Duncan Dam Water Use Plan

Monitoring Program Terms of Reference

- **DDMMON-11 – Duncan Reservoir Burbot Monitoring**

Addendum 1

April 30, 2013

A11 Addendum to DDMMON-11 – Duncan Reservoir Burbot Monitoring

A11.1 Addendum Rationale

The original study program was developed in 2008 to address the following objectives highlighted in the Duncan Dam Water Use Plan Consultative Committee process:

- to understand the life history requirements of the Burbot population in the Duncan Reservoir; and
- to evaluate potential effects of reservoir operations on Burbot spawning success.

Once these objectives have been met, it was expected that the study would culminate in a set of recommended reservoir operations that would improve Burbot spawning and rearing.

Initially, these objectives were to be met through adult Burbot radio-telemetry tracking to observe spawning use, and through annual adult/juvenile Burbot mark-recapture studies. After three years of attempting to monitor adult spawning with little success and capture juvenile Burbot with no success, it was recommended that an alternative approach be pursued to address these study objectives. After consulting with MFLNRO, DFO and First Nations, it was agreed that further direct biological monitoring was not appropriate and that a physical modeling approach should be developed to address the objectives.

A11.2 Approach

There are four tasks associated with the physical modeling required to address the study objectives and management questions for this study:

1. Burbot spawning and juvenile rearing habitat use requirements – a literature review and professional judgment solicitation will be conducted to identify key habitat attributes that will be to evaluate and quantify the spawning habitats mapped in the field surveys by elevation or stream length. The habitat use review will also determine the most likely habitat conditions required to optimize Burbot spawning success in terms of variations in water levels, while determining potential adverse conditions on spawning success stemming from reservoir operations. Juvenile habitat conditions should also be reviewed to provide further context on potential operation influences on Burbot recruitment.
2. Study planning and site selection – based on the habitat use review and understanding of the first three years of information related to Burbot movement in the Duncan Reservoir, the study team will determine which sites and sub-sections will be targeted for the field study, while refining the field methods to be applied as warranted by new information collected in Task 1.
3. Habitat delineation and substrate mapping in index streams (Upper Duncan River has been identified as the most likely spawning stream tributary to the Duncan Reservoir) and reaches. Habitats will be mapped using GPS and typed according to Burbot spawning preferences: area, substrate type, and stream hydraulic conditions (depth, velocity, pool/run/riffle, etc.). Snorkel and ground surveys may be employed to collect this information. Due to field conditions, two surveys may be required to map habitats and to confirm hydraulic suitability during spawning flows.

4. Habitat modeling and optimization – Based on Water Use Plan reservoir alternative modeling already completed, and for those "Burbot friendly" alternatives generated by the study biologist, evaluate the operational influences on spawning habitat availability. Determine what the total available spawning habitat is for each scenario, and identify key reservoir elevations and dates that should be targeted to optimize spawning success.

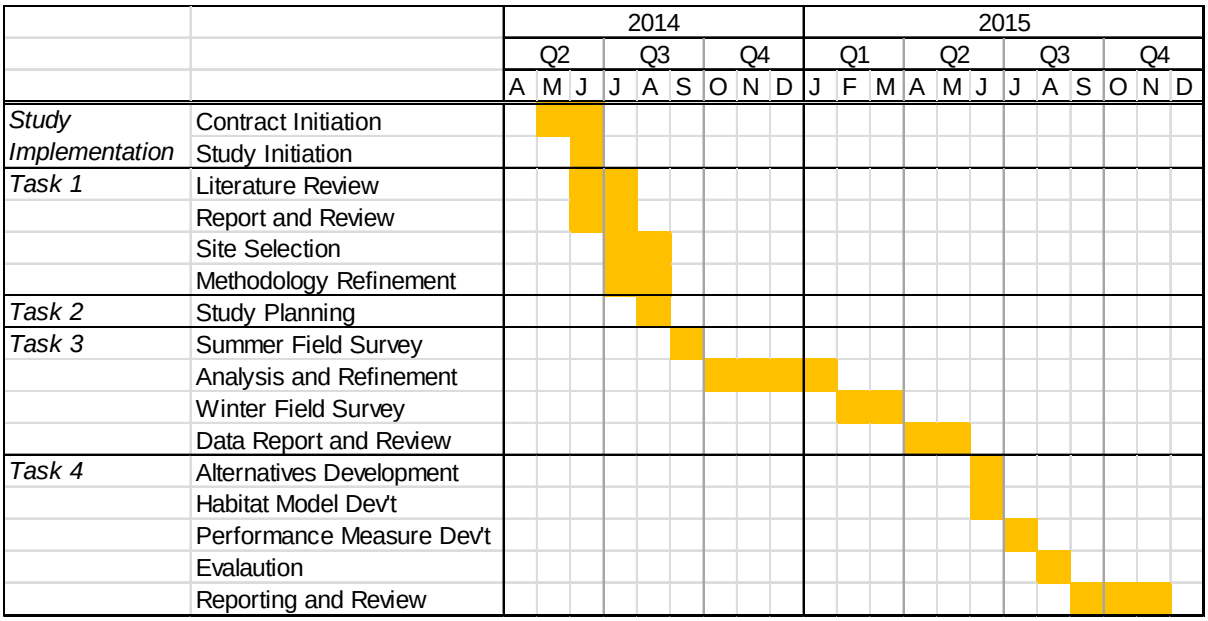
Reporting and analysis steps are required as follows:

- Literature review: a final report is required prior to finalizing the study plan and summer field survey;
- Field data report: after completing the summer and winter field surveys, a summary of preliminary habitat assessment results will be completed to ensure data requirements are met and remaining uncertainties will be adequately addressed in the modeling phase; and
- Final reporting: upon completion of the modeling tasks, a final report will be prepared to address the study objectives and recommend operating protocols to optimize Burbot spawning and juvenile rearing success.

Report timing to be completed as per the schedule in A11.3 below.

A11.3 Schedule

Field work and reporting for year three of this study program wrapped up November 2011. To accommodate a summer field survey in 2014, year four of this program is to be initiated June 2014. Based on the recommendations above, the following schedule is recommended:



A11.4 Budget

Due to the change in methodology and the duration of the remaining field work, a significant component of the existing study budget has been reduced: the original 10-year study is now proposed as a 5-year study (to be completed by end of the

2015 calendar year), reducing the cost from $957K to $656K (all costs “fully loaded” inclusive of contingency, administration and inflation costs).