

2/25/2009

**Study Plan for 2009:**  
**Outmigrating Salmon Fry,**  
**Sherman, Johnson and Slate Creeks**

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**Feb 2009**

## Introduction

The NPDES permit for the Kensington Mine includes a requirement to quantify outmigrating salmon fry in nearby Sherman, Johnson and Slate Creeks, with counts to begin in April and continue until numbers diminish. This monitoring was previously conducted in 2006, 2007 and 2008. This document describes the methods that will be used to meet this requirement in 2009. Sweeny Creek, 1 mile south of Sherman Creek, may also be monitored in 2009.

## Study Area

Sherman Creek drains an area of 10.59km<sup>2</sup> (4.09 mile<sup>2</sup>) that ranges from 0 to 1,693m (5,552ft) in elevation (Konopacky 1992). It consists of four upper tributaries, Ivanhoe, Ophir, Upper Sherman and South Fork Sherman, which converge into a single channel approximately 1,500m from the stream mouth on the east shore of Lynn Canal (Figure 1). A permanent barrier to anadromous fish migration in the form of vertical falls exists 360m from the stream mouth. A tunnel connecting the nearby Kensington Mine with Jualin Mine on the Berners Bay side of the project was completed in July 2007. Mine drainage from the tunnel enters a water treatment facility before being discharged into Sherman Creek at permitted outfall 001, upstream of the confluence with Ivanhoe and Ophir tributaries (Figure 1).

Sweeny Creek, 1 mile to the south of Sherman Creek, has a drainage area of 10.57km<sup>2</sup> (4.08 mile<sup>2</sup>). Falls block fish passage 3,095m from the stream mouth, although passage of pink salmon (*Onchorhynchus gorbuscha*) and coho salmon (*Onchorhynchus kisutch*) is apparently inhibited by a log jam approximately 825m from the ocean.

Slate Creek and Johnson Creek drain into the north side of Berners Bay (Figure 1). Slate Creek drains an area of 11.61km<sup>2</sup> (4.48 mile<sup>2</sup>) and has vertical fall barriers that prohibit fish passage on both East and West forks approximately 800m from the stream mouth. Johnson Creek drains an area of 19.97km<sup>2</sup> (7.71 mile<sup>2</sup>) and has impassable barrier falls approximately 1,200m upstream from the confluence with Berners Bay. Construction of the Tailings Storage Facility at Lower Slate Lake was halted in early 2007 due to legal issues.



**Figure 1:** Location of fry trapping sites on Sherman, Sweeny, Johnson and Slate Creeks.

## Methods

Fyke nets with adjustable wings constructed from 1/8 inch mesh will be used to trap outmigrating salmon fry as in previous years. The opening of the nets is variable from 4 feet with no wings deployed to 11 feet wide with wings deployed (Figure 2). The portion of stream flow sampled by the nets will be estimated daily by taking manual discharge measurements. Each net will be attached to a live holding box containing a partition to deflect flow (Figure 3). The live boxes are made of aluminum and have adjustable legs to raise or lower the box with streamflow and maintain moderate flow inside the box.



**Figure 2:** Fyke net with wings deployed and live holding box, Johnson Creek.

Nets will be set in each creek during the first half of April. The trap sites at Sherman and Sweeny Creeks are approximately 50m upstream of the creek mouth at mean high tide (Figure 3). At Johnson Creek, the trap site is approximately 100m from the confluence with the Lace River and at Slate Creek a net is set approximately 25m above mean high tide. GPS points for each trap location are given in Table 1. Trained field personnel will visit each site daily to identify and count fish in the trap and release them downstream.



**Figure 3:** Partition in centre deflects some flow inside holding box.

**Table 1: Trap Locations**

<b>Stream</b>	<b>Latitude</b>	<b>Longitude</b>
Sherman	58.86908	-135.14005
Sweeny	58.85019	-135.12390
Johnson	58.82383	-134.99936
Slate	58.79628	-135.03716

Every 3-4 days, a sample of up to 150 pink fry will be marked with Bismarck Brown dye and released upstream of the trap to determine trap efficiency. The total population of fry migrating from each creek will be estimated using the average ratio of marked to unmarked fish from successive marking events. Stream flow and temperature will be recorded every 15 minutes by dataloggers at each creek. Manual discharge measurements will be taken at each site twice a week to estimate the proportion of flow sampled by the nets.

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2008 was a “high” year for adult pink salmon returns in these streams, which typically display a pattern of high and low numbers in alternating years due to their 2-year life cycle (Quinn 2005). Although pink salmon returns were relatively low for this region in 2008, numbers returning to these streams were higher than the previous year when low flow impeded migration of pink salmon to Slate and Sherman Creeks (Coeur Alaska 2009). Consequently, numbers of fry out-migrating from the creeks in 2009 are expected to be higher than the previous year.

Results from the 2007 out-migrating study provide a guideline for numbers expected to be captured in 2009 as this was also a “high” year for out-migrating fry. The total catch from Sherman Creek was 34,993 pink salmon fry between April 12 and June 9 with a maximum daily catch of 2474 fry on May 7. Only 2 chum fry were observed in Sherman Creek. Johnson Creek was sampled from April 10 to June 5 with a total catch of 140,768 pink fry and maximum daily catch of 8505 on May 16. 6466 chum salmon fry, 242 juvenile cohos, 38 coast-range sculpin and 15 Dolly Varden were also captured in Johnson Creek over the survey period. Slate Creek was sampled from April 10 to June 6 with a total catch of 121,908 pink fry and maximum daily catch of 6626. Only 3 chum fry, 480 coast-range sculpin, 10 Dolly Varden and 44 eulachon were also captured in the fyke net at Slate Creek.

These numbers have been used to provide guidelines on numbers of each species to expect at each location for the 2009 Fish Resource Permit application, with an extra allowance made for Sweeny Creek. Monitoring of Sweeny Creek depends on the outcome of the Supreme Court case to decide whether Lower Slate Lake may be used for disposal of mine tailings. Sweeny Creek will most likely only be monitored if an alternative for tailings disposal is sought in the vicinity of Sherman and Sweeny Creeks.

**References:**

Coeur Alaska 2009, NPDES Annual Report 2008: Volume 1 Aquatic Resources.

Quinn, T.P. 2005. The behavior and ecology of Pacific salmon and trout. American Fisheries Society. University of Washington Press, Seattle. 378pp.