Meeting Details: Fish & Aquatics Discussion			
Date	08/10/2014	Time	1:05
Location	124 Seymour St. Kamloops	Room	Ironmask Boardroom

Attendee Name/ Title	**Attendee Name/ Title**	**Attendee Name/ Title**
Jean-Paul Salley (JPS), KGHM	Bob Hamaguchi (BH), Consultant	Phil Belliveau (PB), FLNRO
Nicola Banton (NB), KGHM	Steve Maricle (SM), MOE	Cheryl Delwisch (CD), FLNRO
Laura Smithies (LS), KGHM	Andrew Klassen (AK), MOE	Samantha Cooper (SC), MOE
Stephanie Eagen (SE), KP	Corrine Gibson (CG), DFO	

Jacko Lake Presentation (SE)

Jacko Lake – Habitat

- Jacko Lake dates back to 1877; dam dates back to early 1900's, built by ranchers for irrigation and flood control. 1950; 40 hectares (inlet & outlet)
- Raised in 1970 1m; 891 masl.
- 1992 raised 1m; 892masl; 48.5 hectares. For irrigation and MOE conservation purposes.

Jacko Lake – Current

- Local angling lake; for Kamloops and region; 2160 to 6285 angler days.
- Peak months April, May and September.
- Data on angler numbers – SE mentioned the 2007 Stacy Webb report which estimate 4245 average angler days between 2000-2004
- SM noted that this number is low because the estimate is based on flyovers occurring between May to mid-September, which misses the anglers in April and October
- Flights are 3 years on/3 years off; 21 flights between early May to late September, flown once a regular weekend but twice on long weekends.
- Jacko Lake is one of the first lakes opened up; a lot of pressure there.
- Camera work is a little difficult to try and capture it all. Especially on Jacko Lake. Re: data, fresh water fish society has the data. (Knight Piesold to follow up with SM/AK for recent angling data)

Fisheries Resources

- 1940s originally stocked; no data to back that up but mentioned in one of the reports referenced in the bibliography at the end of the presentation. C.J. Price. Integrating Mining With Other Resource Users At The Afton Mine. Proceedings Of The 15th Annual British Columbia Mine Reclamation Symposium Kamloops, Bc, 1991. The Technical And Research Committee On Reclamation Available at: http://circle.ubc.ca/handle/2429/12669.
- Know when they first started stocking but don't know when fish were originally stocked.
- Recent numbers are a bit low because they are using a new company that missed the shore anglers
- Formula used to estimate numbers based on the flyovers is out of date – was developed 30 years ago
- Data has been sent to FFSBC for crunching; SM will be the point of contact to get the information
- Webb report also noted that condition factors are determined for fish in a number of the stocked lakes, but as of 2007 Jacko Lake was not one of the lakes Jacko Lake is not included in condition factor analysis because there has not been any concern with the condition of the fish
- Jacko Lake has never been an issue; condition high; growth rates high.

Potential habitat loss due to proposed project

- Infilling of NE Arm of Lake; 2-3 m deep; represents <1-% of lake surface area; primarily affects littoral rearing habitat (>888masl)
- PB requested to explain picture; (crest, red line is dam)
- Description of the slide: Pit crest is outlined and the red line indicates the proposed dam. The dam is required to protect the pit from the lake; stop spillover into pit.
- Loss of the arm would be considered as a permanent alteration (CG)
- From a Fisheries perspective-Duration of the alteration would be greater than a year so it would still be considered permanent; longer then the ability of the fish's key life stage environment.
- PB: Original design called for a berm encroaching 0.25 ha into the lake – now the impact will be 3 ha, affecting 30% of the fishing area
- Even though the NE arm only represents 10% of the lake area, it is of high value and represents 30% of the fishing effort
- Two key fishing areas are the NE arm and the inlet arm but the inlet arm is unfishable by July because of the benthics (the vegetation choking the channel?)
- Logistically a high value fishing area; inlet and NE bay. The NE bay is used early and right through the year.
- Juvenile use that littoral area as well
- Trade-off; pulling dam back out once pipeline is removed; NB: Dam is required to remove Kinder Morgan Pipeline; definitely the preferred option and a large challenge; the fact remains in original design there would have to be a berm there to protect the lake and provide visual impact mitigation for the pit. The pipeline was not going to be removed in the original GA.
- NEB requires that the pipeline be removed during decommissioning. Sheetpile dam was proposed in order to help in vibration mitigations with fish in Jacko Lake during blasting events.
- MOE questioned the need to have the sheet piling in permanently (e.g., after removal of the pipeline) under the premise of mitigation for blasting, since blasting in the area will represent probably only 10% of the period for the entire pit – have to balance permanent loss of 3 ha of lake against blasting injuries to fish occurring for only a short period of the pit development
- Revised design around the pit and berm/sheetpile dam was driven by the need to remove the pipeline
- Mitigation; principle of avoid and mitigate and then offset; the pit looks like it will encroach on that NE arm and goes against that;
- NB: Mitigations include Steepening pit walls to pull back the edge of the pit. Geotechnical work has been conducted to ensure that the walls of the pit can be constructed at the proposed angles. PB: Discussion of offsetting has skipped over the hierarchy of avoiding and mitigating effects
- SM: If you could remove the pipeline and put a temporary coffer dam in and would you still have to remove the whole bay? Original meeting with KGHM was to minimalize impact. Now it's at least 30% of the fishing (area).
- NB: Mitigation for fish requires that kind of setback for blasting; other mitigations include reduced charge sizes to stay within DFO guidelines for vibration thresholds on fish swim bladders. Pit design has been pulled back a bit from the edge of the lake, therefore avoidance has not been totally ignored, but from an economic perspective pulling the pit all the way back to avoid the lake would be challenging. The technical working group (TWG) has not had a chance to review the proposed design, avoidance and mitigation measures haven't been discussed in the proper forum, avoidance hasn't been adequately discussed prior to jumping right into offsetting. Decisions around things like how close to Jacko Lake and what level of mitigation; this is not a done deal; what we are trying to say is if we looked at the actual policy through the environmental mitigation policy. Hasn't had a chance to adequately discuss and work through this particular topic.
- PB: KGHM shouldn't be having discussions with NGOs and stakeholders without government representation, as they may not be aware that avoidance and mitigation have to also be considered and will think offsetting is the only option

- NB: Avoidance and mitigation was discussed during the NGO meeting.
- SM: Peterson Creek; need to consider Peterson Creek when considering impact to the lake, because the fish spawning in the creek come from the lake and return to the lake
- NB: KGHM has not advanced design far enough for the Peterson Creek diversion to be able to discuss at this point.
- PB: How much of Peterson Creek will have to be diverted? NB: 1-2kms of Peterson creek would need to be diverted.
- SM: just pumping, no outlet; is that still the plan?
- NB: KGHM has considered various options; what kind of alterations would need to be made to the dam; flood situation where would the water need to go.
- SM: if you do pump you lose another 30% of that littoral zone; becomes pretty stagnant.
- NB: suggest pump from the SE arm to maintain flow through that arm; to address some of the stagnancy issues.
- AK: impact to fishermen on the lake during blasting events?
- NB: During early stages of pit development the lake would likely need to be cleared; KGHM is considering mitigations such as timing of blasts in order to minimize the number of fishermen affected by blasting events.
- JP: KGHM is also looking at transportation and access to the lake - Security building moved east along the current Haul Road; Current access is via easement and public access road – KGHM is suggesting alternate access route that would be directly off of a public road (current Haul Road)
- SM: Why was blasting not discussed with anglers? NB: it certainly was discussed but was not part of the presentation. Fishing and fishing experience was discussed at length.
- SM: we are talking about physical impact; not everything that is associated with loss of NE arm of Jacko Lake NB: Socioeconomic, aboriginal, aesthetic concerns are all considered in the Application, Mitigations for fishing experience: have talked about enhancing fishing at other lakes in the area such as Edith.
- SM: with original proposal the proposed location of the pit seemed to be a viable operation and now all of a sudden we are filling in this whole bay. As you blast down the blasts are going to get further away and effects to fish and fishermen on the lake will be reduced. This area represents approximately 10% of the blast period. Not my call but 10% of the time fish may be affected by blasting vs. 100% of the time the bay is going to be gone.
- Already causing serious harm by infilling the bay vs. blasting. Suggest choose which one will be causing greater harm and go with the other option.

  Graph; offset; new effect; time line; mitigation; original impact, etc. Figure 1d.
- Offsetting outside of Jacko Lake; have you looked at offsetting outside of Jacko Lake? Focused on Jacko Lake not on the system as a whole (i.e. Peterson Creek and Jacko Lake)
- Within the footprint of the project other areas will be included for offsetting if they are considered fisheries under the revised Fisheries Act; the purpose of this presentation was to focus on Jacko Lake because we have more information on the project design in this area
- Peterson Creek will be diverted for the life of the project (1.5 – 2 km), at closure will be within a channel but will not follow its exact current path
- CG: This will still be considered a permanent alteration
- SM: Fish spawn in Peterson Creek therefore Peterson Creek will need offsetting– will the diversion at closure become functioning habitat?
- Impact to fishermen from blasting – lake will need to be clear when blasting occurs on that side of the pit – this has not changed from the previous design; concern of effects to fishing experience from blasting was raised by the anglers – this will be discussed in the EA under the heading Jacko Lake, which will include social components

- SM: Many, many years before it's recreated to its original functioning habitat and years before you see it back to its original function.

Fisheries Act

- Section 35, Serious Harm, Commercial, Recreational, Aboriginal.
- Section 35(2); four factors in section 6 of the Act must be considered by the Minister before authorization can be issued.
- Contribution of the relevant fish to the ongoing productivity of commercial, recreational, or aboriginal fisheries.
- Fisheries management objectives;
- Satisfy Ministry, FN, and Regulators.
- Offsetting measures (guiding principles); site specificity; locally valued fish species; offset measures selected should be associated with a high likelihood of success to make a meaningful contribution to the local fishery, and should be measureable.
- Balance the proportional impact; any alteration replaced with similar quality or better quality
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- CG: 1988 blasting guidance is not current – review the new Working near Water Website

Summary & Next Steps

- Installation of sheet piling is for safe removal of pipeline and to minimize the effects of blasting on fish, therefore the sheet piling and infill will be permanent for the life of the project instead of being removed after the pipeline has been removed.
- DFO agreed with MOE – which represent a lesser serious harm on the fish population – loss of the habitat or blasting injuries for a short period of time
- Anticipated Habitat changes (lake filled in)
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- The pipeline needs to be removed as directed by the NEB
- Sheet piling in the arm will be installed to effectively remove the pipe and will stay in place during life of mine in order to help mitigate vibration concerns to fish and inflow of Jacko Lake into the Pit.
- Project could affect approximately... 3 ha of littoral rearing habitat in the NE arm of Jacko Lake. Given that the impacts will affect a recreational fishery, offsetting will be required.
- In keeping with fisheries management objectives, preference is that offsetting occurs where it brings the greatest net benefit to the fishery e.g. further away from impact but greater benefit preferred over close to impact but less net benefit
- Public will be informed of blasting times and safe zones.
- Logical first step; adequate design
- PB: EA application-you will have to discuss closure options; have you put any thought into that and discussed that?
- NB: Thought is to create a channel in as close to original location and essentially put the flow back through Peterson Creek channel; Remove sheet pile and allow lake to return to its full extent within the NE Bay; presumably consistent with what Corrine said earlier; 2.5 km of the Creek channel would be destroyed during mine life.
- CG: alteration to Peterson Creek would be considered permanent because it's greater than a year; Permanent impact or permanent destruction. If you're altering it or just changing the flows; it would be permanent; greater than a year.
- Proposed life of project 23 years.
- Part of mitigation strategy as to how you're going to mitigate that impact of the harm you're doing to the population and offsetting; construct and looks like when you're done. Offsetting to be done up front so

it's more of a mitigation measure. Comes to discussions around the quantification you're doing to the fish population; greater harm if it's completely or never building that creek back; functional creek 28 years later as opposed to two years later. Ends up being serious harm to the population.

- JP: Darren Bennett was supposed to be at this meeting as well; the minutes will be done and completed for this meeting which you will have access to as well. Steve price report? If you can't find it we will have it for you. Request has been sent to SSN a week ago at this point we haven't heard anything back.
- Rough time line for next step in the process; current draft AIR application to come forward?
- Application of next year; AIR is going out for public commenting period in November. EAO wants to have a look at it that their satisfied that the WG comments have been addressed.

Action of Items

- Knight Piésold: Obtain up to date fishing data from MOE (AK/SM)
- Knight Piésold: Obtain from MOE (AK/SM) Regional Fisheries Management Objectives/Plans
- Knight Piésold: Obtain productivity estimates for Peterson Creek – contribution to the fishery of Jacko Lake (from AK/SM)
- Knight Piésold: Follow up with DFO (CG) Re: use of explosives near water. Determine if proponent is required to meet 13 mm/s PPV and <100 kPa overpressure (Wright and Hopky document) if all mitigation measures noted on DFO "Working Near Water" website are applied.

Other Notes/ Comments

- 2:15pm meeting adjourned.

			Fish Habitat Loss Compensation Plan – Special Interest Group Meeting
Date	September 17, 2014	Time	10:00am
Location	124 Seymour St. Kamloops, BC	Room	Sugarloaf Boardroom

Attendee Name/ Title	**Attendee Name/ Title**	**Attendee Name/ Title**
Brian Chan (BC), Riseform Fishing	Don Trethewey (DT), Kamloops Fish & Game Association	John Cartwright (JC), Kamloops fish & Game Association
Leonard Piggin (LP), Kamloops Fly Fishers	Gordon Bacon (GB), Kamloops Fly Fishers	
Laura Smithies (LS), KGHMI	Nicola Banton (NB), KGHMI	Peter Troffe (PT), Knight Piesold
Robert Koopmans (RK), KGHMI	Clyde Gillespie (CG), KGHMI	Bob Hamaguchi (BH), Consultant

- **Topic 1 – Introductions**

- **Topic 2 - Safety**

  Safety Item(s); Fire safety, Muster Points, Washrooms

- **Topic 3 – General Arrangement Presentation (Robert Koopmans)**
  - Changes to the GA
    Google earth snapshot: showing previously proposed TSF; pit, WRSF to the north and temporary ore, and stock pile.
  - 3D represents new GA, looking towards the south instead of previous Google Earth shot that looks from the North.
  - The changes between North and South footprints; Waste Rock Storage Facility (WRSF) – EWRSF smaller, North WRSF moved to SWRSF, stock pile moved to south, dry stacked TSF vs. Wet/Conventional Storage;
  - TSF located to the south; all facilities are now located south of the City of Kamloops boundary.
  - All of mine structures are to the south of the city boundary.
  - Jacko Lake: in previous version of GA it was more in the centre of the overall footprint now, with new GA, it is located more to the West of the project area.

- **Topic 4 – Preliminary Fish Habitat Assessment for Jacko Lake (Peter Troffe)**
  Jacko Lake Historical Aspects changed over years. Presentation included information on the following:

  - Water licenses on Jacko Lake since the 1800`s
  - Initial dam dates back to 1900 in Peterson Creek
  - 1950 inlet and outlet; max elevation 884 masl
  - 70's lake was raised again for improved water storage; lake hectares increased to 17%; 11% more volume; initial formation of the NE and SE arms max elevation 891 46.7 hectares.
  - 1990 photo of Jacko Lake outlet;
  - 1990 photo of dam at Jacko Lake;
  - 1992 lake raised another metre to full elevation to 892 masl. Allocated to MOE for fish conservation;
  - FLNRO current desire to understand water use of lake and make a water use plan. Understand how water is going out Peterson to maintain stage in lake
  - Google earth from May 2012; 48.5 hectares max elevation 892 masl
  - Fish resources from Rob Byson
  - Peak fishing months are April-May and into September. Provincial sampling; 1949/50

- Jacko lake has been stocked annually since 1954
- Both triploids not reproductively viable (?). And diploids (viable) stocked since 2002. Diploids will spawn given the opportunity.

Anticipated habitat changes due to project.

- Outline of pit affects NE arm; area is approximately 2-3 meters deep; represents approximately <10% of current full pool elevation of Jacko Lake; primarily effects littoral rearing habitat >888 masl. Approximately 3 Hectares will be affected by the proposed sheet pile dam and pit edge.

- **Topic 5– General Discussion - Kinder Morgan Pipeline**
  - KGHM requires the relocation of the pipeline from the Project area.
  - KGHM and Kinder Morgan are working together to accommodate this work.
  - The move of the pipeline will be included in the applications for the twinning and relocation of the pipeline – this application is managed by Kinder Morgan and the National Energy Board (NEB).
  - The National Energy Board (NEB) requires the pipeline to be removed. The NEB will not allow for reclamation/backfill of the pipeline in place.
  - All fish habitat and age classes will be evaluated for the affected areas of the Lake due to the Project and the removal of the pipeline. (Response to question from Brian Chan)

- **Topic 6 - Changes to Jacko Lake Outlet and Peterson Creek**

  Proximity of Spillway to edge of pit and other infrastructure was discussed:

  - KGHM are not the dam owners. KGHM will work with the Dam Owners regarding any changes that may need to be made to the Jacko Lake Dam or outflow to Peterson Creek.
  - KGHM will work with the Dam Owners and FLNRO to ensure that water license quantities and water levels are not compromised.
  - KGHM is suggesting a pump station in the northeast arm of the lake, in the vicinity of the sheet pile damn outlined in the GA. The pump station would pump water via pipeline to the north and east of the pit area where it will be re-joined to Peterson Creek (Peterson Creek Diversion) in order to ensure that downstream users are not affected by loss of water quantity.
    - Concern: If no flow in Southeast arm, the arm becomes stagnant and could cause serious fish loss in the area – could be looking at the loss of two key littoral areas of the lake. (BC)
    - This arm of the lake was dredged and in hot days in August there is still superb fishing there because of the water flow – likely the favorite area to fish in the fall. (BC)
    - Can the pump station and diversion be moved? (GB) Discussion: It is better to move the pumping station to the southeast arm of the lake to ensure flow through this arm and maintenance of the fishing in this area. (BC) KGHM will investigate if the pumping station can be moved to accommodate for the flow of water through this arm. (NB)
  - Peterson Creek will be pumped during operations and then returned to as close to the natural channel as possible on closure of the mine facilities. (NB)

  Suggested route to the north for the diversion was to avoid mine infrastructure, but clear that this is becoming more complex and further investigation will be required by KGHM to determine if the diversion and pumping station can be moved to the southeast arm of the Lake. (NB)

  - Concerns are in the mining process; a lot of traffic will be going over that.

  Concerns are in the mining process; a lot of traffic will be going over that (Peterson Creek channel).

  As long as you understand it's impossible to maintain a stream as it is during the time KGHM is in operation. The habitat will be lost but will be restored upon closure. The flow is very important with water licenses. (Level control with the pump)

- **Topic 7 - Fish Compensation Requirements (Regulatory) (PT)**

  2013 policy statement has substantial changes to section 35;

  - Serious harm to fish no person should take on any act that may cause serious harm to fish; death or permanent harm to fish; commercial, aboriginal and recreational fisheries.
  - Offsetting measurements: compensation, DFO guidance documents, site that's specific, offsetting measures in local habitat; local habitat provided for local habitat lost.
  - Local fisheries use: offset measures; high likelihood for success: meaningful and measureable.
  - These are audited and the Regulators want to make sure the offsetting options are working as they were expected to.
  - DFO offsetting guidance; fisheries act review; goal is to have the offsetting to occur at the same time.
  - Offsetting is provided and usually takes some time to show some productivity; impact; mitigation; no net loss to the offsetting occurs at the same time when the habitat impact occurs.
  - Offsetting plans need to consider local Fisheries Management Plans.

  The affected areas of Jacko Lake and Peterson Creek are considered rearing habitat and a Recreational fishery.

  Section 35 is triggered and offsetting will be required. Offsetting has to contribute to management plans; local organizations, stakeholder, and aboriginal. Ideas to identify areas that require restoration for offsetting are welcomed.

- **Topic 8 - Blasting Management and Effects to Fish**

  Mitigation measures will be required for Jacko Lake, not just for offsetting due to habitat loss, but also with respect to blasting in proximity to Jacko Lake.

  KGHM is researching options with blasting that will reduce the effect of vibration on the fish in Jacko Lake. Options include:

  - Reduced powder load;
  - Smaller blasting patterns and holes in the vicinity of Jacko Lake;
  - Installation of Sheet Pile Dam on N.E arm of Jacko Lake to reduce vibrations;
  - Depth of Pit during Life of Mine (LOM) – vibration from blasting becomes less of an issue when the pit goes below the level of the bottom of the lake (depth around 23 m/60 feet)
  - Blast timing; once per day, set time to be communicated to the public.
  - Blasting procedures: Blasts cannot be set off until the blast radius zone is cleared for safety (Explosives Regulations)
  - Impact of the blasts will be more so in the early years of the development.
  - There is one phase that has to be carefully mitigated. Talking about a year or two not all twenty years. It is a limited portion of the overall mine plan.
  - High intensity blasts; design blasts; end up with less wasted energy; design it properly with minimum amount of energy; least effective.
  - Blasting away from the lake. (alluding to directing the shock waves away from the lake and controlling the powder factor)
  - Put delays in between the rows and then delay the smaller blasts; there are also means of stemming explosives in the hole by alternating explosive and crushed rock throughout the blast hole to reduce vibration. (Minimizes energy and disperses it by removing the amount of energy away from the blast; break it into smaller pieces).

Safety factors need to be considered during blasting events. It's a Regulatory requirement that no one can be within the 500 meter radius of the blast zone. Mitigation measures need to be worked out to determine how to best handle fishermen on the Lake during blasting events.

Fish are sensitive to vibration. They're going to change their habitats when those vibrations start; is there going to be any monitoring? (BC)

What is the impact on trout?

How will KGHM determine if fish are affected during blasting – what types of studies would be required to ensure that blasting and the mine activities are not having an effect on Jacko Lake? Will long term monitoring be included in the application? (JC)

- Guidelines are set out by DFO and will be utilized for determination of effects to fish.
- We have been given some guidance of what is acceptable vibration for the fish. There are multiple methods that can be used to move the vibration. We can't control the amount of energy output from the blast. What we can control is the amount of energy that is moved away from the blast. (CG)
- Long term monitoring will be included in the application. Monitoring plans will be developed once assessments are completed and KGHM has a better understanding of the effects expected on Jacko Lake.
- The residual effect is what effect remains after mitigations have been applied. The assessment will look at the baseline conditions and then determine the effect of the Project on those conditions. Once the effect has been determined, mitigations are considered to offset the effect. If there is still an effect on the Lake once mitigation measures have been implemented, than this is considered the Residual Effect and forms the basis of the offsetting required – this may be physical offsetting with Fish Habitat or offsetting through mitigations applied to other Lakes in the area that would offset the loss of fishing experience on Jacko Lake. (PT)
- The best input on the effect to fishing on the Lake will come from the fishermen. Communication plans and reporting opportunities will need to be considered in monitoring plans and mitigations for blasting events. (DT)
- Where there any previous issues noted on Jacko Lake during previous blasting operations in the area?
- KGHM is assessing potential effects on recreational aspects associated with Jacko Lake.

- **Topic 9 - Current use/enjoyment of Jacko Lake**

  There is going to be significant vibrations going through the water; how do you offset the fishing experience to the fishermen that are on the lake that day?

  Previous in the early days of a tournament at Highland Valley Copper; they set off a small blast to set off the tournament and it shut down the feeding of the fish. (BC)

  Set time for blasting and it will affect the fishermen; no one will want to go fishing on blast days.

  The key thing is if you're going to be blasting every day in the summer no one is going to want to go out and fish Jacko Lake in the summer. A lot of the places we send them (visiting fishermen) are Jacko Lake and Six Mile Lake; the number of people that go out to the lake just for experience; there are a lot of people. (LP)

  Six Mile and Jacko; they become heavily iced later in the year.

Those two lakes are probably the premium lakes in the area. With the price of gas if you want to go out for a quick fish Jacko Lake is the place to go. (LP)

Besides Roche Lake it's probably the 3rd highest. Jacko and Edith are probably in the top 20 lakes because of proximity and long season and easy access and nutrient rich for fish population. (BC)

The data you have on angling hours is way out dated. (BC)

Last three years there have been cameras on the boat launch to gain better understanding of usage times and rates.

- Counted boats and shore anglers on about 120 lakes in the region and used that data and a formula to get an estimate of anglers; plus or minus 10%. Significant increase from 1986 to 2014. A lot of it is due to cost of fuel.
- The information has to come from the ministry; try the freedom of information.
- Would Steve Maricle be the contact? (Yes)

Every Five years the government does a national fisheries survey;…every year they ask the top ten regions why you go fishing – fishing is never number one, it is usually 3 to 5. The first they are there to enjoy the natural experience; enjoy a quiet time on the water. It's never about fish it's always about the experience. (BC)

What about the ambiance? Is the noise level from operations around the lake affecting this? Any idea what the noise level is going to be, the decimal level? (LP)

- We are conducting noise modelling studies in the EA and based on your comments we will look at general ambiance around the lake. Suggests to me and from a fishermen's perspective do we need to improve a fishing area elsewhere? Are there other lakes that are close by where we could look at making some improvements in close proximity that we can improve fish habitat there? (NB)

Are the travel routes of the ore trucks close?(JC)

- Ore trucks will not be driving close to the lake. We talked about berms to stop visual impact. Talked about some of the sound barrier.

In the previous version of Fisheries Act; replacing things for local, monetary compensation is at the bottom; Might be able to move things around. However, they do quantify it. Pretty new document not a lot of information on requirements right now, we will have to get guidance from the Ministry and DFO for offsetting options and hierarchy: much more focused on the fisheries than affect to the habitat. (PT)

Fisheries offsetting; and consider in our application recreational use; the mitigation's that we talk about: wharfs at other lakes; creating at other lakes. This comes in under socio-economic. (NB)

- **Topic 10 - Potential offsetting ideas**

The focus of this meeting and discussion is to help KGHM understand options the Angling Community may be interested in seeing developed

What is viable for creating fish habitat? Mining might affect ambiance and how will KGHM maintain that and the fish habitat? Move it downstream? Create a pond on Peterson Creek? If we provided another dam it may help replicate water usage for the downstream water users; Are there other lakes in the area that can be increased in size or improved for recreation? (NB)

- Would KGHM consider installing wharves at the other lakes to offset? (Yes)

DFO wants minimal maintenance and long term for a long time after the project.
If KGHM can't replace area elsewhere, what is suggested for Jacko Lake? (PT)

- Exhaust the potential to do the work on Jacko before moving offsite; every potential to offset and mitigate on Jacko.
- Selective in-lake work - potential to dredge selective areas of the lake
- Compensation elsewhere (i.e. creating a new fishing pond) not favoured.
- Equivalent fishing experience must be created.
- Look at options of raising level of lake to see if it is possible to maintain a level basin. (BC)
- Depth verses Volume, increase the depth so not to create a wetland.
- Create something further downstream closer to Peterson Creek and enhance some fish habitat. It would still be in proximity to mining. (LS)
- Excavate a channel and raise the lake you would create another spillway towards Inks Lake and enhance the pond located to the northwest of the Lake.
- Spawning Channel improvement, potential option for natural recruitment
- NW arm that goes towards Inks; there is potential there; in there.

If we raise the dam 0.5-1.0 meter there will be 60-70% more water in the basin. A raise to the dam will raise the lake and in the short term create loss of some riparian impact; a lot more water storage with a relatively small increase in volume.

There are about 300 or 400 anglers in Kamloops. How would you get a rep for them here? Perhaps a public session would help? (DT)

- There are ways KGHM can reach out to a broader community. KGHM will consider all options to reach a broader audience.

Timeline: Submission in April 2015, currently working through assessments, a year gathering baseline information.

- The offsetting component in the EA and the diligence is to show is that everyone is consulted. Generally a list of 20 or so options is reviewed – this is often completed after the EA process during the mine permitting process.
- We have a lot of input. I guess what I am hearing is; the next meeting you want to see more of the options that we are exploring? That's why we are here and not there yet. It is early in the process.

Action of Items

#	Item Description	Action Needed (Decision, FYI, Review)	Assignee & Date
1	Update angling use data from Ministry	Obtain Information	BH: October 31
2	Investigate Move of Pumping Station in Jacko Lake	Review and Decision	CG: October 31
3	Investigate Blast Timing (Seasonal) for Jacko Lake	Review and Decision	CG/LS: October 31
4	Develop Preliminary List of Offsetting Options	Develop List	PT: October 31

5	**Organize Next Meeting (mid/late November)**	**Organize Meeting**	**LS: October 31**

Minutes of Meeting- (Fish Baseline and Fish Habitat Offsetting)

Meeting Details			
Date	February 5 2015	Time	10:00 am
Location	KGHM office, Kamloops BC	Room	Sugarloaf Boardroom

Attendee Name/ Title	**Attendee Name/ Title**	**Attendee Name/ Title**
Laura Smithies (LS)/KGHM	Jean-Paul Salley (JPS)/KGHM	Peter Troffe (PT)/KP
Stephanie Eagen (SE)/KP	Darren Bennett (DB)/FLNRO	Kevin Inouye (KI)/ CEAA
Melissa Wade (MW) / FLNRO	Scott Bailey (SB) / ED BCEAO	Mark Philpotts (MP)/(FLNRO)
Andrew Klassen (AK)/FLNRO	Jennifer Puhallo (MOE)	Steve Maricle (SM)/FLNRO
Ryan Deneault (RD)/KGHM	Nicola Banton (NB)/KGHM	Sunny LeBourdais (SL)/SSN
	Rebecca D'Onofrio/KGHM	

Meeting Outline

- Review of project summary and baseline information
- Description of high-level preliminary off-setting opportunities
- Solicit feedback on preliminary data on Jacko Lake and Peterson Creek

Aquatic Baseline

- Existing Fisheries information:
  - Diverse population of fish in Thompson River
  - Fish species within Peterson creek watershed: rainbow trout (stocked), coho salmon juveniles in mouth of Peterson creek, Eastern brook trout.
  - Cherry creek: rainbow trout (stocked), Eastern brook trout.
- Climate baseline: The region is fairly dry. The main precipitation events occur in June and July. The evaporation rate is high.
- Hydrological baseline (2007-2011): KP began baseline studies of the regional hydrological regime in 2007. BGC took over hydrological monitoring in 2013 (kept most of the previous stations and added a few)
  - There are several water users on the system
- Peterson Creek Morphology, Hydrology and fish presence
  - The portion of the creek within downtown Kamloops : contains rainbow trout
  - Upstream of Bridal Veil Falls: confined channel, steep bedrock walls, high gradient; Pockets of fish populations but no upstream passage past this point.
  - Peterson Creek near Humphrey Creek confluence: meandering channel, silty substrate and banks, not a lot of cover or channel complexity. There is beaver activity in the area
  - Peterson Creek upstream of Goose Lake road: meandering channel, silty substrate and banks, not a lot of cover or channel complexity. There is beaver activity in the area.
  - Peterson Creek at Jacko Lake outlet: contains areas that are periodically dry over the summer
  - Upstream of Jacko lake: dry August-September most years. Cobble, gravel substrate (likely placed there by MOE in the 1980s)
- Baseline monitoring of fish (2007-2011):
  - Early efforts focused on the Cherry Creek watershed

  - Gill netting in lakes, electrofishing
  - Rainbow trout were found within the city and at falls. Mature fish found in portion of channel downstream of Jacko only when spillway is flowing.
- Baseline monitoring of fish 2014:
  - Focussed on Jacko lake and Peterson Creek watershed
  - A few more monitoring stations added (fish sampled for presence/absence, tissue metals concentrations)
  - Other types of samples taken: sediments, periphyton, benthic invertebrates, phytoplankton and zooplankton sampling in lakes and streams
  - Bridal Veil Falls are a barrier to upstream passage of fish from the South Thompson river
  - Rainbow trout are present at Peterson creek, within city limits and upstream of Bridal Veil Falls
- Temperature regime 2007-2011:
  - Warm channel temperatures (sometimes reaching 21-25°C), outside of the preferred temperature window for rainbow trout rearing

Discussions/Questions

- No record of fish in Jacko prior to 1939. Rainbow trout have been stocked annually at Jacko Lake since the 1950s – it's now a productive lake and excellent fish habitat
- Outlet of Peterson: wetted when gates are opened for downstream water users
- Mature rainbow trout were found in sections downstream of Jacko Lake when spillway is open, but no juveniles were captured in that area (since sampling began in 2007)
- Fish habitat in Peterson Creek (in the project area) is marginal: The channel has a high silt load, is disturbed by cattle movement in the creek, has temperatures above optimum for Rainbow Trout rearing, and has ephemeral and intermittent flow in late summer and fall.
- SB: Is there a clear history of Jacko Lake dating back to before mining/daming (before the 1950s)?
  - PT: In the early 1950s there was some sampling done, several age classes of fish were noted in Jacko.
  - There is historical information on rainbow trout in Jacko, but not on any other species
  - There is some anecdotal information from locals that fish were stocked in the 1930s. However, the First Nations don't corroborate this information. It's likely that fish stocking began in the 1920s and 1930s. Fish presence is confirmed for the late 1940s.
  - The Current dam was in put in place in the late 1920s. The lake has been raised several times since then.
  - There were possibly rainbow trout in the lower end of Peterson creek prior to the 1930s.
  - Not sure where fish above Bridal Veil Falls came from, it's possible they originated from past flooding events.
  - ACTION ITEM: provide Scott and Sunny with previous slides showing the history of Jacko lake
- SB: Was there a lake (Jacko Lake) before the dam was installed?
  - PT: Yes probably, because there's a deep bowl in the center of the lake.
  - LS: a bathymetric survey was done in the late 1930s. The deepest portion of lake was present, but it was lacking the arms that are there today.

  - JPS: The lake surface area is 48.5 ha currently. It was originally much smaller
- PT: First survey of the lake didn't show much spawning habitat
- SM: Where were fish found in the study area?
  - SE: section above Bridal Veil Falls has nice cobble-boulder substrate, all life stages were found here.
  - Farther up toward Hwy 5a and upstream of that: no fish between here and Goose Lake road
  - Upstream of Goose Lake road: mature fish upstream of beaver pond, but no juveniles found
  - Electroshocking and minnow traps were used to sample
  - Sometimes there was no water to sample because the area was dry
- SM: Surprised that no fish were found in the mine site area
  - This stream runs all summer and has beaver ponds. Very surprised that the beaver ponds are not supporting fish. He will check out and cross-reference this fish presence.
  - The ministry has not done any sampling but he saw fry below the dam when he used to hike into the area as a kid from McGill Street
- PT: Low DOs and high temps found in this area. Also, fish can't find a mechanism back into the lake from the creek.
- SM: Hull Lake is not stocked by the province , but it has a natural fish population (NOTE: Post Meeting Follow-up: Provincial fisheries database indicates that it is a stocked population). McConnell Lake has only been stocked with all-female triploids for the past 5 years because of the limited spawning habitat.
  - SE: found fish upper side of Anderson creek, 0-4+ years old

Fish Habitat Offsetting (Peterson Creek)

- Peterson Creek will have to be diverted for the project. The alterations include:
  - Diversion (pipeline intakes and return location). 3.4-4km of Peterson won't receive flow anymore
  - Peterson Creek pond and dam
- Options for Peterson Creek Diversion:
  - Different downstream pond options are being looked at. The pond and dam would be the control point for downstream flow (for fish and for water licenses on the system)
  - Downstream aquatic pond for offsetting a portion of the habitat loss
  - Pumping location (North arm vs. South arm): Still working on the design for the location of the pumping station for the diversion
  - Pipeline (5.5km)
- Pond: 6ha; spillway configuration to be determined
  - Intersects with Humphrey Creek
  - This pond would hold water from Jacko Lake. Would not be deep enough for fish habitat, but would be aquatic habitat and would help mitigate some of the losses of Peterson creek.

Fish habitat offsetting option (Jacko Lake):

- NE arm sheet pile dam (for removal of the KM Pipeline and setback from pit)

- Upgrade of Jacko Lake dam downstream of current location (old dam from 1920s)
- Additional dams to contain probable maximum flood (PMF event)
- SM: Will the NE bay still to be lost for fisheries?
    - NB/PT: Yes. This will be a loss and there will need to be offsetting
    - This is part of the mine plan. This is the proposal KGHM would like to move forward with.
    - KGHM has taken measures to steepen slopes and pull back the edge of the pit, but from an economic perspective it is preferable to pull into that area of the lake a bit.
    - How much of the set-back is due to the pit edge, and how much is it due to DFO blasting guidelines? This is unsure.
- JP: There is still some uncertainty about the path forward. What's the timing on this? How does this feed into the application for the EA? Some of these things will need to be understood more fully for the EA.
    - NB: the current uncertainty is about offsetting options, which are being developed as KGHM moves through the assessment process. The assessment will focus on the preferred option
- KI: was there an outstanding question with DFO regarding Jacko Lake arm being filled-in once the pipeline is gone, and potentially not filling it in?
    - NB: There is nothing pending from DFO. This is the preferred option and what KGHM is moving forward with.
- The desire is to contain offsetting to within the watershed where the habitat alterations are occurring
- Soliciting input for DFOs guidance: local management plans
- Jacko Lake fish habitat offsetting option map:
    - NE Arm of Jacko Lake being cut-off with a sheet-piling dam. There will be 3.5ha of littoral habitat lost.
    - SE arm : 1-2 m depth in this bay
    - JP: where would the Tailings impoundment be? What are the lines appearing on the figure?
        - JPS: The tailings impoundment is just off the figure. The lines are the mandatory offset.
    - JP: would like to see a map showing how close this would be from the tailings impoundment (with highest water level in lake)
    - DB: Is the design for the spillway being incorporated onto the main dam? Where would PMF go?
        - NB: KGHM looked at various options for this and input is welcomed. Because there are several dams in place, there are options of where the spillway would go and where any excess of PMF would go. Options considered were the East side (into pit) and the northwest side (into Inks Lake).
        - It is recognised that a passive spillway would be needed (a "PMF+" type spillway, where the likelihood of seeing any flow there would be small)
- DB: Would the current Jacko Lake dam be completely decommissioned?
    - NB: Yes it would need to be decommissioned.
    - LS: license-holders currently own the dam. Any modifications would need to be done in conjunction with consultation with dam users.
    - Downstream users would still have control over the new dam through the activities of the Water Bailiff at the downstream pond; it would be off of mine property

  - DB: Need to make sure that all licensee requirements have been addressed. Details here would need to be discussed.
    - JP: Input from DB would be valued on this.
  - SM: What habitat will be gained from flooding?
    - PT: Details will still be coming. A basic look at the littoral habitat has been done and potential increases in littoral area would be quite large.
    - SM: 1-3m depth is preferred for littoral area depth.
- Losses vs Gains
  - Losses
    - Jacko lake losses: In the NE arm 3.5 ha of littoral habitat will be lost. Proposed offset ratio for this loss is 2:1. More habitat is being added than is lost to account for lost productivity in new habitat. This equates to 7 ha of new habitat.
    - Peterson Creek losses: diverted portion of creek is a loss of 16 ha of riparian and wetted channel. Proposed offset at 1:1 ratio. The required offset amount is 16 ha.
  - Total offsetting requirements = 22 ha of habitat
  - Gains
    - Jacko lake: 17-22 ha will be gained by raising lake levels (littoral lake habitat gained, along with increased lake volume)
    - Peterson Creek: 6.1 ha will be gained with the addition of the downstream pond (aquatic habitat gained)
  - Total habitat gained: 23.1-28.1 ha
- SM: A small pond is already present where the downstream pond is planned; is this accounted for in the 6.1 ha gain?
  - PT: Yes it's accounted for. Can also provide the LiDAR images and how these values have been reached (for transparency).
- JP: Will riparian areas be replaced?
  - PT: Haven't spoken about this yet in detail. Within the pond itself macrophytes will be put in.
- JP: will there be temperature effects on the habitat?
  - PT: temperature influences will be monitored.
- SM: What will happen with water use with regards to the downstream pond?
  - PT: Don't know for sure yet. Water-use plan will be in place. Will want to remain similar to current hydrologic regime (current regime will need to be maintained).
  - SM: Have to develop a water-use plan for the system to ensure irrigators use water as efficiently as possible.
- SM: Where does the water for addition to the system come from?
  - PT: This hasn't been decided yet. Discussions have occurred with BGC, but ongoing studies are required.
  - SM: The past 3 years were anomalous with high water flow. Likely the system will be much dryer in the future.
- MP: What about the effect of these changes to terrestrial invertebrates in riparian areas?
  - LS: Terrestrial habitat is also being studied, but it's being done separately.
- Must talk to water users on system, to discuss ownership/operatorship of water and dam structures
- Next steps:

- Compile baselines (almost done)
- Studies continued in 2015
- Continue program and expand as necessary
- Jacko lake and Peterson creek habitat accounting
- Receive further input from regulators, First nations and community as available
- Compile and quantify offsetting opportunities that support a fisheries act authorization

Discussions/Questions:

- Were other potential offsetting options have been examined in presentations or in other documentation?
  - PT: This is the best path-forward at this point
  - JPS: There are no previous presentations that outline other options for offsetting
  - NB: another option looked at was making the downstream pond into fish habitat, but this would have to be a much larger dam structure. That location was not feasible and the long-term implications of that dam would not be viable.
- SM: Has KGHM looked at making a lake somewhere else to offset for habitat losses?
  - NB: the downstream pond seemed like the best opportunity for creating a new lake but was not viable.
- SM: Has KGHM examined the possibility of raising the water level in Inks Lake to make it a possible fishery?
  - NB: This option was examined briefly but is not viable.
  - PT: Because the lake is very shallow, there's the possibility of winter kill of fish. The conductivity in Inks is also very high. It would not be ideal fish habitat.
  - The water level would need to be raised, and water would possibly need to be diverted into Cherry Creek from the Peterson Creek watershed. SM: There may also the opportunity for water to come from Kamloops Lake (since there will already be a pipeline drawing water)
- SM: What will the impact be on Jacko lake recreational users?
  - JPS: The impact would be mostly in the early years when operations are ongoing in the Western area of the pit. There will be a requirement to clear Jacko (like when Teck was in operations)
    - Lake clearing would be staged for a few years (maybe 5-8). Up until recently, it wasn't looked at as "temporary" clearing but would have been during all of operations. Now, lake clearing is being confined to a timeline of 5-8 years.
  - LS: Recreational impacts on Jacko are being looked at in the Socioeconomic Impact assessment, this will roll up into the Jacko Lake supporting topic
- After life of mine, will Peterson Creek be re-aligned to its original channel?
  - LS: after closure of the mine, the pipeline will be removed and the channel will be re-created as close to its current configuration as possible
  - SM: Operation of D/S Pond
    - Will the pond be drained?
    - PT: Hydrologic regime above Bridal Veil Falls will need to be maintained
  - SM: Where will the water come from for the D/S users and raising the lake
    - PT: Freshet over a few years will be used to fill the D/S pond

- AK: Maintenance of the Dams at Closure – who will maintain the new dams that will be constructed on the edge of Jacko Lake?
    - JPS: Concurrent Permitting is being developed. Jacko Lake is on the Mine Lease, therefore ownership of the dam will belong to the Mine Lease holders
- SM: Would like a copy of the presentation
    - NB: Can't release the presentation yet (design maps haven't been released to public)
    - NB: We can pull out images that haven't been approved internally; and provide attendees with Baseline data.

Action Items

NO.	Item Description	Assignee & Target Date
1	Provide Scott Bailey and Sunny LeBourdais with slides of the previous presentation detailing the history of Jacko Lake	RD to SSN: Mar 6 JPS to BC EAO: Mar 6
2	Follow up with MOE and DFO Re: Local Management Plans	PT: Mar 15
3	Provide Map to Jennifer Paholo Re: Proximity of Jacko Lake (with water level raises) to TSF	LS: Mar 6
4	Discussions required with Water License Holders to discuss ownership/operation of the D/S Pond and structures	KGHM: TBD
5	Slides of the current presentation to be provided to attendees after pulling out images that have not been approved internally	LS: Mar 6

Other Notes/ Comments

N/A

KGHM INTERNATIONAL AJAX PROJECT

MEETING MINUTES
Fish & Aquatics Focus Discussion with DFO/CEAA

Meeting Details			
Date	**2/19/2015**	**Time**	**9:00 AM – 10:30 AM**
Organizer: Jean-Paul Salley		**Room**	

Attendee Name:	
Kevin Inouye, CEAA (KI) Corrinne Gibson, DFO-MPO (CG) Peter Troffe, KP (PT) Laura Smithies, KGHM (LS) Jean-Paul Salley, KGHM (JPS)	

Item Description/ New Items

Discussion Topics

Feedback PT is looking for is on approach to offsetting
PT- Introduction to CG on background of KP and Stephanie
Estimated submission date – Q2 (later part)

Introduction

- October last discussion
- Baseline being finalized
- Moved towards compensation offsetting
- Focus on offsetting options and general approach to offsetting on Jacko Lake and Peterson Creek
- Comments can be integrated

Baseline Summary for Peterson Creek and Jacko Lake

1. Peterson Creek and Baseline Info collected
    - Jacko Lake stocked annually since 1954 with Rainbow trout, but fish were stocked before – likey late 1940's
    - Edith Lake stocked with Rainbow trout and Eastern Brook trout- females. stocked with Eastern trout because of shallow lake and the species has a lower oxygen demands.
2. Edith lake spills periodically
3. Goose Lake
    - non fish bearing
    - shallow
    - no inlet/outlet
    - no fish
4. Cherry Creek – some rainbow trout
5. Reference Lakes
    - Scuito
    - Edith
    - McConnell
6. Jacko
    - Stocked population of Rainbow Trout

Rainbow Trout and Coho observed at the bottom end of the watershed near N. Thompson CG- Coho – Adult or juvenile?

PT – Juvenile – in general young of year, animals ready to smolt. Information to be included in Baseline Report

7. Climate
    - shows monthly precipitation
    - wet / dry periods
    - arid climate
    - effects inflows and temperature regimes for area

- Air Temp Regime
    - Can get cold, and in summer can get hot.
    - BCG – conducting stream gauging for the project
    - Hydrograph – on average mean year
      $0.1/m^3$ in May during freshet
    - low flow system but can have double of mean flow in wet years.

8. Water licences
    - some licenses on Peterson Creek go back to late 1800s
    - most licenses are on Peterson Creek (upper and lower)
    - large allocation (high) or water for irrigational purposes

9. Peterson Creek Morphology
    - Small creek
    - Small wetted width
    - Incised channel with control on Jacko Lake outlet
    - low hanging vegetation along channel
      caught fish at lower portion of channel and just below Jacko Lake where fish escape outlet of Jacko Lake during freshet.
    - u/s of bridal veil falls – unlikely that fish coming up from d/s.
    - Fish may have historically come from Jacko juvenile and adults found in both areas (above bridal veil falls and at confluence to Thompson River)
        - u/s of bridal spillway at Jacko lake flows in Spring
    - Goose lake road area series of beaver dams
        - as freshet subsides flows subside dramatically
        - no juvenile productivity in the area
        - during freshet – some adult fish entering Creek but can't get back into Jacko lake if outlet not flowing (fish are have been observed to be stacked at the outlet)
    - Jacko Lake full pool elevation at 892m
    - freshet observed in Upper Peterson Creek
    - September no flow and only residual pockets of water remain in Upper Peterson Creek

10. Sampling Programs
    - Various methods used
        - gill nets in Jacko Lake under scientific permit
        - electro fishing / minnow trapping in Peterson Creek
        - Inks Lake also monitored as site of seepage ponds for previous footprint configuration
    - Take home message from the baseline information – different methods for sampling utilized in different situations. Tissue samples taken from fish collected during baseline studies.

CG –What sampling was completed in Goose Lake?
- Some sampling
- no inlet/outlet

- DO and Temperature not conducive of fish habitat.

CG - didn't think it would be fish bearing

PT – Goose Lake appears to be a groundwater fed pond and non-fish bearing and will be covered in baseline

11. 2014 project design changed and studies shifted to Peterson creek water shed
    - added background lakes in 2014
        - Scuito Lake
        - McConnell Lake
        - Edith Lake
    - Sampled in June/ July/ September.

12. Hydrological Regime
    - Stream gauging information on Jacko Lake inlet
    - Peak after beginning of May and hydrograph slowly drops in June, and exhibits extreme low flow or now flow in September
    - Jacko Lake and in Upper Peterson Creek/Jacko Creek – sampled in September and no observations of fish at that time
    - Brian Chan indicated that previous effort on spawning beds conducted at inlet arm of Jacko Lake
        - Confirmed that this is not appropriate substrate for spawning
    - Jacko Lake Seep hydrograph
        - flow dependent on elevation of Jacko Lake and low level outlet
        - Outlet at invert and controlled by water Bailiff
        - Spikes are likely due to combination of freshet and control by Water Bailiff
        - Less than 1.5m^3 at peak and drops below 0.5m^3 at low flow
        - Loose correlation with precipitation but mostly water bailiff and level of Jacko Lake driving the hydrograph

    CG – Spawning platform completed while working with MOE?

    PT: Took place in early 80's while working with angling groups
        - Gravels inundated with fines
        - Happened long time ago and not effective
        - Has not received good flushing flow.

13. Peterson Creek near Goose Lake Road
    - Freshet flow in June
    - Flow in system due to control by water Bailiff
    - September / fall – low to zero flow

14. Keynes Creek
    - Tributary of Peterson Creek
    - Very low flow system
    - Freshet peak in May 2014
    - By June/ July base flow at zero

    Temperature Regime
    - Insitu water temps
    - Upper Peterson peak temperatures between 15 C – 20 C
    - Below Jacko Lake water temps above 20 C and peaking above 25 degrees
    - Peterson Creek d/s also high temp
    - Take Home: Temperature outside of regime for juvenile rainbow trout; Flow goes low, temperature goes very high

15. Summary Slide

- Have seen no evidence of juveniles in Peterson creek below Jacko Lake
- Habitat has high silt content; high temp; low oxygen levels

Proposed Alterations to Peterson Creek and Jacko Lake

Alterations to Peterson Creek/ Jacko Lake

- Peterson Creek Diversion
- downstream pond
- habitat alteration
- aquatic habitat effected
- fish offsetting required

Peterson Creek

1. Divert Peterson Creek to north of pit
    - Divert creek around Project
    - Pumping station location still in design
    - d/s ponds – 2A option: small dam
        - Receive flows from the diversion and the proposed dam will act as the central point for management of water for downstream users, as per current configuration at low level outlie on Jacko Lake (i.e. controlled at 892 masl)
        - further d/s option: higher dam
        - Downstream pond will NOT be fish bearing
        - Currently investigating temperature considerations for closed pipe diversion; temperature pickup is not likely an issue but will be part of the Application/EIS

CG –Options for just Peterson creek:

- Downstream Pond will receive diversion water
- Receives Humphrey's creek water
- Control point for water Bailiff to control water use for downstream water license holders

- Habitat loss quantification has been calculated for Peterson creek from outlet of dam to downstream pond
- Pond over existing area of channel; considered in quantification of loss; using LIDAR to quantify
- Lidar taken at freshet and used max channel width; very apparent riparian habitat; have quantified loss of channel and riparian habitat
- Habitat under pond; considered as a loss and has been included in Peterson Creek Quantifications
- Area of Pond; included in gain calculation as it contributes to downstream watershed
- Approximately 5.25km of Peterson Creek affected by diversion channel and downstream pond.

CG – how deep will pond be?

PT – dam will be around 5 m so pond somewhat less; Considered for fish habitat but concerned about winter kill as this has been an issue in the area for shallower lakes.

Thought about fish but concerned with winter kill

CG – Area based approach to quantify loss; also include productivity loss on Peterson Creek

PT – what kind of metrics would be used to quantify productivity loss?

CG – DFO will not dictate metrics; however in section downstream of Peterson Creek that may be lost – what habitat is being supported?

- Adult equivalencies?
- Need to show that this will be sufficient to offset other losses

PT – Macro invertebrates; some fish use this area opportunistically; Can't get back to Jacko Lake once freshet flow is diminished; Peterson Creek below the outlet of Jacko Lake acts as a fish sink

CG – fish trapped could potentially go to this location (d/s pond) but would not be overwintering habitat

PT – no over overwintering Habitat in Peterson Creek; overwintering occurs in Jacko Lake under ice, but not in Peterson Creek below current dam. Downstream pond is not proposed to be fish bearing habitat, but rather to help offset losses of Peterson Creek food sources.

CG – Sell it on benthic contributions to overall system

JPS – to CG: if any specific methodology that you would want seen in the Application/EIS then provide example so that we can provide the information.

CG – Quantification of localized effect

- How fish use the area
- What will be lost
- New pond could be mitigation rather than offsetting
- Quantify localized effect and gains to system

JPS – Like for Like and relate to quantification?

PT – rather than using Habitat Evaluation Procedures scores/square meters; taking square meter approach; baseline provides a description of original habitat lost due to diversion

Proposed Jacko Lake Alterations

- Setback for Pit
- Removal of Kinder Morgan Pipeline
- Entire North East Arm will be affected
- Additional dams proposed outside of footprint of Jacko Lake for PMP event to contain water so it does not spill to the pit
- Littoral habitat in Northeast arm
- Desire to provide offsetting with Jacko Lake
- Guiding Principles: Want to do things in watershed where losses occur

CG – In October Call KGHM mentioned that KGHM may need to dam a portion of the Lake; Northeast Arm will have a sheet pile dam duration will be life of mine.

LS – Sheet pile dam will be in place during construction and operations; if possible to remove at closure it will be considered, but has not been confirmed at this time.

CG – would like discussion on why the entire NE arm will be lost
PT – NE Arm of Jacko Lake: Bathymetry is between 1.5 m and 2.0 m deep; 2 m deep at location where NE arm joins

the Lake proper; Loss will be quantified with LIDAR, same as was conducted for Peterson Creek

CG – NE Arm; Provincial Representation; arm is main rearing area for the lake

PT – Not sure; bathymetry drops off in this area; great fishing area; littoral habitat; completed loss of littoral loss calculations as suggested by Steve Maricle (FLNRO) using a 3 m contour as demarcation; rearing occurring above all littoral areas of the Lake; anglers are fishing 5 – 6 m deep areas along these areas for larger fish

Jacko Lake Water Level Raise:

- Area has acted as a bowl for a long time and has likely always contained a small lake
- Depth at approximately 25 m (full pool depth)
- Experienced a number of raises on the lake level since the 1920's
- No arms present on the lake in the 1950's
- 1970's detailed bathymetry and area capacity curves completed and increased overall area of lake
- 1990's Teck raised the Lake level another 1m
- Consider that another raise to the lake would be a good opportunity for Jacko Lake and Peterson Creek offsetting for productivity of the Jacko Lake/Peterson Creek system
- Creel Surveys conducted by MOE
- Design to move current dam downstream and a number of small dams to be added:
    - Northwest dam to prevent back flow into Inks Lake
    - Sheet Pile dam at Northeast Arm outlet for Pit setback and protection of fish during blasting events
    - Small dam by New downstream dam on Southeast arm to replace original dam
    - Elevation likely at 894 mas (full pool) – a 2 m lift over current maximum elevation of Jacko Lake
- Relationship between surface area and volume: large increase in volume vs surface area
- Represents one of the best options to compensate for lost aquatic habitat in Peterson Creek and lost productivity in Jacko Lake

CG – Would we be able to include bathymetry for quantification

PT – Yes; GIS is comparing littoral areas from bathymetry and LIDAR

CG – Connection between Jacko Lake/Inks Lake?

PT – When Jacko Lake is at full pool there has been some seepage at higher elevations of lake levels; the dam would be placed in the NW arm to ensure that flows would not go to Inks Lake

JPS – Inks Lake is the division between Cherry Creek and Peterson Creek Watersheds and coffer dam will keep demarcation of these two watersheds.

CG – How long will dams stay in place; Need to consider for long term offsetting.

Depth area capacity curve:

- detailed bathymetry of Jacko Lake
- Current area of lake is less than 50 Ha
- Curves show increase in area corresponds with increase in elevation
- also show increase in pelagic volume receiving capacity in Jacko Lake
- pelagic increase and surface area increase and improving littoral habitat in Jacko Lake

Habitat Loss vs Habitat Gain

- Jacko Lake 2:1 ratio; 7 Ha of offset required based on 3.5 Ha loss calculated
- Peterson Creek 1:1 ratio; 16 Ha of offset required based 8 Ha loss calculated

- Total of 11.5 Ha loss vs 22Ha gain, based on proposed options discussed today

PT – KGHM/KP requesting input from Regulators regarding calculations and proposed plans

CG – Channel vs pond aquatic habitat and appropriateness;

- If habitat model could be okay, but without details it is difficult to comment
- Lake – concern about using lakes for offsetting
- Makes sense to use this given the popularity of the lake
- Are we going to do riparian habitat?
- Area to area vs mean adult size productivity to determine if alterations are altering fitness of the fish

PT – Currently 3 strains of rainbow trout stocked in Jacko Lake

CG – Typical size of adult fish vs biomass of fish; will refer to Province for advice on this; suspect want to make sure fish will be able to grow to correct size that they are currently being fished out at.

PT – assuming GoFish will continue stocking the lake due to fishing pressure and no evidence of natural recruitment; metrics of primary productivity; Have information on mean condition factor in relation to other stocked lakes in the area

CG – Metric for long term monitoring to show that some productivity is same or better with increase in size of lake

PT – will need to speak to long term monitoring of Lake

CG – did province speak to this?

PT – Not a lot of feedback from the Province; Steve Maricle (FLNRO) spoke of Inks Lake, but trying to stay within Guidance of Fisheries Act (Different watershed; high conductivity; divert water from Peterson Creek to Cherry Creek watershed); Suggest some habitat areas within Peterson Creek but these area are already doing okay.

CG – Pumping water from Jacko Lake; How do we maintain water flow in Peterson Creek once mining is complete?

PT – Re-establish Peterson Creek channel after closure of Mine.

CG – Would elevation of Jacko Lake remain at closure?

PT – Yes

CG – Will we change the outlet?

PT – The Peterson Creek Channel will be re-established. Dams would stay in place and elevation of Lake would stay the same.

CG – Consider for closure a fish ladder to allow fish to get back into Jacko Lake from Peterson Creek

PT – Fish only leave when spillway spills; screen off spillway when re-established to keep fish in the lake.

CG – Preferred to have passage to get into Jacko Lake or way to prevent them from getting out; Need to discuss with the Province – they would know best what would be preferred.

JPS – Compensation for longer term; not temporary measure for operations; long term for Northeast arm dam

looking at this to determine if we can return the arm to some form of current configuration; coffer dam ensures removal of pipeline; operations gives us workable buffer; looking at alternatives to be able to return arm to productive fish habitat; rest of dams will be left in place at closure; channel at freshet into the lake would have been preferred but historical but concerns over debris build up was the issue.

PT – some Triploids stocked at Jacko; -fish are larger and faster growing; More important – steelhead fishery interactions may be a concern and stocking non-reproductive fish would prevention of natural stock (wild stock) from breeding with stocked fish; Bridal veil falls likely a good barrier as well.

CG – Considered enhancing stream at outlet?

PT – area of outlet runs through the project site in area of major infrastructure

JPS – Intention is to re-establish the current flow arm (SE) at closure that allows current configuration of the creek

Summary Slide

CG – Considered in terms of aquatic pond in Peterson Creek should we look further downstream? (Losing benthic and food sources)

PT – Land issues; confined channel within Peterson Creek downstream

CG – And much of the creek has been urbanized

JPS – Park with Bridal veil falls; 8 – 10 m impasse for falls; Downstream of falls the creek is channeled into underground urban culvert though the city into outflow into Thompson River

CG – Population upstream of Bridal Veil falls?

PT – Municipal park, incised channel; urbanized; could rob creek flow if off channel habitat; ability to get equipment into areas constrains activities

CG – Will refer to guidance from Province; Make sure that offsetting makes sense; Section 6 factors.

JPS – Land considerations issue; concern/constraint with water licensing issues on Jacko Lake– 4 of which are agricultural use for irrigation purposes

PT – Top 1 m of Jacko Lake allocated to MOE as fish habitat compensation (during Teck raise of the Lake in 1990's); water license precedence set and why we were led to Jacko Lake as offsetting options; Spoke with Steve Maricle looking for management plans – indicated that some of the MOE plans are quite outdated and require updates. This is why we are currently focusing on Jacko Lake because other options have not been provided by Province.

CG – Was not aware of the allocation for MOE on Jacko Lake

PT – MOE is water license holder; Able to increase productivity; spillway not run every year; spillway actually running now (early freshet); may not be an opportunity for fish to leave the lake this year

Next Steps

- Accounting: updated since previous presentation to FLNRO. Accounting of habitat loss now completed
- Looking for input from Regulators and First Nations and Community to finalize for *Fisheries Act* Authorizations

JPS – SSN was represented at last meeting with FLNRO; SSN representative (Sunny LeBourdais) is a fisheries biologist

and will be working on the Ajax File for the SSN.

JPS – In closing: Lines of communication are open; questions and concerns use JPS as intermediary but LS, PT and SE (Stephanie Eagen – KP) are available for further conversations.

Meeting adjourned: 10:42.

KA39-KGHM-MOM-000103

Minutes of Meeting- (FLNRO_Fish Habitat Offsetting and Loss of Fishing Experience)

Meeting Details			
Date	April 21 2015	Time	09:00 am
Location	FLNRO office, Dalhousie St	Room	Conference room

Attendee Name/ Title	**Attendee Name/ Title**	**Attendee Name/ Title**
Corinne Gibson (CG)/ DFO	Todd Goodsell (TG)/ KGHM (phone)	Nicola Banton (NB) / KGHM
Laura Smithies (LS)/ KGHM	Stephanie Eagen (SE)/ KP	Steve Maricle (SM)/FLNRO
Kevin Inouye (KI)/ CEA	Phil Belliveau (PB)/ FLRNO	Kyle Simpson (KS)/ Keystone
Cheryl Delwisch (SD)/ FLNRO	Darren Bennett (DB)/FLNRO	Christa Pattie (CP)/(FLNRO)
Sunny LeBourdais (SL)/ SSN	Bob Hamaguchi (BH)/Consultant	Andrew Klassen (AK)/ FLNRO
Oscar Gustafson (OG)/ KP	Darcy McGregor (DM) / Intergroup	Sarah Wilson (SW)/ EAO
Gabriele Matscha (GM)/MOE	Rebecca D'Onofrio (RD) / KGHM	

Action Items:

Action Item	**Assignee / Target Date**
LS to follow-up with AK about the flow release strategy.	KAM/ May 15
LS to follow up with Kinder Morgan on the rationale for removing the pipeline, and provide it in writing to DFO.	KAM/May 31
KAM to request meeting with SSN Re: Jacko Lake	KAM/May 31
KAM to request meeting with SSN Re: Peterson Creek Diversion	KAM/May 31
LS to follow up with FLNRO Re: Support of monitoring activities for Jacko Lake	KAM/May 31
KAM to request meeting with SSN Re: Cultural History related to Jacko Lake and other areas within the proposed Project footprint	KAM/May 31
KAM to request meeting with SSN Re: Fisheries components in SSN territory that SSN would be interested in improving	KAM/May 31
PB to distribute SM's presentation to participants	FLNRO/Complete

Purpose of meeting: To engage further dialogue regarding the KGHM Ajax Mining Inc.'s (KAM) offsetting proposals for Peterson Creek and Jacko Lake; to discuss the recreational fishery challenges associated with the mine; to explore alternative recreational fishing opportunities should Jacko Lake become unviable as a fishery.

- SL: Would like it on record that the SSN sent a letter on Friday in which they state that the timing of this meeting is premature. The SSN is here in an informational capacity, and this meeting should have no impact on aboriginal title and rights.
    - According to the SSN, Jacko Lake qualifies as a cultural keystone area.
    - The SSN believes that impacts to fish are un-mitigatable.
    - Mitigations that are discussed here today are premature to conversations that SSN would like to have on a one-on-one basis with government agencies.
- CG: Was unavailable for the meeting on February 5th in which Jacko Lake was discussed, and therefore documented her comments in a letter that was sent to KAM.
    - Concerned with what is being proposed as off-setting measures, and whether or not the measures are appropriate
    - FLNRO is the recreational fisheries manager in the area, DFO wanted to hear their opinions and SSNs opinions about if the measures proposed would be useful and adequate for offsetting

Creation of the downstream pond on Peterson Creek

- CG: The proposed mitigation is to create an impoundment on Peterson Creek (the downstream pond), which would be used as a food source for fish
    - CG's concern: by doing this, KAM will be blocking off access from fish in Jacko, so there would not be much need for additional food sources. Peterson Creek is already a healthy wetland, and altering the wetland to create a mitigation measure would not yield any benefit.
    - If this basin is required to meet the needs of downstream users, it would not be considered offsetting for fisheries because it is already a requirement for the project.
    - DFO is looking for additional offsetting over and above what will be used for the project
- NB: Would the downstream pond be considered offsetting if additional features were added to it?
    - CG: Yes, typically it could be used as offsetting if there were additional features added on; however the fish from Jacko are being blocked off. DFO therefore doesn't see how it would be useful for fish offsetting.
- SE: The intention of the impoundment wasn't to support productivity in Jacko, but to support productivity downstream.
- SM does not see the pond as an offset, but rather something that requires offsetting.
    - The fish population would cease to exist if there isn't a continuous source, since most likely the pond will be dry in the fall. Connectivity is being removed.
    - There wouldn't be any requirement of the pond to create additional food sources for downstream fish, as the creek would supply more than enough.
    - Right now this is fish habitat (for a portion of season), so if you remove connectivity you are taking away fish habitat
- PB: To FLNRO, this pond is not considered an offset. The pond would impact the current wetland habitat; therefore it is expected that offsetting would occur elsewhere. Also, since this will be mainly an irrigation pond, it shouldn't be considered an offsetting measure for fish.
- CG: These changes, combined with a drought year, might cause a loss of the whole population of rainbow trout upstream of Bridal Veil Falls.
    - NB: KAM would keep the flow of Peterson as close to current conditions as possible, therefore the pond wouldn't cause any additional impacts to flow.

  - SM: The impact to the fish during a drought year isn't caused solely by low flow. During a drought, the population will naturally suffer or perish as the creek goes dry. The population of fish in the creek is sustained by the output of fish from Jacko Lake, and not the output of water. These changes will isolate the lake's fish population from the downstream portion of the creek.
- SE: In the Fisheries Act, it's stated is that you have to offset for fish populations that contribute to a fishery. Does Peterson Creek count as a "fishery"?
  - CG: yes Peterson would be considered a fishery. Anywhere that you need a fishing license to fish is considered a fishery.
  - SM: There is anecdotal evidence that people currently fish in the area
  - SL: The Cultural Heritage Study identifies this area as a fishing location for First Nations.

  Follow Up: The St'kemlupsemc t Secwepemc Calendar and Seasonal Round spreadsheet (Page 95 of the CHS) identifies hunting, gathering and fishing areas for each month of the year. There is no reference to any fishing in Peterson Creek or Jacko Creek at any time of the year.

Offsetting measures within Jacko Lake and the proposed water level increase

- CG: The proposed offsetting involves raising the water level in Jacko Lake by 2m, which would increase lake volume and area. However, reservoir creation alone is not considered an offsetting measure by DFO. Additional habitat features and measures will also have to be created in Jacko.
  - By raising the level of the lake, the riparian area is being changed. The gain in terms of riparian area has not been quantified at this point. There would also be a time lag associated with establishment of riparian area after the lake level is increased.
  - Increased lake area and volume is not necessarily equal to increased lake productivity. There would need to be a study on a much finer scale to quantify how productivity would be affected
  - There are concerns of the long-term viability of these changes, especially when considering the effect that blasting and mining may have on fish in Jacko.
  - While the effects of blasting would be temporary (only for the mine life), the full impacts on the fishery are not known.
  - This mitigation measure alone is likely not enough to reach the required offsetting. KAM will likely need to look at additional offsetting measures elsewhere.
- NB: The approach to mitigating in Jacko Lake has changed. The lake level will no longer be raised due to concerns around continued viability of the South-East arm of the Lake.
  - KAM is interested in hearing and discussing other potential mitigations that the government and the SSN would like to explore.

Maintaining the downstream pond water level for water users

- NB: The water level in the downstream pond will be raised to maintain the water level for downstream users. Different water sources and pumping methods are being studied to determine how to meet the needs of downstream users and the fishery downstream.
  - AK: FLNRO developed a flow release strategy about 3 years ago; it could be a starting point for KAM.
  - Action Item: LS to follow-up with AK about the flow release strategy.
  - SM: Are there any plans to use Edith Lake water as part of the filling process for this pond?

- LS: KAM is looking at different options for this at the moment, nothing firm has been decided yet.
- NB: KAM understands that it has a secondary water license on Edith that is to be used for irrigation, KAM is not prepared to discuss these options yet until a more detailed water balance is completed.
- SM: If KGHM uses the water from Edith Lake to fill the downstream pond it would impact 2 waterbodies (Edith Lake and Jacko Lake).
- DB: The purpose of this water license on Edith is for irrigation, additional permitting would be required to use the water for other reasons.

DFO Blasting Guidance and Impacts of Blasting on Jacko

- PB: Even if the water level is left as-is in Jacko, fish will still be affected by blasting in the nearby pit.
  - CG: The DFO blasting guidelines are not current. The current section that deals with blasting is much smaller. DFO now evaluates based on "Measures to Avoid Harm". There are no longer numerical values for distance from a blast; instead, the proponent must demonstrate to the government that the appropriate measures to avoid harm to fish have been taken. The government will then determine if these are appropriate or not.
  - Offsetting measures should be what's best for managing the fisheries resources, including consideration of what the ideal location for offsetting is (in this case, it may be best to step away from offsetting in Jacko).
- NB: From a blasting perspective, KAM has done significant work to adapt the mining plan in order to meet the previous DFO blasting guidelines.
  - CG: The old guidelines can still be used as guidance, but they're not endorsed. KAM must now demonstrate that it will avoid serious harm to fish.
- SE: Are there other projects where this issue has come up that KAM should refer to as an example of how to proceed without the DFO guidelines on blasting?
  - CG: KAM is one of the newer EAs since the blasting guidelines have changed. Also, other EAs occurring since the new guidelines have come up may not have been located quite so close to lakes.
- SL: SSN does not support the idea of offsetting in other locations – SSN considers this to be a cultural keystone area. Cultural activities and practices around Jacko cannot be moved.
  - SL: The SSN also considers this to be a "tainted baseline", because previous land claims in the area have already impacted SSN's use of the land. The entire history of Jacko is not being considered, therefore there is information missing from the proposed mitigations.
  - NB: KAM is very interested in meeting with the SSN to discuss Jacko Lake, as is demonstrated by the recent correspondence between KAM and the SSN.
- Blasting near the pit may have impacts on fish survival and growth, angler catch success may decrease, and anglers will have to be cleared off of the lake during blasting
  - BH: There is conflicting first-hand evidence of the effects of blasting on fishing. There is anecdotal information from both sides of the discussion, however these are subjective accounts (SM has experienced negative impacts to fish catch success after a blasting event; BH has experienced no effects on fishing success after a blasting event).

- NB: The assessment is investigating what the impacts to fish in general are predicted to be, including impacts from noise and vibration as well as other physical factors. It's premature to assume the results of the assessment at this time.
- Worst case scenario of blasting near the lake: the lake drains due to a fracture in the bedrock, and there is a total loss of the fishery in Jacko.
    - NB: KAM appreciates the proximity of the open pit to the lake and is taking measures to ensure everything is done safely. Note that for a large portion of the mine life, blasting will be on the other side of the pit. There will also be back-filling into the area of the pit closest to the lake.
- SM: what happens if the lake does start to drain? Can KAM do anything to off-set it?
    - NB: KAM is investigating if lake draining into the pit is possible, but everything suggests that it's highly unlikely (there is no connectivity between the lake and the pit). The blasts are being designed to prevent fractures from occurring. If the lake does start to drain, it wouldn't be a sudden on-rush of water but would begin with slow seepage. It would also be monitored very closely as blasting is approaching the lake, and adaptive measures would be taken as blasting moved closer. KAM will work with MEM to determine what the monitoring program will be and what adaptive measures will need to be taken.
- AK: Have any details been developed for clearing anglers from the lake?
    - LS: KAM is looking into this now. There will be a "safe zone" outside of the blast radius where anglers will need to go when blasting occurs. Anglers will likely have to clear the lake for about an hour while blasting is occurring. KAM still needs to determine what will happen if fishermen don't leave the blast zone.

Kinder-Morgan Pipeline Removal and loss of the South-East arm of Jacko Lake

- CG would like confirmation that the Kinder-Morgan pipeline must be removed. There also needs to be additional rational for the permanent loss of the arm instead of returning it immediately after the pipeline is removed. CG would like the following to be provided in writing: 1- A confirmation that removal of the pipeline is absolutely necessary; 2- An explanation as to why the removal is necessary
    - NB: Our understanding is that the removal of the pipeline is a requirement of NEB.
    - Action Item: LS to follow up about rational for removing the pipeline, and provide it in writing to DFO.
    - NB: There is resource in the area under the S-E arm that was sterilized when the lake was flooded and the arm was created. The location of the sheet-pile was determined based on accessibility of the resource and the distance from the pipeline that's required to allow for its safe removal. There is also the need to protect the lake from the edge of the pit.
- SM: Why not remove the arm and put it back in place immediately afterwards? It would re-establish very quickly. There doesn't seem to be a reason to leave the sheet-pile dam in place long-term, other than the presence of resource beneath it.
    - NB: There is resource within that area that is economic to mine. We are preparing an alternatives analysis to rationalize the approach.
- PB: The arm to be removed is shoal habitat, and is very important for benthic invertebrate productivity in the lake. It is therefore a very important bay from a fisheries perspective.
    - NB: Is there any data on the productivity of Jacko Lake prior to the most recent raise of the lake? Was there any monitoring done after the lake was raised?

- SM: There is no data on Jacko Lake productivity before the last lake level raise. Raising Jacko Lake was likely done as compensation for water license holders downstream by Teck Resources. It was understood that by raising the lake there would be additional fisheries benefits, however it wasn't raised as compensation for the Fisheries Act. DFO was not involved.
- CG: If Jacko had been raised for compensation for the fisheries act, there would have been monitoring associated with it; the lake raise was therefore not done for fish compensation. The exact reasoning behind it is unclear.
- Productivity in Jacko Lake was assumed prior to the previous raise by Teck Resources. Because the raise was for mitigation rather than compensation monitoring to determine productivity or effect to productivity was not conducted after the raise in water level.

Peterson Creek Diversion

- NB: An Alternatives Assessment is currently being done and is examining how the Peterson Creek diversion could be accomplished, and which arm is preferred as an outlet.
  - Pumping at the North end of Jacko Lake is still the preferred option.
- BH: One potential adaptive management approach being considered is to install a pump in the South-East arm, which would re-circulate water and maintain flow in that area of the lake even if the arm is no longer used as the outlet.
- What would prevent KAM from pumping from the existing outlet?
  - The infrastructure in that area would make pumping difficult.
- PB: Is maintaining flow through the current creek an option?
  - The option was examined, but was determined to be of high risk to the creek.
  - The diversion would protect the creek during operations; over-all, it's safer to go to the North.
- SL: Has KAM explored the idea of creating natural habitat that would allow for connectivity between Jacko and the diversion?
  - NB: Going toward the North of the pit is uphill. There would be no way to create a natural channel in that direction.
  - KAM would like to meet with SSN to discuss these options.
- PB: There will be a loss of 1km of riparian habitat due to this diversion, and there is expectation from the province that this will be offset in some way.
- CG: Will KAM prevent all outflows through pumping? Will the spillway be removed?
  - NB: The dam at the S-E arm will be replaced and there will no longer be a spillway there during operations. KAM is looking at options for managing the need for a spillway during a PMF event.
  - NB: The spillway and Peterson Creek Channel will be re-established at closure.
- There is no data on the numbers of fish spawning and stocking in Jacko, or on the movement of fish between Jacko and Peterson. However it's "working" well and is known to be a very productive lake with its current configuration.
  - Triploids (3,500) and diploids (6,500) are stocked in Jacko Lake for a total of 10,000 fish annually.
  - FLNRO does not have any data on the number of fish moving between Jacko and Peterson. However, there is spawning and rearing habitat near the spillway at Peterson Creek, which will be lost. Adult fish from Peterson can get back into Jacko if the spillway is open. Fry could go back to the lake under the right conditions.
  - NB: KAM is interested in supporting MOE on monitoring activities around Jacko Lake.

Alternative offsetting options

- SL: The area has a cultural history to the SSN that isn't replicable, and that needs to be honoured (such as the story of the Trout people and the location of the Prayer tree). Fishing on Jacko Lake opens up quite early in the season, and Jacko was therefore a valuable historical fishery.
    - The SSN would like Jacko Lake added as a VC.
    - NB: KAM would like to discuss these topics further with SSN in a separate meeting.
- PB: Supports the maintenance of Jacko Lake as a fishery, however examining the cumulative impacts on Jacko brings a lot of uncertainty to the potential future viability of the recreational fishery there. What is KAM's view on an alternative to recreational fishing on Jacko Lake?
- NB: KAM is willing to discuss the possibility of developing other fisheries elsewhere, and is open to hearing what the Government and SSN think of as viable alternatives to Jacko.
    - There are also questions regarding the monitoring activities that will be needed on Jacko.
- SM: A possible alternative to offsetting in Jacko could be to construct an additional fishery elsewhere, with sufficient depth and structures to support fish.
    - Inks Lake could be viable: It's in the immediate area, the topography around Inks is favourable to constructing a larger basin (though it would be expensive), and there is easy access for the public (the highway runs very close to Inks).
    - KAM owns the Inks Lake property.
    - Inks Lake has a very high pH, but it could be adjusted properly if water with a buffering capacity was added to it.
    - The highway may need to be moved. Inks Lake is also very close to the haul road.
- SM: The water to fill Inks would likely have to come from Kamloops Lake. The water level would then need to be maintained.
    - Water rights and licenses would have to be figured out.
    - Water chemistry would need to be monitored.
- LS: Inks Lake was covered in the original baseline investigations, since it was in the original footprint.
- NB: Is there an opportunity to develop additional riparian wetland around Inks? This would be a more holistic "ecosystem approach" to offsetting riparian habitat with the increase in fisheries habitat
- LS: KAM has LiDAR data of the area and will have to examine it more closely to see how to properly flood the area.
    - SM: Would also have to look at the reservoir and see where it would drain.
- DB: initial filling and maintenance of this area may be difficult and costly.
    - SM: FLNROs water license could possibly be used here.
    - NB: Likely would draw water from Kamloops Lake. Is there a separate licensing process to use water for different purposes?
        - DB: Up to 3 uses can be added on one water license.

Other/Final Notes

- DB: Has bathymetry of the Jacko Lake arm been done to date?
    - LS: The bathymetry of Jacko Lake has been completed and we are currently working through the quantification of the Jacko Lake Arm.
- NB would like the SSN to note that KAM has requested meetings to discuss AIR, VCs and fisheries.

- NB: Fisheries act/terminology around fisheries: KAM would like a better understanding of the separation between the DFO and FLNRO mandates. Now the fisheries act is speaking to fisheries, which draws in recreational use?
    - CG: DFO is now looking at the impact to the over-all fishery and not just on fish habitat. How important is habitat to the fishery on overall scale. DFO is now relying on input from the Provincial fisheries managers (in this case, the FLNRO).
    - The focus is not only on quantification of habitat lost, but also what the impact of that loss will be to the over-all fishery.
    - PB: There are now stronger ties between the Federal and Provincial regulators.
- KAM made a request to the SSN a while ago to meet, to discuss fisheries within the SSN territory that they would like improved on (other areas where KAM could enhance the fisheries). KAM is still interested in exploring those options.
- SL: The SSN are in discussions with the government, and will respond to the request .

KGHM Ajax Project

KA39-KGHM-MOM-000133
Minutes of Meeting – Fisheries Act Authorization Application and Fish Offsetting Plan

Meeting Details			
Date	November 24, 2015	Time	1:30-4:30pm
Location	124 Seymour Street	Room	Sugarloaf Boardroom

Attendee	Organization	Title
Lisa Christensen	DFO	Fisheries Protection Biologist
Corrinne Gibson	DFO	Fisheries Protection Biologist
Steve Maricle	FLNRO	Fisheries Biologist
Andrew Klassen	FLNRO	Fisheries Biologist
Lisa Payne	MMPO	Senior Project Lead
Kevin Inouye	CEAA	Project Manager
Sunny LeBourdais	SSN	KGHM Ajax Project Specialist
Amanda Watson	SSN	Timcw Coordinator
Nicola Banton	KGHM Ajax	EA Permitting Manager
Ryan Deneault	KGHM Ajax	First Nations Liaison
Jean-Paul Salley	KGHM Ajax	External Affairs Specialist
Todd Goodsell	KGHM Ajax	Sr. Permitting Specialist
Nettie Ore	KGHM Ajax	Sr. Permitting Specialist
Ken Davis	KGHM Ajax	Jr. Permitting Specialist
Oscar Gustafson	KP	KGHM Consultant
Stephanie Eagen	KP	KGHM Consultant

Meeting Objectives:

- Present the fish habitat offsetting concept prior to detailed design and permitting
- Present predicted impacts to fish and fish habitat including unavoidable serious harm
- Discuss habitat loss and gain balance
- Review information requirement and timeline for the Fisheries Act Authorization

Impacts to Fish Habitat:

- **O. Gustafson:** summarized potential impacts to fish habitat presented in the Application/EIS (see attached presentation for details).
- **R. Deneault:** KGHM Ajax recognizes that SSN has conducted traditional fishing in the area where Jacko Lake flows into Peterson Creek. This spring fishery will be temporarily lost as a result of the Peterson Creek diversion during the Project's operation phase.

Serious Harm Assessment:

- **O. Gustafson:** presented the serious harm assessment presented in the conceptual fish habitat offsetting plan submitted as part of the Application/EIS.
- **T. Goodsell:** It is important to note that the upper reach of Peterson Creek area immediately downstream of Jacko Lake has been heavily altered in the last several decades by ranching activities and the Afton Operating Corporation, the previous operator of the Ajax mine. The Afton Operating Corp. realigned this section of Peterson creek in 1990 and lined it to mitigate water losses for irrigation uses downstream.
- **O. Gustafson:** these previous alterations combined with the current condition of the riparian habitat, soft sediments, low gradient, high water temperatures and long sections of upper Peterson Creek is often dry in summer during low flows; equate to low quality or lack of fish habitat.
- **S. Maricle:** Shouldn't the Jacko Lake outlet be flowing until late August?
    - **O. Gustafson:** The outlet is controlled by the water bailiff to meet downstream needs for irrigation of hay fields and other crops. In general, late summer flows are below the threshold to meet the minimum requirements to support fish.
- **A. Klassen:** FLNRO has developed a flow release schedule from Jacko Lake with the four other water license holders to ensure fish habitat in Jacko Lake is maintained. The flow release schedule is to retain fish habitat in Jacko Lake to the greatest extent possible; not to provide minimum flows for fish in Peterson Creek. Importantly, FLNROs license is junior to the other irrigation licenses on Jacko Lake/Peterson Creek and is therefore subject to agricultural water draw requirements.
- **L. Christensen:** The information on the PowerPoint shows the mean annual discharge reduction fluctuating; spefically the reduction of 44% during September is considerably large, why?
    - **O. Gustafson:** The discharge averages vary by season. The decrease of -44% isn't that large of a volumetric change, since the rate of flow is very low in September, it's comparable to flow from a garden hose so the predicted flow reduction from the project is a large percentage but as a discharge volume is not that great.
- **L. Christensen:** Please explain how the Peterson Creek diversion is mitigating the flow impacts from the project.
    - **O. Gustafson:** A diversion system will be created to pump water around the mine area and back into Peterson Creek at a downstream location.
    - **A. Klassen:** Flow into Peterson Creek is controlled by a water bailiff who opens and closes the valve based on water needs and a water release schedule, as well as input from FLNRO to ensure Jacko Lake water levels for fish habitat in the lake. FLNRO

understands that the proposed Peterson creek diversion will be controlled in a similar way through control over water out of the proposed Peterson Creek Downstream Pond.
    - **A. Klassen:** will the downstream pond dam remain post mine closure?
    - **T. Goodsell:** we have not yet determined whether the downstream pond and its dam will remain post project closure but are interested in FLNRO feedback.
    - **A. Klassen:** as a water license holder, FLNRO is not interested in acquiring the responsibility of dam maintenance and inspection post mine closure. I cannot speak for the FLNRO dam management group.
    - **T. Goodsell:** noted and thank you, the closure plan submitted as part of our MA/EMA permit application will address the Peterson Creek Downstream Pond.
- **L. Christensen:** Has temperature been considered for the downstream collection pond?
    - **S. Eagen**: A temperature assessment has been conducted. The assessment shows no significant change in water temperature.
- **S. Maricle:** Is Ajax planning on using their water license on Edith Lake for process water? As a water license holder on Edith Lake, would you use that water allocation for Peterson creek and its downstream pond?
    - **T. Goodsell:** There are no plans for the use of water from Edith Lake for mineral processing. Currently there is no plan to direct water from Edith, or Humphreys Creek, into the Pond.
- **S. Maricle:** The Peterson Creek Diversion System will reduce fishing opportunity in the SE arm. Currently trout congregate in this area due to the outflow from the dam. When the flow is diverted from the SE arm to the intake fish will no longer congregate in the area, resulting in a loss of fish habitat which will reduce fishing opportunity and rearing area.
    - **O. Gustafson:** We suspect the fish will adjust to the changes in flow at the existing outlet and relocate within Jacko Lake; we do not expect any loss of fish habitat in the SE arm; there will actually be a nominal gain to habitat of 0.2ha with the downstream movement of the existing dam. However we recognize that fishing opportunity in this area may be impacted due to the lack of outflow once the diversion system is operational. Rearing habitat in the SE arm will be unaffected by the diversion system.
    - **N. Banton**: We can look at ways to recirculate water in the SE arm to mimic current conditions during operations if this becomes a problem.
- **A. Klassen:** We will need further discussion with Darren Bennett about the lack of a passive spill way on the proposed new SE dam.

  - **N. Banton**: passive spillways can be added; one referring to the pit, the other out the NW arm, to address Darren's comment. KGHM intends to capture PMF volumes within Jacko Lake however, also a request from Darren.
- **L. Christensen:** Are the proposed saddle dams within the riparian area around Jacko Lake?
  - **O. Gustafson:** The toe of the dam likely is, but the dams are located above the high water level mark and the riparian areas consist mainly of grasses therefore there is a lack of riparian function in these areas.
  - **L. Christensen:** Please provide more information on the saddle dams located within 30m of riparian areas to determine potential impacts to fish habitat.
- **S. LeBourdais:** The SSN has pointed out a number of inadequacies in the characterization of Jacko Lake spawning area. SSN does not consider the loss of the Spring Fishery during operations to be temporary. 23 years of "temporary non-use" of the trout fishery will effect more than one generation of SSN members. By not separating the Jacko Lake inflow/outflow Creeks from the lake habitat you are not taking into consideration Aboriginal rights. There is living memory of a Trout Fishery in the Inflow and Outflow of Jacko Lake, with large volumes of fish. SSN used to manage streams by removing areas of beaver dams and planting specific species of plants to enhance the streams and shores for fish habitat. The SSN intends to further develop the inflow and outflow to enhance the spring trout fishery. The SSN is concerned that there will be a significant loss of knowledge among Aboriginals resulting from the amount of time the Peterson Creek outflow will be diverted, leading to the inability for knowledge in practice and rights to be shared.
  - **S. Maricle:** I have personally observed many fish exhibiting spawning behaviour downstream of Jacko Lake in previous years, walked that area two years ago, and it is presumed that some of these spawners return to Jacko Lake via the spillway.
- **S. LeBourdais:** Droughts and salmon conservation efforts are causing Aboriginals to shift away from Salmon towards Trout from lakes for greater percentage of their dietary protein. The objective of the SSN is to restore the spring fishery on both the inlets and outlets of Jacko Lake.
- **R. Denault:** Does the SSN use Lac Le Jeune and Edith Lake for fish protein sources?
- **S. LeBourdais** – the SSN uses Lac Le Jeune for sure. I am not sure about Edith Lake; I'd have to check the Cultural Heritage Study.
- **O. Gustafson:** Regarding the spawning habitat in Peterson Creek upstream of Jacko Lake, although there are some suitable spawning substrates, low flow at the Jacko Lake inlet is not adequate for successful incubation of eggs. The drying of the creek in early spring post freshet will cause desiccation of eggs prior to emergence, and there is a very small window of connectivity when rainbow trout could potentially move upstream into the creek. The lack

of flow due to over allocation of water licenses in Peterson Creek upstream of Jacko Lake is the primary reason there is not a self-sustaining trout population in Jacko Lake.

Inks Lake Fish Habitat Offsetting Plan:

- **S. Maricle:** Filling in the Northern water bodies of Inks Lake will most likely not be accepted as part of the offsetting solution, as these are very valuable habitats for many waterfowl, amphibians, etc., and is one of the most diverse ecosystems in the area in spite of their poor water quality.
- **L. Christensen:** How do you avoid the banks collapsing after Inks Lake is excavated?
    - **O. Gustafson:** The side slopes will be very gradual. We suspect from previous drilling information that there will be glacial till present, which will allow for grades of approximately 3:1.
- **L. Christensen:** Is there a riparian vegetation planting plan?
    - **O. Gustafson:** There is a conceptual planting plan developed and a detailed plan per DFO guidelines will be submitted as part of the Fisheries Act Authorization application.
- **S. Maricle:** The proposed depth of 10-12m would have to be over a fairly large area to avoid winter kill. You will also need to consider how small the littoral zone would be with the current plan to prevent winterkill in a small deep lake. Why wouldn't you consider building a dam next to Lac Le Jeune Road and raise the level of the lake rather than excavate?
    - **O. Gustafson:** raising the lake by building dams was evaluated however was not advanced due to previous comments from FLNRO regarding liability and maintenance requirements for dams that would eventually transition to the Province at mine closure.
- **S. LeBourdais:** The SSN does not support the current plans for Inks Lake as offsetting. The process of modifying Inks Lake would not be supported by council. The offsetting plan does not offset the damage to the Jacko Lake fishery as a protein source. We would be willing to look at other offsetting plans suggested previously.
- **A. Klassen:** Who owns the land surrounding Inks Lake? Will access to Inks Lake be maintained after the mine closes?
    - **T. Goodsell**: Yes, the conceptual plan includes access to Inks Lake after mine closure. The land tenure surrounding Inks Lake is mixed between land owned by KGHM Ajax through its Sugarloaf Ranch subsidiary and a small parcel to south which is Crown land. There are no other private land holders that would be impacted.
- **T. Goodsell**: KGHM has advanced the fish offsetting concept at Inks Lake that was suggested by FLNRO as a potential option. The biggest concern we have identified is that once the

mine closes KGHM will cease pumping of freshwater from Kamloops Lake. While we do not know definitively if Inks Lake will not support fish without freshwater input, to be conservative we assume that Inks Lake will not sustain water quality suitable for fish within a few years after active pumping. Previously FLNRO indicated they have a water license on Jacko Lake and that a portion of this allocation may be possibly available to augment Inks Lake via a passive gravity flow channel. We are interested in feedback from the agencies to determine if A) DFO or FLNRO will be interested in taking over the cost and maintenance of the freshwater pumping system or B) if FLNRO will provide a portion of the water license held on Jacko Lake. We have estimated that Inks Lake would require up to 30% of the current FLNRO allocation on Jacko Lake depending on the year. This is a conservative estimate that requires assessment upon confirmation that the Inks Lake concept is supported for the application.

- **L. Christensen:** DFO will not take responsibility for the freshwater pumping system to Inks Lake after the mine closes.
- **S. Maricle & A. Klassen**: FLNRO will not take responsibility for the freshwater pumping system to Inks Lake after the mine closes. FLNRO will likely not be able to divert any of its Jacko Lake water allocation for Inks Lake. This allocation is to preserve fish habitat in Jacko Lake and by providing any quantity would result in impacts to the recreational fishery in Jacko Lake. In addition, the FLNRO water license is junior to others on Jacko Lake and therefore there would be no guarantee that water would be available to feed Inks Lake in dry years.
- **S. LeBourdais:** SSN has issues with the volume of water coming out of Kamloops Lake in conjunction with cumulative effects of global warming and the various Thompson River user groups on the watershed. The SSN has issues with the water intake and the surrounding foreshore. More information is needed on intake location and groundwater impact. The SSN will not support the water permit until cumulative water impacts model is done to model water flow through the Thompson system.
- **T. Goodsell:** The proposed freshwater intake on Kamloops Lake involves only existing infrastructure. The intake pipeline that will be used is in place and was previously constructed and operated by Teck for the Afton Mine. The existing wet well and pump house will be retrofitted to accommodate our design.
- **L. Christensen:** Has Ajax considered habitat enhancement within Jacko Lake? Looking at productivity, how many fish would be stocked in Inks Lake, suggest that KGHM consider coming back to Jacko Lake and adding to productivity to that recreational fishery.
    - **S. LeBourdais:** The SSN will not support manipulation of Jacko Lake but would support the revitalization of the Jacko Lake Inflow and Outflow fisheries. The SSN would have to study these options prior to providing full support.

  - **N. Banton:** What would be some approaches to revitalization of the inflow and outflow? Could this be an agenda item for discuss this at an upcoming technical meeting?
  - **S. LeBourdais:** The SSN would be interested in seeing what KGHM has assessed or planned to date. We can discuss this at an upcoming technical meeting.
- **L. Christensen:** Does SSN support restoration of the spring fishery as offsetting?
- **S. LeBourdais:** Yes, SSN supports the revitalization of the spring fishery on upper and lower Peterson Creeks.
- **T. Goodsell:** regarding the post application stage of the Fisheries Act authorization, we understand that DFO requires a 60 day completeness review that can occur concurrently during the EA review and a 90 day review period following the EA Decision. We intend to submit the Fisheries Act Application in late March 2016 and the earliest the EIS can be approved is August. Given that we will provide the application at least 5 months in advance of the EA decision, can the 90 day review by DFO be shortened assuming our application is complete and the issues resolved during the EA?
  - **L. Christensen:** The time provided for the review represents a best case scenario based on 100% completeness. It is unlikely that we will issue a decision in less than 90 days following the EA decision.
  - **S. LeBourdais:** The SSN will not likely agree to the timeline proposed due to the significant sensitivity of the project.
- **L. Christensen:** The habitat offsetting calculation needs to be revisited and recalculated. The Peterson Creek downstream collection pond can't be considered as a habitat gain because fish will not be able to access the pond during operations.
  - **O. Gustafson:** This area will be like-for-like in terms of habitat gain
  - **T. Goodsell:** If DFO does not consider the Peterson Creek downstream pond as a habitat gain would you consider removing a section of Peterson Creek from the habitat loss calculation, as this is not fish habitat either?
  - **L. Christensen:** Habitat gain/loss calculations require further discussion prior to application submission.

Meeting Action Items:

No.	Item Description	Assignee
1	The fish offsetting plan presented in the application will need to include: additional information regarding riparian impacts from the proposed dams constructed within 30 meters of Jacko Lake	Todd Goodsell / Oscar Gustafson
2	Schedule a Technical Meeting with SSN to discuss Jacko Inlet/Outlet	Ryan Deneault /

	revitalization plans	Sunny LeBourdais
3	Further discussion of habitat gain/loss calculations to determine offsetting requirements	Todd Goodsell/Lisa Christensen
4	KAM to provide the presentation to all participants in the meeting	Todd Goodsell