MVEIRB Public Hearing

Giant Mine Remediation Project

Fisheries and Oceans Canada

Potential Physical Impacts to Fish Habitat

Baker Creek Flows and Outfall/Diffuser

Baker Creek - Flows

Issue

- Potential physical changes to Baker Creek from the removal of mine water discharge flows

Baker Creek - Flows

Review

- Removal of treated mine water discharge from Baker Creek:
  - Benefits: eliminates exposure of fish and fish habitat within the creek to mine effluent; returns the creek hydrology to natural condition
  - Impacts: lower summer flows may reduce migratory access and habitat availability for resident fish species

Baker Creek - Flows

Conclusion

- The removal of treated effluent to Baker Creek is expected to improve habitat quality and return the creek flows to pre-mining conditions.
- Reduction in summer habitat availability is not considered a loss of habitat.

Upper Baker Creek – upstream of mine site and effluent discharge

Baker Creek - Flows

Recommendation

- Any future Baker Creek channel realignments and in-stream habitat features be designed to minimize the potential for channel barriers and impacts to fish passage under low summer flow conditions (DFO Rec #5).

- The habitat restoration plan and supporting channel designs for Baker Creek be submitted to DFO for approval as required under the *Fisheries Act* (DFO Rec #5).

Outfall and Diffuser

Issue

- In-water works may impact fish and fish habitat in Yellowknife Bay.

Outfall and Diffuser

Review

- Construction and operation may impact:
  - Aquatic habitat quality
  - Sediment quality

Outfall and Diffuser

Conclusions

- There is potential for physical changes to fish habitat and fish use within the turbulent zone of the diffuser
- Construction and final designs may alter habitat.
- DFO expects that any water being discharged from the diffuser will meet water quality limits and include conditions and standards that would ensure no significant impacts on the aquatic environment (*EC administers s.36 of the Fisheries Act*)

Outfall and Diffuser

Recommendations

It is recommended that the proponent:

- Complete the fish habitat assessment in Yellowknife Bay (DFO Rec #6).
- Develop an Environmental Monitoring Plan (EMP) for mitigation and monitoring during construction and operation (DFO Rec #7).
- Submit the final design and associated mitigation measures for the outfall and diffuser for review pursuant to the *Fisheries Act* (DFO Rec #8).

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Baker Creek Remediation and Historic Foreshore Tailings

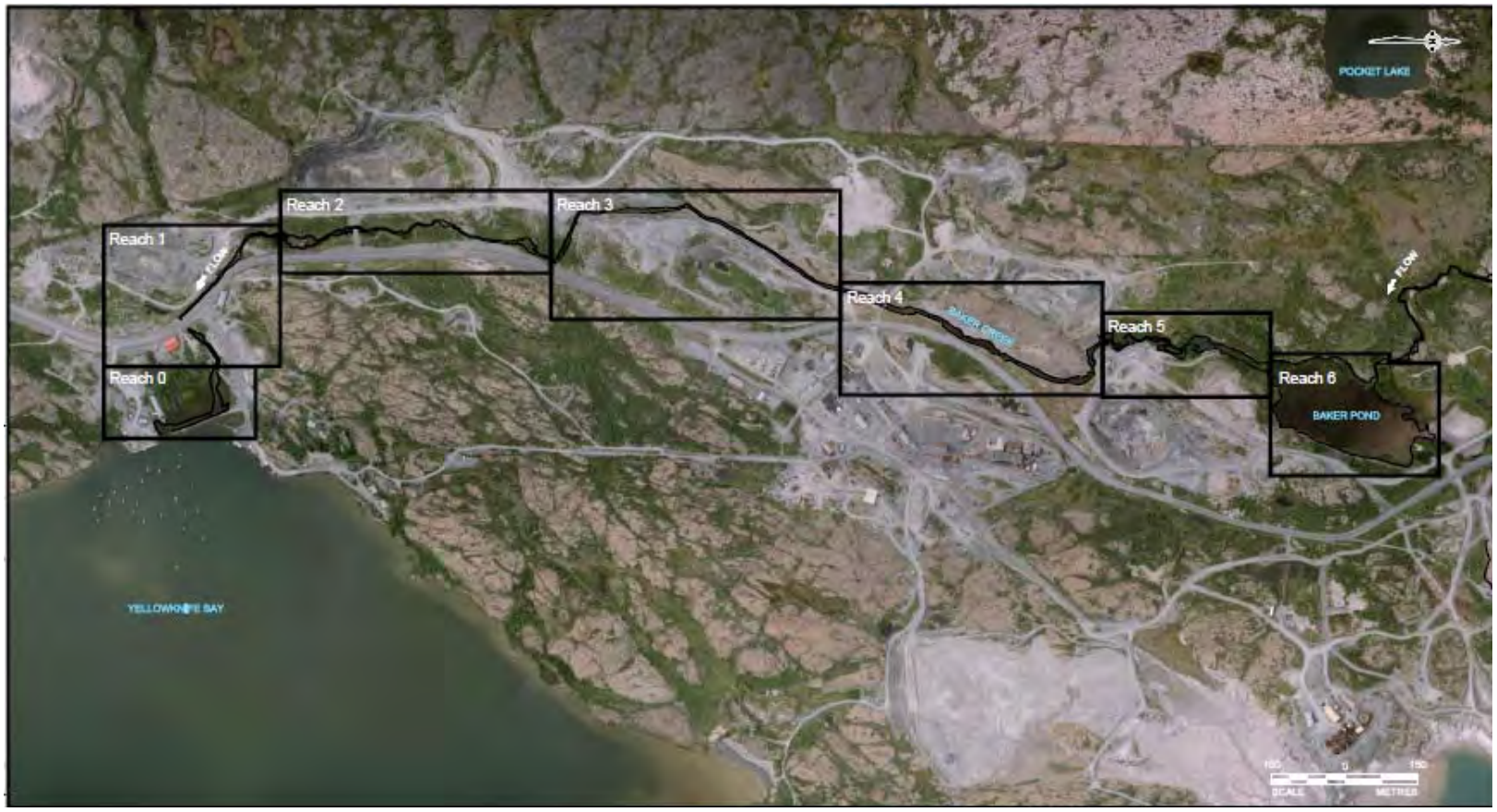
Baker Creek Remediation

Issue

- Re-routing parts of Baker Creek and potential removal or capping of sediments will disrupt currently functioning fish habitat.

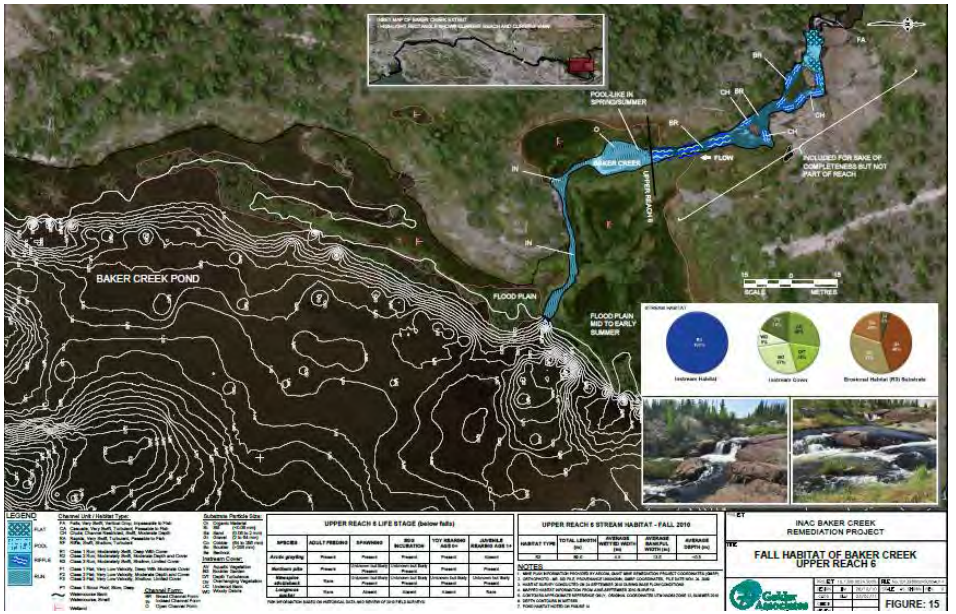
Reach 2 Baker Creek 2012

Baker Creek Remediation



Baker Creek Remediation

Review – Fish Habitat



Reach 6 – Baker Pond

Canada

Baker Creek Remediation

Review – Fish Habitat

- Baker Creek (Reaches 0 to 6) provides a variety of fish habitat
- Spawning, rearing, feeding, migratory and overwintering habitat for a number of fish species
- Arctic grayling spawning in 6 reaches of the creek on the mine site

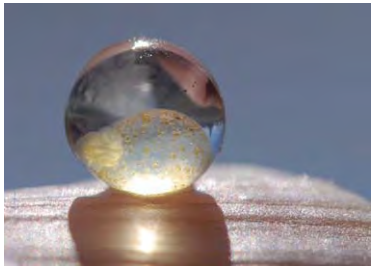
Baker Creek Remediation

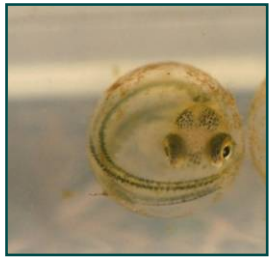
Review – Fish Habitat

spring spawners

Baker Creek Remediation

Review – Fish Habitat





Life stages

Baker Creek Remediation

Review – Fish Habitat

Other spawning and resident species

Baker Creek Remediation

Review - Impacts

- Proposed remediation activity will have direct short-term effects on existing fish habitat.

Baker Creek Remediation

Review - Impacts

- There will be reduced biological attributes within the remediated portions of the creek until natural recovery occurs.

Baker Creek Reach 2

Baker Creek Reach 4

Baker Creek Remediation

Conclusion

- Evaluation of final remediation options for several portions of Baker Creek is still required to determine full extent and magnitude of impacts to fish habitat.
- It is DFO's opinion that effects can be minimized through avoidance, mitigation measures and restoration.
- Loss of fish habitat will be offset through development and implementation the restoration of Baker Creek as proposed by the proponent.

Baker Creek Remediation

Recommendations

It is recommended that the proponent:

- Complete the evaluation of sediment assessment in order to select final remediation options for Baker Creek (DFO Rec #1).
- Develop a Baker Creek Restoration Plan as part of the overall remediation to offset loss of fish habitat (DFO Rec #2).
- Develop a Environmental Management Plan (EMP) for Baker Creek remediation and restoration including mitigation and monitoring plans (DFO Rec #3).
- Engage public on Baker Creek remediation options and restoration plan (DFO Rec #4).

Historic Foreshore Tailings

Issue

- Historic tailings deposited in Yellowknife Bay
- Redistributed due to wave action and lake currents

October 2010 – low water year

Historic Foreshore Tailings

Review

- The submerged cap is expected to:
  - prevent erosion and exposure of tailings
  - provide overall improvement in sediment quality in the impacted shoreline area
- Final cover design, footprint and construction details have not been submitted.

Historic Foreshore Tailings

Recommendations

It is recommended that the proponent:

- Complete baseline assessment in Yellowknife Bay (DFO Rec #9).
- Develop an Environmental Monitoring Plan (EMP) with mitigation measures during construction and monitoring to ensure cover is functioning (DFO Rec #10)
- Design and mitigation measures for the submerged tailings cover be submitted to DFO for review pursuant to *Fisheries Act* (DFO Rec #11)

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Potential Physical Impacts to Fish Habitat

Monitoring

Monitoring

Issue

- Environmental Monitoring Framework proposed to:
  - evaluate environmental performance, remediation objectives and commitments
  - monitor regulatory requirements
- Incorporation of aquatic effects and fish habitat monitoring

Fish habitat monitoring – Reach 4 Baker Creek 2007

Monitoring

Review

- *Fisheries Act* Authorizations require monitoring of mitigation measures during construction and success of fish habitat restoration
- Need to adequately monitor and assess habitat compensation and restoration in Baker Creek

Fish habitat monitoring – Reach 1 Baker Creek 2007

Monitoring

Review

- Lessons learned from monitoring of constructed streams in the NWT:
  - Use a suite of ecological measures
  - Use reference streams as standards to measure against
  - Focus on macro-invertebrates, vegetation and organic matter
  - Duration of monitoring should be linked to extent of habitat impact, rates of habitat change and life-cycle of target species

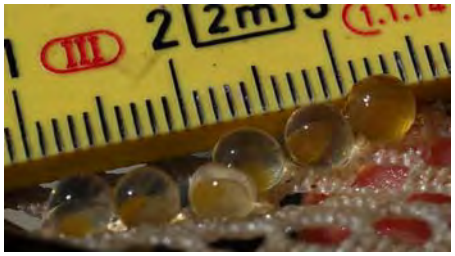
Reach 4
Baker Creek
Spring 2010

Upper
Baker Creek
Spring 2010

Monitoring

Recommendation

- Develop a fish habitat restoration monitoring plan for Baker Creek which:
  - Clearly states objectives, criteria and goals for restoration
  - Uses appropriate scientific method and experimental design
  - Measures range of physical and biological attributes
  - Includes sufficient frequency and duration to measure recovery over time (DFO Rec # 12).



Monitoring

Recommendation

- The proponent develop and implement an Aquatic Effects Monitoring Program (AEMP) as part of the overall environmental monitoring framework (DFO Rec #13).