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VANCOUVER LAKE FISHERIES
CATCH DATA REPORT FOR 1984

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INTRODUCTION

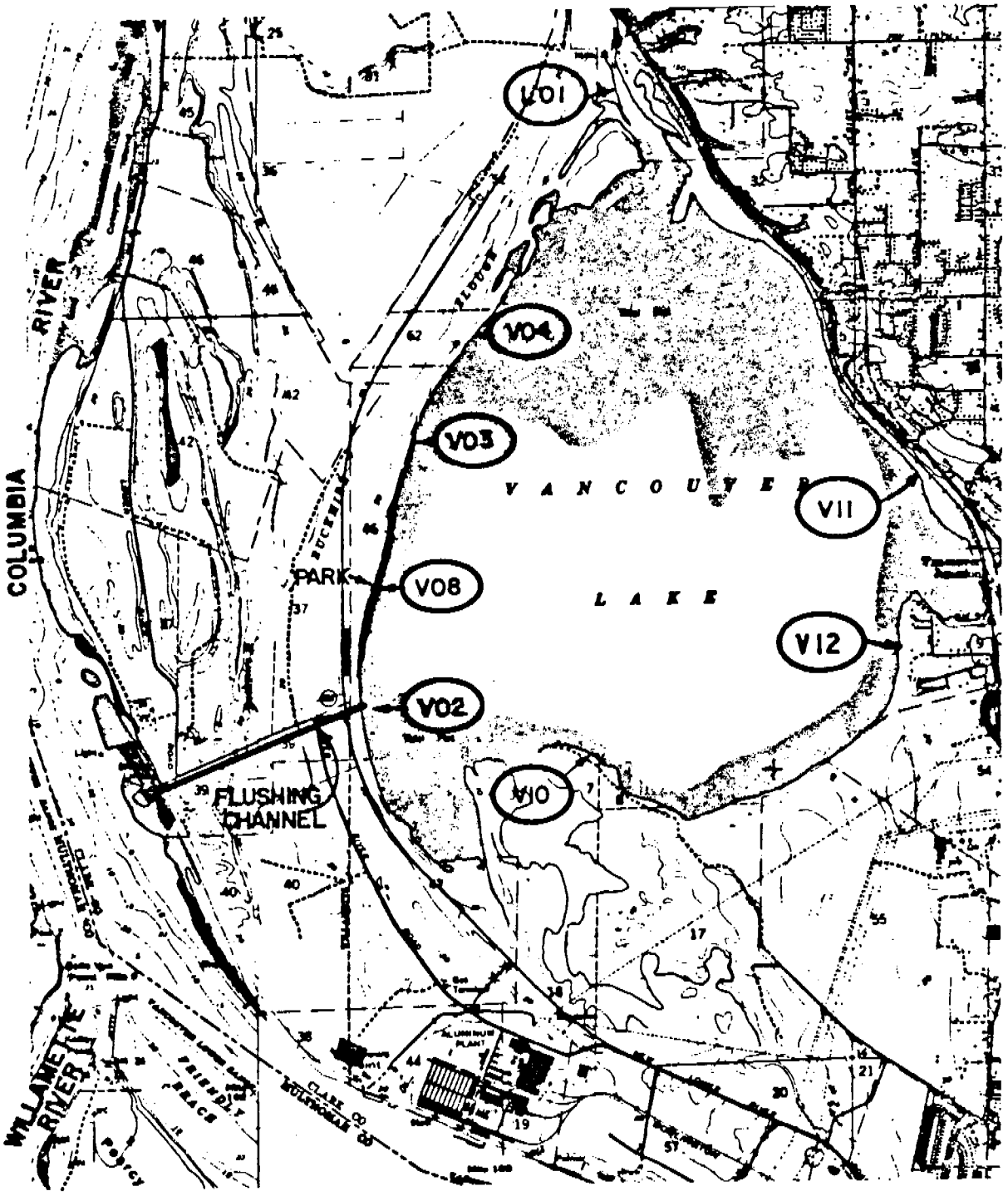
State and federal fisheries agencies have expressed concern over the effect of the Vancouver Lake Restoration Project on fisheries resources of the Columbia River. Of particular concern was whether the Vancouver Lake flushing channel would divert juvenile salmon and trout, which utilize the Columbia River as a nursery area and migration pathway, into the lake where they could become disoriented and incur increased mortality from predation or adverse water quality or both. Columbia River water flowing through the lake and out via Lake River may attract upriver migrating adult salmon and trout into the lake. This would cause migration delays and possibly mortality. Concerns were also expressed over the effect of increased flushing and dredging of the lake on resident warm-water fish species, important to local sport fishermen.

A fisheries monitoring program was designed to address the major agency concerns. This report briefly describes methods used, tabulates fish catches by location and date, and discusses the disposition of the catch for the sampling period to the end of the project, January through September 1984. The 1984 study followed the original scope of work with some modifications. Because of the delay in opening of the flushing channel (from June 1982 to October 1982), the 1984 program was the second year of sampling the lake during peak periods of downstream juvenile chinook salmon migration with the flushing channel in operation.

METHODS AND MATERIALS

LOCATIONS AND FREQUENCY OF SAMPLING

A total of seven sampling locations in Vancouver Lake were sampled regularly be beach seine and occasionally by gill net (Figure 1). One location on Lake River at Felida was sampled by weir during typical



VANCOUVER LAKE
FISH SAMPLING LOCATIONS

FIGURE 1

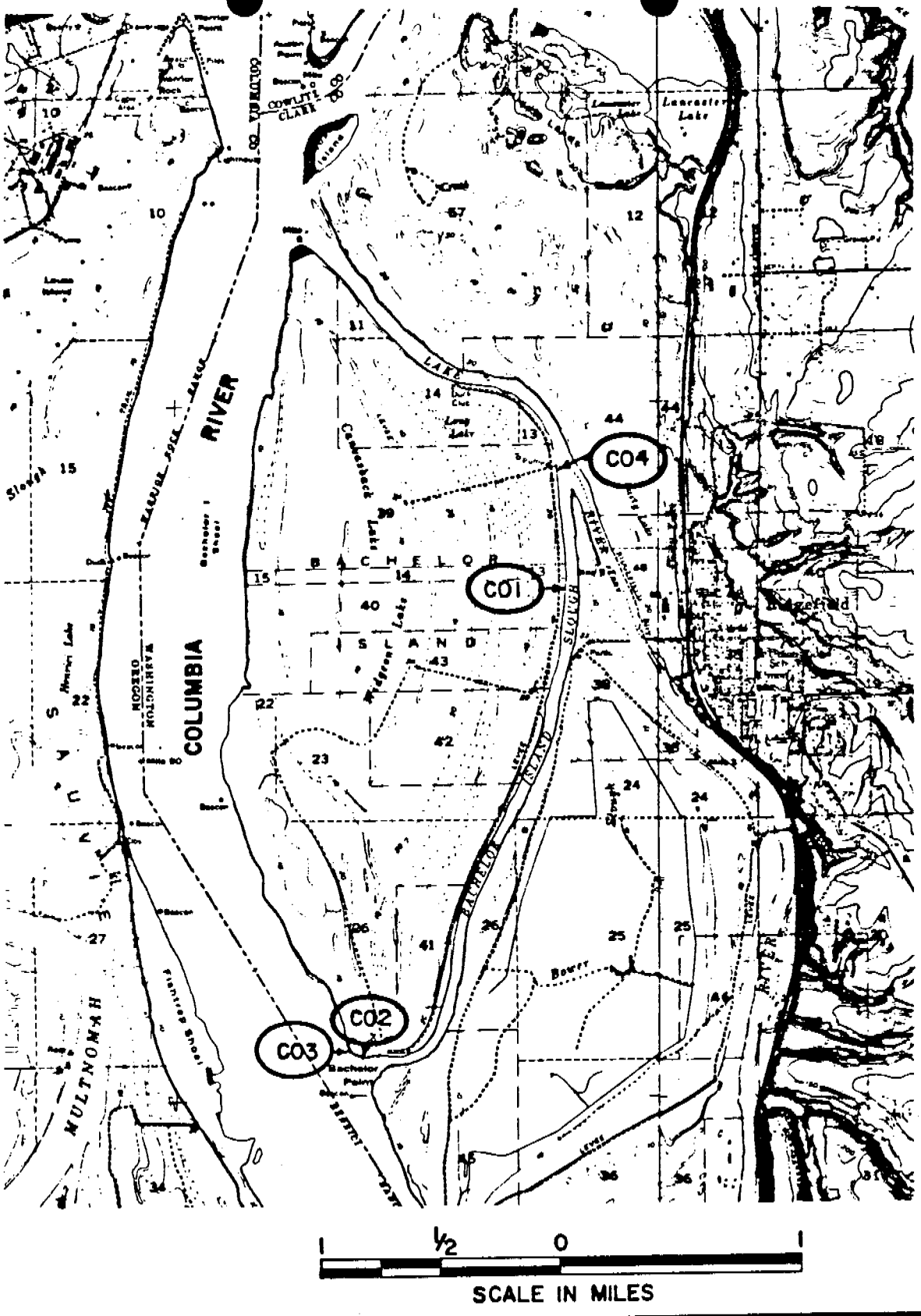
Columbia River salmon or steelhead migration periods (Figure 1). During June and July a floating fyke net was fished on the lake side of the opening of the flushing channel. Occasional beach seining was conducted during June and July in the flushing channel and adjacent Columbia River areas near the channel opening. Additonal seining for mark-recapture studies were done at the flushing channel-lake confluence during June, July, and August, 1984. Beach seining was also conducted at four stations regularly on the Columbia River and Bachelor Island (Figure 2).

SAMPLING GEAR

Beach Seining

The beach seine used in this program was designed to capture juvenile salmon and trout 30 mm in length or larger. This is the minimum size of juvenile salmon and trout expected in the study area. The floating seine is 120 ft (37 m) in length, tapering from 3 ft (0.9 m) at each end to 8 ft (2.4 m) in the middle. The seine was set by rowing 100 ft (30 m) offshore and parallel to the shoreline. Rowing rather than an outboard motor was used to minimize frightening the fish. Lines extending from each end of the seine were then used to pull the seine to shore. Seine configuration and method of fishing were patterned after Miller et al. (1977). All fish captured in seine hauls were identified and sometimes aged; fork length (salmon and trout), total length of white sturgeon, and standard length (all other species) were recorded; injuries, anomalies and disease were noted; and the fish were released where captured. Selected specimens were retained to determine their weight and what they were eating.

Dissolved oxygen (DO), water temperature, and water transparency were measured each time a sample was collected at beach seining locations. Samples for DO and temperature were taken within 6 in (0.2 m) of the surface, and water visibility was measured with a 6-in Secchi disc.



COLUMBIA RIVER BACHELOR ISLAND SLOUGH

FISH SAMPLING LOCATIONS

FIGURE 2

Gill Netting

Variable-mesh gill nets 125 ft (38 m) long, 6 ft deep, and composed of five equal-length panels arranged in the following order: 1, 2, 3, 4, and 5 in stretched mesh were used. Each net was set adjacent and perpendicular to the lake shore with the smallest mesh next to shore. All nets were set at dusk and fished for up to 3 hours each. All fish captured were taken to the lab and processed in the same manner as beach seine catches (above). Stomachs were sampled from selected individuals for food habit analysis.

Adult Weir

The adult weir fished in Lake River consisted of a large trap box 8 ft (2.4 m) long x 4 ft (1.2 m) high x 4 ft (1.2 m) wide. All mesh was 3 in (7.6 cm) stretch, designed to catch only adult salmon, trout, and other large fish (i.e., greater than 15-20 in). Due to high current velocities encountered (greater than 2 feet per second or fps), a shorter outside wing was used that fished 30 percent instead of the desired 50 percent of Lake River's width. The weir was fished continuously for 48 hours. Fish in the net were checked and removed twice a day.

Juvenile Fyke Net

The floating fyke net was fished in the upwelling of the incoming water from the flushing channel. The design was modifed from that described by Conlin and Tutty (1979) for a floating fyke net trap (pages 103-107). Wings were 25 ft (7.6 m) long by 6 ft (1.8 m) deep having 3/4 in. (19 mm) stretch mesh. The fyke portion had 1/4 in. (6 mm) knotless bar stretch mesh leading to a floating live box. The fyke net was fished 72 continuous hours, once in June and once in July. The live box was checked at least every four hours and more frequently as catch increased. Fish were removed, identified, counted, and released. Some fish were dye marked and released into the flushing channel gatewell to determine capture efficiency of the net.

DISPOSITION OF CATCH

The date, number, and location of fish caught each month are shown in Tables 2-24. Table 1 shows the total number of fish that were sacrificed for stomach analysis. All fish captured by gill net were also sacrificed. Some of the latter were used for food habit analysis. Some additional fish were collected during routine beach seining and returned to the lab for accurate measurements of weight. Thirty-two juvenile chinook salmon were collected from the Columbia River and Vancouver Lake for coded wire head tag identification. All other fish captured during beach seining were released unharmed, as were all fish captured in the Lake River weir and flushing channel fyke net.

LITERATURE CITED

Conlin, K. and B. Tutty. 1979. Juvenile salmonid field trapping manual. Fisheries and marine service manuscript report No. 1530.

Miller, B.S., C.A. Simenstad, L.L. Moulton, K.L. Fresh, F.C. Funk, W. Karp, and S. Borton. 1977. Puget Sound baseline program: Nearshore fish survey. Final Report, University of Washington, Fisheries Research Institute, Seattle. Report No. FRI-UW-7710. 220 pages.

LIST OF TABLES

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TABLE 1

NUMBER OF FISH COLLECTED FOR STOMACH ANALYSIS
IN VANCOUVER LAKE IN 1984

Species	Month of Collection					Total
	March	May	June	July	Aug	
Chinook Salmon[a/]	15	10	9	16		50
White Crappie	6	12	22	13	23	76
Yellow Perch	17			2	2	21
Largemouth Bass	1		2	5	12	20
Black Crappie	10	1		2	7	20
Brown Bullhead			2		17	19
White Sturgeon			6	2	10	18
Northern Squawfish				9	3	12
Channel Catfish	1			4	1	6
Walleye			2			2
TOTAL	50	23	41	55	75	244

[a/] Juveniles.

TABLE 2
BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 9-11 JANUARY 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03[b]	V04	V11	V12	TOTAL[c]	RELATIVE ABUNDANCE
Yellow Perch						3	10	13	.283
Yellow Perch[d]					1	3	5	9	.196
White Crappie						1	1	2	.044
White Crappie[d]						3	3	6	.130
Black Crappie[d]						1	6	7	.152
Largescale Sucker							4	4	.087
Chinook Salmon[e]		1				1	1	3	.065
Carp						1		1	.022
Pumpkinseed							1	1	.022
TOTAL		1			1	13	31	46	1.001

SPECIES	SAMPLING LOCATION[a] C01[f]	C04	C02[f]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon[e]	1	1			2	.571
Threespine Stickleback	0.5		0.5		1	.286
Yellow Perch	0.5				0.5	.143
TOTAL	2	1	0.5		3.5	1.000

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Not sampled due to ice.
c/ Three additional seine hauls near the mouth of Burnt Bridge Creek captured five juvenile chinook salmon and one adult cutthroat trout.
d/ Young of this year, others of same species are yearlings, juveniles or adults.
e/ Parr or smolts.
f/ Average of two seine hauls taken adjacent to each other.

TABLE 3

WEIR CATCH IN LAKE RIVER FOR THE PERIOD
1100 DECEMBER 12 TO 1340 DECEMBER 14, 1983
AND 1000 JANUARY 9 TO 1330 JANUARY 11, 1984

Species	December		January	
	Number	Relative Abundance	Number	Relative Abundance
White Crappie	82	.506	14	.169
Black Crappie	45	.278	23	.277
Carp	18	.111	42	.506
Largescale Sucker	11	.068	1	.012
Brown Bullhead	2	.012	1	.012
Peamouth	3	.018		
Largemouth Bass			1	.012
Starry Flounder			1	.012
American Shad	1	.006		
TOTAL	162	.999	83	1.000

TABLE 4

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 21-22 FEBRUARY 1984

SPECIES	SAMPLING LOCATION[a/] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Yellow Perch	1			4	1	4	10	20	.328
Chinook Salmon[c/]	1	4			2			7	.115
Prickly Sculpin	1			1		1	4	7	.115
Brown Bullhead					5		2	7	.115
Largemouth Bass						2	1	3	.049
Largemouth Bass[b/]	1						1	2	.033
Carp	1					3		4	.066
Peamouth					2		2	4	.066
Black Crappie						2		2	.033
Black Crappie[b/]							1	1	.016
White Crappie						1		1	.016
White Crappie[b/]				1			1	2	.033
Pumpkinseed							1	1	.016
TOTAL	5	4		6	10	13	23	61	1.001

SPECIES	SAMPLING LOCATION[a/] C01[d/]	C04	C02[d/]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon[c/]		4			4	.727
Largescale Sucker	0.5	1			1.5	.272
TOTAL	0.5	5			5.5	.999

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Young of this year, others of same species are yearlings, juveniles or adults.
c/ Newly emerged fry.
d/ Average of two seine hauls taken adjacent to each other.

TABLE 5

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 27-28 MARCH 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Yellow Perch	40			3	2	3	30	78	.470
Chinook Salmon[c]	23	17	9	1		4	4	58	.349
Peamouth	2			1	1	3	5	12	.072
Carp				1			3	4	.024
Prickly Sculpin	1					1	2	4	.024
Northern Squawfish	1		2					3	.018
Threespine Stickleback		2						2	.012
White Crappie						1		1	.006
Black Crappie[b]						1		1	.006
Largemouth Bass[b]					1			1	.006
Brown Bullhead							1	1	.006
Goldfish							1	1	.006
Pumpkinseed						1		1	.006
TOTAL	67	19	11	6	4	14	45	166	.999

SPECIES	SAMPLING LOCATION[a] C01[d]	C04	C02[d]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon[c]	4.5	4		2	10.5	.724
Largescale Sucker	0.5	1	0.5		2	.138
Peamouth	0.5	1			1.5	.103
Northern Squawfish	0.5				0.5	.034
TOTAL	6	6	0.5	2	14.5	.999

[a] Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
[b] Young of this year, others of same species are yearlings, juveniles or adults.
[c] Parr or smolts.
[d] Average of two seine hauls taken adjacent to each other.

TABLE 6

GILL NET CATCHES IN VANCOUVER LAKE ON 26 MARCH 1984

Species	Sample Location					
	V10	V02	V03	V11	Total	Relative Abundance
Peamouth	24	19	13	25	81	.711
Black Crappie	5	1	2	2	10	.088
Largescale Sucker	4	1	2	1	8	.070
White Crappie	2		1	2	5	.044
Yellow Perch	3		1	1	5	.044
Carp				2	2	.018
Rainbow Trout a/			1		1	.009
Channel Catfish				1	1	.009
Brown Bullhead			1		1	.009
TOTAL	38	21	21	34	114	1.002

a/ Spent adult male steelhead 620 mm in length.

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TABLE 7

WEIR CATCH IN LAKE RIVER FOR THE PERIOD
1200 MARCH 26 to 1330 MARCH 28, 1984

Species	Number	Relative Abundance
Black Crappie	24	.316
White Crappie	23	.302
Carp	14	.184
Largescale Sucker	9	.118
White Sturgeon [a/]	2	.026
Brown Bullhead	1	.013
Rainbow Trout [b/]	1	.013
Cutthroat Trout [c/]	1	.013
Goldfish	1	.013
TOTAL	76	.998

a/ One additional white sturgeon gilled in wing net.
b/ Spent adult steelhead male 620 mm fork length.
c/ Spent adult sea run cutthroat.

TABLE 8

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 29-30 MAY 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
White Crappie	3		7	5	2	33	7	57	.228
White Crappie[b]				8				8	.032
Prickly Sculpin		56	5					61	.244
Chinook Salmon[c]	2	30	7				1	40	.160
Chinook Salmon[d]	2	2	6		2		1	13	.052
Threespine Stickleback	1			10		5	1	17	.068
Coho Salmon[c]		15	1					16	.064
Carp	1					8		9	.036
Peamouth		2			3	1	2	8	.032
Black Crappie				2		1	1 [b]	4	.016
Rainbow Trout[e]		3						3	.012
Northern Squawfish				3				3	.012
Mountain Whitefish[b]			3					3	.012
Goldfish	1					2		3	.012
Largescale Sucker						1	1	2	.008
Brown Bullhead							1	1	.004
Yellow Perch[b]						1		1	.004
Cutthroat Trout		1						1	.004
TOTAL	10	109	29	28	7	52	15	250	1.000

SPECIES	SAMPLING LOCATION[a] CO1[f]	CO4	CO2[f]	CO3	TOTAL	RELATIVE ABUNDANCE
Coho Salmon[c]	4	1	16	4	25	.407
Chinook Salmon[d]	11	7	1		19	.309
Black Crappie	0.5	5			5.5	.089
Largescale Sucker	1	3			4	.065
Peamouth	0.5		1	1	2.5	.041
Threespine Stickleback	0.5	1			1.5	.024
Yellow Perch	1				1	.016
Goldfish		1			1	.016
Carp		1			1	.016
Chiselmouth		1			1	.016
TOTAL	18.5	20	18	6	61.5	.999

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by CO1 to CO4.
b/ Young of this year; others of same species are yearlings, juveniles or adults.
c/ Yearlings.
d/ Subyearlings.
e/ Smolts
f/ Average of two seine hauls taken adjacent to each other.

TABLE 9

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 6-7 JUNE 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Prickly Sculpin		107						107	.543
Chinook Salmon[b]		3	2				4	9	.046
Chinook Salmon[c]	1	19	15			1	3	39	.198
Carp							8	8	.041
White Crappie	1				2		2	5	.025
Black Crappie					5			5	.025
Coho Salmon			2		1	1		4	.020
Threespine Stickleback					2		2	4	.020
Largescale Sucker	2	1				1		4	.020
Peamouth	2					1		3	.015
Northern Squawfish	3							3	.015
Largemouth Bass					2			2	.010
Brown Bullhead					1			1	.005
Warmouth		1						1	.005
Bluegill					1			1	.005
Goldfish					1			1	.005
TOTAL	9	131	19	0	15	4	19	197	1.000

SPECIES	SAMPLING LOCATION[a] C01[d]	C04	C02[d]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon [c]	13	27	3.5	11	54.5	.832
Black Crappie		4			4	.061
Threespine Stickleback		3			3	.045
Prickly Sculpin	0.5	1			1.5	.023
American Shad[c]			0.5		0.5	.008
Peamouth			0.5		0.5	.008
White Sturgeon			0.5		0.5	.008
Speckled Dace			0.5		0.5	.008
Northern Squawfish	0.5				0.5	.008
TOTAL	14	35	5.5	11	65.5	1.001

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Yearlings.
c/ Subyearlings.
d/ Average of two seine hauls taken adjacent to each other.

TABLE 10

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 18-19 JUNE 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
White Crappie	8		1	42	3	1	14	69	.261
Black Crappie	1			1	1	19	23	45	.170
Yellow Perch	2	1		1		1	1	6	.023
Yellow Perch[b]	19		10	1	6			36	.136
Chinook Salmon[c]		21	3				1	25	.095
Chinook Salmon[d]		2	3			2		7	.027
Threespine Stickleback		1	5	14	13			33	.125
Coho Salmon[c]		22						22	.083
Largescale Sucker	4	1		2		1		8	.030
Peamouth	2	1						3	.011
Northern Squawfish	1			1			1	3	.011
Prickly Sculpin			2		1			3	.011
Rainbow Trout[e]		2						2	.008
Sockeye Salmon[e]		1						1	.004
Carp	1							1	.004
TOTAL	38	52	24	62	24	24	40	264	.999

SPECIES	SAMPLING LOCATION[a] C01[f]	C04	C02[f]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon[d]	10	32	2	2	46	.609
Threespine Stickleback	2	11			13	.172
Black Crappie	0.5	4			4.5	.060
Largescale Sucker	1.5	2	0.5		4	.053
Peamouth	0.5	2	0.5		3	.040
Goldfish		2			2	.026
Prickly Sculpin	0.5	1			1.5	.020
Northern Squawfish		1			1	.013
Speckled Dace			0.5		0.5	.007
TOTAL	15	55	3.5	2	75.5	1.000

[a] Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
[b] Young of this year, others of same species are yearlings, juveniles or adults.
[c] Yearlings.
[d] Subyearlings.
[e] Smolts
[f] Average of two seine hauls taken adjacent to each other.

TABLE 11

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER ON 2-3 JULY 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Crappie Species[b]			101	274	206	101		682	.526
Chinook Salmon[c]		258						258	.199
Yellow Perch				1	2		10	13	.010
Yellow Perch[d]	5		113	8				126	.097
Largemouth Bass	2			72			1	75	.058
White Crappie	1		1	21	13	8	13	57	.044
Coho Salmon[c]		34						34	.026
Peamouth	2	1	5	4				12	.009
Northern Squawfish	5			3		1		9	.007
Prickly Sculpin			1	4	1			6	.005
Largescale Sucker	5							5	.004
Black Crappie			1	1		3		5	.004
Carp						3	1	4	.003
Threespine Stickleback			1		1	1		3	.002
Pumpkinseed				1	1			2	.002
Walleye	2							2	.002
Rainbow Trout[e]		1						1	.001
Bluegill				1				1	.001
Brown Bullhead						1		1	.001
TOTAL	22	294	223	390	224	118	25	1,296	1.001

SPECIES	SAMPLING LOCATION[a] C01[f]	C04	C02[f]	C03	TOTAL	RELATIVE ABUNDANCE
Chinook Salmon [g]	17.5	41	40.5	10	109	.681
Threespine Stickleback	3.5	34			37.5	.234
Black Crappie		8		1	9	.056
Prickly Sculpin	1.5				1.5	.009
Peamouth				1	1	.006
Rainbow Trout[h]				1	1	.006
Yellow Perch		1			1	.006
TOTAL	22.5	84	40.5	13	160	.998

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ First appearance of young of this year black and/or white crappie.
c/ Yearlings.
d/ Young of this year, others of same species are yearlings, juveniles, or adults.
e/ Smolts
f/ Average of two seine hauls taken adjacent to each other.
g/ Subyearlings.
h/ Adult steelhead.

TABLE 12

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER ON 16 JULY 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Crappie Species[b]	1	1	58	252	302		12	626	.564
Carp	8			8	1	101	21	139	.125
Largemouth Bass			1		3	1	5	10	.009
Largemouth Bass[c]			1	48	51			100	.090
Yellow Perch	5		1	1	7		2	16	.014
Yellow Perch[c]	4		1	33	22		3	63	.057
White Crappie	4			9	13	6	29	61	.055
Brown Bullhead	1					31		32	.029
Black Crappie	2		1				10	13	.012
Chinook Salmon[d]		9	2					11	.010
Chinook Salmon[e]					1			1	.001
Prickly Sculpin				4	1		7	12	.011
Coho Salmon[d]		10						10	.009
Threespine Stickleback		3	1		1			5	.005
Pumpkinseed					2		2	4	.004
Largescale Sucker							2	2	.002
Peamouth			1		1			2	.002
Northern Squawfish					1			1	.001
Goldfish				1				1	.001
Bluegill					1			1	.001
TOTAL	25	23	67	356	407	139	93	1,110	1.002

SPECIES	SAMPLING LOCATION[a] C01[f]	C04	C02[f]	C03	TOTAL	RELATIVE ABUNDANCE
Prickly Sculpin	5	9	0.5		14.5	.212
Northern Squawfish		1		11	12	.175
Chinook Salmon[e]	2.5	3	2	3	10.5	.153
Largescale Sucker	8				8	.117
Threespine Stickleback	2.5	5	0.5		8	.117
Yellow Perch	6				6	.088
Peamouth	2		1.5	1	4.5	.066
Carp	0.5	2			2.5	.036
Starry Flounder	1.5				1.5	.022
Mosquitofish	0.5				0.5	.007
Smallmouth Bass	0.5				0.5	.007
TOTAL	29	20	4.5	15	68.5	1.000

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Young of the year black and/or white crappie.
c/ Young of this year, others of same species are yearlings, juveniles, or adults.
d/ Yearlings.
e/ Subyearling.
f/ Average of two seine hauls taken adjacent to each other.

TABLE 13

GILL NET CATCHES IN VANCOUVER LAKE DURING JUNE 5 AND JUNE 18, 1984

JUNE 5

Species	Sample Location V10	V02	V03	V11	Total	Relative Abundance
White Crappie	11	28	4	11	54	.486
Largescale Sucker	4	5	4	8	21	.189
Peamouth	1	11	1	3	16	.144
Carp		4	1	7	12	.108
Chinook Salmon[a/]		1	2	1	4	.036
Black Crappie		1		2	3	.027
Goldfish	1				1	.009
TOTAL	17	50	12	32	111	.999

a/ Yearling.

JUNE 18

Species	Sample Location V10	V02	V03	V11	Total	Relative Abundance
White Crappie	18	11	21	15	65	.307
Peamouth	2	49	2	6	59	.278
Carp	29		6	10	45	.212
Largescale Sucker	16	2	4	2	24	.113
Brown Bullhead	5	1		1	7	.033
White Sturgeon		6			6	.028
Northern Squawfish		2			2	.009
American Shad[b/]		2			2	.009
Starry Flounder		1			1	.005
Goldfish	1				1	.005
TOTAL	71	74	33	34	212	.999

a/ Yearlings
b/ Adults.

TABLE 14

GILL NET CATCHES IN VANCOUVER LAKE DURING JULY 2 AND JULY 17, 1984

JULY 2

Species	Sample Location V10	V02	V03	V11	Total	Relative Abundance
White Crappie	13	37	11	31	92	.505
Carp	8	1	2	18	29	.159
Northern Squawfish		18		1	19	.104
Largescale Sucker	7	3	4	2	16	.088
Peamouth	3	6	2	1	12	.066
Channel Catfish				4	4	.022
Black Crappie		1	2		3	.016
Brown Bullhead	2	1			3	.016
Chinook Salmon[a/]		2			2	.011
Yellow Perch		1			1	.005
White Sturgeon		1			1	.005
TOTAL	33	71	21	57	182	.997

JULY 17

Species	Sample Location V10	V02	V03	V11	Total	Relative Abundance
Carp			6	2	8	.258
White Crappie	2	1	4		7	.226
Black Crappie	2		1	1	4	.129
Peamouth	1	2	1		4	.129
Brown Bullhead			2	2	4	.129
Yellow Perch	1		1		2	.065
Northern Squawfish		1			1	.032
White Sturgeon		1			1	.032
TOTAL	6	5	15	5	31	1.000

a/ Yearlings.

TABLE 15

WEIR CATCH IN LAKE RIVER FOR THE PERIOD
5-7 JUNE 1984

Species[a/]	Number	Relative Abundance
White Crappie	352	.828
Black Crappie	39	.092
Carp	13	.031
Largescale Sucker	13	.031
Bluegill	4	.009
Goldfish	2	.005
Rainbow Trout[b/]	1	.002
Pumpkinseed	1	.002
TOTAL	425	1.000

a/ A White sturgeon was found in the wing when the net was pulled.

b/ Bright adult male steelhead 750 mm long of hatchery origin.

TABLE 16

VANCOUVER LAKE FLUSHING CHANNEL FYKE NET
CATCH FOR THE PERIODS 1100 JUNE 11 to 1205 JUNE 14
AND 1140 JULY 9 TO 1035 JULY 12, 1984

Species	June 11-14[a/]		July 9-12[b/]	
	Number	Relative Abundance	Number	Relative Abundance
Threespine Stickleback	106	.326	107	.546
Peamouth	96	.295	2	.006
White Crappie	43	.132	7	.022
Chinook Salmon	45	.138	4	.012
Crappie Spp.			31	.095
Prickly Sculpin	14	.043	6	.018
Carp	5	.015	15	.046
Largemouth Bass			10	.031
Yellow Perch	3	.009	5	.015
Black Crappie	5	.015	2	.006
Starry Flounder	2	.006	2	.006
Northern Squawfish	1	.003	2	.006
Rainbow Trout	2	.006		
Largescale Sucker	2	.006		
Coho Salmon			2	.006
Cutthroat Trout	1	.003		
Bluegill			1	.003
TOTAL	325	.997	196	

a/ June net efficiency for chinook salmon - 23/199 = 11.6 percent
for other fish - 6/71 = 8.5 percent.

b/ July net efficiency for chinook salmon - 14/64 = 21.9 percent.

TABLE 17

BEACH SEINE CATCHES OF JUVENILE CHINOOK SALMON IN THE FLUSHING CHANNEL, IN NEARBY OPEN AND PROTECTED AREAS IN THE COLUMBIA RIVER, AND TOTAL FYKE NET CATCH IN VANCOUVER LAKE DURING JUNE AND JULY 1984

Location	Total
Fyke net catch	
June 11-14	45
July 9-12	4

Location	Seine Haul Location[a/]						Mean
	Inner		Middle		Outer		
	N	S	N	S	N	S	
Flushing Channel							
June 11-15[b/]	30	16	17	8	10	19	16.7
July 9-13[b/]	30	31	8	16	2	4	15.2

Location	Seine Haul Number						Mean
	1	2	3	4	5	6	
Davis and Frenchman's Bar (open water)							
June 15	8	6	12	10	16	36	16.3
July 13	25	32	12	25	17	7	19.7
Frenchman's Bar (backwater)[c/]							
June 15	11	21	16	15	5		13.6
July 13	31	37	33	78			44.8

a/ Inner = Closest locations to the lake; Outer = Closest locations to the river; N = North bank of channel; S = South bank of channel.
b/ Average seine haul catch for each location (2-4 hauls/location)
c/ Moderate flow through area in June, no flow in July.

TABLE 18

SALMON AND TROUT CATCHES FROM ADDITIONAL[a/] SEINE HAULS IN THE FLUSHING CHANNEL OPENING IN VANCOUVER LAKE DURING JUNE AND JULY 1984

Species[c/]	Date of Sampling[b/] June 14	June 19	July 5	July 6	July 10	July 11	July 12	July 20	Aug 2
Number of Seine Hauls	2	6	3	6	4	5	4	3	3
TOTAL CATCH FOR ALL SEINE HAULS									
Chinook Salmon[d/]	96	159	1,478	1,412	18	5	8	47	3
Chinook Salmon[e/]	3	16	[f/]	[f/]		1	2		1
Coho Salmon	12	88	55	34	27	18	7	14	
Sockeye Salmon			2	7					
Rainbow Trout	6	8		6				1	
AVERAGE CATCH PER 1000 m^2									
Chinook Salmon[d/]	48.0	26.5	492.7	235.0	4.5	1.0	2.0	15.6	1.0
Chinook Salmon[e/]	1.5	2.7	[f/]	[f/]		0.2	0.5		0.5
Coho Salmon	6.0	14.7	18.3	5.7	6.8	3.6	1.8	4.7	
Sockeye Salmon			0.7	1.2					
Rainbow Trout	1.0	1.3		1.0				0.3	

a/ Seine hauls made in addition to the regular monthly seining.
b/ Values for June 19 and July 20 include regular seining.
c/ All parr or smolts unless otherwise designated.
d/ Large juveniles (≥ 110 mm) fork length.
e/ Small juveniles (< 110 mm) fork length.
f/ Number of small juveniles (<110 mm) not determined.

TABLE 19

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER ON 1-2 AUGUST 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Crappie spp.[b]		4	74	28	206			312	.266
Carp	10			40	25	157	11	243	.207
American Shad[b]	20	56	146				4	226	.193
White Crappie	31		1	13	36	6	1	88	.075
White Crappie[c]	15			12	1		22	50	.043
Black Crappie	1		2					3	.003
Black Crappie[c]	11		1	2	37	7	8	66	.056
Brown Bullhead	22			2		34		58	.049
Brown Bullhead[c]				5				5	.004
Yellow Perch				1				1	.001
Yellow Perch[c]			1		49	8	2	60	.051
Largemouth Bass	3	2		2	1			8	.007
Largemouth Bass[c]		7		2	11	5	1	26	.022
Threespine Stickleback		6						6	.005
Goldfish	2			3			1	6	.005
Northern Squawfish			2				3	5	.004
Prickly Sculpin	1	1	1	1				4	.003
Bluegill					1		3	4	.003
Chinook Salmon[d]		1	1					2	.002
TOTAL	116	77	229	111	367	217	56	1,173	.999

SPECIES	SAMPLING LOCATION[a] C01[e]	C04	C02[e]	C03	TOTAL	RELATIVE ABUNDANCE
Yellow Perch	1.5	1			2.5	.020
Yellow Perch[c]	7.5	26	1	1	35.5	.290
Peamouth	4	5	18	2	29	.237
Chinook Salmon[b]	6		6.5	3	15.5	.127
American Shad[b]	6	3			9	.073
Carp				8	8	.065
Threespine Stickleback	2.5	4	0.5		7	.057
Prickly Sculpin	1.5	2	0.5		4	.033
Black Crappie[b]	1	2	1		4	.033
Largemouth Bass[b]		1	1		2	.016
Largescale Sucker	2.5				2.5	.020
Northern Squawfish	1		1		2	.016
Speckled Dace			1		1	.008
Starry Flounder	0.5				0.5	.004
TOTAL	34	44	30.5	14	122.5	.999

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Small juveniles (<110 mm fork length).
c/ Young of this year, others of same species are yearlings, juveniles or adults.
d/ Large juveniles (>110 mm fork length).
e/ Average of two seine hauls taken adjacent to each other.

TABLE 20

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA R
ON 20-21 AUGUST 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12
American Shad[b]		685	35	1	13		
Carp	17		3	143		301	5
Black Crappie			2	6	11	25	6
Black Crappie[b]		1	2	231	75	65	1
White Crappie	11	2	2	37	20	11	47
White Crappie[b]	4	130	44	14	29	20	11
Yellow Perch			2				8
Yellow Perch[b]	11	4	1	119	9	53	
Largemouth Bass	3			4		1	
Largemouth Bass[b]	10	2	6	120	15	10	
Brown Bullhead			1	8		45	2
Prickly Sculpin		8	1				
Goldfish	7			1			
Northern Squawfish[b]		5	1				
Bluegill							1
Chinook Salmon[c]		1					
Peamouth		1					
TOTAL	63	839	100	684	172	531	81

SPECIES	SAMPLING LOCATION[a] C01[d]	C04	C02[d]	C03
Northern Squawfish	1	1		
Northern Squawfish[b]	81	1	2.5	98
American Shad[b]	57.5	37	4	18
Largescale Sucker	87.5	1		
Peamouth	71	5	2	10
Threespine Stickleback	76			
Yellow Perch	0.5	2		
Yellow Perch[b]	12.5	7	1	
Speckled Dace	0.5	3	0.5	6
Carp		2		
White Crappie		1		
Black Crappie		1		
Black Crappie[b]		1		
Prickly Sculpin		1		
Largemouth Bass[b]	0.5			
Goldfish	0.5			
TOTAL	388.5	63	9	132

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Colum
by C01 to C04.
b/ Young of this year, others of same species are yearlings, juvenile
c/ Large juveniles (>110 mm fork length).
d/ Average of two seine hauls taken adjacent to each other.

TABLE 20

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 20-21 AUGUST 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
American Shad[b]		685	35	1	13			734	.297
Carp	17		3	143		301	5	469	.190
Black Crappie			2	6	11	25	6	50	.020
Black Crappie[b]		1	2	231	75	65	1	375	.152
White Crappie	11	2	2	37	20	11	47	130	.053
White Crappie[b]	4	130	44	14	29	20	11	252	.102
Yellow Perch			2				8	10	.004
Yellow Perch[b]	11	4	1	119	9	53		197	.080
Largemouth Bass	3			4		1		8	.003
Largemouth Bass[b]	10	2	6	120	15	10		163	.066
Brown Bullhead			1	8		45	2	56	.023
Prickly Sculpin		8	1					9	.004
Goldfish	7			1				8	.003
Northern Squawfish[b]		5	1					6	.002
Bluegill							1	1	<.001
Chinook Salmon[c]		1						1	<.001
Peamouth		1						1	<.001
TOTAL	63	839	100	684	172	531	81	2,470	.999

SPECIES	SAMPLING LOCATION[a] C01[d]	C04	C02[d]	C03	TOTAL	RELATIVE ABUNDANCE
Northern Squawfish	1	1			2	.003
Northern Squawfish[b]	81	1	2.5	98	182.5	.308
American Shad[b]	57.5	37	4	18	116.5	.197
Largescale Sucker	87.5	1			88.5	.150
Peamouth	71	5	2	10	88	.149
Threespine Stickleback	76				76	.128
Yellow Perch	0.5	2			2.5	.004
Yellow Perch[b]	12.5	7	1		19.5	.033
Speckled Dace	0.5	3	0.5	6	10	.017
Carp		2			2	.003
White Crappie		1			1	.002
Black Crappie		1			1	.002
Black Crappie[b]		1			1	.002
Prickly Sculpin		1			1	.002
Largemouth Bass[b]	0.5				0.5	.001
Goldfish	0.5				0.5	.001
TOTAL	388.5	63	9	132	592.5	1.002

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Young of this year, others of same species are yearlings, juveniles or adults.
c/ Large juveniles (>110 mm fork length).
d/ Average of two seine hauls taken adjacent to each other.

TABLE 21

GILL NET CATCHES IN VANCOUVER LAKE DURING AUGUST 1 AND 20, 1984

AUGUST 1, 1984

Species	Sample Location				Total	Relative Abundance
	V10	V02	V03	V11		
White Crappie	1	15	3	2	21	.404
Carp		1	8	4	13	.250
White Sturgeon	4				4	.077
Goldfish	2		1		3	.058
Brown Bullhead				3	3	.058
Black Crappie		2			2	.038
Northern Squawfish		2			2	.038
Largemouth Bass		1			1	.019
Bluegill		1			1	.019
American Shad		1			1	.019
Peamouth	1				1	.019
TOTAL	8	23	12	9	52	.999

AUGUST 20, 1984

Species	Sample Location				Total	Relative Abundance
	V10	V02	V03	V11		
White Crappie	2		17	17	36	.404
Carp	11		1	5	17	.191
Black Crappie	1		9	3	13	.146
White Sturgeon	4		1	1	6	.067
Brown Bullhead	3			1	4	.045
Peamouth	1		2		3	.034
Goldfish	2			1	3	.034
Yellow Perch			3		3	.034
Prickly Sculpin		1			1	.011
Chinook Salmon[a/]			1		1	.011
Northern Squawfish				1	1	.011
Channel Catfish				1	1	.011
TOTAL	24	1	35	29	89	.999

a/ Large juveniles (>110 mm fork length).

TABLE 22

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 4-5 SEPTEMBER 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Largemouth Bass	2	2		2	3		1	10	.006
Largemouth Bass[b]	4	9	7	301	74	2		397	.257
Carp	8			257	13	13	2	293	.190
White Crappie	8	2	2	43	36	18	8	117	.076
White Crappie[b]	73	16	5	51	35	40	12	232	.150
Yellow Perch	3		1	1	2	5	5	17	.011
Yellow Perch[b]	38	1	6	133	19	8	1	206	.134
Black Crappie	1	4	11	8	15	4	3	46	.030
Black Crappie[b]	16	2	2	34	24	24		102	.066
American Shad[b]	1	70	1		1	23		96	.062
Brown Bullhead				4			3	7	.005
Bluegill	3	1				1	1	6	.004
Northern Squawfish		4						4	.003
Northern Squawfish[b]			2					2	.001
Pumpkinseed				1		2	2	5	.003
Prickly Sculpin			1		1			2	.001
Peamouth			1					1	.001
TOTAL	157	111	39	835	223	140	38	1,543	1.000

SPECIES	SAMPLING LOCATION[a] CO1[c]	CO4	CO2[c]	CO3	TOTAL	RELATIVE ABUNDANCE
American Shad[b]	134	10	22	6	172	.566
Yellow Perch	3	2			5	.016
Yellow Perch[b]	24.5	9			33.5	.110
Black Crappie		10			10	.033
Black Crappie[b]	2	6			8	.026
Largescale Sucker	13.5	1			14.5	.048
Threespine Stickleback	5	1		5	11	.036
Northern Squawfish	1				1	.003
Northern Squawfish[b]	7.5	1			8.5	.028
White Crappie	1.5	1			2.5	.008
White Crappie[b]	1.5	5			6.5	.022
Prickly Sculpin	0.5	1	6.5		8	.026
Sandroller		7			7	.023
Peamouth	2	2	0.5	2	6.5	.021
Speckled Dace			4.5		4.5	.015
Chinook Salmon[d]				2	2	.007
Carp	1		0.5		1.5	.005
Starry Flounder		1			1	.003
Largemouth Bass[b]	0.5				0.5	.002
White Sturgeon	0.5				0.5	.002
Banded Killifish	0.5				0.5	.002
TOTAL	198.5	57	34	15	304.5	1.002

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Young of this year, others of same species are yearlings, juveniles or adults.
c/ Average of two seine hauls taken adjacent to each other.
d/ Small juveniles (<110 mm fork length).

TABLE 23

BEACH SEINE CATCHES IN VANCOUVER LAKE AND COLUMBIA RIVER
ON 17-18 SEPTEMBER 1984

SPECIES	SAMPLING LOCATION[a] V10	V02	V08	V03	V04	V11	V12	TOTAL	RELATIVE ABUNDANCE
Largemouth Bass			1	3	2		1	7	.005
Largemouth Bass[b]	8	3		171	172	25	3	382	.261
American Shad[b]		236	18				15	269	.184
Carp	5			7	2	187	10	211	.144
Yellow Perch				1			1	2	.001
Yellow Perch[b]	58			25	22	89	5	199	.136
Black Crappie			1			1	1	3	.002
Black Crappie[b]	25	5	1	5	57	68	20	181	.124
White Crappie	4			8	1	11	14	38	.026
White Crappie[b]	15	6	4		3	17	32	77	.053
Goldfish	13					60	2	75	.051
Bluegill				1	1	1	1	4	.003
Pumpkinseed				1		2	1	4	.003
Northern Squawfish[b]	1	1				2		4	.003
Brown Bullhead							2	2	.001
Peamouth		1			1			2	.001
Prickly Sculpin					1			1	.001
Walleye			1					1	.001
TOTAL	129	252	26	222	262	463	108	1,462	1.000

SPECIES	SAMPLING LOCATION[a] C01[c]	C04	C02[c]	C03	TOTAL	RELATIVE ABUNDANCE
American Shad[b]	2	20	8.5	63	93.5	.341
Threespine Stickleback	76	8			84	.307
Yellow Perch		2			2	.007
Yellow Perch[b]	1	9		16	26	.095
Peamouth	9.5	6	2.5		18	.066
Northern Squawfish	1	5		1	7	.026
Northern Squawfish[b]	4	2	3.5		9.5	.035
Largescale Sucker	10.5	2	0.5		13	.047
Prickly Sculpin		6	0.5		6.5	.024
Chinook Salmon[d]	0.5		0.5	2	3	.011
Starry Flounder		3			3	.011
Black Crappie		1			1	.004
Black Crappie[b]		2			2	.007
White Sturgeon			0.5	1	1.5	.005
Speckled Dace			1.5		1.5	.005
White Crappie		1			1	.004
Mountain Whitefish				1	1	.004
Mosquitofish			0.5		0.5	.002
TOTAL	104.5	67	18.5	84	274	1.001

a/ Vancouver Lake sampling locations are denoted by V02 to V12, Columbia River locations by C01 to C04.
b/ Young of this year, others of same species are yearlings, juveniles or adults.
c/ Average of two seine hauls taken adjacent to each other.
d/ Small juveniles (<110 mm fork length).

TABLE 24

WEIR CATCH IN LAKE RIVER FOR THE PERIOD

17-19 SEPTEMBER 1984

Species	Number	Relative Abundance
Black Crappie	34	.405
White Crappie	22	.262
Carp	19	.226
Largescale Sucker	7	.983
Peamouth	1	.012
Rainbow Trout[a/]	1	.012
Total	84	1.000

a/ Female adult steelhead trout, 425 mm fork length, gilled in the wing net.