

Reviewer #2:

We thank the referee for her/his review. Below we reply to each of the reviewers comments and suggestions.

Note: Our references to page numbers refer to the original manuscript. In the revised manuscript page number may differs.

“While the title would suggest that this is a regional survey, it is instead an exploratory investigation on two lakes located in contrasting hydrological settings.”

**Response:** We agree and changed to title to:

*The contribution of groundwater discharge to the overall water budget of two typical Boreal lakes in Alberta/Canada estimated from a radon mass balance.*

“...the implications of the study are largely left unexplored. For instance, 1) what are the management implications with respect to the fact that very different results were obtained on the two different lakes? 2) How will mining activities affect groundwater - surface water interactions? Given the results, is it not prudent for the authors to recommend a broader survey of lakes in the Fort McMurray area to test their hypotheses (i.e., sediment type, hydraulic gradient and catchment area determine the role of groundwater recharge to lake water balances).”

**Response:** We agree that the implications of our results could have been better explored. We have added the following to the summary and conclusion section (page 5006):

*Oil mining in Alberta significantly alters shallow and deep groundwater resources. Steam-assisted gravity drainage involves injection of steam and pressurization of groundwater formations to extract bitumen, and disposal of brine into deeper formations. One major concern is that abstraction of groundwater will impact surface water bodies and wetlands in the region by altering natural subsurface inputs. Adaptive management strategies therefore require an understanding of potential for groundwater exchange with surface water bodies. As our radon approach was useful to examine two remote lakes with contrasting groundwater input rates, we recommend that further investigations should cover a broader area to better understand how factors such as sediment types, hydraulic gradients, and catchment areas control groundwater discharge rates. The large number of lakes in the Fort McMurray region makes it ideal for such comparative investigations.*