

Labrador Iron Mines Holdings Limited



Rehabilitation and Closure

May 10, 2016

**Re-establishing Flow to the
Un-named Tributary**

Evolution of the Un-named Tributary

James Mine Dewatering was required to lower the water table in the immediate vicinity of the pit. Cessation of flow from the James North and South Spring to the Un-named Tributary. Lost flow was supplemented with Dewatering Wells.

A re-design of the James Pit was required. The removal (de-watering) of approximately 500m of the upstream section of the unnamed tributary was required and a diversion pipe was installed to bypass the de-watered section and to deliver flows into the downstream section. November 2013 the James Pit was exhausted, 2013 production: 1.7 million tonnes (dry)

James Pit dewatering wells were systematically shut down and the pit allowed to flood.

2010

2011

2012

2013

2014

2015

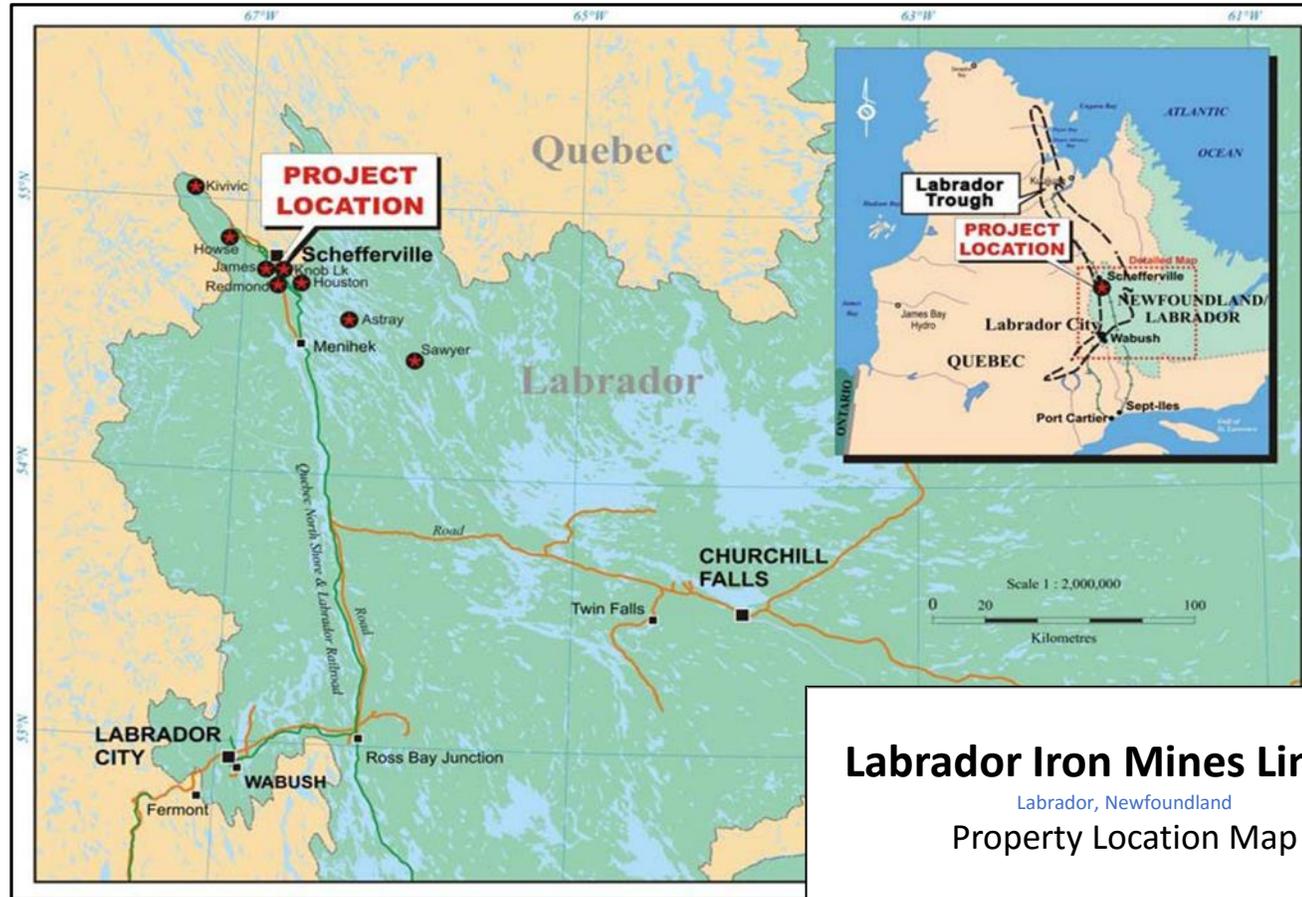
Production commenced at the James Mine: 400,000 tonnes (dry)

Production: 1.5 million tonnes (dry)

The Redmond Creek Habitat Compensation Facility was constructed in August – September 2013.

Re-establishment of flow into the Un-named Tributary after pit flooding July 2015.

Property Location Map



Labrador Iron Mines Limited

Labrador, Newfoundland

Property Location Map

Modified after: Watts, Gniffs & McQuat Limited



James Mine Dewatering



Alterations to the Un-named Tributary:

- In 2010 prior to the development of James Pit the source of flow to the Un-named tributary were natural springs (James North and James South) under the proposed Pit.
- In May 2010 a Letter of Advice was received from DFO authorizing:
 - disruption of the natural spring flows and the installation of de-watering wells along the pit perimeter
 - pumping of water into the Un-named Tributary to provide minimum flows and to maintain fish habitat.



James Mine Dewatering

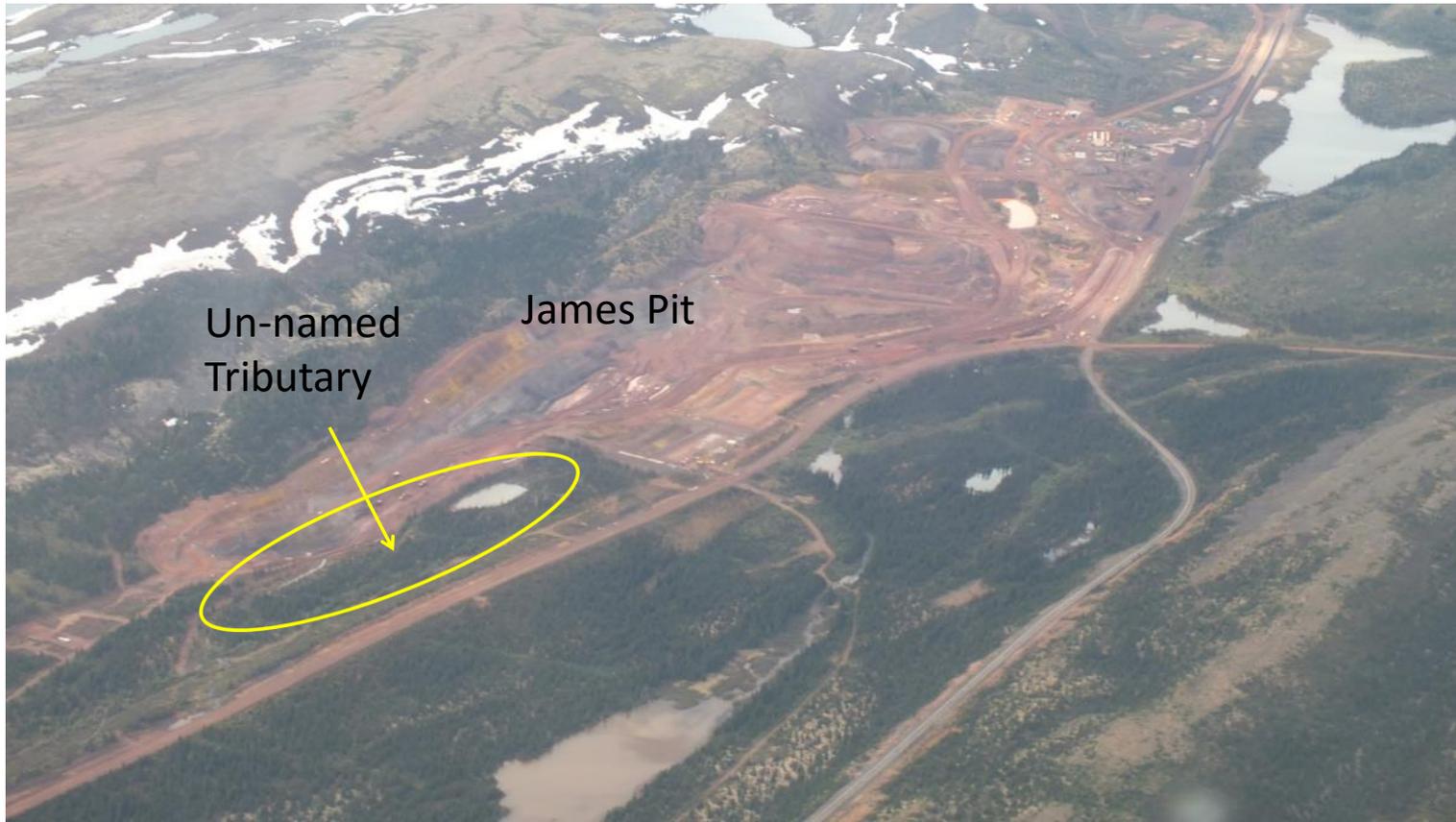


The James Mine was operated seasonally from May 2011 through November 2013. LIM operated a series of 11 Perimeter Dewatering Wells to maintain pit wall stability

- Ground water flow was redirected from the James Mine open-pit to the Un-named tributary (UNT) as well as James Creek.
- Flow ranged between 8,000 liters per minute (lpm) to 12,000 lpm
- A minimum of 4,000 lpm was diverted to the UNT and continued to flow south-southeast until its eventual discharge into Bean Lake approximately 1 km downstream
- Remainder of the water was discharged to James Creek

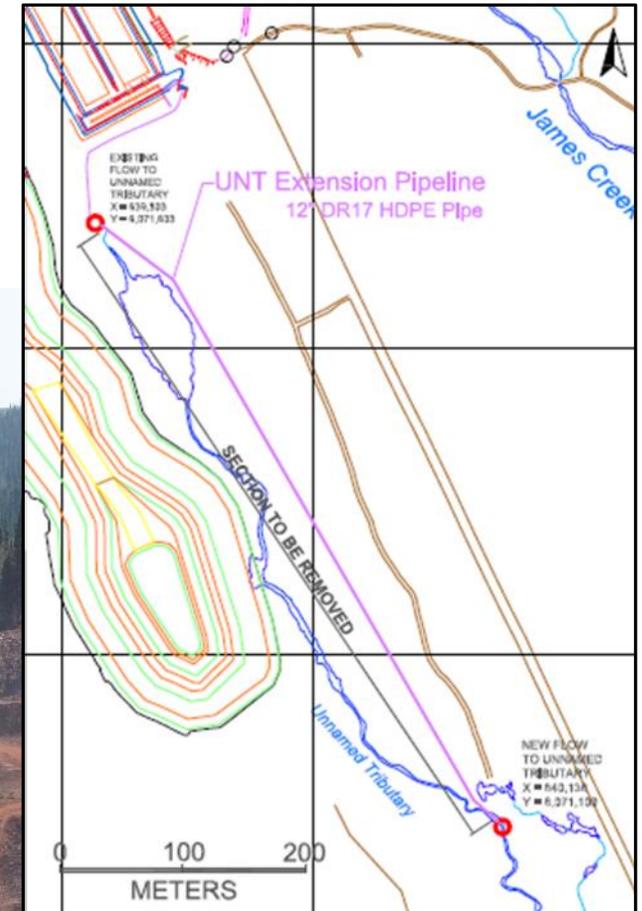
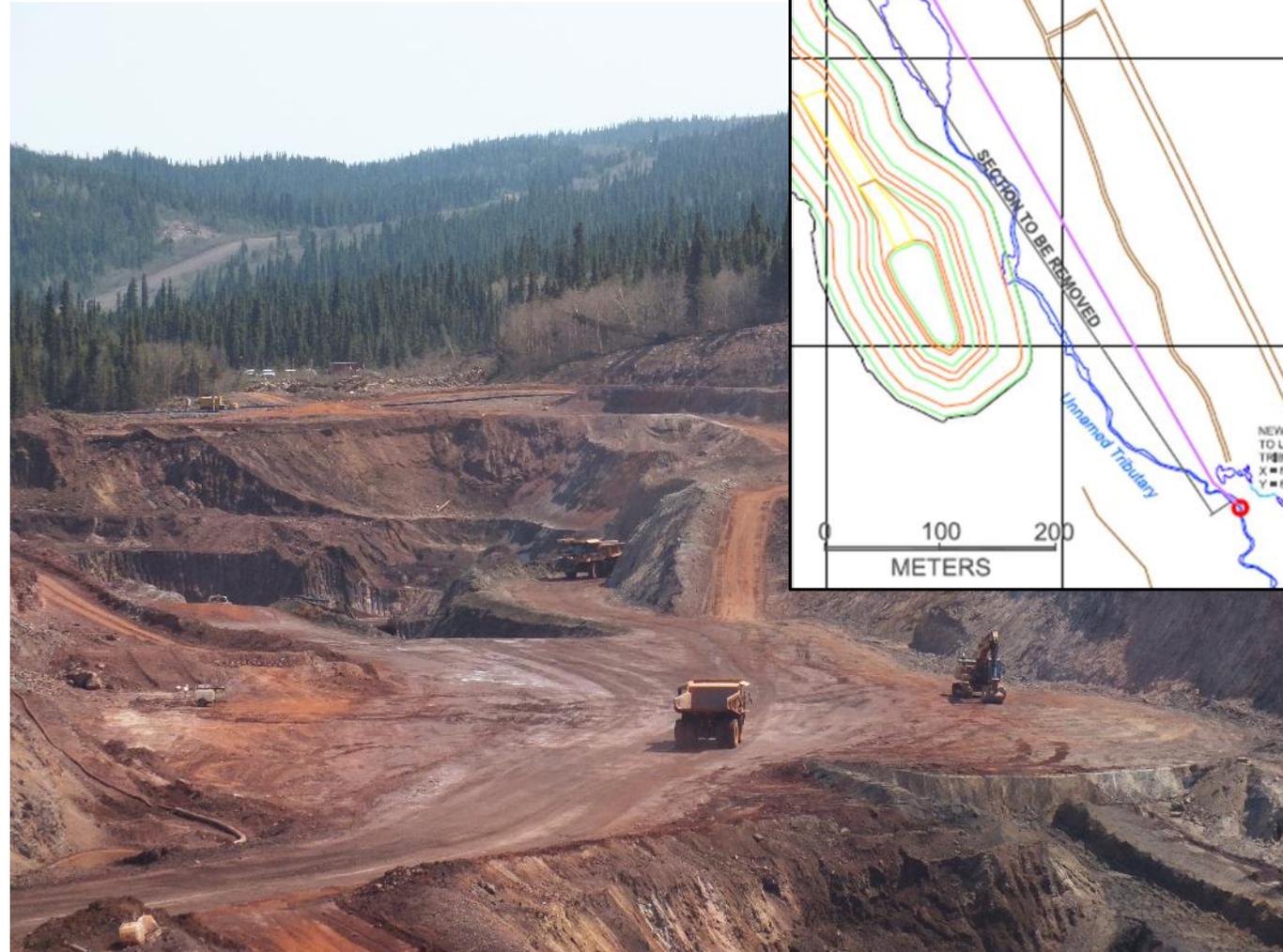


James Pit Expansion



James Pit Expansion

1. In 2013 the re-design of the James Pit was required due to two concerns:
 1. Structural Integrity of the Pit Wall:
 2. Access to additional ore:
2. The re-design required the removal (de-watering) of approximately 500 metres of the upstream section of the unnamed tributary and the installation of a diversion pipe to bypass the de-watered section and to deliver flows into the downstream section.

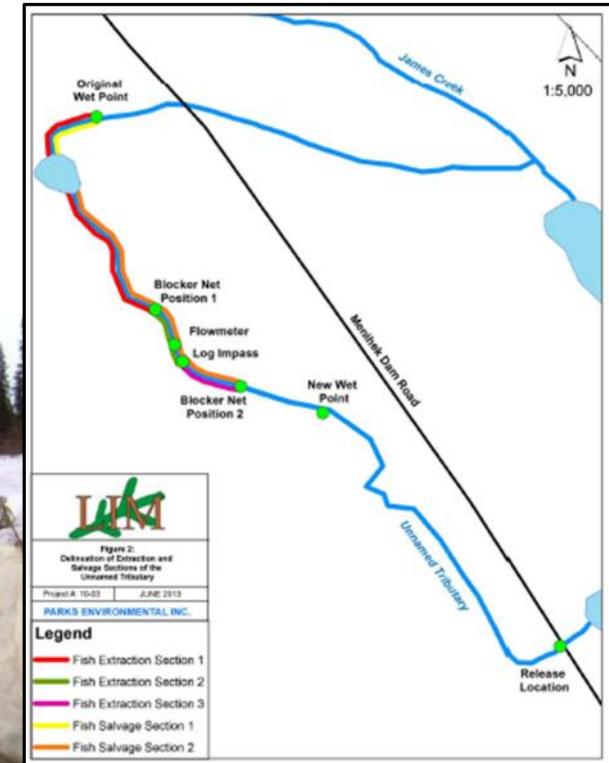


Alterations to the Un-named Tributary



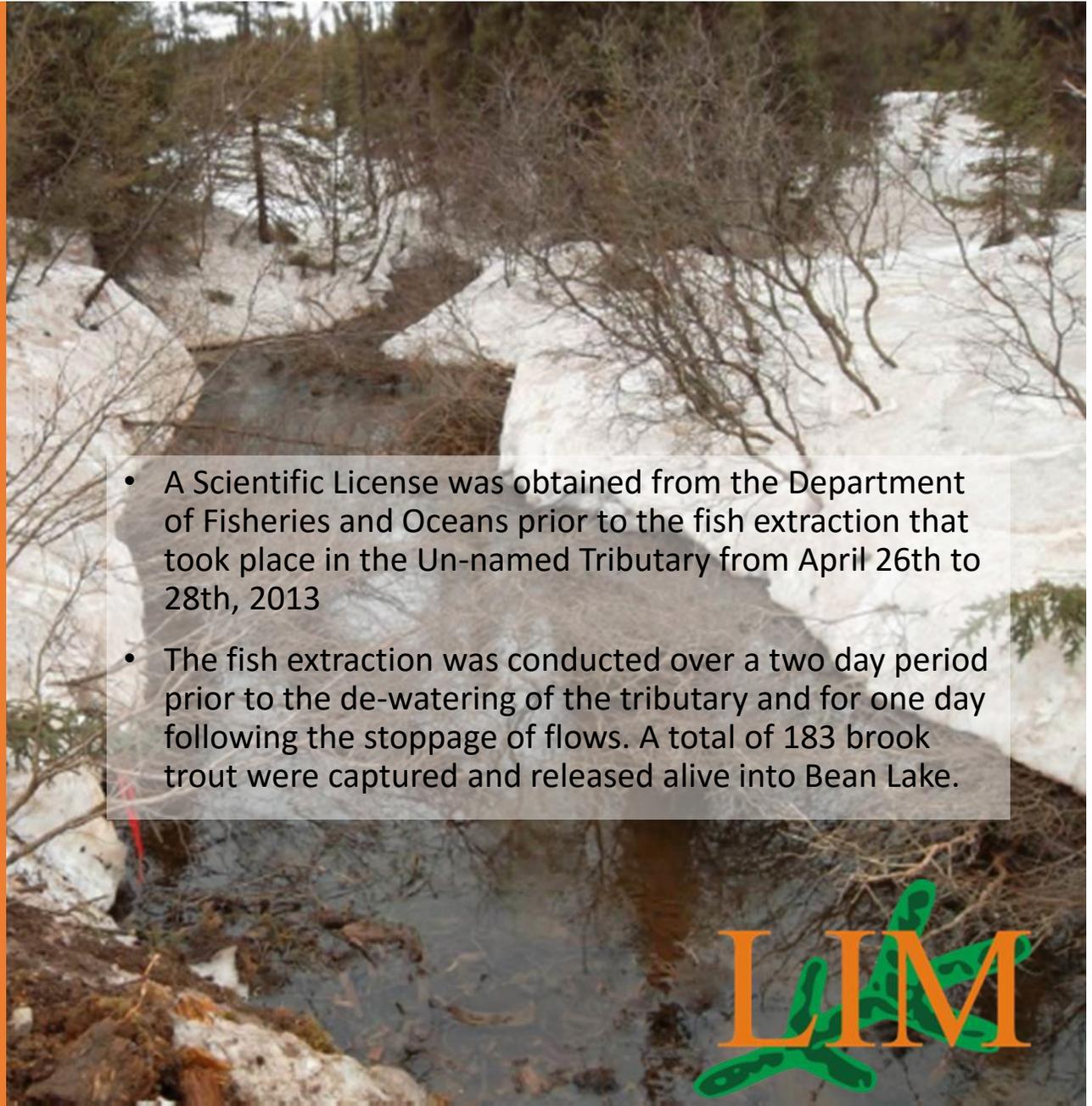
Labrador Iron Mines received a Fisheries Authorization from the Department of Fisheries and Oceans for the removal of approximately 5,662m² of fish habitat contained within the upper 500m section of the Un-named Tributary to accommodate the future extension of the east perimeter wall of the James Pit.

(Fisheries Act Authorization No. 13-05-001)



James Pit Expansion: Un-named Tributary Diversion Pipeline





- A Scientific License was obtained from the Department of Fisheries and Oceans prior to the fish extraction that took place in the Un-named Tributary from April 26th to 28th, 2013
- The fish extraction was conducted over a two day period prior to the de-watering of the tributary and for one day following the stoppage of flows. A total of 183 brook trout were captured and released alive into Bean Lake.



An Off Set Plan was approved by DFO to compensate for loss of 5,662 m² of fish habitat in the Un-named Tributary.

The Redmond Creek Habitat Compensation Facility was constructed in August – September 2013.





Unnamed Tributary



James Pit Before Flooding, 2013



Re-establishment of Flow to the Un-named Tributary



Following the cessation of mining in November 2013, the dewatering perimeter pumps were shut down in May 2014 and the filling of the James Pit began. Thus the pumping into the Un-named Tributary was halted resulting in the temporary de-watering of the stream



De-watered Section of the Un-named Tributary, immediately upstream of the road Culvert





James Pit Overflow Event: July 2015

The end result of discontinuing pit dewatering pumping has been the filling of James Mine to approximately 520 masl (metres above sea level) and the re-establishment of water flow into the Un-named Tributary.





The James Pit flooding assessment prepared by WESA in 2014:

- Estimated the flooding period to be 1-1.5 years, Spring 2014-Summer 2015
- Predicted retention and settling time would be adequate to achieve compliant discharge turbidity results upon overflow into the Un-named Tributary

LIM continuously measured water-levels during filling to better understand the fill rate

As predicted by WESA, the James Pit filled to overflow in late July 2015





Over Flow into the Un-named Tributary

LIM



Fish were removed from the stream by electrofishing and released alive into Bean lake immediately prior to and following de-watering



Mitigation Measures



Temporary filter cloth barriers to aid in initial sediment removal



Hay bales to aid in filtration, control water flow, and divert flow into vegetated areas



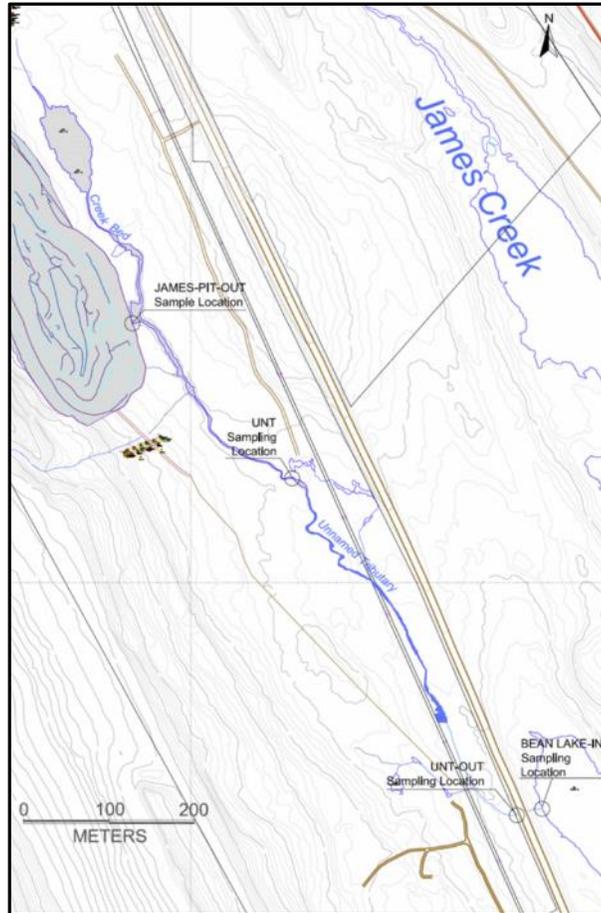
Mitigation Measures



Screens were installed at the road culvert to prevent fish from moving into the stream until water quantity and quality were stabilized.



Sampling Locations



Sampling, to monitor the quality of water originating from James Pit was conducted at four representative locations; the outlet of James Pit, halfway down the UNT, the inlet into the road crossing culvert, and the inflow into Bean Lake.

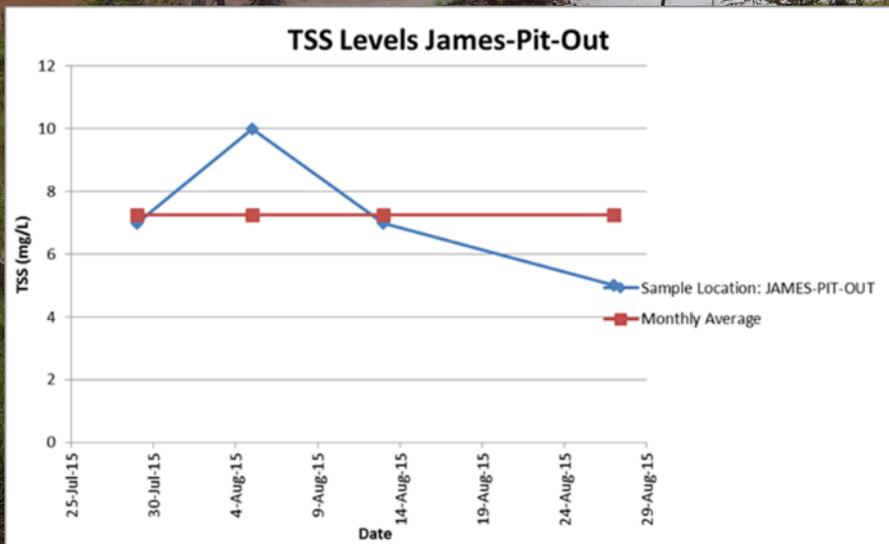


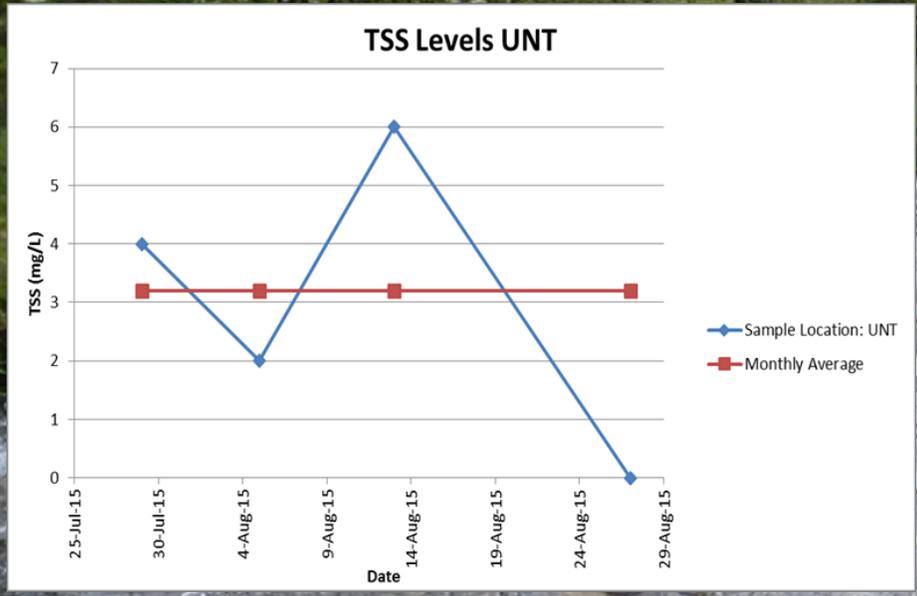
Sampling Results

Regulated TSS Levels:

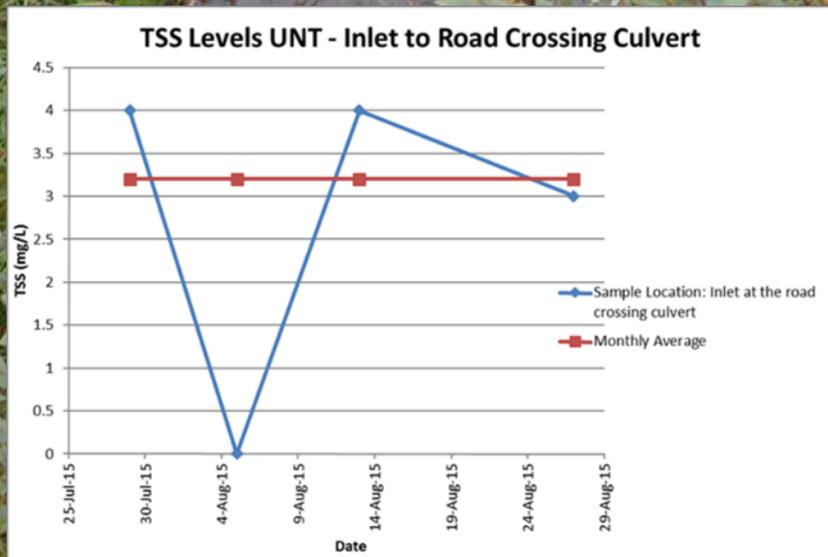
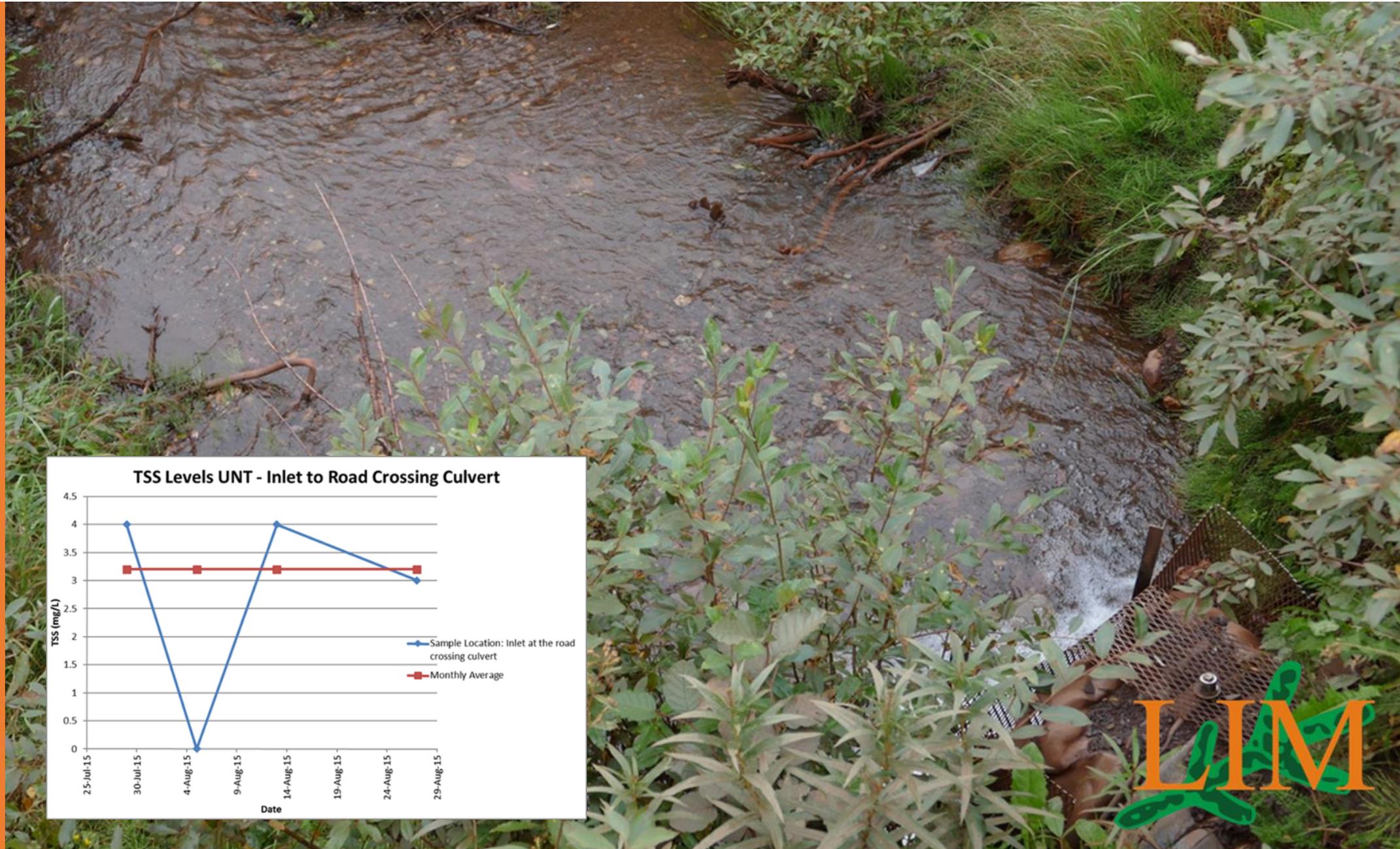
- 30mg/l for a single sample 15 mg/l as the monthly mean of all samples

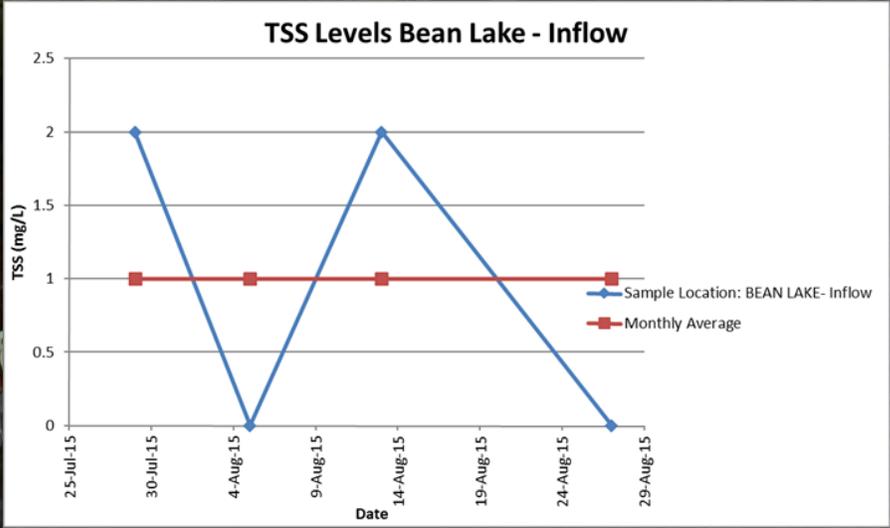
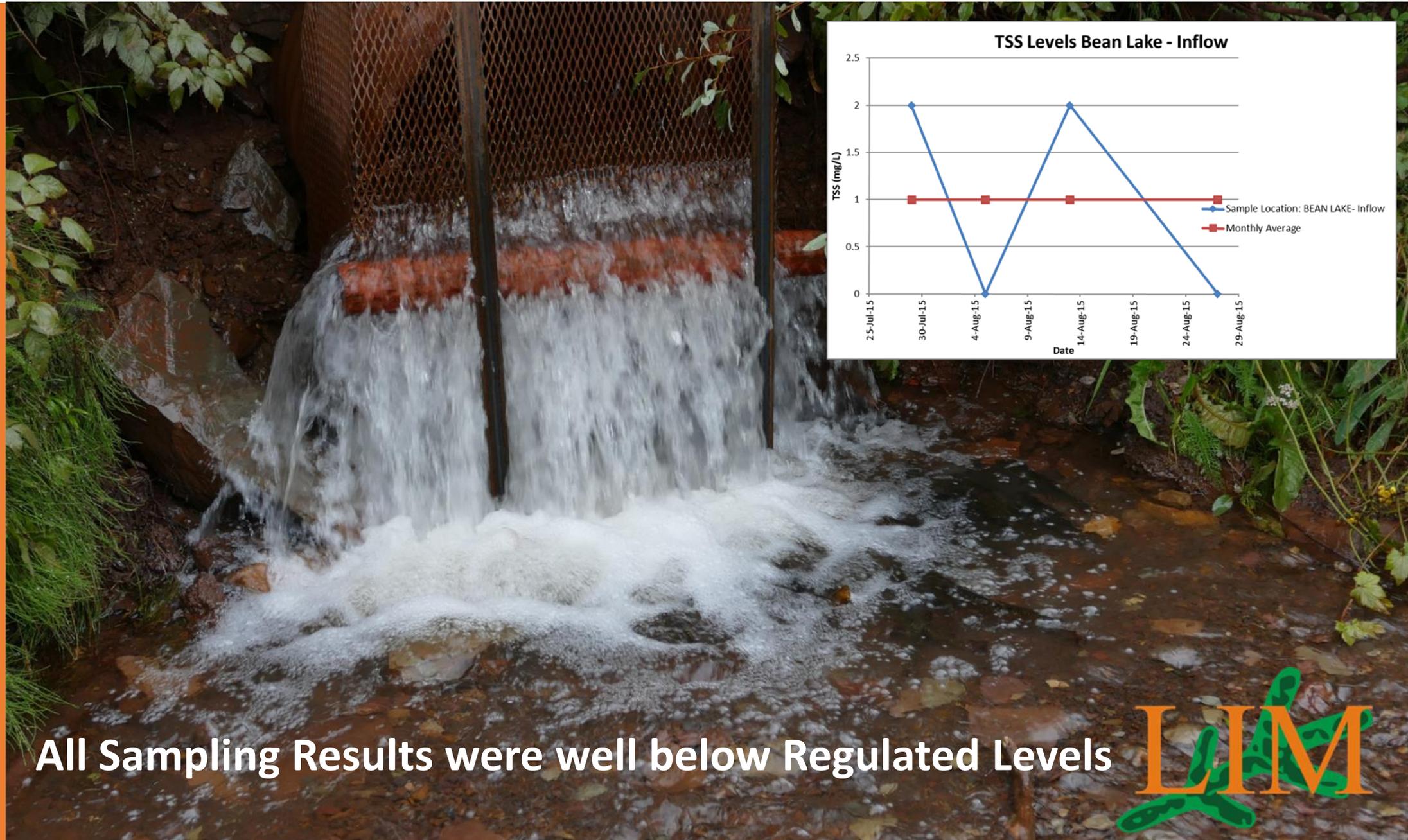






LIM





All Sampling Results were well below Regulated Levels



Fish Re-enter the Un-named Tributary



A DFO representative visited the Site on August 8, 2015 to assess the habitat conditions in the Un-named Tributary. After reviewing the sampling results and inspecting the creek conditions it was determined that the water quality was at a level to allow fish to re-enter the creek and the screens on the road crossing culvert were removed. This marked the successful re-establishment of the un-named Tributary.



Conclusions and Lessons Learned



- Innovative technical and environmental solutions were successful in minimizing environmental effects
- Solutions employed were cost effective
- The hydrology model accurately predicted pit overflow timing; July 2015
- Cooperation with Federal and Provincial Regulatory authorities was excellent
- All permit and regulatory requirements for water quality were met at each stage
- Original fish habitat was restored at the end of mining in addition to a pit lake that increases fish habitat
- End result is more overall fish habitat and higher value fish habitat than before the mining and diversion project
- Aboriginal communities were consulted and supportive throughout



Environmental Policy and Guiding Principles

Labrador Iron Mines Limited (LIM) is committed to conducting operations in an environmentally responsible manner by maintaining a high standard of environmental responsibility and performance.

*Our goal is to minimize the environmental footprint at all operations, while conducting operations in a safe and socially responsible manner. We have adopted this **Environmental Policy** to demonstrate our respect for the environment and the local communities in which we work.*

