To:	WEI Meeting Participants
From:	Brodie Smith and Rahul Ray
Date:	December 14, 2021
Re:	Final Rio Tinto WEI Table Meeting 24 (Videoconference) Summary, November 24, 2021

A videoconference for the Rio Tinto Water Engagement Initiative (WEI) was held on Wednesday, November 24, 2021, from 9:00 am to 1:00 pm. The videoconference was held instead of an in-person Main Table meeting to promote social distancing in response to COVID-19, while making progress on aspects of the WEI.

This document is a summary of the videoconference and not word-for-word "meeting minutes". The information presented highlights the topics raised, key discussions, and identified action items.

The facilitator was Rahul Ray (RR) from EDI. Brodie Smith, also from EDI, took notes during the meeting and prepared this summary. Jayson Kurtz (JK) from Ecofish Research participated as the Technical Working Group (TWG) coordinator. Michael Harstone (MH) from Compass Resource Management participated as a decision analyst. Clayton Schroeder (CS), also from Compass Resource Management, participated as technical support.

Andrew Czornohalan (AC), Operations Director - Power and Services, Kitimat and Kemano participated as a WEI Table member. Andy Lecuyer (AL), Senior Environmental Advisor, and Devrie Sanghera (DS), Communities & Social Performance Advisor, from Rio Tinto, participated in the videoconference as support.

A draft agenda was included in the invitation, and outlined the anticipated meeting topics:

- Agenda, meeting summary, action item update
- Rio Tinto update:
    - Operations update
    - T2 breakthrough
    - Winter flows
    - Other topics
- Southside Working Group update:
    - Reservoir tour
    - Southside Working Group meeting
- Mike Robertson presentation

- Technical Working Group (TWG) update:
    - WEI climate change modelling
    - Memo update (in review with WEI Technical Working Group)
    - Memos in progress
    - Sturgeon update
    - Issues Scoping
- Climate research: Presentation by Dr. Stephen Dery
- First Nations engagement update
- SDM process path (Michael)
- Next Steps and meeting dates

Table 1 lists the participants that were involved in the videoconference and the organizations they represent.

Table 1. November 24, 2021 - WEI Videoconference Participants

Individual	Organization
John Alderliesten	Public participant
Jolinka Alderliesten	Public participant
Karen Batycki	
Lyla Brophy	Nechako Regional Cattlemen's Association
Michael Cranny	Cheslatta Carrier Nation invite
Stephen Dery	UNBC
Gerd Erasmus	Public participant
Greg Farney	Cheslatta Carrier Nation invite
James Jacklin	BC Government-FLNRORD
Jennifer Howell	District of Fort St. James
Henry Klassen	Public participant
Donna Klingspohn	Public participant
Ray Klingspohn	Public participant
Taddea Kunkel	Regional District of Bulkley Nechako
Clint Lambert	Regional District of Bulkley Nechako
Gina Layte-Listen	Public participant
Jason Llewellyn	RDBN
Jerry Petersen	Regional District of Bulkley-Nechako
Lynda Maertz	Cheslatta Carrier Nation
Kim Menounos	Fraser Basin Council
Mark Parker	Regional District of Bulkley Nechako
Colin Parkinson	Southside Working Group Navigation Specialist
Tasha Peterson	NWR Coordinator
Ray Pillipow	FLNRORD

Tim Plesko	Public participant/Southside representative
Mike Robertson	Southside representative / Cheslatta Carrier Nation
Wayne Salewski	Public participant / NEWSS
Dan Sneep	Department of Fisheries and Oceans
Maria Sotiropoulos	Department of Fisheries and Oceans
Denis Wood	Public participant
June Wood	Public participant

The following provides a summary of the topics discussed during the videoconference.

- RR opened the meeting by welcoming participants and reviewing the draft agenda.

- MH reviewed the Nechako WEI Work Plan. He reminded the participants of the new plan that was discussed in the last WEI meeting. The Structured Decision Making (SDM) process will be paused for the winter while waiting for new models and other components. This provides an opportunity to get the house in order and work on other items that will help the process. They will have more discussions with the sturgeon recovery team and explore new ways to align the work between the two tables. There will an opportunity to share information and have broader engagement with First Nations. Ecofish will continue to work on the technical tasks. The SDM process will resume in the spring. This will be the first meeting following the new schedule, with the focus on providing updates.

- RR stated that the Main Table will continue on with this new schedule, as agreed to in the last meeting. The Technical Working Group and South Side Working Group have lots of ongoing work that will help the Main Table prepare for the spring work.

- RR reviewed the Main Table Meeting 23 summary

    - No suggested revisions received from participants

    - Final meeting summary posted on the Get Involved Nechako website: https://www.getinvolvednechako.ca/wp-content/uploads/2021/11/1-Summary-WEI-M23-27_September_2021.pdf

- RR reviewed action items from Meeting 22:

    - **Action Item:** AL will discuss the extent of the fire into the riparian zones with the Technical Working Group. **Update:** AL reached out to Cheslatta to check out the extent of the fires. Images were brought back to the Technical Working Group. They will also look to see if the tributaries are affected.

        - Denis Wood (DW) asked if they had considered the fires at Cut-off Creek and Swanson Creek. He also noted that Big Bend Creek was majorly affected by the Cut-off Creek fire. AL thanked DW for bringing that forward. Both those creeks will be brought in. He asked if anyone else had any other information to reach out to him (andy.lecuyer@riotinto.com).

        - Wayne Salewski (WS) noted that similar issues may have been associated with the Kenney Dam fire in 2004. The cause and effect of fires is visible from that point on in that area. AL thanked WS for sharing that information.

- WS also suggested utilizing John Rex. James Jacklin (JJ) added that John Rex and Alexandre Bevington have been working on similar issues over the last few years. This could be a great opportunity to share information. He encouraged JL to reach out to John. (John's email address was shared in the chat john.rex@gov.bc.ca). AL thanked JJ for the information.

- AC noted that there was a lot of data from the various types of surveys that were done on the river this year, and it will be interesting to feed it back through the lens of wildfire impacts to see the effect on the tributaries and river.

- WS stated that it was also important to understand the effects of mountain pine beetle and other forest structure issues. These add to the effects of wildfires. JJ responded that this was exactly the kind of work they were doing. They are working on finding the linkages between wildfires, clear cut effects, hydrology, and other issues. They just signed a contract this morning to continue the work. He encouraged AL to reach out to the team so that the work was not duplicated.

- **ACTION ITEM: AL will touch base with John Rex and his team about their ongoing work.**

    - **Action Item:** Andy will ask the UVIC lab if they have an eDNA primer for Kokanee. **Update:** AL noted that JK talked to the lab and confirmed that the lab has a primer for sockeye. JK added that there is definitely a primer that will detect Kokanee, which are the same species as sockeye salmon.

    - **Action Item:** RR will compile the joint Rio Tinto/Union communications, confirm they are joint communications, and send them out with the next meeting summary. **Update:** RR sent the compiled communications as part of the between-meeting update package.

        - AC added that the intent moving forward on those types of bulletins is to have them as joint bulletins and continue to forge that relationship and improve it into the future. Those bulletins are targeted at the staff in Kitimat, and more loosely targeted at the community members. They are not designed to be a watershed specific communication but will give a sense of what they are seeing here in Kitimat.

        - RR asked if the intent was to have periodic updates. AC responded that yes there will be periodic updates, but there is no set schedule. A new update went out last week, and he can provide that to RR to go out with the next email to the Main Table members.

- **ACTION ITEM: AC will provide RR with the most recent joint communications from Rio Tinto and the Union, and RR will send this to the Main Table members.**

- **Action Item:** James Jacklin will determine if any reports of fish kills during the heat dome were received. **Update:** JJ provided this information to RR, and it was sent as part of the between-meeting update package.

    - "Regional provincial fisheries staff were notified of only one occurrence of potential fish kills this summer. This report came in for Kwitzil Lake (Gravel Pit Lake) after the extreme heat in July. Staff visited the site and collected some of the specimens for analysis and deployed temperature probes to collect information. Field assessment at Kwitzil Lake suggest it was only a small partial kill, as anglers continued to be successful through the rest of the summer.

      There may have been other incidents in the region this summer, however they were not reported to our staff. It is our understanding the significance of the heat this summer was more pronounced in southern BC resulting in many waterways being closed to angling due to extreme temperatures."

- **Action Item:** The Technical Working Group will create a graphic that shows pre-dam flows into the reservoir. **Update:** JK responded that they have naturalized hydrograph plots, and these will be shared as part of the Technical Working Group update.

    - More information can also be found here: https://www.getinvolvednechako.ca/wp-content/uploads/2021/11/TWG-Naturalized-Flow-WEI-M23-27_September_2021.pdf

- **Action Item:** Main table members will do a critical review of the website and provide comments to DS by October 8, 2021 (Devrie.Sanghera@riotinto.com). **Update:** Comments received from Donna on Tuesday, October 5, 2021.

    - DS added that comments were received and incorporated where applicable. Two sets of comments were received.

- AC presented a Rio Tinto update. He was really pleased to see everyone today. He realizes that people are being impacted by the events in the Lower Mainland, and he hopes everyone is keeping well.

- AC provided an operations update:

    - Return to work in progress.

        - Rio Tinto is continuing the return to work after the labour dispute over the summer. Over 470 people are back, and another 30 people will be back at the smelter this week. About 250 to 300 people are still to return. This will occur over the winter and

into the new year. Each person is doing onboarding, providing reflections, and completing one-on-ones with their leaders as part of the return-to-work process.

- Planning the re-start
    - Rio Tinto is planning for the restart of the smelter, and they are currently running at 25%.
- Building the culture of the future
    - Rio Tinto is working on building culture, with the union and focus groups. They are working on the culture of the leaders and the broader Rio Tinto including the systems and how work is done. They are putting a process in a place so that they do not fall into the same patterns and can cement the long-term future of the smelter. It is going well. It is a difficult undertaking, but it is the most critical thing they are undertaking now.
- Preparing the pots and the plant
    - They are preparing to restart the process and are ensuring there are no damages and completing repairs. They have created a situation so that the pots can be put back into service. The workers that have returned to site are focused on that task.
- Getting in front of maintenance
    - They are using this time get in front of as much of the maintenance as possible, so that they are in the best possible shape when everything starts back up again.
- Executing projects
    - There are a number of project works that need to be completed. While at a reduced capacity, this can be done more efficiently, and it is easier and safer to do. They can shut down sections of the plant for longer. This is all about securing the long-term future.
- Detailed and integrated planning
    - There are currently many people working on the restart process. Everything has to be done in order. This is a huge amount of work, and it is very detailed. They will continue ramping up the smelter over next 12 months. In the spring they will start to increase from 25%, and then will be back to full operations in a year.
- Logistics and Transport Challenges

- There have been impacts on the rail and road networks, and this needs to factor into their thinking and return to production plans.

- DW asked if they used all the power, and if not, what happened to the surplus from Kemano. AC responded that have been able to increase exports to BC Hydro. They will continue to do that over the winter. They have currently maxed out the transmission line capacity. There is still power going to the smelter. The leftover flow is going to the Nechako River.

- WS asked what the management strategy will be going forward. AC responded that he would address that question in a few slides.

- Colin Parkinson (CP) asked if there were water flow requirements for the Kemano River. AC responded that there were, and that these also drive the decision making in the overall system. The requirements are different than those for the Nechako River and are more focused around short-term impacts. Generally, if they can keep operations running smoothly through Kemano, then they are fulfilling the requirements for the Kemano River.

- RR noted that there were a few new people at the meeting, and asked them to take a moment to introduce themselves the rest of the members:

    - Colin Parkinson: He is helping the Southside Working Group as a navigation specialist. He was a navigable waters officer for 20 years and has been involved in work in this system in the past. He thanked the table for having him here and said it was great to be back.

    - Greg Farney: Mike Robertson invited him to be here to listen to his presentation.

    - Lynda Maertz: Here to help Mike Robertson with his presentation.

    - Tasha Peterson: She is the new NWR coordinator, and just started on Monday.

    - Taddea Kunkel: She is the First Nation Liaison with the Regional District of Bulkley Nechako.

- AC provided an update on the T2 (Tunnel 2) project. He reminded the members that this project was built around providing a second tunnel to Kemano from the reservoir. It provides risk mitigation in case of tunnel collapse, or if Tunnel 1 has to be closed. T2 breakthrough has happened and the cutterhead is being dismantled. The focus is now around completing tie in works and concrete works. They will be tying into penstock and arrays and making sure everything is in place and complete.

- AC provided an update on What's Next for the T2 Project

    - Remove the TBM from the tunnel.
    - Put in the Horetzky plug to block the passage.

- Refurbish the tunnel that was bored in the 1990s, including cleaning the rock, rock bolting and shotcrete spraying.
- Fill in the tunnel with water until the second half of 2022.

- AC added that they want to have the tunnel pristine so that the debris does not get flushed into the Kemano River. Ultimately the two tunnels will be paralleled. There is a lot of activity, and fantastic work is being done by the Cheslatta group. There are 45 to 50 people from Cheslatta supporting the T2 works. It has been a huge effort, and really good work is being done.

- Mike Robertson (MR) asked to share a story. Rio Tinto called us to ask what a good name would be for the tunnel boring machine. We suggested the name Tl'ughus. Tl'ughus is the story of the giant fish that is legendary in our area. It is a monster that lived in different lakes and had the ability to go through rock and go from lake to lake. There are many stories and legends about the damage Tl'ughus did to people and communities. The only way to stop it was to cut the head off. So, when the tunneling was done Cheslatta asked that Rio Tinto cut the head off Tl'ughus! The cutterhead is now being dismantled. Several members thanked MR for the great story.

- Mark Parker (MP) asked how many cubic meters the tunnel holds. AC replied that it is 16 km long with a 5.9 m diameter. Stephen Dery (SD) completed the math, stating it would be approximately 1,800,000 m^3 of water. AC noted that it will be a lot of water. He added that filling it is a sensitive issue. To fill, they will crack the gate at the intake four inches and allow it fill slowly over time. The process takes a week. They do not want a rapid pressure differential in the tunnel. At the same time, they will bleed air out of the high points of the system. They will fill it and then leave it full for a week to ensure the integrity of the tunnel. During the next phase, the intent will be to leave it full. If it ever needs to be dewatered, it is another complicated process. The slower the better.

- AC provided an update on Reservoir Operations:
    - AC reviewed graphics showing the Observed Precipitation, Inflow versus Historical.
        - They are watching the forecast. They did not see a significant peak during the last rain event. The rainfall was concentrated on the west side of the mountains, so there was not too much precipitation inland.
        - In 2017, there was an event similar to the one that just happened down south. They were able to shift operations. In 2011 there was another similar event, but it happened closer to freshet. The Murray Cheslatta system was impacted, but it did not translate into flooding in the Vanderhoof area.
        - The reservoir can and has handled these kinds of events. There is both the capacity and ability. This results in changes the flow regime over the 6 to 12 months

following the event. Ultimately, the reservoir flexibility is important, and it can be an important mitigator in these types of events.

- AC reviewed a graphic of Historical Reservoir Elevations, showing how the 2021 flows compare to other years.

- AC reviewed the 7 Day Weather Forecast. He noted that the forecast shows rain on western side of watershed. Inland conditions will be about average, maybe a bit warmer.

- AC reviewed Spillway Management – Looking to Winter

  - SLS discharge currently 40 m^3/s and is expected to be maintained at 40 m^3/s all winter. They are continuing to ramp down really slowly into the winter flows.
  - Recent spills combined with dry weather have significantly reduced the expected winter spills.
  - Working through the Smelter load and re-start scenarios.
  - Detailed review of the 2020 / 2021 Freeze-up.
  - Observations Report with NHC.
  - Ice Jam risk and winter flow protocols.
  - Impact to the Murray Cheslatta system.
  - Review of fisheries data and technical team feedback.
  - Spring Freshet flood risk; Murray Cheslatta.

- AC reviewed the Forecast – Vanderhoof Flows:

  - AC reviewed a figure showing the observed and projected flow on the Nechako River at Vanderhoof. He highlighted the slower ramp down represented by the dashed line.

- AC reviewed Reservoir Level Projection

  - AC reviewed a figure showing observed and projected levels for 2020-2022. The levels are currently in line with the long-term average, and they expect to follow this through the winter.
  - Inflow projections are used to estimate reservoir levels over time considering current hydrology and historically observed additional snow and rain.

- AC reviewed the latest Flow Facts. He reminded members to keep an eye open for the Flow Facts that go out weekly.

- MR noted that Ken Hansen, the spillway operator and long-time Cheslatta employee, suffered a serious stroke last week. He is in the Vancouver hospital right now. We are passing on our best wishes to Ken and his family.

- DS provided an update on Rio Tinto communications initiatives. The new website went live last week. They have not done a big launch yet as they are still working on a few things. Bookmarks for the page will still work. She thanked those who provided feedback. The intent was to have a new look and to integrate all the different communication channels. They want to have everything in one place, and to provide a greater understanding of who we are and what we do. DS shared her screen so members could see the new website and completed a brief tour.

    - Home Page: Shows some of the most current information through one click.

    - Flow Facts: Still where you can find all of the charts. It is now embedded in the site. This will evolve over the next couple of months as things are added, including a map so you can receive information by location.

    - Water Engagement Initiative: Users wanted to see more filters to make documents more accessible. There are now filters in the document library, so you can filter by year or by meeting type. The designer will continue to evolve this.

    - In Your Community: Provides information about donations, sponsorships, etc.

    - Keep In Touch: Provides contacts, FAQ, and job opportunities.

- MR thanked DS and noted that this was the first time he had seen the new page. He added that it gives the viewer a kind of romantic view of a snow-capped lake. He asked if there was a photo-gallery that shows some of the challenges that the residents live with. Realistic facts should be embedded into this. Gerd Erasmus (GE) thanked Mike and added it was a good comment. DS also thank MR for the feedback and stated that they can definitely look into adding that to the site.

- DS asked members to send her any other feedback. She can be contacted at Devrie.Sanghera@riotinto.com

- Mike Robertson presented the video “Nechako Reservoir 101,” a production of the Cheslatta Carrier Nation. The video uses bathymetric and LiDAR data to create a fly through of the Nechako Region showing the watershed before and after the building of the Kenney Dam. MR stated that for years they have had challenges explaining the reservoir system upstream of the Kenney Dam. Now that we are in communications with the downstream works, they wanted to create a presentation that showed how it was created and how big it is. The video can be found here: https://youtu.be/2YbkPhlnMX8

- MR gave a history of the project:

    - Historically, there was a series of 7 lakes and rivers in the Nechako watershed. When the dam was constructed and closed in 1952 it created a watered surface area of 240,000 acres. It is the second largest surface area of lake in the area after the Williston Reservoir. Initially

there was 250 CMS of inflow. Two thirds of the flow was diverted. One third of the natural inflow was left to go down the main stem of the Nechako River. Today it is a severally diminished river.

- The first concept of the hydroelectric project was created by Frank Swannell, who came to the area in the 1910s and 1920s. He proposed to the Provincial Government to undertake a hydrometric survey of the system. This was accepted by the government, and they commissioned surveys in the 1930s. This coincided with large hydro projects in the US.

- Attention was temporarily diverted by World War II. During the war, aluminum became a highly prized metal. Alcan came out to the area in 1948 and did some preliminary work. In order to entice Alcan, the Provincial Government passed an act in 1949 that granted Alcan rights to take advantage of resources as necessary. They did more surveys, and the Nechako system was the first priority.

- In 1950, Minister Kenney granted a water license to Alcan, and the following year they commenced the construction of the Kenney Dam. To divert the river, they constructed a diversion tunnel, which was 1,400 ft by 26 ft in diameter. The tunnel diverted the entire flow away from Dam site. The dam was completed by 1952, and the diversion tunnel was shut off.

- Before the flooding of the reservoir, there were very brief archeological surveys conducted. These only lasted about six or seven months.

- MR played the video and provided commentary:

  - There are approximately nine saddle dams in the system to help impound the entire reservoir.

  - The archeological investigations suggest that there was 5,000 to 7,000 years of human occupations at these sites.

  - 97% of the archeological sites mapped by Borden before the flooding are now underwater. The last excavations took place in the summer of 1952. Almost all the sites were underwater by the late fall of 1952.

  - At the west end of Tatachuk, archaeological work will begin, and they will embark on multi-year excavations. It is an amazing untouched site. The size of the village sites is off the scale compared to other inland sites in BC. The size of the pit houses is about 30% greater and show evidence of 5,000 to 7,000 years of habitation.

- The video shows the scale of inundation on the archeological sites. There was a 30 to 40 ft increase at Kenney Dam, but the increase diminished further down the system.

- The main community of Ootsa Lake had 76 settler families that were forced to leave when flooding happened. Alcan purchased much of the land, and the settlers left the area. There are still quite a few decedents of the settlers living in the area.

- The areas around the Whitesail and Tahtsa confluence is the caribou crossing. It is a difficult area for navigation now.

- Further west, less inundation occurred, but it was still substantial enough to create a very long Tahtsa Lake. At the end of Tahtsa Lake there are 10-mile-long tunnels, with a 2,200 ft drop to the powerhouse at Kemano.

- MR provided that back story how the Kenney Dam got its name. Ed Kenney was originally a hardware store own until he ran for office in 1933. Ultimately, he became a senior minister, of lands and forest and public works. In early days of the project, he was in charge of all the water in BC. He signed the water license for Alcan in 1950. As part of the license, there is a schedule of fees they have to pay to the Provincial Government, based on what they are using the water for, be it hydro, aluminum or something else. They pay 15 to 20 million dollars a year to the Provincial Government to rent the use of the water. Cheslatta has called on the Provincial Government to invest those royalties back into the region and communities.

- MR stated that the project did bring some benefit to BC as a whole, but the impacts environmentally and socially were quite immense among the First Nations and non-native people of the area. They still face challenges at the reservoir, and the downstream people have a diminished river. The good news is that the Cheslatta people do have a good relationship with Rio Tinto today. “We are sitting here together discussing the issues that need to be addressed, we have partnerships, and we are in the early stages of the feasibility work and the collection of environmental data.”

- If WEI participants have any comments or suggestions for improving the video, please contact Mike.

- RR thanked MR for the presentation. HK stated that he thought it was a very impressive presentation. It takes him back to when he toured those areas from the ground and the air. His original impression of the entire project was that it was an engineering marvel. But also, as he knew in the past, the cost to the environment and people was very, very high, and it will never go away. This presents us with a challenge with the partnerships. But there is a way to do this. We know that the power production will not leave, and we need to make the best of what we have. This is an invaluable reminder of what happened and the costs of the project. Several other members expressed their thanks to MR through the online chat function.

- Dan Sneep (DSn) stated that it was an incredible presentation. He has not seen one like that with all the BC hydro presentations over the years. He noted that MR touched on the displacements that occurred and asked if he know how many communities had to move. MR replied that there were five different communities, including 76 non-native families and 76 Cheslatta. There were also 25 people below the spillway that were relocated.

- JK provided an update from the Technical Working Group. He stated it was good to see everyone. This update will cover what the Technical Working Group has been doing the last several weeks.

- JK gave an overview of the Reservoir Tour:

    - Jayson, Andy, Tim, Gary, Mike, and James Rakochy participated. Going on the tour was really valuable and a good opportunity to connect with people on the reservoir.
    - Tahtsa Narrows and Wisteria areas to look at fish, wildlife, and erosion
    - Gary, Tim, Mike, and James described various fish and wildlife concerns and provided local observations
    - Inspected shoreline erosion areas. They noted that there was extensive erosion.
    - Observed abundant large woody debris in the reservoir and commented on the significant navigation hazard.
    - Identified opportunity to use citizen science to narrow some data gaps
    - Summary memo has been distributed
    - Another tour proposed in the spring during lower reservoir elevation

- MR stated that it is always good to take people out there. The photo of erosion is a typical example of erosion. Some of the banks have really quite substantial erosion. There are also siltation issues. Tim Plesko (TP) added that during the wind event we had yesterday the water was completely grey with siltation. It made a mess of the lake. Even with a full house filter, there was still a full layer of silt at the bottom of the tub after a bath.

- JK gave an overview of the Naturalized Hydrograph. He presented two graphics showing the Actual Flows and the Naturalized Flows. This is what the flows would have looked like over the last 70 years, excluding the really high and low flows. He compared differences between the two graphics. We can highlight particular years to look at what the flows would have looked like if they had not been diverted. He noted that the naturalized flow is not from removing the dam out, but if it was rerouted through the spillway, since they have data for that flow. June Wood (JW) noted that it would make more sense to her if the Actual Flows were referred to as Current Flows.

- JK reviewed the work being done with regards to Climate Change:

    - Climate change modelling update
    - Ongoing dialogue with UNBC, ETS, other researchers

- Preferred approach: integrated model
  - Climate change being built into RT reservoir model and river model
  - Includes temperature and precipitation
  - Anticipated spring 2022
- Alternative approach: piece-together model
  - Integrate interim climate change research and modeling
  - Identify a trigger (date) when we would pursue this option.
- Next meeting on Friday, Nov 26

- JK reviewed the work being done on the Technical Memos:
  - Ecofish was tasked by the TWG to review/compile information for select complex interests/issues
  - Draft memos under review by TWG:
    - Naturalized Hydrograph: Nechako flows if there was no diversion.
    - Wetlands: identify wetlands in and around the reservoir, assess how water elevation affects wetland function (floods or dewaters).
    - Wildlife: scope potential effects of reservoir operations on the broad range of birds, mammals, amphibians and their habitat.
    - Caribou: assess how reservoir level/timing affects caribou migration (woody debris, islands).
    - Productivity: assess how can reservoir elevation and timing affect the amount of plankton (initial food chain, indicator for fish)
  - Memos in progress:
    - Kemano Entrainment: fish leaving the reservoir to the Kemano Watershed.
    - Skins Lake Spillway Entrainment: fish leaving the reservoir to the Cheslatta watershed and potentially Nechako River.
    - Ramping: asses how the magnitude and rate of water level change affects risk of fish stranding or isolation.
    - Salmon Water Temperature: implications of water temperature on salmon migration (fitness and survival). Relevant to STMP.

- RR asked when the memos will be available for the Main Table to review. JK replied that he expects they will be ready by the next meeting, early in the New Year.

- DW and JW asked if dewatered side channels will be included. JK responded that it is a piece the TWG is still working on, and they are not sure if they will develop a memo on that topic yet. There are a number of other topics that the TWG is working through. It is likely that they will have to develop some more memos in the new year to address these.

- JK reviewed the work being done on Sturgeon:
    - Sturgeon are clearly important to the WEI and informing flow decisions
    - Our approach has been to share information with NWSRI
    - Moving forward, we want to:
        - Strengthen our collaboration with NWSRI
        - Best understand how flow affects sturgeon
        - Consider broad range of options: Performance measures (both relative and absolute); expert opinion before, during after decisions; and, and adaptive management (for monitoring and specific flow trials).

- DW and JW asked if JK had a number for spawning Chinook in the Upper Nechako this year. JK responded that he did not know the number but could look into it after the meeting. Between he and Dan, they can find out for the next meeting. DSn confirmed that they could get those numbers. He noted that they are better than they originally though considering the Big Bar Slide. GE asked if they could provide a ballpark on the numbers. DSn replied that numbers were within 20%. WS added that numbers were approximately 1,500, down from 4,000. Kim Menounos (KM) added that over 1.9 million fish managed to get past Big Bar this year. DW and JW replied that they had heard that number earlier but thought it might have changed.

- **ACTION ITEM: JK and DSn to provide the number of spawning Chinook salmon in the Upper Nechako for this year.**

- JK reviewed Issues Scoping and Performance Measures:
    - Continue to scope issues, including full range of MT interests
        - 59 issues/groups of issues
        - Technical memos directly support 18 of the most complicated
        - Some data gaps and uncertainty: LIDAR and bathymetry, additional research and memos, additional experts (Ecofish, Triton, NHC), and adaptive management.
    - Developing draft performance measures
    - The TWG will develop a scoping report.

- Donna Klingspohn (DK) asked who the memos were targeted to, and what is the intention of the memo process. JK responded that the memos were to help the TWG understand the issues. The intent is to provide the TWG with a summary of everything we know about the topics so that we can figure out performance measures and alternatives. While they are aimed for TWG, they will also be releasing the memos to the Main Table if the members are interested.

- DW and JW asked if the memos were available on the website. JK responded that he expects that the memos will be posted on the Get Involved Nechako Website.

- HK asked JK when he does the variable flows research on sturgeon, over how many seasons would you leave the flows before you change flows. JK responded that that was a good question. There is no one easy fit answer. Some examples have many years for the flow trials before they could expect results. JK hopes that we will not be entertaining trials over a short time frame when we are expecting results over a long time period. Experiments can be targeted at different times of year to determine some of the different factors. The question would drive the action, not current operations.

- HK stated that he thinks most people understand that there are more factors than just spawning that influence the success of sturgeon. He knows it is complex, but he just wanted to make the point that flows are just one of the many things we need to look at. JK responded that the recovery initiative is not currently looking at flows. They are looking at gravel, and spawning. They are starting at one spot. We will look at the full range and will determine if there is a specific limiting factor we need to focus on or if we need to continue looking at range. It is complicated, as HK mentioned.

- GE asked who is running the research. JK responded that some is run by universities and other organizations. JK does not know specifically who is funding each component. There is a fairly broad group, not just one initiative. AC add that the work Dr. Dery is doing is funded by NSERC, UNBC and Rio Tinto. They are also working through various stewardship initiatives for First Nations. There is some direct funding from Rio Tinto. There is quite a mix of everything.

- WS asked for confirmation that Rio Tinto would support the NWSRI and not duplicate their efforts. They are on this issue but need support and not duplication. AC responded that WS was absolutely right. The biggest goal in moving the Nechako forwards is ensuring that all groups are aware of all the work in Nechako so we can combine our work and not duplicate. We need to increase communications. At the moment, it is a little ad hoc, and AC would like it to be more structured.

- JK reviewed the TWG Next Steps:

    - Continue to integrate climate change
    - Review and integrate other research and information
    - Finalize technical/summary memos
    - Continue to scope issues, develop PMs
    - Finalize reporting structure

- Dr. Stephen Dery (SD) presented “The Tahtsa Ranges Atmospheric River Experiment (TRARE).”

- SD explained that Atmospheric Rivers are known as the Pineapple Express in BC. Moisture is transported by mid-latitude cyclones which hits the mountains leading to abundant precipitation. These usually affect BC in the fall. There can be 25 to 30 a year, but some can be more intense than others. They are important for replenishing the hydrological cycle in BC.

- "Atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. These columns of vapor move with the weather, carrying an amount of water vapor roughly equivalent to the average flow of water at the mouth of the Mississippi River. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow." Source: NOAA

- SD reviewed Atmospheric Rivers and Floods in BC:
  - For 1979-2016, 78% of BC floods were caused by 'Pineapple Express' storms with damages >$500M
  - 2010 Bella Coola floods induced by AR with 250 mm of rain, $45M in damages (1/200 year event)
  - Feb. 2015 Kitimat record snowfall ~2 m during AR, spring floods followed snowmelt
  - Nov. 2021 southern BC flood (277.5 mm in Hope)

- SD reviewed the TRARE Objectives:
  - Tracking atmospheric and terrestrial pathways of storm-generated precipitation in the upper Nechako Watershed.
  - Understanding precipitation formation, distribution and extremes on the western and eastern slopes of the Coast Mountains.
  - Training highly qualified personnel (HQP) on the operation of state-of-the-art meteorological equipment, real-time weather forecasting, storm monitoring, data interpretation, and remote field work skills.

- SD reviewed a map showing the locations where data was collected from various types of instruments. Instruments used include hot plates, micro rain radar, optical disdrometers and weather stations.

- SD reviewed graphics showing the September 21, 2021, atmospheric river in relation to the TRARE study area. He reviewed a graphics showing the data they collected including precipitation and water levels, and data on wind speed from a weather balloon and radiosonde trajectory. Weather balloons are launched prior to storms. This one captured a maximum wind of 210 km per hour.

- AC noted that he had learned that atmospheric rivers are very narrow and asked what their width is when the hit BC. SD responded that yes, they are very narrow, so one valley can be hit while next valley is not hit. This is one reason why they are hard to forecast.

- DSn noted that the scale in the graphics was in mm, and that the atmospheric river is coded in blue. He asked if the atmospheric river is raining as it makes its way across the ocean, or if it starts to precipitate only once it hits land and the coastal topography. SD responded that some precipitation occurs over the

ocean. But the precipitation is enhanced when the atmospheric river hits the topography of the coast. This is called the Orographic Effect.

- DSn asked what the actual measurement is, and how it is detected. SD responded that moisture is measured. An atmospheric river is defined as 250 kg m^{-1} s^{-1}.

- JK noted that the graphic looks similar to what he sees on the evening news and asked if the precipitation rates were hourly or weekly. SD responded that it was the hourly precipitation rate. It is usually mm per hour, so over 24 hours it is a lot of precipitation.

- SD shared some images of the data collection sites and instruments in the field. He thanked Cheslatta for helping to collect the measurements.

- SD reviewed the TRARE Outcomes:

    - 1 participant
    - 11 storms, 2 atmospheric rivers
    - 250 mm total rainfall at Huckleberry Mines
    - 75 Gigabytes of data collected at 6 field sites

- SD reviewed the Relevance to the WEI Process:

    - With climate change, the number and intensity of atmospheric rivers influencing the Nechako is expected to increase substantially in the 21st century.
    - Future water management needs to consider the potential impacts of such storms on reservoir levels.

- SD reviewed where to find out more about TRARE:

    - UNBC press release
    - CICK News Podcast
    - Prince George Citizen article
    - CBC Daybreak North interview
    - TRARE website (http://web.unbc.ca/~sdery/irc/trare.php)
    - Nechako IRC Newsletter

- SD thanked the numerous sponsors. He welcomes any questions, and can be reached at Stephen.Dery@unbc.ca

- HK asked to pose a parallel short conversation. In the Fraser Valley there has been a book been written about the Sumas Lake, “When the Lake Comes Back”. We could write something similar here - “When the River Comes Back”. We know that climate change is here, and we know how violent it can be. In the area

of focused rainfalls over the reservoir, we have seen some violent, unusual inflows. It is hard to believe that the reservoir with its size that it could be anything other secure and safe. But it is actually fragile. If we had a big rainstorm and it landed over the reservoir for 48 hours when it was full, the river would come back. So far, when we have these storms, we wake up and we say so far so good. How do we look at these kinds of extenuating circumstances and look forward to how we can prepare for these problems? We need to plan ahead so that we can prevent these disasters that we know are imminently possible. HK knows there is a lot going on already, so saying this with respect. But he does not want us to go on without trying to prepare for this.

- AC responded that yes, there are steps we can do to prepare. There is considerable thought looking at the longer term and looking at reservoir flexibility. At the last meeting AC talked about spilling water at the right time of year for when the water has a higher ecological value. For example, they will look at what drives the water release in March, hopefully minimizing the flood risk downstream. Then they can look at opportunities around Vanderhoof. They can look at what else can drive flexibility. They will work to dust off old Tahtsa narrows studies. In the past, it was viewed as just sending water to Kemano but perhaps it can be used as a lever to be better prepared for extreme weather events. AC does not know the answers to those questions yet and it is still a work in progress. As well, the dam is designed for a probable maximum flood, which is a 1 in 10,000-year flood. When you look at dam integrity, there is still a lot of room there. They are looking into downstream floods and there are many conversations happening. AC hopes that gives you an idea what is happening now.

- DW and JW asked SD what is the likelihood that the Huckleberry Mine tailings pond would breach containment during a severe atmospheric river event. SD responded that Imperial Metals can better answer that question and he does not have an answer. He hopes they are organized to ensure there is not a breach of the tailings pond. They do get a lot of precipitation there, so he thinks they would have considered it during the engineering phase.

- AC discussed First Nations engagement. Representation and inclusion of FN in the process is an important part of what we have tried to do at the WEI. But there are a number of nations that are not involved in the WEI. We have turned our mind to how we can increase that involvement. Concerns have been expressed about court proceedings, available time, and rights and title as owners rather than as participants with other stakeholders in the process. These issues have all been identified. We need to figure out how can we still have the feedback and inclusion of the Nations while still progressing. They have begun another round of interacting with the 17 tribal groups and Nations and are going through process of re-engaging. Andrew will share some of the technical work that the TWG has done and other information that has been collected. They are seeking a review of this information and looking for any feedback, information gap identification, and any information that needs to be added. Andrew is seeking to find a process where the First Nations are engaged in the outcomes and find mechanics to engage the non-participating First Nations. This will not be a one size fits all solution. So far, conversations have been received well. They are continuing to provide updates, including passively if there is not an ongoing

conversation. AC is relying on RR and MH and their expertise, as well as MR and the nations that are engaged.

- MR stated that from Cheslatta, the priority remains the water up at their end of the system and the health of the reservoir. It is a crucial part of their day-to-day life and excited to be part of the technical discussion and to be able to help along with that table. We remain very positive with the ongoing work.

- RR asked MH to describe the road ahead. MH responded that we are getting our house in order waiting for the climate work and modeling to be completed to begin the SDM process. The technical work will be ongoing over the next 6 months. The SDM process will be re-engaged mid spring 2022. The plan over the next six months is to meet every other month, and to get updates from Rio Tinto, the Southside Working Group, and the Technical Working Group. The TWG will provide updates on draft performance measures and alternatives, share memos, and provide updates on the climate change studies and engagement and information sharing with First Nations. The SDM will pick up in the spring and work will continue into the fall, hopefully leading to an agreement on a water use plan.

- RR provided an update from the Southside Working Group:

    - Southside Working Group (SWG) objectives:

        - Identify reservoir-specific issues
        - Develop pathways to address the issues
        - Not focused on flow changes that will part of the WEI Structured Decision Making (SDM) process
        - All recommendations will flow through the WEI Main Table

    - The latest meeting summary was emailed on Friday

    - Southside Working Group Issues: Erosion, Livestock, Water pumps and intakes, Water quality, Navigation, Recreation, Wildlife, Funding, Wildfire, Communication, Power

    - Key discussions at the recent SWG meeting:

        - SWG boat tour (Jayson and participants)
        - Navigation issues: Dead standing trees, shoreline access, shallow access
        - Colin Parkinson was brought in to Support pathway to address navigation issues

    - WEI Southside Implementation Committee:

        - Intent is better communication and action post-WEI.
        - Forms part of overall WEI Adaptive Management.

- The approach is collaborative. Representatives from Indigenous communities, governments, Rio Tinto, land users, conservations groups, resource specialists, and stakeholders would form a "WEI Southside Implementation Committee."
- Meeting on an annual or twice-yearly basis
- Discuss and action solutions to existing or emerging issues
- Responsive vehicle
- SWG support for this approach
- Rahul to draft update

- TP noted that the community at large still has a sour flavor in its mouth as to how Alcan used to be and don't know the reality of how Rio Tinto is today. That is going to take some time to get that to change, and communications from Rio Tinto and actually putting actions to where their mouth is. Until that happens, people are not going to change. RR responded by asking if TP thinks they are on the right path, but there is still more work that needs to be done. TP responded yes. AC said he was in.

- MR stated that communication is key. When we took the boat tour, we needed to have designated people that are trusted to pass on the information to Rio Tinto. MR has confidence that people like Tim and Gary will be able to pass on the information and follow up if nothing happens.

- RR reviewed the proposed meeting schedule:

    - Meeting 25: Wednesday, January 26, 2022
    - Meeting 26: Wednesday, April 6, 2022

- MH will not be able to attend the January meeting, but noted that he will not be needed for that meeting. There were no objections from any other members.

- RR reminded members that per diems and preparation funding is available. Please send completed forms to Jason Collier, jcollier@edynamics.com. RR thanked everyone for their time and dedication to the process.

- Meeting adjourned at 1:00 pm

ACTION ITEMS

- **ACTION ITEM: AL will touch base with John Rex and his team about their ongoing work.**

- **ACTION ITEM: AC will provide RR with the most recent joint communications from Rio Tinto and the Union, and RR will send this to the Main Table members.**

- **ACTION ITEM: JK and DSn to provide the number of spawning Chinook salmon in the Upper Nechako for this year.**