Wahleach Project Water Use Plan

Physical Works Terms of Reference

- Addendum 1 to WAHWORKS#2 Wahleach Reservoir Fertilization Program

November 4, 2008
A1 Addendum to WAHWORKS#2 – Wahleach Reservoir Fertilization Program

A1.1 Addendum Rationale

The Wahleach Reservoir Fertilization Program is in year 4 of implementation, and while most objectives of the study have been met using the approved terms of reference, the fish population assessment approach requires modification and associated program delivery costs have increased more significantly that planned primarily due to large increases in fertilizer cost and the need to expand the fish population assessment. This addendum summarizes these program modifications to be implemented in 2008 (Year 4) through 2010 (Year 6). Confirmation of modification to implementation years 7 – 10 will be made during the fall 2010 interim Water Use Plan (WUP) review.

A1.2 Approach

Since MOE initiation of fish acoustic assessments in 2006, insufficient resolution of acoustic targets has resulted in difficulties in distinguishing between different kokanee age classes and the presence of other, similarly sized fish species. To resolve this poor resolution issue, additional mid water gillnetting and trawling will be completed to better characterise the spatial and temporal distribution of fish in the reservoir. This will provide the necessary information to identify acoustic targets with much greater accuracy and ensure consistency with pre-WUP, 1993 – 2000, monitoring methods.

A1.3 Methods

In addition to littoral fish sampling both surface and midwater gillnetting as well as trawling will occur in the pelagic zone during a single evening sampling session. Fish collection will occur at depths of confirmed fish presence based on cursory analysis of acoustic transect data.

Timing of fish sampling will be within several days of acoustics assessments in the early fall period prior to turnover.

A1.4 Reporting

Reporting will include fish size at age determination as well as species composition and abundance based on calibration of acoustic results. Back calculation of 2006 – 2007 population characteristics will also be attempted based on additional 2008 fish sampling efforts.

A1.5 Schedule

Based on 2005 WUP initiation, it was recommended that two years of full reservoir fisheries production be completed prior to embarking on a review every two years. As per Table 1 and based on logistical and methodological issues, full fisheries production assessments did not take place in 2005 and were only partially completed in 2006 and 2007. To ensure adequate program evaluation, transition to biennial fisheries assessment will not occur until after the 2009 (Year 5) implementation year.
There are three levels of reporting over the review period (Table 1):

- **Annual Data Summary**: study results will be summarized for each performance measure on an annual basis;
- **Biannual Review**: study results are summarized for entire program period; program performance reviewed and recommendations provided; and
- **Full Analysis and Review**: after the first 4 years of study, a comprehensive evaluation of the program’s performance as per above, peer reviewed and published.

Table 1: Fertilization Program Schedule including revised hydro-acoustic survey and fish sampling sessions.

<table>
<thead>
<tr>
<th>Component</th>
<th>2005 Year 1</th>
<th>2006 Year 2</th>
<th>2007 Year 3</th>
<th>2008 Year 4</th>
<th>2009 Year 5</th>
<th>2010 Year 6</th>
<th>2011 Year 7</th>
<th>2012 Year 8</th>
<th>2013 Year 9</th>
<th>2014 Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizer addition</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Limnology Sampling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hydro-acoustic Survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Fish Sampling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Spawner survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Annual Report and Presentation to stakeholders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Biannual Report</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Year Review</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### A1.6 Budget

The fertilization program recommended by the WUP Consultative Committee was budgeted at $78,200 (2005 dollars) annually and includes $20,000 in equipment for Year 1 and $25,000 of equipment for Year 2. Subsequent increasing fertilizer and monitoring costs resulted in annual cost increases of $24,000 (2006 dollars) commencing in 2006 (Year 2). A further increase of $34,420 (2008 dollars) required for the 2008 (Year 4) implementation year is related to four core areas of the program:

1) Purchase of fertilizer - $5K,
2) Acoustic survey and fish sampling - $21.2K,
3) Laboratory analysis of water quality samples - $4K, and
4) Salary of technical personnel - $5K.

The increased costs related to fertilizer purchase, water quality sampling and technical personnel salaries will be carried forward annually through 2010 (Year 6) with additional fish sampling costs incurred in 2008 and 2010 only. These modified yearly amounts will be adjusted annually for inflation.

The Wahleach Monitoring Advisory Committee committed to review fertilization program results and revise the BC Hydro expenditures as required during the year 5 interim review. Given related scheduling and implementation of other WUP recommended programs this interim WUP review is scheduled to occur in the 20010/11 winter period, after the 2010 (Year 6) fertilization program implementation year. Accordingly the 2008 (Year 4) program cost increases will only be carried forward through 2010 with the expected confirmation of the remaining four years of implementation to be provided during the interim review. As per Table 2, the approved total ten year budget allocation of $1,004,984 will not be increased as
discussed above for 2008 – 2010, however, will be reallocated from the final year 10 implementation year.

The revised budgets for 2008 and 2010 are approximately 60% greater than that proposed by the WUP Consultative Committee for the years of full fisheries production assessment.

Through a memorandum of understanding, this program will be delivered by the Ministry of Environment who provide an annual in kind contribution valued at $60,615 (2006 dollars).

Table 2: Proposed budget for the Wahlleach Fertilization Program

| Total Cost:     | $1,639,235 |