



HULLCAR REVIEW

Prepared by: E.Dennis Einarson, RPBio
Environmental Impact Assessment
Biologist

Date: 11-Sep-2017

Client name: Inter-Ministry Working Group - Hullcar
File: 76600-20 Armstrong

Re: Review of FLNRO's summarization of the State of the Aquifer (File: 38050-40/Hullcar)

I reviewed Dave Thomson's summary of the available information regarding the state of the Hullcar aquifer and path-forward guidance. He has accurately summarized the currently available information on the Hullcar aquifer. The recommendations he cites would add tremendously to the understanding of the interactions between recharge, surface interactions and discharge dynamics of the aquifer.

As suggested by his recommendations, the interactions with Deep Creek are a bit more complex than what was first thought. The creek's headwaters are outside the valley and are a significant source of the recharge to the aquifer- but only one of several. The outflow from the aquifer is also complex. There is no overland flow; only springs. A number of springs have been identified and samples collected, between Hullcar Road and Steele Springs. The water chemistry and identifiable characteristics vary significantly between springs. Each of the springs has a localized effect on the water chemistry of Deep Creek with the summation of the GW discharge to Deep Creek observed at the sample site located at Gultch Road. The most pronounced effects can be seen during late August and September where the GW is a significant proportion of the creek volume. These dynamics would be better understood with the studies Dave refers to above.

Below Hullcar the creek flows down through the Armstrong area, Otter Lake and eventually ends up in Okanagan Lake. Historical sampling shows that NO₃-N values **decrease** from headwaters to Okanagan. This is usual and shows the complexity of this small watershed. The claim of "contributing" to algal blooms in Okanagan Lake is inaccurate. First and foremost, Okanagan Lake is phosphorus limited as such nitrates have no effect on algal growth.

E. Dennis Einarson, RPBio
Environmental Impact Assessment Biologist
Ministry of Environment, Regional
Operations Branch