Washington Department of FISH and WILDLIFE

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INTRODUCTION

The Lake Washington-Sammamish Watershed is one of five watersheds in Washington (Baker, Whatcom, Wenatchee, and Chelan) that support native populations of resident *Oncorhynchus nerka* or kokanee. There are three distinct kokanee populations within the Lake Washington-Sammamish Watershed, including the early, middle, and late-runs. Late-run kokanee are known to be present in south Lake Sammamish tributaries, such as Lewis, Ebright, Laughing Jacobs, Vasa, and Pine Lake creeks.

The Washington Department of Fish and Wildlife Region 4 Fish Program, with assistance from King County Department of Natural Resources and Parks and volunteer stream walkers, annually survey late-run kokanee spawner escapement within selected Lake Sammamish tributaries from November through January. Annual spawner escapement surveys allows the Washington Department of Fish and Wildlife and other interested entities to better monitor late-run kokanee escapement trends and make timely decisions regarding the management and/or conservation of this species.

METHODS

Selected Lake Sammamish tributary streams known to have late-run kokanee spawning were surveyed weekly from November through January. Tributaries surveyed included Vasa, Lewis, Laughing Jacobs, Ebright, and Pine Lake creeks. Surveyors walked upstream in each tributary counting all live and dead fish observed. All dead fish encountered were processed for biological data. Biological data collected included fork length (mm), sex, otoliths, and percent of unspawned eggs for females.

Typically, late-run kokanee escapement is determined by using area under the curve (AUC) methodology. AUC consists of graphing live fish counts (y-axis) over survey dates (x-axis) and then finding the area underneath that curve. The calculated AUC value, termed fish-days, is then divided by the stream life value of a fish to determine total escapement. For Lake Sammamish kokanee a stream life value of 10 days is used. Stream life of Lake Sammamish kokanee is an estimated value based on stream life values for kokanee and sockeye identified in the literature and from past field observations in the tributaries. For the 2007/08 late-run kokanee spawning season a stream life value of 5 days was used, because observed stream life of live and dead kokanee was noticeably shorter than in years past. For example, in Lewis Creek 60 live kokanee were observed on November 20th, but six days later no live kokanee were observed. On November 28th, 2 days later, 26 live kokanee were observed during surveys. Furthermore, these 26 kokanee appeared to be fresh fish and not spawn-outs from the previous 60 fish observed.

While escapement estimates derived from AUC are presented in summary tables within the results section of this document for comparison purposes, AUC was not used to determine kokanee escapement in tributary streams for 2007/08. Due to the low number of kokanee observed in tributary streams and the observed short stream life this spawning season, escapement for tributary streams was instead determined by enumerating live and/or some dead kokanee counted during surveys.

RESULTS

Vasa Creek:
Vasa Creek was surveyed once per week from November 28th, 2007 through January 31st, 2008. No live or dead kokanee were observed during those surveys. In speaking with the landowner who lives along the survey reach, he informed me that he observed no live or dead kokanee during the spawning season. It is possible that any returning kokanee moved above the index area to spawn. However, kokanee observed in the past have always been located in the portion of Vasa Creek downstream of West Lake Sammamish Drive.

Lewis Creek:
Lewis Creek was surveyed twice and sometimes three times per week from November 8th, 2007 through January 31st, 2008. Peak spawning occurred in mid-November when 60 live fish were observed on November 20th, 2007. A total of 118 live and 18 dead kokanee were observed during surveys. Total escapement in Lewis Creek was estimated to be 111 fish. Escapement of kokanee into Lewis Creek was calculated by enumerating the live fish observed on November 20th, November 28th, and December 6th and the dead fish observed on November 15th, November 20th, November 28th, and January 7th. The live fish observed on November 15th (n=23) are assumed to be part of the 60 live fish counted on November 20th. The 2007/08 escapement was 18.3% of the 1996/97-2006/07 average (606). Figure 1 summarizes all the survey data.

A total of 18 kokanee carcasses were processed for biological information. Of the 18 total carcasses processed, 11 (61.1%) were female and 7 (38.9%) were male. Average fork length of female and male kokanee was 428mm and 406mm, respectively. Otoliths were extracted from 15 of the 18 carcasses, of which 5 were male and 10 were female. Otoliths have not been read to determine ages of kokanee. Female kokanee carcasses were examined to determine the percent of unspawned eggs. Of the 11 females examined all except one were completely spawned out. The one female with eggs was determined to be 100% unspawned and appeared to have been recently killed by a predator.

On December 3rd, 2007 an extremely large flood event occurred in Lake Sammamish tributaries. It is unlikely that any of the redds constructed prior to the flood event survived the scour and sedimentation effects. Most of the live fish and redds in Lewis Creek were observed prior to December 3rd, 2007 flood event. Of the total 118 live fish observed, only 9 were recorded after the flood event.

Figure 1. Summary of Lewis Creek late-run kokanee spawning ground surveys and escapement.

SURVEY DATE	LIVE FISH	DEAD FISH	FISH DAYS	MOD. LIVE FISH
Nov-08	0	0	0	0
Nov-15	23	9	81	9
Nov-20	60	3	208	63
Nov-26	0	2	180	0
Nov-28	26	2	26	28
Dec-04	0	0	78	0

Dec-06	9	0	9	9
Dec-10	0	0	18	0
Dec-11	0	0	0	0
Dec-13	0	0	0	0
Dec-17	0	0	0	0
Dec-18	0	0	0	0
Dec-27	0	0	0	0
Dec-31	0	0	0	0
Jan-03	0	0	0	0
Jan-07	0	1	0	1
Jan-10	0	0	0	0
Jan-14	0	0	0	0
Jan-17	0	1	0	1
Jan-25	0	0	0	0
Jan-31	0	0	0	0
TOTAL:	**118**	**18**	**599**	**111**
ESCAPEMENT:	--	--	**120**	**111**

Laughing Jacobs Creek:

Laughing Jacobs Creek was surveyed twice a week from November 8th, 2007 through January 31st, 2008. Peak spawning occurred in early December when 7 live fish were observed on November 20th, 2007. A total of 14 live and 1 dead kokanee were observed during surveys. Total escapement in Laughing Jacobs Creek was estimated to be 15 fish. Escapement of kokanee into Laughing Jacobs Creek was calculated by enumerating the live fish observed on November 20th, December 6th, and January 14th and the dead fish observed on December 28th. The 2007/08 escapement was 15.5% of the 1996/97-2006/07 average (97). Figure 3 summarizes all the survey data.

Only one kokanee carcass was found and processed for biological information during surveys. The dead kokanee was a male measuring 381mm fork length. No otolith was extracted from the carcass.

Of the 14 live kokanee counted in Laughing Jacobs Creek, 7 of those fish were observed prior to the December 3rd, 2007 flood. Similar to Lewis Creek, the scouring and sedimentation effects of the flood likely destroyed all redds constructed before December 3rd, 2007.

Figure 3. Summary of Laughing Jacobs Creek spawning ground surveys and escapement.

SURVEY DATE	LIVE FISH	DEAD FISH	FISH DAYS	MOD. LIVE FISH
Nov-08	0	0	0	0
Nov-15	0	0	0	0
Nov-20	7	0	18	7
Nov-26	0	0	21	0
Dec-04	0	0	0	0
Dec-06	6	0	6	6
Dec-10	0	0	12	0
Dec-13	0	0	0	0
Dec-17	0	0	0	0
Dec-24	0	0	0	0
Dec-27	0	0	0	0
Dec-28	0	1	0	1
Dec-31	0	0	0	0
Jan-03	0	0	0	0
Jan-07	0	0	0	0
Jan-10	0	0	0	0
Jan-14	1	0	2	1

Jan-17	0	0	2	0
Jan-25	0	0	0	0
Jan-31	0	0	0	0
TOTAL:	**14**	**1**	**60**	**15**
ESCAPEMENT:	--	--	**12**	**15**

Ebright Creek:
Ebright Creek was surveyed twice a week from November 8th through January 31st, 2008. Peak spawning occurred in late-November with 11 fish observed on November 26th, 2007. A total of 17 live and zero dead kokanee were observed during surveys. Total escapement in Ebright Creek was estimated to be 17 fish. Escapement of kokanee into Ebright Creek was calculated by enumerating the live fish observed on November 26th, December 24th, and December 28th. The 2007/08 escapement was 7.0% of the 1996/97-2006/07 average (243). Figure 4 summarizes all the survey data.

No kokanee carcasses were found in Ebright Creek.

Of the 17 live kokanee counted in Ebright Creek, 11 of those fish were observed prior to the December 3rd, 2007 flood. Similar to Lewis and Laughing Jacobs creeks, the scouring and sedimentation effects of the flood likely destroyed all redds constructed before December 3rd, 2007.

Figure 4. Summary of Ebright Creek spawning ground surveys and escapement.

SURVEY DATE	LIVE FISH	DEAD FISH	FISH DAYS
Nov-08	0	0	0
Nov-15	0	0	0
Nov-20	0	0	0
Nov-26	11	0	33
Dec-04	0	0	44
Dec-06	0	0	0
Dec-07	0	0	0
Dec-10	0	0	0
Dec-13	0	0	0
Dec-17	0	0	0
Dec-24	5	0	18
Dec-27	0	0	8
Dec-28	1	0	1
Dec-31	0	0	2
Jan-03	0	0	0
Jan-07	0	0	0
Jan-10	0	0	0
Jan-14	0	0	0
Jan-17	0	0	0
Jan-25	0	0	0
Jan-31	0	0	0
TOTAL:	**17**	**0**	**104**
ESCAPEMENT:	**17**	**0**	**21**

Pine Lake Creek:
Pine Lake Creek was surveyed daily by a volunteer stream walker from November 4th, 2007 through January 14th, 2008. No live or dead kokanee were observed during surveys.

Late-Run Kokanee Escapement Trends:
Total combined escapement for Vasa, Lewis, Laughing Jacobs, Ebright, and Pine Lake creeks

was 143 fish, which is only 15.1% of the 1996/97-2006/07 average (946). This collapse in spawning escapement is surprising considering that basin wide escapement in 2003/04 was 4,591 fish. The 2007/08 escapement was expected to be much larger. This extremely low basin-wide escapement is disconcerning for the 2010-11 run, especially considering the impacts of the December 3rd, 2007 flood event. Figures 5 and 6 summarize late-run kokanee escapement trends.

Figure 5. Escapement trends and average escapement levels of late-run kokanee.

LATE-RUN KOKANEE ESCAPEMENT TRENDS				
YEAR	**LEWIS**	**EBRIGHT**	**L.J.**	**COMBINED**
1996-97	219	70	170	459
1997-98	10	15	29	54
1998-99	43	40	0	83
1999-00	247	134	27	408
2000-01	143	362	92	597
2001-02	722	110	2	834
2002-03	1,002	319	384	1,705
2003-04	3,296	1,063	232	4,591
2004-05	442	134	18	594
2005-06	217	135	44	396
2006-07	330	292	65	687
2007-08	111	17	15	143
AVE (96-07):	**606**	**243**	**97**	**946**
AVE (w/o 03-04):	**567**	**236**	**68**	**870**
4-YEAR AVE (03-07):	**1,071**	**406**	**90**	**1,567**

Figure 6. Escapement trends of late-run kokanee.