

Yukon/Pelly River Chinook Salmon

- Lifeblood of ecosystem health and productivity – aquatic and terrestrial
- Lifeblood of FN and SFN cultural and Socio-Economic health

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Ecological importance

- Chinook salmon key species bringing back nutrients from the Pacific ocean 3000 km upstream to the Yukon
- Nutrients carried by Chinook salmon fertilize and enrich productivity in both aquatic and terrestrial ecosystems
- Chinook salmon important for mammal and bird species like bears, eagles and other predators and birds of prey as well as riparian trees and vegetation

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Socio-Economic and Cultural

Importance

- Chinook salmon a key species for SFN culturally but also for socio-economic reasons as a subsistence and traditional food resource.
- SFN subsistence fishery involves 23+ family fishing camps on Yukon and Pelly Rivers where harvesting and culture training occurs
- SFN actively involved in with traditional and science based Chinook management
 - Development and publication of Salmon Management Plan that integrates Traditional Knowledge and scientific/technical information and approaches
 - Operation of Pelly sonar since 2017
 - Implementation of salmon restoration and enhancement projects for more than 2 decades

Yukon/Pelly River Chinook Key Population and Habitat Considerations – Faro Mine Site

- Yukon/Pelly River Chinook salmon in decline for 20+ years
- Faro did not cause Chinook salmon decline but contributed to it through water quality degradation and habitat loss as a cumulative effect
- Key Chinook habitats affected by development, operation and abandonment of Faro mine site include the downstream receiving waters:
 - Anvil Creek – spawning, incubation, juvenile rearing and overwintering habitat
 - Lower Vangorda Creek – rearing and overwintering habitat
 - Pelly River – all Chinook life history functions potentially affecting stocks in the entire watershed
 - Rose Creek does have some current Chinook salmon habitat utilization and juvenile rearing value especially in the lower reaches but productivity is low relative to the above mainly because of distance from the mainstream Pelly River also because of severe mine impacts over decades.
 - The lower section of Vangorda which is highly significant juvenile Chinook habitat while it is only a few km but the **Rose-Anvil system represents ~40 km of Chinook spawning, incubation, rearing and overwintering habitat which is of major significance to Pelly River Chinook populations.**

Cumulative Effects Considerations

-Faro Mine Site

- Anvil Creek contributes to Pelly Chinook populations directly as a spawning, incubation and rearing stream
- Juvenile Chinook from other Pelly River stocks use Anvil and Vangorda Creeks for rearing and overwintering
- Declines in Pelly River populations affect not only SFN fisheries but other mixed stock fisheries downstream
- Declines in Pelly River Chinook means that other Yukon River stocks undergo corresponding increases in harvest pressure

Faro Remediation Project is Unique

- Faro Remediation project unique in that it is a very complicated long term 25+ year project to remediate past, current and ongoing future adverse impacts as follows:
 - Adverse environmental impacts involved with the development, operation and abandonment of the Faro mine site over the past ~50 years
 - Future ongoing adverse environmental impacts at the mine site and in downstream receiving waters not only over the next 25 years but in perpetuity
 - Adverse impacts from seepage of contaminated groundwater from the site is predicted to continue to worsen for the next 50 years with oxidation of waste rock dumps and tailings

Pelly River Chinook Salmon as a VESEC

- The Chinook salmon VESEC needs to be partitioned and assessed by life stage and corresponding habitat requirements and values potentially impacted as follows:
 - Pelly River and Anvil Creek – migration, spawning, incubation, rearing, overwintering
 - Lower Vangorda Creek – juvenile rearing, overwintering
 - Rose Creek – juvenile rearing
- The value of Chinook to productivity of aquatic and terrestrial ecosystems in the Pelly drainage needs to be considered
- Socio-Economic and cultural values of harvest as well as “existence” value Chinook as part of the aquatic ecosystem and landscape in the Pelly drainage over the long term needs to be considered

Pelly River Chinook Salmon

Spatial scoping considerations

- Key Chinook salmon habitat located downstream from the Faro mine site and directly affected by contaminated mine seepage need to be included in detailed assessment with respect to Chinook salmon as follows:
 - At a minimum Anvil Creek and the lower fish bearing section of Vangorda Creek need to be included in the local study area
 - The entire Pelly River drainage needs to be included in the regional study area
 - With respect to Chinook harvesting the entire Pelly River drainage and the mainstem Yukon River downstream from the confluence of the Pelly River needs to be included in the regional study area.

Pelly River Chinook Salmon – Water Quality Objectives

- For key Chinook salmon habitat located downstream from the Faro mine site and directly affected by contaminated mine seepage the following water quality objectives are recommended:
 - Non degradation water quality objective for Pelly River, Anvil Creek, the lower fish bearing section of Vangorda Creek and Rose Creek at the confluence with Anvil Creek
- Regardless of whether an non degradation objective can be achieved or is realistic over the short term it should be the water management target over the long 25 year term to protect key Chinook habitat.

SFN Position on the Faro Remediation with respect to Chinook salmon

- The project should go ahead ASAP and should not be unduly delayed as environmental conditions are worsening and remediation is urgently needed
- Data gaps should be addressed through the AMP and intergovernmental processes and as a condition of licensing
- In particular the data gaps with respect to Chinook salmon relate to historical and current Chinook habitat utilization especially during critical winter conditions for which there currently is little or no data and Chinook habitat inventories of the receiving waters in the Rose – Anvil drainages.
- Further there is little or no current data for the lower section of Vangorda Creek with respect to juvenile Chinook salmon rearing and overwintering which is an important data gap as overwintering habitat is such a limited and critical habitat for Chinook salmon.

Aquatic Life and Health

- Laboratory bioassays of effects of contaminant levels on selected laboratory organisms such as Rainbow trout and establishment of contaminant thresholds and monitoring programs is important for responding in a timely manner to changes in contaminant levels but it is not an adequate measure or indicator of long term aquatic health
- An aquatic health VESEC that is based on a number of known indicators of aquatic health is required

Potential Indicators of Aquatic Health

A aquatic health VESEC is recommended which would include consideration of the following indicators:

- Fish species – abundance and distribution, growth and body condition, tissue contaminant levels, TK and local knowledge of harvesters
- Benthic invertebrates – species abundance and diversity especially of more contaminant sensitive EPT species, tissue contaminant levels
- Stream sediments – contaminant levels
- Water quality – changes in chemistry and contaminant levels
- Stream hydrology – changes in flows and seasonal flow patterns
- Control streams – need monitor and compare the above to reference or control streams and watersheds e.g. Blind Creek that are not impacted

TK and local knowledge regarding the aquatic ecosystem including the above indicators needs to be systematically gathered and fully considered (e.g. observation of Ferric oxide in lower Rose Creek in 2017)

Temporal Issues associated with historic development and operation of the Faro Mine

- The key question is whether the overall objective of the Faro Remediation project is to prevent further deterioration of environment conditions or is it to fix and restore the impacted ecosystems to pre project state to the extent possible?
- If the objective includes the latter then it is necessary to establish what the pre project environmental conditions were.

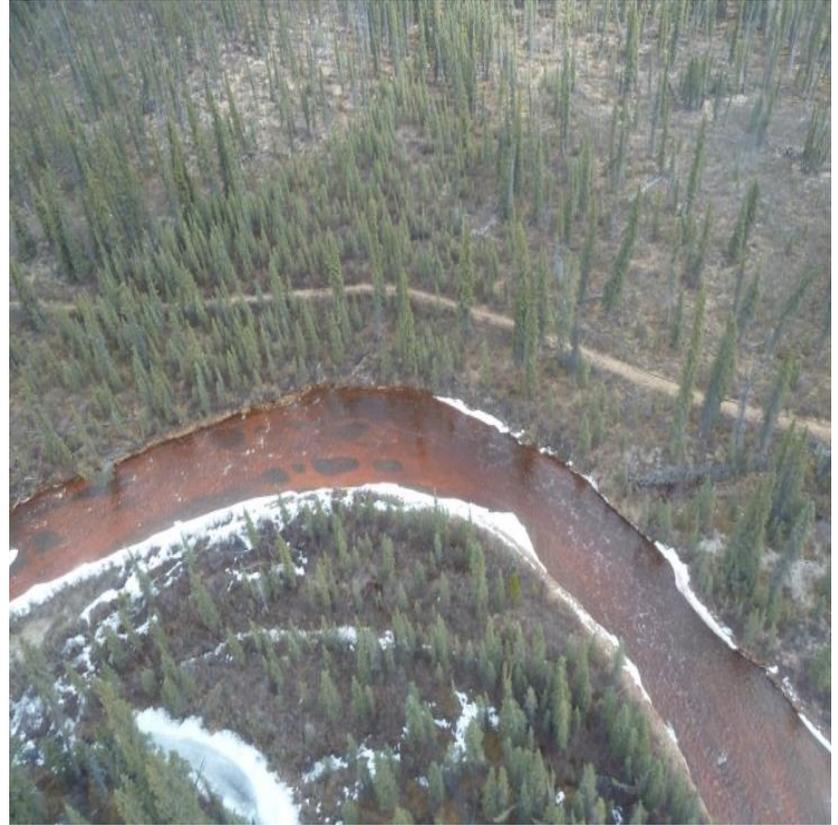
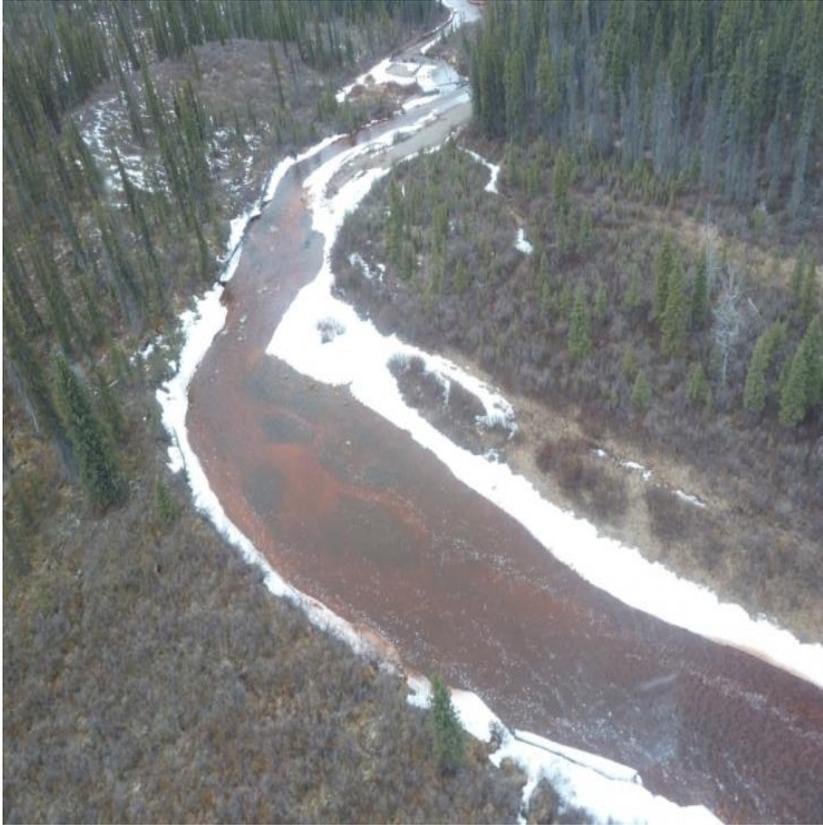
Establishment of Pre project Baseline Environmental Conditions

- The current practice of establishing and monitor a few reference sampling locations upstream of water quality mine impacts (e.g. R7, R6, P1) is not sufficient especially for mobile biological indicators such as fish as these reference sites are all on impacted drainages
- A number of non impacted reference or control drainages need to be selected as part of the baseline studies and monitored as part of the AMP (e.g. Blind Creek where a lot of data already exists)
- TK and local knowledge of baseline conditions of streams and drainages affected by Faro and observed changes needs to be fully incorporated and considered

Restoration and Compensation for past impacts

- Historic adverse impacts to highly valued VESEC's e.g. Chinook populations and habitats and harvest and cultural values are a priority for restoration and compensation
- Highly preferable to earmark funding for proactive and progressive restoration and compensation programs rather than on inconclusive studies to establish and document pre project baseline conditions i.e. where there is uncertainty rather than spending resources on documenting/proving these adverse changes focus these resources on restoration and compensation projects to fix past impacts and improve the current conditions.

Rose Creek Winter WQ at Station R3
~5 km downstream from Faro Mine Site
May 2017 – YCS Website
Precipitated Ferric Hydroxide



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Chinook Juveniles

Summer and Winter Condition-
It makes a difference to WQ thresholds!

