

CHAPTER 4
APPENDIX 4C

**Activities Involving NND -
Consultation Materials**

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4C-1.0 ACTIVITIES INVOLVING NND – CONSULTATION MATERIALS

Activities involving NND focused on four groups: 1) Chief and Council, 2) the Lands and Resources Department, 3) the Project Agreement Working Team, and 4) NND membership. Activities occurred were categorized into three time frames: feasibility stages, project introduction and issues identification, and potential project effects and mitigation. Upon entering into a cooperative engagement process with NND (i.e., meeting dates starting November 17, 2009), meeting notes were sent to the NND Lands and Resources department for verification purposes.

4C-2.0 FEASIBILITY STAGES

4C-2.1 JULY 8, 2008

4C-2.1.1 Meeting Notes

Meeting Report

Title:	Mayo B Project – Operations Overview & Summer Field Studies Notification		
NNDFN Attendees:	Chief Simon Mervyn, Deputy Chief, Sharon Peter Councilor, Nancy Hager Councilor, Mary McMahon Councilor, Beverley Blanchard Councilor, Norma Germaine Elder, Rose Lemieux (or Bernice Catchside) Executive Director, Anne Leckie Executive Secretary, Ellenise Profeit		
YEC Attendees:	David Morrison, Hector Campbell, Travis Ritchie & Darielle Talarico		
Meeting Location:	NNDFN Chief & Council Chambers	Mayo, Yukon	
Date:	July 2, 2008	Minutes status:	Final
Author:	Darielle Talarico	Phone:	867 668-2411
Meeting Purpose:	To inform the NNDFN that there will be several test holes placed in around the Yukon Energy hydro generation station property and that other environmental field work, including heritage resources field work will be undertaken over the next few months. A YESAB application would be filed for this summer's geotechnical investigation as is required by law.		
Discussion:	<ul style="list-style-type: none"> o Introduction of meeting attendees. o David Morrison introduced meeting purpose: YEC will file a YESAB DO 		

	<p>application this summer to conduct some preliminary geotechnical assessment work to determine if it is possible to make enhancements to the existing Mayo Hydro facility. Possible future enhancement work would not include changes to the Dam structure. David indicated this meeting was to initiate ongoing and productive dialogue with the NNDFN for existing and future activities in the region; the first of several future interactions between the parties.</p> <ul style="list-style-type: none"> ○ Drilling of test holes would be required this summer. ○ Some environmental field studies in the area will also be undertaken. ○ Information gathered this summer and fall will be used to determine if it will be possible to do work to the Mayo Hydro facility that may lead to a doubling of electrical capacity. Stated that current and new demands on electricity capacity are requiring YEC to start looking at options and opportunities for more effective use and growth to our hydro infrastructure. ○ Darielle Talarico spoke of the bigger picture and the risk that if hydro options are not planned and executed immediately the risk would be that required electricity would have to be generated by diesel which is expensive and produces greenhouse gas emissions (CO₂). ○ NNDFN raised concerns from their community members, especially their Elders, concerning the existing dam and its security, and systems for early warnings of a problem, if there should ever be one. YEC indicated they would seek to provide opportunities to discuss concerns and share information about how operations are conducted and the systems YEC has in place regarding dam safety. YEC will coordinate with Dennis Buyck (Lands Director) and the Elder's council. ○ Interests were raised by NNDFN meeting participants regarding the following: <ul style="list-style-type: none"> ▪ Notification of the economic benefits associated with this summer's activities and the possible future project. ▪ Elders interest in a fish ladder. ▪ The need to be updated about previously discussed projects including some past discussion of micro-hydro. ▪ Maintaining contact with, and involving participation of, the NNDFN lands office (and other NNDFN technical staff) for all activities including any need for transmission lines in the future. David indicated that Travis would engage NNDFN staff in this regard. ▪ Whether there would be any power surges on the system if the mines are back on. ▪ The cost of power. ▪ The quality of the road and NNDFN interest in seeing area roads improved. ▪ YEC should examine the local land use plans as part of any planning exercises for its facilities and activities in the area.
<p>Follow up required:</p>	<p>1. A meeting to be held with the NNDFN Lands and others to talk about the geotechnical/environmental field work and with the Elders regarding their interests in dam operations and safety.</p>

	<ol style="list-style-type: none">2. Post notices on the NDNFN bulletin board describing any geotechnical activity in the area.3. YEC to acquire and examine current land use planning documentation available for the Mayo Area.
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4C-2.2 AUGUST 5, 2008

4C-2.2.1 Meeting Notes

Meeting Report

Title:	Mayo B Project –Summer Field Studies Notification		
NNDFN Attendees:	Josie Lieme Trembly – Alexco Mining Liaison Donna Hope – Fish and Wildlife Joella Hougen – Heritage and Culture Steven Buyck – Environmental Officer / Lands and Resources Dept. Pat Tobler – EDI Environmental Dynamics Inc. Vice President James Mooney – ECOFOR Cultural Resource Specialist Robin ? – ECOFOR Archeologist		
YEC Attendees:	Travis Ritchie & Darielle Talarico		
Meeting Location:	NNDFN Lands Office	Mayo, Yukon	
Date:	August 5, 2008	Minutes status:	Draft 1 (Aug. 6)
Author:	Darielle Talarico	Phone:	867 668-2411
Meeting Purpose:	To inform the NNDFN of the environmental and cultural/heritage field work to be conducted over the next month and half.		
Discussion:	Travis Ritchie and Darielle introduced the following key messages: <ol style="list-style-type: none"> 1. Energy demand is on the rise in the Yukon due to growth on the system and predicted industrial growth from mining. It is expected by 2011 that there will be a need for more electricity than YE produces at the moment. 2. YE as part of it resource planning is now beginning to investigate its options for producing that needed power. Of the many options available, YE is first seeking to identify enhancements options for its existing hydro infrastructure. This approach is favored, in order to avoid burning diesel in the future which is expensive and produces green house gas emissions. This is why we are in Mayo and why we are looking at the Mayo facility – to investigate some possible options for enhancing its capacity. This includes geotechnical work – specifically test holes below the existing power house. The test holes are to determine the viability of one option being assessed – the addition on a new power house and conveyance system down from the existing one. This option takes advantage of altitude changes which results in more head on the water which means approximately double the electrical production. 3. Given the preliminary nature of this investigation; YE also felt it was a good opportunity to take a look at the existing operation and the environment it operates in. This is why we are doing some baseline 		

	<p>environmental and cultural/heritage research in the area of Mayo River and Lake.</p> <p>4. The results of the geotechnical, environmental, and cultural/heritage work will be discussed in a YE workshop in September. At this workshop the experts will determine if there if a project to enhance power at the Mayo facility. If a project “concept” can be defined it will be formally detailed, including its related interests and effects. This project concept will then be brought back to you for review and discussion.</p> <p>5. Again, at this stage there is no formal project. This is a pre-feasibility stage.</p> <p>Questions –</p> <p>Steve B – how deep will the drilling be? What about geothermal?</p> <p>Darielle – explains the difference between district heating/heat pumps and geothermal for electricity. Also, explains YE is at the early stages of investigating geothermal resources in the area.</p> <p>Steve B – is this a micro-hydro project? NNDFN is interested in being involved to increase local capacity.</p> <p>Darielle – not sure if you would call it a micro-hydro project, it is however an enhancement to the existing system and not a brand new project of a large scale. Nothing will change on Wareham dam. Noting as well, that any future project on the Mayo System means that Stage 2 of the CSTP would proceed. Explaining there are advantages of joining the two major grid systems and creating one system with three hydro sources (i.e. Marsh/Yukon, Aishihik and Mayo). Goal to avoid using diesel, YE at present does not burn diesel to generate electricity. Yukon Electric does. The goal of avoiding diesel fits with the work Yukon Government is doing on the Energy Strategy and the Climate Change Action Plan.</p> <p>Steve B – when are you expecting us to get more involved?</p> <p>Travis – there are opportunities to participate in the environmental and cultural/heritage work now (joining flights, interviews etc.). Once the project concept has been determined in late September, YE will be able to come back with something substantial for you to comment on, including what the effects and benefits might be.</p> <p>Patrick T - There are three components of the field work aquatic, terrestrial and cultural/heritage. The aquatic work is the largest component and the majority of this will be on the lower Mayo River below the Wareham dam. Here we are</p>
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	<p>looking to learn more about the habitat use of Chinook salmon. Baseline information will be collected on the river and at Mayo Lake.</p> <p>Steve and Donna - Chris Burn has done some mapping work of the lake bottom contours. Part of a climate change study/thermal karsts project. Jodie Mackenzie-Grievies has also done some work here.</p> <p>Patrick T – We will look for water flow changes along the natural travel routes and spawning channels of the salmon. In particular if there are changes in water levels so we need to look at how this effect fish spawning areas which tend to be in the shallower areas. He mentioned work he has done since 1994 in the area over the last few years to create habitat for fingerlings etc. There was a brief discussion on Chum salmon – a few have been spotted or caught but very few. Odd one a Fraser Falls.</p> <p>Mike Miles did some work on the geomorphology of the river below the dam (check). If there is going to be a project concept he will help with predicting effects. There is concern about open water in the slough near the bridge.</p> <p>Steve B – this slough is a natural Chinook salmon area. As well, historically our people harvested Cisco at the lake. They are not there anymore. In 1949, NCPC promised to look at the feasibility of a salmon fish ladder. The decision was made not to proceed because of the mining activities past the lake made for poor habitat. So decision was made to increase the habitat options for Chinook in the river below the dam. NNDFN would like to pursue a project to build a trail from the new administration building to the river with a walking bridge. We would like the bridge to have the ability to be a weir as well. NNDFN needs to locate money to the engineering work for this project.</p> <p>Patrick T – EDI did a weir feasibility study if you want to look at it.</p> <p>Steve B – Archive photos show that there use to be 1000's of fish on the Stewart.</p> <p>Patrick T – Explains there are several zones of investigation. There will be gill netting, aerial flights, categorization of shoreline characteristics etc.</p> <p>Steve B – At Mayo Lake a few people net fish (4 or 5) they are getting Whitefish and some trout. Look at the lake points these are the areas that could</p>
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<p>get dry if water is let out.</p> <p>Patrick T – Continues to explain research (baseline water quality, investigate streams flowing into the lake, shallow areas identified). We will radio tag 35 fish to see where they go to spawn.</p> <p>Steve B – Do you have NNDFN members helping? Elders?</p> <p>Patrick T – Edward Brown is on staff and yes we would be interested in Elders. James and Joella will coordinate with Patrick on this.</p> <p>Patrick T - The terrestrial component of the field work includes baseline information on wildlife use of the area. Mike S. has already done a shoreline survey with Edward Brown to identify bird use and habitats. Flew bottom areas below the dam in search of raptor use. YG has identified a key raptor area.</p> <p>Steve B – Discussed off Mayo Lake there is a key moose calving area (George N Slough). Located site on map.</p> <p>Patrick T – We will also do a rare plan survey at each of the proposed drilling sites.</p> <p>Steve B – Concerns about climate change. We are seeing new birds here. The sweet clover growth is concerning. We think we see some Beringia plants growing from seeds that get exposed.</p> <p>James M – We will start by talking to the Elders. I like to use existing traditional knowledge. We will also walk a lot and in key areas do shovel tests as you will have seen in our application for an archeology permit with Jeff Hunston (YG). Nicole Hutton will attend. We will “ground truth” by walk the possible conveyance routes and the Mayo Lake area and compare information we get from Elders with records. Our work plan outlines our approach for baseline information on historic and pre-historic areas.</p> <p>Steve B – you may need to meet with the elders 2 – 3 times to gain their trust. Minot Landing had a village – now flooded. Archives show lots of activity there.</p> <p>James M - I want to recognize that we consider our research to include what NNDFN might consider proprietary information. This information doesn't need to</p>

	<p>be made public or put into YEASB documents. You can help us determine what we can share and what you want confidential. NNDFN can manage this.</p> <p>Joella H – NNDFN has traditional knowledge guidelines and consent forms you can use.</p> <p>James M – Talked about sites and the idea of renting a cabin on the lake to base out of. Mike Mancini has a cabin on the lake – Peggy’s island.</p> <p>Darielle – One other item we would like to ask you today. At the NNDFN Chief and Council meeting they mentioned the Elders might be concerned with the dam and related safety standards and issues. Do you want a meeting set up on this and tour?</p> <p>Steve B – This is something I was supposed to do last year and we had to cancel it. I think we just need to take some of the leaders and some elders to view the facility. Elders won’t meet for a while. Hunting season is also coming up. It would be best in October.</p>
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4C-2.3 SEPTEMBER 19, 2008

4C-2.3.1 Meeting Notes

Meeting Report

Title:	Mayo B Project –Dam Safety		
Attendees:	Donna Hope – Fish and Wildlife Joella Hougen – Heritage and Culture Beverly – Heritage and Culture Millie Olsen – NND GIS Technician Bernice Catchside – Elder Rose Lemieux – Elder		
YEC Attendees:	Hector Mackenzie and Darielle Talarico		
Meeting Location:	NNDFN Lands	Mayo, Yukon	
Date:	September 19, 2008	Minutes status:	Draft 1
Author:	Darielle Talarico	Phone:	867 668-2411
Meeting Purpose:	To explain the Wareham Dam structure and safety facts.		
Discussion:	Attached power point.		
Questions asked:	Water levels are high right now is that a concern? What type of dam is in Whitehorse? Earth filled How long with the dam last? What is the status of Hess River? Map notation possible future use. Why have our power rates increased so much, since Dawson was added to the system? RSF decrease. Why do you need more power when Elsa and Mayo use to use the facility without problems? Won't the two use it all up again.		

4C-2.3.2 Materials

The Mayo Power Plan dam safety presentation is located the following pages.

Yukon Energy Mayo Hydro Facility Presentation

September 2008

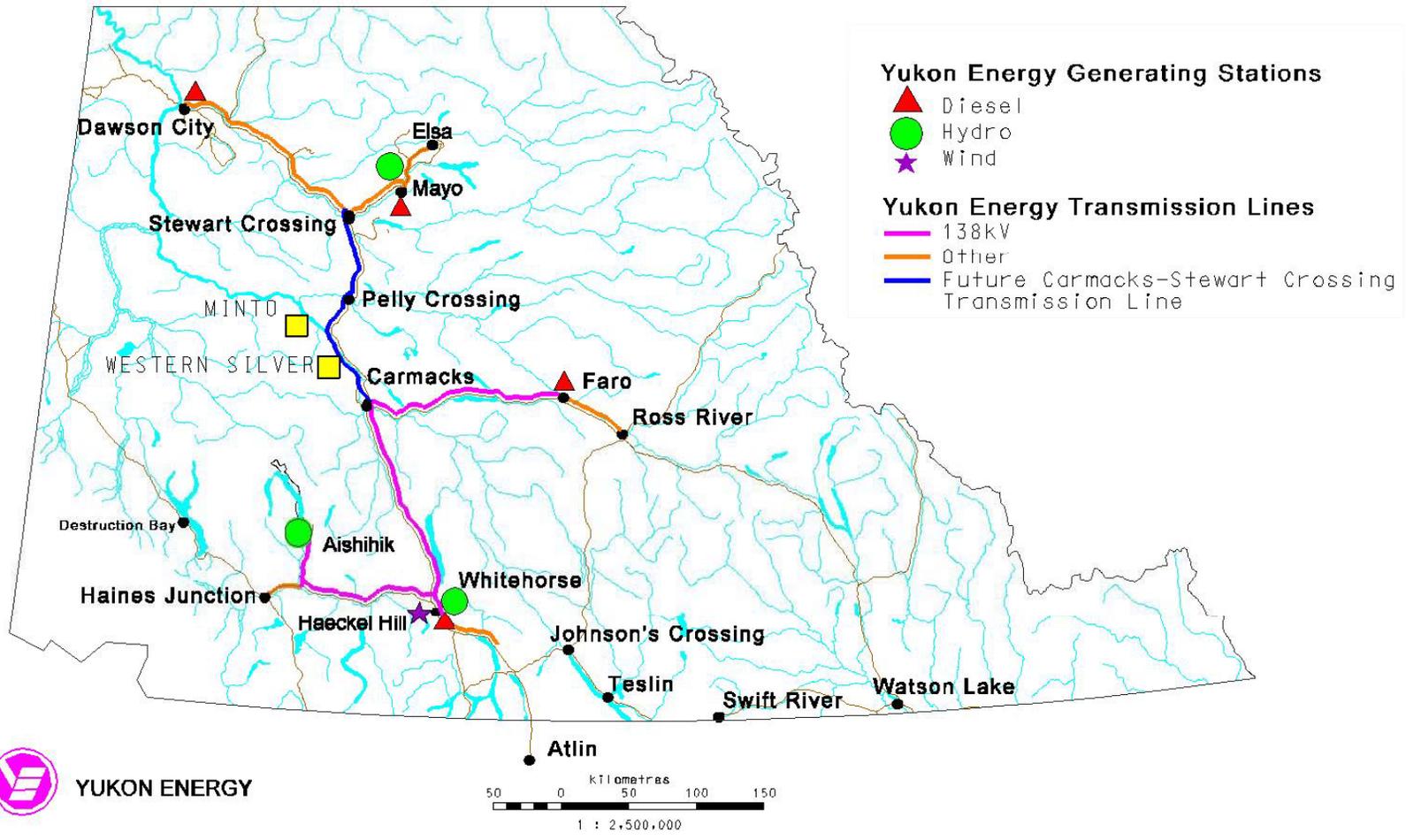
YUKON
ENERGY

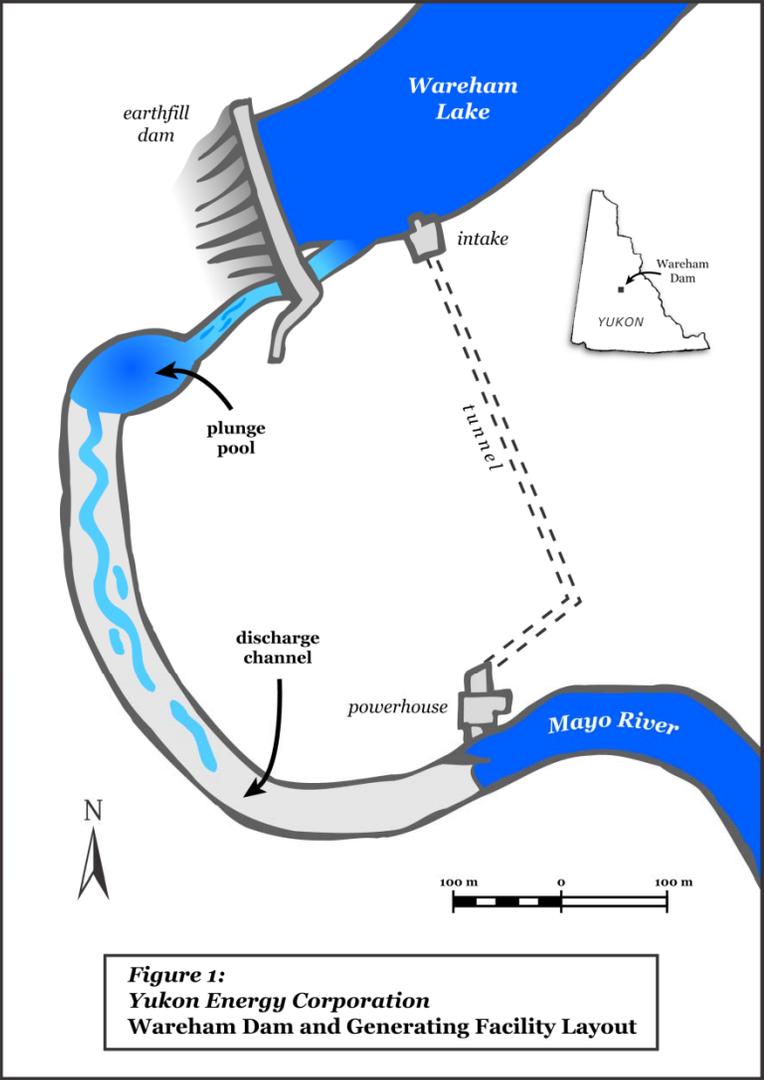


Yukon Wide Systems

Yukon Energy Generation Assets (in MW installed & currently rating)			YECL Generation Assets (in MW installed)			
Hydro Facilities			Hydro Facilities			
Whitehorse	WAF	40.0	Fish Lake	WAF	1.3	
Aishihik	WAF	30.0	Base Load Diesel Facilities			
Mayo	MD	5.4	Old Crow	Isolated	0.7	
<u>Total Hydro</u>		<u>75.4</u>	Pelly Crossing	Isolated	0.7	
Wind Facilities			Beaver Creek	Isolated	0.9	
Haeckel Hill	WAF	0.8	Destruction Bay	Isolated	0.9	
Diesel Facilities			Swift River	Isolated	0.3	
Whitehorse	WAF	22.4	Watson Lake	Watson Lake	5.0	
Faro	WAF	5.3	Back-up Diesel Facilities			
Dawson	MD	5.0	Carmacks	WAF	1.3	
Mayo	MD	2.0	Teslin	WAF	1.3	
Mobile Diesel		1.5	Haines Junction	WAF	1.3	
<u>Total Diesel</u>		<u>36.2</u>	Stewart Crossing	MD	0.3	
TOTAL YUKON ENERGY			112.4	Ross River	WAF	1.0
				<u>Total Diesel</u>	<u>13.7</u>	
			TOTAL YECL			
					15.0	
TOTAL YUKON GENERATION			127.4 (YEC + YECL)			

Yukon Energy's Systems





History –

- The Mayo hydro facility can produce about 5 mega watts (MW) of power which is enough to supply power to 1,700 homes.
- The Mayo hydro facility has been supplying electricity to central Yukon since 1951.

History –

- The development of United Keno Hill Mine in Elsa was the original customer to drive the facility development.
- The Mayo hydro facility now supplies electricity to Mayo, Dawson, Stewart Crossing, Keno City and neighbouring areas.

Mayo Hydro Facility

System includes:

- Mayo Lake control structure
- Wareham Lake control structure
- Wareham dam (32 meters high) and spill way
- Powerhouse (two 2.5 MW generators)
- Transformers and transmission line

Water is stored in Mayo Lake, released to Wareham Lake and moved through a tunnel to the power house.

Wareham Dam

Built to withstand

- ❑ an earthquake of a 1/10,000 year occurrence
- ❑ any possible worst case flood scenario

- ❑ this dam is very solid having been in place for over 50 years
- ❑ meets today's Dam Safety guidelines

Wareham Dam

Earth filled dams

- ❑ Shake and settle during earth quakes
- ❑ Versus cracking
- ❑ Core is impervious to water

Earth filled dams

- ❑ Seep water naturally
- ❑ These seepages are monitored
- ❑ Changes indicate concerns
- ❑ Changes are not normally dramatic in nature

Inspections –

Three levels of inspections

- Routine
 - Day to day observations
 - Monthly checklist driven inspection
 - 24 hour equipment monitoring by control centre in Whitehorse

- Formal
 - Once a year by engineering staff

- Dam Safety Review
 - Every five years by independent consultants according to the Canadian Dam Association guidelines

Wareham Dam

There are three types of emergency classifications

1. Imminent Dam Breach
 - Very unlikely
2. Potential Dam Breach
 - A situation that threatens the integrity of the dam
 - Can be managed
3. Non-Failure Emergencies
 - A situation that require attention but would not cause the dam to fail

EMO Planning and Response

In case of an event

Plans exist and are practiced

- Yukon Energy Operations, Maintenance and Surveillance
- Mayo Lake and Wareham Dam Emergency Response Plan

EMO procedures (varies depending on the classification)

- Problem classified (Yukon Energy Staff)
- YE notifies: RCMP, Village of Mayo, NNDFN and SCC / EMO response

Conclusion

- Earth filled dams are very safe
- This dam has proven to be safe (50 + years)
- Problems tend to be found well in advance of real concern

END Thank you



4C-2.4 SEPTEMBER 25, 2008

4C-2.4.1 Meeting Notes

Meeting Report

Title:	Mayo B Project – Socio-Economic Field Work Introduction		
NNDFN Attendees:	Dennis Buyck –Lands Manager Dawna Hope – Lands Policy/Fish and Wildlife Crystal Stevens – Lands Assistant Millie Olsen – GIS Technician.		
YEC Attendees:	Darielle Talarico, Nancy LeBlond (InterGroup Consultants)		
Meeting Location:	NNDFN Lands Office	Mayo, Yukon	
Date:	September 25, 2008	Minutes status:	Final
Author:	Darielle Talarico/Nancy LeBlond	Phone:	867 668-2411 / cell 334-6966
Meeting Purpose:	To inform and introduce NNDFN Lands and Environment of the start of socio-economic field work; and to collect some pre-feasibility baseline data.		
Discussion:	<p>Darielle introduced the following key messages:</p> <ul style="list-style-type: none"> 6. As discussed at the previous meeting in August, we are in the pre-feasibility stage of gathering preliminary baseline information. Today we will focus on socio-economic baseline information. 7. The results of the geotechnical, environmental, and cultural/heritage work will be discussed in a YEC workshop in September. At this workshop the experts will determine if there is a project to enhance the Mayo facility. If there is a project “concept” it will be formally detailed, including its related interests and effects. This project concept will then be brought back to you for review and discussion. 8. Again, at this stage there is no formal project. This is a pre-feasibility stage. <p>Nancy introduced the kinds of information normally collected as part of socio-economic baseline research – population, education & employment (including training opportunities), economic activities & businesses in the community, and land and resource use information. Questions were asked of NND participants relating to resource use, business owned by NNDFN and governance.</p>		
Questions or comments:	Dennis indicated it will be important to address cumulative effects of this project in relation to effects from past projects (i.e., the original construction of the dams at Wareham and Mayo Lakes)		

	<p><u>Resource Use:</u></p> <ul style="list-style-type: none"> • A large proportion of NDNFN members hunt moose and fish for salmon, lake trout, whitefish and grayling. There is very limited waterfowl hunting. Roughly less than 25% of members participate in trapping. • Dennis noted there has been increasing hunting pressure over the past 15 years from other Yukoners coming into this general area to hunt moose, with variance from year to year. This is a popular area to come and hunt. The outfitter only uses floatplane dock in Mayo to access the outer limits of his outfitting area – not active in this immediate region. • NDNFN has not adopted the Dooli tradition as has SFN. • NND has Game Guardians to monitor member harvesting. • Ethel Lake caribou herd: members have seen the Ethel Lake herd crossing Mayo Lake near the dam during fall and spring migrations. They come down from the mountains to the lake and river. Their range is quite large; however, this information seems to be more detailed than what Mark O'Donoghue, the Regional Biologist has reported. • Trapping concessions: #85 used to be Dennis Buyck, but he has recently sold it to Shawn Hughes in Dawson. #84 is Bernard Menelon. #86 (east side of Mayo Lake) is registered to Michael Arden; however, Dennis indicated he had shares in it with Michael. #89 is registered to Jimmy Hager; #74 to Dan McDiarmid; and #407 is a community/group trapping concession under the direction of the Conservation Officer. • Fishing: Wareham Lake is used for fishing (especially Chinook salmon & grayling); and Mayo Lake is used for Lake trout fishing NND used to do lake whitefish netting at Mayo Lake, but not as much anymore. • Berry Picking: in the vicinity of Wareham Lake, and along the Mayo River out to Mayo Lake – blueberries, raspberries, high-bush cranberries, soap berries (stone berries). Wherever access is possible, people pick berries and other medicinal plants. <p><u>Business/Employment:</u></p> <ul style="list-style-type: none"> • The NND Development Corporation runs the store and a restaurant on settlement land. There are Joint Ventures with the mines and the Mining Training Program. There have been large increases in opportunities for NND members to have employment on mining activities in the past 5 years (Keno Hill mine) – more jobs than people. This has affected trucking, catering, bush work, etc. • Some members used to be employed in forestry. • Employment and business information is available through the Development Corporation. • Members are not involved in placer mining. • NDNFN will be having their elections Oct. 22nd. <p><u>Mayo Lake:</u></p> <ul style="list-style-type: none"> • About half the cabins are NDNFN (often hidden in the vegetation) and half related to placer mining activities. <p><u>Consultation and TK guidelines:</u></p> <ul style="list-style-type: none"> • NND provided their Consultation protocol – note it is up for renewal/change
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	<p>soon.</p> <p><u>Concerns identified by NND:</u></p> <ul style="list-style-type: none"> • Chinook salmon; previous request for a fish ladder • Safety of the Wareham Dam and Mayo Lake structure. It was noted that part of the Mayo Lake structure needs replacing. It was fixed once in the past. • Water levels near Minto Bridge and the effect on beavers • Mayo Lake levels and flows affect Wareham Lake and what flows over the dam. The control structure out at Mayo Lake does not provide real-time information – there should be better monitoring. • If changes are made to Mayo Lake, there will be issues from NNDFN's perspective. The existing license has a large range in which to operate.
<p>Follow up required:</p>	

4C-3.0 PROJECT INTRODUCTION AND ISSUES IDENTIFICATION

The introduction of the project on November 17, 2008 with Chief and Council marked the beginning of the Cooperative Engagement process with NND. The document outlining the process is attached on the following page.



Cooperative Engagement Process for
Economic Activities Proposed in the
Traditional Territory of the First Nation of
Na-Cho Nyak Dun

NA-CHO NYAK DUN FIRST NATION

The relationship between industry in the Traditional Territory of the First Nation of Na-Cho Nyak Dun and the Chief and Council of Na-Cho Nyak Dun is very important as we move forward together to capitalize on the economic opportunities as they are presented. The following protocol has been developed specifically to enhance the relationship between industry and the Na-Cho Nyak Dun First Nation.

The ultimate goal of developing this initiative is the well being of our community. It is our belief that following this protocol will create an opportunity to establish a balance between community, environment, and industry needs. We hope that all parties will benefit from equity in communication, decision making and creation of new opportunities for our growth and human development.

Step A Initial Contact

1. Request a meeting, in writing, with Chief and Council including a copy to Lands & Resources Department. Included in the package there should be a briefing note with information about the company, the proposed project and the associated time lines.
2. Council will ask the Lands and Resources Department to review the information and make a recommendation to Council to either meet with the company or not to meet with the company.
3. Chief and Council will make a decision based on the Lands & Resources Department recommendation regarding a meeting with the company.
4. If the decision is made to meet with the company the Lands & Resources Department will be directed to develop questions for the meeting, and to identify whether or not additional information is needed. They will also draft a letter of response for Chief and Council to send to the company.
5. Chief and Council will send the letter to the company, with the associated request for information.
6. Once all of the information has been received Chief and Council will identify a time and date for a meeting and the company will liaise with the Executive Assistant to coordinate a meeting. Council will have a series of pre-selected dates in their schedule to meet on economic initiatives. Every effort will be made to schedule dates within this framework.

Step B Initial Meeting

1. If a meeting is arranged the following order will be followed:
 - a. Company Presentation
 - b. Question and Answers
 - c. Chief and Council explains the follow up process
 - i. Internal discussion (involving the Lands & Resources Department).
 - ii. Chief and Council will decide formally on the proponent's project by way of a Council motion and will send a letter to the proponent identifying the decision and the next steps if required.

Step C Formal Engagement

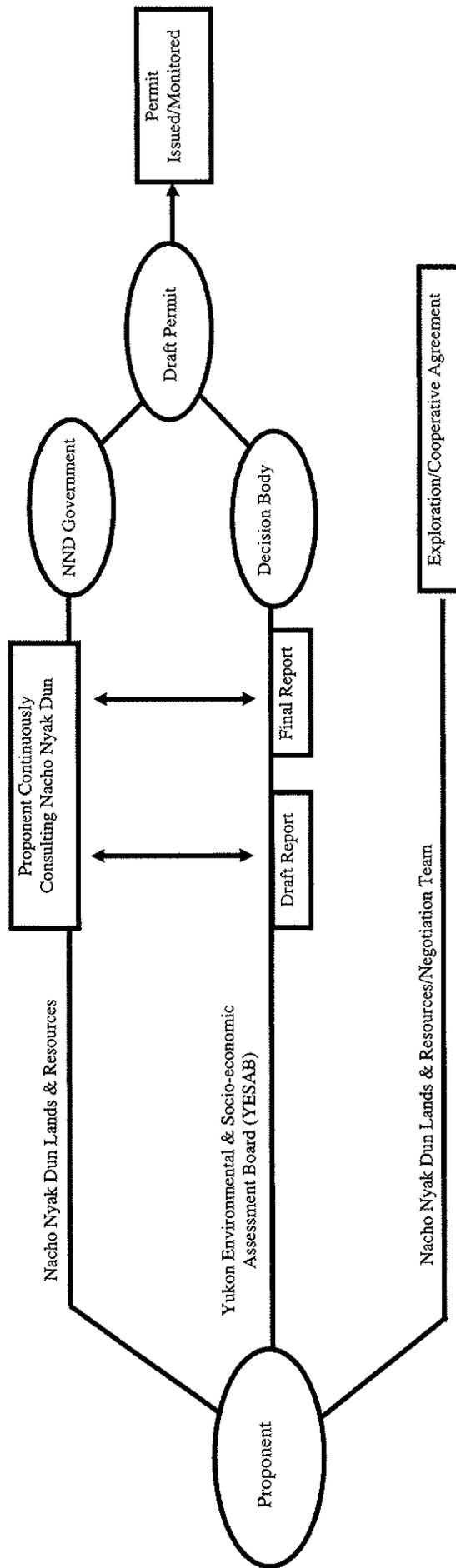
1. If the project is consistent with the goals and interests of the First Nation then the company will be asked to:
 - a. Contact the negotiation team, start the negotiation process and work towards the development of a cooperative agreement for Chief and Council consideration.
 - b. Continue the flow of information and discussion with Lands & Resources Department in regards to the formal assessment and permitting processes (YESAA, land use permitting , etc..). Seek NND input prior to the submission of assessment and permitting applications.
 - c. Work toward reconciling differences prior to submission of applications
2. Apply to YESAB for an environmental assessment
 - a. YESAB releases draft report and NND Lands & Resources provides comments.
 - b. YESAB releases final report and recommendations. NND Lands & Resources reviews final report and prepares comments for Chief and Council to use during government to government consultation.
3. Government to government consultations occur to review the report and to decide to accept, reject or vary the recommendations.
 - ☐ Discussion about concerns and issues
 - ☐ Accommodation of NND interest
 - ☐ Establish regulator to regulator discussions
4. Regulators consult First Nation Land & Resources Department on draft permit
 - ☐ Regulator issues the land use permit with terms and conditions
 - ☐ Project proceeds in accordance with permit
5. Regulators monitor project for compliance and inspect as required
 - ☐ Na-Cho Nyak Dun Lands & Resource participates in process

CONTACT INFORMATION:

First Nation of Na-Cho Nyak Dun
Box 220
Mayo, Y.T. Y0B 1M0
(867)996-2265
main@nndfn.com

Director of Lands and Resources
(867)996-2415
landsmanager@nndfn.com

Na-Cho Nyak Dun Negotiating Team Liaison
(867)996-2248
nnddc2@northwestel.net



4C-3.1 NOVEMBER 17, 2008

4C-3.1.1 Meeting Notes

Meeting Report

Title:	Mayo B Project – Proposed Project Briefing with Chief and Council		
NNDFN Attendees:	Simon Mervyn Sr. Chief Roxanne McGinty Youth Councilor Anne Leckie A/Executive Director Carol VanBibber Exec Assistant Bryan Moses Councilor Rosa Lemier Councilor Mary McMahon Councilor Beverly Blanchard Councilor		
YEC Attendees:	David Morrison Hector Campbell Travis Ritchie Darielle Talarico		
Meeting Location:	NNDFN council office	Mayo, Yukon	
Date:	November 17, 2008	Minutes status:	Final
Author:	Darielle Talarico/Travis Ritchie	Phone:	867 668-2411
Meeting Purpose:	To introduce the proposed project in order to initiate formal consultation towards a MOU and YESAB application.		
Discussion:	Chief Simon Mervyn Sr. – welcomed YEC Anne Leckie – Began with an acknowledgement that NND had received the October 27, 2008 letter from YEC regarding the Mayo B project and interpreted the letter as a request for consultation on the potential project. Also NND notes that opportunities and matters related to Chapter 22 need also to be addressed. Dave Morrison – - YEC is here as a follow-up from the summer meeting with Chief and council to update NND on work that has been done so far on the Mayo B project. - YEC would like to start consultation for this project and discuss process and		

	<p>timelines.</p> <ul style="list-style-type: none"> - YEC would like to establish an agreement or MOU process so each party knows what it is doing. - YEC would like to officially start consultations with NND for the project today. <p>Chief Simon Mervyn Sr. -</p> <ul style="list-style-type: none"> - Understand it's about the consultation process and need to look at Chapter 22 which states there is opportunity for up to 25% of a new hydro electric project. - Noted that YEC had been here before to see Chief and Council to discuss the research which was done in the summer of 2008 and to discuss the potential for future development and that YEC staff had been to see various members of NND staff. <p>David Morrison -</p> <ul style="list-style-type: none"> - Preliminary geotechnical, environmental and heritage field work has been completed. - The Mayo B project description and footprint was detailed. This includes the establishment of a new powerhouse 3 km downstream of the existing powerhouse to enable twice as much power to be generated from the same amount of water. No new dam would be required as the new plant would use the existing Wareham Dam intake. A tunnel, penstock or canal are still the options being sorted out as a means to move the water to the new powerhouse. - The project cost is estimated to be \$100 million; however this is just a preliminary estimate. More work needs to be done to determine the exact cost as there have been no tendering of the work or equipment. <p>Chief Simon Mervyn Sr. / Anne Leckie Question – are there any other options?</p> <ul style="list-style-type: none"> - David explained that there could be another turbine added to the existing powerhouse but it would not generate as much energy as, building a new powerhouse located further down river (here there is greater head because there is a bigger elevation difference from the Wareham Lake to the new powerhouse). - David continued with the update. Next phase is to complete field work and other baseline data collection, to secure land needed including some from Simon Mason-Wood, and to carry out consultations in preparation of a YESAB submission filing. As well, the financing necessary to ensure the project does not negatively affect rate payers must be found. It was noted that in the negotiations between YEC and NND there will be discussion on NND investment options with regards to this project.
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	<p>Timelines</p> <ol style="list-style-type: none"> 1. Originally, YEC thought the project would be needed in 2011. So working backwards from this it is important to file with YESAB within the next couple of months, as YESAB process could take a year. It also takes a long time to get turbines built (24 months). The timelines may have changed now, due to the recent change in market conditions which are affecting Western Copper’s ability to get financing. As this is one of the intended customers for the new Mayo B power, it may also delay the project. 2. This is why we are approaching the Mayo B project in a staged approval manner: research (pre-feasibility), project development, financing, etc. Final approval of the project would only occur after the project has been tendered and found to be in budget. This is how YEC did the Carmacks Stewart Transmission Project (CSTP). 3. In terms of timing YEC will first complete CSTP Stage 2 before YEC completes Mayo B. This is because Alexco is expecting to be in production before Western Copper. Alexco could be supplied by power from the Whitehorse grid and Mayo grids combined, thus CSTP Stage 2 is required. For CSTP Stage 2 the YESAA environmental assessment has been completed and we have a Project Agreement with the Northern Tutchone Council. YEC still needs to get permits and determine construction costs for Stage 2. YEC will meet with the Northern Tutchone Chiefs and go over the CSTP Stage 2 project timelines. A power purchase agreement needs to be negotiated with Alexco. Once this is done, YEC is hoping to have the project completed by the end of 2010. 4. As work is being done on CSTP Stage 2, work will also be carried out on Mayo B. This is why we are here to keep the processes going and to move into formal consultations with NND regarding Mayo B. We would like to know what consultations process NND wants to use. We are hoping to come up next week to engage the community and NND technical staff with regards to the project. YEC also looks forward to concurrent proceedings on an agreement with NND. <p>Chief Simon Mervyn Sr. Question –</p> <p>Is there information about the historic fishing site in the canyon around the new proposed powerhouse? This is a traditional fish hole used for 1000’s of years. This is an area of high traditional values. As well, the Chief noted that the community is interested in expanding salmon habitat and this may include developing a fish ladder so the young salmon can use habitat above Wareham Dam. He noted that we must think of future generations and try to keep the salmon stocks healthy as they have been in the past. This river used to be</p>
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	<p>called Red River because there were so many salmon.</p> <p>Anne Leckie – Introduced the NND Cooperative Engagement Process</p> <ol style="list-style-type: none"> 1. NND has a consultation protocol mostly designed to deal with mining companies. This protocol outlines the process needed to talk with NND people. 2. YEC staff have been phoning to set up meetings and NND has been messaging that they are waiting for the green light in the form of a letter to YEC from Chief and Council. 3. Anne acknowledged that NND received a letter from YEC on October 27th to establish an agreement, whether it is called an MOU or a cooperative engagement process. Negotiating teams need to be established to deal with this. At the same time as negotiations are occurring on an agreement, the technical review work can be done prior to filing the project application with YESAB. NND would like to work cooperatively towards the YESAB submission (in terms of working with YEC staff regarding the technical aspects of the project). If NND has any issues with the project, NND will note these early so there is time to address the concerns before the YESA submission is sent in, and this way there is less likelihood of NND having to respond negatively to the project during the regulatory process. <p>Anne noted that NND is in the process of developing an intergovernmental accord with YG regarding approaches to interactions and one of these is for the licensing and permitting process.</p> <p>So everything is upfront and there are no surprises, Chief and Council will vote on this matter later today, and if agreement to work with YEC on this project is approved, will provide a letter that will act as the green light on NND related consultation, the negotiation process and the NND contacts.</p> <p>Anne Leckie question – What happened with the stranded fish issue below Wareham Dam?</p> <p>David Morrison answer – This was dealt with previously and new habitat was provided. With Mayo B there are new potential habitat issues to be discussed.</p> <p>Anne Leckie question – What about erosion out of the new powerhouse site as there will be a lot more water being released at this point?</p>
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	<p>David Morrison answer – The design will take this into consideration and it shouldn't be a problem.</p> <p>Anne Leckie –</p> <ul style="list-style-type: none"> - NND would also like to discuss in the agreement negotiations what contribution might be made to assist NND with the technical work associated with YESAB, and in NND negotiations. NND needs to hire some experts, probably Bill Slater. - David indicated that this could happen and that he would also approach Yukon Government to seek support for NND. <p>Anne also handed out the <i>Cooperative Engagement Process for Economic Activities Proposed in the Traditional Territory of the First Nation of Na-Cho Nyak Dun</i> and <i>Guiding Principles Towards Best Practices Codes for Mineral Interests with Na-Cho Nyak Dun First Nation's Traditional Territory</i>.</p> <p>Anne said the process now to follow needs to be detailed in a paper trail. For instance, YEC has sent two letters and now NND needs to respond.</p> <p>Next steps, Executive Director will send back a letter from Chief and Council to start the process. YEC should follow the protocol now and not be talking to any NND staff until this letter is received. YEC should then coordinate the approach to be taken with the Executive Director who will provide detailed contact information and procedures.</p>
<p>Follow up required:</p>	<p>NND will send a letter or other form of confirmation from Chief and Council to YEC to begin the consultation process and the negotiation process.</p> <p>YEC will look at funding for NND to participate and will wait for the letter before engaging staff.</p>

4C-3.1.2 Materials Resulting from the Meeting

The materials resulting from the meeting are located on the next page.

First Nation of Na-Cho Nyak Dun

Box 220

Mayo, Yukon Y0B 1M0

Tel: (867) 996-2265

Fax: (867) 996-2107

E-mail: main@nndfn.comWebsite: www.nndfn.com

November 21, 2008

Dave Morrison, President and CEO

Yukon Energy Corporation

Box 5920

Whitehorse, YT Y1A 6S7

Dear Mr. Morrison;

On behalf of the First Nation of Na Cho Nyak Dun I would like to thank you for your letter of October 27th 2008 and your subsequent presentation to NND Chief and Council on November 17, 2008 regarding entering into a Consultation between YEC and NND on the Mayo B project.

This letter is to confirm that Chief and Council reviewed the presentation given by yourself and your staff and our Executive Director has communicated with Mr. Campbell via email regarding next steps. It is our understanding that our technical staffs will enter into discussions regarding the project and will be kept apprised regarding the outcome of the geotechnical work currently being undertaken and other studies relevant to the upcoming YESAB assessment of the project. Our primary contact with the Lands and Resources Department is Manager Dennis Buyck. Mr. Buyck has informed us that both Dawna Hope, our lands policy analyst, and Steven Buyck, our environmental officer, will be working on this file under the direction of Mr. Dennis Buyck. We anticipate that YEC staff will review the YESAB submission with our Lands and Resources staff and best efforts will be made to address any issues the First Nation may have on the technical aspects of the project. We also support the effort being made to inform the general public regarding the project with the Community meetings that are being planned for December.

We are pleased to advise you that Council supports entering into cooperative and diligent consultation with YEC and has received confirmation that our negotiation team will be comprised of Mr. Tom Lie, Mr. Albert Peter and Councillor Bryan Moses. Mr. Lie will be taking the lead on this consultation process and will be contacting Mr. Campbell directly regarding the process that is outlined in our Cooperative Engagement Process.

It is anticipated that Chapter 22 obligations and responsibilities regarding NND involvement in the project will be subject of early discussion as will the provision by YEC of a contribution for NND to participate in the consultative process.

Sincerely



Chief Simon Mervyn
On Behalf of NND Chief and Council

cc. Mr. Dennis Buyck
Mr. Tom Lie
Mr. Albert Peter
Councillor Bryan Moses

4C-3.2 NOVEMBER 26, 2008

4C-3.2.1 Meeting Notes

Meeting Report

Title:	Mayo B Project Briefing		
Attendees:	Denis Buyck – Lands Manager Dawna Hope – Lands Policy/Fish and Wildlife Crystal Stevens – Lands Assistant Millie Olsen – GIS Technician Stephen Buyck - Environmental Officer		
YEC Attendees:	Hector Campbell, Darielle Talarico, Kristin Kent		
Meeting Location:	NND Lands and Resources	Mayo, Yukon	
Date:	November 26, 2008		
Author:	Kristin Kent		Final
Meeting Purpose:	To introduce the Mayo B project in preparation for technical workshops to be held in Whitehorse on December 4 & 5, 2008		
Discussion:	<p>Darielle opened the meeting. She explained Yukon Energy’s 20 Year Resource Plan (2005) and that Yukon Energy has been considering options for increasing power production to meet anticipated electrical needs in the territory. She indicated that the urgency for this new power has diminished somewhat due to current market conditions. While Alexco coming into production at the Keno mine site is still very likely, it is likely that customers such as Carmacks Copper will be delayed in their need for power. In any case, there is still likelihood for power customers in the future, and as such Yukon Energy is proceeding with a YESAB filing for Mayo B due to the lengthy period of time it takes to acquire licenses and permits.</p> <p>Hector explained that Mayo B is one of several projects that have been considered, including a third turbine at Aishihik which is anticipated to come online by 2011. This will provide some additional capacity on the Whitehorse-Aishihik-Faro grid. With the completion of Stage II of the Carmacks-Stewart Transmission Project (CSTP), the Whitehorse-Aishihik-Faro grid and Mayo-Dawson grid would be interconnected, resulting in sufficient power to meet Alexco’s power needs. However YTG has only verbally committed to the project and there is still a need for commitment in writing for the project to proceed. Mayo B is an estimated \$100 million project, and as such, government and other funding would be necessary to proceed with the project.</p>		

	<p>No decisions have been made to proceed with Mayo B project at this time. Several tasks need to be accomplished including finalizing engineering for the project, a submission to YESAB, application for a Water Board license, consultation with stakeholders across the Yukon, completion of CSTP Stage II and confirmation of another major customer on the system.</p> <p>Some discussion occurred about the agreement by Chief and Council to proceed with discussions on the project. Hector explained that Chief and Council had agreed to move forward with two parallel processes:</p> <ol style="list-style-type: none"> 1. Consultation and sharing of information with NND's technical staff, and 2. Working towards a potential cooperative partnership agreement regarding project development. <p>Hector began by explaining the current Mayo hydro facility which came into production in 1951 to service the United Keno Mine. There are three main components to the facility; the Mayo Lake control structure, the Wareham Dam, and the existing powerhouse (which has historically not been needed to be operated at its peak capacity).</p> <p>The 20-Year Resource Plan recommended enhancing existing hydro facilities was preferred to the development of green field sites, and as such, Mayo B was considered since there was an opportunity to take advantage of an increase in head (or vertical drop). A new powerhouse could be developed approximately 3 km downstream resulting in almost double the amount of power production. The existing powerhouse could continue to be used to maintain flow rates for the reach of the Mayo River between the old powerhouse and the new powerhouse. The balance of the water would be diverted, ideally through a tunnel, to the new powerhouse. A tunnel has the advantage of minimizing the effects on the environment as it would be located underground. The project would also require a low voltage transmission line to connect to the electrical grid.</p> <p>Water levels on Mayo Lake would not be increased above the current license, although consideration is being given to increasing the lower limit of the water range by up to 1 meter (i.e., the water could be drawn down). This would require an amendment to the existing water license. Water would be stored and drawn down over the winter. It would reach the lowest level just before the spring freshet and refill in the spring and summer.</p> <p>Hector briefly explained the studies that have occurred to date, emphasizing that further engineering work is required before they can make conclusions on exactly how water levels are likely to change in Mayo Lake and Mayo River. From a power production perspective, the additional drawn down of water would be used to meet the increase in demand for winter power.</p>
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Fish and wildlife studies were conducted in the summer and fall from confluence of the Stewart and Mayo Rivers up the Mayo River to and including Mayo Lake. The consultants that have conducted the work will be better able to explain the work that has been completed, their preliminary results and the potential options for mitigation at the workshops next week in Whitehorse. They are in the process of developing a more complete understanding of various scenarios including connecting the two hydro grids together with the completion of Stage Two of the CSTP.

Hector explained that water level modeling is still underway and that the use of the plant flows will contribute to mitigation measures for the project. A river geomorphologist was hired to consider how water changes will occur in each reach of the river and along the lake. His reports are not yet complete. Some discussion occurred about the icing that has happened in recent years near the Mayo bridge. The cause of the icing and whether it can be managed through river flow changes is being reviewed.

A review of how flows can be used to enhance salmon spawning and rearing habitat is also underway. There is also potential for the development of a side channel in an old river bed by the new powerhouse for salmon to use as habitat. More detail will be available on this at the workshop next week.

Yukon Energy is hoping to file a submission to YESAB in the first quarter of 2009. It will take 12-18 months for that review to occur, in addition to a review process by the Water Board for changes to the water license.

Some discussion occurred comparing the potential changes at Mayo Lake to what occurs at Aishihik Lake. This is a difficult comparison to make since they are different environments and have different ecosystems. Aishihik has a 7 foot operating range in its license. because of concerns about whitefish spawning in the lake.

Hector explained the work that has occurred to determine which option (the tunnel or canal/penstock) is best for conveying water. Rock core samples are being examined for strength and environmental characteristics. There is seismic work going on to determine whether the bedrock is suitable for a tunnel.

A discussion was had about the heritage work conducted by James Mooney. One attendee indicated that he did shovel tests about 100 feet short of a known site on the south east arm of the Mayo Lake. NND has not yet had the opportunity to verify that site but since flooding is not going to occur it is unlikely to be an issue.

	<p>Hector explained that a number of projects have been considered to increase hydro use in the Yukon, with Mayo B being the most promising option. Projects such as Atlin Lake, Gladstone or Marsh Lake don't offer the same power benefits (they are quite small). There is a need to connect the Whitehorse-Aishihik-Faro and Mayo-Dawson grids to efficiently use hydro energy on both grids when it is available. There is still the need for a new major customer to help pay for this infrastructure. Wind and geothermal options are also under consideration, but those plans are longer term.</p> <p>There was some informal discussion about geothermal power production and the Chena project in Alaska.</p>
<p>Questions asked or issues raised:</p>	<ul style="list-style-type: none"> • Will there be changes to the current water license? • Although there have been previous efforts to coordinate meetings about dam safety, there is some concern that explaining this issue to the community has not been done adequately. There is a need to inform the community about dam safety, and Yukon Energy should consider the development of a dam safety brochure to help address people's concerns. • Will the first powerhouse remain in operation? • A question was raised as to how much water is being used for power production on the system right now. • What is the seasonality of flows? • How will an extra meter of draw down affect aquatic fur-bearing mammals that use the lake – in particular small mammals that use the streams and marsh areas that feed the lake? There is prime habitat on the eastern arms of the lake. A draw down of water may have the potential to negatively impact beaver and muskrat populations. • Has any consideration been given to increasing water levels? Have you modeled the option of capturing the additional meter of water by raising the license limits by ½ a meter and lowering the license limits by ½ a meter? • How much data has been collected on wildlife? What species have been examined? What time of year did the studies occur? • Has any consideration been given to a fish ladder at the Wareham Dam? • NND asked whether one of the elders from their community was consulted in terms of understanding what fish species (in particular salmon) were in the Mayo River system and lake prior to the construction of the dam. • A question was raised to compare draw down of water to what occurs on the Aishihik system. • There was some thought that if water flows were more consistent that it may help to address the icing issue at the Mayo bridge. Water flow fluctuations may be what is exacerbating the issue. • How long will the project take? • How large would the tunnel be? • At what point will YEC decide what option (the tunnel or canal/penstock) will be built?

	<ul style="list-style-type: none">• There was some indication that NCPC had disposed of some transformers close to the conveyance options (i.e., buried them). Was that considered?• If Alexco doesn't go ahead with their project will Mayo B still be considered further into the future?• Some comment was provided about the need to reinforce the benefit of a project such as Mayo B. It is considerably more beneficial than a green field site like Granite Canyon.• There was some indication that Yukon Energy should look to other organizations or individuals (academics) to improve baseline information about the area. There is very little known about whitefish and lake trout in the area, for example.• The group asked if the information that is going to be shared with/by the DFO next week could be shared with NND.
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4C-3.2.2 Materials

The first newsletter was distributed as discussion material. See Appendix 4B-2.2.

4C-3.3 DECEMBER 3, 2008

4C-3.3.1 Meeting Notes

Meeting Report

Title:	Mayo B Project – Initial Discussions on a Contribution Agreement and Steps towards a MOU/Project Agreement		
NNDFN Attendees:	Tom Lie, General Manager, NND Development Corp. Albert Peters Bryan Moses Councilor		
YEC Attendees:	Hector Campbell Patrick Bowman (InterGroup Consultants) Nancy LeBlond (InterGroup Consultants)		
Meeting Location:	YEC Meeting Room	Whitehorse, Yukon	
Date:	December 3, 2008	Minutes status:	Draft 1
Author:	Nancy LeBlond	Phone:	204-942-0654
Meeting Purpose:	To initiate discussions on a contribution agreement to enable NND Staff participation in the Planning Phase towards a YESAB application; and to discuss next steps for the parallel process towards an MOU/Project Agreement.		
Discussion:	<p>Hector welcomed the members from NND and round table introductions were made. Hector briefly reviewed the notes from his earlier meeting with Tom and Albert on Nov. 28th, indicating that the Mayo B Project and Nov. Newsletter were reviewed together. Tom indicated that both he and Bryan will attend the two NND workshops on Dec 4th and 5th.</p> <p>Patrick noted that no commitments have been made to proceed with the Project. Mayo B represents one of the better supply options for near-term load growth. YEC has developed a schedule which could proceed quickly; however, there is uncertainty in terms of increased industrial load growth and completion of Carmacks Stewart Transmission Project (CSTP) Stage 2. YEC is currently protecting an earliest In Service Date (ISD) of late 2011 under a compressed schedule especially with environmental licencing and permitting. This may shift to 2012; however, the longer schedule essentially builds in float room/flexibility for any unanticipated delays. Even under the 2012 ISD schedule, YEC will target filing a YESAB Project Proposal by Q1 of 2009 as the environmental assessment and approval process is comprehensive and takes time. There is uncertainty which pace will unfold – the driver of timing will be Carmacks Copper or other industrial load growth.</p> <p>Hector noted that YEC met briefly with YESAB representatives on Dec. 1st.</p>		

	<p>They indicated they are expecting four possible Executive Committee submissions, which will be more than they have had to deal with at one time before.</p> <p>Patrick indicated that experience from the CSTP indicated it is beneficial to have points of agreement with NND before we file the YESAB submission. It is also helpful to both parties that later in the YESAB process, aspects of that agreement are more crystallized. YEC is looking to a simple two-step process on the MOU/Project Agreement track (separate from any Contribution Agreement towards participation in the assessment process):</p> <ul style="list-style-type: none"> a) Early February 2009, (prior to YESAB filing) an MOU where YEC and NND jointly indicate their support for the Mayo B Project going forward to YESAB and through the environmental assessment process. b) Later in the process, a Project Agreement to include business and investment opportunities/arrangements. This information will not likely be clarified before the summer/fall of 2009 as several sources of financial contributions will be required to be coordinated to fund this Project (i.e., including a mix of industrial contributions, YG and federal government funding). <p>Tom noted that the NND Cooperative Engagement Process was developed as NND proceeded through the Alexco development process. YG is supportive of this approach, which includes early engagement of the Lands and Resources staff to work through key issues before filing with YESAB. This will give YEC an opportunity to review NND perspectives on the project before filing; and hence issues can be addressed in advance, helping to prevent the YESAB clock from stopping.</p> <p>The MOU would be expected to go before Chief and Council for approval.</p> <p>Patrick noted that there is not any firm position from YEC as to maximum NND investment range. Also, caution was noted about using percentage "of what". Main point is that YEC wants to work with NND, that the spirit of investment will be consistent with all existing obligations and established frameworks, and that there is plenty of flexibility to consider and review the best approach here – options ranging from debt types of investments to something more analogous to equity or preferred shares will need to be looked at to meet all the relevant objectives, including NND's relative desire for income versus growth. Also need for attention to make sure risk/reward profile is fair to both parties.</p> <p>Tom explained that any arrangement with NND will need to be cognizant of not attracting any tax implications. NND has two branches – NND government and NND Development Corporation. The latter is a business entity that is a fully taxed organization. We will need to ensure that any business arrangement does not put NND government off-side from the tax perspective. NND is interested in investing in the Project, up to 25% of the costs; but there is a need to flesh out the details. Hector noted that YEC is also very cognizant of tax implications as its investments are currently not taxable.</p>
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	<p>Government financial support at this point is uncertain. The project is currently estimated at about \$100 million. New green power in BC costs about 7-8 cents a KWh. YEC is looking to federal government financing, which may be based on bringing the Mayo B capital costs down to a level consistent with green power costs in other jurisdictions.</p> <p>Patrick also indicated we need to discuss process funding for NND staff to participate in the YESAB process – likely on an upset, one-time contribution basis. The CSTP MOU process is not likely the best template for the Mayo B Project as we are dealing with a more focused timeline. There are essentially three discrete elements we need to address:</p> <ol style="list-style-type: none"> i. Involvement in the YESAB filing process – technical, working-level discussions with NND Lands and Resources staff; opportunity for Bill Slater to be involved as technical advisor to NND Lands; and input to the YESAB and Water Board filings. ii. Community consultation – opportunities for the broader NND community to provide input to the YESAB submission. iii. Formal negotiation process on an MOU/Project Agreement which addresses business and investment arrangements. <p>Patrick indicated we need to address (i) and (ii) above in the near-term to enable both NND and YEC to keep moving. We assume NND can manage a Contribution Agreement of a lump-sum dollar amount that will cover both (i) and (ii) above. This might roughly correspond to the Carmacks-Stewart level of about \$4,000 per month for the next three months; and that Lands and Resources can take the lead to help organize meetings and be part of the presentation team at any community consultation.</p> <p>Nancy asked whether NND would use translators at workshops or community meetings. Albert indicated that NND do have 2–3 people who can act as translators. It would be important to offer to do this to ensure elders hear, and are comfortable with the information.</p> <p>Tom indicated that in Anne’s absence, he will be the key contact person to flow the Contribution Agreement through. He agreed that an upset limit will be easiest; and that the accounting dept. can provide an accounting of monies spent on a monthly basis. As for item (iii), Tom suggested a process of several face-to-face meetings with the negotiation teams; and that a reasonable amount of work can be accomplished off-line through emails etc. Tom is in Whitehorse and Mayo; Albert will be residing in Chilliwack over the winter, but has email access; and Bryan is in Mayo.</p> <p>Patrick reviewed the attached Potential Scope of Issues and Commitments re MOU with the group (Attachment A). Highlights noted:</p> <ul style="list-style-type: none"> • May need to bundle the construction management on this project, and have fewer contracts to manage given its size. This may affect the
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	<p>ability to carve out. Options may exist here, but we also don't want to undermine the financial feasibility of the Project.</p> <ul style="list-style-type: none"> • Section 2.b (i) notes that much of the Project requires highly technical electrical and mechanical expertise; however, there are still many opportunities for employment and business participation. This could include NND member participation in taking up trades, such as the experience with Carmacks-Stewart. • Section 2.b (ii) notes that YEC seeks to ensure maximizing opportunities on Stage 2 of CSTP, where there is more likely opportunity for NND participation • Section 3 notes the key importance of the MOU as showing NND support for the project progressing through the YESAB process; and that the MOU will include acknowledgement of issues yet to be resolved (similar to the CSTP MOU). This worked very well in the past. <p>Patrick noted that YEC expects NND Lands and Resources to be the key to keeping the process going and ensuring the community is informed. YEC will continue to use Tom as the contact person for the Contribution Agreement and MOU discussions.</p> <p>Tom noted that NND is also working with YTG to access funds for participating in various development processes focused largely on mining. Tom asked that YEC clarify for him whether they would need to include this process in those discussions with YTG. Patrick and Hector noted that YEC intended to work with NND to satisfy their reasonable requirements in respect of this project, and that YEC would not expect that NND would be required to bring something new into their ongoing negotiations with YTG.</p> <p>Albert noted that all parties should keep in mind that the Project Agreement will need a legal review on behalf of NND Chief and Council. Tom indicated that prior to that, there was no intention to involve lawyers until required, including potentially review of the MOU. Further legal assistance may be required in terms of how to structure any investment from a tax perspective. Hector noted that YEC's Board of Directors would have similar legal review requirements in respect of any ultimate Project Agreement, but that this group could move the process a long way before needing to expand it to specialists as needed such as lawyers.</p> <p>The group discussed general information about YEC, its financing, equity returns and debt loads. YEC maintains a 40% equity to 60% debt ratio. This project has not to date been anticipated to change that ratio. Albert noted that NND have Land Claim Agreement funds which were invested about 15 years ago and left to grow over time. NND can access some of these funds for development as long as the profile of the investment would match the risk profile NND intends for these amounts. These funds are more suited to debt investments (loans) than any form of equity. NND asked about "blended" investment involving debt and equity type returns. For example, to use hypothetical numbers, if NND was to invest \$20M, an option could be \$12M in</p>
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	debt provided to YEC (as a loan), and \$8M in something that is more analogous to equity in terms of returns and risk as it relates to this project. NND is looking at a long-term investment opportunity. Many options are available to explore in the future.
Follow up required:	<ol style="list-style-type: none">1. YEC to draft a Contribution Letter of Agreement for Tom's review to cover:<ul style="list-style-type: none">• Lands and Resources involvement in the planning phase prior to YESAB, including participation of their external consultant• Community consultation activities• Scope and timeline of the above• Lump sum contribution value2. Once the Contribution Letter of Agreement has been finalized, attention can turn to drafting an MOU between NND and YEC by early to mid-February.

4C-3.3.2 Materials

The Meeting plan for the NNDFN meeting on December 3, 2008 is located below.

MAYO B – POTENTIAL SCOPE OF ISSUES AND COMMITMENTS RE: MOU

1. YEC is seeking **NNDFN involvement and support** for this important renewable energy project located in their traditional territory.
 - a. This support is sought notwithstanding that NNDFN is not a Decision Body for Mayo B.
 - b. A key consideration is need for support to get through YESAB, Water Board and other regulatory processes in a timely way as is needed if project development to be successful

2. YEC would like to move towards some form of **Project Development Agreement** with NNDFN, ideally preceded by some form of simple MOU before YEC files its submission with YESAB (target approximately late January).
 - a. **Financial Participation:** Given that the financial model assumes a large YEC financial investment will be required for Mayo B, unlike CSTP¹, there will be opportunities for investment by NNDFN
 - i. YEC wants to accommodate this without getting locked down at outset to specifics re mechanics or terms, and
 - ii. also without letting it affect consultations and timing needed on YESAB submission, i.e., without YEC getting on with lengthy YESAB and other regulatory review processes as soon as possible, there will not be anything to participate in financially.
 - b. **Business Opportunities, Jobs, etc:** Unlike the Carmacks Stewart Transmission Project (CSTP), most employment opportunities related to the powerhouse and conveyance option will require highly specialized workers. It is also harder in this case to carve out specific “sole source” or direct award business opportunities given need for integrated contractor arrangements.
 - i. Construction employment opportunities for NNDFN members may include access clearing, heavy equipment operators and road construction, provision & transportation of goods & services (particularly to camp-related activities) depending on the available skills and training in the community.
 - ii. Completion of the CSTP Phase II project, similar to CSTP Phase I, will provide greater opportunity for participation by NNDFN members who do not have specialized trades training.

3. **Key potential topics for MOU:**
 - o Agreement in Principle:
 - To support the development of Mayo B generating station project (support moving the project forward to YESAB review)

¹ The CSTP Project Agreement with NTFN provides for certain possible financial participation by NTFN regarding YEC/YDC financing of Minto Mine owner contributions (but not the CSTP itself, per se). The CSTP MOU assumed financial contributions from the mine interests, YDC and YTG, with no opportunity for investment.

- Acknowledgement of issues/processes not resolved by this time – expected to include:
 - a) Decisions on where financing will be secured
 - b) Opportunity for NND consultations and discussion on effects of project options within YESAB process
 - c) Opportunity for participation in other regulatory proceedings under YUB as well as Water Board processes.
- Process:
 - a) Process for discussions and negotiation towards completion of a Project Agreement with NNDFN during 2009.
- Project Options and Consultations:
 - a) A commitment to keep NNDFN informed on timing of submissions, communication planning
- Economic Opportunities and Arrangements:
 - Means to assess opportunities for employment of qualified NNDFN citizens to be employed by YEC contractors
 - Opportunities for investment by NNDFN
 - Capturing business and employment opportunities related to development of the Project [camp catering, transportation of goods]

4C-4.0 POTENTIAL PROJECT EFFECTS AND MITIGATION

4C-4.1 DECEMBER 4, 2008

4C-4.1.1 Meeting notes

Meeting Report

Title:	Mayo B Project – Workshop with NND and YEC on Terrestrial Environment, Land and Resource Use		
Attendees:	<p>NND:</p> <p>Dawna Hope Beverly Genier Tom Lie Bryan Moses Stephen Buyck Teresa Samson</p> <p>Yukon Energy:</p> <p>Hector Campbell, Project Sponsor, YEC Travis Ritchie, Manager, Environmental Assessment & Licensing Patrick Bowman, Project Manager, InterGroup Consultants Shaun Beatty, KGS Group - Engineering Ben Schonewille, EDI – Aquatics Mike Settingington, EDI - Terrestrial Nancy LeBlond, Socio-Economic Assessment, InterGroup Consultants</p>		
Meeting Location:	High Country Inn	Whitehorse, Yukon	
Date:	December 4, 2008	Minutes status:	FINAL
Author:	Nancy LeBlond	Phone:	204-942-0654
Meeting Purpose:	Introduce the Mayo B Project, provide an overview of the terrestrial field work and data collection and gain an understanding of NNDFN interests and concerns, and land and resource use activities in the construction footprint area as well as regionally.		
Presentations:	<p>Introduction and Rationale</p> <p>Hector and Travis thanked everyone for coming to Whitehorse to participate in this workshop on Land and Resource Use. Round table introductions were made and the Agenda was reviewed and approved with no changes. Hector noted the session is meant to be informal, with interactive discussion throughout. Questions can be asked at any time.</p> <p>Patrick noted the workshops were originally planned to start with the Aquatic</p>		

	<p>Environment and a focus on water levels and flows. Given participants availability, we switched the order to start with a land-focus today. Greater detail on aquatic field work and water will occur tomorrow (Dec. 5th).</p> <p>Tom indicated that representatives from NND's Development Corporation met with YEC on Dec. 3rd to initiate discussions on a Contribution Agreement to enable NND staff and advisors to participate in the planning phase of the Mayo B Project. Tom indicated that very positive progress was made at the meeting.</p> <p>YEC's Presentation</p> <p>Hector and Patrick reviewed the PPT presentation – handouts were distributed. The following is provided as additional information to what is on the PPT slides.</p> <ul style="list-style-type: none"> • YEC is planning on submitting an Executive Committee level project proposal to YESAB in Q1 2009 to protect an earliest In Service Date (ISD) of 2011 (possibly 2012 if load growth slows). • YEC met with YESAB members on Dec. 1st to introduce them to the Project and learned the Mayo B Project is potentially one of four Ex. Com'tee level submissions in early 2009. • The Mayo B Project is contingent on having the Carmacks Stewart Transmission Project (CSTP) Stage Two (Pelly to Stewart Crossing) completed first; as well as a second mine (beyond Alexco) to contribute towards the load and possibly funding of the project. The Project is at minimum \$100 million, hence funding is being pursued from various sources including the federal government. There is room for substantial NND participation. • Initially, surplus hydro power from the Whitehorse-Aishihik-Faro (WAF) and Mayo Dawson (MD) grids will service the Alexco development through the interconnected grid. • The interconnected grid will meet the needs of non-industrial customers as well as future industrial loads wherever these loads are on the grid system. This provides YEC with flexibility in shifting delivery of power where needed. • No decisions have been made to proceed with the Project. • Mayo B could displace up to 28,000 tonnes of GHG emissions annually [40 Gwh x 700 tonnes]. • The Project is one of several enhancement opportunities YEC is considering as it will use an existing disturbed environment, and will double the energy production with the same amount of water. • Environmental field work is essentially complete (one additional piece on groundwater work is to come); and socio-economic field work is on-going. YEC is looking at a range of potential environmental impacts and looks to minimize or eliminate those affects. • Existing facilities – Mayo and Mayo Lake: <ul style="list-style-type: none"> ○ After MD was developed, the existing plant went from about 25% capacity to about 75% capacity, or 30 GWh.
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	<ul style="list-style-type: none"> ○ Mayo Lake has an operating range of 2.5 m – typically used in winter when the power is needed. The full range is not used every year; and currently, the utilized range is about 2m. When the United Keno mine was operating, the range used was greater than 2m, but less than the full license range of 2.5m. • Reason for Mayo B Project: <ul style="list-style-type: none"> ○ Mayo B is one possible enhancement project identified in YEC's 20 year Resource Plan. At \$100 million for approximately 10 MW, it is an expensive project compared to southern Canada projects; however, the alternative is diesel generation to service increasing loads. ○ Projects in the south (i.e., BC), cost about 7-8 cents per KWh; Mayo B is in the range of double that or more, and diesel is between 25 and 30 cents/KWh. YEC is looking for funding from the federal government to bring the prices to be closer to being equivalent to costs in BC for new hydro. ○ YEC's focus is on renewable projects including hydro, geothermal and wind. • Project Description: <ul style="list-style-type: none"> ○ The main benefit is the new powerhouse which has double the vertical drop, hence the ability to generate double the power. ○ There will be no new dams, no additional flooding and takes advantage of what is there. ○ The project will take about two years to construct, with a maximum camp size of 50-75 people (depending on the activity and conveyance option). ○ Tunnel option – seismic work was completed last week to identify the bedrock profile. The benefits of a tunnel include: <ul style="list-style-type: none"> ▪ Less operational issues ▪ Can be built all winter ▪ Less surface environmental disturbance ○ Penstock or canal option – can follow the contours of the landscape and be relatively flat (avoid high ridge). It is essentially some combination of a buried pipe 12-14 ft. in diameter lying in a trench, or possibly some open canal like at Aishihik. The last portion will be a steel pipe in order to withstand the water pressure. The penstock will tie into the existing intake tunnel and will include intake gates. ○ Both options may have a surge tank similar to the existing tank at the existing plant – this is one way to address the issue of a blow-out in the penstock or any safety issues related to the conveyance of water under pressure. ○ The project team is also considering a 1 m of additional storage at Mayo Lake through increasing the draw-down by a meter. This extra storage lets YEC hold water until it is released over the winter when the demand is greatest. ○ Costs are not completed yet on these options, however the surface options are likely comparable to a tunnel (the latter
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	<p>may be less costly if there is good bedrock).</p> <ul style="list-style-type: none"> • Construction Activities and Sequence: <ul style="list-style-type: none"> ○ On-site material and equipment “lay-down” area is likely to be located near the existing plant. Once this area is not required post-construction, a reclamation plan will be followed. ○ Tunnel construction: <ul style="list-style-type: none"> ▪ Generally they can tunnel 3m/day – activities include blasting and hauling out rock on a daily basis. The rock will then be trucked and deposited at a disposal site. ▪ Construction will start at the new powerhouse location. ▪ Will likely line the tunnel with concrete on an “as you go” basis to stabilize the rock and provide less friction as the water passes. ▪ The weight of the rock around the tunnel will contain the pressure. ▪ A steel penstock will be built back into the last 200 m of the tunnel; and 2-3 pipes will be attached at the end of the penstock leading to each of the turbines in the plant. ○ New Powerhouse construction: <ul style="list-style-type: none"> ▪ This will be set back from the river at the location recently cleared for drilling. ▪ Erosion will be minimized with silt fences or other such mechanisms. ▪ The powerhouse will be quite similar to the existing plant, about 20m by 30m in size. ▪ The new plant will be fully remote-controlled from Whitehorse; plus there will be a local plant operator as there is now. ○ Surface conveyance construction: <ul style="list-style-type: none"> ▪ Clearing can start in the winter, depending on timing of permits. ▪ Excavation of the trench requires a frost-free period for construction (possibly May through October – depending on the year). • Construction-related aspects requiring mitigation plans: examples noted to date include the following – there may be others discussed in the YESAB submission: <ul style="list-style-type: none"> ○ Timing windows for wildlife (e.g., clearing before breeding birds are nesting) ○ Noise ○ Removal of vegetation ○ Deposition of over-burden and rock (tunnel rock is being tested for acid and metals leaching) ○ Potential silt deposition (use of silt fences and majority of
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	<p>construction "in the dry")</p> <ul style="list-style-type: none"> ○ Location of camp (up at the site; there are likely business opportunities associated with camp operations) ○ Traffic – there will be a lot of truck traffic hauling materials and equipment ○ Increased hunting and fishing pressure (e.g., no-hunting policy for external workers) <ul style="list-style-type: none"> ● Operations Phase – the focus of tomorrow’s workshop on the Aquatic Environment will discuss in greater detail management of water levels and flows. YEC has considered several options for managing the water at Mayo Lake – including raising the lake levels by 1 m. After careful examination, this is now essentially off the table due to several factors: <ul style="list-style-type: none"> ○ Requires structural changes to the Mayo Lake Control Structure ○ Adverse impacts on heritage resources and cabins ○ Increased risk of erosion. ● YEC is considering lowering the minimum level by 1 m and is modeling the effects. More information will be available in January. <p>Terrestrial Field Work (EDI)</p> <p>Mike introduced the terrestrial baseline field work done to date, noting that the major emphasis for field work is focused on the aquatic environment (i.e., about 85-90%).</p> <ul style="list-style-type: none"> ● EDI field crews were on-site from July to freeze-up undertaking environmental baseline work for both the aquatic and terrestrial components. ● The terrestrial component of the fieldwork focused on potential effects within the construction footprint, shoreline effects, wetlands and key mammals such as moose. Three key elements were a waterfowl and brood survey done in late July; a raptor survey (often of concern to YG biologists); and habitat mapping for the footprint area. ● Waterfowl and brood survey – July 2008: Flew the entire Mayo River route from the Stewart River up to and including the shoreline of Mayo Lake. ● Boat survey up and down the Mayo River in Zone 4 – between Wareham and Mayo lakes – re: waterfowl and anecdotal information on wildlife ● Mike noted that the two wetlands areas at the ends of Roop and Nelson Arm were not surveyed. These areas were outside the field study area. The Nelson Arm area is not accessible by boat (only canoe as it is very shallow). ● Key Findings: <ul style="list-style-type: none"> ○ Broods of seven species were observed; two are listed as “sensitive” by YG – American Wigeon and Northern Pintail. ○ Reach 7 near the Minto Bridge, upstream of Wareham Lake, is a high quality wetland habitat for breeding waterfowl and aquatic furbearers (Nancy noted a large beaver dam right at
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	<p>the bridge with three beaver were observed by Nancy and Darielle in September)</p> <ul style="list-style-type: none"> ○ Three active Osprey nests and one active Bald Eagle nest were observed. ○ No cliff-nesting raptors were found in Zone 2. <ul style="list-style-type: none"> • Key species of concern are moose, waterfowl and aquatic mammals such as beaver. Increased local knowledge will assist in the completion of the terrestrial field work.
<p>Discussion:</p>	<ul style="list-style-type: none"> • Steve asked if anything was done for owls. Mike indicated there were no nocturnal surveys done as there is not thought to be a project effect on owls. • Steve noted that the slough in Reach 11 (upstream of Davidson Creek) is also good waterfowl breeding habitat. Steve agreed that the general categories of high (Reach 7), medium (Reaches 8 & 9) and low (Reaches 10-12) along Zone 4 are correct, with the exception of Reach 11. Ben indicated they would re-classify Reach 11, based on this information. • Ben noted that most waterfowl nesting in Reach 7 is in the off-channels. • Steve indicated he would like a better understanding of spring-time water flows through Zone 4.
<p>Map-based Resource Use Discussion</p>	<p><u>Area between Mayo and Wareham Lake</u></p> <ul style="list-style-type: none"> • NND hunt beaver and ducks up the only creek flowing in the Lower Mayo River (below the existing plant) and up into the small lake. Access is via the dump or powerline ROW. • There is some recreational use of the river for running rapids, canoeing or kayaking (mostly from the existing powerhouse downstream to Mayo). • Chinook salmon fishing – Stewart River at Fraser Falls (netting). There is some recreational angling at McIntyre Park. • Fish weir on the Mayo River in 1994 – Darryl Otto counted over 620 salmon. • Cross-country skiing in the Five Mile Lakes area, plus off to the east side of the Silver Trail Highway. • There is also a small wetland area between Five Mile Lakes and Silver Trail Hwy. This area in general is part of the migration route for birds. • Crocus Hill trail [from the Silver Trail Hwy. near the airport, along the ridge line to the river near the proposed powerhouse] is a trail used historically for travel to the river for fishing (also, is a great cross country ski trail). • No snowmobiling on the lower Mayo – people know to avoid the river for safety reasons (but there is a lot of travel by foot from the Prince of Wales trail across the lower Mayo River to sewage lagoon road/McIntyre Park area).

Zone 4 -Wareham Lake to Mayo Dam (& environs):

- Berry picking – low-bush cranberries (especially along the road to Elsa). Other berries of importance include black currents, raspberries, stone berries, high bush cranberries, blue berries. Good berry picking areas include along the Mayo Lake road, around Janet Lake, at the west end of Mayo Lake and to the south of Mayo Lake
- NND used to have fish camp at the Minto Bridge area (can see it from the river). Remains of fish traps are still there.
- Medicinal plants include: yarrow, spruce, pine, balsam, alder, Labrador tea, caribou horn (lichen), puffballs (fungi) [information contained in the “A Home for Mayo”, a Mayo RRC 2000 report].
- Moose hunting: boats go down-river in the fall for moose hunting (put in near Mayo dam and go downstream to Minto Bridge). There are many areas off the Mayo River for good moose hunting, particularly SE of the river between the Silver Trail Hwy. and Mayo Lake.
- Porcupine and grouse hunting north of the Mayo Lake Road.
- Grayling fishing at the east end of the Mayo River between Davidson Creek and the lake.
- Reach 11 wetland area has waterfowl and beaver.
- Zone 4 throughout has good aquatic mammal habitat – trapping for marten, lynx, muskrat, wolf, wolverine and fox. Beaver are caught for food (not as much for furs).

Zone 5 – Mayo Lake Environs

- Moose is the dominant mammal for hunting. Caribou only enter the area occasionally.
- Concern over late winter draw-down affects on the ice – could this lead to large cracks in the ice, and could moose get trapped and freeze? There is also snowmobiling on the lake.
- There is some moose calving in Roop Lakes and in the southern Nelson Arm area. Waterfowl and duck hunting – there is some out at Mayo Lake. In the spring, most occurs along the west side; and in the fall, in the eastern portion of the lake.
- Mayo Lake is used for hunting, fishing, berry picking, medicinal plant gathering.
- The spring is the best time for lake trout fishing – just after the ice leaves the lake in late May). Good lake trout fishing around Gull Island and in the Nelson Arm.
- Southern end of Nelson Arm is only accessible by canoe – good waterfowl and moose habitat.
- Jackfish are also up the Roop Lakes area – good fishing spring and fall.
- Roop Lakes area is important for moose hunting (fall); angling for pike and lake whitefish (spring/early summer) and waterfowl usage throughout. Lake whitefish also use the end of Roop Arm and Edwards

	<p>Creek.</p> <ul style="list-style-type: none">• Used to be netting under the ice up at Mayo Lake – not so much anymore.• Gull Island is used for overnight camping and recreation; Mayo Lake is used for recreational boating.
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Dec 4/08 Mayo B
hand + Resource Use

Name	Email Address (if available)
TRAVIS RITCHIE - JEC	travis.ritchie@yec.yk.ca
Mike Settleington - EDT	msettleington@edynamics.com
Ben Schoneville - EOI	bschoneville@edynamics.com
Dorena Hope - NNDEN	landspolicy@nnden.com
Beverly Genier	Heritage@nnden.com
TERESA SAMSON	Economic DEVELOPMENT / DEV COOP.
Tom die	nodda2@northwestal.net
Bryan Moses	Counsellor - NND
Steven Buyek	landsewmanagement@nnden.com
Hector Campbell	hector.campbell@yec.yk.ca
Patrick Bowman	pbowman@intergroup.ca
SHAW BEATTY	sbeatty@kgsgroup.com
Nancy LaBlond	nlablond@intergroup.ca

4C-4.1.2 Materials

Draft Agenda

NNDFN Land and Resource Use Workshop for the Mayo B Project

Thursday, December 4, 2008

1:30 pm to 5 pm, Meeting Room B, High Country Inn

1) Getting Started (Hector/Patrick)

- Welcome and Round Table Introductions
- Review Agenda & Meeting Format
- Objectives of the Workshop:
 - To share information about the Project, including what has been done to date for terrestrial field work and data collection
 - To gain an understanding of NNDFN interests and concerns, and land and resource use activities in the construction footprint area as well as regionally (map/photo-mosaic based interaction)

2) Project Description**Construction Phase**

- a. Describe key physical components of the project and the types of construction activities in the footprint area (KGS/Patrick): Project components; Camp; Construction activity timing

Operations Phase

- b. Brief review of water levels and flows during Operations Phase (all Zones) (KGS/Patrick)

Terrestrial Field Work Undertaken (Mike Settingington, EDI)**3) Identification of key features of interest or value to NNDFN****a. Terrestrial & Socio-Economic Data Collection - Discussion**

As part of the terrestrial environment, Yukon Energy looks to NNDFN to help identify issues and areas of concern, including wildlife species, and to help YEC understand NNDFN activities such as berry picking, plant gathering, types of land and water based recreation, areas of aesthetic or traditional/spiritual importance that may overlap with the Project.

- i. Wildlife species – species and activities of most importance and concern to NND
- ii. Berry picking, medicinal plant gathering – types of berries/plants, areas of concern
- iii. Aesthetic, traditional/spiritual areas of importance (particularly in construction area)
- iv. Land and water-based recreation activities
- v. Others?

b. Implications for land and resource use activities – Discussion

For each of the following, Yukon Energy would like to gain an understanding of NNDFN areas of concern (where these activities take place, season/month and how many people generally engage in these activities). This part of the session will focus on the footprint and regional setting maps. Specific locations will not be identified or mapped – looking for general locations where we need to avoid potential project effects.

- i. Hunting, fishing and trapping (e.g., traditional fishing camp locations)
- ii. Berry picking and medicinal plant gathering
- iii. Land and water-based recreational activities (boating, snowmobiling, others?)

For each of the above, discuss potential project effects such as: Access, Navigation and safety over ice, or Others?

4) NNDFN Perspectives on Valued Components (YESAB) for the Terrestrial Environment and Resource Use

- a. Moose?
- b. Aquatic Furbearers?
- c. Raptors?
- d. Plant species?
- e. Others?

5) Conclusions



**YUKON
ENERGY**



NNDFN & YEC Land & Resource Use Workshop

Dec.4, 2008
Whitehorse

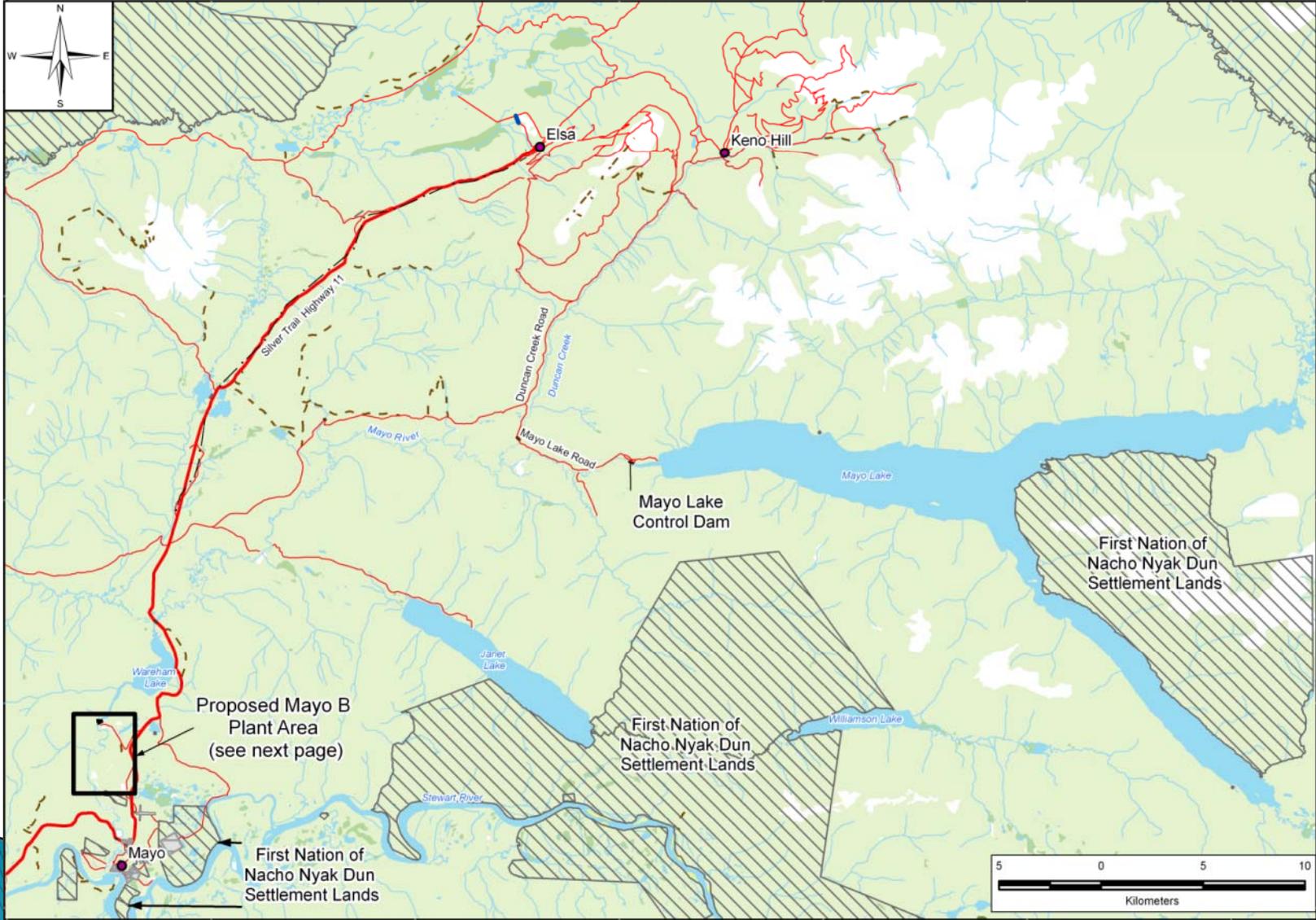
Purpose of Session

- ▶ To share information about the Project, including what has been done to date on terrestrial field work and data collection
- ▶ To gain an understanding of NNDFN interests and concerns, and land and resource use activities in the construction footprint area as well as regionally (map/photo-mosaic based interaction)

Introduction

- ▶ Yukon Energy is looking at enhancing the existing Mayo GS to serve an integrated Yukon-wide electrical grid
- ▶ No decisions have been made at this time to proceed with the project.
- ▶ If developed, the project would be used to serve new electrical loads in Yukon, rather than serve these loads with diesel generation – could displace up to 28000 tonnes of GHG emissions annually
- ▶ Currently, consultation activities are underway as well as detailed analysis of possible environmental and socio-economic effects.

Project Area



Existing Facilities – Mayo

- ▶ Existing powerhouse with two generating units of about 2.7 MW each
- ▶ Wareham Lake dam controls the Wareham lake levels within a licensed range. Water not passing through the intake and tunnel to the existing plant, is spilled through the Wareham Lake spillway.



- ▶ The existing plant has an annual generation capability of 40 GWh
- ▶ Between 1951 and 1988/89 when the Keno mine closed, the plant operated at or near full capacity.
- ▶ Between the 1989 and 2003, the plant was typically operating at between 8-15 GWh. This has increased to 30 GWh upon completion of the power line to Dawson.

Existing Facilities – Mayo Lake

- ▶ Mayo Lake control structure is about 40-50 km upstream of Wareham Lake- this provides the ability to control the level of the lake within a licensed range.
- ▶ YEC has the ability to draw the lake down as much as 2.5 m as an operating range – typically done in winter when power is needed.

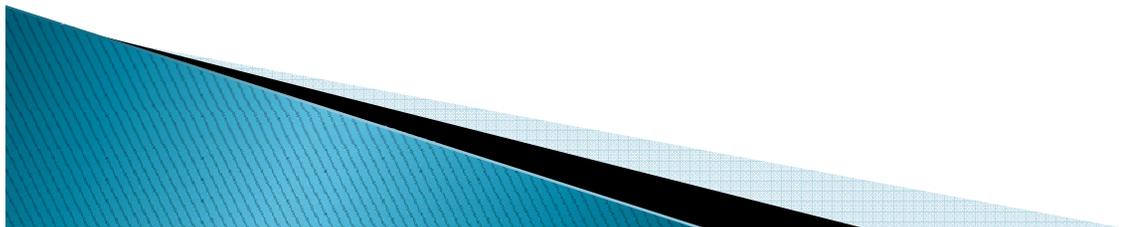


Reason for Mayo B Project

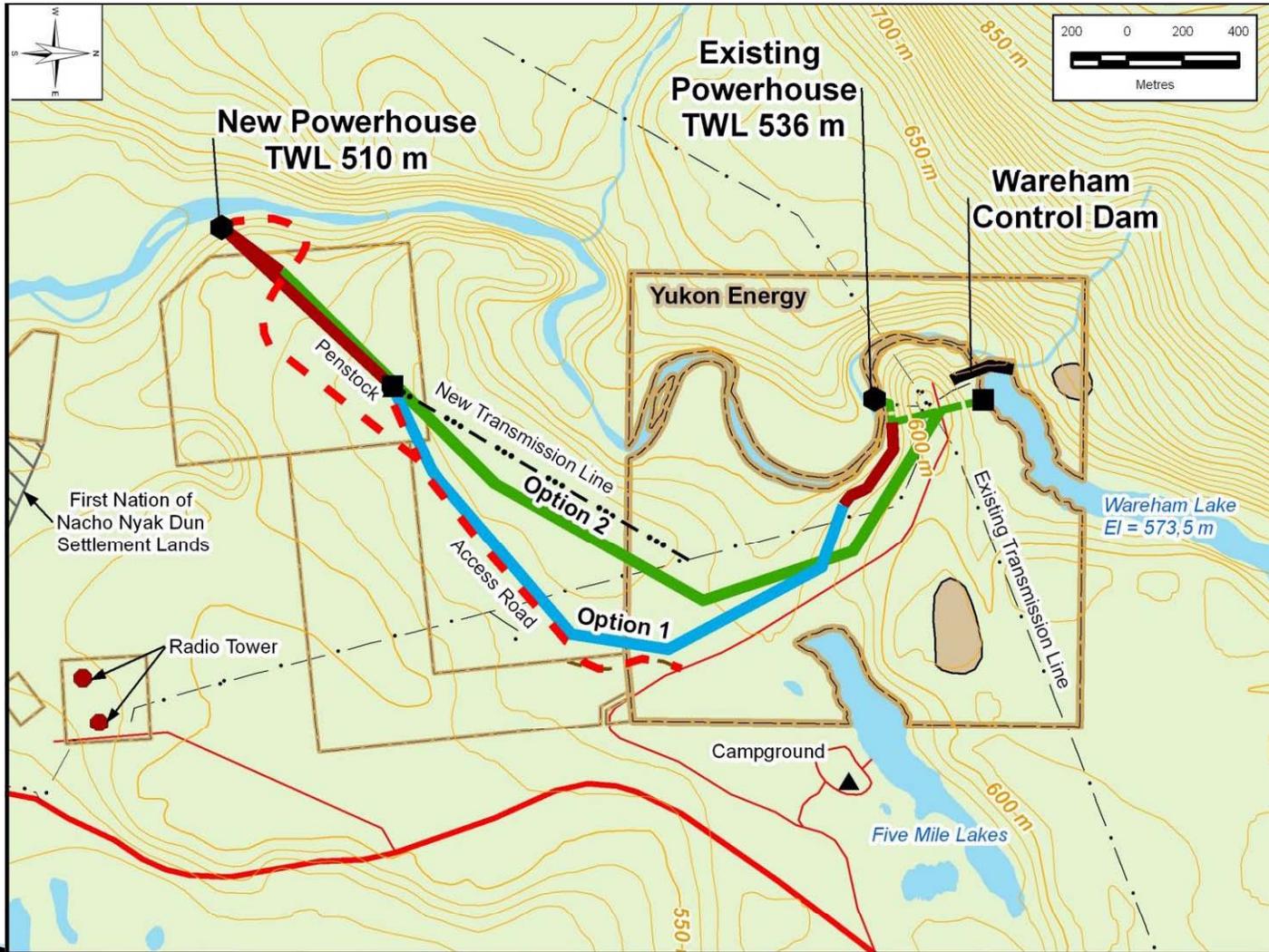
- ▶ YEC's 20 year Resource Plan, completed in 2005, looked at increasing renewable energy through enhancements of existing hydro facilities.
- ▶ Electrical loads are increasing, and by 2011 YEC will need additional renewable power to help minimize the use of diesel to serve the increasing load growth – both industrial customers such as Alexco and Western Copper, and non-industrial load growth.

Project Description

- ▶ Construction Phase Components
 - ▶ New Powerhouse
 - ▶ Water Conveyance Options:
 - ▶ Tunnel Option; or
 - ▶ Canal/Penstock Option
 - ▶ Additional Infrastructure:
 - ▶ New all-weather road access
 - ▶ Distribution line to new plant (various alignment options)
 - ▶ Temporary work camp for 50 – 75 people
- See following map



Construction Footprint



Construction Activities & Sequence

- ▶ Early Site Preparation:
- ▶ Clearing of vegetation for physical components of the Project
 - ▶ Transmission Line
 - ▶ Access Roads
 - ▶ On-site material & equipment “lay-down” area
 - ▶ Area for camp
- ▶ Access road construction to new powerhouse; upgrade existing access road
- ▶ Install distribution line for site power. Options for routing include:
 - cross-country from new plant to existing plant; or
 - aligned with new access rd. then along existing t-line ROW

Construction Activities & Sequence

- ▶ Main works Construction – Tunnel Option
(approx. 1 yr of fairly continuous work)
- ▶ Excavate to bedrock face
- ▶ Drilling and blasting work
- ▶ Small volume of rock hauled out each day –
hauled to stockpile location
- ▶ Line tunnel with concrete (as you go)
- ▶ Connect to existing intake structure at
upstream end

Powerhouse Concept



Construction Activities & Sequence

- ▶ Main Works Construction – New Powerhouse
(About 1.5 yrs. of work)
- ▶ Excavation of powerhouse sub-structure and portion of tailrace on land (1st summer)
- ▶ Construction of powerhouse:
 - Concrete formwork
 - Building envelope (pre-engineered off-site)
 - Installation of electrical & mechanical components
 - Installation of turbine & generator
- ▶ Install steel penstock at downstream end of tunnel
- ▶ Excavate last portion of tailrace out to meet the river

Construction Activities & Sequence

- ▶ Main Works Construction – Penstock Option
- ▶ First summer –
 - Clearing of penstock corridor and construct access road
 - Excavation of penstock trench and prepare foundation
 - Haul in sand & gravel; spread along trench
- ▶ Second summer –
 - Haul steel penstock pipes to site & lay along trench
 - Weld or couple pipe ends together
 - Re-spread over-burden material over pipe to bury the penstock

Construction-related Aspects

- ▶ Timing windows for wildlife
- ▶ Noise
- ▶ Removal of vegetation
- ▶ Deposition of over-burden and rock
- ▶ Potential silt deposition
- ▶ Location of camp
- ▶ Traffic
- ▶ Increased hunting & fishing pressure

Operations Phase

- ▶ Changes in river levels & flows below Wareham (monthly averages)
 - ▶ In winter, the Project will result in somewhat increased water flows (Nov – April)
 - ▶ For context – summer higher flows range from 40 cms (Mayo Lake Outlet) to 80 cms (at Stewart R.) or higher (see table on next slide)
 - ▶ Project will help provide more stable winter water flows, likely leading to more uniform ice cover
 - ▶ Spring freshet remains dependent on inflows from tributaries into upper Mayo River

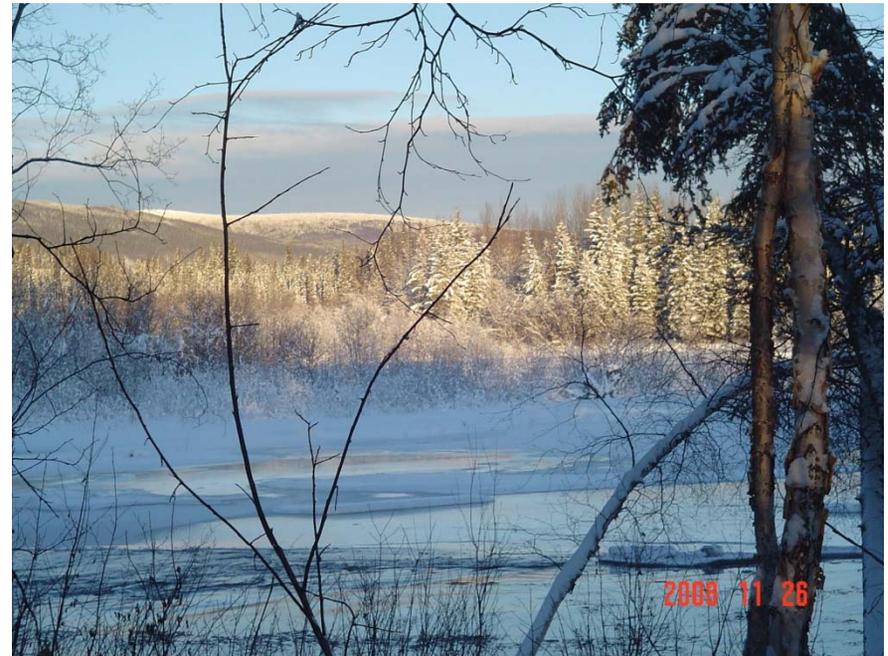
Monthly Average Flows

	Mayo Lake outflows	Mayo River flows at Stewart River
High Summer Flow Levels	40 cms (examples 2004, 2001 and 2000)	80 cms (examples 2002, 2001 and 2000)
Recent winter experience 2007, 2007	10 - 12 cms (25% of summer high)	13 - 15 cms (16 - 19% of summer high)
Full winter load - existing plan	14 - 16 cms (35 - 40% of summer high)	17 cms (21% of summer high)
Winter flows with Mayo B Project	22 - 24 cms (55 - 60% of summer high)	25 cms (31% of summer high)

Next Steps

- ▶ Input from various sources helps to shape and solidify the physical components for the Project Description:
 - ▶ Geotechnical and seismic survey re: tunnel option
 - ▶ Location of Heritage resources (re: road/t-line)
 - ▶ General topography for alignment of canal / penstock option, and bundling of access road/t-line
 - ▶ Public consultation (re: location of camp)
 - ▶ Construction best practices and regulatory requirements re: construction activities, timing windows and environmental protection plans

Discussion

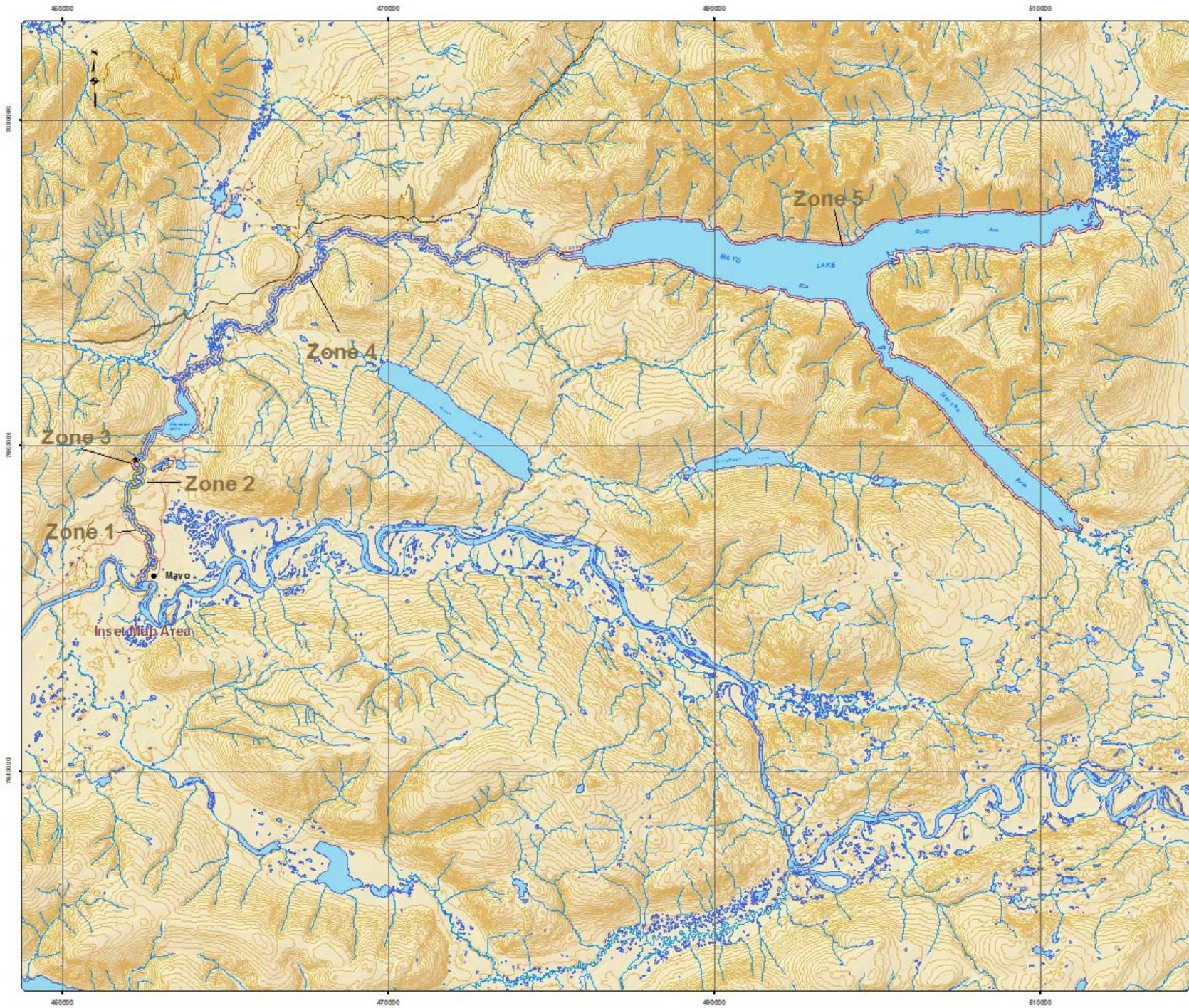


Mayo B Terrestrial Baseline Work

NNDFN Land and Resource Use
Workshop for the Mayo B Project
December 4th, 2008

Terrestrial

- Waterfowl and Brood Survey;
- Raptor Survey;
- Habitat Mapping

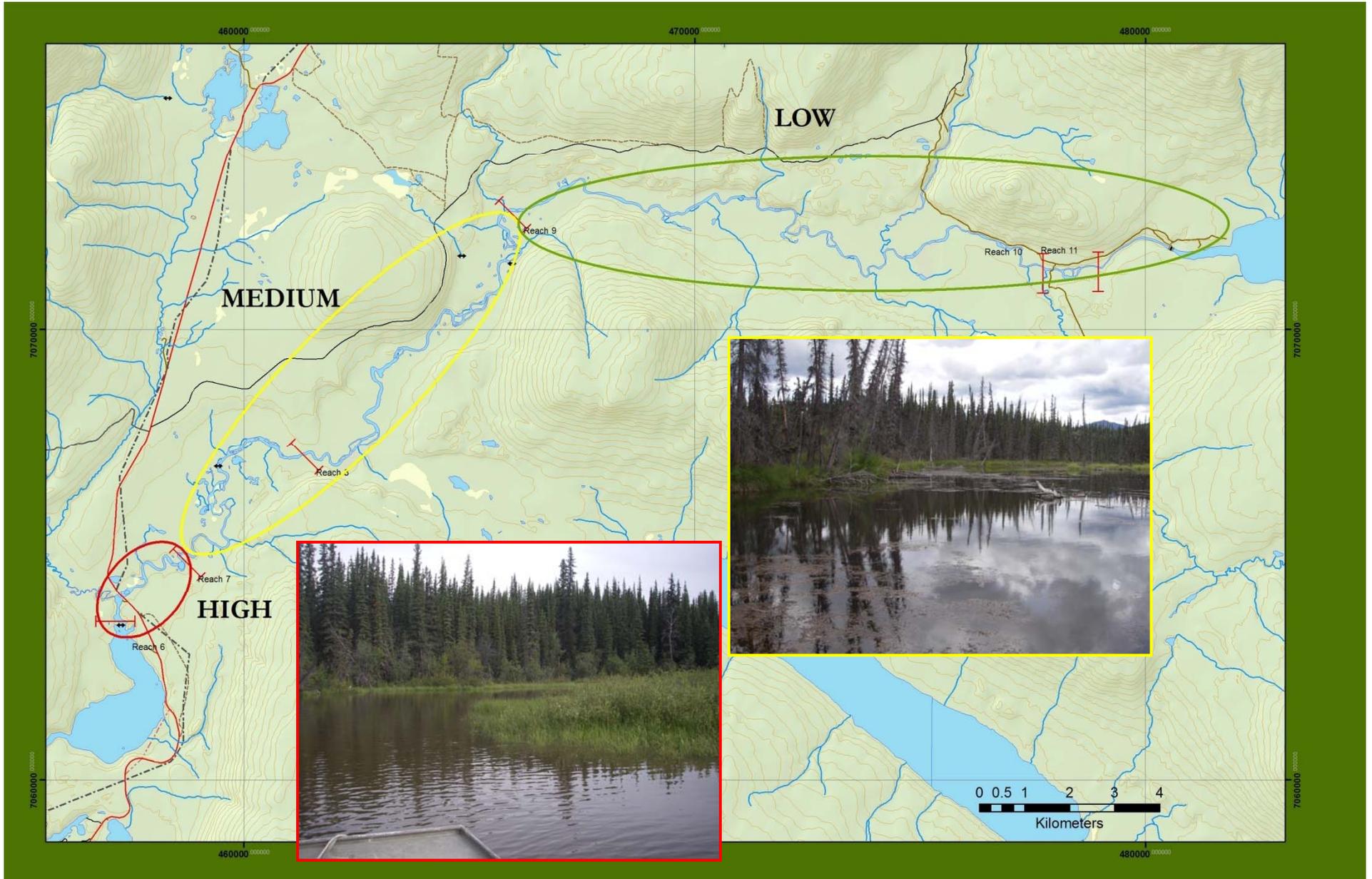


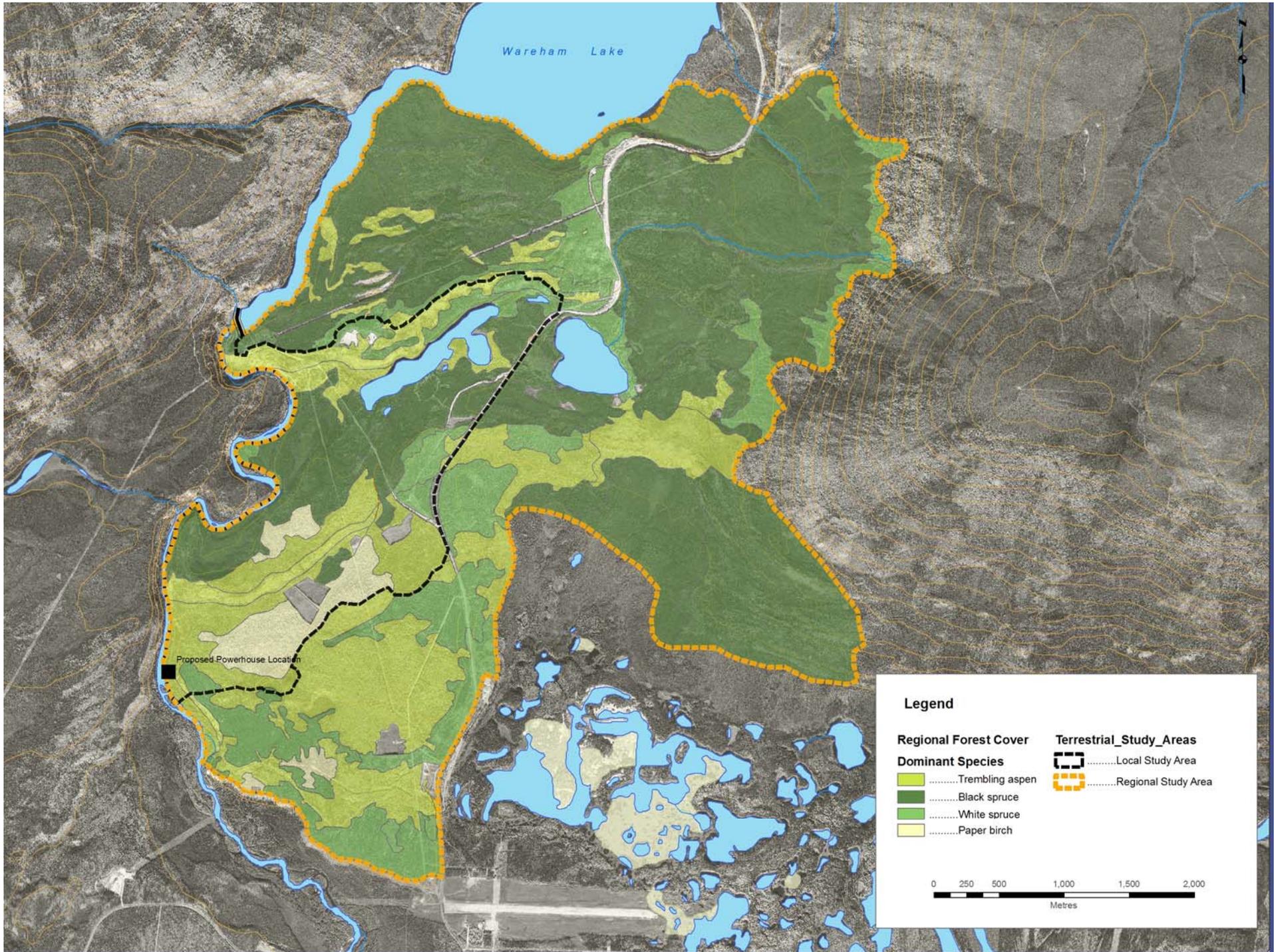
Key Findings

- Broods of 7 seven species observed;
- Two “sensitive” species (American Wigeon and Northern Pintail);
- Reach No. 7 high quality waterfowl habitat;
- Three (3) active Osprey and one active Bald Eagle nest;
- No cliff nesting raptors in Zone 2



Reach #7 (immediately upstream of Wareham Lake) is the most suitable waterfowl breeding habitat.





4C-4.2 DECEMBER 5, 2008

4C-4.2.1 Meeting notes

Meeting Report

Title:	Mayo B Project – Workshop with NND and YEC on Aquatic Environment		
Attendees:	<p>NND:</p> <p>Dawna Hope Beverly Genier Millie Olsen Tom Lie Bryan Moses Bill Slater Stephen Buyck Teresa Samson</p> <p>Trap Line Holder:</p> <p>Lolita Welchman</p> <p>Yukon Energy:</p> <p>Hector Campbell, Project Sponsor, YEC Travis Ritchie, Manager, Environmental Assessment & Licensing Patrick Bowman, Project Manager, InterGroup Consultants Karl Schiefer, Aquatic Advisor Shaun Beatty, KGS Group - Engineering Ben Schonewille, EDI – Aquatics Mike Settington, EDI - Terrestrial Nancy LeBlond, Socio-Economic Assessment, InterGroup Consultants</p>		
Meeting Location:	High Country Inn	Whitehorse, Yukon	
Date:	December 5, 2008	Minutes status:	FINAL
Author:	Nancy LeBlond	Phone:	204-942-0654
Meeting Purpose:	Introduce the Mayo B Project, provide an overview of the aquatic field work undertaken and discuss preliminary project effects and possible mitigation		
Presentations:	<p>Introduction and Rationale</p> <p>Hector thanked everyone for coming to Whitehorse to participate in this workshop on the Aquatic Environment. Round table introductions were made.</p> <p>Patrick explained that yesterday, the group discussed some information on construction of the Mayo B Project, with a focus on NND's interests and concern for the land, and land-based activities. Today's focus is on water and the</p>		

	<p>aquatic environment. YEC has two presentations to start the discussions:</p> <ol style="list-style-type: none"> i. Project overview of the existing facilities, the future Mayo B facilities and how water levels and flows will change in relation to the aquatic environment; and ii. The aquatic field work undertaken this past summer/fall, including results of studies that was prepared in a letter to DFO that we can share with NND. <p>Action: YEC to provide a copy of the aquatic field work letter sent to DFO.</p> <p>Following these presentations, we would like to focus on NND's interests and concerns, and answer questions you may have.</p> <p>Project Introduction</p> <p>Patrick reviewed the PPT presentation – handouts were provided. The following is provided as additional information to the PPT slides.</p> <p><u>Introduction:</u></p> <ul style="list-style-type: none"> • The timing for the Mayo B Project is fairly sensitive, depending on timing of mine loads. YEC is protecting the earliest In Service Date (ISD) of late 2011, acknowledging this may shift to 2012. • The Project will undergo an Executive Committee level assessment through YESAB. This is expected to take a year, so it is important to file in early 2009 in order to meet a 2011 ISD. Currently however, no decisions have been made to proceed with the Project. <p><u>Existing System:</u></p> <ul style="list-style-type: none"> • Current installed hydro plant capacity is 5.4 MW – this compares to the WAF grid at 70 MW of hydro capacity. The Mayo plant can produce approximately 40 GWh over the course of a year. The original plant (1951) was built to serve the mine at Keno and the community of Mayo – using between 32 and 35 GWh/yr. • After the mine closed, the plant continued to serve the community of Mayo. During this time, water levels in Mayo Lake were kept high and any surplus water spilled when it was not needed for power generation; and the highest flows through the plant were in summer. Since Mayo-Dawson went on-line, more water is used in the winter and less in the summer. • The original project in the 1950s raised Mayo Lake about 15 feet. Mayo Lake has an operating range of 2.59 m. The lake refills in the summer, and YEC draws it down over the winter to meet power demands on the MD electrical grid. <p><u>Water Management:</u></p> <ul style="list-style-type: none"> • YEC balances power generation with environmental considerations
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	<p>within a licensed regime.</p> <ul style="list-style-type: none"> • Naturally high inflows (which can't be managed by the system) do cause the lake to be higher than the licensed limits (i.e., in very high rainfall seasons and flood years) and the water is spilled over the wood crib spillway at Mayo Lake and through the concrete spillway at Wareham Lake. There are no turbines out at Mayo Lake, so no ability to generate power at that location • Mayo Lake is a large reservoir that gives YEC some ability to store water on an annual basis. The operating range for the lake is about 2.59 m or about 8.5 feet. This is annual storage, not multi-year storage such as Aishihik Hydro reservoir. YEC does not use the full 2.59 m range every year. • The Historic Operation of Mayo Lake shows how the lake has been managed since 1979. YEC does not have good records prior to this. <ul style="list-style-type: none"> ○ In the period 1988-1992, after the Keno mine shut down, there was still care and maintenance out at the mine that used power; as well as a re-build of the Mayo Lake control structure. ○ The period 1993-2004, YEC used about a 1 m operating range of Mayo Lake to supply the town of Mayo. Any change in demand in Mayo causes a change in water levels and flows in the system. This will be quite different when the plant is interconnected to the WAF grid – the plant will now be a small facility on a larger system. This likely will lead to a more uniform water flow regime downstream of the new plant. ○ Since MD went on-line, the graph shows high lake levels in July/August and low levels in April/May, using less than 2 m operating range. • Wareham Lake is not managed for storage; however, it absorbs fluctuations in flows and creates a more stable water regime. This has helped to develop the wetlands in the vicinity of Minto Bridge. <p><u>Proposed Mayo B Project – Project Description:</u></p> <ul style="list-style-type: none"> • There are no new dams associated with this Project. • The original plant was designed to suit the mine load, not the river system. • The new plant will about double the head (or vertical drop), thus generating almost double the power with the same amount of water. • Project construction “in the dry” has far less potential to affect the aquatic environment. • Looking at more storage options at Mayo Lake due to winter power demand. <p><u>Water Management – Mayo Lake:</u></p> <ul style="list-style-type: none"> • The assumption is that CSTP Stage Two will proceed before Mayo B and all of YEC’s plants will then be interconnected. Modeling of how this system will work together is on-going. • YEC’s 20 year Resource Plan originally identified a variety of options for enhancement projects, including raising or lowering lake levels. <ul style="list-style-type: none"> ○ The team has reviewed raising Mayo Lake by 1 m; however,
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	<p>due to a variety of reasons (such as potential increase in erosion, changes required to the control structure, heritage, cabin and placer mining access concerns), we have effectively decided not to raise the lake.</p> <ul style="list-style-type: none"> ○ The team is now modeling water flows to reflect extra bottom storage of up to 1m (based on an interconnected system). The models will protect against going below the minimum levels due to late arrival of inflows. <ul style="list-style-type: none"> • The full range would not always be used; with additional 1m bottom storage, the lake could be managed more like multi-year storage rather than just annual storage. • In order to protect lake trout spawning, extra drawdown rules may be necessary – this is part of the mitigation being reviewed. • The model would not release water that is not needed by the system. • YEC is continuing discussions with placer miners and trappers concerning access concerns with lowering the minimum controlled level of Mayo Lake. Shoreline line work re: erosion is also continuing. The extra range may provide benefits to erosion re: high wind/wave actions at the west end of the lake. • Having an increased range provides YEC the ability to capture flood flows. A variety of options are being considered. <p><u>Water Management Options:</u></p> <ul style="list-style-type: none"> • YEC is looking at preparing a proposal that provides additional power production as well as enhanced salmon habitat. <p><u>Summary:</u></p> <ul style="list-style-type: none"> • Recent field work, coupled with past studies has provided YEC with the most comprehensive set of scientific data on this stretch of the Mayo River. • The Mayo B Project has a very real opportunity to make this environment better for salmon. <p>Aquatic Field Work Undertaken</p> <p>Ben Schonewille (EDI) reviewed the presentation – Mayo B Aquatic Studies Preliminary Summary – hand-outs, including 11 x 17 maps were provided. The following is recorded as additional information to the PPT slides.</p> <ul style="list-style-type: none"> • Aquatic Zone 1: <ul style="list-style-type: none"> ○ Low gradient, meandering river morphology ○ High complexity with numerous side and back channels ○ River is less confined through this zone, so the river has the ability to move. ○ Substrate is made up of cobbles and gravel • Aquatic Zone 2: <ul style="list-style-type: none"> ○ Higher gradient, more confined river channel ○ Higher velocities ○ Less complexity of the channel, especially in the canyon (lower
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	<p>photo). The upper 30% is more like Zone 1 but with no off-channel habitat.</p> <ul style="list-style-type: none"> ○ Substrate is boulders and cobbles <ul style="list-style-type: none"> • Aquatic Zone 3: <ul style="list-style-type: none"> ○ Very short corner between the dam/spillway and existing plant ○ Very confined channel with little opportunity for Chinook salmon spawning; substrate is boulders ○ Velocities depend on the flows through the spillway – the upper photo was taken this past October with high spills. ○ The lower photo rounding the corner was taken at reduced flows. • Aquatic Zone 4: <ul style="list-style-type: none"> ○ Divided the Upper Mayo River into reaches with similar characteristics ○ The red arrows point to two major tributaries (Duncan and Davidson) with very active placer mining activity ○ Reach 7 is a meandering wetland upstream of the Minto Bridge. It has fine material substrate, and is affected by Wareham Lake. There is a lot of channel complexity, islands etc. ○ Reach 8 upstream of reach 7 also has channel complexity with side and back channels. Substrate is hard-textured. ○ Reach 9 and 10 are very similar – one main channel with fewer wetlands and ponds off to the side. ○ As noted on Thursday, Reach 11 is potential waterfowl habitat. ○ Reach 12 is upstream of the placer mining activity at Duncan & Davidson Creeks, and before the Mayo Lake Control Structure. This reach parallels the Mayo Lake access road. Higher numbers of fish such as grayling are present in this Reach. • Aquatic Zone 5 is Mayo Lake: <ul style="list-style-type: none"> ○ Photo is looking east towards the Roop Arm. ○ Edwards Creek, Roop Creek and the Roop Lakes drain into the Roop Arm; the Nelson Creek drains into the Nelson Arm. ○ The Nelson Arm is quite deep with a large drop-off. <p><u>Methodology Zones 1-3:</u></p> <ul style="list-style-type: none"> • Chinook salmon spawning investigations – 6 helicopter flights in early August to mid September of the entire Lower Mayo River. The Sept 15th flight was targeted at locating spawning redds. • Fish sampling – targeted all species and life cycles. Three methods were used: <ul style="list-style-type: none"> ○ Beach seining for adult fish (i.e., dragging a net) ○ Electro-fishing along stream margins and in off channel habitats targeting juvenile fish ○ Minnow trapping – effective for catching juvenile Chinook • Channel classification/habitat mapping
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	<ul style="list-style-type: none"> • Invertebrate sampling for catching aquatic bugs and insects • Water quality – field measurements and lab analysis • Water temperature monitoring (data loggers) • Tributary assessment – there is 1 tributary into the Lower Mayo River which was assessed. • Photo reference points – example is off the Silver Trail Bridge looking downstream. These are pictures of the river at different times of the year. • Geomorphology review of the river channel <p><u>Methodology Zone 4:</u></p> <ul style="list-style-type: none"> • No Chinook salmon investigations or habitat mapping in Zone 4 • Fish sampling – same as for Zones 1-3 using all 3 methods. The photo is an example of beach seining • The other points on the slide are the same as for Zones 1-3 <p><u>Methodology Zone 5:</u></p> <ul style="list-style-type: none"> • Littoral Zone classification around the entire lake (based on substrate type, slope and presence of vegetation) • Fish sampling – lake trout and lake whitefish – used small mesh nets to avoid fish mortality • Radio tagging and tracking to locate spawning areas – tagged 16 lake whitefish and 11 lake trout. EDI then used nets to confirm spawning activity. • Overview assessment of selected tributaries • Water quality (field measured parameters and lab analysis) <p>Additional work being done by other parties will tie into EDI’s field work:</p> <ul style="list-style-type: none"> • Mayo Lake erosion studies • Mayo River ice studies • Compilation of historic Mayo River flow data • Mayo River cross section data <p><u>Preliminary Results</u></p> <p>The following information is preliminary in nature as analysis is still on-going.</p> <p><u>Preliminary Results – Zones 1-3 (Map # 2)</u></p> <ul style="list-style-type: none"> • Lower two-thirds of Zone 2 is canyon with high velocities; the upper one-third has a flatter gradient • Chinook spawning locations are in the side channel as noted in the photos of Zone 2. Chinook salmon were observed spawning throughout Zone 2. • The 7 confirmed redds shown in the lower photo correspond to the dot on Map 2. Confirmed redds were where EDI saw salmon attending the redds. The suspected redds have a very high likelihood of being redds. • As Figure 3 notes, fish sampling was done throughout the Lower Mayo
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	<p>River. In addition to Chinook, EDI found Arctic grayling, round and lake whitefish, long-nose suckers, northern pike, slimy scuplin and burbot.</p> <ul style="list-style-type: none"> • Figures 4 through 7 are habitat mapping of Zones 1-3. Channel classification was based on flow characteristics, the amount of vegetation cover, ortho-photos taken in July 2008 and field knowledge: <ul style="list-style-type: none"> ○ Main stem (photo is from Zone 2) ○ Primary Side Channel – similar characteristics of a main channel, but with a side channel ○ Secondary Side Channel – smaller proportion of flow, with over-hanging vegetation cover and riparian influence ○ Tertiary Side Channel – very small, tributary-like channel with greater cover. Not susceptible to high flows. A lot of riparian influence. The restoration channel looks like this photo. ○ Back Channel – back-flooded from the river with no real flowing water. • Juvenile Chinook like cover such as over-hanging vegetation and woody debris. • The mainstem, primary and secondary side channels were further divided into Habitat Units, classified as riffles, glides, and pools. One example is shown in the presentation. <ul style="list-style-type: none"> ○ Riffles are faster flowing, shallow areas ○ Glides are between riffles and pools, deeper than riffles but with less turbulence ○ Pools are calm areas with some depth – the deepest is the plunge pool just downstream of the spillway <p><u>Preliminary Results – Zone 4 (Figure 8)</u></p> <ul style="list-style-type: none"> • Freshwater fish sampling resulted in 8 fish species, including Arctic grayling, burbot, round and lake whitefish, northern pike and slimy sculpin (no inconnu). The photo on the left is a burbot; and on the right an arctic grayling. • The highest rate of success was through beach seining. <p><u>Preliminary Results – Zone 5 Mayo Lake (Figure 9)</u></p> <ul style="list-style-type: none"> • Six types of Littoral areas are described. <ul style="list-style-type: none"> ○ Type 1 – gravels/cobbles/boulders are areas with highest potential for spawning. The top left photo is at Gull Island which was later identified as an active lake trout spawning area. Figure 9 shows there is not a lot of high-potential areas for spawning for lake trout and lake whitefish. ○ Type 2 – narrow band of gravels/cobbles/boulders is the predominant littoral area around the lake. The upper right photo is an example of this littoral type, showing a narrow band of gravels with different size rocks. ○ Type 4 has extensive macrophytes (aquatic plants) – an example is the lower left photo of the end of Nelson Arm where aquatic plants are widespread. On Figure 9, type 4 habitat is at
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	<p>each end of the Nelson and Roop arms; plus in the narrows one-third down the Nelson Arm.</p> <ul style="list-style-type: none"> ○ Type 5 has exposed bedrock outcroppings – an example is the lower right photo at the east end of Peggy’s Island where Mike Mancini has a cabin. <ul style="list-style-type: none"> ● Mayo Lake – Lake whitefish spawning assessments: <ul style="list-style-type: none"> ○ Tagged 16 lake whitefish. The majority of the tagging occurred in the middle section of the lake. (Ben noted that one tagged lake whitefish mortality, leaving 15 tags in operation) ○ The radio-tags fall off naturally after a few years. ○ Figures 10 and 11 show lake whitefish movements – the majority went into the Edwards Creek/Roop Lakes area. The photos on the left are of Edwards Creek where EDI observed the lake whitefish spawning at night during October. This area is likely outside the influence of the lake. The top photo was taken the next day, after observing lake whitefish spawning at night. ○ The lake whitefish likely retreated back into the lake as they were not relocated when the last aerial survey was done in late October. ● Mayo Lake – Lake trout spawning assessments: <ul style="list-style-type: none"> ○ Figure 12 shows lake trout movements. ○ There was evidence of spawning at the north and west end of Gull Island. The spawning area’s substrate was gravels and cobbles with a few boulders as shown in the bottom right under-water photo (clear to the bottom substrate). This area is exposed to wind and wave action. The graph indicates that most of the lake trout were captured at a water depth of up to 4m. ○ Sampling was done at night with small mesh gillnetting in very short sets of about 10 mins. to prevent harm to the fish. They caught a variety of size; however, they had no success radio-tagging lake trout prior to spawning. ○ They only caught 1 lake trout in spawning condition at the east end of Roop Arm. <p><u>Salmon spawning at a variety of river flows – series of graphs:</u></p> <p>Karl explained what these graphs illustrate:</p> <ul style="list-style-type: none"> ● Five graphs illustrate the variability of river flows (blue line) overlaid with the life cycle of Chinook salmon (orange is spawning; green is incubation). ● The salmon look for the ideal conditions (river levels, flows and substrate materials) each year for spawning. <ul style="list-style-type: none"> ○ In 1989/90, the graph shows spawning in flows of 20 cms or less; followed by low flows of 4cms during early stages of incubation. ○ In 1990/91 they picked a different spawning location (likely
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	<p>deeper and more secure channels) as the flows were 6-7 cms at the time of spawning.</p> <ul style="list-style-type: none"> ○ The following year, 1991/92, spawning occurred at quite high flows of between 25 and 70 cms – they may have sought out side channels as the preferred spawning habitat. Later in the year, those side channels would have had 3-4 cms flows or less. ○ In 1992/93 – a typical year before MD was connected and loads were equivalent to the community of Mayo alone – summer flows during spawning were dropping from 65 cms to 30 cms. This was a year where the flows were spillway flows as the plant tops out at 18 cms. During incubation, the flows were reduced back to less than 5cms. . <ul style="list-style-type: none"> • Most of the salmon habitat was greatly reduced when the Wareham dam was built. Then the salmon were subjected to flow fluctuations as shown in these graphs. Despite these conditions, the lower Mayo River is a very productive salmon river. • It is well known that salmon productivity is better in areas below large lakes, with good velocity and presence of side channel habitat. • The Mayo B Project is an opportunity to increase power generation with the same amount of water, while looking after the salmon better than in the past. We have the opportunity to increase salmon production – that is the focus of our current analysis.
<p>Discussion:</p>	<ul style="list-style-type: none"> • Bill cautioned there may be a conflict with managing the Mayo Lake levels for lake trout and increasing/protecting salmon production. • Karl responded that the team is not trading off lake trout for salmon. • Patrick noted that Mayo Lake has experienced draw-downs of between 2-2.5 m in the past, and there is evidence of a variety of age classes (with caveat that there is not enough data to identify each individual age class). Mayo Lake was surveyed in 2000 and 2005. The results indicated that the size and numbers of lake trout, and the productivity of the lake was lower than other lakes in Yukon, as would be expected given the topography of the lake, but not the lowest (as compared to other lakes in the Yukon). • Karl indicated that the system historically has not taken into account all these factors currently being considered by the Project team. For Chinook salmon: <ul style="list-style-type: none"> ○ In 1994, counting fences were installed for part of the year, which provided the best count in records of about 620 Chinook going into the river (with an average age of 5-6 years). This is the only single run data available, but it can be correlated to river flows. ○ Having 600 spawner escapements after going through the entire Yukon River system, would provide enough eggs to populate the lower Mayo River for juvenile production. We have also heard of many years of much less production of salmon. ○ Counting fences, visually observing salmon and carcass counts are the best ways (outside of local knowledge) to gain an

	<p>understanding of salmon numbers.</p> <ul style="list-style-type: none"> ○ We can calculate the productive capacity and manage the river to produce more salmon with this project in place. In recent years, runs have been low in the Yukon River and runs up the Stewart River. DFO should have the numbers for other areas to gain an understanding of the general nature of the salmon runs. One idea NND may want to pursue is to encourage DFO to re-install a counting fence to provide better, regular data for the Stewart and/or Mayo River runs. <p><u>Resource Use Discussion:</u></p> <ul style="list-style-type: none"> • NND indicated that most of their harvest of Chinook occurs in the Stewart River, mostly at Fraser Falls – for the past 15-20 years. • Lake trout – there used to be past netting of lake trout in Mayo Lake; now not too many people net fish. This situation may change if people aren't working, or if salmon numbers decline – then people will start to fish for lake trout. • The fellow at the Bedrock Motel takes people into Mayo Lake for sport fishing. • Commercial fishing prior to the dam – there were some people who sold fish up at Keno mine. • Arctic grayling – people fish in spring and fall at McQuesten Lake; and on the Mayo River near Davidson Creek • <u>Question:</u> In the Roop Lakes and Nelson Arm areas, how much would the lake levels have to drop to cut-off these areas? • Patrick noted that we know that Mayo Lake was raised 15 feet and backed up water into these areas. The Mayo B Project may be using a 2.5-3.5 m range, but this is not as low as the natural lake originally was. YEC has late 1940s aerial photos which can be compared with current photos taken this year. These areas are visible on the 1940 photos but with less wetland areas. • Lake whitefish spawning appears to have been up high enough in Edwards Creek and Roop Lakes to indicate that the draw-down wouldn't affect the spawning. The eggs likely would not be de-watered. We are also looking at the possibility of groundwater discharge in this area being important to the whitefish spawning. • Ben noted that lake whitefish spawning at Edwards Creek was in water depths of 70 cm and higher. There are likely flows from the lake upstream and/or groundwater discharge that also provide water to the Creek. • Karl noted that lake whitefish can handle a variety of spawning locations. The lake is quite deep, with narrow stretches of littoral zones, so fish migrate up to better habitat; or, over time, have adapted to the lake level fluctuations and have chosen better spawning habitat in these areas. • Jackfish: these fish spawn earlier – right after the ice is out in the spring – in the same areas. This means they will be spawning at the lower point of lake levels, and then the lake will start filling with the spring freshet. This means there is no threat to eggs being de-
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	<p>watered.</p> <ul style="list-style-type: none"> • The two key wetlands at the ends of the Mayo Lake arms are prime rearing habitat for northern pike. People fish in these areas in the early spring, using rods. • People used to catch large numbers of whitefish, especially as food for their dogs; plus lake trout and other species for human food. <p>Issue of long-term monitoring:</p> <ul style="list-style-type: none"> • The various options being considered for both Chinook salmon and lake trout mitigation can work in conjunction with on-going monitoring and on-going management by local people. For example: <ul style="list-style-type: none"> ○ The spawning and rearing channel below the new powerhouse will need on-going flow mgt., including possibly ensuring Chinook use and/or are put in the channel. ○ At Mayo Lake – monitoring may be useful to determine if populations are increasing or decreasing. • Question: Does YEC have enough information to complete the assessment? • Answer: Karl indicated that the field work has tried to capture the seasonally-sensitive work. The team is optimistic with the results; however, analysis is on-going. • Question: What kind of information on ice has been collected if Mayo Lake is drawn-down further? • Answer: Hector noted that YEC draws-down Marsh Lake 2 m and therefore has information that indicates if the lake is drawn-down slowly, then the ice will form fairly uniformly. Marsh Lake stays quite flat. Some cracking will occur; YEC installs notices for snowmobiling. In addition, KGS has done some ice modeling work on the Yukon River to understand ice processes, especially near the Whitehorse plant. Travis indicated that the lower Mayo River currently has a lot of daily fluctuations and that recently there have been problems at McIntyre Park with layering of ice. The Mayo B Project likely will flatten out the peaks and lead to less daily fluctuations; this will likely mean less potential for ice layering. The draw-down at Mayo Lake will be gradual. The ice will form at a high level and will likely settle slowly. <ul style="list-style-type: none"> ○ YEC has also had 31 river cross-sections prepared for input into KGS’s model. This will help determine if the river should be managed to enable flows be maintained to let the ice set. • Question: What time of year will Mayo Lake be drawn-down? • Answer: Mayo Lake will be drawn-down fairly continuously over the winter months. The lowest point will be late April/early May; it will fill fairly quickly with the spring freshet. • There is not too much ice fishing out at Mayo Lake – too windy and cold; and there are other closer places to ice fish (i.e., Ethel and Janet lakes are accessible by snowmobile). Richard Reid does some ice fishing at Wareham Lake. • People fish at the mouth of the Mayo River in spring for grayling. People also fish at the plunge pool for grayling and inconnu (spring and fall, but more so in spring).
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	<ul style="list-style-type: none">• Mayo Lake fishing was historically focused on lake whitefish; now people fish for lake trout.• NND indicated the importance of the Roop Lakes area for fishing, hunting, and berry picking in the open water season. More should be known about this area. People drive up the Mayo Lake road, and then put in their boats at the west end. The launch at the Brinkerhoff place is much better.
Follow up required:	<ol style="list-style-type: none">1) YEC to provide NND with a copy of the aquatic field work letter sent to DFO.2) Nancy will follow up with Dawna about the possibility of a trip to Mayo in the upcoming week or so – this way discussions may be able to occur with Dennis Buyck (re: trapping, hunting and fishing out at Mayo Lake), Shaun Hughes and Lolita Welchman (and perhaps other resource users).

Dec 5/08 Aquatic Environment

<u>Name</u>	<u>Email Address (if available)</u>
Mike Settegrino EDI	msettegrino@edynamics.com
Ben Schnewille, EDI	bschnewille@edynamics.com
Karl Schierer	kschiefer@ecometrix.ca
Beverly Genier	her heritage@ ecometrix nndfn.com
Dawn Hope	landspolicy@nndfn.com
Millie Olsen	molsen@nndfn.com
Tandie	tandc2@northwestel.net
Bryan Moses	bmoses@nndfn.com
Bill Slater	bslater@whitv.cable.com
Steven Buyck	lands.environment@nndfn.com
Hector Campbell	hector.campbell@yec.yk.ca
P. Frank Baum	pbaum@intgroup.ca
Shaun Beatty	sbeatty@kgs.group.com
Nancy Blond	nblond@intgroup.ca
T. Ritchie	tad.ritchie@yec.yk.ca
Teresa Samson	ec_dev@nndfn.com
Lolita Welchman	lwelchman@yahoo.ca

4C-4.2.2 Materials**Draft Agenda****NNDFN Aquatic Environment Workshop for the Mayo B Project****Friday, December 5, 2008****8:30 am – 12:30 pm, Meeting Room B, High Country Inn**

1) Getting Started (Hector/Patrick)

- Welcome and Round Table Introductions
- Review Agenda & Meeting Format
- Objectives of the Workshop:
 - To enable Yukon Energy to share more specific information about the Project, including future water levels and flows in relation to the aquatic environment
 - To share what was done in the aquatic field studies this past summer/fall
 - To discuss preliminary project effects and mitigation measures
 - To gain an understanding of important issues relevant to NNDFN

2) Improving Understanding of the Mayo B Project overlaid on the Aquatic Environment**ii. Project Introduction – Yukon Energy Presentation (Patrick)**

- a. Rationale for the project
- b. Existing system
- c. Key physical components of the project
- d. Water levels and flows during Operations Phase (all Zones)

iii. Aquatic Field Work Undertaken (Ben Schonewille/Karl Schiefer)**iv. Preliminary Project Effects and Possible Mitigation – Discussion; particular focus on:**

- a. Zone 2 – between existing powerhouse and new powerhouse location
 - i. Identification of issues and concerns
 - ii. Discuss potential effects, with focus on Chinook salmon
 - iii. Discuss preliminary proposed mitigation measures
- b. Zone 5 – Mayo Lake
 - i. Identification of issues and concerns
 - ii. Discuss potential effects (focus on fall spawners, such as Lake trout)
 - iii. Discuss preliminary proposed mitigation measures

v. NNDFN Perspectives on Valued Components (YESAB) for the Aquatic Environment

- a. Chinook Salmon
- b. Lake Trout
- c. Other freshwater fish (including grayling and lake whitefish)
- d. Riparian zones and wetlands

3) Conclusions

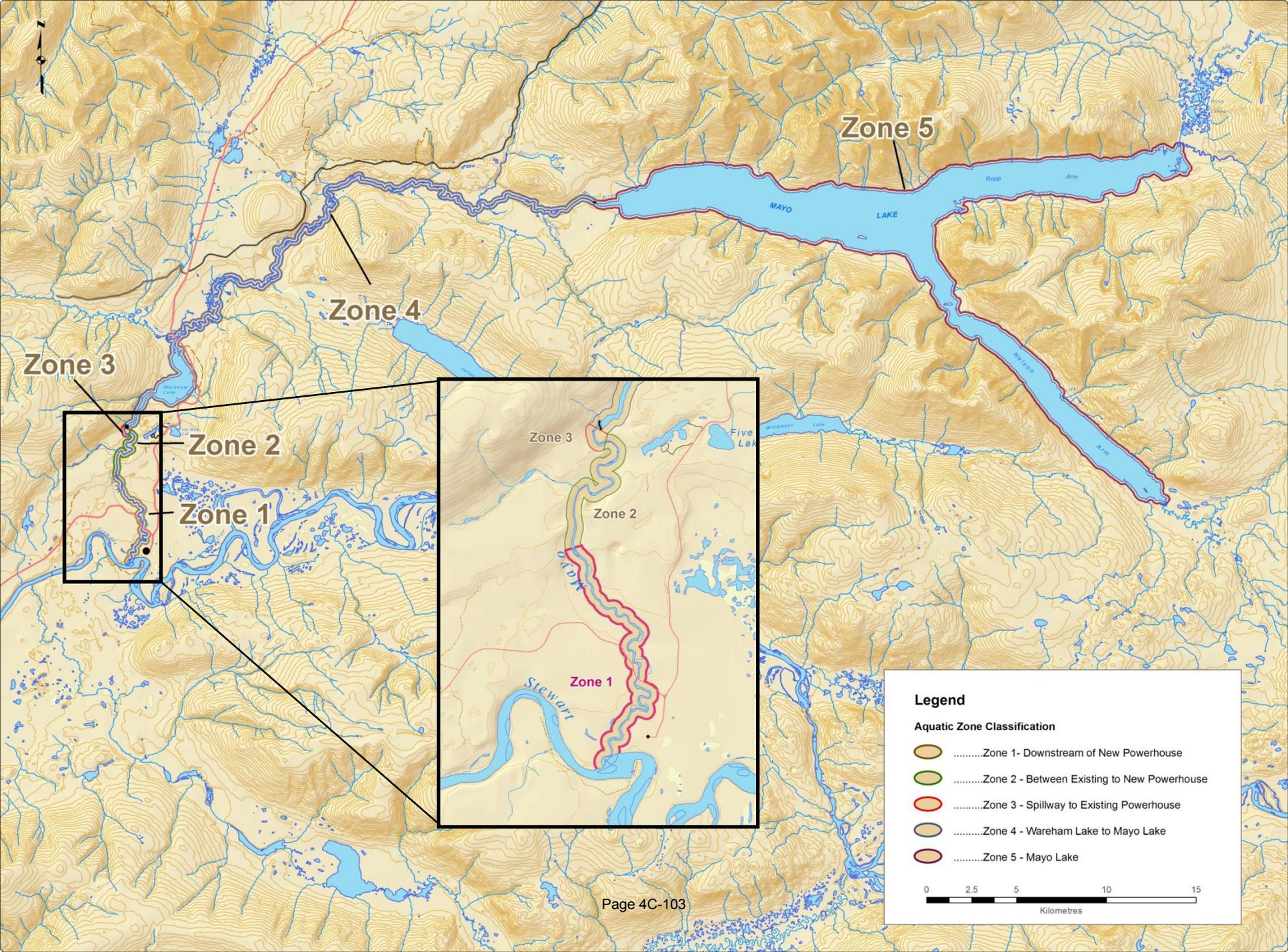
Mayo B – Aquatic Studies Preliminary Summary



EDI ENVIRONMENTAL DYNAMICS INC.
Natural Resource Consultants

**YUKON
ENERGY**





Zone 3

Zone 2

Zone 1

Zone 4

Zone 5

Zone 3

Zone 2

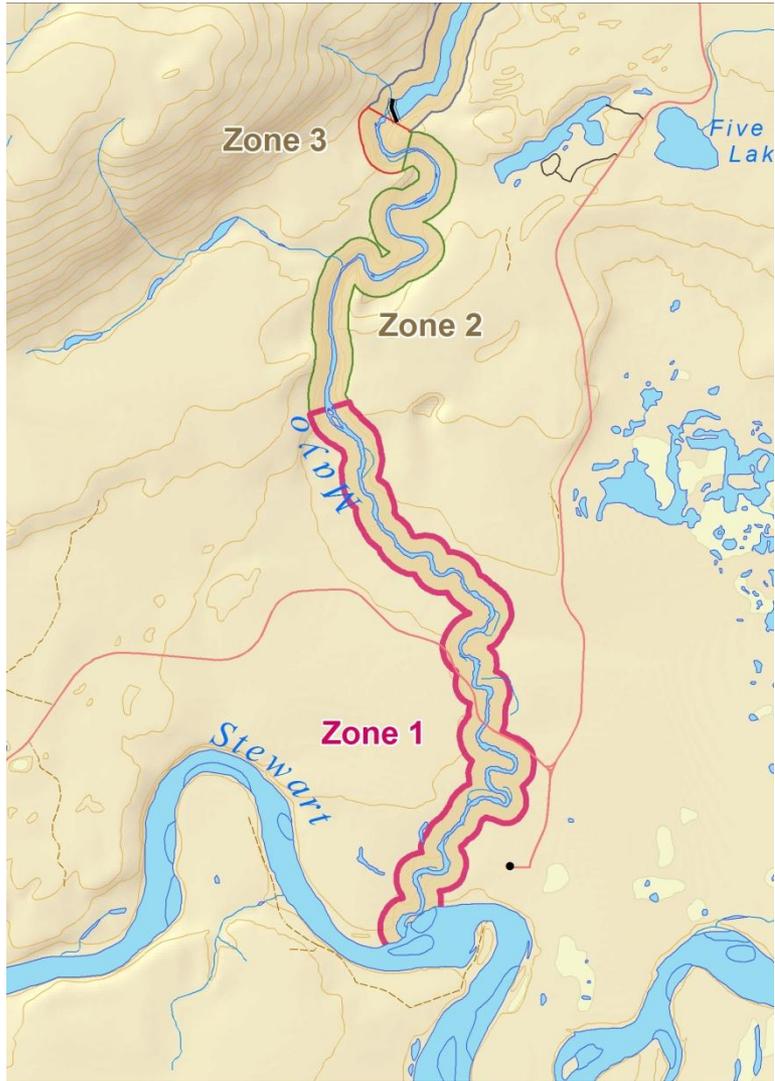
Zone 1

Legend

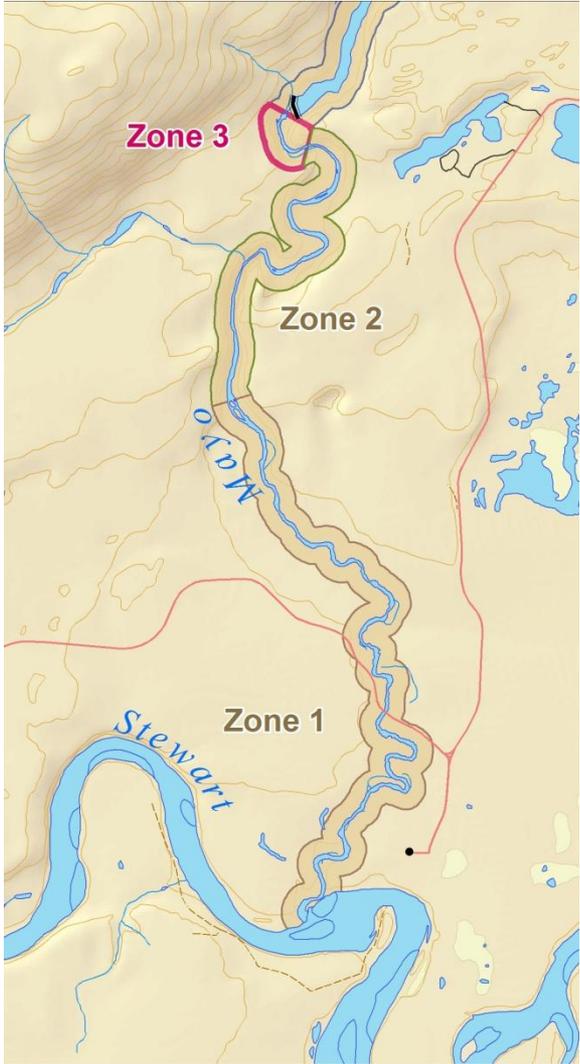
Aquatic Zone Classification

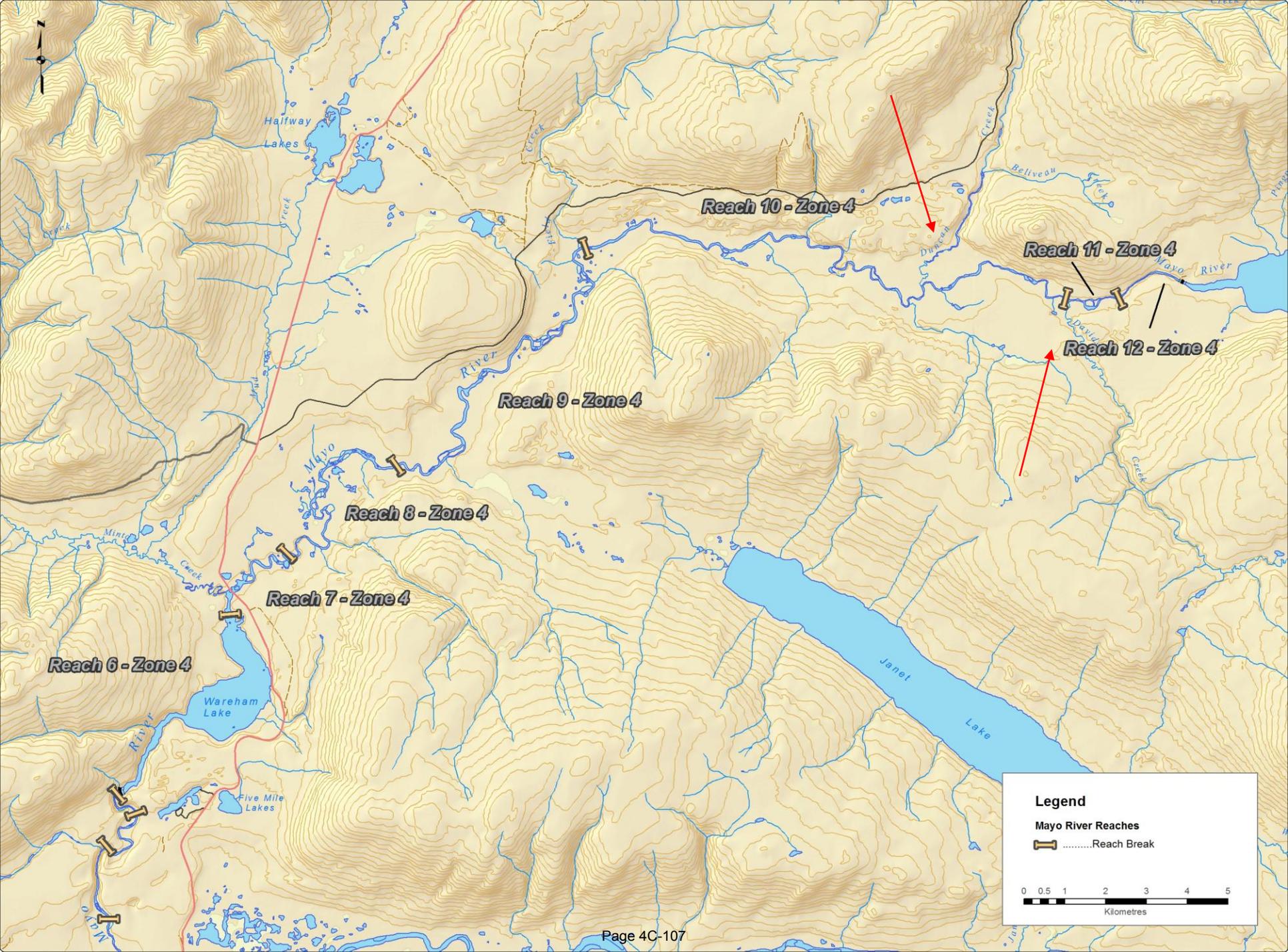
- Zone 1 - Downstream of New Powerhouse
- Zone 2 - Between Existing to New Powerhouse
- Zone 3 - Spillway to Existing Powerhouse
- Zone 4 - Wareham Lake to Mayo Lake
- Zone 5 - Mayo Lake











Halfway
Lakes

Reach 10 - Zone 4

Reach 11 - Zone 4

Reach 12 - Zone 4

Reach 9 - Zone 4

Reach 8 - Zone 4

Reach 7 - Zone 4

Reach 6 - Zone 4

Wareham
Lake

Five Mile
Lakes

Janet
Lake

Legend

Mayo River Reaches

Reach Break



Aquatic Zone 4





Surface Area = 9,560 ha
Maximum Depth = 106 m
Average Depth = 57 m
Shoreline Length = 116.7 km



Methodology – Aquatic Zones 1 - 3

- Chinook Salmon Spawning Investigations
- Fish Sampling
- Channel Classification / Habitat Mapping
- Invertebrate Sampling (using drift nets)
- Water Quality
- Water Temperature Monitoring
- Tributary Assessment
- Photo Reference Points
- Geomorphology Review



Methodology – Aquatic Zone 4

- Fish Sampling
- Reach Stratification & Habitat Data Collection
- Invertebrate Sampling (using drift nets)
- Water Quality
- Photo Reference Points
- Geomorphology Review



Methodology – Aquatic Zone 5

- Littoral Zone Classification
- Fish Sampling
- Radio tagging / tracking to locate spawning areas utilized by fall spawners (lake whitefish / lake trout)
- Overview assessments of selected tributaries
- Water quality



Additional Work Being Undertaken By Other Parties

- Mayo River cross section data
- Compilation of historic flow data
- Mayo Lake erosion studies
- Mayo River ice studies

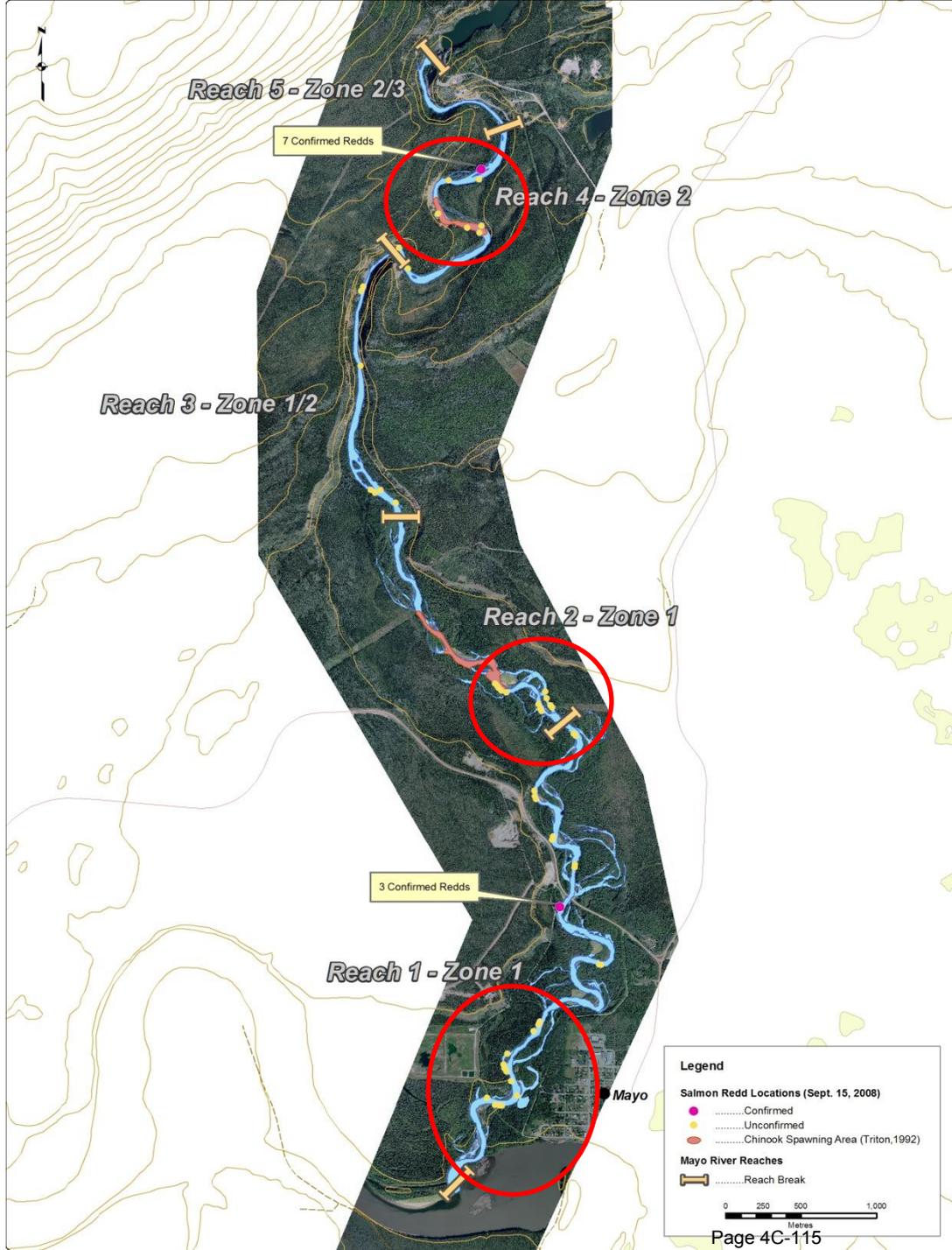


Preliminary Results – Aquatic Zones 1 - 3



Chinook Salmon
Spawning Investigations





Zone 1
Confirmed = 3
Suspected = 41

Zone 2
Confirmed = 7
Suspected = 11

Zone 3
None

Fish Sampling



Habitat Mapping

Channel Classification



Mainstem



Tertiary Side Channel



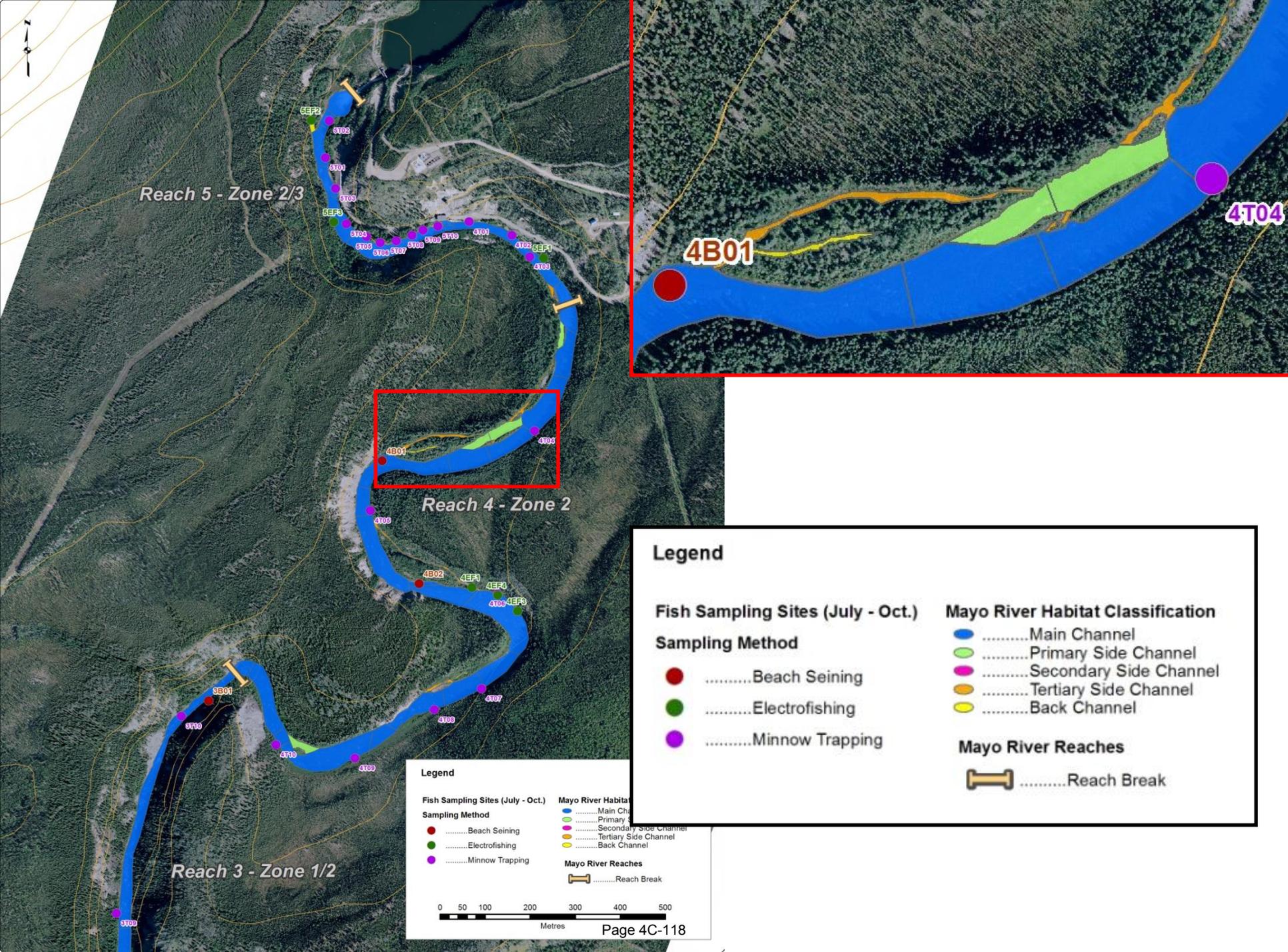
Primary Side Channel



Secondary Side Channel



Back Channel



Reach 5 - Zone 2/3

Reach 4 - Zone 2

Reach 3 - Zone 1/2

4B01

4T04



Legend

Fish Sampling Sites (July - Oct.) Sampling Method	Mayo River Habitat Classification
● Beach Seining	● Main Channel
● Electrofishing	● Primary Side Channel
● Minnow Trapping	● Secondary Side Channel
	● Tertiary Side Channel
	● Back Channel
	Mayo River Reaches
	Reach Break

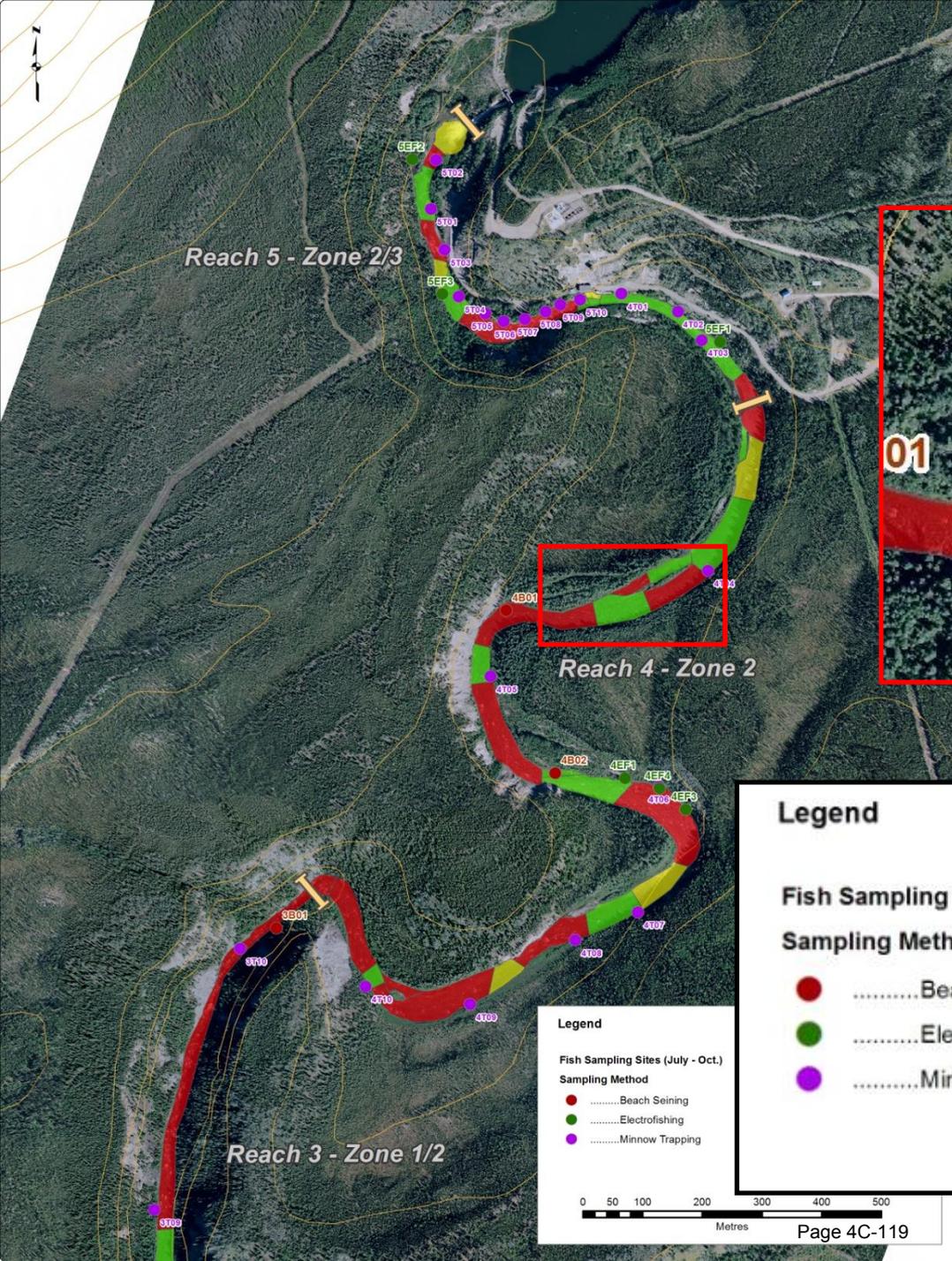
Legend

Fish Sampling Sites (July - Oct.) Sampling Method	Mayo River Habitat Classification
● Beach Seining	● Main Channel
● Electrofishing	● Primary Side Channel
● Minnow Trapping	● Secondary Side Channel
	● Tertiary Side Channel
	● Back Channel
	Mayo River Reaches
	Reach Break

0 50 100 200 300 400 500
Metres

Habitat Mapping

Habitat Units



Legend

Fish Sampling Sites (July - Oct.)

Sampling Method

- Beach Seining
- Electrofishing
- Minnow Trapping

Mainstem Habitat Classification

- ▬ Glide
- ▬ Pool
- ▬ Riffle

Mayo River Reaches

- Reach Break

Legend

Fish Sampling Sites (July - Oct.)

Sampling Method

- Beach Seining
- Electrofishing
- Minnow Trapping



Preliminary Results – Aquatic Zone 4

Freshwater Fish
Sampling



Preliminary Results – Aquatic Zone 5

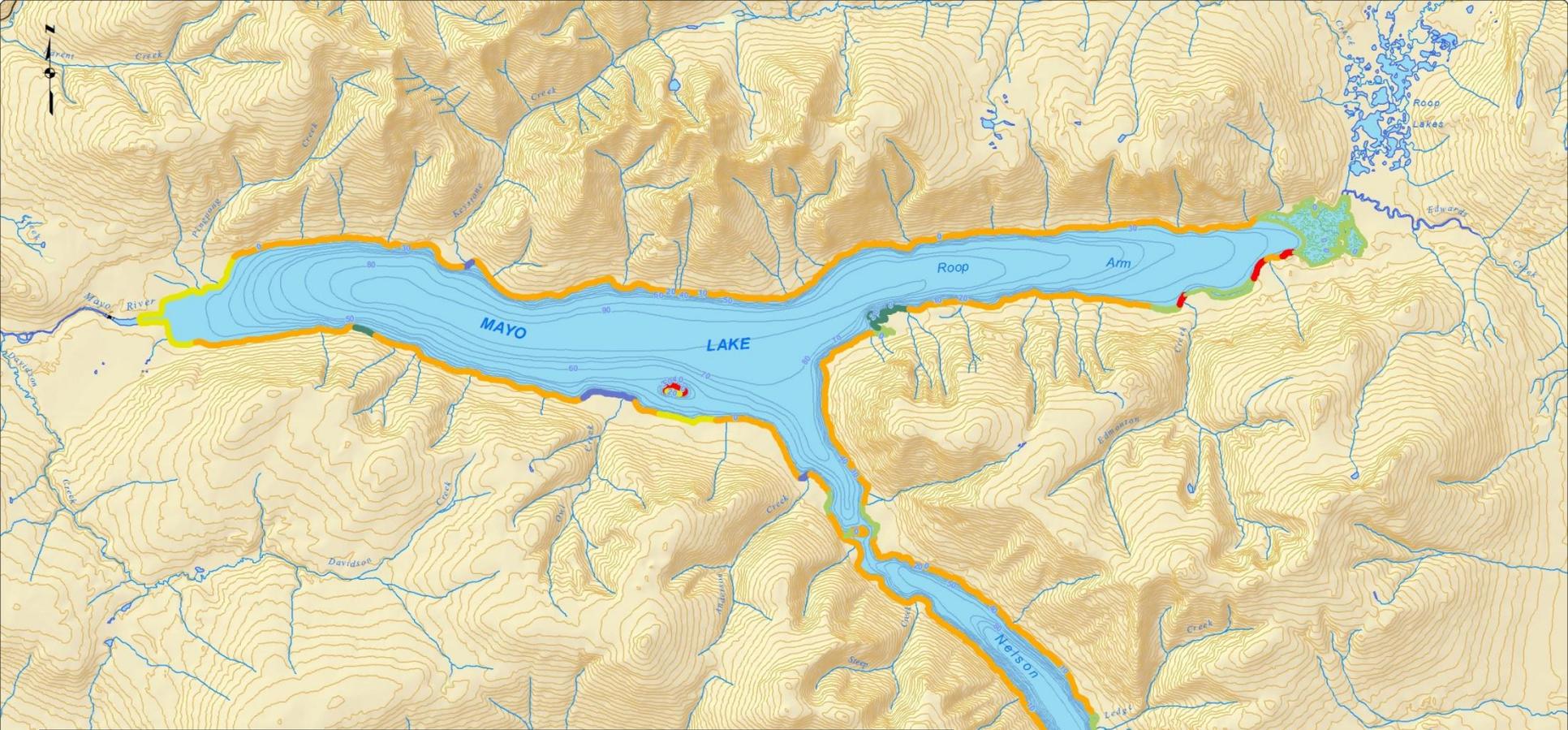
Legend

Mayo Lake Littoral Area Classification

-  Type 1: Gravels/cobbles/boulders
-  Type 2: Narrow band of gravels/cobbles/boulders
-  Type 3: Fine bed material and woody debris predominant
-  Type 4: Fine bed material and extensive growth of macrophytes
-  Type 5: Extensive bedrock outcroppings
-  Type 6: Sand

Mayo Lake Littoral Classification





Legend

Mayo Lake Littoral Area Classification

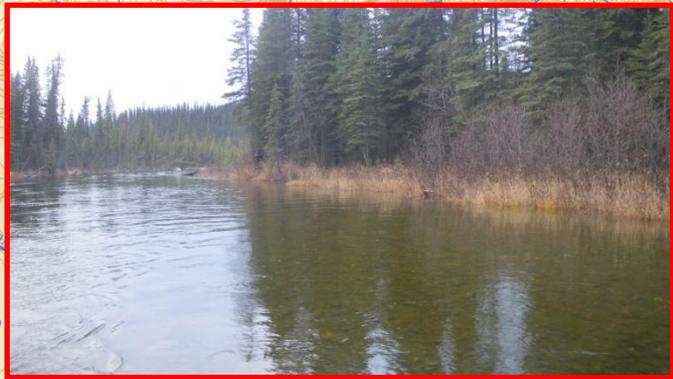
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Mayo Lake

Lake Whitefish Spawning Assessments





Legend

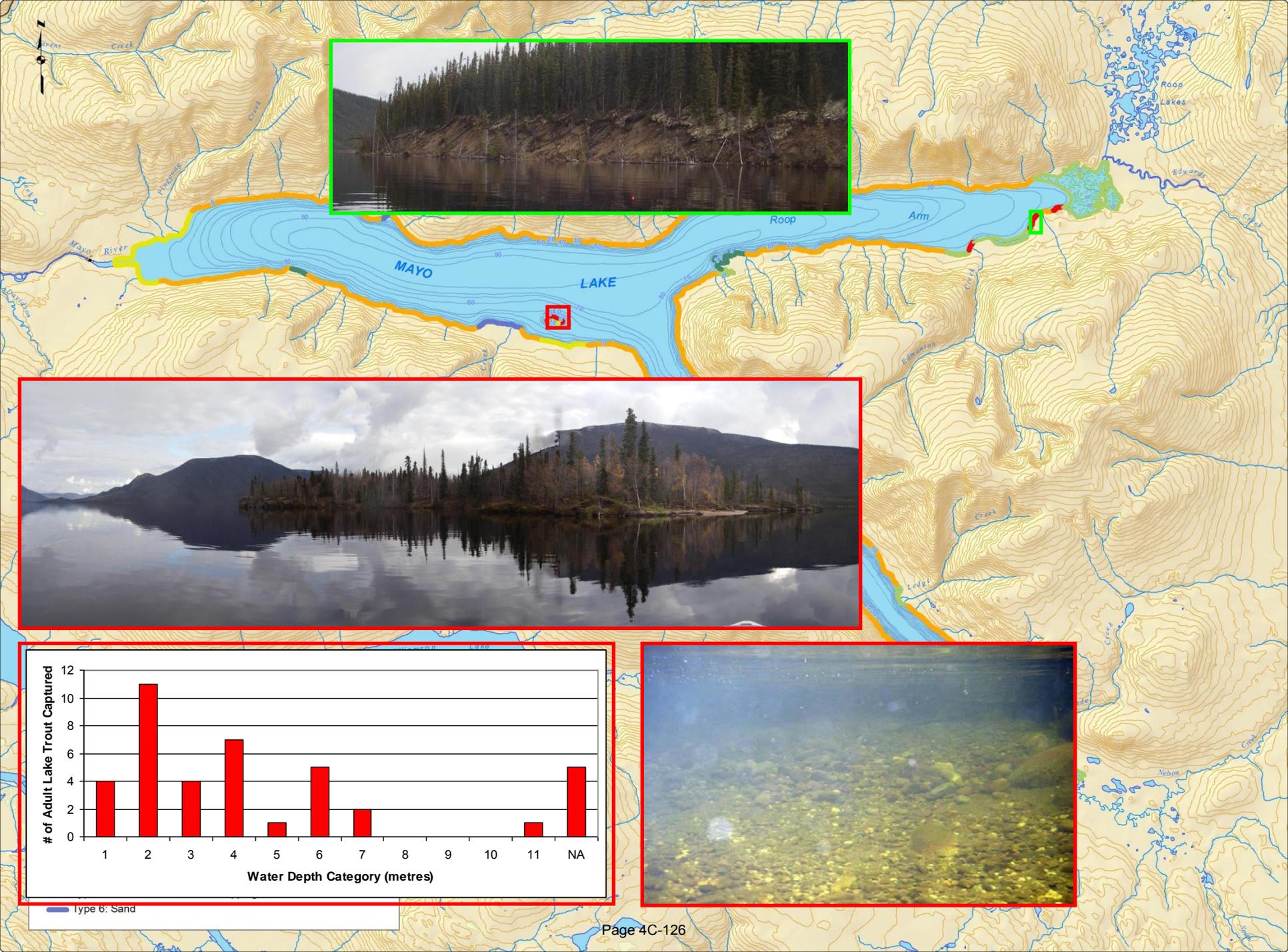
Mayo Lake Littoral Area Classification

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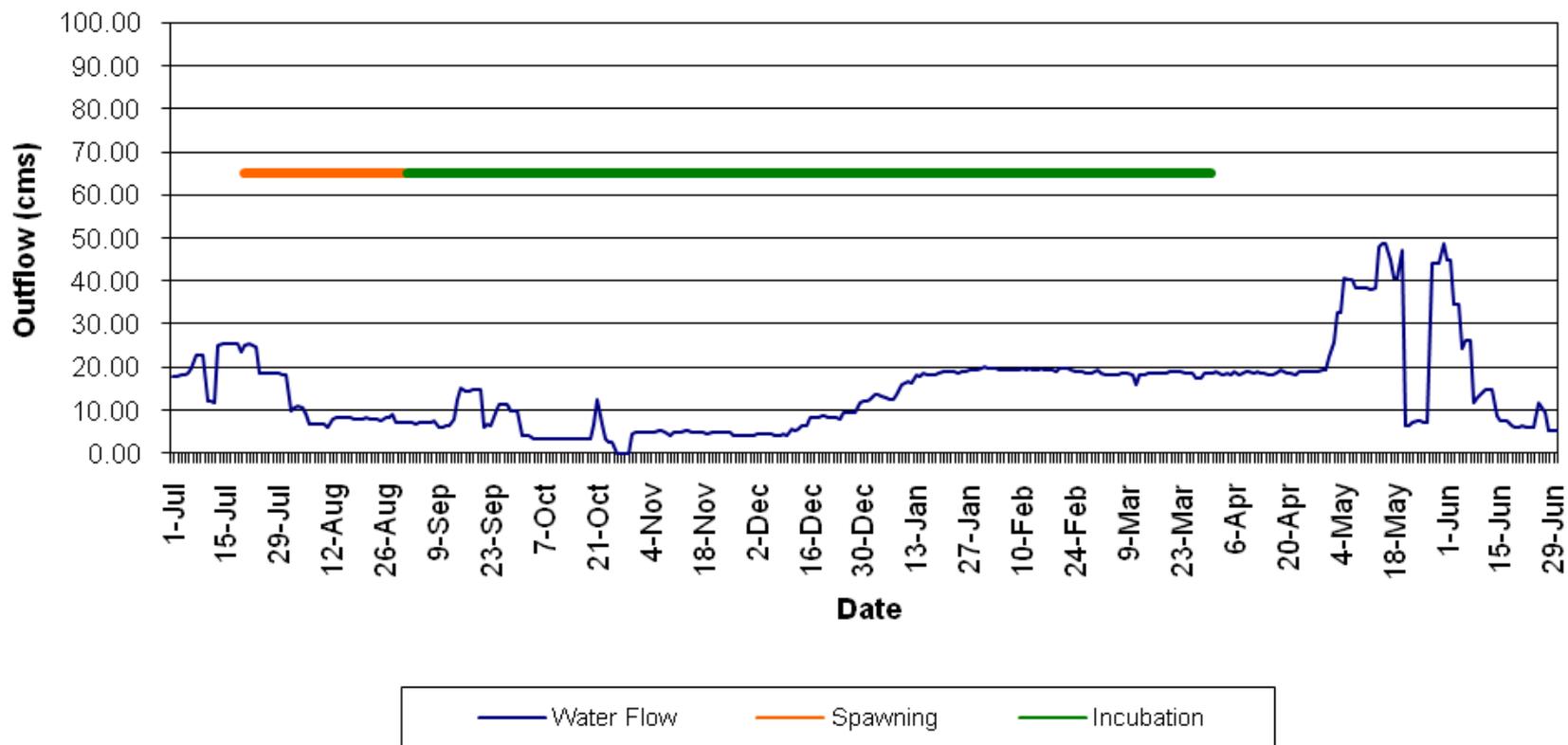
Mayo Lake

Lake Trout Spawning Assessments

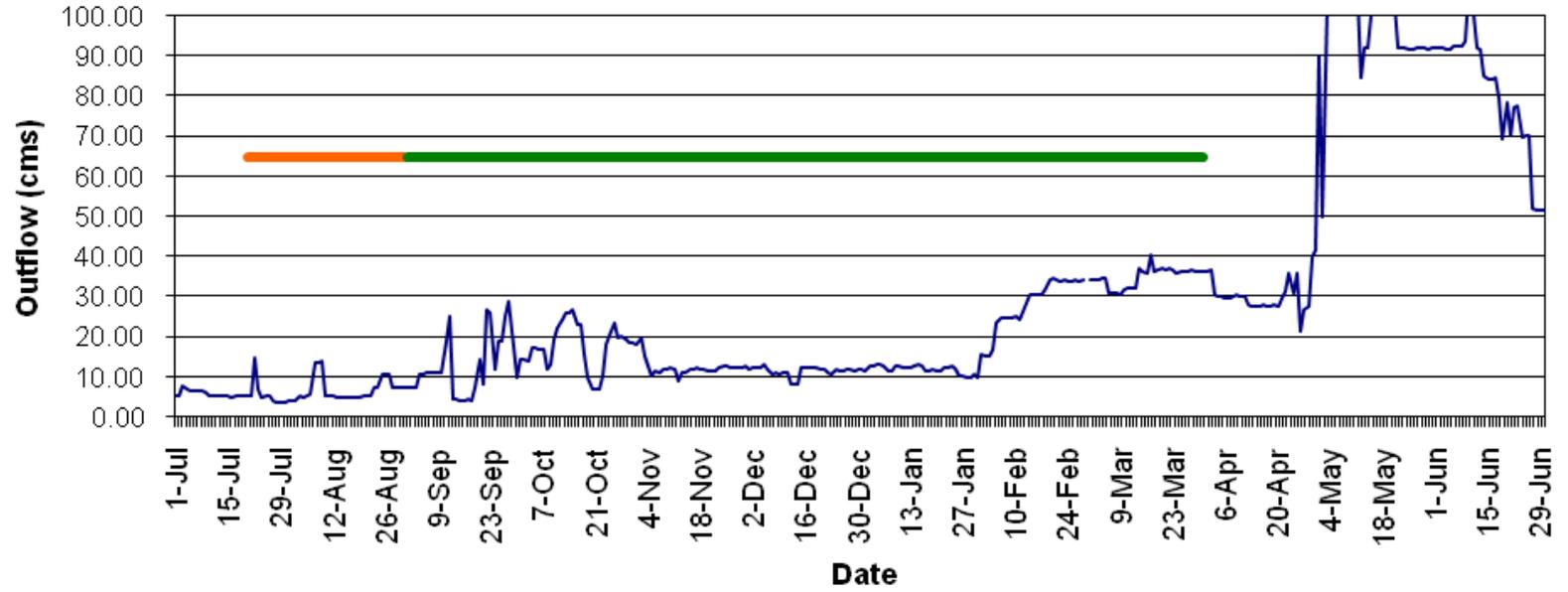




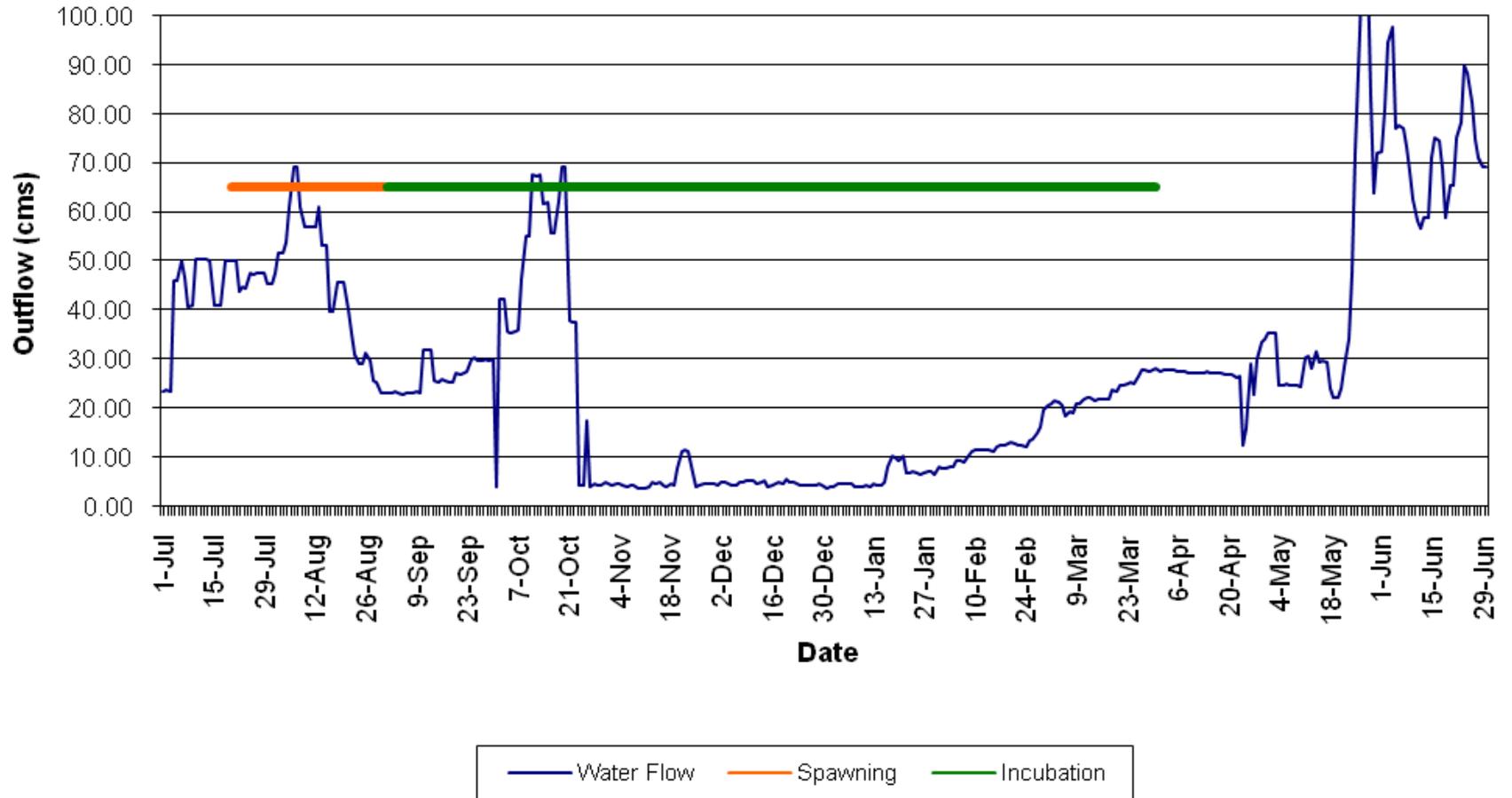
July 1989 - June 1990



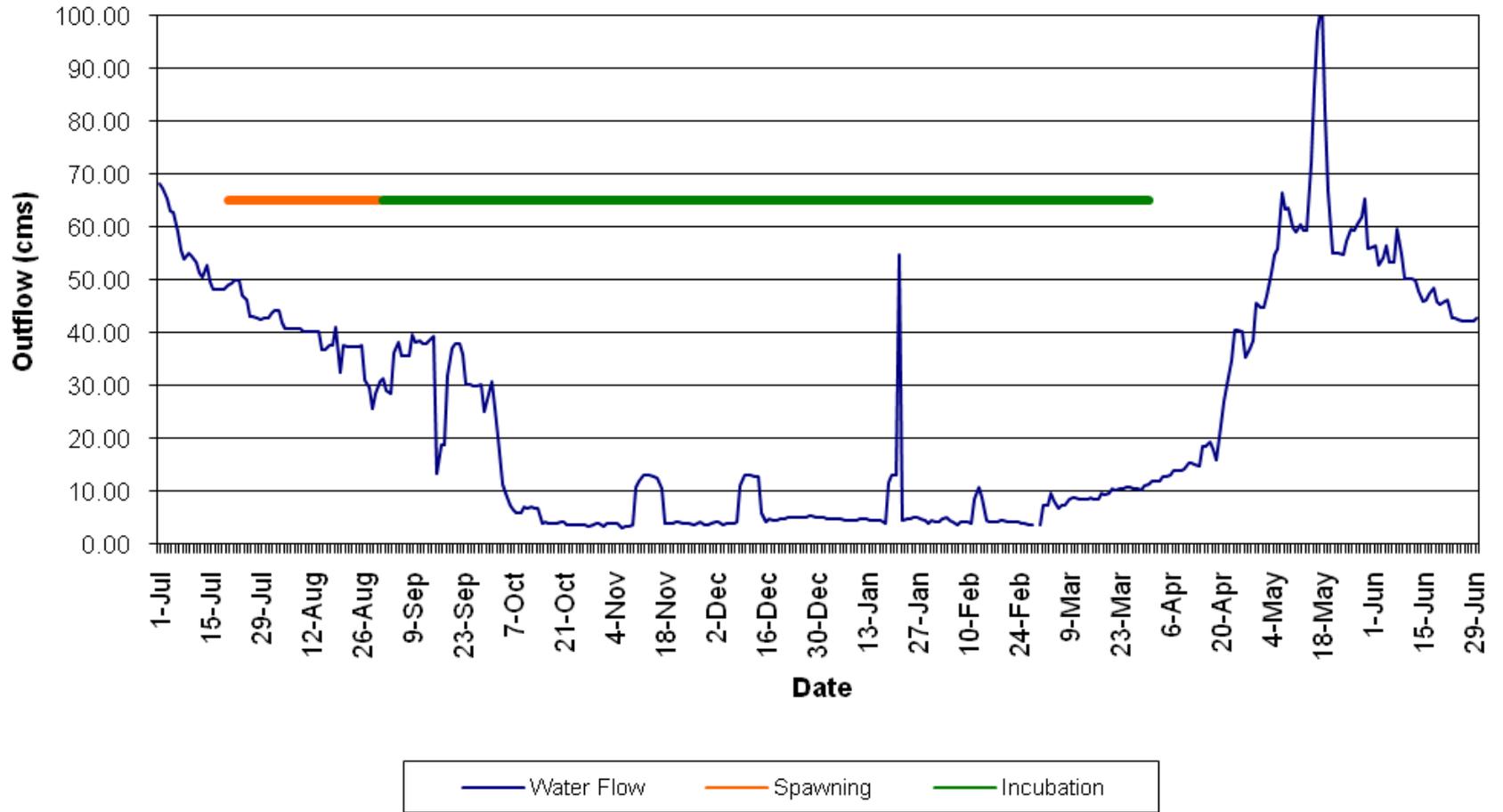
July 1990 - June 1991



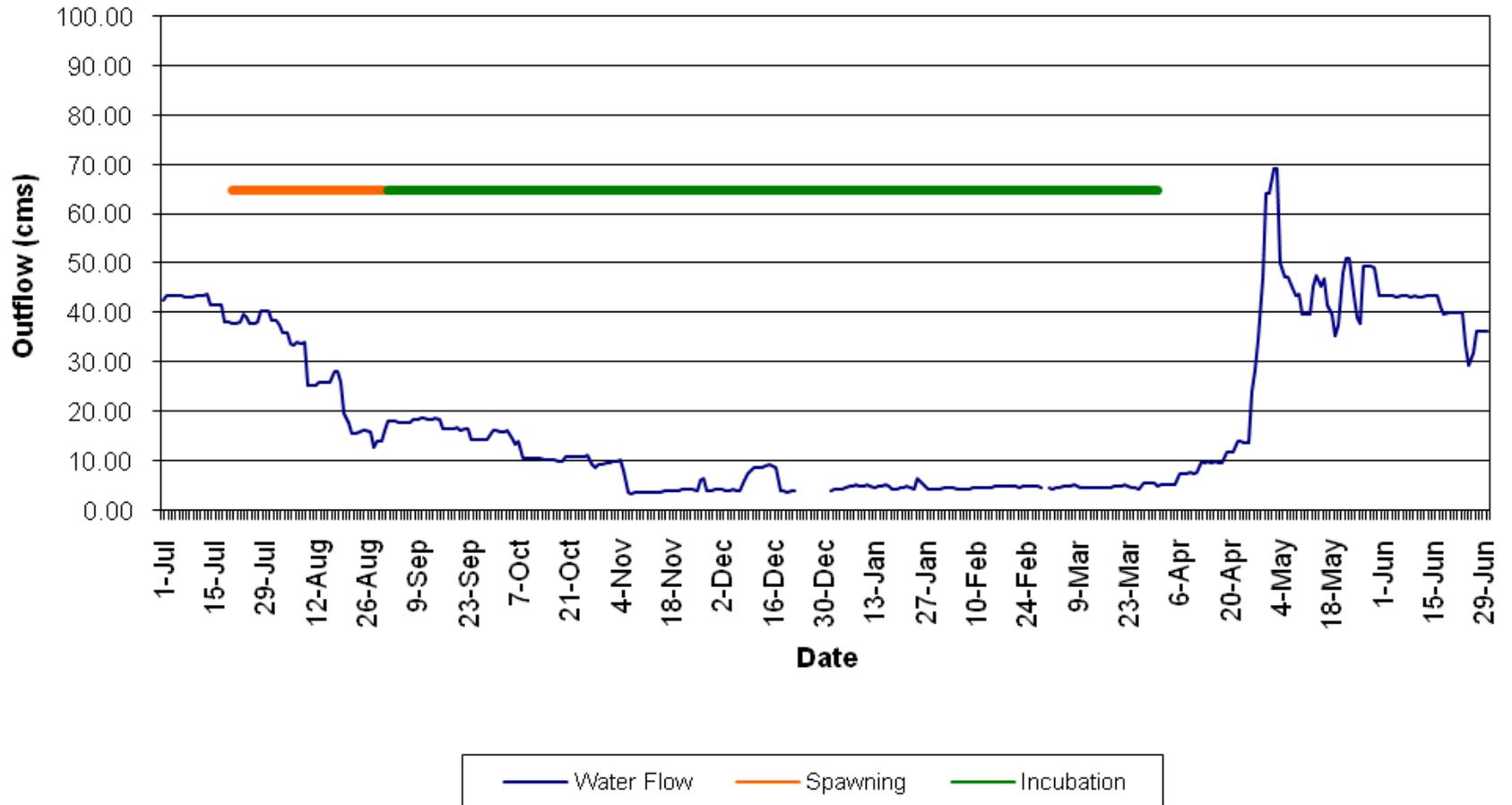
July 1991 - June 1992



July 1992 - June 1993



July 1993 - June 1994



4C-4.3 DECEMBER 16, 2008

4C-4.3.1 Meeting notes

Meeting Report

Title:	Mayo B Project – Workshop with NND and YEC on Aquatic & Terrestrial Environment		
Attendees:	<p>NND:</p> <p>Dennis Buyck Dawna Hope Stephen Buyck Lolita Welchman Shaun Hughes</p> <p>Yukon Energy:</p> <p>Hector Campbell, Project Sponsor, YEC Ben Schonewille, EDI – Aquatics Nancy LeBlond, Socio-Economic Assessment, InterGroup Consultants</p>		
Meeting Location:	NND Lands Offices	Mayo, Yukon	
Date:	December 16, 2008	Minutes status:	Draft 1
Author:	Nancy LeBlond	Phone:	204-942-0654
Meeting Purpose:	Introduce the Mayo B Project, provide an overview of the aquatic & terrestrial field work undertaken and discuss preliminary project effects and possible mitigation.		
Presentations and Discussion:	<p>Introduction and Rationale</p> <p>Hector thanked NND for arranging this meeting with Dennis who was unable to attend the workshops on Dec 4 and 5 in Whitehorse. Hector indicated that YEC is interested in doing the right thing to improve Chinook salmon habitat in the lower Mayo River. YEC is looking to file a YESAB proposal in late February or so (Q1 2009). Consultation and information collection is now on-going; and YEC will return in late January with more information on mitigation measures, flow models for the river, time of year and lake level changes.</p> <p>Hector noted that Stage Two of the Carmacks Stewart Transmission Project (CSTP) is expected to be completed first to serve the expected load from the Alexco mine; and the next major load would be served by Mayo B (e.g., Carmacks Copper or other potential developments). Domestic load growth is also increasing:</p> <ul style="list-style-type: none"> On Monday Dec 15th, the WAF system hit a peak of 60 MW, even with the Minto Mine down 3MW (reflecting their maintenance shut-down on 		

	<p>Mondays). Secondary sales had to be notified and turned off (about 5MW). The peak is likely reflective of increasing electric heat during this cold snap.</p> <ul style="list-style-type: none"> • Mayo Lake is used for storage to enhance winter flows. The spring freshet (50% of annual inflows occur in May and June) is mostly stored over the summer and then flows are released during winter when the demand increases. YEC is learning quite a bit about inflow data over a 30 year time period and this information is part of the modeling being done. <ul style="list-style-type: none"> ○ The team is now modeling water flows to reflect an extra half to one meter of bottom storage (based on an interconnected system). • The full range would not always be used; however having a greater range enables YEC to capture high peak flows. • For Wareham Lake, about 1/3 of the inflows to Wareham are local and uncontrolled. Dennis noted that Wareham is affected by the large snow-belt up at Halfway Lakes area. • Hector indicated that Wareham has an operating range of about 2.3 meters and YEC generally keeps the lake near full. • The system is operated to minimize spills. <p>Dennis asked whether, since Mayo Dawson, YEC was using the full capacity of the plant. Hector indicated that since this line was completed the existing Mayo hydro plant is operating at about 75% capacity.</p> <p>Dennis noted that he recently spoke with Nick de Graff about the Project. Dennis indicated that they are not favourable towards changes to levels of Mayo Lake or changes to the existing Water License.</p> <p>Hector indicated one of the options YEC is considering is no change in Mayo Lake water license levels. YEC must review the project economics of all options. The engineers are developing computer models, based on an interconnected grid, to see what power production can be generated at a new plant with different lake levels. Once YEC's three plants are interconnected, the system will be fairly complicated, but will provide greater flexibility in serving demand. The engineers will be able to determine the correct size of plant and effects on Mayo Lake once the modeling is completed.</p> <p>Dennis indicated that since the original Wareham dam resulted in a substantial drop in the Chinook salmon numbers, they are not as concerned with the 30 km stretch of the Mayo River upstream of Wareham. They are more concerned with effects at Mayo Lake and the ecosystem there. Steve noted that people may return to harvesting more lake whitefish and lake trout at Mayo Lake if the low Chinook salmon runs continue.</p> <p>Hector indicated that work is still on-going on the model; however, information should be available when YEC returns in January and will include information on the "system benefits".</p>
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NND asked why interest in micro-hydro facilities has essentially died. Hector indicated that these types of sites don't provide winter energy or the ability to store water, which is what is needed in the Yukon. In addition, YEC doesn't have the manpower to construct and manage four 10GWh/yr. plants that would be equivalent to the addition of 40GWh/yr. through one project.

NND asked if YEC is considering other types of energy projects such as geothermal. Hector indicated that YEC is studying geothermal and wind possibilities. Next year they will need to decide whether geothermal drilling proceeds; and they are undertaking a wind feasibility study. Geothermal locations identified to date include Haines Junction, McArthur hot springs and Sulphur Mountain.

Hector reviewed average costs of different types of energy projects. For example:

- Wind was at one time 35cents/KWh but is now in the high 20s.
- Existing legacy hydro (excluding distribution) in the Yukon is about 6 cents/KWh which compares favourably with Alaska, NWT and Nunavut. In comparison, diesel is about 25 cents/KWh.
- Mayo B would price out at about 15 cents/KWh (including the extra meter of storage at Mayo Lake). YEC would look to the federal government to contribute half the costs of the Project to reduce this to 8 cents/KWh, thus bringing it in line with green power costs in BC, and thus having little impact on Yukon ratepayers.

Dennis asked how YEC will protect against future mine closures. Hector noted that YEC does not want to repeat what occurred when the Faro mine shut down. This is one of the reasons behind interconnecting the grids which provides YEC with more options to service new customers in the future, and serve secondary sales which now are shut-off during peak load times. Hector reiterated that YEC does not install baseload diesel for new mines – it is up to the mine to install their own diesel. YEC is focusing on developing renewable energy.

Terrestrial Field Work Undertaken

Ben reviewed the short hand-out that notes the terrestrial field work conducted this year. The terrestrial component is small compared to the aquatic work as the project is mostly focused on water.

EDI conducted a waterfowl brood survey along the Mayo River from the confluence of the Stewart River all the way out to, and including Mayo Lake. This was done in late July when the waterfowl were present and breeding. A raptor survey was done along the same route, with particular focus in Zone 2 along the canyon bluffs. They were looking for cliff-nesting raptors such as peregrine falcon and golden eagle. In addition to these surveys, EDI has done

terrestrial habitat mapping in the project footprint area.

Key Findings:

- Waterfowl brood survey: found 7 species, two of which are ranked as sensitive by YG (the American Widgeon and Northern Pintail)
- Reach 7 by the Minto Bridge has been identified as the highest quality waterfowl habitat. Medium quality habitat runs along the mid portion of the Mayo River upstream of Minto Bridge; and as noted at the Land and Resource Workshop with NND previously, Reach 11 (upstream of Davidson Bridge) will be re-classified as higher quality waterfowl habitat. [Ben noted that during their survey, they did not observe the presence of waterfowl at this location; however local knowledge shared Dec. 4th will be incorporated in this re-classification.]
- Raptors: they observed three active osprey nests and one active bald eagle nest in the upper Mayo River/Mayo Lake area. Ben noted that YG previously identified the Roop Lakes area as a Key Wildlife Area for raptors; and NND confirmed there are a lot of nests in this complex. Steve noted there is an owl nest across from the airport; and an osprey nest at Keystone Creek (also mentioned by Mark O'Donoghue). Eagles were observed during the fall at Mayo Lake.
- No cliff-nesting raptors were found in Zone 2 when they were out in the field. Ben noted this area is not particularly good habitat for cliff-nesting raptors except for a small stretch in the upper end of the canyon. Mark also indicated he had not seen cliff-nesting raptors in this area as well. Steve noted that the small lake to the west along the high-gradient creek is likely a good spot for raptors. This is across the river and well outside the project footprint – but should be considered if additional raptor surveys are done.
- Ben noted the last map was an example of terrestrial habitat mapping. EDI will quantify the amount of disturbance in the Project footprint area as part of the YESAB submission.

Aquatic Field Work Undertaken

Ben reviewed the presentation – Mayo B Aquatic Studies Preliminary Summary – handouts, including 11 x 17 maps were provided. The following is provided as additional information to the PPT slides.

- Aquatic Zone 1:
 - Low gradient, meandering river morphology
 - High complexity with numerous side and back channels
 - River is less confined through this zone, so the river has the ability to move.
 - Substrate is made up of cobbles and gravel
- Aquatic Zone 2:
 - Higher gradient, more confined river channel
 - Higher velocities
 - Less complexity of the channel, especially in the canyon (lower photo). The upper 30% is more like Zone 1 but with no off-

	<p>channel habitat.</p> <ul style="list-style-type: none"> ○ Substrate is boulders and cobbles <ul style="list-style-type: none"> ● Aquatic Zone 3: <ul style="list-style-type: none"> ○ Very confined channel, not as complex as other zones with little opportunity for spawning habitat; substrate is cobbles and boulders ○ Velocities can be quite high at time of high spills (upper photo). ○ The lower photo rounding the corner was taken at reduced flows. ● Aquatic Zone 4: <ul style="list-style-type: none"> ○ Divided the Upper Mayo River into reaches with similar characteristics (i.e., substrate materials, channel complexity, aquatic plants etc.) ○ The red arrows point to two major tributaries (Duncan and Davidson) with active placer mining activity ○ Reach 7 is a meandering wetland upstream of the Minto Bridge. It has fine material substrate, and is affected by Wareham Lake. Sediment has been deposited in this area and there is substantial aquatic vegetation. There is a lot of channel complexity, islands etc. ○ Reach 8 upstream of reach 7 also has channel complexity with side and back channels. Substrate is hard-textured. The reach has different types of cover providing good quality fish habitat. ○ Reach 9 and 10 are very similar – one main channel with fewer wetlands and ponds along the margins. ○ As noted on Dec. 4th, Reach 11 is potential waterfowl habitat. ○ Reach 12 is upstream of the placer mining activity at Duncan & Davidson Creeks, and before the Mayo Lake Control Structure. Higher numbers of fish such as grayling are present in this Reach. The reach has high quality fish habitat. ● Aquatic Zone 5 is Mayo Lake: <ul style="list-style-type: none"> ○ Edwards Creek and Roop Creek are the major tributaries that drain into the Roop Arm; the Nelson Creek drains into the Nelson Arm. ○ There are two wetland complexes – one at the end of the Roop Arm and one at the end of the Nelson Arm. ○ Smaller tributaries include Cascade, Ledge, Owl, Anderson and Ping Pong creeks. <p><u>Methodology Zones 1-3:</u></p> <ul style="list-style-type: none"> ● Chinook salmon spawning investigations – 6 helicopter flights in early August to mid September of the entire Lower Mayo River. The Sept 15th flight was targeted at locating spawning redds. The visibility was very good. ● Fish sampling – all species and life cycles. Three methods were used: <ul style="list-style-type: none"> ○ Beach seining for adult fish (i.e., dragging a net)
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	<ul style="list-style-type: none"> ○ Electro-fishing in small areas – targets everything ○ Minnow trapping – effective for catching juvenile Chinook ● Channel classification/habitat mapping ● Invertebrate sampling for catching aquatic bugs and insects ● Water quality – field measurements and lab analysis of data logger information (i.e., dissolved oxygen, temperature) ● Water temperature monitoring ● Tributary assessment – there is 1 tributary into the Lower Mayo River with an extremely high gradient into the canyon ● Photo reference points – example is off the Silver Trail Bridge looking downstream. These are pictures of the river at different times of the year under different flow conditions. ● Geomorphology review of the river channel <p><u>Methodology Zone 4:</u></p> <ul style="list-style-type: none"> ● No Chinook salmon investigations or habitat mapping in Zone 4 ● Fish sampling – same as for Zones 1-3 using all 3 methods. The photo is an example of beach seining. ● Reach stratification and Habitat Data Collection for reaches 7 through 12, using the BC Risk card. ● The other points on the slide are the same as for Zones 1-3 <p><u>Methodology Zone 5 – Mayo Lake:</u></p> <ul style="list-style-type: none"> ● Littoral Zone classification around the entire lake (substrate type, slope and presence of vegetation). Assists with identifying potential high quality areas where spawning for lake trout and lake whitefish would occur. ● Fish sampling – lake trout and lake whitefish – used small mesh nets to avoid fish mortality ● Radio tagging and tracking to locate spawning areas – tagged 16 lake whitefish (includes 1 mortality) and 11 lake trout. EDI then used short set, small mesh nets to confirm spawning activity. ● Overview assessment of selected tributaries to understand any areas of critical fish habitat ● Water quality, using a long temperature & dissolved oxygen probe as seen in the photo. <p>Additional work being done by other parties will tie into EDI's field work:</p> <ul style="list-style-type: none"> ● Mayo R cross-section work will provide the shape of the riverbed ● Compilation of historic flow data through the plant and over the spillway; ● Erosion studies help to understand how erosion rates may change ● Mayo R ice studies – especially around the Mayo bridge. <p>Steve asked where the water quality sampling occurred and how many samples were taken. Ben responded that sampling was done at the surface, and at depths of 10 m and 20 m in three locations in Mayo Lake – roughly in the</p>
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center of the lake, in Roop Arm and in Nelson Arm. In addition to Mayo Lake, sampling was done in each reach of the Mayo River. The types of data collected include dissolved oxygen, temperature, ph, nutrients, dissolved metals etc.

Preliminary Results

The following information is preliminary in nature as analysis is still on-going.

Preliminary Results – Zones 1-3 (Map # 2)

- Lower two-thirds of Zone 2 is canyon with high velocities; the upper one-third has a flatter gradient
- Chinook spawning locations are in the side channel as noted in the photos of Zone 2.
- The 7 confirmed redds shown in the lower photo correspond to the dot on Map 2. Confirmed redds were where EDI saw salmon attending the redds. There is spawning throughout the lower Mayo River as indicated in the three clusters on Map 2. EDI's previous work with NND on the restoration project, combined with previous studies on juvenile Chinook, helped to identify Chinook habitat.
- Figure 3 - fish sampling was done throughout the Lower Mayo River. In addition to Chinook, EDI found eight other species including Arctic grayling, round and lake whitefish, long-nose sucker, slimy scuplin, northern pike and burbot.
- Figures 4 through 7 show examples of habitat mapping of Zones 1-3. Channel classification was based on flow characteristics and riparian influence and each class has different qualities for juvenile Chinook habitat:
 - Main stem (photo is from Zone 2)
 - Primary Side Channel – similar characteristics of a main channel, but with a side channel. There is not high potential for juvenile Chinook habitat in this class.
 - Secondary Side Channel – smaller proportion of flow, with over-hanging vegetation cover and riparian influence
 - Tertiary Side Channel – very small, tributary-like channel with greater cover. Not susceptible to high flows. A lot of riparian influence. The restoration channel looks like this photo. Juvenile Chinook prefer this type of habitat.
 - Back Channel – back-flooded from the river with no real flowing water.
- Juvenile Chinook like cover such as over-hanging vegetation and woody debris.
- Hector noted that EDI will try and quantify habitat to demonstrate possible changes to spawning and rearing habitats.
- The main stem, primary and secondary side channels will be further divided into Habitat Units, classified as riffles, glides, and pools. One example is shown in the presentation. This will lead to Habitat Suitability Index analysis.

Preliminary Results – Zone 4 (Figure 8)

- Freshwater fish sampling resulted in 8 fish species captured, including Arctic grayling, burbot, round and lake whitefish, and slimy sculpin (no inconnu). The photo on the left is a burbot; and on the right an Arctic grayling. Arctic grayling was the most common species; and Reach 12 has the highest numbers of grayling, sucker and whitefish.
- The highest rate of success was through beach seining.

Preliminary Results – Zone 5 Mayo Lake (Figure 9)

- Six types of Littoral areas are described.
 - Type 1 – gravels/cobbles/boulders are areas with highest potential for spawning. The top left photo is at Gull Island where lake trout were spawning. Figure 9 shows there is not a lot of high-potential areas for spawning for lake trout in particular and lake whitefish (2% of lakeshore).
 - Type 2 – narrow band of gravels/cobbles/boulders is the predominant littoral area around the lake. The upper right photo is an example of this littoral type, showing a narrow band of gravels with different size rocks.
 - Type 4 has extensive macrophytes or aquatic plants– an example is the lower left photo of the end of Nelson Arm where lots of aquatic plants are visible. On Figure 9, type 4 habitat is at each end of the Nelson and Roop arms; plus in the narrows one-third down the Nelson Arm.
 - Type 5 has exposed bedrock outcroppings – an example is the lower right photo at the east end of Peggy's Island where Mike Mancini has a cabin.
- Mayo Lake – Lake whitefish spawning assessments:
 - Tagged 16 lake whitefish with 1 mortality. The majority of the tagging occurred in the middle section of the lake; and one was tagged at the south end of Nelson Arm.
 - The radio-tags are less than 2% of the fish's total weight and will fall off naturally after a few years.
 - Figures 10 and 11 show lake whitefish movements – 7 out of 15 migrated into the Edwards Creek/Roop Lakes area. The photos on the left are of Edwards Creek where EDI observed the lake whitefish at night – this area was ground-truthed on October 9th, with most whitefish being in the lower section of Edwards Creek. This area is likely outside the influence of the lake. The top photo was taken the next day, after observing lake whitefish spawning at night.
 - The lake whitefish must have retreated back into the lake as they were not relocated when the last aerial survey was done.
 - Could not confirm spawning in Nelson Arm in October although there is suitable habitat in Nelson Creek.
- Mayo Lake – Lake trout spawning assessments:
 - Figure 12 shows lake trout movements.

	<ul style="list-style-type: none"> ○ There was evidence of spawning at the north and west end of Gull Island. The spawning area substrate is gravels and cobbles as shown in the bottom right under-water photo. This area is exposed to wind and wave action. The graph indicates that the lake trout appeared to be spawning relatively shallow (majority captured in less than 4 m of water). ○ Sampling was done at night with small mesh gillnetting in to prevent harm to the fish. They caught a variety of size classes; however, they had no success radio-tagging lake trout prior to spawning as they had already moved to the spawning areas. This meant they relied on littoral classifications to identify the high potential spawning locations, such as Gull Island, where they observed high concentrations of lake trout at the north and west ends. ○ They only caught 1 lake trout in spawning condition at the east end of Roop Arm. <p><u>Discussion:</u></p> <p>Steve noted that in the past, a person used to net lake trout in the vicinity of Peggy’s Island and sell the catch up at Keno mine. Ben indicated that a couple of fish were tagged in this area but didn’t move very far.</p> <p>Dennis indicated that the most productive zone for lake whitefish and ling cod is at 90-120 foot depths. Ben also noted that lake whitefish don’t always spawn every year.</p> <p>Hector indicated that the current operating range of Mayo Lake is about 8.5 feet, and one option is dropping it up to 1m or about 3.5 feet. The lowest point would be late April/early May. The modeling is looking at how many years the lake wouldn’t completely fill, is considering rule curves and adaptive management for when the additional draw-down could be used. Until the modeling is complete, this information is not completely known.</p> <p>Shaun asked what would happen to the Roop Lakes area if water levels are dropped an additional meter. Hector indicated that the team is still working on the modeling and results should be available when we meet again in January.</p> <ul style="list-style-type: none"> • Dennis noted that some areas of Roop Lakes don’t freeze completely; however, the area would not be cut-off if water levels change. • Hector noted that groundwater surveys in winter are being considered to see if Edwards Creek and Roop Creek have evidence of over-winter groundwater discharge. • Ben indicated that fish will seek areas of groundwater discharge in cold habitats as this provides a constant source of water. • We also have ortho-photos of the Roop Lakes area in 1949 and can compare with more recent photos to help assess the effects of the additional 1m bottom storage option. YEC recognizes that this area has been identified as important habitat for a variety of species.
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	<ul style="list-style-type: none"> The question was raised about effects on northern pike. Ben indicated that northern pike are spring spawners and the lake is beginning to fill prior to spawning so there is no concern for freezing out eggs. <p>Dennis enquired if the interconnection of the WAF and MD grids would result in less spilling of water. Hector indicated this may be likely – except for uncontrolled inflows that are beyond the capacity of the plant. YEC has no history with operating the three plants as one system; and is currently developing a power system benefit model. More information should be available in January. KGS also needs to finalize the size of the Mayo B plant.</p> <p>Dennis asked Ben why he was not aware of the fact that lake trout don't feed right before spawning. Ben indicated this was also news to YG Fisheries biologist. It is likely that the females heavily feed in advance and sometime after spawning.</p> <p>The question was asked why EDI did not sample lake whitefish at lower depths. Ben explained that netting at deep locations would result in fish mortality – their bladders can't take bringing them up from deep water and being handled (also sensitive to handling). Instead, EDI focused on presence of lake whitefish and spawning locations in shallower zones that would be affected by lake level changes.</p> <p>Dennis noted that the lake prior to the Dam used to have more beaches along the shoreline. There was a fellow who sold fish up at Keno who traveled by motorbike along the shoreline from the west end of the lake up to Roop Lakes.</p> <p><u>Salmon spawning at a variety of river flows – series of graphs:</u></p> <p>Ben explained what these graphs illustrate:</p> <ul style="list-style-type: none"> Five graphs illustrate the variability of river flows (blue line) overlaid with the life cycle of Chinook salmon (orange is spawning; green is incubation). The salmon select the ideal conditions for spawning based on what is available that year (river levels, flows and substrate materials). The graphs show that the Chinook have been spawning at different flow levels (from less than 10 cms up to 60+ cms); followed by different flows during incubation – some as low as 3-4 cms. Despite these conditions, the lower Mayo River is a very productive salmon river. The Mayo B Project is an opportunity to increase power generation with the same amount of water, while looking after the salmon better than in the past. The project will also manage flows better in winter.
<p>Additional Discussion:</p>	<ul style="list-style-type: none"> The issue of a fish ladder was also raised, and whether YEC was considering this. Hector indicated that in general, the idea of a fish ladder is not of serious consideration. Instead, other options are being considered – both costs and benefits will need to be assessed. The extra lower storage at Mayo Lake provides YEC the ability to

	<p>capture peak flows/floods during high wet years.</p> <ul style="list-style-type: none"> • Being connected to the grid (through CSTP Stage Two) will result in fewer daily fluctuations in flows. The key is to manage the flows to sustain fish populations in Zone 2 – KGS is reviewing how much water needs to be run through the existing plant and down through Zone 2, vs. how much through the proposed new plant. • Ben noted that Chinook try to go upstream as far as possible. When it is time for spawning, they may go back downstream to find the most suitable habitat for the conditions – this may be the reason they are spawning in Zone 2 even though this stretch of the river doesn't have the highest potential spawning habitat. • Ice cover at Mayo Lake – when the lake is drawn-down in late winter, what happens to the ice cover at the edges of the lake? Hector explained that the draw-down will be gradual over the course of the winter. At other lakes such as Marsh Lake (with a similar operating range), we have information on what happens to the ice. Generally, it will sit on the mud-banks; there may be some fractures or over-hangs. • The ice studies that are on-going by the engineers are focused on ice conditions at the Mayo Bridge as this has been a past issue. We may have to look at adjusting flows during the key ice formation phase to prevent over-flooding of ice. This will allow the ice to set up and freeze. <p><u>Resource Use Discussion:</u></p> <ul style="list-style-type: none"> • NND expressed concern that the 1 m additional draw-down will affect aquatic furbearers in the Roop Lakes area – this is an important area for trapping. Any back-water effect associated with the increased draw-down may be important to consider. • Key species for trapping are: marten, lynx, wolf and wolverine. Other species trapped include mink and fox. Beaver are caught for food. Pricing of pelts has affected trapping; as well as lack of active trappers. Access is generally by truck along the road and then snowmobile on the lake. There is no recorded trapping data that is accessible – most activity is domestic trapping. • Beaver are key species for the ecosystem. When they dam up the creeks other species start to enter the area. In the past 10 years people have seen the beaver move back into the lake. • Roop Lakes area has open water all winter. Access is up Roop Creek. • Edwards Creek also doesn't freeze completely; the deeper pools at the mouth freeze up. • There are many access trails off the Mayo River, Mayo road and Mayo Lake that are used for resource use – hunting and trapping. • Hunting access should not change significantly as the lake will be at its fullest as it has in past years (since MD). • Trappers still have to cross the river and creeks. With more managed/regular winter flows down the Mayo River, this should be more favourable to ice formation and crossing of the river.
Follow up	3) How far up does the zone of influence go into the Roop Lakes area?

required:	<p>Also for Edwards Creek? To be addressed in January.</p> <p>4) YEC to provide field study results to Shaun Hughes – his mailing address is:</p> <p style="text-align: center;">Box 618, Dawson City Yukon, Y0B 1G0</p> <p>5) YEC to return in January with additional information on water levels and flows, how Mayo Lake could be managed and the effects on lake trout & lake whitefish spawning habitats. Results of ice studies at Mayo Bridge (if available) will also be discussed.</p>
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4C-4.3.2 Materials

The same presentation materials were used as on the December 5, 2008 meeting. See Appendix 4B-2.2

4C-4.4 JANUARY 19, 2009

The meeting notes and materials for this date are found in Appendix 4D-4.2.1 as the event was for all stakeholders in NND, not solely for NND.

4C-4.5 JANUARY 20, 2009

4C-4.5.1 Meeting notes

The following notes have been sent to NND for verification and are still considered a draft. If there are any substantive changes a supplementary filing with YESAB will follow.

Meeting Report

Title:	Mayo B Project – Key Issues Workshop with NND and YEC		
Attendees:	<p>NND: Dennis Buyck Dawna Hope Bill Slater Millie Olsen Crystal Stephens Stephen Buyck</p> <p>Yukon Energy: Hector Campbell, Project Sponsor, YEC Travis Ritchie, Manager, Environmental Assessment & Licensing Darielle Talarico, Corporate Consultant Patrick Bowman, Project Manager, InterGroup Consultants Nancy LeBlond, Socio-Economic Assessment, InterGroup Consultants</p>		
Meeting Location:	NND Lands Office	Mayo, Yukon	
Date:	January 20, 2009	Minutes status:	Draft 1
Author:	Nancy LeBlond	Phone:	204-942-0654
Meeting Purpose:	To provide a brief project update on project components that are still evolving; and to discuss a list of key interests and concerns heard from NND.		
Project Update	<p>Hector thanked everyone for the successful event of the evening of January 19th – it was great to see so many community residents come out to hear about the project and to provide their perspectives. Round table introductions were made. Hector presented the draft agenda and no changes were made.</p> <p>Patrick indicated that Yukon Energy wanted to start this meeting with a brief review of the poster/fact sheet handouts and an update on three key topics – water conveyance options, Mayo Lake operating range, and the Roop Lakes</p>		

area.

Patrick reviewed the eight poster/fact sheet handouts – copies were provided to NND. He noted that the fact sheets provide some additional detail on the various topics, including in some cases how we are addressing people's concerns. Many of the topics are still receiving attention as we work our way towards a YESAB filing.

Water Conveyance Options:

- The drilling program in the summer, followed by seismic work this past November has resulted in not finding bedrock at depths estimated in all areas of the proposed tunnel route. The area to the west of Five Mile Lake appears to have bedrock at a depth 30 m below what was originally thought. This will make building the tunnel more difficult as it will need to go deeper in this section, then go back up.
- The original concept was for the tunnel to be self-draining; but with this deep section, pumping would be required.
- This has resulted in the tunnel option becoming less favourable.
- The second option is a canal/penstock. Recently, this option has received greater attention. It has been mapped and priced out and is now close enough in costs to the tunnel to be considered more favourable. The land contours for the canal section along the ridge are sufficient to construct using a cut and fill process (mostly an earth-moving project).
- A penstock (buried pipe) would come off the existing tunnel (location still to be finalized) and would turn into a surface run canal along the ridge for just under 2.5 km. The last 800 m section would be a steel penstock running down the bank and into the proposed powerhouse.
- Construction of the canal/penstock option would be similar to building a 12 km gravel road.
- The canal would be 30 m wide, about 4 m deep and would be lined with a geotextile liner and covered with natural material to hold it in place. The liner is meant to be impervious to water to reduce leakage.
- Additional heritage resources work may be necessary in advance of construction of the canal. In addition, the canal route would have to be field proofed in the upcoming summer to confirm there is no permafrost. To date, the engineers have not found any evidence of permafrost.
- Steve asked whether Yukon Energy would anticipate ice problems with the canal. Hector indicated that past experience at Aishihik (since 1974) indicates there would be no issues. The ice cover would be set at maximum flows in the winter and remain stable.
- The canal is an engineered feature with stable, slow-moving flows over a gradual gradient. It has to be deep enough so the water does not freeze to the bottom of the canal.
- Bill asked what the gradient was compared to Aishihik. Hector

	<p>indicated that the engineers are finalizing this now. One of the benefits of the canal/penstock option is that there are lower head losses.</p> <ul style="list-style-type: none"> • Dennis asked if the canal would be fenced as a safety issue. Hector indicated no decision has been made at present. Yukon Energy's property will be gated, including at all road access points. He noted that Aishihik was not fenced; however, the Mayo B project is closer to a community. Yukon Energy will look at constraining/restricting access and is interested in hearing NND's perspective on how this could be accomplished. Animals will be able to swim across the canal in summer and walk across the ice in winter. Animals and people will also be able to go around the canal at either end. • Questions were asked about design flows and speed. Patrick noted that design flows are still being finalized; however, a rough estimate is 25 cms for the entire system – with 5-6 cms going through the existing plant to provide flows for Chinook salmon habitat in Zone 2, and 19-20 cms through the new plant. The water would flow at about 1 km/hour in the canal, similar to Aishihik. • Patrick noted that the engineers need to ensure the topography can handle the canal width as currently planned. Then if possible, reductions in width would be assessed. <p><u>Operating range of Mayo Lake:</u></p> <p>Patrick reviewed the various concerns people have identified in relation to changes in Mayo Lake water levels, including the following key concerns:</p> <ul style="list-style-type: none"> • effects on fall spawners, • erosion, • wetlands, • placer mining access <p>Yukon Energy has looked at an increased storage range at Mayo Lake by (a) raising the top level, (b) lowering the bottom level or (c) a combination of both. Early in the review process, Yukon Energy decided not to raise the top end due to effects on erosion, heritage resources, new flooding and the need for structural changes to the existing facility.</p> <p>Recent attention has focused on lowering the bottom range. Consultation with various people, plus input from the aquatic team have indicated there is concern with the "relative" effects of lowering water levels in the fall as compared to what the level of the lake would be in spring – and effects on the eggs of fall spawners (particularly lake trout – NND noted that we also need to consider whitefish as the lake trout eat the whitefish). For concerns expressed by placer miners over when they can use their barges to access claims, and from NND concerning effects to wetland areas at the ends of the Roop and Nelson arms – the issue is the absolute level of the lake in the spring time when the lake will be at its lowest.</p> <p>Work on this issue is on-going to address the concern. Currently, we understand the real concern is over the full use of the 1m additional drawdown every year. To address this, the team is looking at various options, in particular</p>
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to address the suggestion of raising the lake by half a meter and lowering the lake by a half meter.

- The water flow model has shown that the first half meter of extra range is more valuable than the second half meter in terms of power production
- Given the above, we are considering tiers of bottom storage:
 - 1st half meter unconstrained use – the ability to drawdown every year and capture higher inflows in wet years
 - 2nd half meter might include constraints on its use, e.g., use only once in five years
 - Align a drought reserve with what happens in nature
- Bill asked if Yukon Energy would want to use the full 3m (including additional half meter) every year. Patrick indicated we would want the ability to use extra storage, but would not use it every year.
- In an interconnected system, the stacking order for using the generating stations would be:
 - Whitehorse would be used for baseload power (can't store it over a year)
 - Mayo would be used if needed on top of Whitehorse
 - Aishihik would provide the remaining balance of renewable energy. It will be more flexible with the 3rd turbine installed, with 37 MW installed capacity and generating an average 100 GWh/year
- Patrick noted that the water flow modeling will provide information related to power production; we then must overlay environmental concerns to ensure we are not causing more problems.
- The comments of half meter raised and half meter lowered option caused the team to focus interest on the decreasing value of the storage, which has led to thinking about tiers of use and constraints for some of those tiers.
- It was noted it is critical to be able to use the existing 2.5 m of storage range. The first half meter of additional storage would equate to about 2.4 GWh of additional energy each year.

Bill suggested it would be beneficial for YEC to prepare a few options with the rules and benefits associated with each option and have a discussion based on that; versus preparing a Project Proposal and hope people like what was decided on.

The group discussed the best way of discussing the water flow model output and options and decided on the following:

- Patrick would prepare a package of information on the modeling, including some of the data and graphs for various scenarios
- Get together in Whitehorse to explain the model complexity and assumptions that drive the scenarios and their outputs.
 - Without Mayo B
 - Adding Mayo B with different scenarios of Mayo Lake water license levels

Roop Lakes Area

- Dennis explained the area has importance as an ecosystem. It is valued as such, in addition to its value to fish, aquatic mammals, moose and fishing/trapping/hunting/recreational activities.

	<ul style="list-style-type: none"> • Patrick noted this area has been identified as being of concern to NND; however, there is not a lot of data before the Mayo Lake dam was built. • The group reviewed the historic aerial photos of the area which show the approximate size of the various lakes and bays over time (July 1947, June 1996 and July 2008). • To date, the concerns heard by YEC are: <ul style="list-style-type: none"> a) If Mayo Lake is drawn down an additional meter, will the Roop Lakes area be drained? b) If Mayo Lake is drawn down over winter, will the Roop lakes become isolated from Mayo Lake (i.e., cut off)? This can be answered easily – there is flow going into Mayo Lake from Roop Lakes and above. Dennis agreed that there is good flow in this system,. • The aerial photos post-ML dam compared to pre-dam appears to show that the water does back up into Roop Creek for some distance (not the entire complex); the channels leading to the first of the Roop Lakes are wider now than pre-dam; the lower bays and lakes are bigger now than pre-dam. • Traditional knowledge indicates that when the water level is high on Mayo Lake, the water backs up into the Roop system, upstream of Edwards Creek. The Roop Lakes area is affected by inflows, precipitation and groundwater. • Additional questions: <ul style="list-style-type: none"> a) How much is rain affecting lake levels? • Before Mayo Dawson was on line, the practice was NOT to keep Mayo Lake full; it was kept below the adjustable flashboards on the Mayo Lake structure. • Travis asked NND to indicate their interests in the area – for example, is it heavily used for hunting, or recreation? NND indicated that the area provides opportunities for a variety of activities, including travel, some trapping, fishing, moose hunting, and duck egg collection; but also has value outside of just what NND uses the area for.
<p>Zone 2 water flows, salmon spawning & rearing channel</p>	<p>We know that Zone 1 has some spawning and lots of rearing habitat; and that Zone 2 is good for spawning and rearing habitat. As part of the Mayo B project, we will manage these areas to enhance Chinook habitat:</p> <ul style="list-style-type: none"> • 5-6 cms minimum water flows will be maintained from the existing plant downstream to the proposed plant (Zone 2) – this area will be optimized for salmon spawning and rearing to enable egg survival over the winter • Balance of flows will be through the new plant. In the spring freshet, some additional water will be spilled into Zone 2. • Immediately below the tailrace of the new plant, the Project will include the re-creation of an old side channel into spawning and rearing habitat (could be up to 1km long – there are several possible exists of the channel back into the mainstem of the river) <ul style="list-style-type: none"> ○ The flows will be regulated from the tailrace through a diversion structure with some kind of provision to ensure in-flows when the plant is off-line for maintenance. • The Project Team will be looking at DFO's no net loss requirements as it quantifies the habitat for spawning and rearing.

<p>Zone 4 spring water flows</p>	<ul style="list-style-type: none"> It was noted that one-third of the flows into the Upper Mayo River are uncontrolled inflows. Nothing associated with the Mayo B project will affect this. The existing license has a minimum flow requirement of 2.8 cms; operation of Mayo Lake usually is much higher than this.
<p>Operation of Wareham Lake</p>	<ul style="list-style-type: none"> The Mease property appears to now be lower than Full Supply Level (FSL) of Wareham Lake. Dennis mentioned his belief that the Mease property is sinking, likely due to permafrost melting. There are remnants of old fish traps in the vicinity of the Minto Bridge. NND historically used this area as a fish camp. There also used to be some cabins in this general area as well. Wareham Lake is not currently managed all the way to the absolute FSL due to: <ul style="list-style-type: none"> Over-flow onto Mease property Need to be able to absorb flow changes, particularly during very cold weather – want to avoid overtopping the gates In future, with or without Mayo B, YEC will want to operate Wareham Lake to within one-two foot of the FSL of its existing license (which is two feet higher than it is currently managed). The lake will be managed within its existing license limits – there are no changes to the limits due to the Mayo B Project. The wetlands at the Minto Bridge were created by the Wareham dam and creation of Wareham Lake. The Mayo B plant will not change Wareham Lake. Wareham Lake is used as a daily buffer for water fluctuations; Mayo Lake is used for water storage. Currently, people experience daily fluctuations whenever an increase in power demands occurs. The Mayo B Project will flatten the peak demands, will have less daily fluctuations downstream of Wareham and flows will likely be steadier downstream of the new plant.
<p>Erosion at west end of Mayo Lake</p>	<ul style="list-style-type: none"> The banks at the west end of Mayo Lake are very erodible material. That end of the lake is silt; it is eroding over long periods of time. Raising the top storage option could make the erosion worse, so this option is now off the table. Natural erosion occurs at some water levels when wind/wave action acts on the banks (during ice-free season). Fine sediment is held in suspension and travels downstream to at least Wareham Lake. Heavier pieces will settle out at the bottom of the banks.
<p>Others:</p>	<p>Trapping access across Upper Mayo River:</p> <ul style="list-style-type: none"> Steve indicted a trapper crosses the Mayo River to access Janet Lake for trapping (December, January and February). Will access be changed due to water flow changes? Hector indicated that the Mayo B Project may result in more favourable crossings of the river in winter. The ice will be set up higher (with higher flows in December) relative to the bank, likely providing easier access. Currently, maximum flows are a maximum of approximately 18 cms through the existing plant; with Mayo B, the flows will be sustained at closer to 25 cms through this stretch of the river (about

	<p>25% more flow) and stable through the point of freezing.</p> <ul style="list-style-type: none"> • Flows will also be more consistent, with a gradual draw-down in late winter/early spring. <p>Carmacks-Stewart Stage Two:</p> <ul style="list-style-type: none"> • Does the Mayo B Project hinge on completing Stage Two? Hector indicated that the long-term economics support this as both industrial and non-industrial load growth continues. The forecast for power demand by Alexco would not use up all the surplus power on the MD grid with Mayo B, so having the ability to shift power south to WAF loads (including potentially Carmacks Copper), would be beneficial. • Yukon Energy is looking at government funding to help build Mayo B. Costs have not been finalized – once the project is tendered, the costs will be better known . Yukon Energy has not determined the type of contracting approach it will use. • Yukon Energy is looking to maximize the benefits to the region and to develop an economically beneficial project. • Hector noted that if NND can identify activities associated with the project that would benefit the First Nation over the long term, Yukon Energy is interested in hearing about them. (e.g., an educational program associated with the re-created spawning and rearing channel). • Darielle suggested the work camp could be a business opportunity that NND may be interested in pursuing..
<p>Next steps with YESAB</p>	<ul style="list-style-type: none"> • Targeting March for filing of the YESAB Project Proposal • YESAB process is about 12 months, including information adequacy review and YESAB's own public consultation process. Once the adequacy review is complete, this is a trigger point for more engineering design and specifications for long-lead equipment (i.e., turbines), and for a more detailed construction schedule to be prepared. • Earliest start of construction is targeted at summer of 2010, depending on receipt of permits and approvals. • Summer of 2009 will include additional geotechnical drilling; possibly some on-going environmental monitoring to add to the baseline data collected to date. • If government funding is not forthcoming, the Project would not proceed.

<p>Follow up</p>	<ul style="list-style-type: none"> • Provide a package of 3-4 options with some data, graphs showing the results and power production information. Send this by email by end of the month. <ul style="list-style-type: none"> ◦ Bill and others can ask questions once they receive the package (iterative email exchange) • Meeting in Whitehorse – tentatively Friday, Feb. 13th where Patrick will provide a brief run through of the model and discussion can focus on effects to the Mayo Lake area. EDI aquatic team should participate if available; Karl could be available by conference call. • Get anecdotal information from local people who use the Roop area (Dennis & others) – examples include the following: <ul style="list-style-type: none"> • At low lake levels, it is more difficult to get up into the area than at high water levels; • It is difficult to get far into the Roop Lakes are unless very skilled, as the channels are changing, easy to get lost beyond the large lake (D on one set of aerial photos) • There is good flow through the last stretch of Roop Creek into Mayo Lake. After the 1st large lake (D) going upstream, the flow slows down and the terrain is flat. • If we lose the water in this area, animals will leave and sometimes they will not come back. • Ice comes off the lake in late May/early June. The spring freshet has already started, so the lake is re-filling.
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4C-4.5.2 Materials

Draft Agenda

Key Issues Workshop with NND

Tuesday, January 20, 2009

9am to noon, NND Land & Resources Offices

1) Getting Started

- Welcome and introductions
- Review draft agenda to ensure all interests and concerns are identified

2) Key Interests and Concerns heard from NND

- Water levels & flows management down Zone 2 for salmon and freshwater fish
- Salmon rearing & spawning channel
- Spring-time water flows through Zone 4.
- Extra draw-down of Mayo Lake and effects on:
 - Lake trout and lake whitefish
 - Wetlands at end of Roop Arm and Nelson Arm
 - Trapping around Mayo Lake, particularly access and ability to travel on ice
- Erosion at west end of Mayo Lake
- Others?

3) Next Steps

4C-4.6 FEBRUARY 17, 2009

4C-4.6.1 Meeting notes

These meeting notes have yet to be finalized and require the verification of NND. Once the notes are finalized they will be filed as a supplementary filing to Appendix 4C.

4C-4.6.2 Materials

The materials are provided on the following pages.

Proposed Mayo B Hydro Plant Session Yukon Energy/NND

Feb. 17, 2008
Whitehorse

1

Purpose of Session

- ▶ To enable Yukon Energy to share more specific information about the water management model
- ▶ To illustrate potential changes to Mayo Lake in the event a different licenced range or conditions are proposed
- ▶ To indicate the power benefits that arise from increases in storage at Mayo Lake
- ▶ To illustrate the effects on summer/fall flows in Zone 2 (Salmon spawning) from increased storage range at Mayo Lake

2

Introduction

- ▶ Yukon Energy is looking at enhancing the existing Mayo GS to serve an integrated Yukon-wide grid
- ▶ **No decisions have been made at this time to proceed with the project.**
- ▶ The project could include a revised storage range at Mayo Lake, by lowering the minimum lake elevation by up to 1 metre
- ▶ Changes to the storage range at Mayo Lake may lead to changes in the flows downstream in the reaches used by Salmon, particularly during summer

3

Water Management Objectives

- ▶ Yukon Energy Water Management Objectives
 - a balancing act:
 - Use water before non-renewable energy sources such as diesel to produce power for Yukon Energy's customer needs
 - Optimize the water in order to minimize electricity costs to Yukon Energy's customers
 - Respect and protect the environment through a sustainability focus
 - Utilize the Corporation's water management resources to the benefit of other water users

4

Water and Power Model

- ▶ Yukon Energy has had a model developed that reflects the operation of the system under varying load and flow conditions
- ▶ The model is quite new, and still being applied to various conditions
- ▶ The model can be used to portray how a modified system (such as by adding Mayo B) would operate in future under possible expected load conditions
- ▶ The outputs of the model show both energy data (kWh produced by various sources) and water levels and flows

5

Model – Operation

- ▶ The model has the following characteristics:
 - Operates on a weekly “time step”
 - Looks at a particular load condition; such as, ‘what might the system operate like with current load plus a Carmacks Copper mine?’
 - Models the full range of water conditions, as represented by historical information. For cases where WAF and Mayo are interconnected, the data used covers 21 years (1987 to 2007)
 - Looks at how the system would be operated as a whole to serve the necessary firm loads in a week

6

Model – Inputs

- ▶ Key inputs to the model are as follows:
 - Water inflow data for each week of the historical period
 - Load data for the scenario, by week
 - Turbine and generator efficiencies for each unit or plant
 - Water licence conditions for each reservoir or plant
 - Other operational constraints (e.g., ice)
 - Spillway rating curves for each spillway, particularly Mayo Lake
- ▶ Does not model wind – it is assumed to be first source of supply to help meet loads “outside the model”

7

Model – Analysis

- ▶ Model conducts a week by week analysis of how to meet the loads required
 - First source of supply each week is req'd releases – e.g., minimum licenced flow conditions. All plants must meet their req'd releases.
 - Second source is flows that cannot be stored – for example Yukon River flows at Whitehorse
 - Third source of supply is drawing down reservoirs. Always draws down Marsh first (if available), then Mayo, then Aishihik. Model uses “rule curves” to prevent violating water licences.
 - Last source is diesel

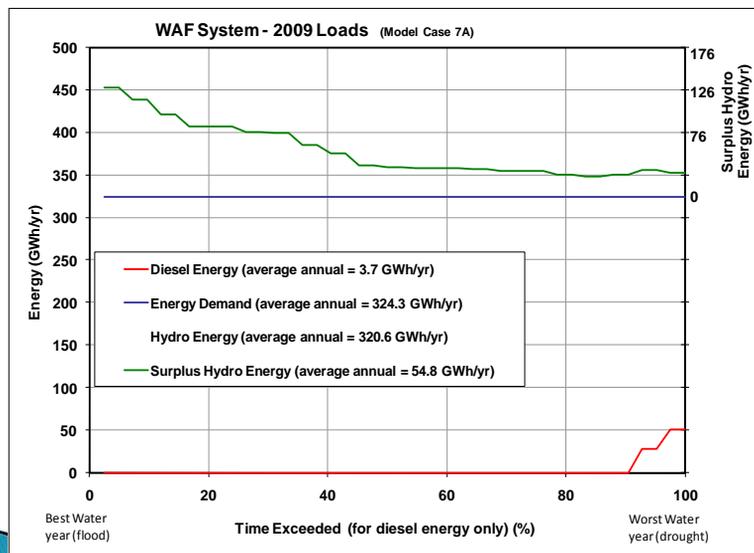
8

Model – Outputs

- ▶ Key outputs from the model:
 - Average annual hydro output from the entire system, under the particular load scenario (averaged across all conditions, including low and high water) – also the distribution of this generation from best water years to worst
 - Average annual diesel generation required to supplement times when there is insufficient hydro
 - Lake and flow levels, by week, for each reservoir and plant on the system
 - Amount of “surplus” energy – or power that could be generated if only there was a load for it.

9

Model Output – energy example



10

Mayo B Project

- ▶ Mayo B Project was planned as potential addition up to 40 GW.h average hydro- including 1 metre extra storage at Mayo Lake.
 - Key is to maintain this generation as useful for serving load (and displacing diesel).
 - The long-term value of 1 GW.h of alternative supply (diesel) is approximately \$3 million (NPV) at today's fuel and financing rates
- ▶ Keeping 5–6 cms minimum in Zone 2 year-round for Salmon, as may be proposed, reduces output a substantial amount (being confirmed).
- ▶ Extra Mayo Lake storage is substantial remaining benefit – about 4 GW.h of long-term average hydro

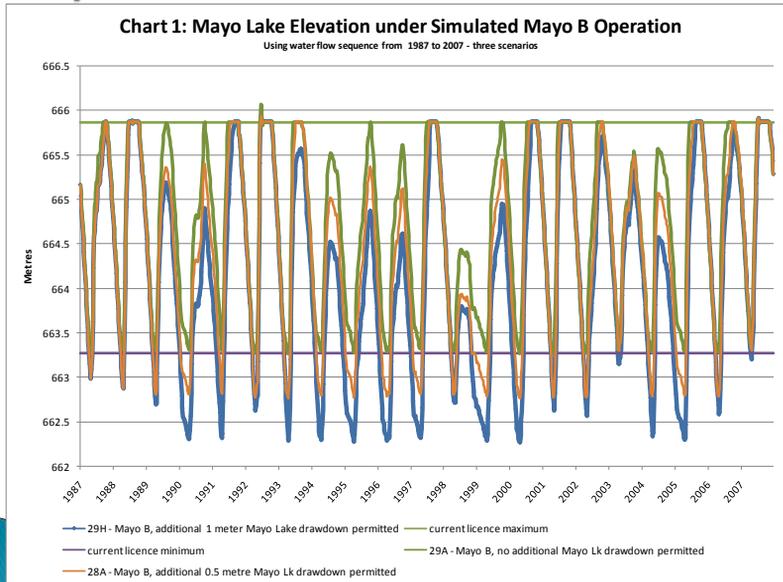
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Mayo Lake

- ▶ Basic information:
 - Minimum release of 2.8 cms
 - Maximum controlled elev. 665.84m (licence in ft)
 - Minimum controlled elevation 663.25m
 - Current licenced range 2.59 metres
 - Each 1 metre is approximately 100 million cubic metres (mcm) – about 8 GW.h per metre if used at existing plant, 14 GW.h if used at new plant.
 - Current range yields storage of 256 mcm
 - Annual inflows vary from high of 653 mcm to low of 238 mcm, average 445 mcm

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Mayo Lake Elevations – scenarios



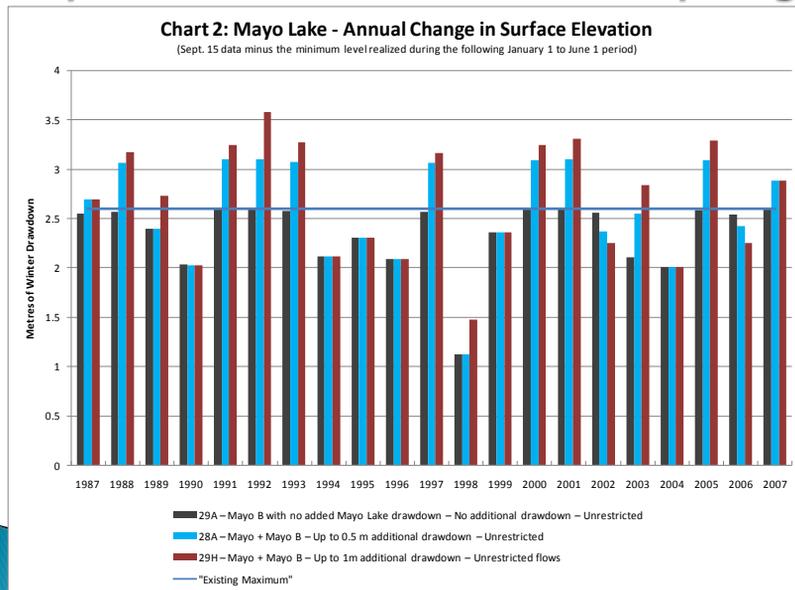
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Mayo Lake – considerations

- ▶ Have found a number of interests at Mayo Lk
- ▶ Appears most are not likely to be adversely affected in any material way, e.g.:
 - Erosion – expected to be less erosion with larger operating range and more bottom range than with existing range
 - Barge access – lower elevations in spring are expected to rebound quickly in May with seasonal inflows, allowing for summer shipping season
- ▶ A key issue of ongoing analysis – fall spawners; need to look at relative drawdown

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Mayo Lake-Drawdown: fall-spring



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Possible approaches to consider

- ▶ 3 Possible distinct approaches :
 - Give access to lower 1 metre with limits on frequency of use; did not appear suited to situation – key concern is fall spawners (Lake Trout) which are most focused on “relative” elevation change, not absolute
 - Seek smaller increase drawdown (less than 1 metre)
 - Seek drawdown greater than 2.59 metres (from fall to spring), with some limits on how often it would be used (e.g., not more than three years in a row – then need “rest” year less than 2.59m)
 - Also looking at hybrid of above
- ▶ Implications are still being assessed
 - Appears possible to get most of 4 GW.h with some conditions in place – like 1 in 4 year “rest”

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