

Remaining Comments for the Public Hearings regarding the DeBeers Canada Gaucho Kue Diamond Mine Proposal

October 22, 2012

Submitted to:

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Introduction

On behalf of the Deninu K'ue First Nation (DKFN), LGL Limited is offering the following comments on the DeBeers Canada Gaucho Kue Diamond Mine Environmental Impact Statement (EIS) submitted to the Mackenzie Valley Environmental Impact Review Board. We reviewed the majority of the fish, water and fisheries related EIS chapters for the Gaucho Kue Diamond Mine and submitted regular information requests over the last six months. While DeBeers Canada responded to all our information requests in a timely and appropriate manner, the contents of the responses did not meet our expectation in several instances and we therefore would like to request that the remaining information gaps summarized in this short document be filled.

Specific Comments

Although the fish population in the majority of Kennady Lake will be killed through the dewatering of the lake, it is essential to properly describe the baseline fish population as the benchmark for the desired status and habitat compensation following closure of the mine. De Beers carried out three daytime hydroacoustic surveys of which one had to be disregarded based on technical difficulties and thus tried to enumerate the Kennady Lake fish population. We feel for the following reasons that this task has only been partially completed if at all:

- Fish, especially larger fish (>20cm) evade boats during daytime especially in shallower lakes such as Kennady Lake and to our knowledge all hydroacoustic surveys to date have been carried out during daytime. From our own experience and firmly supported by the literature (i.e. review by MacLellan and Hume 2010) the results of daytime hydroacoustic surveys generally produce significantly lower overall fish densities and particularly significantly lower densities of fish larger than 20 cm. Larger fish due to their higher swimming speed can evade the boat at a higher rate than smaller fish before being detected in the narrow beam of the hydroacoustic sonar. Although we appreciate the short period of darkness found in summer at the Gaucho Kue project site, the month of September will accommodate the completion of nighttime hydroacoustic surveys. In addition to a short dark period, De Beers also stated safety concerns for the completion of hydroacoustic surveys at night. We therefore recommend to use the daylight hours to geo-reference safe transects and follow those transects when carrying out the survey at night.
- De Beers only processed and included the hydroacoustic data for fish larger than 18 cm in their estimate of the Kennady Lake fish population. Typically, the number of fish smaller than 18 cm makes up the majority of the fish density of a lake and therefore likely the majority of fish have not been included in the fish population estimate. We appreciate that De Beers was mainly concerned with the fish that are in the size classes large enough to be harvested for consumption when the lake is dewatered but this

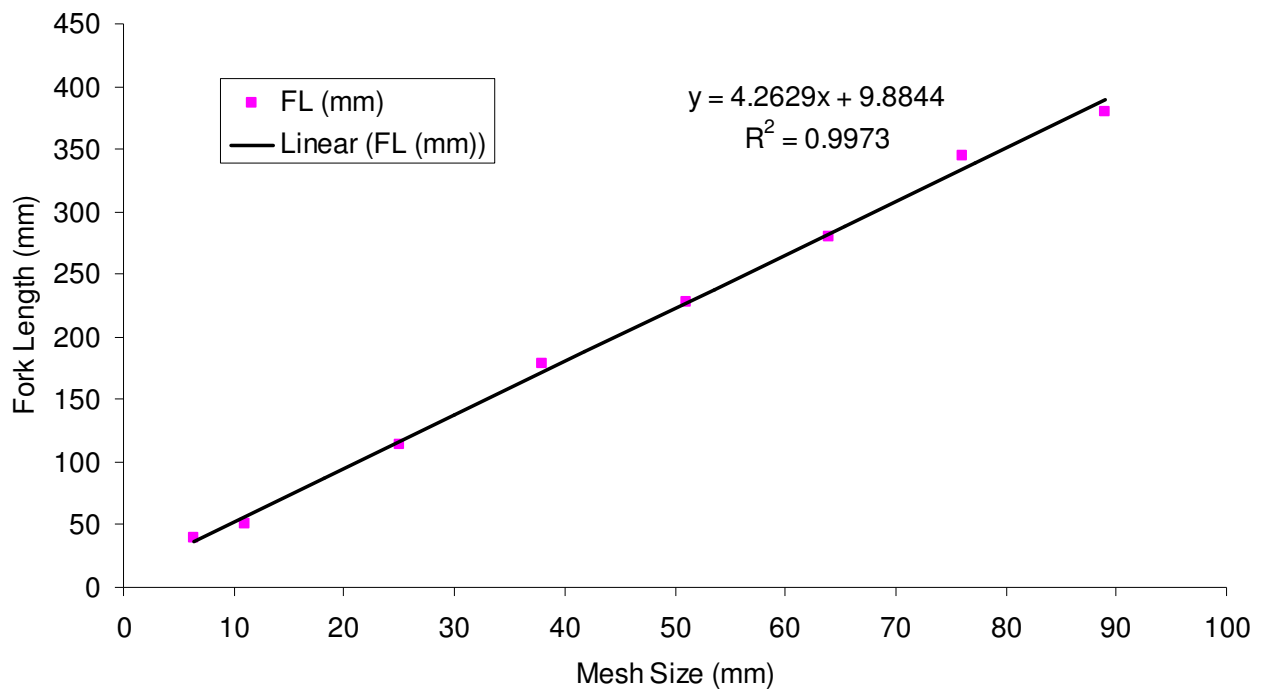
approach neglects to detect and describe the majority of fish in Kennady Lake and is therefore unsuitable as a baseline study.

- De Beers referred to a peer-reviewed paper (Hartman and Margraf 2007) to justify that the daylight hydroacoustic surveys are suitable to describe a fish population in high latitude lakes. In our opinion and based on our own experience with hydroacoustic surveys the Hartman and Margraf (2007) paper is not suitable to show that daytime hydroacoustic surveys are as effective as night-time surveys. Hole Lake, the lake surveyed by Hartman and Margraf has glacial water and is likely naturally turbid. Therefore, it is not as strongly influenced by daylight as a non-glacial lake. Hole Lake is also small (approximately 50 ha) and has very variable and high fish densities of up to 9,834 fish/ha (Hartman and Margraf 2003). Comparisons with the conditions in the clear water, much larger, and likely much lower fish density Kennady Lake should therefore not be made. When a large body of literature is showing that day-time hydroacoustic surveys are only detecting a fraction of fish in a lake when compared with night-time hydroacoustic surveys and it is easily technically feasible to conduct such night-time surveys than they should simply be carried out.
- Based on our own experience in oligotrophic lakes, daytime fish target densities are approximately one order of magnitude lower than densities determined during night-time (Bussanich et al. 2006, Plate et al. 2011, Plate et al. 2012a and Plate et al. 2012b). The application of this knowledge to the Kennady Lake example would mean that the small fish population in Kennady Lake was hugely underestimated by carrying out the surveys during daytime. In addition, the numbers of fish smaller than 18 cm, in most cases the majority of fish in a lake were not described at all.

We therefore requested the following additional baseline work to be completed in 2012 in an information request:

- Timing Recommendation: The new moon phase (which ensures a dark night) and a long dark period from 9:35PM to 5:49AM and from 8:00PM to 7:05AM in the Gahcho Kue Project area can be expected in the time periods around August 17, 2012 and September 15, 2012. We recommend carrying out the surveys during either one of these periods.
- Survey Frequency Recommendation: We recommend carrying out at least three night time surveys to reduce the confidence bounds of the calculated fish estimates.
- Data Analysis Recommendation: De Beers mentioned that they had difficulties to analyze the number of hydroacoustic targets <18cm length because of signal to noise ratios. We therefore recommend to send the hydroacoustic raw data to Don Degan at Aquacoustics Inc. (<http://www.aquacoustics.com/>) to be analyzed using his extraordinary experience with hydroacoustic data and the "Echoview" software that specifically sorts targets from noise.

In response to our comments and the request for baseline work DeBeers Canada listed gillnetting, shoreline electrofishing, angling and minnow trapping as the fisheries methods that were used to support the population estimate based on the hydroacoustic day-time surveys. All four methods listed are commonly used as tools to assess species composition and species presence but cannot be used as population estimate tools on their own. DeBeers Canada further mentions that several mark-recapture programs were carried out to provide population estimates but DeBeers does not mention the results of the mark-recapture estimate. Based on another review of Section J 4.4.5 of Annex J the mark-recapture program did use nets with a minimum mesh size of 38mm which would result in mainly catching fish that are larger than approximately 180mm (see figure below). This results again in the complete exclusion of fish that are smaller than 180mm into this population estimate. DeBeers Canada therefore did not only exclude fish <180 mm from the analysis of the hydroacoustic surveys but also from the population estimate based on the mark-recapture program.



Graph showing fork lengths versus net mesh size for fish caught in freshwater lakes in British Columbia (Hamley 1972, Plate 2007).

Furthermore, I would like to quote directly from the EIS Annex J Section J3.5.5.3:
 “Due to the low number of recaptures in fall, Peterson population estimates were not calculated because confidence intervals were too large to make such point estimates reliable.”
 At this point we would have recommended to disregard the results from the mark-recapture experiments because recapture numbers were too low. In addition, the never mentioned alternate explanation for very low recapture numbers is a very high population estimate.

DeBeers Canada also completely disregarded the attached literature in stating that:

“There is no evidence in the literature, or from fish salvage programs undertaken in the Canadian Arctic, to suggest that fish densities are much higher in northern lakes (e.g., 1,000 fish per ha), as may be the case in larger waterbodies at lower latitudinal locations (e.g., Coquitlam Reservoir; see references listed in the Preamble).”

Coquitlam Reservoir has almost the same size as Kennady Lake (1200 ha), and is characterized as ultra-oligotrophic and often has several of month of ice cover. Coquitlam Reservoir also has virtually no litoral zone due to its reservoir-typical fluctuating water levels which further reduces its fish habitat. Coquitlam Reservoir is therefore very similar in area, nutrient contents and available productive fish habitat to Kennady Lake.

In summary, we conclude that no solid estimate for the whole fish population and particularly the fish population <180 mm in Kennady Lake has been carried out up to date and that DeBeers Canada should provide a solid fish population estimate for Kennady Lake to provide adequate base line information.