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# 2001 SALMON SPAWNING SURVEYS IN SELECTED TRIBUTARIES OF THE CEDAR RIVER, WASHINGTON

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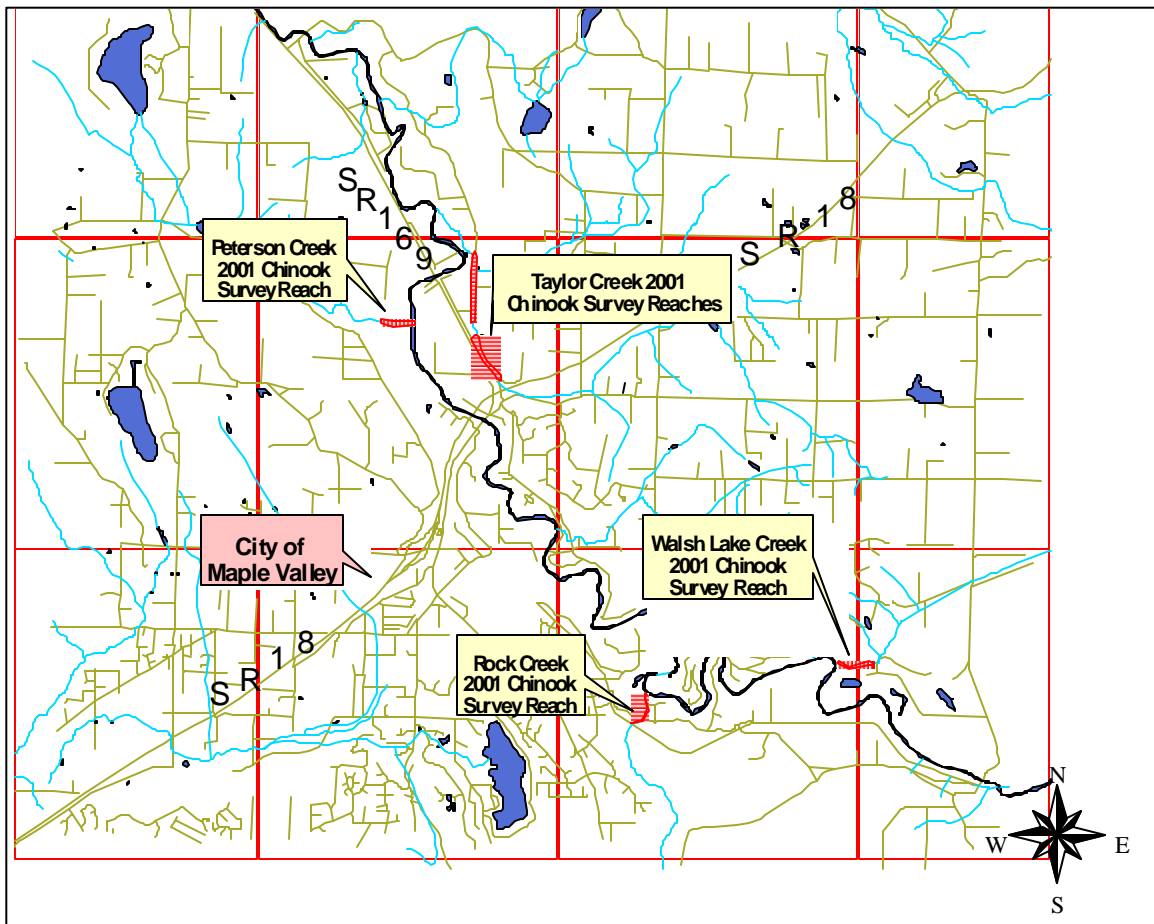
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## INTRODUCTION

Foot surveys were conducted for the presence of adult chinook salmon in four of the major tributaries of the Cedar River during the fall of 2001. The tributaries surveyed include Rock, Taylor, Peterson, and Walsh Lake Creeks. The surveys began during the second week of September and continued until the end of November. Each stream survey covered approximately 1000 feet of channel beginning at or near the confluence with the Cedar River (Map 1). These reaches were selected based on their likelihood of containing suitable chinook spawning habitat, and/or the observation of adult chinook in recent years (Mavros et al. 2000).

**Map 1. Cedar River Tributary Vicinity Map**

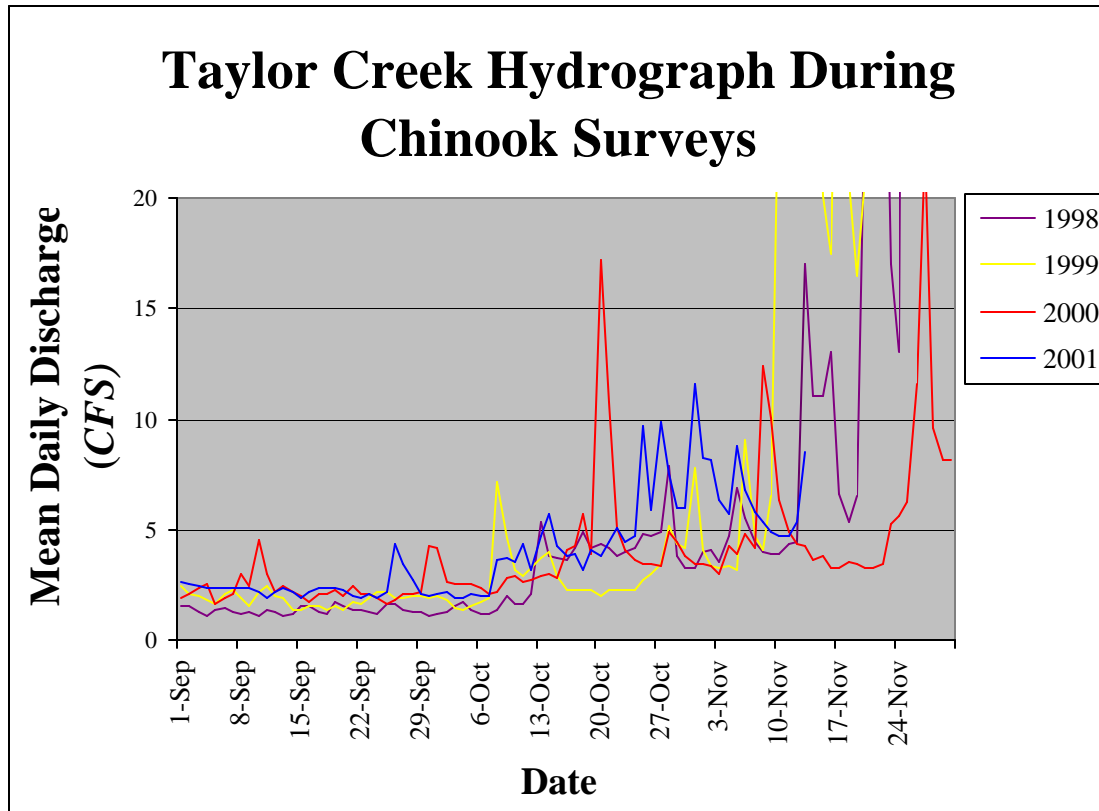


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## STREAM DESCRIPTIONS

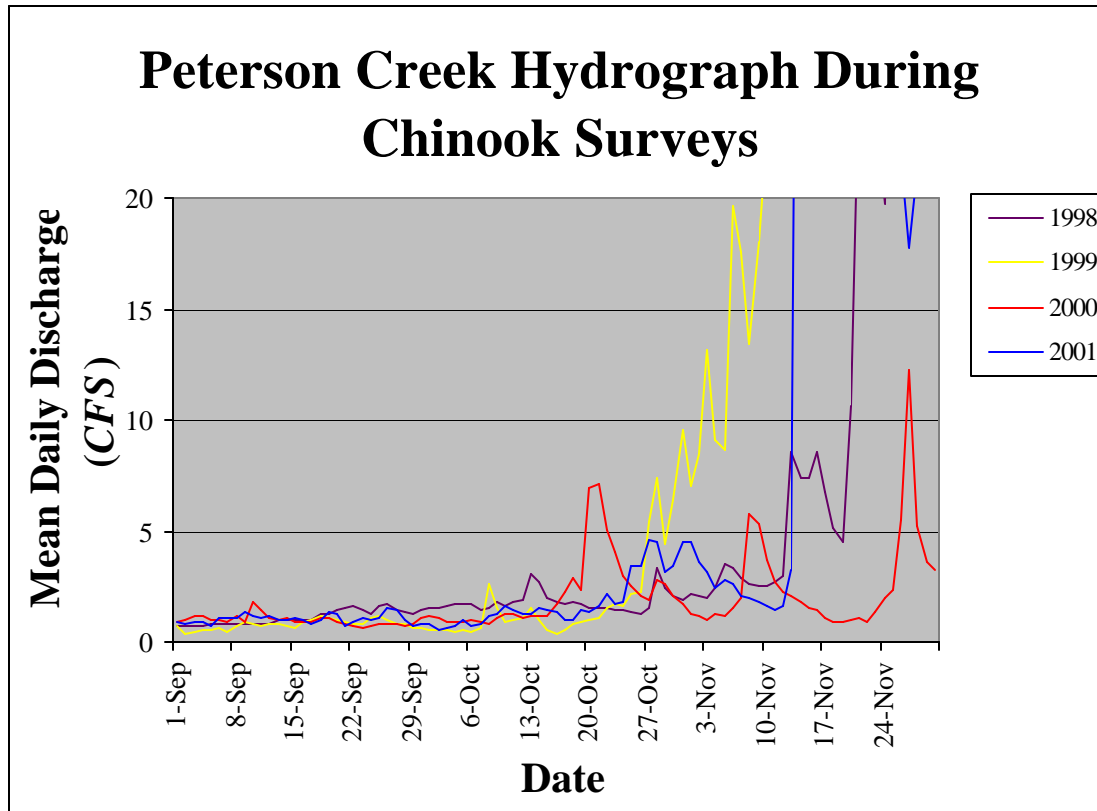
The Cedar River drains a watershed of 188 square miles and is approximately 56 miles in length (King County 1993). Currently, anadromous fish have access to spawning habitat in the mainstem river up to the Landsburg dam located at River Mile (RM) 21.5. The four tributaries surveyed (Taylor, Peterson, Rock, and Walsh Lake) are all located below RM 19.8. These streams range in length from 1.6 to 7.0 miles and have catchment areas ranging from 5.2 to 12 square miles (King County 1993).

**Taylor Creek** enters the river-right bank of the Cedar River at RM 13.1 (Map 1). It is approximately 3.3 miles long with a catchment area of 5.2 square miles (King County 1993). Surveys began at the Maxwell Road crossing and proceeded upstream in three main segments that ranged from approximately 500-700 feet in length. Lack of access to private property in some locations prevented a continuous foot survey that would connect the segments into one reach. The two lower sections are channelized as a roadside ditch with a mix of riffles, runs, and low quality pools (Overton et al. 1997; Platts et al. 1983). The riparian zone in this survey reach is fragmented into a mix of deciduous trees, shrubs (both native and invasive), landscaped lots, and pastures. The upper segment surveyed in Taylor Creek is within a King County restoration project located near RM 1.0. Large woody debris (LWD) has been placed in the restoration area but it is not in the two lower segments (King County 2000). Channel configuration, depth, and stream flow in Taylor Creek allows early season access for spawning chinook salmon (Figure 1). The dominant substrate is sand and gravel that is subject to movement and scour created by storms. This stream is prone to annual flooding in this reach due to the narrow channel and the flat valley floor topography. Water clarity can rapidly turn from clear to “mud” brown and is subjected to runoff flooding along the Maxwell Road during storm events (King County 1993).



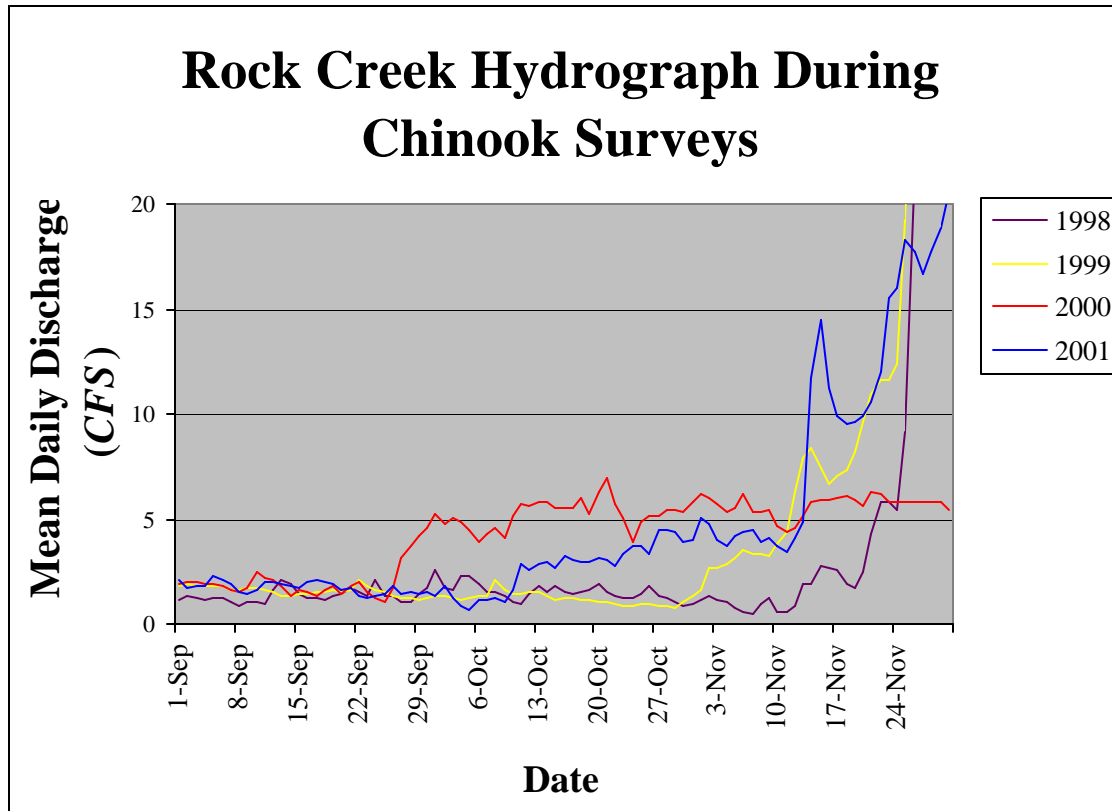
**Figure 1. Taylor Creek Hydrograph**

**Peterson Creek** enters the river-left bank of the Cedar River at RM 14.1 (Map 1). It is approximately 1.6 miles long with a catchment area of 6.3 square miles (King County 1993). The survey was conducted in the lower 1000 feet of stream channel beginning at the mouth. This reach has a mix of habitat types including riffles, runs, and a variety of pool types (Overton et al. 1997; Platts et al. 1983). There is a dense mixed-forested riparian zone that covers steep ravine walls until the channel merges with the Cedar River. The substrate in this channel ranges from fine sediments to large cobbles and small boulders. There is a moderate amount of LWD found within the stream that adds to channel stability. Flows are relatively stable throughout the year due to a low density of development in this tributary basin, although low flows during the early fall limit adult salmonid access to this stream (Figure 2).



**Figure 2. Peterson Creek Hydrograph**

**Rock Creek** enters the river-left bank of the Cedar River at RM 18.2 (Map 1). It is approximately 7.0 miles long with a catchment area of 12 square miles (King County 1993). Currently, anadromous fish have access from the mouth to RM 2.65 (King County 1993). The survey began at the confluence with the Cedar River and ended at the Seattle Water Department pipeline crossing approximately 1200 feet upstream. This reach is characterized by a mix of riffles, runs, and pools with substrates ranging from fine gravel to small boulders (Overton et al. 1997). The riparian cover is a mix of maturing deciduous and coniferous forest in this reach. There are three houses adjacent to the streams right bank in the bottom 500 feet of channel that creates a fragmented riparian zone. There is LWD found in the channel above the SE 248<sup>th</sup> Street crossing, but it is absent in the channel downstream to the confluence with the Cedar River. The flow in this stream is very stable, resulting in excellent water quality and clarity with slight turbidity only observed during very large storms (King County 1993). Flows in Rock Creek for the years 1998 through 2001 are represented by the following hydrograph (Figure 3).



**Figure 3. Rock Creek Hydrograph**

**Walsh Lake Creek** (also known as Walsh Lake Diversion Ditch) enters the river-right bank of the Cedar River at RM 19.8 (Map 1). It is approximately 3.5 miles long with a catchment area of 6.6 square miles (King County 1993). This survey was conducted from the confluence to a ravine approximately 1000 feet upstream from the Cedar River. A maturing deciduous forest, with scattered conifers dominates the riparian zone along this reach of Walsh Lake Creek. The active channel lacks naturally placed LWD within this reach. In 1995, there was an LWD placement project that has helped stabilize the channel and create additional spawning habitat (Laird O’Rollins, pers. comm.). During storm events this channel is very dynamic in both flow response and sediment transport that can reduce water clarity. Sediment size ranges from sand and gravel up to small boulders. There are many habitat types in this stream including low- and high-gradient riffles along with a variety of pool types as defined by Platts et al. (1983). Flow data is not available for this stream, but 2001 flows were similar to other tributaries surveyed.

## METHODS

Surveys were conducted on foot, wearing hip waders and polarized glasses while traveling in an upstream direction. Surveys were conducted once a week during the spawning season. In addition, Washington State Department of Fish and Wildlife (WDFW) staff conducted otolith recovery studies and provided data according to the described protocols. Adult salmonids, both live and dead, were counted and recorded in a write-in-the-rain field book. Redds were enumerated only when live chinook were observed exhibiting spawning behavior as described by Mavros et al. (2000). Surveys were not conducted when storm related turbidity prevented accurate assessment of salmonid species present in the survey reach.

## OBSERVATIONS

**Taylor Creek:** Chinook, sockeye, and coho were observed within the survey reach. Chinook were first seen on October 4 and the last observation for live fish was on October 24 (Table 1). The peak live count for chinook was nine fish. Seven of the chinook were found within a King County restoration project site located at RM 1.1. Of the seven chinook observed within the project site, only four were exhibiting spawning behavior over redds as cited by Mavros et al. (2000). One male chinook had a metal disc tag attached near the dorsal fin. Extensive efforts were made to find the carcass and retrieve the tag but it proved unsuccessful. The peak carcass count for chinook was twelve on October 24. Tissue samples were collected from three of the chinook carcasses for future DNA analysis. Four of the chinook redds were clustered within the instream restoration site. Live sockeye counts peaked at 63 on October 24 with the first sockeye observed on October 10. The final survey date for Taylor Creek was on November 27.

**Table 1. Taylor Creek 2001 chinook spawner survey data**

Date	Live Chinook	Chinook Carcass	Chinook Redds	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
9/11/01	0	0	0	0	0	0	0
10/4/01	3	0	0	0	0	0	0
10/10/01	9*	4	2	7	0	0	0
10/17/01	1	11	1	22	3	0	0
10/24/01	8	12	4**	63	8	0	0
11/1/01	0	5	0	~100	No count	0	1
11/8/01	<b><i>No survey due to high flow, turbidity, and dark lighting</i></b>						
11/14/01	<b><i>No survey due to flooding</i></b>						
11/27/01	0	0	0	14	No count	1	3
* One male chinook had a metal disc tag near it's dorsal fin (carcass was not found)							
** Includes Washington Department of Fisheries and Wildlife (WDFW) survey data							

**Peterson Creek:** No live chinook were observed during any of the surveys of Peterson Creek. Four chinook carcasses were found at the confluence with the Cedar River on October 12. Three of these carcasses had been placed at the mouth by WDFW personnel (Larry Lowe, pers. comm.). The other chinook, a male, was found approximately 30 feet upstream of the mouth of Peterson



Creek. Live sockeye were first observed in the channel on October 25 and the peak count was twelve fish on November 8. No coho were observed in this survey reach during 2001. The final survey date for Peterson Creek was on November 27.

**Table 2. Peterson Creek 2001 chinook spawner survey data**

Date	Live Chinook	Chinook Carcass	Chinook Redds	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
9/11/01	0	0	0	0	0	0	0
10/5/01	0	0	0	0	0	0	0
10/12/01	0	1	0	0	0	0	0
10/18/01	0	1	0	0	0	0	0
10/25/01	0	1	0	6	1	0	0
11/1/01	0	0	0	8	3	0	0
11/8/01	0	0	0	12	6	0	0
11/14/01	<b><i>No survey due to high flows and poor visibility</i></b>						
11/27/01	0	0	0	10	5	0	0

**Rock Creek:** Sockeye were observed in Rock Creek earlier in the season and in greater numbers than in recent years (King County 2000b). Sockeye were first seen on October 5 with two fish counted. The peak count for sockeye was on October 31, with 262 live sockeye and 107 carcasses counted. Adult chinook were observed during two of the surveys. The first was a single female seen on October 11. The second sighting was on October 25 with one female and one jack. All three of the live fish were observed below the SE 248<sup>th</sup> Street crossing. No chinook carcasses were found in the Rock Creek survey reach. On two occasions, live coho were observed within the survey reach, and no active redds were identified. The first siting was a male coho on October 31. The second sighting was a male coho on November 27. Three coho carcasses were counted on the last survey date in November.

**Table 3. Rock Creek 2001 chinook spawner survey data**

Date	Live Chinook	Chinook Carcass	Chinook Redds	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
9/11/01	0	0	0	0	0	0	0
10/5/01	0	0	0	2	0	0	0
10/11/01	1	0	0	12	0	0	0
10/17/01	0	0	0	102	11	0	0
10/25/01	2	0	0	236	70	0	0
10/31/01	0	0	0	262	107	1	0
11/7/01	0	0	0	110	-150	0	0
11/14/01	0	0	0	63	-200	0	0
11/27/01	0	0	0	14	-175	1	3

**Walsh Lake Creek:** One live chinook and one chinook carcass was observed during the surveys. One chinook redd was observed on October 17. Low flows typically prevent adult salmon from entering the channel during the early fall as a result of an annual alluvial sediment wedge that builds up each winter at the confluence with the Cedar River. Fall rains then cut down through the sediment allowing fish access into the channel during the week of October 11. Sockeye were first seen on October 17 with two adults being counted. Sockeye peaked on October 31 with a total of sixty-one live fish and ten carcasses. No coho, either live or dead were observed in this channel during any of the surveys. High flows, turbidity, and dark lighting made counts difficult during November. The final survey date was November 27.

**Table 4. Walsh Lake Diversion Ditch 2001 chinook spawner survey data**

Date	Live Chinook	Chinook Carcass	Chinook Redds	Live Sockeye	Sockeye Carcass	Live Coho	Coho Carcass
9/11/01	0	0	0	0	0	0	0
10/4/01	0	0	0	0	0	0	0
10/11/01	0	0	0	0	0	0	0
10/17/01	1	0	1	2	0	0	0
10/24/01	0	1	0	57	0	0	0
10/31/01	0	0	0	61	10	0	0
11/7/01	0	0	0	13	22	0	0
11/14/01	<b><i>No count due to high, turbid flows</i></b>						
11/27/01	0	0	0	6	5	0	0

## DISCUSSION

Total chinook salmon escapement in the Cedar River Basin for 2001 was estimated to be 810 fish, the largest since 1987 (Steve Foley, pers. comm.). In years of higher chinook abundance, chinook salmon in the Cedar River system might naturally distribute themselves over a wider range of habitats throughout the mainstem, including tributary streams. Run timing may also be extended both earlier and later during the spawning season during times of greater abundance.

Surveys conducted during the fall of 2001 in the Cedar River tributaries have been the most extensive effort by King County WLRD staff to date. Survey work in 2001 surveys showed that chinook salmon spawn in tributary habitats that are accessible from the mainstem Cedar River.

To better understand distribution and timing of chinook use of tributary habitats, future research may be designed to (1) determine the relationship between total abundance of chinook salmon entering the system and incidence of tributary spawning; (2) determine the influence of flow from both the mainstem and tributaries on spawning distribution and timing; and (3) chinook productivity of tributaries of the Cedar River.

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## **ACKNOWLEDGEMENTS**

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## PHOTOS



**Taylor Creek**



**Spawning Chinook in Taylor Creek**



**Peterson Creek**



**Rock Creek**



**Male Sockeye Salmon in Rock Creek**



**Spawning Sockeye in Walsh Lake Creek**