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Comments on Recommendations of Technical Report 2 – Potential Effects of Contaminants of Fraser River Sockeye Salmon by Robert Grace, RPBio.

1. Somewhat in agreement. However, most incubation and rearing habitats for sockeye salmon are lightly impacted by human development. Land uses in these watersheds are mostly forestry, agriculture and small residential developments. Many "industrial" contaminants should not be present in these habitats, so a reduced monitoring program would be advisable. Monitoring in these two habitats should be reduced to relevant parameters. The parameters selected should concentrate on sewage related compounds, volatile organic compounds that are spread via the atmosphere and contaminants that are present in relatively pristine areas or can be naturally present (i.e. metals).

   The migration habitats and the rearing habitat for the Harrison River run are more exposed to industrial and large municipal impacts. Monitoring should be directed more to these habitats.

   An initial monitoring program should be developed to look at a wide range of contaminants and habitats. The results of this program should be assessed to identify contaminants and habitats that may be problematic or at least detectable. I would not be surprised to see that many contaminants, especially in incubation and rearing habitats are not a problem. Subsequent monitoring should concentrate on problematic contaminants and habitats.

2. Agree that monitoring should address several environmental compartments, in order to evaluate possible contaminant sources and possible pathways of contamination. For example, many contaminants are hydrophobic and bind to particulate matter that settles out into the sediment. Contamination through the food chain is the primary method of contamination for some parameters (i.e. selenium and many chlorinated organics) rather than directly through contact with contaminants in the water column.

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3. Agree that the monitoring programs should address TSS and streambed substrate quality in incubation habitats, dissolved metals (including Se) in all habitats, nutrients in rearing habitats and common organic contaminants in all habitats and fish tissue. However, the parameter list in Table 8-1 could be revised to only assess relevant parameters. I have the following comments on Table 8-1:

   BOD and COD are relevant parameters in effluents, but are not really relevant (or detectable) in streams and lakes. Therefore, BOD and COD should be deleted.

   Faecal coliform and Enterococci are good indicators of sewage and agricultural contamination, but do not impact fish directly. These two parameters could be deleted if not being used to track fecal contamination.

   Anions are mostly used as tracers. However, sulphides are highly unlikely to be detected in streams and lakes, except where anaerobic conditions occur or downstream of effluent discharges containing sulphide. Sulphide could be deleted at most sites.

   Nutrients are important for assessing productivity and should be low in most sockeye habitats. I am not sure that urea is necessary as the other nitrogen parameters should be sufficient. I am not sure if urea is analyzed regularly by laboratories.

   Metals can be a natural contaminant and should be included (at least initially) for the Nahatlatch and Bowron Rivers.

   Organotins, cyanide, MAH's, PAH's, phenolic compounds, chlorinated phenolic compounds, PCB's, PCDD's, PCDF's and all parameters from petroleum hydrocarbons on are unlikely to be found at detectable concentrations in the less disturbed watersheds, except for those compounds that are volatile and known to be transported via the atmosphere. These parameters are expensive and if found to be less than detectable in initial samples should be dropped to concentrate resources in areas and on parameters that are more relevant to sockeye health.

4. Agree that direct measures of effects on sockeye salmon should be included in the monitoring program.

5. Agree that co-ordination among government agencies and regulated interests should be improved. MOE has promoted the Thompson River partnership monitoring program, to integrate monitoring being conducted by several dischargers and government agencies on the Thompson River.

Robert Grace, RPBio