams Creek. Inspect&d April 1941 by Frey. 10' wide, 1-12" deep near mouth. Flow est. 5-7 cfs, gradient too steep to be of much value.

## Adams Creek

River System: Cowlitz River

Stream Surveyed: Adams Creek, tributary to Cispus River.

Date of Survey: 4/25/41

source: Arises on northwest slope of Mt. Adams in S27,T9N,R10E.

Direction of Flow: Flows in a general northwest direction to its confluence with the Cispus River in S35,T10N,R9E.

Total Length: 11 miles, 2.4 miles surveyed by Frey and Bryant.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	Be-		---		S35,T10N,R9E	12'	--
B 1st rd br	2.4		2.4		S6,T9N,R10E	20'	--

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0015	0.00
B	17080004	0015	1.80

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
		\$	%	\$	%	\$	%	\$	%
A-B	28,000	\$1,81b	42.2	8,770	31.3	4,750	17.0	2,670	9.5

Classification of stream based on amount of usable spawning rubble and area present: N/A

spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> )		%	Usable Spawning Area (yd <sup>2</sup> )		%
	vds	miles		(MR&SR)	Avail		Area (yd <sup>2</sup> )	Usable	
Total	400		1,600	310	19.4		185	-11.6	

## Spawning Area Unavailable and Unusable:

Station	Distance	Area (vd <sup>2</sup> )	Area Unavail (vd <sup>2</sup> )	% Unavail	When Avail	Usable Unavail (vd <sup>2</sup> )	% Usable Unavail
	3,800	26,400	13,210	50.0	Lw* AT**	6,595	25.0

\* - Steelheads

\*\*- Chinooks

## Character of Watershed:

A-B

Mountainous

Hilly

Rolling

Flat

Swampy

Wooded      Dense forests of douglas fir, cedar, hemlock, large leaf and vine maple

Open

Cultivated      No cultivation

Character of Valley      Narrow box canyon in lowest 1/4 mile, v-shaped

Character of Banks      Bedrock and boulders covered w/moss, average 6', Up to 100' in gorge

Density of Marginal Vegetation      Dense; alder, devil's club, salmon berry, moss, ferns, skunk cabbage

Erosion

a) Banks      Extensive in places

b) Watershed      Little recent erosion

Diversions:      None

Artificial Obstructions: None

Natural Obstructions:

1. 15' falls and log jam at 400 yds above mouth. Steelheads might be able to get over at high water after some of the debris is removed. The obstruction is considered impassable to chinooks at all times.

Fluctuation in Water Level: Very extensive, probably 40' or more in the gorge and ca. 10' where the valley broadens out.

Cause of Variation: Flow taken at Sta. B, but records can't be found. Approximately 98% of the stream bed was covered at the time of survey.

Pollution: Copious glacial silt from Mt. Adams muddies the entire stream in summer, as well as the main Cispus below the confluence.

Fish (Salmon): None were observed. No person interviewed had ever seen salmon in Adams Creek or heard of any salmon being there.

Fish (other than salmon): No fish were seen in the stream. Several persons reported they had never been able to catch any fish here.

General Remarks:

Adams Creek is one of the streams arising from the glaciers on Mt. Adams. In summer, when the glaciers are working, the stream is heavily loaded with glacial silt, but in winter and spring the stream is almost as clear as any other mountain stream.

The lowest 1/2 mile of the stream flows through a narrow bedrock gorge 70-100' deep and only 10-15' wide at the bottom. There are several 5' falls in this canyon, another measuring 7', and still another 15' high. The last one is filled in with logs and debris. It appears to be impassable to chinooks at all times and to steelheads at least in low water.

---

## General remarks (cont):

Above the falls the valley broadens somewhat and the gradient is less extreme, although the river is still almost continuous white water. gC1 and gC3 riffles are abundant, mixed in with cascades. Some of the former seem to be excellent for salmon, providing that the velocity of the water is not too great. It was surprising to see such good rubble in a steep mountain stream.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
800 yds above Sta. A	4/25/41	12:30 PM	58.0 F	44.0 F	Clear

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6	Total
A-B				2		10	4	69	
				12.5		62.5	25.0		

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A	2.3	296'	129'	Water Supply Paper #313; Columbia Nat'l Forest contour map.

## Tributaries:

1. Sheep Creek, 2,610 yds above mouth, right bank, 10' wide, flow ca. 8-10 cfs, enters over steep cascade impassable at low water.

**Orr Creek**

River System: Cowlitz River

Stream Surveyed: Orr Creek, tributary to Cispus River

**Description:**

tributary to upper Cispus River. Orr Creek mouth was seen by the Cispus survey party of Frey and Bryant in April 1941, but the water in the Cispus was too high at the time to cross to look at it. Probably of little value as it lies in a rugged and heavily forested section of the upper Cispus and is the next creek above Adams Creek. Mouth appeared at the time to be about 8' wide and flow of 5-10 cfs.

**Cat Creek**

River System: Cowlitz River  
Stream surveyed: Cat Creek, tributary to Cispus River.

## Description:

Flows five miles east and south from Blue Ridge to confluence with cispus, 1/2 mile above Gail Falls. Flowing est 5 Cfs, 10/25/36. Wooded and mountainous watershed. Bed nearly all large rubble. Steep gradient. Falls impassable to migrants a few hundred yards above its mouth. Mouse Creek tributary to the left bank one mile upstream.

Inaccessible to spawners due to 30' Gail Falls on Cispus.  
Picture taken of falls on Cat **Creek**.

Mouse Creek

River System: Cowlitz River  
stream Surveyed: Mouse Creek, tributary to Cat Creek

Description: small tributary to Cat Creek of upper Cispus River.  
Inaccessible to salmon or steelhead due to Gail Falls  
on Cispus below it (see Cat Creek).

Pimlico Creek

River System: Cowlitz River

Stream Surveyed: Pimlico Creek, tributary to Cispus River

Description: inaccessible tributary to Cispus River next above Cat Creek and above impassable Gail Falls on the Cispus. Hence no value to salmon or steelhead.

## Muddy Creek

River System: Cowlitz River  
stream Surveyed: Muddy Creek, tributary to Cispus River

## Description:

flows 11 miles north from source at Lava Glacier on Mt. Adams to confluence with Cispus, 4 miles above Gail Falls. Moderate gradient in lower reaches. Barren, burned over watershed. Observed 10/21/36 at road bridge 1 1/2 miles above mouth; muddy, 20' wide and flowing about 10 sec. ft. 'Falls quite passable where Muddy Creek enters the Cispus River Canyon. Spring Creek tributary to right banks, 3 miles above mouth.

Inaccessible to all fish due to 30' Gail Falls on the Cispus. Picture taken of Muddy Creek.

**Midway** Creek

River System: Cowlitz River

Stream Surveyed: Midway Creek, tributary to Cispus River

Description: inaccessible tributary to Cispus River above Pimlico Creek. No value to salmon or steelhead as is blocked by impassable Gail Falls on Cispus River.

**Chambers Creek**

River System: Cowlitz River  
stream surveyed: Chambers' Creek, tributary to Cispus River

Description: tributary to the headwaters of the Cispus River.  
Dense forest and undergrowth along banks. Moderately  
steep gradient. Flowing about 3 cfs 10/21/36.  
Inaccessible to fish due to impassable 30' Gail Falls  
on the Cispus.

**Elk Creek**

River System; Cowlitz River

Stream Surveyed: Elk Creek, tributary to Cispus River

Description,: inaccessible tributary to upper Cispus above Midway Creek. Gail Falls on Cispus blocks runs, hence of no value to salmon or steelhead.

**Walupt Lake Creek**

River System: Cowlitz River  
stream surveyed: Walupt Lake Creek, tributary to Cispus River

## Description:

outlet of Walupt Lake, flowing about 8 sec.ft 10/21/36.  
Moderate gradient with good spawning areas. Flows into headwaters  
of Cispus. A 75' fall in the creek renders Walupt Lake  
inaccessible to fish. The State maintains a trout egg taking  
station on the lake. There are two tributaries.

Upstream salmonids are stopped at Gail Falls on the Cispus, a  
considerable distance below Walupt Creek. Picture taken of Walupt  
Lake.

## Goat Creek

River System: Cowlitz River

Stream Surveyed: Goat Creek, tributary to Cispus River

Description: tributary to the headwaters of the Cispus. Above impassable. Gail Falls on the Cispus. Not looked at.

**Schooley Creek**

River System: Cowlitz River

Stream Surveyed: Schooley Creek, tributary to Cowlitz River

Description: enters the right bank of the Cowlitz 4 miles below Randle. Flowing less than 1/2 sec. ft. 8/3/37. Lower section very brushy through flat pastures. Stream impassable - full of debris. Observed by Hanavan.

## Siler Creek

River System: Cowlitz River

Stream Surveyed: Siler Creek, tributary to Cowlitz

Date of Survey: 6/13/36

Source: Lewis County, NE4,S6,T11N,R8E. Just west of Lone Tree Mountain.

Direction of Flow: Flows northwest from source to Cowlitz at SW4,S20,T12N,R7E.

Total Length: 7 miles, 2.6 miles surveyed (4,545 yds).

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---	---	---	---	S20,T12N,R7E	27'	5"
B Cispus Road br		0.9		0.9		18'	13"
C Falls		1.7		2.6		13'	4"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0095	0.00
B	17080004	0095	0.10
c*	17080004	0095	0.10.

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
		%	%	%	%	%	%	%	%	
A-B										100.0
B-C			5.0		9.0		59.0			26.0
Total			2.5		4.5		29.5			63.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available	%	Usable	%
	yds	miles		Spawning Area(yd <sup>2</sup> ) (MR&SR)		Spawning Area(yd <sup>2</sup> )	
A-B							
B-C				10,910	69.0		

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	A-B	B-C
Mountainous		
Hilly		
Rolling		
Flat	X	
Swampy	X	
Wooded		
Open		
Cultivated	20%	
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		
Erosion		
a) Banks		
b) Watershed		

## Diversions:

Diversion 1: Local farmyard diversion 319 yds above Sta. B,  
return at 131 yds above Sta. B.

## Artificial Obstructions:

1. 319 paces above Sta. B, dam, passable at all stages, low height.

## Natural Obstructions:

1. 300 paces above Sta. B, falls bedrock 6' high, passable with difficulty.
2. Sta. C (50 paces above), 22' high falls, impassable.
3. Sta. C, 12' high falls, impassable.

Fluctuation in Water Level: Unknown

Cause of Variation: Swamp drainage, rains.  
Stream Volumes:

Pollution: Swamp pollution. 5' drainage ditch from farm, 131 paces above Sta. B. Type of pollution, farm and swamp water.

Fish (salmon): None

Fish (other than salmon): None. Small salmonids above Sta. B.

## General Remarks:

Survey

A fair size stream, Siler Creek flows in a northwesterly

## General remarks (cont):

direction from its source in Lewis County for a distance of about 7 miles before discharging into the Cowlitz River about one mile below Randle, Washington. Its main tributary, Squire Creek, entering from the left, 2,100 paces above Sta. B, was surveyed also.

Topography

In lower part of its course, the creek flows through a flat, swampy river valley. A few farms are found in the area and the land is primarily pasturage. In the upstream stretches, Siler Creek becomes faster as it flows through higher country. The hills are wooded, with conifers predominating. The headwaters are in a rugged, mountainous area.

Character of Stream

From Sta. A to Sta. B, the stream is sluggish with no true pools and very poor riffles. At places, the current is imperceptible. The bottom is 100% mud. At the mouth, the stream was 27' wide and had an estimated 4.5' depth.

Between Sta. B and Sta. C, the character of the stream changes and a good number of large pools and good riffles are present. 10,910 sq. yds of available spawning area or over 68% of the 15,900 sq. yds of total bottom is found. The stream gradually becomes narrower and shallower varying in width from 17.5' at Sta. B to 12.5' at Sta. C. The depth varies from 14"-13". A series of falls at Sta. C render the stream above inaccessible to migrating fish. There are two falls; one drops 12', the other 22'. Above the second falls, the stream cascades in sheer drops.

Fish Population

Small salmonids are noted in the stream above Sta. B. No other fish were seen or reported.

## Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Sky</u>
A	6/13/36	10:00 AM	67.0 F		Clouded
B	"	12:20 PM	68.0	51.0	"
C	"	2:15 PM	71.0	49.5	"

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S2T2 %	S3T2 %	S5T2 %	S5T1 %	S6	Tot
A-B	None								
B-C	2.6	9	3	2	4	2	1		
				22.0	44.0	23.0	11.0		
Total	2.6	9	3	2	4	2	1		

Gradient: The average gradient between Sta. C and the source, a distance of 5 miles, is 582' per mile.

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A	.92	0'		USGS Mt. Rainier Quad.
B	1.66	20'	12.0'	"
C	2.58	20'	7.8'	"

Tributaries: None

**Squire Creek**

**River System:** Cowlitz River  
**stream Surveyed:** Squire Creek, tributary to Siler Creek

**Description:**

Tributary to Siler Creek. Small tributary to the right bank of Siler Creek, 2 miles above its mouth. Flow about 1 sec.ft., no pools, continuous GC3 riffles. Moderate gradient. Dense marginal vegetation and forested slopes. 740 yds surveyed above mouth, 6/13/36. Probably not used for spawning.

**Kiona Creek**

River System: Cowlitz River

Stream Surveyed: Kiona Creek, tributary to Cowlitz River

**Description:**

Enters the left bank of the Cowlitz River in 520, T12N, R7E. It is approximately 10 miles long of which 6,838 yds were surveyed on 7/31/37.

The terrain is semi-mountainous with a covering of conifers and scattered hardwoods along the stream banks.

The lower portion of the stream or 4,610 yds flows through flat pasture and swamp. Dense alder and maple lines its banks. It is in this lower section the mud and silt make up nearly 100% of its entire bottom. The stream here is also very much branched. Observations revealed that in this lower section and likewise in the small tributaries of this area silver salmon fry are very abundant. A quotation from the field notes, "the stream resembles a well stocked hatchery pond in many places."

In time of high water, the entire lower valley is flooded. The spawning rubble that is present is of good quality but very limited in extent.

Considering the upper portion of the stream surveyed, we find that there is considerable good spawning rubble present. It was found to be 6,250 sq. yds or 61.9% of the entire bottom. Good resting pools are quite plentiful and salmon fry were also found in great abundance. Cutthroat trout up to 12" were fairly common.

The stream flow at the Randall-Cispus bridge or Sta. A was estimated to be about 8 cfs, 7/31/37. Measured flow in upper section is 4.5 cfs. This stream presents excellent cover, resting pools and spawning areas.

Oliver and Peters Creeks are two very small tributaries of Kiona Creek. Each flowing less than 1 cfs on 7/31/37.

## Hill Creek

River System: Cowlitz River  
stream Surveyed: Mill Creek, tributary to Cowlitz River

## Description:

A small stream with its source in Lewis County (NW4, S4, T12N, R7E). From its source, it flows southward for a distance of about 2.5 miles to discharge into the Cowlitz at Randle, WA in S8, T12N, R7E. Its lower course runs through the town of Randle. The survey started at the mouth and was carried on upstream to an impassable 30' falls, 821 yds from the mouth.

From the river to the town, 500 paces, Mill Creek flows through pastures and is well shaded by willows. Above the town, it enters a deep, narrow gorge. The upper watershed is extremely rugged and covered with a dense forest.

In the portion surveyed, 3,820 sq. yds, there were 2,956 sq. yds or 77% of good spawning gravels. There is a succession of good cascades but few good pools. For the greater part of the surveyed portion, the stream is polluted by domestic sewage and garbage from the town of Randle, Washington. The gradient of the creek becomes steeper until it reaches an impassable barrier to fish, a 30' fall. Two stations were established. One at the mouth was labelled A and the other at the falls and termination of the survey is called B. The average width was 14.5'. Average depth was 14". Air temperature was 63.0 F, water 47.5 F. The volume was computed at 28 cfs at the mouth.

Cutthroat trout have been planted above the falls, Sta. B. A silver run of small numbers is reported as far upstream as the falls. No chinooks or steelhead are reported.

Pool Grade: Sta. A-B frequency 4 resting and 11 S6 pools/mile. Distance .47 miles. S5T1 (2) 29%, S9 (5) 71%.

Gradient: Moderate for 821 yds surveyed. Steep above terminus of survey.

## Silver Creek

River System: Cowlitz River

Stream Surveyed: Silver Creek, tributary to Cowlitz River

Date of Survey: 8/4/37 by Baltzo, Kolloen, Hanavan, Lobell

Source: High on western slope of the cascades in the vicinity of Allen Mountain, Sq, T13N,R7E.

Direction of Flow: Flows south to confluence with Cowlitz River in S15,T12N,R7E.

Total Length: 12 miles.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Conf w/Cowlitz R	---	---	---	---		19'	7"
B	Randle-Packwood br				1.7		51'	11"
C	200 yds abv conf E.Fk				2.7		28'	18"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0069	0.00
B	17080004	0069	0.00
C	17080004	0069	2.49

Character of Bottom Between Stations:

Station	Area (vd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B			17.6		39.0		37.6		5.8
B-C			<u>49.7</u>		<u>18.4</u>		<u>15.6</u>		<u>16.2</u>
Total			32.2		29.7		27.6		10.5

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
A-B	1.7		26,200	76.6		
B-C	1.0		<u>9,678</u>	34.1		
Total	2.7		35,878	57.3		

## Spawning Area Unavailable and Unusable:

Cause of Unavailability: The greatest part of Silver Creek and its tributaries unavailable due to impassable barrier at Sta. C. Probably some suitable spawning area in remaining nine miles of Silver Creek and in the principal tributaries of Lynx and Lake Creeks.

## Character of Watershed:

	A-B	B-C
Mountainous		X
Hilly		
Rolling		
Flat	X (Cowlitz River bottom)	
Swampy		
Wooded	X (Scattered trees and brush)	B-C (Dense)
Open		
Cultivated	0.1%	
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		

## Diversions:

Diversion 1: 343 yds above Sta. B, power and domestic water supply for Silver Creek store on Randle Packwood Highway. Ditch on right bank 5' wide and 14" deep. Water depth in ditch 7". The headgate is made of wood. Approximately 10 cfs is diverted but with the exception of the domestic water supply of less than 1 cfs, all is returned through a turbine 230 yds below the headgate. The 20" pipe leading into the turbine is covered by a wooden grizzly, the bars of which are 2 1/2" apart. This diversion is not a serious trap for downstream migrants.

## Artificial Obstructions:

1. 343 paces above Sta. B, 1' high dam. This dam is for the purpose of power and domestic water supply. It has a crest of 60' with a drop of 1'. The spill consists of leakage through the dam. Construction is of wood and rubble with no abutments. This dam is passable to fish at all times.

## Natural Obstructions:

1. 1,720 paces above Sta. B, 8' high falls, passable with difficulty.
2. 1,750 paces above Sta. B, 8' high falls, passable with difficulty.
3. 1,800 paces above Sta. B, 4' high falls, passable with difficulty.
4. 1,820 paces above Sta. B, 20' high falls, passable with difficulty.

Series of 26 3' falls from 1,200 paces above St B to Sta C. An impassable fall with a total drop of 20' was found at Sta. C. Although the falls are broken into two steps, each is sufficiently high to prevent the passage of fish. Low falls, 4-5', and cascades occur in the 200 yds immediately above. Silver fry were numerous below the falls at Sta. C, but absent above.

Fluctuation in Water Level: 1-3' in lowest two miles over flood plain of Cowlitz River; 4-8' in mountainous section between St B-C.

Cause of Variation: High water occurs in the spring caused by rains and melting snows in the mountainous country of its source.

Stream Volumes: Sta. A - 8/4/37 - 30.4 cfs - good.

Pollution: None

Fish (salmon): Silver salmon fry numerous especially in lowest two miles. No adult salmon observed.

Fish (other than salmon):

<u>Species</u>	<u>Date</u>	<u>Very Abundant</u>	<u>Abundant</u>	<u>Fair No.</u>	<u>Scarce</u>
Steelhead	8/4/37		one-dead adult		X
Steelhead Fry	8/4/37				X
Trout	"				X

General Remarks:

Length of survey, 2.7 miles.

Topography

Silver Creek flows on the Cowlitz River bottom from the mouth to Sta. B. The valley is flat with scattered stands of conifers, alder, willow and brush. Above Sta. B, the watershed becomes mountainous with the stream occupying the entire floor of a narrow v-shaped valley approximately 1,500' deep. The steep valley sides are well covered with a conifer forest.

Character of Stream

In the lowest two miles (Cowlitz River bottom), the stream banks are flat with an average height of 2'. Bank composition is of gravel and earth.

General remarks (cont):

Marginal Veatation

Consists of scattered alder and willow trees with some brush. In the canyonous section above Sta. B, the steep cut banks range from 3-12' and composed of dirt, boulders and bedrock. There is a dense growth of alder, maple and brush along the margins of the stream affording adequate shade and protection for fish.

The bottom of the lowest two miles of stream provides much excellent spawning area, since 76% of the total is in medium and small gravel. Above Sta. B there is a rapid increase in gradient with cascades and more large rubble. Spawning area in this upper section amounts to only 34%. Resting pools are numerous throughout the stream.

Silver Creek was at approximately normal level on the date of survey when it occupied only about 10% of its flood wash in the section between Sta. A and B. The wash was composed in areas of good spawning gravel which would be available during periods of high water level.

Water fluctuation between Sta. B and C varies from 4-8' and from 1-3' on the flat Cowlitz bottom. There is only a slight erosion of the banks. The creek runs in two channels for a distance of 1,000 yds just before converging with the Cowlitz River,

Fish Population

Silver salmon utilize the excellent spawning riffles in the lowest two miles as shown by the abundance of silver fry in this area. The last mile is of little value because of cascades and large rubble. Trout are present but the large pools of the lower section have been well fished out. Trout were numerous above the falls at Sta. C and because it is inaccessible by road or trail, fishing is-probably good in the upper reaches of the stream.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	8/4/37	10:30 AM	76.0 F	57.0 F	Clear
B	"	1:00 PM	82.0	56.0	"
C	"	1:15 PM	75.0	55.0	"

## Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T3 %	S2T1 %	S2T2 %	S2T3 %	S3T1 %
A-B	1.7	31	18	9	2	11	2	1	5
				29.0	6.5	35.5	6.5	3.2	16.1
B-C	1.0	43	43	S5T2 (1) 3.2%					
				S1T1	S1T2	S2T1	S5T1		
				20	1	20	2		
				46.5	2.3	46.5	4.6		
Grand Total	2.7	74	27	S1T1	S1T2	S1T3	S2T1	S2T2	S2T3
				29	1	2	31	2	1
				39.2	1.3	2.7	41.9	2.7	1.3
				S3T1	S5T1	S5T2	S6		
				5	2	1	75		
				6.8	2.7	1.3			

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	Slight		35'	Topography Map
B-C	Very Steep		140'	" "

Tributaries: East Fork of Silver Creek, right bank, 1,600 paces above Sta. B. Separate write up under file "minor streams Cowlitz River." Above termination of survey:

1. Lake Creek, left bank, approximately 4.5 miles above Sta. A.
2. Lynx Creek, left bank, approximately 5 miles above Sta. A.

**Purcell Slough and Hopkins Creek**

River System: Cowlitz River  
Stream Surveyed: Purcell Slough and Hopkins Creek, tributaries  
to Cowlitz River

## Description:

The Columbia National Forest map shows Purcell Slough on the Cowlitz flats above Randall, Washington. Should not be confused with Purcell Creek, a tributary to the upper Cowlitz.

Purcell slough has not been surveyed, but on the map appears to be a side channel connecting the mouth of Hopkins Creek and Davis Creek. However, Davis Creek also has a channel connecting it at its mouth with both Purcell Slough and Hopkins Creek outlet and also directly into the Cowlitz. Probably at various water stages it uses one or the other or both passages into the Cowlitz, but either channel may be blocked at any time either temporarily or for some period. It should be investigated before any use of either streams details are contemplated.

There are no notes on Hopkins Creek other than a preliminary reconnaissance which states that it has a flow of approximately 3 cfs, ak steep gradient, dense cover, but probably supports a few silver.

**Davis Creek**

River system: Cowlitz River

Stream surveyed: Davis Creek, tributary to Cowlitz River

Description:

Davis Creek enters the Cowlitz River not far above its confluence with the Columbia River. 3,572 yards of the Creek was surveyed 7/31/37.

The watershed is mountainous and covered with coniferous pines. The lower portion of the stream is largely mud and silt with here and there a very small riffle of small rubble. Starting at about 2,200 yards above the mouth the stream bottom contains considerably more medium and small rubble. Of the entire stream bottom of 34,700 square yards, 6,220 square yards or 17.9% was of medium and small rubble.

Estimated stream flow 7/31/37 was 3 1/2 to 4 cfs. Average width was 15' and average depth 8". Silver salmon fry were numerous in the stream.

## Cunningham Creek

River System: Cowlitz River

Stream Surveyed: Cunningham Creek, tributary to Cowlitz River

## Description:

A tributary to the Cowlitz River. One mile east of Cline School in Lewis County Washington. Surveyed for a distance of about 1/2 mile on 6/5/36 by Kolloen and Baltzo.

The lower portion of the stream runs into a low swampy area. At the upper end of the survey, there is an impassable falls 5' high at a distance of about 66 yds above the highway bridge (county road).

Since this creek, like many others in this section is intermittent, very small, and has impassable barriers a short distance from the mouth, it is doubtful whether it could be utilized in any way by a salmonid population. At the time of survey, 6/5/36, it was estimated to discharge 3 cfs. On available maps it is depicted as being incomplete to the Cowlitz with a highly intermittent flow. Now, hardly more than a runoff rill.

Since no fish were seen or reported, and also on account of its uncertain character, this stream is useless as a salmon producer.

No pools.

**Cougar Creek**

River System: Cowlitz River

Stream Surveyed: Cougar Creek, tributary to Cowlitz River

Date of Survey: 6/5/36

Source: Not fixed since this stream is intermittent. Forest Service Rainier National Park Map - Willamette Meridian 1930 shows source at NE4,S33,T12N,R8E.

Direction of Flow: Flows north from source to right bank of Cowlitz, NE1/4,S21,T12N,R8E.

Total Length: 1.5 miles, .22 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---	---	---	---	S21,T12N,R8E	7'	3"
B Bridge		0.2		0.2		10'	4"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	1016	0.00
B*	17080004	1016	0.00

\* Station location is not definite and has been estimated

**Character of Bottom Between Stations:**

Station	Area (yd <sup>2</sup> )							
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B		10.0		44.0		42.0		4.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

spawning Area Usable and Available: Available only during high water.

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% A v a i l	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B			1,035	88.0		

Spawning Area Unavailable and Unusable:

None in high water. All 1,035 sq. yds unavailable during low water.

Character of Watershed:

	A-B
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: About 1', dry during summer.

Cause of Variation: Runoff and rains.

Stream Volumes: 6/5/36, 2 cfs (est.)

Pollution: None

Fish (salmon): None-

Fish (other than salmon): None

General Remarks:

Survey

Cougar Creek, only 400 yds of a total of 15 miles were surveyed.

Topography

The watershed is mountainous and densely wooded.

Character of Stream

Although there is a large percentage of spawning gravels, this stream is so steep in gradient and so small in size, that it, is doubtful whether migratory salmonoids could utilize it. The creek discharges into the Cowlitz from a series of cascades with a few small pools. During the dry season, the stream is altogether dry or discharges but a trickle of water. At the time of survey, the flow was estimated at 2 cfs. This was shortly after heavy rains.

General remarks (cont):

Fish Population

No fish were seen. It may be possible that steelhead frequent this stream during the spring and fall. Local residents report a trout run in this creek.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	6/5/36	12:20 PM	63.0 F	52.0 F	Clear
B	"	12:50 PM	62.0	52.0	"

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S3T1 %	S6 Total
A-B	.22	4	22	17.0	5

Total number of pools: 6 - 1 resting and 5 S6

Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	.22	200'	909'	U.S.G.S. Mt. Rainier Quad.

Tributaries: None

**Kilborn Creek**

River System: Cowlitz River

Stream Surveyed: Kilborn Creek, tributary to Cowlitz River

Date of Survey: 6/3/36 by Kolloen

Source: Lewis County, SE4,S36,T12N,R8E.

Direction of Flow: Flows northwest from source to Cowlitz, right bank, at NE4,S21,T12N,R8E.

Total Length: 5 miles, 1,386 yds or .78 miles surveyed. Survey from mouth to impassable falls 35' high.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---	---	---	---	S21,T12N,R8E	18'	9"
B 436 paces abv A	0.2		0.2			22'	11"
C Terminus	0.5		0.7			26'	8"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0091	0.00
B	17080004	0091	0.00
C	17080004	0091	0.00

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B			29.0		37.0		33.0		
B-C			54.0		15.0		7.0		
Total			41.5		26.0		20.0		

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance; vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
A-B			1,923	70.8		
B-C			<u>2,690</u>	39.5		
Total			4,613	55.2		

Spawning **Area** Unavailable and Unusable: None

## Character of Watershed:

	A-B	B-C
Mountainous	X	X

Hilly

Rolling

Flat

Swampy

Wooded            X                    X

Open

Cultivated

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks

b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Sta. C, 35' high falls, impassable.

Fluctuation in Water Level: 2-3' (estimated)

Cause of Variation: Runoff and seasonal rains.

Stream Volumes: 6/5/36 15 cfs (estimated)

Pollution: None

Fish (salmon): None

Fish (other than salmon): None

General Remarks:

#### Survey

Kilborn Creek, 1,386 yds of a total 5 miles was surveyed. This included the area between the mouth and an impassable falls at Sta. C. No tributaries were noted or surveyed and none appear on maps of this region in the area surveyed.

#### Topography

Kilborn Creek flows through a rugged and heavily wooded region. There are fir, cedar, alder and cottonwood trees covering the hills draining into the stream. The entire bed of the stream is very steep.

General remarks (cont):

Character of Stream

The stream is very swift, breaking into cascades in many places. The average width is about 18' and the depth varies from 6-48". 50 yds above Sta. A there is a 6' falls formed chiefly by a timber jam with a gravel deposit on the upstream side. There is a good pool below the falls so that the obstruction is probably no great hindrance to ascending salmon. The survey terminated at a 35' impassable falls 950 paces above Sta. B. A large relative percentage of available spawning gravels plus numerous small pools and some good riffles would make this stream a successful salmon producer in a small extent. However, the small absolute number of square yards of spawning gravels, the swiftness and the predominance of cascades would limit its use except to trout and steelhead.

Fish Population

Although no fish were seen, resident fishermen report steelhead ascending as far as the upper falls. Chinooks are reported as not frequenting this stream.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	6/5/36	10:45 AM	59.0 F	47.0 F	Clear
B	"	11:25 AM	60.0	47.0	"
C	"	11:30 AM	52.0	46.5	"

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S3T1 %	S3T2 %	S6	Ttl	
A-B	.24	29	33	5	2	8		
				33.3	13.3		53.3	
B-C	.54	.5	144	S2T1	S5T1	S6		
				1	2	78		
				1.2	2.4		96.2	
Grand Total		12	110	S2T1	S3T1	S3T2	S5T1	S6
				1	5	2	2	86
				1.0	5.1	2.0	2.0	89.5

## Gradient:

<u>Station</u>	<u>Distance (Miles)</u>	<u>Total Drop</u>	<u>Avg Drop Per Mile</u>	<u>Source of Data</u>
A-B	.24	5'	21'	U.S.G.S. Mt. Rainier
Quadrangle				
B-C	.54	255'	472'	" " " "
Above C	2.5	1,820'	728'	" " " "

Tributaries: None

*Garrett Creek*

River System: Cowlitz River  
stream Surveyed: Garrett Creek, tributary to Cowlitz River

Description: surveyed 6/5/36.

Survey

Garrett Creek is a small, intermittent creek entering the cowlitz near the town of Cora, Washington in NW4,S14,T12N,R8E. It flows northwest from its source near Pompey Park, NW4,S25,T12N,R8E, for a distance of about 2 miles. Of the total length, 950 yds was surveyed starting from the mouth and going upstream to an impassable 12' falls.

Topography

Falling from the mountainside, the stream is well shaded by maples, alders and firs. It goes under the highway through a pasture (no shade), goes under the highway again and enters a swamp. About 1/2 mile below the highway, the swamp drains through a wide mouth into the Cowlitz. The swamp apparently is passable.

Character of Stream

Of a total 2,850 sq. yds of bottom, 2,068 sq. yds are spawning gravels. Riffles are continuously good, but pools are lacking. Two stations were established, Sta. A, at a highway bridge 1/4 mile south of Cora Bridge (across Cowlitz) and Sta. B, at the falls 950 paces above A. At Sta. A; the air and water temperatures were 63.0 F and 49.0 F respectively and at Sta. B 59.0 F and 47.0 F. The average width of the stream was 9' and the average depth 4". The flow was computed as 10 cfs on the date surveyed. Maps of the stream show it as intermittent. During especially dry seasons this is possible.

Fish Population

A few silvers are reported to enter the upper creek in the fall and winter but no fish were observed and no other species were reported.

Pool Grade

Frequency, 22 S6 pools per mile. Distance .54 miles. S6 (12) 100%.

Description (cont):

Gradient

Gradient moderate for 900 yds surveyed. Becomes steep upstream from terminus (1,800' per mile drop).

## Burton Creek

River System: Cowlitz River

Stream Surveyed: Burton Creek, tributary to Cowlitz River

Date of Survey: 6/4/36

Source: Lewis County, NW1/4, S30, T12N, R9E (U.S. Forest Service Map, Rainier National Forest - Willamette Meridian, 1930 edition).

Direction of Flow: Flows north from source to confluence right bank of Cowlitz, NW1/4, S11, T12N, R8E. One mile north of Cora, Washington.

Total Length: 3.5 miles, 2,233 yds or about 1.3 miles surveyed. Mouth to 180 paces above highway bridge.

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth					S11,T12N,R8E	40'	15"
B 880 yuds abv A		0.5		0.5	S11,T12N,R8	--	--
C 1,173 yuds abv B		0.7		1.2	S12,T12N,R8	--	--
D 180 yuds above C		0.1		1.3			

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0078	0.00
B*	17080004	0078	0.15
C	17080004	0078	0.15
D*	17080004	0078	0.15

\* Station location is not definite and has been estimated

## Character of Bottom Between Stations:

Station	Area (vd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
A-B	All Swamp								
B-C				4.0		18.0			78.0
<b>C-D</b>			<b>73.0</b>		<b>13.0</b>		<b>6.0</b>		<b>8.0</b>

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> ) Usable
A-B	880		None		
B-C	1,173		1,380	22.0	
C-D	180		102	19.0	

Spawning Area Unavailable and Unusable: None

Character of Watershed:

	A-B	B-C	C-D
Mountainous	X	X	X (upper portion)
Hilly			
Rolling			
Flat			
Swampy	X	X	X (lower portion)
Wooded			
Open			
Cultivated			
Character of Valley			
Character of Banks			
Density of Marginal Vegetation			
Erosion			

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 1.3 miles above mouth, precipitous cascades, impassable.

Fluctuation in Water Level: Unknown

Cause of Variation: Spring runoff and rains  
 Stream Volumes: 6/4/36 22.5 cfs (estimated).

Pollution: None

Fish (salmon): None

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Steelhead	6/4/38				
Cutthroat	"				

General Remarks:

Survey

Burton Creek, 1.3 miles of a total of 3.5 miles were surveyed.

Tributaries

Main tributary, the East Fork of Burton Creek was noted and surveyed.

General remarks (cont):

Topography

In the lower portion of the watershed, Burton Creek flows through the valley of the Cowlitz River. This area is an impenetrable swamp during rainy seasons. The upper stream has a very steep gradient in a box canyon.

Character of Stream

Large cascades make it impassable. Of 6,905 sq. yds of bottom, 1,482 sq. yds or about 20% is spawning gravel. Small shallow pools with an almost complete absence of riffles in the surveyed portion is characteristic of this stream.

Velocity computed as 22.5 cfs. Varies greatly.

Fish Population

Silver salmon known to run in this stream. Steelhead and cutthroat trout have also been seen or taken.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	6/4/36	11:50 AM	59.0 F	47.0 F	Cloudy
B	"	3:10 PM	57.0	48.0	"
C	"	4:45 PM	59.0	48.0	"

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S2T2 %	S6 Ttl
A-B	Swamp	- No pools.	Distance,	0.5 miles				
B-C	.7		10	<u>S1T3</u>	<u>S2T1</u>	<u>S3T1</u>	<u>S5T1</u>	
				1	1	4	2	
				13.0	12.0	50.0	25.0	
C-D	.1		60	<u>S6 (6) 100%</u>				

Total number of pools: 14 - 8 resting and 6 S6.

Total distance surveyed: 1.3 miles

Average frequency of pools per mile: 10 - 6 resting and 4 S6

S1T3(1)7%; S2T1(1)7%; S3T1(4)29%; S5T1(2)14%; S6(6)43%

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data			
A-B	.5	0'	0'	USGS	Mt.	Rainier	Quad.
B-C	.7	less than 100'		"	"	"	"
C-D	.1	200'	2,000'	"	"	"	"

## Tributaries:

1. East Fork Burton Creek

## East Fork Burton Creek

River System: Cowlitz River  
 stream Surveyed: East Fork Burton Creek, tributary to Burton  
 Creek

Date **of** Survey: 6/4/36

Source: Lewis County, S18, T12N, R9E. Enters Burton Creek, left  
 bank at SW 1/4, S12, T12N, R8E. USGS Topographical Map  
 of Rainier Quadrangle 1928 edition.

Total Length: 3 miles, 1,530 yds or about .87 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	--		--				
B Exit of stream from swamp,			330 yds				
			above				
			highway				
			culvert				

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	Not available		
B	Not available		

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B			2.0		13.0		25.0		59.0

Classification **of** stream based on amount of usable spawning  
 rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (vd2)	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B	1,530		3,206	39.0		

Spawning Area Unavailable and Unusable: None

Character of Watershed:  
A-B

---

Mountainous

Hilly

Rolling

Flat

Swampy           X

Wooded           X

Open

Cultivated

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion

a) Banks

b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: Unknown

Cause of Variation: Seasonal rains  
Stream Volumes: 6/14/36 2 cfs (estimated).

Pollution: None

Fish (salmon): None, many 1-2" salmonoid fry.

Fish (other than salmon): Many small salmonoid fry 1-2" observed.

General Remarks:

Survey

East Fork Burton Creek. Approximately 3 miles of stream, 1,530 yds or almost 1 mile was surveyed.

Tributaries

No tributaries were noted or surveyed.

Topography

A portion of this creek flows through a flat river valley which is quite swampy and covered with a dense growth of trees and underbrush. The upper part of the stream drains a very rugged and thickly wooded section with a steep gradient.

Character of Stream

The lower part of the stream flows through a flat with many windfalls across the stream. These obstruct the flow, making the creek widen out into swampy areas. Further upstream, small pools and good riffles are present with a large percentage of spawning gravels. The flow during high water was about 2 cfs. During the dry season, this stream doubtless is intermittent. It is shown thus on maps of this area.

General remarks (cont):

Fish Population

Many small salmonoid fry 1-2" were observed. Whether they are silver salmon or a species of trout is unknown since both groups are known to frequent this stream. A heavy run of silver salmon ran into this stream in 1935.

Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	6/4/36	3:10 PM	68.0 F	48.5 F	Clouded
B	6/5/36	9:00 AM	58.0	50.0	Clear

Pool Grade:

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S2T1 %	S5T1 %	S5T3 %	S6 Ttl
A-B	.87	5	7	2	2	1	
				40.0	40.0	20.0	

Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	.87	less than 100'		USGS Mt.Rainier Quad.

Section above terminus drops 900' per mile.

Tributaries: None

## Willame Creek

River System: Cowlitz River

Stream Surveyed: Willame Creek, tributary to Cowlitz River

## Description:

Willame Creek enters the left bank of the Cowlitz River in Sec. 6, T-12N, R9E. 900 yards of this stream was surveyed 7/25/37. The flow at this time was estimated to be 15 - 18 cfs. Average width of the stream was 21' and average depth 4".

The stream flows through mountainous, heavily wooded terrain. There is considerable bedrock and large rubble in evidence and the spawning rubble that is present is restricted to small areas at the end of the pools. Under the method of classifying the rubble 3,100 square yards or 44.3% of the entire 7,000 square yards of stream bottom is classified as "good" spawning rubble.

Silver salmon fry were found to be quite numerous as far upstream as 835 paces above the mouth. Here are a 5 1/2' and a 4' falls. It was reported that these falls are impassable. There is also a 30' fall about 1 1/2 miles above the mouth.

*Dry Creek*

River System: Cowlitz River

Stream Surveyed: Dry Creek, tributary to Cowlitz River

Description: Enters right bank of the Cowlitz, 1/2 mile below Johnson Creek below Packwood. Flows thru a small, steep sided and banked area valley. A run off stream primarily, dry during the summer and fall.

**Smith Creek**

River System: Cowlitz River

Stream Surveyed: Smith Creek, tributary to Cowlitz River

## Description:

The source of Smith Creek is in Lewis County near Jackpot Lake, S4,T11N,RSE. From the source, the course of the stream is northerly finally discharging into the Cowlitz River, SE4,S32,T13N,RgE. Of a total distance of 10 miles, 1,860 yds were surveyed. The survey was started at the mouth and was terminated at an impassable falls 20' high, about a mile upstream.

This stream is very swift and tumultuous and emerges from a precipitous canyon. With the exception of the last 1/4 mile, it flows through a steep valled box canyon. Of a total of 14,260 sq yds of bottom, 7,269 sq. yds or 51% was LR; 6,426 sq. yds or 45% was MR; 565 sq. yds or 4% was SR. Total spawning gravel area was 6,991 sq. yds or 49% of total. Two stations were taken. One at the mouth and the other at the falls where the survey was ended. The average width is 24', average depth is 8". The average air and water temperatures were 52.0 F and 44.5 F. Good and fair cascades occur in abundance, with numerous small pools, some well shaded are present. Alder, cottonwood, fir and cedar make up the forest surrounding the lower 1/4 mile of stream. Many windfalls are found across the stream.

Although no fish were observed during the survey, it is thought that steelhead and eastern brook trout inhabit this stream.

Pool Grade: Sta. A-B Frequency, 10 resting and 37 S6 pools/mile. Distance, 1.1 miles. S1T2(1)1.9%; S2T2(2)3.8%; S3T1(6)11.5%; S3T2(2)3.8%; S6(41)78.8%.

Total number of pools: 52 - 11 resting and 41 S6.

Gradient: Sta. A-B has a total drop of 450' and 409'/mile. Source: USGS Mt. Rainier Quadrangle. For the next five miles above the survey, however, the gradient drops off to 270'/mile.

**Johnson Creek**

River System: Cowlitz River

Stream Surveyed: Johnson Creek, tributary to Cowlitz River

Date of Survey: 7/27&amp;28/37 by Kolloen and Baltzo

Source: High in cascades short distance to SE of Mt. Rainier,  
T11N,R10E.Direction of Flow: Flows NW to confluence with the right bank of  
the Cowlitz River, 3 miles below Packwood,  
WA. Mouth in S32,T13N,R9E.

Total Length: 12 miles, 5 miles surveyed.

Station Location:

St	Location	Distance		Map	Location	Width	Depth
		Above Prev. Station	Above Mouth				
A	Conf w/Cowlitz R	---	--W	S32,T13N,R9E	37'	11"	
B	Log jam at falls			S11,T12N,R9E	Falls	Falls	
C	Conf w/Glacier Cr			S12,T12N,R9E	47'	8"	

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0035	0.00
B*	17080004	0035	3.89
C	17080004	0035	5.16

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
		%		%		%		%	
A-B		55.0		22.0		19.0		4.0	
B-C		<u>52.0</u>		<u>25.0</u>		<u>18.0</u>		<u>5.0</u>	
Total		53.5		23.5		18.5		<b>4.5</b>	

Classification of stream based on amount of usable spawning  
rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles'	Area ( $vd^2$ )	Available Spawning Area( $vd^2$ ) (MR&SR)	% Avail	Usable Spawning Area( $vd^2$ )	% Usable
A- lowest log jam	2,800		20,493	56.0		

Spawning Area Unavailable and Unusable: Surveyed only to Glacier Creek. More spawning area above.

Station	Distance	Area ( $vd^2$ )	Area Unavail ( $vd^2$ )	% Unavail	When Avail	Usable Unavail ( $vd^2$ )	% Usable Unavail
Lowest log jam to Sta. B	4,810		16,110	30.0			
B-C	1,300		6,260	43.0			

## Character of Watershed:

	A-B	B-C
Mountainous	X	X
Hilly		
Rolling		
Flat		
Swampy		
Wooded	X	X
Open		
cultivated	None	None
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 2,800 yds above mouth, log jam, impassable.
2. 3,600 yds above mouth, log jam 300' long, 30' high, impassable..
3. Sta. B, log jam 750' long, 25' high, impassable.
4. Sta. B, falls 15' high, impassable.
5. 800 yds above Sta. B, falls in two steps 10' high, passable with difficulty.

Fluctuation in Water Level: 6' in canyon, 4' below. Steep gradient carries off floods rapidly.

Cause of Variation: Heavy rainfalls during most of the year.  
Heavy snow in mid winter.

Stream Volumes: Sta. A - 7/27/37 - 132 cfs. Sta. C - 7/28/37 - 84 cfs (rough). Percent of stream bed covered: 90% in canyon and 30% below.

Pollution: Erosion of earth on steep valley walls during heavy rainfall. Also melting snow and ice from headwaters. Makes water milky to varying extent and silts bottom in comparatively quite areas and eddys. Not very harmful to spawning areas in lowest reaches.

Fish (salmon): None observed during survey. Fair silver run in fall.

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Fingerlings	7/28/37			Below Log Jam	
Rainbow Trout				X	

General Remarks:

#### Survey

Surveyed 5 miles from mouth to confluence of Glacier Creek. Only lowest 2,800 yds accessible to salmon.

#### Topography

Johnson Creek flows through the worst canyon the stream survey has encountered to date. Bordered by high, rugged mountains, the valley is some 2,000 feet deep and has very steep, often perpendicular, walls on both sides. The steepest places are of exposed bedrock, while elsewhere a virgin growth of timber and brush grows in a density proportional to the depth of the soil. Near the headwaters of the stream is an old burn, which results in greater erosion of the open slopes. A wonderful growth of huge cedar and fir grows above the canyon edges on the right bank below Glacier Creek.

#### Topography

One and one half miles above its mouth, Johnson Creek emerges from its canyon and flows through the comparatively broad and flat Cowlitz valley. Here the timber is smaller and the bordering slopes gentle. The bedrock gives way to gravel and earth, and the underbrush is much thicker.

#### Character of Stream

Johnson Creek nearly fills the bottom of the deep and narrow canyon through which it flows, the rock walls often rising sheer for several feet above the very edge of the water. In this canyon there is no marginal vegetation, but the overhanging rock banks and huge boulders in the stream bed offer plenty of protection to fish. The gradient is so steep that it is doubtful if fish could ascend very far, even if the log jams were not present. Several 5-6' falls occur, and cascades are long and numerous. Pools are frequent.

Along the lowest 1 1/2 miles below the canyon and through the wide and flat Cowlitz valley, the gradient is more moderate, the marginal growth of willow, alder and maple is dense, and the earth and gravel banks are not very high and are moderately

## General remarks (cont):

sloping. There is a considerable amount of good spawning area in this lower stretch, but in the steeper canyon above small gravel occurs only in patches at the lower end of the larger pools.

The bottom is moderately silted as a result of the earth washing off the steep canyon sides during the heavy rains but this probably does not harm the spawning areas to any great extent. Considerable, and at times terrific fluctuation occurs varying with the frequent rainfall and the snow runoff.

Obstructions

A short distance above where it enters the canyon, Johnson Creek is quite effectively blocked by a log jam some 300' long and piled up 30' high between the narrow canyon walls. No silver fingerlings were observed above this, although they occurred in fair numbers everywhere below. A couple miles higher is a much larger log jam, this one occurring on the top of a natural 15' falls. Inasmuch as there is very little spawning area and very swift and difficult cascades above the lowest jam, its effect on fish life is unimportant.

Fish Population

A fair number of silver salmon fingerlings were observed below the lowest log jam, but no other evidence or report of salmon was found. Rainbow trout are numerous in the canyon and above, because of its inaccessibility.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	7/27/37	11:00 AM	69.0 F	53.0 F	Cloudy
B	7/28/37	3:30 PM	63.0	48.0	Clear
C	"	5:00 PM	59.0	48.0	"

## Pool Grade:

Sta. A-B: Frequency, 42 resting and frequent S6 pools/mile. Distance 4.3 miles. S1T1(54) 30%; S1T2(4) 2%; S1T3(16) 9%; S2T1(19) 11%; S2T2(21) 12%; S2T3(13) 7%; S3T3(49) 27%; S5T1(1) 1%; S5T3(3) 2%.

Sta. B-C: Frequency, 36 resting and numerous S6 pools/mile. Distance .7 miles. S1T1(6) 24%; S2T1(5) 20%; S2T2(4) 16%; S3T3(10) 40%.

Gradient: Average

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-C		Steep throughout	195'	Topographic Mapd

Tributaries:

1. Glacier Creek, left bank at Sta. C, estimated at 20 cfs on 7/28/37 but inaccessible to upstream migrants. Also about 20 small springs at intervals through canyon.

## Hall Creek

River System: Cowlitz River  
 Stream Surveyed: Hall Creek, tributary to Cowlitz River

Date of Survey: 6/6/36

Source: Rainier National Forest on Mt. Rainier,  
 SW4,S14,T13N,R9E (USGS Topographic Map, 1928 edition).

Direction of Flow: Southwest from source; Lewis County.

Total Length: 3.5 miles, 2,741 yds or 1.6 miles surveyed from  
 mouth upstream.

Station Location: Mt. Rainier National Forest, T13N,R9E.  
 Confluence right bank of Cowlitz River at  
 NW1Z,S33,T13N,R9E.

<u>St Location</u>	<u>Distance</u>		<u>Map</u>	<u>Width</u>	<u>Depth</u>
	<u>Above Prev.</u>	<u>Above</u>			
	<u>Station</u>	<u>Mouth</u>	<u>Location</u>		
	<u>Yds</u>	<u>Miles</u>	<u>Yds</u>	<u>Miles</u>	
A Bridge on road	---		0.2		34' ---
B 971 paces abv A, *Creek on right bank	0.6		0.8		26' 13"
C 1,600 paces abv B	0.9		1.7		40' 10"

\*This creek called Hager Creek on stream blanks. Hager is tributary to Hall Creek see Columbia National Forest Map.

EPA River Reach Codes:

<u>Station</u>	<u>HUC</u>	<u>SEG</u>	<u>Rmi</u>
A*	17080004	0894	0.00
B*	17080004	0891	0.00
C*	17080004	0891	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

<u>Station</u>	<u>Area (yd<sup>2</sup>)</u>	<u>L.R.</u>	<u>%</u>	<u>M.R.</u>	<u>%</u>	<u>S.R.</u>	<u>%</u>	<u>M&amp;S</u>	<u>%</u>
Mouth-A									100.0
A-C						6.0			94.0
B-C						9.0			91.0
Total						7.5			95.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
Mouth-A	270		0	0		
A-B	871		700	6.0		
B-C	1,600		770	9.0		

spawning Area Unavailable and Unusable: None

Character of Watershed:

	A-B	B-C
Mountainous		
Hilly		
Rolling		
Flat		
Swampy	X	X
Wooded	X	X
Open		
Cultivated		
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		
Erosion		

Diversions: None

Artificial Obstructions: None

Natural Obstructions: None

Fluctuation in Water Level: Unknown

Cause of Variation: Spring runoff in hills and seasonal rains.

Pollution: None

Fish (salmon): None

Fish (other than salmon): None

General Remarks:

#### Survey

Of a total of 3.5 miles, 2,741 yds or about 1.6 miles were surveyed. The survey commenced at the mouth and was terminated at an old logging road bridge upstream.

#### Topography

The major tributary to Hall Creek flows through a portion of the valley of the Cowlitz River. The watershed is for the most part, swampy. In the lower portion there is some grazing land, but in the upper portion the stream flows through a more rugged terrain.

#### Character of Stream

Hall Creek is a typical lowland stream. A very slow current, beaver dams, large pools and poor, wide and deep riffles (PC3), are found. In a total of 25,475 sq. yds only 1,470 sq.

## General remarks (cont):

yds are spawning gravels. The bottom is covered with aquatic algae and other water plants. Stream temperatures at Sta. A-C were 46.0 F, 47.0 F and 48.0 F, respectively.

Fish Population

No fish were observed or reported. It is doubtful whether this stream is capable of supporting a population of migrating salmonoids due to the almost complete absence of spawning gravels.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	6/6/36	9:10 AM	66.0 F	46.0 F	Cloudy
B	"	10:20 AM	57.0	47.0	Rain
C	"	12:00 PM	62.0	48.0	"

## Pool Grade:

Mouth - Sta. A: No pools. Distance .15 mile.

Sta. A-B: Frequency, 26 resting pools/mile. Distance .5 mile.  
S2T2(2) 15.3%; S3T1(2) 15.3%; S5T1(9) 69.2%.

Sta. B-C: Frequency, 17 resting pools/mile. Distance .9 mile.  
S2T2(2) 12.5%; S3T1(7) 43.7%; S5T1(4) 25.0%; S5T2(3) 18.7%.

Total number of pools: 29 - all resting pools

Total distance surveyed: 1.6 miles

Average frequency: 18 resting pools/mile.

S2T2(4) 13.7%; S3T1(9) 31.0%; S5T1(13) 44.8% S5T2(3) 10.3%.

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
Mouth-A	.15	100'	100'	USGS Mt. Rainier Quad.
or less			BA-B	5"
B-C	.9	I	II	IV
Mouth-C	1.55	"	"	II

## Tributaries:

1. The major tributary to Hall Creek, entering on the right side, is Hager Creek. It was noted but not surveyed.

**Skate Creek**

River System: Cowlitz River

Stream Surveyed: Skate Creek, tributary to Cowlitz River

Date of Survey: 7/25-29/37 - by Lobell and Hanavan

Source: Bear Prairie, S8,T14N,R8N, Columbia National Forest Map 1933.

Direction of Flow: Flows SE to confluence with the Cowlitz River, NW4,S21,T13N,R9E.

Total Length: 14 miles, 8 3/4 miles surveyed.

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Conf w/Cowlitz R	---	---	---	---	S21,T13N,R9E	23'	7"
B	Conf w/Johnson Cr					S20,T14N,R8E	42'	12"
C	Unnamed Forks					S22,T14N,R8E	20'	9"

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0062	0.00
B	17080004	0062	6.79
C	17080004	0064	0.43

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.		M.R.		S.R.		M&S	
			%		%		%		%
A-B	146,100	57,380	39.2	32,900	22.5	31,580	21.6	24,240	16.6
B-C	19,800	8,090	40.9	4,100	20.7	4,400	22.2	3,210	16.2

Classification of stream based on amount of usable spawning rubble and area present:

Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	available spawning area (yd (MR&SR)	% Avail	Usable spawning Area (yd <sup>2</sup> )	% Usable
A-B			64,480	44.1		
B-C			8,500	42.9		

Spawning Area Unavailable and Unusable: None

Character of Watershed:

	A-B	B-C
Mountainous	X	X
Hilly		
Rolling		
Flat		
Swampy		
Wooded	X	X
Open		
Cultivated	None	None
Character of Valley		
Character of Banks		
Density of Marginal Vegetation		
Erosion a) Banks		
b) Watershed		

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Several 6-7' falls near Dixon Creek. Impassable at low water. At this point the hillside is slipping into the river canyon and may in the future form a completely impassable barrier.

Fluctuation in Water Level: High water mark 30' above present level.

Cause of Variation: Heavy rains and snow runoff.

Stream Volumes: Sta. A - 7/25/37 - 36 cfs. Above Sta. A, where the stream emerges from canyon onto Cowlitz flood plain, flow in excess of 40 cfs, estimated

Pollution: None

Fish (salmon): Steelhead and silver salmon fingerlings abundant between Sta. A-B. Mouth to falls, 4,200 paces, not as numerous above falls.

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Steelhead			X		
Rainbow 4-8"				X	

General Remarks:

Survey

8 3/4 miles surveyed - total stream length 14 miles.

Topography

The watershed is mountainous and densely wooded with douglas fir. The stream emerges from a rock canyon and flows through the

General remarks **(cont)**:

Cowlitz flood plain to the river. This canyonous section extends approximately one half of the way to Johnson Creek. For the remainder of this distance and above Johnson Creek the valley is wider with occasional alder flats.

Character of Stream

The best spawning areas lie above and below the canyonous stream section which contains many cascades and low falls. Good pools are numerous throughout. Above Dixon Creek rock slides have formed several partial barriers. Further action may at any time create impassable obstructions. At flood stage water rises as much as 30' above present level. With the exception of the stream section crossing, the Cowlitz flood plain, the gradient is steep. Marginal vegetation is dense, composed of alder, cedar, berry vines, maple and fir. The banks are of bedrock and rubble, usually steep with occasional jams of debris built up by flood water.

Fish Population

Silver salmon fingerlings are abundant to falls above Dixon Creek, numerous above, scarce near Johnson Creek. Steelhead or trout fingerlings are numerous throughout. Rainbow trout 4-8" are abundant near Johnson Creek and above, probably common to numerous from Sta. A-B.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	7/25/37	12:30 PM	85.0 F	61.0 F	Clear
B	7/29/37	10:00 AM	57.0	50.0	Ptly cloudy
C	7/28/37	4:30 PM	62.0	54.0	Clear

## Pool Grade:

Sta. A-B: Total number of resting pools 183 - 24.4/mile. 7.5 miles. Total number of S6 pools 370 - 49.4/mile. S1T1(84) 15.2%; S1T2(1) .2%; **S2T1(82)** 14.8% S2T2(3) .5%; S2T3(1) .2%; S5T1(2) .4%; S5T2(2) .4%; S5T3(8) 1.4%; S6(370) 66.9%.

Sta. B-C: Total number of resting pools 79 - 43.9/mile. 1.8 miles. Total number of S6 pools 68 - 37.8/mile. S1T1(2) 1.4%; S1T3(1) .7%; S2T1(18) 12.2%; S2T3(5) 3.4%; S5T1(51) 34.7%; S5T3(2) 1.4%; S6(68) 46.3%.

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	7.5	1,100'	147'	Mt. Rainier Quad.
B-C	1.8	255'	142'	"
Right Branch	2.0	1,560'	780'	"
Left Branch	3.0	1,760'	585'	"

## Tributaries:

1. Boulder Creek, more than 1 cfs.
2. Dixon Creek, 1 cfs.
3. Rock Creek, more than 1 cfs, the above and several other small creeks steep and of no value to fish.
4. Johnson Creek, 20+ cfs, written up.
5. Left Branch, 8-10 cfs at Sta. C.
6. Right branch, 8-10 cfs, at Sta. C.

## Johnson Creek

River System: Cowlitz River

Stream Surveyed: Johnson Creek, tributary to Cowlitz River

## Description:

Tributary to the upper reaches of Skate Creek on the left bank. Flows through a narrow v-valley in a heavily forested and mountainous watershed on the south slope of Mt. Rainier. Dense marginal growth above the 6-10' banks of boulders and bedrock. The gradient is very steep with only small pools occurring in the practically continuous cascades. The bottom is chiefly large rubble with a high percentage of coarse sand, but small patches of good gravel occur at the ends of the pools. The annual fluctuation is about 8', and the air and water temperatures were 57.0 F and 50.0 F at 10:00 am.

400 yds above the mouth of Johnson Creek is a series of 6-10' falls which appear impassable to salmon at all times.

Salmon are reported to spawn in Johnson Creek but cannot ascend above the falls. Rainbow trout 7-10" long are abundant.

Survey by Hanavan.

**Butter Creek**

River System: Cowlitz River

Stream surveyed: Butter Creek, tributary to Cowlitz River

Date of Survey: 7/26/37 - by Lobell.

Source: Pinnacle Peak on the southern slope of Mt. Rainier in Mt. Rainier.

Direction of Flow: Flows south on slope of Mt. Rainier to confluence w/Cowlitz in NE4,S10,T13N,R9E (Columbia National Forest Map).

Total Length: 10 miles

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/Cowlitz R	---	---	---	---	S10,T13N,R9E	31'	11"
B Falls		1.2		1.2		33'	-

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0061	0.00
B*	17080004	0061	0.00

\* Station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )							
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B		32.3		25.0		31.9		10.8

classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	% Usable
A-B	1.2		13,540	56.9		

spawning Area Unavailable and Unusable: None

## Character of Watershed:

A-B  
Mountainous X (above Cowlitz River Bottom)

Hilly

Rolling

Flat

Swampy X (on Cowlitz River Bottom)

Wooded X

Open

Cultivated None

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks  
b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 2,090 yds above Sta. A, 2 bedrock falls, 20' drop at a 45 degree angle, impassable to salmon. Passable with difficulty to steelheads at high water.
2. 1/4 mile above Sta. B, bedrock falls 30' high, impassable to salmon.

Note : The falls at Sta. B possibly passable to steelhead during high water. A 30' falls is located 1/4 mile above here, however, which is a complete barrier to all fish.

Fluctuation in Water Level: 3-4' on Cowlitz bottom and 5-6' above.

Cause of Variation: Melting snow causes increased runoff in early spring.

Stream Volumes: 7/25/37 - Sta. A - 80 cfs - good. 60% of stream bed covered. Large wash, 100-200 yds wide, on flood plain of Cowlitz River. All good gravel.

Pollution: None

Fish (salmon): Silver salmon fry numerous on 7/26/37.

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Trout	7/26/37			X	
Whitefish	"			X	

General Remarks:

Survey

1.2 miles.

## General remarks (cont):

Topography

The lowest 1/2 mile of Butter Creek is on the flood plain of the Cowlitz River. The watershed above is mountainous and rugged and the creek at the end of the first mile is in a canyonous valley approximately 1,000' deep. On the flood plain the vegetation is alder, willow, maple and brush changing above to a conifer forest of fir, cedar and spruce. There is no significant erosion of the watershed.

Character of Stream

On the flood plain of the Cowlitz, Butter Creek is considerably wider than above with low flat banks. The low gradient of this section results in a large wash composed of excellent rubble and probably utilized by salmon during the spring runoff. Scattered growths of alder, willow, maple and brush occur along the stream banks. There is extensive erosion in this sector as evidenced by the number of high water channels. The bottom in this section is composed largely of good gravel with excellent riffle. The gradient increases rapidly at the margin of the flood plain, the creek becoming gradually swifter and smaller until it is flowing in a box canyon above. In this upper area the banks are usually cut extending to a height of 100 in places. Bank composition is of soapstone, igneous rock and earth. Shade is afforded by a moderate growth of alder, maple, conifers and brush along the stream banks. The gradient in the upper section becomes increasingly steep and the bottom is composed principally of large rubble over which are numerous falls and cascades. There are only small patches of spawning gravel in this portion of the creek. Large pools are numerous throughout. The fluctuation in water level is from 5-6' with only a slight erosion of the banks.

Fish Population

The number of silver salmon fry present indicates that this stream is utilized by this species. However, the amount of stream available is only one mile since an impassable barrier is located at Sta. B. Rainbow trout and whitefish occur in fair numbers. The lower portion of the creek is subject to a fair amount of fishing by sportsmen.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Sky
A	7/25/37		88.0 F	58.0 F	Clear
B	None secured				

**Pool Grade:**

A-B: Total number of resting pools, 27 - 22/mile. Distance 1.2 miles. Total number of S6 pools, 26 - 22/mile.  
 S1T1(5) 94%; S2T1(6) 11%; S2T3(3) 5.7%; SST1(10) 18.9:  
 S5T3(3) 5.7%; S6(26) 49.1%.

**Gradient:**

<u>Station</u>	<u>Distance (Miles)</u>	<u>Total Drop</u>	<u>Avg Drop Per Mile</u>	<u>Source of Data</u>
A-B		steep	165'	US Topography Map

Tributaries: None

**Lake Creek**

River System: Cowlitz River

Stream Surveyed: Lake Creek, tributary to Cowlitz River

Date of Survey: 6/24/37 by Baltzo

Source: Lake Creek is the outlet of the large Packwood Lake in the high cascades near the SE side of Mt. Rainier.  
Source in S21,T13N,R10E.

Direction of Flow: Flows NW from Packwood Lake to confluence with the right bank of the Cowlitz River, 3 miles above the town of Packwood. Mouth in S11,T13N,R9E.

Total Length: 5 miles from mouth to source at lake. 1.9 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/Cowlitz R	---	---	---	---	S11,T13N,R9E	41'	15"
B Lowest impassable	1.9		1.9		S18,T13N,R10E	Falls	

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	0039	0.00
B*	17080004	0039	1.67

\* station location is not definite and has been estimated

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )							
	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B-		66.0		20.0		12.0		2.0

Classification of stream based on amount of usable spawning rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance vds miles	Area (yd <sup>2</sup> )	Available Spawning Area (yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area (yd <sup>2</sup> )	Usable
A-B	3,400		12,030	32.0		

## Spawning Area Unavailable and Unusable:

Cause of Unavailability: Entire stream above falls at Sta. B inaccessible to upstream migrants. Probably very little good gravel anyway.

## Character of Watershed:

A-B  


---

Mountainous X

Hilly

Rolling

Flat

Swampy

Wooded X

Open

Cultivated None

Character  
of Valley

Character  
of Banks

Density of  
Marginal  
Vegetation

Erosion  
a) Banks

b) Watershed.

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Sta. B, 25' high falls, impassable at all times. Falls over rounded and steeply sloping bedrock incline. About 50' wide with an average depth of 2" of water over the surface of the rock. A bypass on the left bank carries considerable water but is too steep for fish to ascend. Only a small pool below the falls.

Fluctuation in Water Level: 5-6'

Cause of Variation: Heavy winter snows and heavy rains in spring and fall. Lake above tends to smooth out fluctuation.

Stream Volumes: Sta. A - 7124137 - 150 cfs. All of stream bed is covered with flood wash, has exposed low banks in places.

Pollution: Steep, earthen banks and valley sides. Silting of bottom in quieter areas and milking of water. No detriment to spawning.

Fish (salmon): No adults observed on survey.

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Silver Fingerlings	7/24/37		X		
Rainbow Trout	"		X		

30 steelhead nests counted in the lowest 300 yds of stream.

## General Remarks:

Topography

The lowest 1/2 mile of Lake Creek flows through the wide and comparatively flat Cowlitz Valley. Small second growth timber and brush cover the earth and gravel of which the ground is composed. During flood stages, the Cowlitz covers a good portion of this section.

Above the valley, the watershed is mountainous and rugged. Except along the road and river, the timber is all large and virgin growth fir and cedar. Lake Creek flows through a valley from 100-300' deep, very narrow and so steep sided as to be almost canyonous. The valley sides are largely earth in places, which washes into the stream during heavy rains.

Character of Stream

Lake Creek is exceptionally steep, being cascades, small falls and white water practically its entire length. It is doubtful if any migrant could ascend upstream very far, although no falls below that at Sta. B seemed impassable in itself. The falls at Sta. B. are always impassable see card #9. Very good spawning gravel occurs in the lowest 300 yds of the stream, but above that there are only small patches scattered in the cascades.

The lowest mile is bordered by 6-10' banks, but above the valley walls themselves form the banks. In a couple of places box canyons occur and everywhere the banks are mainly of boulders and bedrock. They are protected by a moderate growth of alder, conifers, maple and brush. The water is always more or less milky, due to the silt that is washed in by rain and melting snow.

Fish Population

Due to its inaccessibility and replenishment from the well stocked lake above, Lake Creek has an abundance of rainbow trout throughout its length. Salmon and steelhead congregate near the mouth during their spawning season, but the swift current and poor gravel higher up discourages any general migration upstream.

## Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Skv</u>
A	7/24/37	10:30 AM	74.0 F	63.5 F	Clear
B	"	2:30 PM	68.0	63.5	Ptly cloudy

## Pool Grade:

Frequency, 57 resting and numerous S6 pools/mile. Distance, 1.9 miles. S1T1(19) 17%; S1T2(3) 3%; S1T3(2) 2%; S2T1(27) 25%; S2T2(7) 6%; S2T3(8) 7%; S3T1(7) 6%; S3T2(2) 2%; S3T3(26) 24%; S5T3(8) 7%.

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	.		250'	Topographic Map

Tributaries: None of importance, moderate seepage.

**Coal Creek**

River system: Cowlitz River

Stream Surveyed: Coal Creek, tributary to Cowlitz River

Date of Survey: 6/3/36

Source: Lost Lake, Lewis County 1 mile NE of Packwood Lake,  
S23,T13N,R10E.Direction of Flow: Flows NW from source to confluence with upper  
main Cowlitz River, right bank,  
NE1/4,S1,T13N,R9E.Total Length: 6 miles, .64 miles surveyed, mouth to impassable  
falls.

## Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Mouth	---	---	---	---	S1,T13N,R9E	25'	10"
B Falls		0.6		0.6		24'	6"

## EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004	004:	0.00
B*	17080004	0045	0.00

## Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
	Yds	Miles	%	%	%	%	%	%	%	%
A-B			38.0		32.0		24.0		6.0	

Classification of stream based on amount of usable spawning  
rubble and area present: N/A

## Spawning Area Usable and Available:

Station	Distance yds miles	Area' (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B	1,120		5,249	56.0		

Spawning Area Unavailable and Unusable: None

## Character of Watershed:

	A-B
Mountainous	X
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
cultivated	
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. 1,120 yds above mouth, falls 75' in 150', impassable.

Fluctuation in Water Level: Unknwon

Cause of Variation: Runoff from snow, rains.

Pollution: None

Fish (salmon): None

Fish (other than salmon): None

General Remarks:

#### Survey

Coal Creek. Of a total of 6 miles of stream, only the lower 1,120 yds were surveyed. The survey started at the confluence with the Cowlitz River and continued upstream for about 3/4 mile, where an impassable fall was found.

#### Topography

Practically the entire watershed of Coal Creek is very rugged, abounding in buttes, ridges and canyons. The stream runs through a canyon for a large part of **its** course, emerging into a very small valley before discharging into the Cowlitz. Dense growths of conifers cover the surrounding ridges and thickets of alders and willows fringe the lowlands.

#### Character of Stream

Coal Creek is a typical mountain stream. Numerous small pools (S6) occur in the large, deep riffles. In going upstream, the increasingly steep gradient is noticed. This produces

General remarks **(cont)**:

numerous cascades until finally an impassable series of falls dropping 75' in 150' is reached. 5,249 sq. yds of the bottom, over 56%, is available to spawners. The average width is 24' and the average depth 10". At Sta. B, below the falls, a depth of 6' was noted. Water temperature was about 43.0 F, air about 56.0 F.

Fish Population

No fish were seen or reported.

## Temperature Data:

Sta	Date	Hour	Air Temp	Water Temp	Skv
A	6/3/36	12:1 PM	58.0 F	43.5 F	Cloudy
B	"	1:05 PM	54.0	42.5	"

## Pool Grade:

Sta. A-B: Frequency 6 resting and 128 S6 pools/mile. Distance .7 miles. S2T1(1) 1%; S5T1(3) 3.1%; S6(90) 95.5%.

Total number of pools 84 - 4 resting and 90 S6.

## Gradient:

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B	.64	280'	437'	USGS Mt.Rainier Quad.

Tributaries: None

**Purcell Creek**

River System: Cowlitz River

Stream surveyed: Purcell Creek, tributary to Cowlitz River

**Description:**

Surveyed 6/3/36 by Kolloen. Purcell Creek is a small stream which rises in Lewis County, SW4,T13N,R10E, and flows NW for a distance of about 2.5 miles, and discharges into the Cowlitz River, SW4,S29,T14N,R10E. A total distance of 532 yds was surveyed from the mouth upstream to an impassable falls falling 60' in 100'.

The stream emerges from a relatively steep canyon and flows for the last quarter mile over a flat valley floor covered with a dense forest of fir, cedar, alder and cottonwood trees.

Of a total 2,260 yds of bottom, 2,039 sq. yds or 90% is spawning gravels. There is a succession of good riffles, but pools are not present. The average width of the stream is 16.5' and the average depth is 5". The air and water temperatures were 50.0 F and 44.0 F respectively. Two stations were established, one at the mouth and one at the terminus. At the mouth, Sta. A, the flow was computed to be 12 cfs.

Although no fish were observed during the survey, rainbow and eastern brook trout probably frequent the stream and it is reported that there is a silver run. With such a small available area for spawning it is doubtful whether this stream contributes an appreciable amount to the fishery.

**Clear Fork**

River System: Cowlitz River

Stream Surveyed: Clear Fork, tributary to Cowlitz River

Date of Survey: 7/24 and 29/37 by Hanavan and Baltzo

Source: North side of Goat Rocks SE of Mt. Rainier in T12N,R11E.  
56 square miles of drainage area.

Direction of Flow: Flows N and NW to confluence with the  
Ohanapecosh River to form the Cowlitz River.  
Originates near the top of the cascade divide  
in the extreme eastern end of Lewis  
County close to the SE side of Mt. Rainier.

Total Length: 16 miles, only lowest 1 1/2 miles surveyed.

Station Location:

St Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
	Yds	Miles	Yds	Miles			
A Conf w/Ohanapecosh	--		---		S29,T14N,R10E	30'	5'
B Conf w/Cartright	1.5		1.5		S21,T14N;R10E	50'	2"

EPA River Reach Codes: N/A

Character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )		L.R.		M.R.		S.R.		M&S	
	Yds	Miles	%		%		%		%	
A-B			60.0		13.0		13.0		13.0	

Classification of stream based on amount of usable spawning  
rubble and area present: N/A

Spawning Area Usable and Available:

Station	Distance		Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)		% Avail	Usable Spawning Area(yd <sup>2</sup> )	
	vds	miles					Usable	
A-B		1.5		8,041		27.0		

## Spawning Area Unavailable and Unusable:

Cause of Unavailability: Reported that swift current stops all migrants from ascending above Sta. B. All cascades and large rubble with practically no spawning area.

## Character of Watershed:

	A-B
Mountainous	X

Hilly

Rolling

Flat

Swampy

Wooded X

Open

Cultivated None

Character  
of ValleyCharacter  
of BanksDensity of  
Marginal  
Vegetation

Erosion

a) Banks

b) Watershed

Diversions: None

Artificial Obstructions: None

Natural Obstructions:

1. Throughout most of survey, small falls and cascades up to 5' high, passable with difficulty.

Fluctuation in Water Level: 10' near mouth to 20' in narrower canyon.

Cause of Variation: Heavy winter snows and heavy spring and fall rains.

Stream Volumes: Average over 11 year period 255 cfs. Maximum discharge recorded 8,030 cfs, and minimum 34 cfs. Data from Geological survey water supply paper #814. % of stream bed covered - practically none.

Pollution: None, flows through wilderness entire distance.

Fish (salmon): None observed. Too early in year.

Fish (other than salmon):

Species	Date	Very Abundant	Abundant	Fair No.	Scarce
Rainbow	7/24/37				X

General Remarks:

Survey

Lowest 1 1/2 miles above mouth. Remaining upper 14 1/2 miles unfit for salmon or steelhead migrants.

Topography

Throughout its lower reaches at least, the Clear Fork flows through a very steep and narrow canyon, the walls of which often rise sheer for 200' above the stream margins. The heavily wooded mountains rise steeply from the very edge of the canyon. The entire region is very rugged and wild, the bedrock base being an old lava flow from Mt. Rainier. The virgin forest of fir and cedar with its dense undergrowth prevents erosion of the rather light soil from the steep mountainsides.

General remarks (cont):

Character of Stream

Salmon and steelhead can spawn only near the mouth because the gradient is so steep as to preclude the possibility of any extended migration upstream. Falls 4-6' high are numerous and swift cascades occur throughout. Moderate sized pools are frequent. The bottom consists mainly of bedrock and large rubble. Only small patches of gravel at the lower end of the larger pools are suitable for spawning. These areas are excellent.

Because of the steepness of the bedrock banks, there is but little marginal vegetation. Sufficient protection is afforded fish by the rough water, big boulders and overhanging ledges. The spring runoffs of the heavy winter snows cause great increases in the volume of the river. The water is nearly always very clear and cold.

Fish Population

Spring chinooks are caught in the State's Hatchery racks located at the mouth of the Clear Fork so the small run occurring there is artificial. Steelheads and silver salmon enter the river while the racks are out and utilize the spawning area in the lowest mile. These runs are very small. Trout fishing is reported to be excellent throughout the entire length of the stream, due no doubt to the extreme inaccessibility through the virgin wilderness.

Temperature Data:

<u>Sta</u>	<u>Date</u>	<u>Hour</u>	<u>Air Temp</u>	<u>Water Temp</u>	<u>Skv</u>
A	7/24/37	1:45 PM	85.0 F	54.0 F	Clear
B	7/29/37	2:00 PM	75.0	52.0	II

Pool .Grade:

Sta. A-B: Frequency 25 resting and 24 S6 pools/mile. Distance 1.5 miles. S1T1(16) 22%; S1T2(1) 1%; S1T3(1) 1%; S2T1(6) 8%; S2T2(1) 1%; S2T3(3) 4%; S3T3(9) 12%; SB(36) 50%.

Gradient: Very steep for so large a stream.

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
Below Sta. B			130'	.Topographic Map

Tributaries:

1. Dam Creek; right bank, one mile above mouth. Estimated 5-10 cfs.
2. Cartright Creek, left bank Sta. B, estimated 15-20 cfs.

Both of these tributaries have impassable falls at their mouth.

## Dam Creek

River System: Cowlitz River

Stream Surveyed: Dam Creek, tributary to Clear Fork

## Description:

Empties into the right bank of the Clear Fork of the Cowlitz, one mile above its mouth. Parallels the Clear Fork in the next valley to the south. Steep gradient, with bedrock bottom and banks in its lower reaches. Mountainous and heavily wooded watershed. Flowing an estimated 5-10 cfs on 7/29/37. Barriers: Enters the Clear Fork over a 10' and a 30' sheer falls. Entirely inaccessible to salmon or steelhead.

**Cartright Creek**

River **System:** Cowlitz River

Stream Surveyed: Cartright Creek, tributary to Clear Fork

Description:

Empties into the left bank of Clear Fork of the Cowlitz, 1 1/2 miles above its mouth. Cartright Creek parallels the Clear Fork in the next valley to the north. Mountainous and heavily forested watershed. Very steep gradient in lower reaches with bottom mostly bedrock and large boulders. Clear water of rather constant volume, but subject to freshets during runoff and heavy rains. Estimated flow 15-20 cfs on 7/29/37. Flows through a deep box canyon most of its length. Accessible at White Pass Road which crosses the creek 1/2 mile above its mouth. Barriers: Cartright Creek enters the Clear Fork over a 50' sheer falls above which are several more smaller but impassable falls. Entirely inaccessible to salmon or steelhead.

**Ohanapecosh River**

River System: Cowlitz River  
 Stream Surveyed: Ohanapecosh River

Date of Survey: 7/24/37 by Lobell, Hanavan, Baltzo and Kolloen

Source: Chanapecosh glacier on the south eastern slope of Mt. Rainier at an elevation of 8000', T16N,R9E:

Direction of Flow: Flows southward on slope of Mt. Rainier to confluence with Cowlitz in S29,T14N,R10E.

Total Length: 15 1/2 miles

Station Location:

St	Location	Distance Above Prev. Station		Distance Above Mouth		Map Location	Width	Depth
		Yds	Miles	Yds	Miles			
A	Conf w/Cowlitz R	---	---	---	---	S29,T14N,R10E	60'	10'
B	Summit.Creek		1.1	1.1		S20;T14N;R10E		

EPA River Reach Codes:

Station	HUC	SEG	Rmi
A	17080004		Not avail
B*	17080004	0057	0.00

\* station location is not definite and has been estimated

character of Bottom Between Stations:

Station	Area (yd <sup>2</sup> )	L.R.	%	M.R.	%	S.R.	%	M&S	%
A-B			57.5		13.0		14.9		14.6

classification of stream based on amount of usable spawning rubble and **area** present: N/A

## Spawning Area Usable and Available:

Station	Distance vds	miles	Area (yd <sup>2</sup> )	Available Spawning Area(yd <sup>2</sup> ) (MR&SR)	% Avail	Usable Spawning Area(yd <sup>2</sup> )	% Usable
A-B		1.1		10,820	27.9		

spawning Area unavailable **and** Unusable: ` None

## Character of Watershed:

A-B	
Mountainous	X Box Canyons
Hilly	
Rolling	
Flat	
Swampy	
Wooded	X
Open	
Cultivated	None
Character of Valley	
Character of Banks	
Density of Marginal Vegetation	
Erosion	
a) Banks	
b) Watershed	

Diversions: None

## Artificial Obstructions:

1. 180 yds above Sta. A, State Hatchery Racks, 6' high.
2. 718 yds above Sta. A, log dam (State Fish Stop), 12' estimated.

Temporary fish racks are installed each year by the State Fish Hatchery for the purpose of spawn collection from spring chinooks. The racks are in from about August 1 to October 1. Fish are permitted to pass through to the holding area above.

The log dam at 718 paces above Sta. A is premanent and also built by the Stte Hatchery to prevent spring chinook salmon from passing upstream. The area between the racks and the dam is used for holding unripe fish. The estimated width at the crest was 75' with a drop of approximately 12'. The spill was 8" on the date of survey. Construction is log, chinked, and filled in behind by rubble and debris. Since the dam is built into the vertical rock walls of the canyon, there are no abutments.

Hatchery attendants reported that this dam prevented most salmon from passing upstream although a few of both the spring and fall chinooks succeed in getting over. Steelheads are reported to pass over in high water periods. This dam is a complete barrier at low water but is passable with difficulty at high water stages. There is fast white water immediately below the dam.

## Natural Obstructions:

1. 1,187 yds above A, bedrock falls 5' high, 45 degree angle, passable with difficulty.
2. 1,225 yds above A, 8' high bedrock falls, passable with difficulty at high water.
3. 1,258 yds above A, 6' high bedrock falls, passable with difficulty at high water.
4. 1,350 yds above A, 23' high bedrock falls, passable with difficulty at high water.
5. 1,450 yds above A, 10' high bedrock falls, passable with difficulty.
6. 1,671 yds above A, 10' high bedrock falls, passable with diffilty.
7. 1,900 yds above A, 10' high bedrock falls, impassable at low water, partial barrier at high water.

Natural Obstructions (cont):

- 8. 2,052 yds above A, 6-10' high bedrock falls, passable to steelheads.

It is clear that the numerous barriers would make the river difficult to ascend, since nearly all these falls are passable only at high water. It is doubtful whether any fish get up as far as the confluence of Summit Creek. Residents have not observed any sizeable run of fish ever coming above the hatchery dam.

Fluctuation in Water Level: 5' in lowest 1/2 mile; 10' above.

Cause of Variation: Variations in water levels on this river are seasonal with spring flood stages due to melting glaciers and snow at the source.

Stream Volumes: None. Percent of stream bed covered, all.

Pollution: Glacial silt from Ohanapecosh glacier, causing milkiness of water. Slight silting of bottom but not detrimental to fish.

**Fish (salmon):** Spring Chinook - 25 below hatchery dam - none above - 718 yds above A. No salmon fry observed except those in hatchery ponds.

**Fish (other than salmon):**

<b>Species</b>	<b>Date</b>	<b>Very Abundant</b>	<b>Abundant</b>	<b>Fair No.</b>	<b>Scarce</b>
Whitefish	7/24/37		X		
Montana Blackspot	"		X		
Rainbow Trout	"		X		

**General Remarks:**

Survey

1.1 miles.

## General remarks (cont):

Topography

This river has its source high on the south slope of Mt. Rainier and flows through rugged mountainous country. The valley of the lowest mile is u-shaped with the steep slopes rising to a height of about 1,500' and with the river flowing for the most part through box canyons at their base. The mountainsides are moderately covered with medium sized fir, spruce, and pine except in rocky areas. Erosion of the watershed is very slight.

Character of Stream

This stream although of moderate gradient has vertical bedrock walls ranging from 5-500' in height. Near the confluence with the Cowlitz they are composed of rock and earth but above the composition is igneous bedrock. There is no vegetation immediate to the stream although a sparse growth of brush and small conifers occur above the canyon walls. Shelter is provided, however, by the large deep pools which are numerous throughout. Bottom composition is 57.5% large rubble and 27.9% spawning gravel which is limited to the edges of pools. The riffles are deep none being less than 3-5'. Since the stream banks are usually bedrock, **erosion** is very slight.

Fish Population

The hatchery located near the mouth had in the 1936 season an egg take of approximately two million from spring chinook salmon. The entire chinook run is spawned artificially since the state fish stop prevents salmon from ascending above. Excluding the fish stop, the series of falls between the mouth and Summit Creek are probably barriers except during periods of extremely high water. Trout and whitefish abound in the large pools and it is probable that because of the rugged nature of the valley, the stream is seldom fished by sportsmen. There are no trails along the banks.

Temperature **Data:** None

Pool **Grade:**

Sta	Dist (mi)	Resting Pools	Resting Pools/Mile	S1T1 %	S1T2 %	S2T1 %	S5T1 %	S6 Ttl
A-B	1.1	59	54	32		25	3	
				54.0		42.0	5.0	

**Gradient:** Moderate

Station	Distance (Miles)	Total Drop	Avg Drop Per Mile	Source of Data
A-B			70'	Topographical Map

Tributaries:

1. Summit Creek, right bank, Sta. B, estimated flow 20-25 cfs.

## Summit Creek

River System: Cowlitz River

Stream Surveyed: Summit Creek, tributary to Ohanapecosh River

## Description:

Tributary to Ohanapecosh River. Flows through a deep valley in a heavily forested and mountainous watershed. Subjected to about a 10' fluctuation from spring snow runoff; normally clear with a considerable flow. On 7/24/37, the waater temperature was 52.0 while the air was 68.0 F.

Summit Creek in its lower reaches is a continuous succession of falls, cascades and pools then a bedrock box canyon 300-500' deep. occasional patches of excellent spawning gravel occur at the tail end of the pools but most places the current is too swift and the large rubble and bedrock too predominant.

At the mouth of Summit Creek are two falls 20' and 50' high. Thus the entire stream is rendered inaccessible to upstream migrants. Observed by Lobell.

**Carlton Creek**

River System: Cowlitz River

Stream Surveyed: Carlton Creek, tributary to Summit Creek

**Description:**

Empties into the left bank of Summit Creek, 2 1/2 miles above its confluence with the Ohanapecosh River. Carlton Creek is a large, clear stream flowing through a deep valley in a mountainous and heavily forested watershed. In its lower reaches, the gradient is steep but it flattens out considerably upstream.

Carlton Creek is inaccessible to upstream migrants because of impassable falls below it on Summit Creek. The State has stocked the upper and flatter reaches with rainbow and Montana black spotted trout which are now providing good fishing. Observed by Baltzo.