

**NEEF MC Technical Workshop**

**April 25, 2012 – UBC Robson Square, Vancouver**

**0900HRS – 16:00HRS**

**Workshop Summary**

Attendees:

Dr. Mike Bradford – DFO	John Rex – FLNRO
Chelton Van Geloven – FLNRO	Bill Ruble – TECL
Dr. Steve Macdonald – DFO	Dr. Andre Zimmermann – nhc
Mike Miles –MMA	Ted Zimmerman – FLNRO
Clyde Mitchell - TECL	NEEF MC – P. Bekker, J. Benckhuysen, B. Nutton
Dale Muir – nhc	Rod Bell-Irving – Administrator, note taker

Discussion Points:

1. ***Historical Impact Assessment*** – It would be useful to undertake an ‘historical impact assessment’ to quantify post regulation changes to stream discharge (including flood and low flows) sediment and woody debris availability, rates of sediment transport, channel morphology and morphometry, fish habitat and fish populations on Nechako River and relevant downstream sections of Fraser River Many of these attributes would need to be determined from an analysis of historical air photographs, survey data or other sources of surrogate information given the scarcity of pre-project data, .Despite these constraints, an historical perspective and understanding of how fish habitat and populations have changed would provide a context for determining if objectives related to the rehabilitation of fish habitat have been achieved. Ongoing sturgeon habitat studies would also be improved if we knew what types of habitat were historically available. Nechako River is also still responding to regulation related changes in sediment and discharge loadings and additional changes in channel structure, riparian conditions and habitat values are expected to occur. The proposed study would document present conditions, provide the hydrological and sediment data required to predict the anticipated equilibrium conditions and assess how other watershed changes (such as those related to mountain pine beetle infestation, salvage logging or agricultural and ranching activities) could also affect river conditions.
2. ***Mountain Pine Beetle*** – It is anticipated that the MPB has resulted in significant changes to the hydrological function within the Nechako River watershed. The anticipated changes in sediment

loadings and runoff are expected to last at least thirty years. The largest effects are expected to occur on tributary streams.

3. **Tributary Systems** – Mountain Pine Beetle, development or other activities are affecting hydrological and sediment transport processes on tributary streams. Tributaries tend to provide cooler temperature water which has value in countering trends towards higher temperature (climate change) and reduced water supply in the Nechako River Rehabilitation or enhancement work in tributary watersheds could reduce rates of fine textured sediment loadings, increase habitat values and provide opportunities for community involvement and education..
4. **Murray-Cheslatta System** – The Murray Cheslatta system is still adjusting to the increased water flows which have occurred following the construction of the Skins Lake Spillway. Helicopter inspection during high water indicates that areas of channel bank and lacustrine shore line are still eroding, extensive sediment transport and deposition is occurring upstream of Cheslatta Lake with finer textured sediments being carried downstream to Nechako River and that water level variations on both lakes are an impediment to the development of riparian vegetation. , Tributaries between the spillway and Cheslatta Lake are also down-cutting due to a reduced base elevation and seasonal variations in water level. Three types of flows are currently in the system – baseflows, STMP flows and flood flows. Flood flows are thought to be responsible for the majority of the sediment transport but data are not available to quantify suspended sediment concentrations or loadings. It might be possible to construct a low head dam at the outlet of Murray Lake to maintain the water level at a more constant elevation. This could reduce local erosion and promote the development of riparian vegetation.. Lake levels currently fluctuate 3-4 m. during STMP. Consider First Nation Rehabilitation Plans and how these may be affected with a restored Murray Lake. Heating effect not likely. Help riparian conditions and lake littoral values. This might take away the present requirement to surcharge (viewed as a `dull tool`) the Murray Cheslatta system at the commencement of the STMP. Consider live gravel bar staking (with willows, cottonwood and red osier dogwood) on gravel bars to help stabilize/trap sediment movement. Fertilization of the river to increase productivity was discussed and it was felt this would not likely work due to short retention time.
5. **Flow Pattern and Variability** –The importance of trying to restore or mimic a more natural temporal pattern in river discharge and re-establishing channel maintenance flows (which can mobilize bed materials or allow other processes which create habitat values) was discussed.. The Nature Conservancy (<http://www.nature.org/initiatives/freshwater/conservationtools/>), The US Geological Survey (<http://www.fort.usgs.gov/HIP/>) and the US Army Corps of Engineers (<http://www.hec.usace.army.mil/software/hec-rpt/index.html>) have developed models to assess how flow related parameters may affect 'river health' .
6. **Indicators of River Health** – Physical parameters like water quality are one dimensional. Biodiversity easy to measure. Benthic invertebrate can provide a biological index. Channel bed load mobility could be evaluated through a compilation of historical air photographs and by hydraulic calculations. Species diversity, relative numbers of juveniles and adult fish could be evaluated but existing extensive data base is truncated at the Nautley confluence (a constraint). Log jam generation and frequency is an indicator of environmental health although it is

recognized that Cottonwood forests are no longer being generated and this may be a problem as cottonwood tends to make up much of the large woody debris in log jams and other habitat complexes. (The present hydrological regime, which delays and reduces the onset of high water in comparison to natural conditions, may be playing a role in reduced cottonwood establishment. The Wild Salmon Policy looked at habitat indicators of river health and indicators were developed for the Columbia River system. It was recognized that the Nechako River will remain a regulated river and that regulation will unavoidably reduce the complexity of the river which over time may reduce the complexity of the biological communities within. Periodic disturbance by high flows provide benefits for river health such as cleaning the river bed and bringing in nutrients. Ron Ptolemy (BC MOE Aquatic Conservation and Science Section) has developed a model which uses water quality to predict potential WQ and biomass production. This might allow the present sport fish biomass production on Nechako River to be compared to its potential value. The now obsolete Forest Practices Code IWAP (Interior Watershed Analysis Procedure) and more recent Forest Range and Practices Act protocol for Evaluating the Condition of Stream and Riparian Management Areas could be used to identify potential watershed scale impacts associated with upslope development activities.

#### 7. ***Allocation of NEEF***

- Support to community/watershed level organizations (ex. NEWSS). Caution falling into the “watershed restoration trap” doing something functional or just something with good optics. Tributaries often the only areas with the potential to restore to historical levels. Focus tributary work on the restoration of groundwater. Leveraging funds and having local residents involved is important. Engage citizens and all basin operators. Divide Nechako River watershed into segments and apply different levels of attention to each. Need to monitor current conditions to determine whether watershed restoration work is achieving desired outcomes.
- Support to legacy fund concept
- Support for the WRF and rehabilitation of the Murray-Cheslatta. Acknowledge that Murray-Cheslatta won't be restored to pre-Kenny Dam conditions but to something considered appropriate today. Recognize associated benefits of a WRF (9 km of new fish habitat below Kenny Dam; potential (modest) for increased temperature control; potential to create a more natural rising limb of the hydrograph; and potential power generation.
- Look further into the construction of a structure at the outlet of Murray Lake.
- Look at the reservoir and how it is managed for flood control.
- Sturgeon hatchery necessary and worthwhile in the short term. How to decide when is enough? In river habitat manipulation appears to be experimental. Is it possible to learn more about the species before doing experiments?
- Address unanswered questions/technical investigations:
  - i. General support for the need for more data (in additional to fish monitoring) and the development of interpretative reports. Data collected now will provide for the future. Without it there remains considerable uncertainty.

- ii. Sediment transport – how much is moving, where is it going? Expand/continue geomorphology, hydraulic, and sediment transport modelling work below Vanderhoof. Support with data collection; a) survey of sections downstream of Fort Fraser; b) continuous flow monitoring of tributaries for a couple of years; and c) continuous(turbidity with periodic sampling) suspended sediment measurement on tributaries and main channel for a year or two (sampling one year, turbidity for a couple of years).
- iii. Install a debris trap at the outlet of Murray Creek.
- iv. Scalp bars down to adjust velocities, mechanically clean gravel for sturgeon, vegetation planting within tributary watersheds in areas with riparian impacts or in areas of sediment accumulation and along the main channel to reduce summer water temperatures.
- v. Complete impact analysis in the form of a summary document which quantifies project related changes in river flow, sediment transport and river morphology. This analysis will provide a basis for better decision making as we move forward. Some urgency to doing this science now while people with considerable experience on the river are still active.
- vi. Mention made of geological fault running up the centre of the Nechako Canyon downstream of Kenny Dam.

**8. *Miscellaneous Comments and Suggestions:***

- Use NEEF to purchase the rights to water needed to provide a more natural flow regime.
- Buy properties subject to flooding to make it easier to restore larger flows in the river.
- As regulators and stewards we need to make decisions as to what is best not how to get to the past.
- If the Murray-Cheslatta flows revert back to 2-5 cms flows it would take a considerable for the channel and riparian areas to re-adjust to this new flow regime Enhancement Options being considered must come with a clear understanding of why it is important and what the appropriate measures of success might be

**9. *Papers Exchanged/Introduced:***

- Steve Macdonald offered to distribute his recent paper “ The Efficacy of Reservoir Flow Regulation for Cooling Migration Temperature for Sockeye Salmon in the Nechako Watershed, J.S. Macdonald et al., September 2011”.
- Mike Miles offered to circulate reference material from the Columbia River and papers from past DFO scientists on the Nechako River.

All papers are to be added to the NEEF MC Library of documents on the [www.neef.ca](http://www.neef.ca) website.