Wahleach Project Water Use Plan

Monitoring Programs and Physical Works
Annual Report: 2009

- Lower Jones Creek Fish Productivity Indices (Schedule B 1.a)
- Channel Stability Assessment (Schedule B 1.a)
- Herrling Island Sidechannel Chum Spawning Success Monitoring (Schedule B 1.b)
- Boulder Creek Diversion Bypass (Schedule A 2.a. ii)
- Wahleach Reservoir Fertilization Program (Schedule C)
- Lower Wahleach (Jones) Creek Channel Enhancement Project (Schedule D)

For Water Licenses 119711, 119709 and 119710

25 February 2009
1 Introduction

This document represents a summary of the status and the results of the Wahleach Project Water Use Plan (WUP) monitoring programs and physical work to 31 January 2009, as per the Wahleach Project Order under the Water Act, dated 19 January 2005. There are three monitoring programs and three physical work projects:

a) Lower Jones Creek Fish Productivity Indices
b) Channel Stability Assessment
c) Herrling Island Sidechannel Chum Spawning Success Monitoring
d) Boulder Creek Diversion Bypass
e) Wahleach Reservoir Fertilization Program
f) Lower Wahleach (Jones) Creek Channel Enhancement Project

2 Background

The water use planning process for BC Hydro’s Wahleach hydroelectric facility was initiated in September 2000 and completed in October 2002. The conditions proposed in the Wahleach WUP for operation of BC Hydro’s Wahleach hydroelectric facilities reflect the October 2002 recommendations of the Wahleach WUP Consultative Committee (CC).

In December 2004, the Wahleach WUP was submitted to the provincial Comptroller of Water Rights.

On 19 January 2005, BC Hydro was Ordered to implement the conditions proposed in the Wahleach WUP and prepare monitoring program and physical works terms of reference (TOR).

On 24 August 2005, the Wahleach WUP monitoring program and physical works TOR were submitted to the Comptroller for review and approval.

On 27 September 2005, the Comptroller accepted the TOR for the Lower Jones Creek Fish Productivity Indices, the Channel Stability Assessment, and the Herrling Island Sidechannel Chum Spawning Success.

On 28 October 2005, the Comptroller accepted the TOR for the Boulder Creek Diversion Bypass, Wahleach Reservoir Fertilization program and the deferral of TOR for the Lower Wahleach Creek Channel Enhancement project to 15 June 2006. The revised terms of reference for the Lower Wahleach Creek Channel Enhancement project were given leave to commence by the Comptroller 2 August 2006.

On 27 June 2006, the Comptroller accepted the TOR addendum for the Wahleach Reservoir Fertilization Program and the revised implementation budget accounting for increases in both labour and fertilizer costs.
On 26 July 2007, the Comptroller accepted the TOR addendum for the Boulder Creek Diversion Bypass and the revised implementation budget for restoration of the temporary diversion structure.

On 20 November 2008, the Comptroller accepted the TOR addendum for the Wahleach Reservoir Fertilization Program including a further increase in labour and fertilizer costs as well expanded sampling program.

After five years of Wahleach WUP implementation BC Hydro will assess the results of the monitoring and physical works programs specifically availability of Boulder Creek inflows, fish productivity in Lower Jones Creek and productivity benefits of the Wahleach Reservoir Fertilization program. This five year interim review is scheduled for fall 2010.

As detailed in the Wahleach WUP CC Report (2003), a review may be triggered sooner where warranted. If the Wahleach WUP is not reviewed five years after implementation, or where the five-year review indicates further evaluation is required, the plan will continue for an additional five years.

3 Status

The following table outlines the status and schedule for the Wahleach Project WUP monitoring programs and physical works.
<table>
<thead>
<tr>
<th>Study/Physical Work</th>
<th>Component</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<td>Final Upgrade</td>
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<td>Wahleach Reservoir Fertilization Program</td>
<td>Fertilization and Basic Monitoring</td>
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<td></td>
<td>□</td>
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1. Per the terms of reference for these study components, no steelhead or smolt studies will be conducted until confirmation of either populations in Lower Jones Creek is provided through fry and salmon study components.
2. The works completed in September 2005 were undermined during a storm event November 2006; replacement complete in September 2007.
3. The enhancement project delay to 2006 was approved by the Water Comptroller 28 October 2005. The enhancement works terms of reference was given leave to commence 2 August 2006.
4. Interim 5 year review occurs in year 6 given requirement to consider results of a full 5 years of monitoring with sufficient reporting period.

Legend: □ = Project timing subject to change according to maintenance schedule
■ = Project to be undertaken/initiated in identified year
U/W = Project is underway
✓ = Project is complete for the year
DEL = Project was delayed
4 Wahlach Project WUP Monitoring Programs

This section outlines the status of the Wahlach Project WUP monitoring programs as per the Order under the Water Act, dated 19 January 2005. The following table summarizes the monitoring indicator values of interest for each study.

Figure 4-1 Summary of Wahlach Project WUP Monitoring Program Results

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<tr>
<td>Lower Jones Creek Fish Productivity Indices</td>
<td>Chum Salmon Egg to Fry Survival (%)</td>
<td>9%</td>
<td>0.59%</td>
<td>0.29%</td>
<td>0.44%</td>
<td>1.21%</td>
<td>1.10%</td>
<td>0.06%</td>
<td>Mid-study</td>
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<tr>
<td></td>
<td>Pink Salmon Egg to Fry Survival (%)</td>
<td>13%</td>
<td>0.98%</td>
<td>0.33%</td>
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<td>2.46%</td>
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<td></td>
<td>Steelhead Smolt Production (100m²)</td>
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<td>No smolts observed</td>
<td>No smolts observed</td>
<td>No smolts observed</td>
<td>No smolts observed</td>
<td>No smolts observed</td>
<td>No smolts observed</td>
<td>Mid-study</td>
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<td></td>
<td>Coho Smolt Production (m²)</td>
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<td>No smolts observed</td>
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<td>Channel Stability Assessment</td>
<td>Substrate Quality (% Fraction Fine Sand)</td>
<td>10%</td>
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<td>Not Studied</td>
<td>Not Studied</td>
<td>19%</td>
<td>Not Studied</td>
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<td></td>
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<td>Cross sectional area changes (m²)</td>
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<td>Not Studied</td>
<td>0.72m²</td>
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<td>Herring Island Sidechannel Chum Spawning Success Monitoring</td>
<td>Chum egg to fry survival (%)</td>
<td>9%</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>4.90%</td>
<td>3.10%</td>
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<td>Chum Adult stranding risk (# stranded)</td>
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<td>Not Studied</td>
<td>Not Studied</td>
<td>12 adults</td>
<td>2 adults</td>
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<td>Pink egg to fry survival (%)</td>
<td>13%</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>N/A</td>
<td>2.34%</td>
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<td></td>
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<td>Pink Adult stranding risk (# stranded)</td>
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<td>N/A</td>
<td>15 adults</td>
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<td>Wahlach Reservoir Fertilization Program</td>
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<td>4000</td>
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<td>3900</td>
<td>3000</td>
<td></td>
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</tr>
</tbody>
</table>

1. Salmonid Enhancement Program biostandards for Lower Fraser River natural egg-fry survival of chum and pink salmon - March 1997
6. Interim 5 year review occurs in year 6 given requirement to consider results of a full 5 years of monitoring with sufficient reporting period.
7. High flows during chum spawning prevented redd identification and subsequent dewatering assessment.
4.1 Lower Jones Creek Fish Productivity Indices

4.1.1 Overview

The objective of this monitoring program is to determine the fisheries benefits associated with the flow provisions outlined in the Wahleach WUP.

Monitoring Indicator (a): Egg to fry survival for chum and pink salmon (percent)

Monitoring Indicator (b): Smolt production for steelhead (number of smolts)

There are three studies in this program, as described in the TOR:

- Fry and smolt out migration assessment: annual monitoring of chum fry, pink fry (after odd-year runs) and steelhead/coho smolts (where observed) out migration;

- Adult salmon escapement: annual monitoring of chum, pink (in odd-years), and coho (where observed) spawning.

Adult steelhead escapement: when observed during fry outmigration monitoring, steelhead adults will be enumerated during the spring spawning period.

4.1.2 Status

The third year of this study was initiated in September 2007, and a final report was prepared October 2008 covering the salmon spawning escapement and salmon fry outmigration assessments for the 2007/2008 brood year. As per the Terms of Reference for this study, both the steelhead spawning survey and smolt outmigration assessments were not completed due to lack of evidence of either steelhead or coho salmon runs in the creek.

The 2008/2009 study is underway with the salmon spawning escapement component already completed. Given the odd year spawning cycle of south coast pink salmon no pink escapement or fry outmigration assessment will be completed for the 2008/2009 brood year. A final report for this study is expected 30 September, 2009.

4.1.3 Interpretation of Data

Results of the 2007/2008 study program are summarized alongside results from studies initiated in 1999, 2003, 2004, 2005, 2006 and 2007 in Table 4.1. The 2008 chum salmon egg to fry survival of 0.06% was the lowest on record, although chum fry outmigration results are highly uncertain due to low capture rates.

Notwithstanding 2008 fry survival results, recent studies have indicated a general increase in egg to fry survival for chum salmon over those observed during pre WUP flow provisions, although all results have been well below the 9% bio-standard for Fraser River chum spawning success.
The 2008 pink salmon egg to fry survival of 2.5% was the highest recorded since monitoring began in 1999, and the out-migration population estimate was tenfold greater than all previous estimates. Results indicate an increase in egg to fry survival for pink salmon over those observed during pre WUP flow provisions; however all results are still well below the bio-standard of 10 – 20 % for other coastal systems.

Coho escapement to Lower Jones Creek continues to be very limited. However, six adult coho were observed spawning for the second time in 2007 and the capture of four coho smolts indicates that rearing habitat is available and being used by juvenile coho.

Because there was no evidence of a steelhead run, smolt production was not monitored.

To date, there is insufficient data to determine whether instream flow provisions are a driver in Lower Jones Creek fish productivity.

### 4.2 Channel Stability Assessment

#### 4.2.1 Overview

The objective of this monitoring program is to assess channel change and infer its effects on fish productivity in the anadromous reach of Lower Jones Creek, in consideration of results from the Lower Jones Creek Fish Productivity program.

Monitoring Indicator (a): Substrate quality (fraction fine sand);

Monitoring Indicator (b): Channel migration in spawning areas (Average cross sectional area change$^{1}$)

There are two studies in this program, as described in the TOR:

- Channel stability monitoring: assessment of channel movement between field surveys in each study year;
- Substrate quality monitoring: assessment of the size fraction distribution within sample sites of the Lower Jones Creek channel over the spawning and incubation season.

#### 4.2.2 Status

The second year of this study was initiated in September 2007, and a final report for the 2007/2008 field work was submitted December 2008. Per the terms of reference for this study, there will be no field work conducted during “non-pink” years, as pink

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$^{1}$ This indicator has changed as a result of limitations of extrapolating channel area changes observed in channel cross sections. The methodology does not change; the analysis will simply average the total channel area change observed during the field season across all cross sections.
salmon return to Jones Creek every odd-year. Therefore, Year 3 of this study will be conducted in 2009/2010, with a final report expected 30 September 2010.

4.2.3 Interpretation of Data

2007/2008 was the second year this program had been conducted on Lower Jones Creek and includes results for the 2006 – 2008 assessment period.

The study showed that the maximum fine content observed in the channel between three assessments conducted through the December to May field seasons averaged 30% across five sites in the study reach. This is higher than 19% confirmed during the 2005/2006 study period and the bio-standard of 10% selected by the WUP monitoring committee, and may indicate a potential limiting factor in egg to fry success.

Channel change, as indicated by the average cross sectional area change at five sites, was observed to be 7.34m$^2$ for the 2006 - 2008 study period compared to 0.72m$^2$ for the 2005/2006 study period. The large change in the 2006 – 2008 study period is the result of 7500m$^3$ of sand and gravel deposited on the fan between April 2006 and November 2007. Since November 2007, there have been comparatively minor changes in the bed and bars as there have been no large floods capable of causing substantive re-mobilization of stored bed and bar sediments.

A combination of channel shifting, infilling, degradation and fine sediment accumulation throughout the Jones Creek Channel are all likely drivers in impaired Jones Creek fish productivity.

4.3 Herrling Island Sidechannel Chum Spawning Success Monitoring

4.3.1 Overview

The objective of this monitoring program is to assess the effectiveness of the Wahleach WUP operational measures recommended by the CC to minimize chum and pink spawning in marginal areas of the Herrling Island sidechannel. A secondary objective is to assess the risk of stranding of adult spawners associated with the recommended operations.

Monitoring Indicator (a): Chum/pink spawning success (egg to fry survival)

Monitoring Indicator (b): Adult stranding risk (spawners per area stranded)

There are three studies in this program, as described in the TOR:

- Adult spawning behavior observations: assessment of behavioural response of spawning chum and pink to Wahleach Generating Station operations;

- Adult stranding risk assessment: direct assessment of stranding risk to chum and pink spawners through measurement of dewatered spawning area and observation of stranded spawners.
• Hydrologic Monitoring: in consideration of the behavioural monitoring, an assessment of redd/fry stranding risk will be conducted by monitoring water level stages at key index sites.

4.3.2 Status

The third year of this study program was initiated in September 2007, and a final report was submitted 30 June 2008 summarizing the 2007/2008 field season. Year 4 of the study was initiated September 2008, with a final report expected 31 October 2009.

While most objectives of the study have been met using the approved terms of reference, the key measures recommended to describe adult salmon spawning behavioural responses to Wahleach Generating Station (WAH GS) outages have proven difficult to ascertain in the first years of implementation given observer limitations and high spawning densities at index sites. To further support the approved terms of reference annual egg distribution assessments will occur at selected index sites commencing in January 2008.

Due to lack of chum spawner presence and the reduced effort associated with the elimination of a single index, the addition of the egg sampling task resulted in only a minor budget increase of $2K over the ten year assessment period.

The 2007/2008 study year represents the first year pink salmon returns allowed a comprehensive evaluation of pink salmon spawning response to Wahleach WUP operational measures.

4.3.3 Interpretation of Data

2007/2008 was the third year this program had been conducted on Herrling Island sidechannel. High water levels and turbidity in the sidechannel during monitoring precluded effective monitoring of chum salmon in November 2007.

Despite no chum salmon redds being monitored for depth over the 2007/2008 incubation and emergence periods, twenty five individual redd pockets were observed dewatered at site 1 in April 2008.

The results to date for chum salmon have demonstrated that almost all impacts (egg and adult stranding) observed occurred in site 1, a small section of the sidechannel that is prone to dewatering. As outlined in the monitoring report, impacts at this site could be managed through habitat enhancements. Plans to enhance this habitat through a BCH partnership with the local property owner were proposed for summer 2008; however, funding shortfalls delayed work initiation until summer 2009.

Subsequent fall 2008 observations have confirmed further channel infilling due to 2007/2008 high flows modified site 1 conditions to a point where the majority of chum spawning occurs at low risk stranding locations downstream. This apparent change in preferred spawning location and related reduction in stranding risk may preclude
the need for habitat enhancement; however, this will be confirmed during upcoming year 4 and 5 reporting.

Pink salmon returns to the sidechannel peaked in late September at five main spawning sites. Overall 82% of pink redds identified at site 5 dewatered at least once due to operational changes. The 82% of dewatered redds translates into 2.34% survival for the remaining eggs (incorporating 13% biostandard of Fraser River pink egg to fry survival). Fifteen adults were observed stranded in detwatering areas following generating station shut down.

Relative to chum salmon, pink salmon appeared to prefer spawning in shallower, faster-flowing water which increased the risk of adult and redd stranding.

January 2008 provided the first opportunity for the assessment of pink salmon egg distribution. A high proportion of dead eggs were found in high elevation locations at site 5, indicating that generating station shutdowns were not completely effective in reducing marginal spawning; however, more study is necessary to confirm the effectiveness of the recommended operations.

5 Wahleach Project WUP Physical Works

This section outlines the status of the Wahleach Project WUP physical works as per the Order under the Water Act, dated 19 January 2005.

5.1 Boulder Creek Diversion Bypass

5.1.1 Overview

The objective of this physical works is to install and maintain a temporary weir below the Boulder Creek diversion that will ensure supplemental flows are provided when needed and when available. The temporary upgrade involves re-establishment of a headpond and weir structure allowing for the continued access of Wahleach Reservoir kokanee through a ~0.14m$^3$s$^{-1}$ minimum flow provision as well as providing augmented flow for Lower Jones Creek.

There are two components for this physical works, as described in the TOR:

- Temporary upgrade of Boulder Creek diversion bypass: To allow supplementation of Lower Jones Creek flows, there are provisions in the Water Use Plan to redevelop the bypass works on an annual basis until the five-year review provides further direction; and

- Permanent upgrade of the Boulder Creek diversion bypass: A preliminary design for permanent bypass works was recommended in the Water Use Plan. At the five year review, upon consideration of the effectiveness of the temporary upgrades and the necessity of flow augmentation to Lower Jones Creek, the design will be finalized and implemented upon approval.
Reporting for the design and implementation of the physical works will be conducted as part of BC Hydro’s Water License Requirements Annual Reporting. Compliance reporting (i.e. how operations are meeting flow targets to Jones Creek, and compliance for Boulder Creek passage flows) will be conducted through BC Hydro’s Generation Operations reporting protocols to the Comptroller.

5.1.2 Status

The temporary upgrade of the Boulder Creek diversion was initiated in August 2005 and completed in September 2005. A final construction report was completed in March 2006 and submitted as part of the 2006 Annual Report submission.

In November, 2006, an extreme inflow event rendered the bypass and kokanee passage works ineffective, as described in the assessment by Sakamoto (2006). Re-design of the temporary resulted in a revised terms of reference submission to the Comptroller. Based on a leave to commence provided on 26 July 2007, construction was completed in September 2007 during the prescribed instream work window. A final construction report was completed in November 2007 and is included as part of the 2008 Annual Report submission.

5.1.3 Interpretation of Results

The effectiveness of the Boulder Creek diversion bypass works will be evaluated in two ways:

- Availability and effectiveness to meet Water License constraints: the physical ability of the works to deliver flows both for Boulder Creek kokanee fish passage upstream of the weir, and for the augmentation of Lower Jones Creek flows to meet downstream targets will be assessed in consideration of available upstream Boulder Creek flows, channel instability and operating logistics.

- Performance of fish productivity in Lower Jones Creek: it was anticipated that operating to the constraints specified in the Water License would result in improved productivity for salmon species utilizing the anadromous reach of Lower Jones Creek.

Both measures will be evaluated annually, but it is anticipated that the conclusions regarding the effectiveness of the weir will not be substantive until several years of monitoring are completed.

An inflow event 6 November 2006 exceeded the 1:50-year design criteria of the weir and washed out the works, and bypass flows from Boulder Creek were not available until 15 September 2007 when the weir was restored. As per the revised terms of reference weir restoration involved placement of a more robust rock weir structure at

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2 Sakamoto, Derek, 2006. Boulder Creek Temporary Diversion Weir Breach Assessment. BC Hydro Inter-office memo prepared for BC Hydro Water License Requirements, Burnaby, BC.
the location of the original concrete block structure. Weir operations post construction through January 2009 successfully met WUP requirements. Kokanee fish passage was confirmed through the weir structure during the 2008 fall migration.

5.2 Wahleach Reservoir Fertilization Program

5.2.1 Overview

The objective of this physical works is to restore kokanee abundance in Wahleach Reservoir to mitigate impacts of reservoir fluctuations.

There are two annual components for this physical works, as described in the TOR:
- Application of nutrient fertilizer from June through October.
- Effectiveness monitoring including assessments of the below noted performance measure.

Performance Measure (a): Kokanee spawner abundance in index tributaries to Wahleach Reservoir

Monitoring results for this project are summarized in Table 4-1.

5.2.2 Status

Since 2005, fertilizer additions and infrastructure improvements (i.e. boat and storage facility upgrades) outlined in the program terms of reference have been implemented as planned. Hydroacoustic monitoring of fish populations in 2005 were delayed due to boat upgrade issues. In 2006, 2007, and 2008 all components of the physical works program were implemented as planned.


5.2.3 Interpretation of Results

Results are summarized as kokanee spawner abundance in index reservoir tributaries, which provides an index of the productivity derived from fertilization. Measurement of kokanee abundance in the reservoir is dependant on several

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3 This indicator has been modified to account for differences in monitoring approaches between historic assessments conducted by Limnotek (1995-2000) and Ministry of Environment (2004-current). This change does not affect the study design outlined in the physical works terms of reference.
factors, which can influence the degree to which annual results can be reasonably compared. Based on this index, kokanee production has responded positively to fertilizer loading rates restored to pre 1980 levels of ≥ 1000 spawners since 2001.

5.3 Lower Wahleach Creek Enhancement Channel

5.3.1 Overview

The objective of this physical works is to address the poor productivity issues in Lower Jones Creek. Due to channel stability a recommendation was been made by the Wahleach Monitoring Committee to reconsider the WUP proposed Jones Creek spawning channel and assess alternative enhancement options within the Lower Jones Creek floodplain.

Fish use and habitat stability of this physical works will be monitored as part of the Lower Jones Creek Productivity Indices program.

5.3.2 Status

Given Wahleach Monitoring Committee recommendations the Comptroller authorized the delay of submission of terms of reference for the Lower Wahleach (Jones) Creek Enhancement Channel to 15 June 2006. After monitoring committee deliberations, these terms of reference were finalized and submitted to the Comptroller of Water Rights with leave to commence granted 2 August 2006.

Construction on the works, described as a backwater rearing and spawning channel adjacent to the Jones Creek mainstem channel, was completed September 2006 according to plan (with minor exceptions to pool and large woody debris placement). An as-built report was prepared, which included an environmental summary report, and was forwarded to the Comptroller’s office as a component of the 2007 Annual Report submission.

Maintenance of the backwater rearing habitat was completed in August 2008 to maximize rearing potential during low flow periods. Work involved placement of an infiltration gallery to allow supplementation with flows from the Jones Creek mainstem. Infiltration gallery function was initially confirmed; however, subsequent channel shifting has reduced supplementation capacity. Minor gallery adjustments may be initiated in summer 2009 if required based on further assessment of gallery function through spring 2009.

To further improve bank stability and cover adjacent to the backwater rearing channel a vegetation planting program was completed in spring 2008.

The above mentioned enhancement maintenance activities will be funded through the $15K approved for annual maintenance.

BC Hydro
5.3.3 Interpretation of Results

Ongoing monitoring of fish use and habitat stability of the off-channel works is conducted as part of the Lower Jones Creek Fish Productivity Indices study program. 2008 results show that groundwater flows in the channel are sufficient during high flow periods; however, are not adequate to ensure full off-channel habitat utilization during dry summer conditions. During the 2008 summer and early fall low flow periods several large pools within the off-channel work remains wetted with several dozen coho juveniles utilizing the off-channel habitat. Several adults chum spawners were also observed in the spawning channel.

6 Wahleach Project WUP Monitoring Programs and Physical Work Costs

The following table summarizes the Wahleach Project WUP monitoring programs and physical work costs approved by the Comptroller and the actual costs to 31 May 2006.
<table>
<thead>
<tr>
<th>Monitoring Programs/Activities</th>
<th>Costs approved by CWR (Actuals and Forecast) Life to Date</th>
<th>Variance Total to Approved ($)</th>
<th>Explanation</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAHWLR ANNUAL REPORT</td>
<td>$81,247.24 / $21,941.63 / ($59,305.61)</td>
<td>1) Original estimates overestimated and streamlined</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG1 LOWER JONES CREEK FISH PRODUCTIVITY INDEX</td>
<td>$1,335,485.51 / $91,993.19 / ($1,243,492.32)</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG1 Direct Management</td>
<td>$1,187,500 / $851,181.00 / ($336,319.00)</td>
<td>1) Reduced contractor study implementation rates. 2) Per TOR requirements both adult steelhead enumeration and extended coho smolt trapping components were not implemented in years 1 - 3 given no initial presence indicated.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG1 Implementation</td>
<td>$1,187,500 / $851,181.00 / ($336,319.00)</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG2 CHANNEL STABILITY ASSESSMENT</td>
<td>$227,278.18 / $185,565.44</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG2 Direct Management</td>
<td>$74,678.00 / $32,506.44 / ($42,171.56)</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG3 HERRLING ISLAND SIDECHANNEL CHUM SPawning SUCCESS MONITORING</td>
<td>$479,513.50 / $153,059.00 / $326,454.50</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG3 Direct Management</td>
<td>$153,059.00 / $153,059.00 / $0.00</td>
<td>1) The increase in implementation costs is related to project implementation and management costs being apportioned based on the revised BC Hydro Water Licence model introduced in early 2007. This model assigns all service provider costs to works implementation and WLR initiator support to works management. The model utilized prior to this date assigned tasks such as engineering and construction management to works management. These tasks are now included in the implementation costs. 2) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHMONG3 Implementation</td>
<td>$153,059.00 / $153,059.00 / $0.00</td>
<td>1) The decrease in implementation costs is related to project implementation and management costs being apportioned based on the revised BC Hydro Water Licence model introduced in early 2007. This model assigns all service provider costs to works implementation and WLR initiator support to works management. The model utilized prior to this date assigned tasks such as engineering and construction management to works management. These tasks are now included in the implementation costs. 2) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#1 BOULDER CREEK FLOW BYPASS FACILITY REHABILITATION</td>
<td>$1,330,034.00 / $1,183,392.76</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#1 Direct Management</td>
<td>$266,918.00 / $42,295.76 / ($223,622.24)</td>
<td>1) The increase in implementation costs is related to project implementation and management costs being apportioned based on the revised BC Hydro Water Licence model introduced in early 2007. This model assigns all service provider costs to works implementation and WLR initiator support to works management. The model utilized prior to this date assigned tasks such as engineering and construction management to works management. These tasks are now included in the implementation costs. 2) Efficiencies realized which resulted in realignment and streamlining of project implementation task priorities.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#1 Implementation</td>
<td>$1,064,116.00 / $1,141,097.00 / $76,981.00</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#2 WATELACH RESERVOIR FERTILIZATION PROGRAM</td>
<td>$1,055,895.81 / $1,055,895.81</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#2 Direct Management</td>
<td>$570,857.00 / $55,177.81 / ($515,679.19)</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#2 Implementation</td>
<td>$877,747.56 / $877,747.56 / $0.00</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#3 LOWER WAHLEACH CREEK CHANNEL ENHANCEMENT PROJECT</td>
<td>$27,284,475.53 / $27,284,475.53</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#3 Direct Management</td>
<td>$96,659.00 / $91,568.53 / ($5,090.47)</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
<tr>
<td>WAHWORKS#3 Implementation</td>
<td>$172,950.00 / $172,950.00 / $0.00</td>
<td>1) Efficiencies realized which resulted in realignment and streamlining of direct management task priorities. 2) Efficiencies realized leading to refinement of direct management time allocations.</td>
<td>Resubmit to CWR</td>
<td></td>
</tr>
</tbody>
</table>