

# Summary of Rio Tinto Flow Requirements

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# Overview

- Historic Water Licence
- Settlement Agreements
  - Flow management goals
  - Flow schedules
- Modern Water Licence
- Contemporary Flow Management
  - Flow decisions and oversight
  - Flow schedules
  - Flow/temperature data
  - Monitoring and fish response



# Historic Water Licence

- Granted to Alcan in 1950.
- Allocation for Kemano and more.
- No environmental flow requirements.
- No oversight.



# Agreement Background

- 1980: DFO gets Court Order imposing temporary flow schedule (“injunction flows”) to protect salmon in Nechako River.
- 1985: Alcan challenges Court Order with lawsuit. BC Intervenes.
- 1987: Lawsuit settled out of court.



# 1987 Settlement Agreement

- Agreement between Alcan, DFO, and Province of BC.
- Outlined subsequent phases of Alcan's power development.
- Defined environmental conservation goals.
- Prescribed short and long term flow obligations (before and after Kenney release facility) with monitoring.
- Revoked some provisions of 1950 Water License.



# 1987 Settlement Agreement

- Established Nechako Fisheries Conservation Program (NFCP): Alcan, DFO, BC and external expert.
- NFCP mandated to implement agreement:
  - Flow release oversight.
  - Technical monitoring studies.
  - Remedial measures.
  - Reporting.



# Flow Management Goals

- Chinook Salmon conservation
  - Annual Water Allocation (AWA)
  - Ensure changes to instream habitat conditions don't jeopardize the Chinook population
- Sockeye Salmon conservation
  - Summer Temperature Management Program (STMP)
  - Reduce water temperature risks to migrating Sockeye



# Flow Schedules: AWA

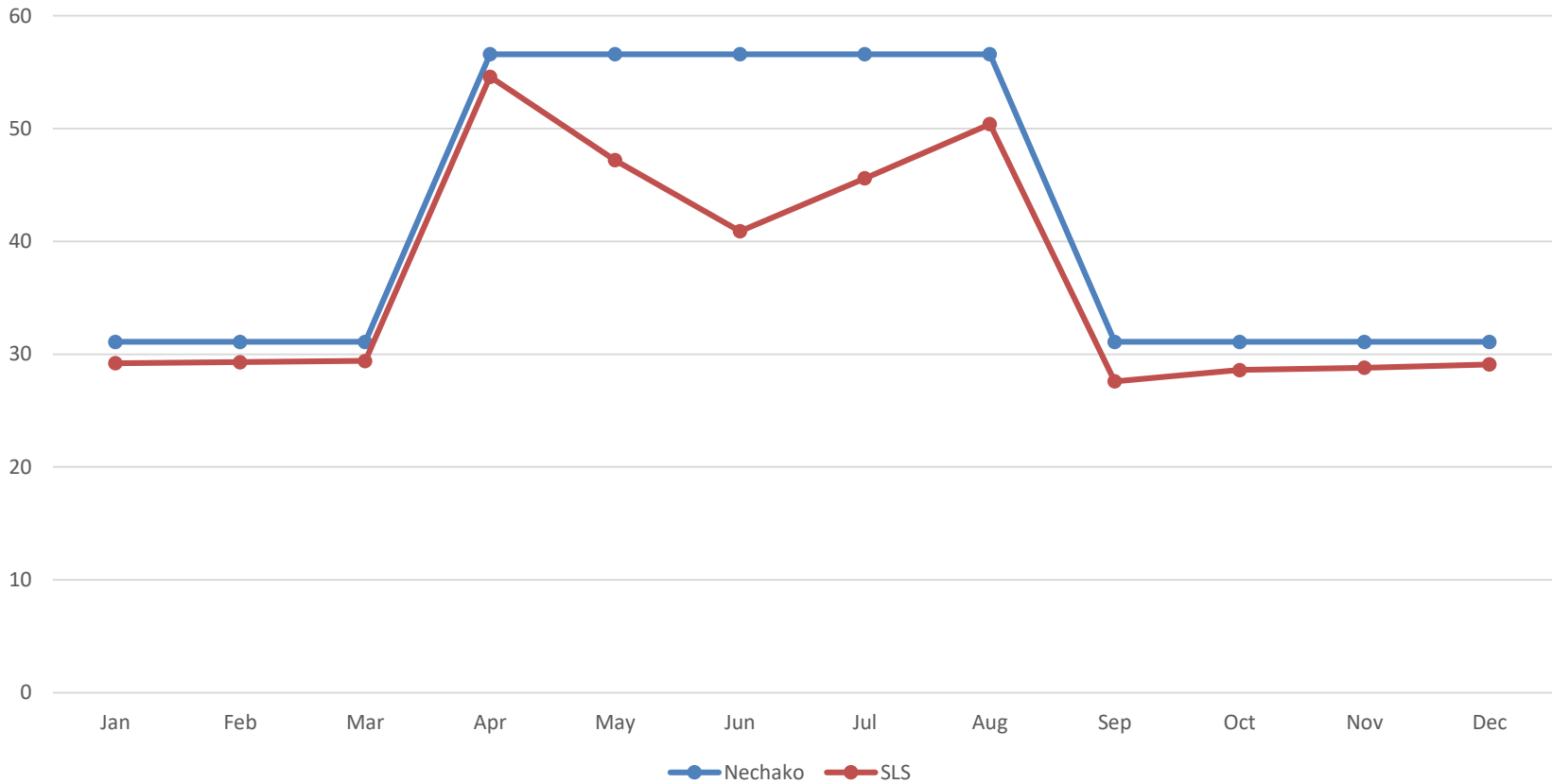
- *“the quantity of water required to be released in accordance with the provisions of the Agreement during the twelve month period commencing on the first day of April in each and every year...”* – 1987 Settlement Agreement
- Requires mean annual water flow at SLS of at least 36.8 m<sup>3</sup>/s (actual target is minimum flow of 41.7 m<sup>3</sup>/s in Nechako River below Cheslatta Falls).





# Flow Schedules: AWA

AWA 36.8 m<sup>3</sup>/s



# Flow Schedules: STMP

- Reservoir releases to keep river water temperature within specific range from July 20th to August 20th
- Water temperature is not to exceed 20°C in Nechako River at Finmore (upstream of Stuart River)
- STMP flows not included in the AWA



# 1997 Final Agreement and Water Licence

- (BC/Alcan 1997 Agreement).
- Formalized flow schedule (short-term) as Final Water License.
- Included electrical supply/purchase agreements.
- Included Nechako Environmental Enhancement Fund (NEEF) and Northern Development Fund.



# 2012 Water Licence

- Currently in effect.
- Incorporates Kemano Tunnel 2 project.
- Maintains flow provisions of 1987/1997 Agreements.
  - 170cms Kemano diversion.
  - 23,850B m<sup>3</sup> reservoir storage.
  - Short-term Annual Water Allocation and Conservation/Flow Management Goals.



# Flow Oversight

- NFCP determines flow schedule within range of Water Licence.
- 1987 – 2013 study results largely inform “tweaks” from 1987 flow schedules.
- Dam safety and flood protection releases supersede NFCP authority.
- RT monitors, models and operates flow



# Flow Schedules: AWA

- Cheslatta inflow didn't augment SLS to meet Nechako target
- Steady SLS discharge preferred, Cheslatta inflow to mimic seasonal hydrograph
- Seasonal flow variability based on conservation requirements.
- Requires ongoing actual flow data and predicted flow calculations



# AWA Flow: Spring (April – June)

- Steady discharge for Chinook emergence
- Based on previous winter flow and predicted inflow.
- Typically  $\sim 49 \text{ m}^3/\text{s}$



# AWA Flow: Summer (July- Aug)

- Flexibility (based on inflow and reservoir levels)
- Recognizes STMP requirements





# AWA Flow: Fall/Winter (Sept-March)

- Calculated based on remaining AWA balance
- Minimum Chinook spawning and overwintering release 31.1 m<sup>3</sup>/s, maximum 125 m<sup>3</sup>/s
- Must be maintained through winter
- Try to avoid late season flow spikes
- Some flow averaging but flow change rules to prevent under-ice scour, protect egg incubation



# Flow Schedules: STMP

- SLS releases to cool Nechako River for early Stuart Sockeye
- Based on water temperature monitoring, weather forecasting, and flow release temperature model.
- Daily modelling July 10<sup>th</sup> to Aug 20<sup>th</sup>
- Water temperature trends are analyzed for observed data (previous days, current day) and predicted conditions to determine likelihood of temp >19.4.



# Flow Schedules: STMP

- Cooling flow July 20<sup>th</sup> - Aug 20<sup>th</sup>.
  - Initial surcharge flow (fill Cheslatta)
  - Cooling flows (max 453 m<sup>3</sup>/s)
  - Non-cooling flows (min 14.2m<sup>3</sup>/s)
- Nechako (Cheslatta) flow range 170 m<sup>3</sup>/s (July 20) to 283 m<sup>3</sup>/s
- Nechako (Vanderhoof) max flows 340 m<sup>3</sup>/s



# Flow/Temperature Data

- Snow/precipitation measured at 10 stations across river and reservoir watershed (consultant).
- Water temperature measured at 4 river and reservoir locations (consultant).
- Water level measured at 4 river locations (Water Survey Canada)



# Flow/Temperature Data

- Standard instrumentation and techniques
- Duplicate data
- Manual data download and real-time satellite transmitted data
- Standard QA/QC



# Flow/Temperature Calculations

- Water Survey Canada sets standards.
- River hydrology/modelling by RT world-class.
- STMP model since 1980s; numerous scientific scrutiny.



# Monitoring Results

- NFCP monitoring since 1987
- Chinook adult and juvenile populations
- Habitat conditions, including enhancements
- Oversight on water temperature and flow
- Annual reporting



# Monitoring Results

- NFCP 2016 Summary Report
- AWA and STMP flow objectives have been consistently achieved
- Chinook conservation goal has been met
- Biological monitoring is no longer collected by NFCP (rely on DFO Stock Assessment)





# Thank you!



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