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Lower-Klamath River juvenile salmonid health sampling 2007

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INTRODUCTION

During June, July and August of 2007, staff from the Yurok Tribal Fisheries Program (YTFP) collected juvenile chinook salmon from the lower-Klamath River for an evaluation of the severity and occurrence of fish disease. The project was conducted in cooperation with staff from the U.S. Fish and Wildlife (USFWS) California Nevada Fish Health Center who performed the analysis of fish pathogens in their laboratory in Anderson, California. The primary function of YTFP staff was to obtain samples from the river, and the main role of USFWS staff was to analyze samples for signs and severity of disease.

A fraction of juvenile hatchery chinook salmon are marked in the Klamath Basin yearly. These adipose fin clipped (ad-clip)chinook salmon were of particular interest to USFWS staff because the hatchery of origin could be determined. This allowed for a comparison of disease occurrence and severity between Iron Gate Hatchery chinook salmon and Trinity River chinook salmon. This information could help shed light on differences in vulnerability to disease between the two stocks, and when and how badly fish become infected, etc.

The purpose of this report is to document the activities of the Trinity River Division of Yurok Tribal Fisheries Program during the sampling efforts; it is not intended to be a full or final report on the disease evaluation which is being conducted by USFWS personnel. Additional sampling by YTFP staff occurred near the Klamath River Estuary, but results from those efforts are not summarized in this document.

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METHODS

We used a beach seine that was 15.24 m long and 1.22 m high to capture fish. We generally used the seine in a downstream direction, one person holding on to each wing, running with the current as quickly as possible in order to ensnare fish. Fish were pulled close to the edge of the water, but left in the water in the cod end of the seine because this greatly reduced mortalities. Captured fish were then scooped up and placed in buckets for sorting.

We then worked quickly, two people at one time, counting the number of non-adipose clipped chinook salmon and other species. Each person kept a mental record until the data could be entered into a log book prior to the next seine set. On many occasions we had three people in the field and one person could record data, while the other two sorted the fish. When an ad-clipped chinook salmon was

encountered, it was placed in a lethal dose of MS-222. Each week, we collected as many adipose clipped chinook salmon as possible. After being counted, all fish other than ad-clipped Chinook salmon were released directly into the river. The ad-clips collected were euthanized and then were placed on ice immediately. Wild coho salmon, were measured by fork length.

We often captured large numbers of juvenile fish and non-target species in one seine set, especially when the bulk of the hatchery chinook salmon arrived in our sampling area. During the heat of the summer and with warm water temperatures, high numbers of mortalities could mount in a matter of minutes if one did not exercise caution. The method we used to sort fish reduced the amount of mortalities, reduced the equipment needed for sampling, and increased the sample size of adipose clipped chinook salmon by allowing us to sort through large numbers of chinook salmon quickly.

We sampled in the Klamath River near Pecwan Creek (rkm 40.0), to Blue Creek (rkm 26.75) (Figure 1). We found it very challenging to locate sites in this reach that were suitable for the use of a beach seine; and the ones we did find were often marginal. For instance, many of the sandy areas, which is the type of substrate a seine is meant for, were too steep and deep to sample effectively. Other areas such as gravel bars looked appealing, but any large cobbles would be captured in the cod end and dragged with the seine, tearing holes in the area where fish collect, as well as injuring the fish.

Nonetheless, we managed to find a few places that were marginally suitable and spent time clearing these areas of large rocks and woody debris. Some of the best areas seemed to be gravel bars with small sized substrate.

In the middle of July we noticed that the catch in the river itself began to decline. At that time we began to sample in thermal refugia areas. The two main areas we utilized were a cold water seep downstream of Pecwan Creek and at various locations around Blue Creek. We found concentrations of fish in these areas that helped boost our catch per seine set.

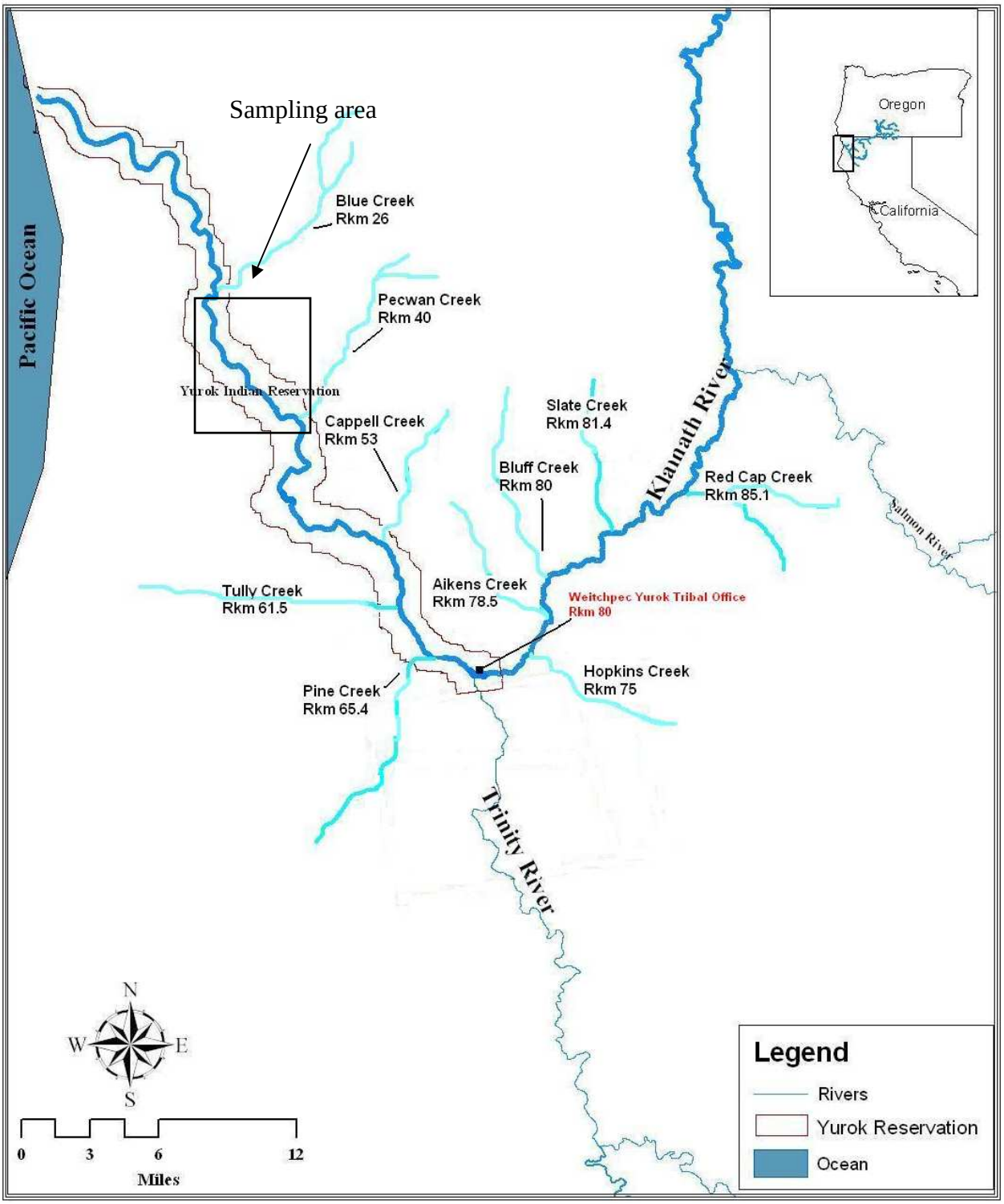

Figure 1. Map of the lower-Klamath River and sampling area.

RESULTS

Catch of unmarked marked juvenile chinook salmon peaked in the first week in July and the last week of June, respectively (Figure 2 and Table 1)

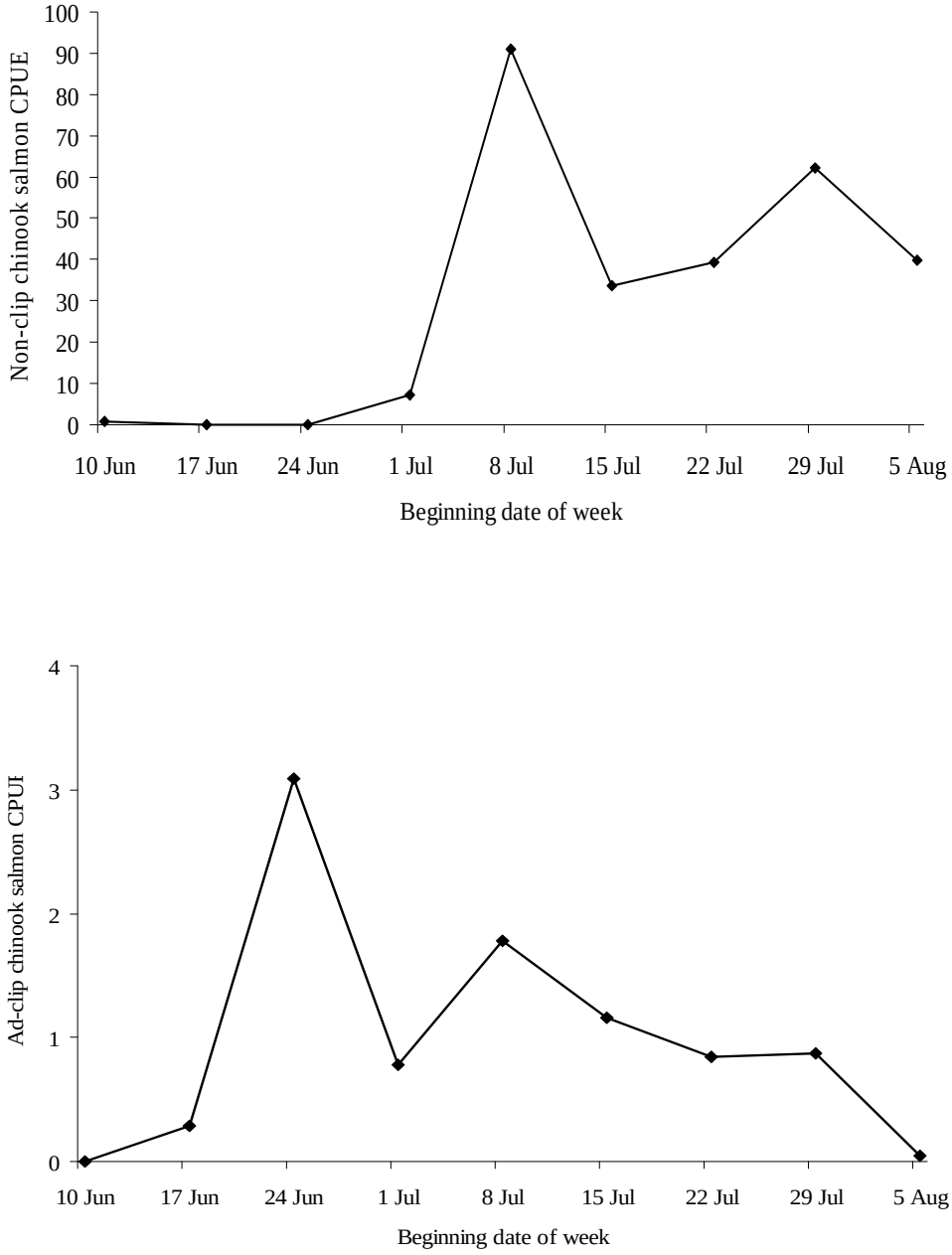

Figure 2. Chinook salmon CPUE, and adipose clipped chinook salmon CPUE, expressed as catch per seine set, lower-Klamath River California, 2006.

However, all CPUE data must be viewed with caution. Changes in catchability, the proportion of the population removed per unit of effort (Ricker 1975), can lead to changes in CPUE, regardless of true population trends. For instance, the congregation of fish in thermal refugia areas that we targeted could influence CPUE. And the usefulness CPUE as a measure of abundance is questionable; some researchers have found that commercial (Harley et al. 2001; Crecco and Overholtz 1990) and sportfishing (Peterman and Steer 1981) CPUE is not proportional to abundance, while others have found that sportfishing CPUE varies directly with fish populations (Hansen et al 2000; Newby et al. 2000) and fish density (Deriso and Parma 1987). Moreover, CPUE measurement error causes bias in parameter estimates (Gould et al. 1997; Peterman et al. 1985), further complicating inferences one can make about fish populations using CPUE.

While it is not known if the CPUE data presented here is directly proportional to abundance, it serves the purpose of giving fisheries personnel a rough idea of when the number of hatchery chinook salmon peaked in the study area, providing information which may aid in planning for future sampling efforts.

The bulk of the wild juvenile steelhead that we captured were generally ensnared near a tributary stream, such as Pecwan Creek. Fewer numbers were found per seine set in areas such as Ahpah where there are no streams in the immediate area. This is why through the middle of the sampling we switched from the river to the refugia areas of the river. By doing so we, increased our sampling catch, for all species greatly. As the river discharge decreased and the air temperature increased, the refugia areas in the river provided areas the fish to rest before they continue on their journey.

No brown trout were captured in 2007, although 4 cutthroat trout were caught in Blue Creek. However, in 2006 four brown trout were captured. Our concern about this non-native invasive species remain.

In 2006, we captured 4 juvenile brown trout during the course of our sampling, all near the mouth of Metah Creek, possibly their natal stream. Two of these fish measured 123 mm and 149 mm. Fork length was not recorded for the other two brown trout, but their size was similar to the others. The stomach of the brown trout that was 149 mm contained fish parts. It is unfortunate that these non-native salmonids may be inhabiting streams in the lower-Klamath River that contain truly wild salmonids like steelhead. Brown trout compete with other species for limited food and habitat (McHugh and Budy 2006; Dewald and Wilzbach 1992; Wang and White 1994; Waters 1983) and could adversely affect juvenile chinook salmon populations (Glova and Field-Dodgson 1995).

Several unclipped juvenile coho salmon were captured, mainly in the large backwater just downstream from Pecwan Creek and Blue Creek. The size range was 66 mm to 85 mm. Fork length data for 15 wild coho salmon are given below in 5 mm bins (65-69mm, 70-75 mm, etc.):

Fork length (mm)	Count
65	2
70	0
75	1
80	9
85	3

These data suggest the possibility that young of the year coho salmon may use the Klamath River, especially near tributary mouths, for rearing zones.

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Appendix Table 1. Data collected by YTFP staff using a 15.24 × 1.22 m beach seine in the lower Klamath River, California, 2007.

					Chinook		Steelhead		Coho salmon						
Week	Date	Location	rkm	Seiene sets (n)	No-Clip	Ad-Clip	No-Clip	Ad-Clip	No clip	Right max	Left max	Sucker	Speckled dace	Three spine Stickleback	Sculpin
0	14 Jun	Blue Creek	26.75	2	0	0	0	0	0	0	0	>100	0	0	3
0	14 Jun	Pecwan	40.25	4	5	0	0	0	0	0	0	>100	0	18	0
1	19 Jun	Pecwan	40.25	5	27	5	0	0	0	0	0	>100	0	3	1
1	19 Jun	Blue Creek	26.75	2	0	0	0	0	0	0	0	>100	0	1	0
1	19 Jun	Surpur	32.75	4	45	3	4	0	0	0	0	>100	0	0	0
1	20 Jun	Surpur	32.75	2	28	3	4	0	0	0	0	>100	0	0	0
1	20 Jun	Tectah	35.00	5	75	18	2	0	0	0	0	>100	0	4	0
1	21 Jun	D/S Pecwan	40.25	3	68	7	0	0	0	0	0	>100	0	110	0
2	25 Jun	Tectah	35.00	3	77	13	3	1	0	0	0	>100	1	6	1
2	25 Jun	D/S Pecwan	40.25	2	17	3	0	0	0	0	0	>100	0	25	0
2	26 Jun	D/S Pecwan	40.25	3	39	7	1	0	0	0	0	>100	2	58	0
2	26 Jun	Surpur	32.75	1	19	6	1	0	0	0	0	>100	2	0	0
2	26 Jun	Tectah	35.00	2	61	5	3	0	0	0	0	>100	0	3	0
3	2 Jul	1/4 Mile D/S of Surpur	32.35	2	10	1	0	0	0	0	0	0	0	0	0
3	2 Jul	Tectah	35.00	2	1	2	0	0	0	0	0	0	0	0	0
3	2 Jul	D/S Pecwan	40.25	3	3	1	1	0	0	0	0	>100	1	2	0
3	3 Jul	1/4 Mile DS of Surpur	32.35	2	3	1	0	0	0	0	0	8	1	0	0

Appendix Table 1 continued.

					Chinook		Steelhead		Coho salmon						
Week	Date	Location	rkm	Seiene sets (n)	No-Clip	Ad-Clip	No-Clip	Ad-Clip	No clip	Right max	Left max	Sucker	Speckled dace	Three spine Stickleback	Sculpin
3	3 Jul	D/S of Blue Creek	26.25	3	4	0	0	0	0	0	0	35	0	0	0
3	3 Jul	Ahpah	27.55	6	64	7	0	0	0	0	0	2	0	0	0
3	5 Jul	Pecwan	40.00	3	97	7	5	0	2	0	0	0	0	0	0
3	5 Jul	Johnson's	37.75	6	15	2	1	0	0	0	0	15	0	4	0
4	10 Jul	Pecwan	40.00	1	543	14	51	0	3	0	0	0	2	8	0
4	10 Jul	Ahpah	27.55	4	142	1	16	0	0	0	0	33	2	10	0
4	10 Jul	Tectah	35.00	1	0	0	0	0	0	0	0	2	0	0	0
4	11 Jul	Pecwan	40.00	1	313	7	25	0	1	0	0	0	0	14	0
4	11 Jul	Ahpah	27.55	2	93	0	16	0	0	0	0	101	1	8	0
4	11 Jul	D/S Pecwan	40.25	1	43	0	4	0	0	0	0	6	0	4	0
4	12 Jul	Pecwan	40.00	2	168	2	13	0	0	0	0	1	0	2	0
4	12 Jul	Ahpah	27.55	1	9	0	1	0	0	0	0	8	0	3	0
4	12 Jul	Pecwan Island	40.00	3	245	5	3	0	0	0	0	51	1	2	0
4	13 Jul	Pecwan	40.00	2	84	3	5	0	0	0	0	1	0	2	0
5	16 Jul	Pecwan	40.00	1	221	11	7	0	0	0	0	0	2	0	0
5	16 Jul	Pecwan Island	40.00	1	11	0	4	0	0	0	0	46	0	0	0
5	16 Jul	Ahpah	27.55	1	4	0	0	0	0	0	0	7	0	1	0

Appendix Table 1 continued.

					Chinook		Steelhead		Coho salmon						
Week	Date	Location	rkm	Seiene sets (n)	No-Clip	Ad-Clip	No-Clip	Ad-Clip	No clip	Right max	Left max	Sucker	Speckled dace	Three spine Stickleback	Sculpin
5	17 Jul	Pecwan	40.00	1	54	5	12	0	0	0	0	1	0	5	0
5	17 Jul	Pecwan Island D/S	40.00	2	43	4	6	0	0	0	0	4	0	0	0
5	17 Jul	Pecwan	40.25	4	150	3	2	0	0	0	0	8	0	5	0
5	18 Jul	Pecwan	40.00	4	6	2	2	0	0	0	0	0	0	0	0
5	18 Jul	Pecwan Island D/S	40.00	2	9	1	4	0	0	0	0	16	0	0	0
5	18 Jul	Pecwan	40.50	3	225	4	15	0	0	0	0	1	0	7	0
5	18 Jul	Johnson's Bar	38.50	2	38	2	5	0	0	0	0	0	0	0	0
5	18 Jul	Wautec	37.80	2	7	0	0	0	0	0	0	0	0	0	0
5	19 Jul	Pecwan D/S	40.00	2	34	1	6	0	0	0	0	0	0	6	0
5	19 Jul	Pecwan	40.25	2	123	2	3	0	0	0	0	>100	0	44	0
5	19 Jul	Johnson's Bar	38.5	1	37	1	13	0	0	0	0	7	0	4	0
5	20 Jul	Pecwan D/S	40.00	2	24	0	36	0	0	0	0	1	0	7	0
5	20 Jul	Pecwan	40.25	2	91	1	2	0	0	0	0	73	0	>100	0
6	24 Jul	Pecwan River Right D/S	40.00	1	320	9	35	0	4	0	0	2	7	>100	0
6	24 Jul	Pecwan	40.25	3	51	1	5	0	0	0	0	28	3	0	0
6	24 Jul	Ahpah	27.55	2	1	0	4	0	0	0	0	0	0	2	0
6	25 Jul	Pecwan	40.00	1	203	5	22	0	1	0	0	2	0	>100	0

Appendix Table 1 continued.

					Chinook		Steelhead		Coho salmon						
Week	Date	Location	rkm	Seiene sets (n)	No-Clip	Ad-Clip	No-Clip	Ad-Clip	No clip	Right max	Left max	Sucker	Speckled dace	Three spine Stickleback	Sculpin
6	25 Jul	Pecwan Island	40.00	1	1	0	0	0	0	0	0	0	1	0	0
6	25 Jul	D/S Pecwan	40.25	2	0	0	1	0	0	0	0	54	1	~50	1
6	25 Jul	Johnson's	37.75	2	12	0	6	0	0	0	0	1	4	~50	0
6	25 Jul	Blue Creek	26.75	4	104	1	0	0	0	0	0	2	0	0	0
6	26 Jul	Pecwan	40.00	2	147	3	23	0	0	0	0	2	2	>100	3
6	26 Jul	D/S Pecwan	40.25	3	34	0	16	0	0	0	0	>100	2	>100	1
6	26 Jul	Johnson's	37.25	2	30	0	3	0	0	0	0	32	0	3	0
6	26 Jul	Blue Creek	26.75	3	252	5	1	0	0	0	0	3	0	7	0
6	27 Jul	D/S Pecwan	40.25	3	105	3	11	0	0	0	0	0	9	>100	0
6	27 Jul	D/S Pecwan	40.25	1	0	0	3	0	0	0	0	>100	8	>100	0
6	27 Jul	1/4 Mile D/S Pecwan	39.60	2	2	0	7	0	0	0	0	>100	11	>100	0
7	30 Jul	Pecwan	40.00	2	225	6	24	0	0	0	0	19	3	>100	0
7	30 Jul	Blue Creek	26.75	4	356	2	1	0	0	0	0	~50	0	0	0
7	31 Jul	Pecwan	40.00	2	46	0	13	0	0	0	0	4	0	9	0
7	31 Jul	Blue Creek	26.75	5	224	1	4	0	1	0	0	3	0	0	0
7	1 Aug	Pecwan	40.00	2	71	2	37	0	0	0	0	10	3	~50	0
7	1 Aug	Blue Creek	26.75	3	78	0	0	0	0	0	0	5	0	0	0

Appendix Table 1 continued.

					Chinook		Steelhead		Coho salmon						
Week	Date	Location	rkm	Seiene sets (n)	No-Clip	Ad-Clip	No-Clip	Ad-Clip	No clip	Right max	Left max	Sucker	Speckled dace	Three spine Stickleback	Sculpin
7	2 Aug	Pecwan	40.00	3	73	6	29	0	1	0	0	6	1	8	1
7	2 Aug	Blue Creek	26.75	8	776	6	4	0	2	0	0	5	1	1	0
7	3 Aug	Pecwan	40.00	2	78	2	25	0	0	0	0	13	6	7	0
8	6 Aug	Pecwan	40.00	3	36	0	16	0	0	0	0	>100	8	>600	0
8	6 Aug	Blue Creek	26.75	3	84	0	2	0	0	0	0	4	0	0	0
8	7 Aug	Blue Creek	26.75	2	26	0	1	0	0	0	0	4	1	0	1
8	7 Aug	Pecwan	40.00	2	109	6	31	0	0	0	0	16	23	3	0
8	8 Aug	Blue Creek	26.75	2	19	0	0	0	0	0	0	4	0	3	0
8	8 Aug	Pecwan	40.00	2	30	0	45	0	0	0	0	0	6	2	1
8	9 Aug	Ahpah	27.55	1	0	0	0	0	0	0	0	0	0	0	0
8	9 Aug	Pecwan	40.00	5	72	0	63	0	0	0	0	20	10	4	0
8	10 Aug	Pecwan	40.00	2	5	1	33	0	0	0	0	10	0	4	0
8	10 Aug	Mouth of Pecwan	40.00	1	534	0	13	0	0	0	0	0	0	0	0
			Totals	201	7,479	219	754	1	15	0	0	>1,000	125	>1,000	13