

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)

**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)

**Cc:** Stanyer, Debbi (debbi.stanyer@brookfieldpower.com)

**Subject:** Powell River Energy flow study

**Sent:** 06/25/2007 21:01:57

**Message Body:**

Hello Mel/Ron,

I had a message from Debbi, she has some questions regarding the study. Would someone be able to call her and provide some assistance, it would be better if you responded to those type of questions rather than me. Debbi's number is 604-489-2205, thank you.

Doug Swift

Habitat Management Technologist/Technologist, gestion de l'habitat

Fisheries and Oceans Canada/Pêches et Océans Canada

South Coast Area

148 Port Augusta Street

Comox BC V9M 3N6

Ph. (250)339-4905/Facsimile (250)339-4612

**From:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca); Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**Subject:** RE: Friends of Eagle River Complaint  
**Sent:** 12/07/2007 16:55:21  
**Message Body:**

I'm also avail. this morning at my office until noon

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration  
Direction des oceans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

-----Original Message-----

From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: December 6, 2007 5:00 PM  
To: Nanson, Dave; Sheng, Mel; Swift, Doug  
Subject: RE: Friends of Eagle River Complaint

Gents:

I am available on Friday morning fom home. The number here is S.22  
training session at Jutland Rd., Victoria.

I will be unavailable Friday pm due to a

Regards,

Ron

---

From: Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
Sent: Thu 12/6/2007 4:55 PM  
To: Ptolemy, Ron ENV:EX; Sheng, Mel; Swift, Doug  
Subject: FW: Friends of Eagle River Complaint

I think we should have a brief conference call with the company tomorrow morning. Let me know if you are available.

Thank you

-----Original Message-----

From: Gibson, Jason  
Sent: December 6, 2007 3:40 PM  
To: Rahier, Gregory; Webb, John  
Cc: Nanson, Dave  
Subject: Friends of Eagle River Complaint

Hi Guys,

Just received a call from Terry Braun, Friends of Eagle River. He says the water level has dropped because the "large gates" are closed. He says that salmon redds are exposed, or soon will be exposed.

He said he has left messages with Doug Swift and at the Hydro Dam administration office itself.

Terry Braun, S.22

JG

Jason Gibson



Fishery Officer, C&P Supervisor  
Nanaimo Detachment  
Fisheries & Oceans Canada  
Nanaimo, BC  
Tel: (250) 754-0206  
Cell: (250) 713-3627  
Fax: (250) 754-0309

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** RE: Friends of Eagle River Complaint  
**Sent:** 12/07/2007 17:06:14  
**Message Body:**

Would you be able to call into a conference line?

-----Original Message-----

From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: December 6, 2007 5:00 PM  
To: Nanson, Dave; Sheng, Mel; Swift, Doug  
Subject: RE: Friends of Eagle River Complaint

Gents:

I am available on Friday morning from home. The number here is s.22  
s.22 I will be unavailable Friday pm due to a training session at  
Jutland Rd., Victoria.

Regards,

Ron

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From: Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
Sent: Thu 12/6/2007 4:55 PM  
To: Ptolemy, Ron ENV:EX; Sheng, Mel; Swift, Doug  
Subject: FW: Friends of Eagle River Complaint

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Sent: December 6, 2007 3:40 PM  
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Terry Braun, <sup>s.22</sup>

JG

Jason Gibson  
Fishery Officer, C&P Supervisor  
Nanaimo Detachment  
Fisheries & Oceans Canada  
Nanaimo, BC  
Tel: (250) 754-0206  
Cell: (250) 713-3627  
Fax: (250) 754-0309

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** RE: Friends of Eagle River Complaint  
**Sent:** 12/07/2007 17:25:45  
**Message Body:**

Not yet, were still setting it up. I'll get back to you soon.

-----Original Message-----

From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: December 7, 2007 9:21 AM  
To: Nanson, Dave  
Subject: RE: Friends of Eagle River Complaint

Dave:

Do you have a conference number to call and access code?

Ron

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From: Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
Sent: Fri 12/7/2007 9:06 AM  
To: Ptolemy, Ron ENV:EX  
Subject: RE: Friends of Eagle River Complaint

Would you be able to call into a conference line?

-----Original Message-----

From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: December 6, 2007 5:00 PM  
To: Nanson, Dave; Sheng, Mel; Swift, Doug  
Subject: RE: Friends of Eagle River Complaint

Gents:

I am available on Friday morning fom home. The number here is s.22  
s.22 I will be unavailable Friday pm due to a training session at  
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Regards,

Ron

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From: Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
Sent: Thu 12/6/2007 4:55 PM  
To: Ptolemy, Ron ENV:EX; Sheng, Mel; Swift, Doug  
Subject: FW: Friends of Eagle River Complaint

I think we should have a brief conference call with the company tomorrow morning. Let me know if you are available.

Thank you

-----Original Message-----

From: Gibson, Jason  
Sent: December 6, 2007 3:40 PM  
To: Rahier, Gregory; Webb, John  
Cc: Nanson, Dave

Subject: Friends of Eagle River Complaint

Hi Guys,

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Terry Braun, s.22

JG

Jason Gibson  
Fishery Officer, C&P Supervisor  
Nanaimo Detachment  
Fisheries & Oceans Canada  
Nanaimo, BC  
Tel: (250) 754-0206  
Cell: (250) 713-3627  
Fax: (250) 754-0309

**From:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** RE: Draft ToR for Lois River partial Flow Restoration Project  
**Sent:** 05/16/2007 14:15:38  
**Message Body:**

Thanks Ron, see you later. Remind me to give a CD of the Lois photos

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration  
Direction des oceans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

-----Original Message-----

**From:** Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
**Sent:** May 15, 2007 2:45 PM  
**To:** Sheng, Mel; Swift, Doug  
**Cc:** Wightman, Craig ENV:EX  
**Subject:** Draft ToR for Lois River partial Flow Restoration Project

Hi Mel!

Here's the Draft ToR for your approval and revisions. We can discuss details tomorrow when your down in Victoria.

Cheers!

**Ronald A. Ptolemy,** RPBio  
Rivers Biologist, Fisheries Science Section  
Ecosystems Branch  
Ministry of Environment  
PO Box 9338 Stn Prov Govt  
Victoria, BC V8W 9M1  
Location: 4th Floor, 2975 Jutland Road, Victoria  
Phone: 250-356-7054 Fax: 250-387-9750  
e-mail: : [Ron.Ptolemy@gov.bc.ca](mailto:Ron.Ptolemy@gov.bc.ca)

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**From:** Sheng, Mel [mailto:ShengM@pac.dfo-mpo.gc.ca]  
**Sent:** Thursday, May 10, 2007 3:55 PM  
**To:** Swift, Doug; Ptolemy, Ron ENV:EX  
**Cc:** Wightman, Craig ENV:EX  
**Subject:** RE: Note to Files --Lois River field inspection of May 1, 2007

Seems to me that we covered all these points at the meeting with Brookfield

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration

Direction des océans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

-----Original Message-----

**From:** Swift, Doug  
**Sent:** May 10, 2007 3:49 PM  
**To:** 'Ptolemy, Ron ENV:EX'; Sheng, Mel  
**Cc:** Wightman, Craig ENV:EX  
**Subject:** RE: Note to Files --Lois River field inspection of May 1, 2007

Thanks Ron, does anyone have any objections to forwarding this to the Company?

-----Original Message-----

**From:** Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
**Sent:** Wednesday, May 09, 2007 3:19 PM  
**To:** Swift, Doug; Sheng, Mel  
**Cc:** Wightman, Craig ENV:EX  
**Subject:** Note to Files --Lois River field inspection of May 1, 2007

To whom it may concern:

The attached files document the conditions and observations of fish habitat in lower Lois River for Tuesday, May 1, 2007. The following are concise notes, conclusions and recommendations for further study of possible release flows at the point-of-diversion (POD Lois Lake). The habitat quality for steelhead production is high throughout the canyon sections; just add flows. The stream length from POD to tidewater is 4.2 km.

1. The stream flow metered at Site 1 was 436 L/s or 15.4 cfs in an ideal bedrock cross-section. This flow represents near 1% of the natural mean annual discharge (nat mad) prior to flow regulation. The presumed natural mean annual discharge at Site 1 is 36 cms. In an unconfined stream channel, the nominal rearing baseflow would be 20%mad or 7.2 cms. The stream channel of lower Lois River is confined by a canyon so flow needs will be less.
2. Two adult fish passage barriers at low flows were evident immediately below Highway #101; the lower Falls is about 600m upstream of tidewater. The lower Falls drop 6.6 m into a large plunge pool which is much greater than that passable by the strongest performer (summer steelhead). Typically both stream temperatures at the time of normal upstream migration have to be above 10 C and flows in the magnitude of 50-100%mad have to co-occur for successful passage.
3. There was evidence that lower Falls height is variable and conditional on stream flow. The location of logs some 3.6 m above the present pool surface level is one indication. Should this back-flooding happen on a regular basis, the actual leap height for strong swimmers may be 3m which is conceivable for summer steelhead. Photographs of this site during "spills" in 2007 and assessment of pool elevation may provide added insights. Some local residents claim that steelhead were abundant prior to full flow regulation in 1943. The flows have been more fully regulated in increments over the last 78 years such that spills are more infrequent and there is no fish conservation flows.
4. Conditional Licence #113351 (June 1929) shows the maximum quantity of water which may be diverted is 1297 cubic feet per second or 36.7 cms or the entire mean annual discharge. The purpose of the water use is for power production.
5. The consensus among Sheng, Swift and Ptolemy was that May 1, 2007 flows were not adequate for adult salmon migration however the extent of riffle coverage with water was satisfactory (quality was questionable, depth and velocity). The issue of

qualifying optimum "rearing flows" may be best described in a limited "Riffle Analysis" in sections that are relatively broad such as Site BB on the map. The wetted stream width was about 18m which is the same as the "toe-width". The first preliminary approximation of a rearing flow based on a stream width of 18 m is 1.8 cms or 64 cfs. Should this be the magnitude of rearing flows required in a partial flow restoration project, it would be equivalent to 5%mad; this is roughly the same flow that was found to be satisfactory in Elk Falls Canyon on the Campbell River, Vancouver Island. A series of Riffle Transects and photographs captured at stepped flow from 400, 800, 1600, to 3200 L/s is recommended to describe the relation of usable width for fish and insects versus known stream flow. It is anticipated that spawning flows will be at least double the optimum rearing flow and may be in the magnitude of 3.6 cms or 127 cfs.

6. According to Redden and Pollard (2000?), the ultimate upstream limit for salmon or steelhead is a 25 m falls at the upstream end of Reach 6. This limits the anadromous stream length to about 3,600 m. The necessity for partly restoring streamflows should recognize the fisheries benefit:cost ratio and opportunities for fisheries funding elsewhere in the region. There is a strong sense that restoration of some baseflows for resident trout rearing is a minimum expectation.
7. The extent of spawning substrates (gravel) is highly limited in the Lois River which is typical of reaches below dams. Appropriate mitigation and compensation may be justifiable.
8. The second fish passage barrier is located immediately upstream of the 6.6m Falls and below Highway 101. This is a complex passage sites that might utilize a natural scour hole set in bedrock in photo 5777.
9. Fish-flow study ToR will be drafted shortly along with a list of potential and qualified biological consultants.
10. The round-table discussion of flow issues at noon May 1, 2007 at the Brookfield Power Office in Powell River recognized the difficulty of completing a competent habitat-flow survey over a range in flows due to the inability to finely control flow releases from Scanlon Dam. The very nature of the flow restoration project on Lois River is highly similar to that for BC Hydro's Jordan River Water Use Plan. The ingredients are canyon, no conservation flows, no flow control, an expensive dam retrofit, and poor understanding of the original fish population.

**Ronald A. Ptolemy, RPBio**

Rivers Biologist, Fisheries Science Section  
Ecosystems Branch  
Ministry of Environment  
PO Box 9338 Stn Prov Govt  
Victoria, BC V8W 9M1  
Location: 4th Floor, 2975 Jutland Road, Victoria  
Phone: 250-356-7054 Fax: 250-387-9750  
e-mail: : [Ron.Ptolemy@gov.bc.ca](mailto:Ron.Ptolemy@gov.bc.ca)

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**From:** Swift, Doug [<mailto:SwiftD@pac.dfo-mpo.gc.ca>]  
**Sent:** April 17, 2007 1:20 PM  
**To:** Ptolemy, Ron ENV:EX; Sheng, Mel  
**Subject:** FW: Friends of Eagle River Habitat Report

For your file

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:57 AM  
**To:** Adkins, Bruce; Russell, Lloyd Rob  
**Subject:** FW: Friends of Eagle River Habitat Report

FYI

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:56 AM  
**To:** 'Dyer, Susan'  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca; Sheng, Mel  
**Subject:** RE: Friends of Eagle River Habitat Report

Hello Susan,

Thank you for your email and continuing support in this matter. From our end Mel Sheng, who was with me when we last met, has been in contact with Ron Ptolemy of the Ministry of Environment regarding this matter as we are seeking his input. Ron has been heavily involved with flow related projects for a number of years. It is our intention to make another visit to Powell River and meet with you in conjunction with a field review of the Lois River so that both Ron and Mel can familiarize themselves with its features. I would expect the fish study parameters to follow after that time. Initially we were hoping to do this in April 2007 but as yet we have not set a date due to workloads.

As soon as we can establish a date to come over I will contact you – hopefully we can provide a couple of different dates to choose from as I know you are busy as well. I have told the Friends of Eagle River that this is what we intend to do plus I have discussed this approach with my Manager and he is in agreement.

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]  
**Sent:** Tuesday, April 17, 2007 8:08 AM  
**To:** Swift, Doug  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca  
**Subject:** FW: Friends of Eagle River Habitat Report  
**Importance:** High

Hello Doug,

I have drafted a response to the Friends of Eagle River and will cc you when I send it out to them today. I also have the following comments with respect to their report as noted below. It is important that PREI receives the fish study parameters from DFO ASAP so we know how best to apply funding for the benefit of fish habitat. Please note that the spill is required at this time because of unusually high anticipated inflows and that PREI are currently responding to spill with respect to dam safety principals. I am interested in your comments and look forward to proceeding with the fish study.  
Regards Sue

Susan Dyer, P.Eng., MBA, PMP  
Brookfield Power  
General Manager  
#202 - 4400 Marine Ave,  
Powell River, B.C. V8A 2K1  
Office: 604-489-2213  
Cell: 604-483-1282  
Fax: 604-485-2996

-----Original Message-----

**From:** Stanyer, Debbi  
**Sent:** Monday, April 16, 2007 5:36 PM  
**To:** Dyer, Susan  
**Subject:** FW: Friends of Eagle River Habitat Report

The latest correspondence from the Friends of Eagle River.

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**From:** Jude Abrams [mailto:s.22]  
**Sent:** Friday, April 13, 2007 4:27 PM  
**To:** Stanyer, Debbi  
**Cc:** Colin Palmer; Doug Swift  
**Subject:** Friends of Eagle River Habitat Report



Hello Debbi,

Following up on our phone conversation of Wednesday April 11th I'm sending you our observations on Eagle River habitat after the many large gate openings this winter. As well I'm ccing this to various people, We've sent the observations to Doug Swift of Fisheries and Oceans Canada as well. After you've read what we've found I'm sure you will understand our dismay.

Jude Abrams and Terry L. Brown have taken a good look at the river from the estuary to the canyon below the highway bridge. This was on April 6th 2007. We are trained Streamkeepers and have been doing salmon survey projects since 1997, so we know what we are looking at and talking about. What we saw follows:

#### OBSERVATIONS OF EAGLE RIVER SALMON SPAWNING HABITAT [FROM ESTUARY TO POOL UNDER THE TRANSMISSION WIRES]

- 1) Major salmon spawning gravel beds have been swept completely away in the lower pool, with the largest one, where chum salmon spawned last fall, scoured to large cobbles. All the developing alevins/fry would have been swept away. Only one of the four areas which formerly had suitable gravel still has gravel. The area where pink salmon spawned (in a non-pink year) now has little gravel with mostly cobble remaining, again no fry would have survived.[Dyer, Susan] Under the current high inflows and above average snow pack the natural flows would have been extreme and flashy causing gravel and wooded debris to be flushed out of the stream system even if the dam did not exist. PREI is modeling the current conditions in an attempt to lessen the impact and therefore lessen the number of gates that will be required to pass the event. PREI opens the small spillway gate first and then if required due to "rate of rise" will open the large spillway gate. It has only been necessary to open the combination of the small spillway gate and the one large spillway gate to date in order to keep the dam from overtopping. It will be necessary to open additional gates this spring if the snow melt is fast and accompanied by high precipitation.
- 2) Gravel in the canyon pool above the transmission line crossing is swept away while the large pile of gravel in the pool beneath the hydro line has been washed further up the bank, with much of it now above the early fall water line.[Dyer, Susan] Anticipate that the current natural flashy inflows would have caused the gravel to be flushed out even if the dam was not there.
- 3) All LWD (Large Woody Debris) has been swept down to the estuary or ocean, there is none instream now. In a mainstem stream such as this, with no tributaries or available offchannel habitat LWD is a critical factor in juvenile survival and pool formation.[Dyer, Susan] same comment as 2).
- 4) A large section of canyon wall has slid, part of it falling into one of the few quiet eddy pools under the hydro line.[Dyer, Susan] PREI will follow up on this, concern for stability of channel walls.
- 5) We observed a large sea-run cutthroat or steelhead [viewed from above water], in the lower pool, the only fish observed. Not even any sticklebacks. This sea-run, whether blue-listed coastal cutthroat or severely diminished steelhead is a precious fish. But will it have any suitable spawning ground?
- 6) In June 2006, we observed stickleback nests made of leaf and twig debris. These were guarded by males. Recently hatched fry were also observed here.[also on video] The leaf and twig debris has been completely swept from the river and deposited on Palm Beach. The riverbed has lost all organic matter.
- 7) No caddis fly larvae were observed, nor have we seen the resident dipper birds during the past 3 weeks.

It remains to be seen whether any chum or coho or pink fry survived, and whether any coho

smolts survived. Due to long-term colds and an ear infection we haven't snorkeled the river since December but in our numerous river walks lately we have seen no young fish in the river. In fact as already noted we have only seen one fish!!!! Last summer there were many juvenile coho, and lots of juvenile and subadult and adult cutthroat, possibly rainbows. That was after two winters where only the small gate had been opened, when there was still spawning gravel available.[Dyer, Susan] The quality of the fish habitat is questionable at this time until the fish study can be completed. PREI is awaiting the study parameters from DFO so we can start the study.

To observe this kind of destruction now, after our conversations with you about restoring the health of the river and actively working to prevent harm to the fish is very disheartening. It is a legacy we are stuck with from 70 years of abuse by corporations and the blind eye of government 'watching over' our land and waters.[Dyer, Susan] PREI is committed to continue working with the Friends of Eagle River and take their concerns seriously. The results of the fish study are so important, we need to know that we are applying the best solution for fish habitat not just reacting to political pressure.

During the boom years of logging and milling in Powell River, when it was a company town, the locals didn't have much to say about company practices. Still, it's hard to imagine how anyone could NOT notice the harm that these unnatural flooding and dewatering practices have had on the river and fish. PR Energy may say the cause this winter was generator repairs and an unusually high rainfall winter. However, as climate change is upon us we need to use the precautionary principle and plan for the "unusual" because "unusual" is becoming usual. Water could have been spilling gradually and continuously from the small gate since last fall to ensure dangerously high levels didn't develop as the generator was repaired. Attempting to maximize profits at the expense of river ecosystems may have been acceptable to the public decades ago, but this is a new era. Fresh water is being recognized as a precious resource, salmon are dwindling and anadromous coastal cutthroat trout are a blue-listed species.[Dyer, Susan] Not possible to spill continuously from the small spill way gate, for at least 4 months last fall the spillway was high and dry. There is a significant financial burden to PREI if we now maintain the reservoir 10 feet lower in order to accommodate the Friends of Eagle River and use the small spillway gate as a weir. Essentially we lose a significant portion of our storage capability.

We all know that DFO is understaffed and overworked. But it doesn't take a flow regime specialist to figure out that just one change at the dam, which would cost nothing extra and could be implemented immediately, would have SIGNIFICANT BENEFICIAL RESULTS. This immediate solution is to LEAVE THE SMALL GATE OPEN PERMANENTLY, so it can continuously spill water. When the reservoir level gets just above the lip it will start spilling GRADUALLY and CONTINUOUSLY, mimicking natural rises. Perhaps this would be enough to prevent openings of the large gate. It would restore winter flow levels, perhaps similar to pre-dam flows. It wouldn't address summer or early fall levels at pink and chum spawning times, but it would be an IMMEDIATE solution which WOULDN'T COST EXTRA MONEY to implement! It would also help the recovery of the river during the longer process of retrofitting the dam for summer/fall flows.[Dyer, Susan] PREI does attempt to gradually spill by opening the small gate first and then depending on how fast the lake level is rising will determine if the large gate is required. PREI will be bringing the lake level down to long term average lake levels in order to help contain the larger than normal anticipated high spring inflows. The modeling to date shows the worst case being snow melt combined with ambient temperatures greater than 25 deg C and unusual precipitation. Our main concern is dam safety at this time and limiting the amount of spill way gates that need to be opened.

This can be done NOW without any studies needed first. It could have been done last fall when PR energy was repairing their generator and there was danger of major flood events over the winter. Unfortunately, damage has been done, let's see how we can keep it from ever happening again.

Thanks for your attention to this matter, we await your response.  
Terry L. Brown & Jude Abrams Friends of Eagle River

Terry L. Brown

s.22

[www.TerryLBrown.com](http://www.TerryLBrown.com)

"Connecting You with Wonder"

--

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**Subject:** RE: Dave Nanson  
**Sent:** 12/03/2007 20:07:00  
**Message Body:**

Thank you all for your assistance on this. I will respond to Ms Stanyer and copy you.

Dave Nanson  
Habitat Biologist  
Oceans, Habitat and Enhancement  
Fisheries & Oceans Canada  
Madeira Park, B.C.  
Phone: 604-883-0454  
Fax: 604-892-2378

-----Original Message-----

From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: December 3, 2007 11:25 AM  
To: Swift, Doug; Nanson, Dave  
Cc: Sheng, Mel  
Subject: RE: Dave Nanson

Thanks Doug!

Ron

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From: Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
Sent: Mon 12/3/2007 11:20 AM  
To: Ptolemy, Ron ENV:EX; Nanson, Dave  
Cc: Sheng, Mel  
Subject: RE: Dave Nanson

Hi Ron,

Yes the Company have hired Tod Hatfield and Adam Lewis who have been to the river recently. Debbi Stanyer told me that they have provided some recommendations regarding ramping down the flow although I have not seen those recommendations. I do not think (but i could be wrong) they have carried out the riffle analysis, I believe that was going to be carried out in the spring.

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From: Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
Sent: Mon 03/12/2007 10:23 AM  
To: Nanson, Dave; Swift, Doug  
Cc: Sheng, Mel  
Subject: RE: Dave Nanson

Doug:

Greetings.

What is the update on habitat-flow surveys on the lower Lois River. Has a qualified consultant been hired? Have they completed habitat-flow surveys according to the ToR? Should a Riffle Analyses been completed, the flow that optimizes riffle wetted width will be similar to that which protects incubation conditions at redd sites. Monitoring draw down may not be necessary.

Thanks,

Ron

From: Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
Sent: Mon 12/3/2007 9:49 AM  
To: Swift, Doug  
Cc: Sheng, Mel; Ptolemy, Ron ENV:EX  
Subject: RE: Dave Nanson

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Thoughts?

Dave Nanson  
Habitat Biologist  
Oceans, Habitat and Enhancement  
Fisheries & Oceans Canada  
Madeira Park, B.C.  
Phone: 604-883-0454  
Fax: 604-892-2378

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Sent: December 3, 2007 9:31 AM  
To: Nanson, Dave  
Cc: Sheng, Mel  
Subject: RE: Dave Nanson

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Cc: Sheng, Mel  
Subject: FW: Dave Nanson  
Importance: High

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From: Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]

Sent: Friday, November 30, 2007 11:55 AM

To: Swift, Doug; Nanson, Dave

Cc: Dyer, Susan

Subject: RE: Dave Nanson

Importance: High

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Subject: Dave Nanson

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South Coast Area

148 Port Augusta Street

Comox BC V9M 3N6

Ph. (250)339-4905/Facsimile (250)339-4612

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**Cc:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** RE: Dave Nanson  
**Sent:** 12/03/2007 17:49:40  
**Message Body:**

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**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**Cc:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Down, Ted ENV:EX (Ted.Down@gov.bc.ca)  
**Subject:** RE: Dave Nanson  
**Sent:** 12/03/2007 19:18:29  
**Message Body:**

Thanks Ron, I agree, moving redds is not something which I have ever agreed to our even suggested.

---

**From:** Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
**Sent:** Mon 03/12/2007 10:08 AM  
**To:** Nanson, Dave; Swift, Doug  
**Cc:** Sheng, Mel; Down, Ted ENV:EX  
**Subject:** RE: Dave Nanson

Dave/Doug/Mel:

Redd recovery and egg relocation is a really bad idea. Maintenance of a baseflow that covers the channel toe-width is highly recommended as a mitigation action while ramping down. Redds are a very special environments created by fish and not humans. An extreme action in advance of reducing flows to something close to zero, would have been to put all potential salmon eggs into a hatchery. Now that eggs are happily maturing in the gravel, they should remain there.

I won't speculate on what a "safe" base flow should look like however we know that confined channels like Lois River below POD can safely operate as fish habitat (incubation issue) at reduced flows near 5%mad (assuming 10%mad is OK in unconfined channels). Mean annual discharge at POD (Lois Reservoir outlet) is about 35500 L/s. 5%mad is about 1775 L/s or 63 cfs.

Ron

---

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**Cc:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**Subject:** RE: Dave Nanson  
**Sent:** 12/03/2007 19:20:47  
**Message Body:**

Hi Ron,

Yes the Company have hired Tod Hatfield and Adam Lewis who have been to the river recently. Debby Stanyer told me that they have provided some recommendations regarding ramping down the flow although I have not seen those recommendations. I do not think (but i could be wrong) they have carried out the riffle analysis, I believe that was going to be carried out in the spring.

---

**From:** Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
**Sent:** Mon 03/12/2007 10:23 AM  
**To:** Nanson, Dave; Swift, Doug  
**Cc:** Sheng, Mel  
**Subject:** RE: Dave Nanson

Doug:

Greetings.

What is the update on habitat-flow surveys on the lower Lois River. Has a qualified consultant been hired? Have they completed habitat-flow surveys according to the ToR? Should a Riffle Analyses been completed, the flow that optimizes riffle wetted width will be similar to that which protects incubation conditions at redd sites. Monitoring draw down may not be necessary.

Thanks,

Ron

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**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)

**To:** Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Rahier, Gregory (RahierG@pac.dfo-mpo.gc.ca); Webb, John (WebbJo@pac.dfo-mpo.gc.ca)

**Subject:** Lois River

**Sent:** 12/21/2007 18:13:59

**Attachments:** Friends of Eagle River.doc

**Message Body:**

Just so that you folks are kept in the loop.

<<Friends of Eagle River.doc>>

Dave Nanson  
Habitat Biologist  
Fisheries & Oceans Canada  
P.O. Box 10, 12841 Madeira Park Road  
Madeira Park, B.C. V0N 2H0  
Phone: 604-883-0454  
Fax: 604-883-2152





Dave Nanson  
P.O. Box 10  
12841 Madeira Park Road  
Madeira Park, B.C. V0N 2H0

December 21, 2007

Nadja Hocking  
Friends of Eagle River  
PO Box 404  
Powell River, B.C.  
V8A 5C1

Dear Ms. Hocking,

**Re: Lois (Eagle) River**

Thank you for your letter dated December 18, 2007. Fisheries & Oceans Canada (DFO) is attempting to work with Powell River Energy to address short and long term fish habitat issues associated with flow releases from the dam on Lois River. DFO is currently waiting for a report from Powell River Energy detailing the events that led to recent flow alterations in the river. We are hopeful that this report will provide short term flow options that maximize survival of salmon eggs that were deposited on gravel benches along the river this past fall.

As you are aware, Powell River Energy has also agreed to complete a detailed habitat flow study for Lois River. DFO expects this study to be completed during the spring of 2008 and we believe that the results of this study will lead to significant improvements in the flow regime of Lois River.

I will endeavour to keep you apprised of progress made on this matter. Thank you for the stewardship that your group continues to demonstrate on this river.

Sincerely,

Dave Nanson, Habitat Management

Cc: Susan Dyer/Debbie Stanyer, Powell River Energy  
Gregory Rahier, Fishery Officer i/c, Powell River Field Office, DFO  
Bruce Adkins, Area Manager, OHEB, DFO (e-mail)  
Mel Sheng, DFO (e-mail)  
Doug Swift, DFO (e-mail)  
Ron Ptolemy, MoE (e-mail)

.../2

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**Subject:** Lois River Report

**Sent:** 12/24/2007 17:47:09

**Attachments:** Lois River Dam Closure, Redd Exposure & Fish Stranding - Vision Marine.pdf

**Message Body:**

Attached is Mark's report.

---

# **Final Report on the Lois River Dam Closure and its Effects on Red Exposure and Fish Stranding**

**Presented to:**

**Powell River Energy Inc.**

**By:**



**Mark Biagi M.Sc., R.P. Bio.**  
7267 Warner St.  
Powell River, British Columbia  
V8A 4A2



**December 2007**



## Introduction:

On the Fifth of December 2007, Vision Marine Consulting Ltd. was retained by Powell River Energy Inc. to go to the lower reach of the Lois River in preparation for the closing of spill gates of the dam at Lois Lake.

## The Survey:

The survey of the river began at 13:00 hrs. and when the dam gate was at when the gates were opened to approximately 0.6 m. The water depth at the location of the photo was 0.78 m. We proceeded up stream while carefully inspecting the shores for the presence of reds and fish carcasses (species identification). The carcasses shown here are chum salmon (*Oncorhynchus keta*). We were unable to see the telltale depressions in the gravel that identify a red.

The reason for this is that the velocity of the water was such that a great deal of fine and medium sized material covered all the depressions. Though we dug shallow holes in the gravel along the banks of the river we did not find any reds.



We continued to travel up the river looking into every puddle or pool that was either isolated from or looked like it was going to be cut off from direct access to the river when the water level dropped. Every pool along the river was carefully examined. The spaces between and under rocks was prodded with a small net or a stick. If any fish were either seen or suspected of hiding in these crevices a photo was taken of the area under the rock, the photo examined and if fish were seen they were either removed from the pool and placed in the river, or they were chased out of the area into deeper waters. The photo above reveals three small trout holding out in a crevice about 0.7 m. deep under a large boulder.



These fish were chased into deeper waters. The area was checked on the 6<sup>th</sup> of December and the pool had very little access to the river and the fish were nowhere to be seen. One fish in the upper region was seen but not captured due to low light conditions. The photo on the right was also taken under suspicion of fish presence and revealed the location empty. Whereas the photo below reveals another fish in hiding.



The photos on the left are a good representation of the type of pool that was encountered throughout the entire length of the reach. The larger pools were found at the estuary and are under tidal influence. They were fairly open (with no places to hide) and the bottoms were typically bedrock with small patches of sand, gravel and detritus.

The smaller pools were located farther up the reach and they were more complex as they were made of large boulders sitting on either gravel or bedrock.



While inspecting the beaches we came across a few stranded live and dead eggs lying between the boulders.



The two photos show close up shots of the eggs that were found. The egg on the upper photo is dead and has a bit of fungus growing on its surface. The photo below it shows a live egg that is still alive and is in the eyed stage. The arrow is pointing to the embryo's eye spot. The photo on the bottom shows the area where the eggs were found. The only plausible explanation for the location of these eggs is that a



raccoon may have been eating eggs in this area and lost a few. As can be clearly seen from this picture this location is far from an ideal spawning area. On this day we found a total of eight eggs.

We proceeded to dig eight to ten shallow holes in the surrounding gravel and found no eggs.



We continued to travel up stream taking note of the water flowing over some of the more restricted areas in the reach. The water flow was what one would expect to find in a river or stream at this time of the year. The photos on the left show the flow conditions in the rapids, and in the pools. We traveled all the way

up the river until we reached a narrow crossing (3.5 m) wide approximately 150 m. from the falls. The water flow was too rapid to cross with an estimated flow of 3 to 3.5 m<sup>3</sup>/sec. We reached this area at approximately 15:30 hrs. By this time the

gates at the dam had been closed for at least one and one half hours. The water flow characteristics at this time can be considered a natural flow for this time of the year without any additional contribution from the dam.





On the way out of the Lois River, we continued to inspect the banks of the river above the water level, from the rivers edge to the bank-full level, and below the water line as far as safely possible. We saw no evidence of reds above the current water level at the water level or to a depth of at about 0.6 m. depth from the bank. The photo on the right is representative of the below water level area where it is feasible to find reds. We dug five or six more shallow (15 cm. to 20 cm.) holes on the gravel bank above the water level and we found no evidence of reds.



### The Survey 2<sup>nd</sup> Day:

On the 6<sup>th</sup> of December, we returned to the river at 08:30 hrs. since we had determined that it would be a good idea to give the river at least twelve hours and then return to survey the river for possible stranded fish or evidence of dry reds. The depth of the river at the estuary was considerably lower than the previous day with an average depth of approximately 0.45 m. Once again all the pools from the estuary to the uppermost part of the reach were checked for fish in the same way as the day before, and nothing was found, with the exception of the fish that we had spotted the day before but were



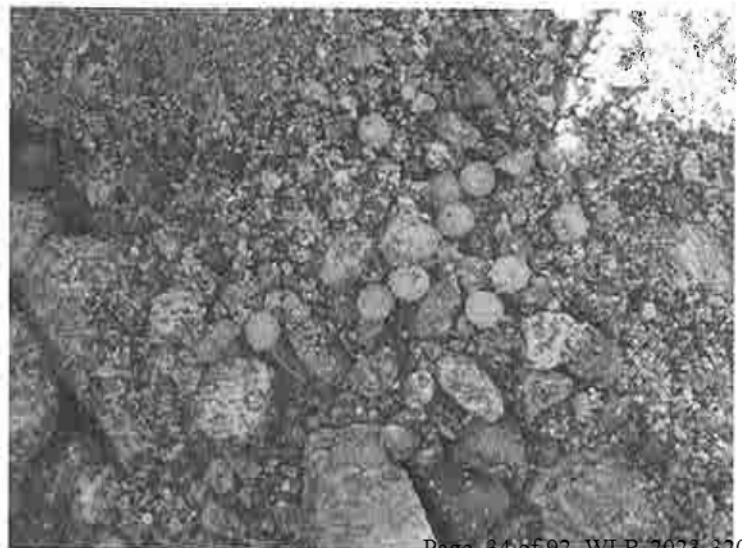
unable to find. The photo below shows the area where the fish was found; however, this is not the location where we had seen it the previous day. That pool was still there and there were no fish in it. Note the rocks around the fish are practically dry except for some surface moisture. The fish was quite dry and covered in sand. We placed the fish in a bucket with water for later identification. Though initially we assumed it was trout, after close examination of the fins, the par marks, the deep fork in the tail (that became more evident with hydration) and gills, the fish was identified as a Sockeye salmon (*Oncorhynchus nerka*). The fish was 19.2 g. and the fork length is 12 cm. To our knowledge there are no serious reports

of Sockeye spawning in Lois River, other than those proclaimed by the Friends of Eagle River. No Sockeye carcasses were found in the river, and the size of this fish and very faint par marks suggests that it is one maybe two years old and ready to migrate to the ocean. Under normal circumstances Sockeye that are hatched in rivers that do not have a lake associated with them migrate to the marine environment soon after emergence. Unless this fish spent one to two years in the pool below the falls (unlikely), it is possible that a Kokanee juvenile was washed out of Lois Lake, and survived the trip down stream. Given the evidence and the lack of reliable information on what species are spawning in the lower reach of Lois River we cannot discount either explanation.



At 12:00 hrs. we were back at the estuary of the Lois River inspecting the banks for the fourth time, when two members of the Friends of Eagle River group showed up and they were very upset about the drop in water level. They claimed that the major spawning reds at the estuary and further up the river. We took a look at the area in the estuary that they claimed to be a major red and despite digging 15 to 20 holes between 15 cm. and 25 cm. deep in an area approximately 15 m<sup>2</sup> we were unable to find evidence of a massive spawn in this area. The photo to the left shows the only evidence of the presence of a red and only en eggs are evident.

We proceeded up stream to the next area where the Friends of Eagle River claimed to have seen hundreds of salmon spawning. The photo on the right shows an overall photo of the gravel beach and the insert is a picture of the pool right beside it. The area with clean gravel is approximately 350 m<sup>2</sup> and the entire bank would have an area of approximately 3,000 m<sup>2</sup>. Once again the claims were that hundreds of chum were spawning in this area. We dug 30 - 40 holes in the cleaned gravel area shown in the photo and once again found no evidence of massive spawning. We did find two areas where there were accumulations of eggs such as the one shown in the lower photo. Further more, this area of the river was not covered by water at the time that the gates were fully opened, therefore, opening the gates once again would have no effect on these eggs.





## Final Comments:

It is the opinion of Vision Marine Consulting, that the closing of the spill gate at the Lois Lake dam did not have a negative effect on the fish populations found in the lower reach of the Lois River. The evidence that was collected during the two day survey of the river reveal that:

- There were no significant spawning events either in the estuary or in gravel beds that are in this reach of the Lois River. The lowering of the water levels in this river due to the closing of the spill gates at the Lois Lake dam has not had a deleterious impact on the fish populations or the fish habitat of the river
- With the exception of one fish, there were no fish stranded in pools by the lowering of the water level in lower reach of the Lois River. Any fish that were thought to be at risk of being trapped were relocated to safer deeper areas of the river
- The evidence of spawning on the gravel located approximately 150 m. from the mouth of the river, suggests that a few chum salmon spawned in this area when the water levels were abnormally high for this time of the year (the spill gate opened in combination with very high precipitation)
- There was no evidence of a major spawning event (hundreds of fish) spawning on the gravel bed that has been the focus of public concern
- At this time, the normal water levels in the Lois River in combination with the increased flow of water coming from the spill gate, were unable to maintain the gravel bed in question under water. This terrace was above water when the gates were fully opened and we suspect that this area has been dry for some time now

## Conclusion:

The closing of the spill gates at the Lois Lake dam had no damaging effect on the various fish populations found in the lower reach of the Lois River.

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Stanyer, Debbi (debbi.stanyer@brookfieldpower.com)  
**Cc:** Rahier, Gregory (RahierG@pac.dfo-mpo.gc.ca); Webb, John (WebbJo@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca); Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca)  
**Subject:** Lois River  
**Sent:** 12/21/2007 16:54:13  
**Message Body:**

Debbie, I am still waiting for the report discussed during our conference call on December 7, 2007. At that time, you indicated that the report may be completed by the end of the day. I have recently visited the river and it appears that some of the eggs on the gravel beaches are still alive. I was hoping that your report would discuss options for keeping them alive once they hatch. Please provide me with an update as soon as possible.

Thank you  
Dave

Dave Nanson  
Habitat Biologist  
Fisheries & Oceans Canada  
P.O. Box 10, 12841 Madeira Park Road  
Madeira Park, B.C. V0N 2H0  
Phone: 604-883-0454  
Fax: 604-883-2152

**From:** (ShengM@pac.dfo-mpo.gc.ca)  
**To:** SwiftD@pac.dfo-mpo.gc.ca  
**Cc:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** Lois R  
**Sent:** 02/16/2007 15:13:40  
**Message Body:**

Hi Doug:

Sorry been out the last two days plus today. I 'm waiting for Ron Ptolemy, the B.C. expert on fish flow requirements to provide a date for on-site. I'll check with him again. We have not prepare any TOR- we wish to do the on-site first.

Sorry for the delay, Mel

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration  
Direction des oceans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

**From:** Down, Ted ENV:EX  
**To:** Martin, Al D ENV:EX (Al.Martin@gov.bc.ca); Wilson, Andrew S ENV:EX (Andrew.Wilson@gov.bc.ca); Tesch, David ENV:EX (David.Tesch@gov.bc.ca); Norris, J.Gary ENV:EX (Gary.Norris@gov.bc.ca); Pollard, Sue M ENV:EX (Sue.Pollard@gov.bc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Scholten, George ENV:EX (George.Scholten@gov.bc.ca); Sebastian, Dale ENV:EX (Dale.Sebastian@gov.bc.ca); Witt, Andy ENV:EX (Andy.Witt@gov.bc.ca)  
**Subject:** FW: The Eighth Larkin Lecture Wednesday March 28, 2007, 5 pm, Dr. Ray Hilborn  
**Sent:** 02/20/2007 00:03:45  
**Attachments:** fishbulletblue.gif  
**Message Body:**

FYI- this should be a good one...

**Ted Down**  
Fisheries Science  
250-387-9715

---

**From:** Janice Doyle [mailto:j.doyle@fisheries.ubc.ca]  
**Sent:** Tue, February 13, 2007 9:55 AM  
**To:** Fisheries Centre Office  
**Subject:** The Eighth Larkin Lecture Wednesday March 28, 2007, 5 pm, Dr. Ray Hilborn

## Larkin Lectures

Colleagues, family and friends established the Larkin Lecture Fund to honour Dr Peter Larkin when he retired from the University of British Columbia, Vancouver, Canada, and later, when he passed away in 1996 (see Northcote 1996). The Lecture is held approximately biennially at the Fisheries Centre, UBC, and the manuscript is submitted for publication in Fish and Fisheries, subject to the normal refereeing process. (Until 1999 in Reviews in Fish Biology and Fisheries)

*Northcote, T.D. (1996) Obituary of Peter Anthony Larkin. Rev. Fish Biol. Fish. 6: 374-7.*

**The Eighth Larkin Lecture will be presented** at 5 pm Wednesday March 28, 2007, in room 120 of the UBC Aquatic Ecosystems Research Laboratory (AERL), 2202 Main Mall, UBC, by

Dr. Ray Hilborn , Richard C. and Lois M. Worthington Professor of Fisheries Management in the School of Aquatic and Fishery Sciences, University of Washington

### **"Learning from Fisheries Successes: managing fish is managing people"**

The Eighth Larkin Lecture is a free lecture open to the public and followed by an open reception in the lobby of the AERL.

On Thursday March 29, at 11 am, Dr. Hilborn will lead a question and answer seminar in AERL 120, also open to all. The Q&A will be followed by a pizza lunch in the foyer.

Poster for the Eighth Larkin Lecture

*Kindly RSVP for Lecture, Reception, Q&A and pizza lunch by sending an e-mail to office@fisheries.ubc.ca providing your name and contact details and indicating which event(s) you will attend, or by telephoning 604 822-2731 with the same information.*

---

Janice Doyle  
Graduate Secretary & Secretary to Director  
Fisheries Centre  
The University of British Columbia  
AERL Room 232  
2202 Main Mall  
Vancouver, B.C. V6T 1Z4  
CANADA

604 822-2731, fax 822-8934  
e-mail [j.doyle@fisheries.ubc.ca](mailto:j.doyle@fisheries.ubc.ca)  
URL [www.fisheries.ubc.ca](http://www.fisheries.ubc.ca)

See the 2004-2005 Fisheries Centre Report at <http://www.fisheries.ubc.ca/publications/reports/FCReport2004-2005web.pdf>

---

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Report from Friends of Eagle River  
**Sent:** 08/27/2007 15:29:44  
**Attachments:** image001.gif  
**Message Body:**

fyi

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, August 21, 2007 1:22 PM  
**To:** 'Stanyer, Debbi'; Dyer, Susan  
**Subject:** RE: Report from Friends of Eagle River

Thanks for the email Debbi, I knew that we discussed the small gate but I could not recollect the details.

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Monday, August 20, 2007 4:31 PM  
**To:** Dyer, Susan; Swift, Doug  
**Subject:** RE: Report from Friends of Eagle River

Doug/Sue

I contacted the biologist that we are planning to use for the fish habitat study to provide an opinion on the FOER report. I caught him just as he was leaving for holidays and expect to here back from him this week. We plan to meet with the both the biologists that will be doing the study later in the year.

With respect to the small gate opening, as we discussed at our meeting in Powell River with Ron, Mel and yourselves, opening the small gate would provide little benefit to the river as the lake level is typically below the bottom of the sill during the year. In addition the effect on the ecosystem and users upstream of the dam would have to be evaluated.

Deb

---

**From:** Dyer, Susan  
**Sent:** Monday, August 20, 2007 1:51 PM  
**To:** Stanyer, Debbi  
**Subject:** FW: Report from Friends of Eagle River

Hello Debbi  
Can you give me an update on the study...  
regards Sue

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Monday, August 20, 2007 1:09 PM  
**To:** Dyer, Susan  
**Subject:** RE: Report from Friends of Eagle River

Thanks for the update Susan. Are you referring to the study that DFO and Brookfield Power discussed during our last meeting or another separate study dealing with the comments in the Friends of Eagle River?s email? Would you explain the issues with keeping the small gate open, I know that I will be asked that question by my Manager. Thank you.

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]  
**Sent:** Friday, August 10, 2007 7:50 AM  
**To:** Swift, Doug  
**Cc:** Stanyer, Debbi; McPhee, Andy

**Subject:** RE: Report from Friends of Eagle River

Hello Doug,

PREI will be responding to the Friends of Eagle River claims below after we have completed an independent fish survey of the alleged habitat damage. We are trying to get a commitment for the fish survey for next week. I will keep you informed.

Regards Sue

---

**From:** Jude Abrams [mailto:[jude.abrams@prei.ca](mailto:jude.abrams@prei.ca)]

**Sent:** Thursday, August 09, 2007 7:51 PM

**To:** Doug Swift; Scott Northrup

**Cc:** Dyer, Susan; Stanyer, Debbi; Nicholas Simons; Maggie Hathaway; Ministry of Environment Barry Penner MLA; Colin Palmer Chair Powell River Regional District; Shane Dobler Powell River Salmon Society; Laura Walz; Dan Bouman; George Smith; Mr Wes Bingham; Kevin; Lars; Monty; Pat; Terry L. Brown

**Subject:** Report from Friends of Eagle River

Aug. 09, 2007

Fisheries and Oceans Canada,  
Doug Swift,  
Habitat Specialist

Dear Doug Swift,

The Large Gate on Lois Lake dam was opened on Sunday July 15th. After the flow stopped Terry L. Brown and Jude Abrams walked the banks from estuary to the highway bridge and also snorkeled the river. The following impacts were observed:

- 1 year+ coho juveniles are present only in the bottom pool before estuary, whereas last summer they were sighted up to the pool below the big falls at the highway.
- Only sighted 2 possible coho juveniles of this spring (viewed from above water and the species identification is uncertain), the coho fry we observed before the big gate opening are nowhere in evidence.
- No juvenile stickleback sighted. There were some in the lower pool close to the estuary before the last opening, but not many due to the lack of spawning habitat ( small woody debris and leaf litter) after the many previous gate openings this year. These are an important food for salmonids.
- Only a half dozen caddis fly larvae were seen. The rest were washed out by the flood These are also an important food for salmonids. The lack of stickleback juveniles and caddis fly larvae poses a significant food shortage for any salmonids still in the river.
- Trees and shrubs on the riverbanks, which could have provided insects to drop into the river for food, have been washed away or flattened
- all pollywogs (pacific tree frog) and salamander larvae (probably roughskin newts) that were in the potholes alongside the river are no longer there, having been washed out.

Once again we reiterate our suggestion to keep the small gate open permanently so water will spill continuously and may prevent the need to open the large gate. In this very wet year there is no good reason why the small gate should have been closed in May. The argument from PR Energy that it wouldn't spill continuously since the water level may go below the gate at some time is no reason not to have it open. We realize that keeping the small gate open all the time is only a temporary solution but it does avoid the catastrophic effects of a major discharge all at once. The water level two weeks ago was only about 2 1/2 feet above the bottom of the small gate. Lowering the reservoir this amount would not have a major impact on fish or float cabins since the level usually goes below that each summer. The current system is not working. It's time to try something else before the late summer pink run.

PR Energy ignored this possible solution and the result is a loss of salmonids and other aquatic organisms from the river. Opening the large gate is destructive and therefore negligent. Under federal fisheries regulations this is a legally enforceable infraction.

We appreciate that habitat studies are now underway which will lead to a new flow regime. Debbi Stanyer (PR Energy biologist) has indicated that PR Energy will respond to direction from FOC. We recommend that only the small gate be used to control water levels and that it remain open from now on. The Friends of Eagle River understand that this isn't the long-term solution but it would help to limit the impacts to fish now, while the long-term solutions are being worked out. These long-term solutions will take at least 2 years to implement, probably more, so this immediate action to reduce destruction of habitat and fish should be implemented now. Do you have any different solution to prevent further habitat loss now?

Having the small gate open will benefit the pink and chum salmon which spawn in early autumn. This is a pink salmon year in the Strait of Georgia so having a good flow in the river will enable them to enter and swim upstream easily, instead of fighting their way to the lower pool and not being able to go further upstream.

There is wide community support for protecting Eagle River. On June 16th more than 100 people attended an Eagle River Celebration and Art Show. There is a petition circulating now, with many signatures already, which states:  
"We the undersigned, petition the Minister of Fisheries and Oceans Canada to undertake all necessary measures to ensure that sufficient waters are provided to the Eagle River to maintain this valuable fish spawning habitat."

The will of the community is to have a healthy Eagle River Ecosystem now.

For the Fish, Folks and Forests,  
Terry L. Brown and Jude Abrams  
On Behalf of the Friends of Eagle River

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**Cc:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Report from Friends of Eagle River  
**Sent:** 08/20/2007 20:10:21  
**Message Body:**

FYI

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]  
**Sent:** Friday, August 10, 2007 7:50 AM  
**To:** Swift, Doug  
**Cc:** Stanyer, Debbi; McPhee, Andy  
**Subject:** RE: Report from Friends of Eagle River

Hello Doug,  
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---

**From:** Jude Abrams [mailto:<sup>S.22</sup>] ]  
**Sent:** Thursday, August 09, 2007 7:51 PM  
**To:** Doug Swift; Scott Northrup  
**Cc:** Dyer, Susan; Stanyer, Debbi; Nicholas Simons; Maggie Hathaway; Ministry of Environment Barry Penner MLA; Colin Palmer Chair Powell River Regional District; Shane Dobler Powell River Salmon Society; Laura Walz; Dan Bouman; George Smith; Mr Wes Bingham; Kevin; Lars; Monty; Pat; Terry L. Brown  
**Subject:** Report from Friends of Eagle River

Aug. 09, 2007

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Page 42 of 92 WLR-2023-32010



pool and not being able to go further upstream.

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For the Fish, Folks and Forests,  
Terry L. Brown and Jude Abrams  
On Behalf of the Friends of Eagle River

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: old photo of the Eagle River  
**Sent:** 05/02/2007 17:28:17  
**Attachments:** Nameless.msg  
**Message Body:**

FYI

-----Original Message-----

From: Nadja Hocking [mailto:s.22]  
Sent: Thursday, February 15, 2007 10:28 PM  
To: swiftD@pac.dfo-mpo.gc.ca; scott Northrup  
Subject: Fwd: old photo of the Eagle River

Dear Scott and Doug,

For your information here is the photo of the Eagle river before the dam was built. Quite the river.

Nadja

> Subject: photo

>

> 

> J. Michael Thoms, Ph.D

> Watershed Writing & Research

> 4476B Marine Ave

> Powell River, BC V8A 2K2

> phone: s.22

> cell:

> email: watershedwriting@onelink.ca

>

>

>

**From:**  
**Subject:**  
**Sent:** 05/02/2007 17:28:17  
**Attachments:** PH005218.jpg  
**Message Body:**

Dear Scott and Doug,

For your information here is the photo of the Eagle river before the dam was built. Quite the river.  
Nadja

**Subject: photo**

J. Michael Thoms, Ph.D  
Watershed Writing & Research  
4476B Marine Ave  
Powell River, BC V8A 2K2  
phone: 222  
cell: ( )  
email: [watershedwriting@onelink.ca](mailto:watershedwriting@onelink.ca)



**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Dyer, Susan (Susan.Dyer@brookfieldpower.com); Stanyer, Debbi (debbi.stanyer@brookfieldpower.com)  
**Cc:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**Subject:** FW: Note to Files --Lois River field inspection of May 1, 2007  
**Sent:** 05/10/2007 23:13:22  
**Attachments:** LoisR\_May1\_2007.xls, LoisRsurveyPoints.jpg, LowerFallsLoisR.bmp, DSCN5777.JPG, DSCN5780.JPG, DSCN5781.JPG  
**Message Body:**

Hello Susan/Debbi

Thank you for the meeting and lunch on May 1, here are Ron's files from our Lois River visit.

-----Original Message-----

**From:** Ptolemy, Ron ENV:EX [mailto:Ron.Ptolemy@gov.bc.ca]  
**Sent:** Wednesday, May 09, 2007 3:19 PM  
**To:** Swift, Doug; Sheng, Mel  
**Cc:** Wightman, Craig ENV:EX  
**Subject:** Note to Files --Lois River field inspection of May 1, 2007

To whom it may concern:

The attached files document the conditions and observations of fish habitat in lower Lois River for Tuesday, May 1, 2007. The following are concise notes, conclusions and recommendations for further study of possible release flows at the point-of-diversion (POD Lois Lake). The habitat quality for steelhead production is high throughout the canyon sections; just add flows. The stream length from POD to tidewater is 4.2 km.

1. The stream flow metered at Site 1 was 436 L/s or 15.4 cfs in an ideal bedrock cross-section. This flow represents near 1% of the natural mean annual discharge (nat mad) prior to flow regulation. The presumed natural mean annual discharge at Site 1 is 36 cms. In an unconfined stream channel, the nominal rearing baseflow would be 20%mad or 7.2 cms. The stream channel of lower Lois River is confined by a canyon so flow needs will be less.
2. Two adult fish passage barriers at low flows were evident immediately below Highway #101; the lower Falls is about 600m upstream of tidewater. The lower Falls drop 6.6 m into a large plunge pool which is much greater than that passable by the strongest performer (summer steelhead). Typically both stream temperatures at the time of normal upstream migration have to be above 10 C and flows in the magnitude of 50-100%mad have to co-occur for successful passage.
3. There was evidence that lower Falls height is variable and conditional on stream flow. The location of logs some 3.6 m above the present pool surface level is one indication. Should this back-flooding happen on a regular basis, the actual leap height for strong swimmers may be 3m which is conceivable for summer steelhead. Photographs of this site during "spills" in 2007 and assessment of pool elevation may provide added insights. Some local residents claim that steelhead were abundant prior to full flow regulation in 1943. The flows have been more fully regulated in increments over the last 78 years such that spills are more infrequent and there is no fish conservation flows.
4. Conditional Licence #113351 (June 1929) shows the maximum quantity of water which may be diverted is 1297 cubic feet per second or 36.7 cms or the entire mean annual discharge. The purpose of the water use is for power production.
5. The consensus among Sheng, Swift and Ptolemy was that May 1, 2007 flows were not adequate for adult salmon migration however the extent of riffle coverage with water was satisfactory (quality was questionable, depth and velocity). The issue of qualifying optimum "rearing flows" may be best described in a limited "Riffle Analysis" in sections that are relatively broad such as Site BB on the map. The wetted stream width was about 18m which is the same as the "toe-width". The first preliminary approximation of a rearing flow based on

a stream width of 18 m is 1.8 cms or 64 cfs. Should this be the magnitude of rearing flows required in a partial flow restoration project, it would be equivalent to 5%mad; this is roughly the same flow that was found to be satisfactory in Elk Falls Canyon on the Campbell River, Vancouver Island. A series of Riffle Transects and photographs captured at stepped flow from 400, 800, 1600, to 3200 L/s is recommended to describe the relation of usable width for fish and insects versus known stream flow. It is anticipated that spawning flows will be at least double the optimum rearing flow and may be in the magnitude of 3.6 cms or 127 cfs.

6. According to Redden and Pollard (2000?), the ultimate upstream limit for salmon or steelhead is a 25 m falls at the upstream end of Reach 6. This limits the anadromous stream length to about 3,600 m. The necessity for partly restoring streamflows should recognize the fisheries benefit:cost ratio and opportunities for fisheries funding elsewhere in the region. There is a strong sense that restoration of some baseflows for resident trout rearing is a minimum expectation.
7. The extent of spawning substrates (gravel) is highly limited in the Lois River which is typical of reaches below dams. Appropriate mitigation and compensation may be justifiable.
8. The second fish passage barrier is located immediately upstream of the 6.6m Falls and below Highway 101. This is a complex passage sites that might utilize a natural scour hole set in bedrock in photo 5777.
9. Fish-flow study ToR will be drafted shortly along with a list of potential and qualified biological consultants.
10. The round-table discussion of flow issues at noon May 1, 2007 at the Brookfield Power Office in Powell River recognized the difficulty of completing a competent habitat-flow survey over a range in flows due to the inability to finely control flow releases from Scanlon Dam. The very nature of the flow restoration project on Lois River is highly similar to that for BC Hydro's Jordan River Water Use Plan. The ingredients are canyon, no conservation flows, no flow control, an expensive dam retrofit, and poor understanding of the original fish population.

**Ronald A. Ptolemy, RPBio**

Rivers Biologist, Fisheries Science Section  
Ecosystems Branch  
Ministry of Environment  
PO Box 9338 Stn Prov Govt  
Victoria, BC V8W 9M1  
Location: 4th Floor, 2975 Jutland Road, Victoria  
Phone: 250-356-7054 Fax: 250-387-9750  
e-mail: : [Ron.Ptolemy@gov.bc.ca](mailto:Ron.Ptolemy@gov.bc.ca)

---

**From:** Swift, Doug [<mailto:SwiftD@pac.dfo-mpo.gc.ca>]  
**Sent:** April 17, 2007 1:20 PM  
**To:** Ptolemy, Ron ENV:EX; Sheng, Mel  
**Subject:** FW: Friends of Eagle River Habitat Report

For your file

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:57 AM  
**To:** Adkins, Bruce; Russell, Lloyd Rob  
**Subject:** FW: Friends of Eagle River Habitat Report

FYI

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:56 AM  
**To:** 'Dyer, Susan'  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; [william.jolley@gov.bc.ca](mailto:william.jolley@gov.bc.ca); [scott.morgan@gov.bc.ca](mailto:scott.morgan@gov.bc.ca); Sheng, Mel  
**Subject:** RE: Friends of Eagle River Habitat Report

Hello Susan,

Thank you for your email and continuing support in this matter. From our end Mel Sheng, who was with me when we last met, has been in contact with Ron Ptolemy of the Ministry of Environment regarding this matter as we are seeking his input. Ron has been heavily involved with flow related projects for a number of years. It is our intention to make another visit to Powell River and meet with you in conjunction with a field review of the Lois River so that both Ron and Mel can familiarize themselves with its features. I would expect the fish study parameters to follow after that time. Initially we were hoping to do this in April 2007 but as yet we have not set a date due to workloads.

As soon as we can establish a date to come over I will contact you ? hopefully we can provide a couple of different dates to choose from as I know you are busy as well. I have told the Friends of Eagle River that this is what we intend to do plus I have discussed this approach with my Manager and he is in agreement.

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]

**Sent:** Tuesday, April 17, 2007 8:08 AM

**To:** Swift, Doug

**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca

**Subject:** FW: Friends of Eagle River Habitat Report

**Importance:** High

Hello Doug,

I have drafted a response to the Friends of Eagle River and will cc you when I send it out to them today. I also have the following comments with respect to their report as noted below. It is important that PREI receives the fish study parameters

from DFO ASAP so we know how best to apply funding for the benefit of fish habitat. Please note that the spill is required at this time because of unusually high anticipated inflows and that PREI are currently responding to spill with respect to dam safety principals. I am interested in your comments and look forward to proceeding with the fish study.

Regards Sue

Susan Dyer, P.Eng., MBA, PMP

Brookfield Power

General Manager

#202 - 4400 Marine Ave,

Powell River, B.C. V8A 2K1

Office: 604-489-2213

Cell: 604-483-1282

Fax: 604-485-2996

-----Original Message-----

**From:** Stanyer, Debbi

**Sent:** Monday, April 16, 2007 5:36 PM

**To:** Dyer, Susan

**Subject:** FW: Friends of Eagle River Habitat Report

The latest correspondence from the Friends of Eagle River.

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**From:** Jude Abrams [mailto:<sup>S.22</sup>]

**Sent:** Friday, April 13, 2007 4:27 PM

**To:** Stanyer, Debbi

**Cc:** Colin Palmer; Doug Swift

**Subject:** Friends of Eagle River Habitat Report

Hello Debbi,

Following up on our phone conversation of Wednesday April 11th I'm sending you our observations on Eagle River habitat after the many large gate openings this winter. As well I'm ccing this to various people, We've sent the observations to Doug Swift of Fisheries and Oceans Canada as well. After you've read what we've found I'm sure you will understand our dismay.

Jude Abrams and Terry L. Brown have taken a good look at the river from the estuary to the canyon

below the highway bridge. This was on April 6th 2007. We are trained Streamkeepers and have been doing salmon survey projects since 1997, so we know what we are looking at and talking about. What we saw follows:

#### OBSERVATIONS OF EAGLE RIVER SALMON SPAWNING HABITAT [FROM ESTUARY TO POOL UNDER THE TRANSMISSION WIRES]

- 1) Major salmon spawning gravel beds have been swept completely away in the lower pool, with the largest one, where chum salmon spawned last fall, scoured to large cobbles. All the developing alevins/fry would have been swept away. Only one of the four areas which formerly had suitable gravel still has gravel. The area where pink salmon spawned (in a non-pink year) now has little gravel with mostly cobble remaining, again no fry would have survived.[Dyer, Susan] Under the current high inflows and above average snow pack the natural flows would have been extreme and flashy causing gravel and wooded debris to be flushed out of the stream system even if the dam did not exist. PREI is modeling the current conditions in an attempt to lessen the impact and therefore lessen the number of gates that will be required to pass the event. PREI opens the small spillway gate first and then if required due to 'rate of rise' will open the large spillway gate. It has only been necessary to open the combination of the small spillway gate and the one large spillway gate to date in order to keep the dam from overtopping. It will be necessary to open additional gates this spring if the snow melt is fast and accompanied by high precipitation.
- 2) Gravel in the canyon pool above the transmission line crossing is swept away while the large pile of gravel in the pool beneath the hydro line has been washed further up the bank, with much of it now above the early fall water line.[Dyer, Susan] Anticipate that the current natural flashy inflows would have caused the gravel to be flushed out even if the dam was not there.
- 3) All LWD (Large Woody Debris) has been swept down to the estuary or ocean, there is none instream now. In a mainstem stream such as this, with no tributaries or available offchannel habitat LWD is a critical factor in juvenile survival and pool formation.[Dyer, Susan] same comment as 2).
- 4) A large section of canyon wall has slid, part of it falling into one of the few quiet eddy pools under the hydro line.[Dyer, Susan] PREI will follow up on this, concern for stability of channel walls.
- 5) We observed a large sea-run cutthroat or steelhead [viewed from above water], in the lower pool, the only fish observed. Not even any sticklebacks. This sea-run, whether blue-listed coastal cutthroat or severely diminished steelhead is a precious fish. But will it have any suitable spawning ground?
- 6) In June 2006, we observed stickleback nests made of leaf and twig debris. These were guarded by males. Recently hatched fry were also observed here.[also on video] The leaf and twig debris has been completely swept from the river and deposited on Palm Beach. The riverbed has lost all organic matter.
- 7) No caddis fly larvae were observed, nor have we seen the resident dipper birds during the past 3 weeks.

It remains to be seen whether any chum or coho or pink fry survived, and whether any coho smolts survived. Due to long-term colds and an ear infection we haven't snorkeled the river since December but in our numerous river walks lately we have seen no young fish in the river. In fact as already noted we have only seen one fish!!!! Last summer there were many juvenile coho, and lots of juvenile and subadult and adult cutthroat, possibly rainbows. That was after two winters where only the small gate had been opened, when there was still spawning gravel available.[Dyer, Susan] The quality of the fish habitat is questionable at this time until the fish study can be completed. PREI is awaiting the study parameters from DFO so we can start the study.

To observe this kind of destruction now, after our conversations with you about restoring the health of the river and actively working to prevent harm to the fish is very disheartening. It is a legacy we are stuck with from 70 years of abuse by corporations and the blind eye of government 'watching over' our land and waters.[Dyer, Susan] PREI is committed to continue working with the Friends of Eagle River and take their concerns seriously. The results of the fish study are so important, we need to know that we are applying the best solution for fish habitat not just reacting to political pressure.



During the boom years of logging and milling in Powell River, when it was a company town, the locals didn't have much to say about company practices. Still, it's hard to imagine how anyone could NOT notice the harm that these unnatural flooding and dewatering practices have had on the river and fish. PR Energy may say the cause this winter was generator repairs and an unusually high rainfall winter. However, as climate change is upon us we need to use the precautionary principle and plan for the "unusual" because "unusual" is becoming usual. Water could have been spilling gradually and continuously from the small gate since last fall to ensure dangerously high levels didn't develop as the generator was repaired. Attempting to maximize profits at the expense of river ecosystems may have been acceptable to the public decades ago, but this is a new era. Fresh water is being recognized as a precious resource, salmon are dwindling and anadromous coastal cutthroat trout are a blue-listed species.[Dyer, Susan] Not possible to spill continuously from the small spill way gate, for at least 4 months last fall the spillway was high and dry. There is a significant financial burden to PREI if we now maintain the reservoir 10 feet lower in order to accommodate the Friends of Eagle River and use the small spillway gate as a weir. Essentially we lose a significant portion of our storage capability.

We all know that DFO is understaffed and overworked. But it doesn't take a flow regime specialist to figure out that just one change at the dam, which would cost nothing extra and could be implemented immediately, would have SIGNIFICANT BENEFICIAL RESULTS. This immediate solution is to LEAVE THE SMALL GATE OPEN PERMANENTLY, so it can continuously spill water. When the reservoir level gets just above the lip it will start spilling GRADUALLY and CONTINUOUSLY, mimicking natural rises. Perhaps this would be enough to prevent openings of the large gate. It would restore winter flow levels, perhaps similar to pre-dam flows. It wouldn't address summer or early fall levels at pink and chum spawning times, but it would be an IMMEDIATE solution which WOULDN'T COST EXTRA MONEY to implement! It would also help the recovery of the river during the longer process of retrofitting the dam for summer/fall flows.[Dyer, Susan] PREI does attempt to gradually spill by opening the small gate first and then depending on how fast the lake level is rising will determine if the large gate is required. PREI will be bringing the lake level down to long term average lake levels in order to help contain the larger than normal anticipated high spring inflows. The modeling to date shows the worst case being snow melt combined with ambient temperatures greater than 25 deg C and unusual precipitation. Our main concern is dam safety at this time and limiting the amount of spill way gates that need to be opened.

This can be done NOW without any studies needed first. It could have been done last fall when PR energy was repairing their generator and there was danger of major flood events over the winter. Unfortunately, damage has been done, let's see how we can keep it from ever happening again.

Thanks for your attention to this matter, we await your response.  
Terry L. Brown & Jude Abrams Friends of Eagle River

Terry L. Brown

s.22

[www.TerryLBrown.com](http://www.TerryLBrown.com)  
"Connecting You with Wonder"

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Legend

Borders

Water Bodies - Polygons (1:20K)

- Water Bodies - Polygons (1:20K)
- Mine - Tailing Pond
  - Lake - Definite
  - Reservoir - Definite

Water Courses - Polygons (1:20K)

- Water Courses - Polygons (1:20K)
- Canal
  - River/Stream - Definite

Wetlands - Polygons (1:20K)

- Wetlands - Polygons (1:20K)
- Flooded Land - Inundated
  - Marsh
  - Swamp

Water - Lines (1:20K)

- Water - Lines (1:20K)
- Canal
  - Dam
  - Dam - Beaver
  - Ditch
  - Falls
  - Flume
  - Rapids
  - River/Stream - Definite
  - River/Stream - Dry
  - River/Stream - Indefinite
  - River/Stream - Left Bank
  - River/Stream - Right Bank
  - Dam - section.Base
  - Flooded Land - Inundated
  - Lake - Definite
  - Lake - Indefinite
  - Lake - Intermittent
  - Reservoir - Definite
  - Reservoir - Intermittent
  - Marsh
  - Swamp
  - Glacier
  - Icefield



<b>ID #</b>	<b>Location</b>	<b>Comments</b>
5773	Above tidewater	
5774	Above Site 1 flow metering	
5775	Crew	
5776	Above Hydro Line Crossing	
5777	Upper Cascade/Shoot	Note scour hole and possible step for fish migration on River Left
5778	Highway 101	Picture taken from 60m downstream of bridge centre abutment
5779	Top of Lower Falls	6 m drop from lip to pool surface
5780	Lower Falls	Upstream View at a flow of 1%mad
5781	Log debris below Falls	Indication of 3 m higher pool elevation at higher flows
5782	BB Reach	
5783	MacBlo Crossing	Views from Logging Bridge
5784	MacBlo Crossing	Site 3
5785	BB Reach	Potential study reach and riffle cross-section
5786	BB Reach	

## Metering Notes for Lois River at BC Hydro Line Metering Site on May 1, 2007

**UTM** 10U 0404262; 55514607  
**Reach** 1  
**Hydraulic Type** Glide  
**Surface turbulence** none  
**Sound** None  
**Stage Level (m)**  
**Channel width (m)**  
**Verticals** 13  
**Stream temp** 9.0C 0917 hr  
**Meter** Swoffer 3000 Calibrated  
**V average (seconds)** 20  
**Location** Run Tailout over smooth bedrock  
**Sensor location** 0.6\*depth  
**Notes:** 1. Mel Sheng, Doug Swift and Ron Ptolemy present  
 2. Flow regulation at Dam outlet producing zero flows; metered flow below the Highway are largely the inflows from two small tributaries

	Station (m)	Depth (m)	Velocity (m/s)	Substrate	X Area	Panel Q
<b>Right bank</b>	0.6	0	0			
	1	0.07	0.438		0.021	0.0092
	1.2	0.1	0.414		0.025	0.01035
	1.5	0.55	0.467		0.165	0.07706
	1.8	0.32	0.407		0.08	0.03256
	2	0.3	0.362		0.09	0.03258
	2.4	0.38	0.324		0.133	0.04309
	2.7	0.32	0.351		0.128	0.04493
	3.2	0.32	0.471		0.128	0.06029
	3.5	0.35	0.514		0.105	0.05397
	3.8	0.33	0.615		0.0825	0.05074
	4	0.14	0.76		0.028	0.02128
<b>Left bank</b>	4.2	0	0		0	0

	<b>Particle dia. (cm)</b>	<b>Sum Q, cms</b>	<b>0.436</b>
F = fines	0 to 0.1	Q, cfs	15.4
Sg = Small gravel	0.11 to 4.0	%mad	1.2%
Lg = Large gravel	4.1 to 10	Sum A	0.9855m2
C = Cobble	10.1 to 30	mean depth	0.274
B = Boulder	>30	W:depth	13.2
Bedrock		Width	3.6

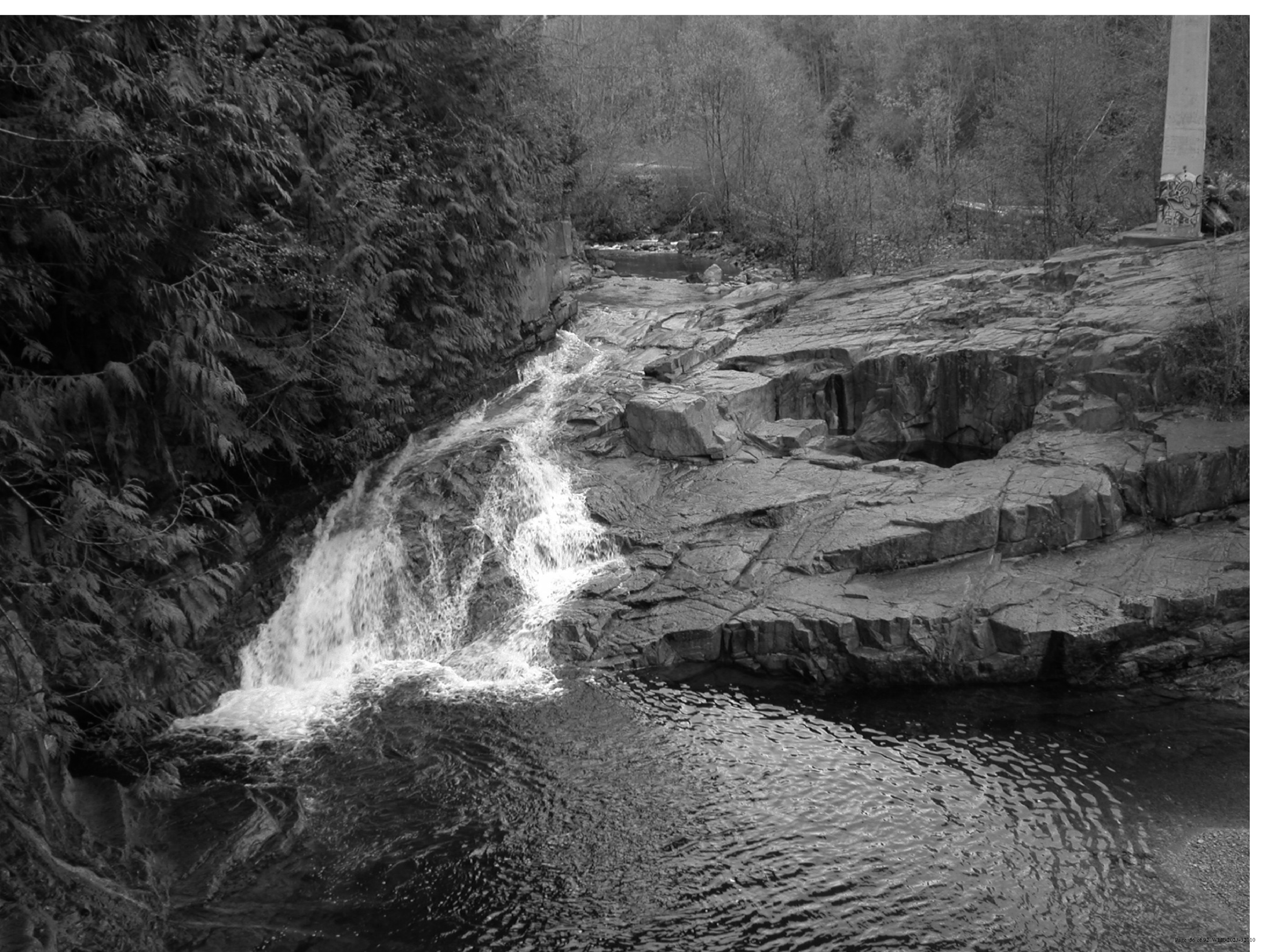
D90 (cm) approx. Bedrock  
 Dmx (cm) Bedrock

Catchment area of 2 tribs (km2) 5.37  
 Unit Runoff 81

Watershed Area (POD) 468  
 Predicted flow at POD 38001.121  
 %mad 107%

Max diversion flow (cfs)	1297		
Max diversion flow (cms)	36.7		
Salmon River (Kelsey Bay)	77 118%	cms %mad	May 1, 2007 flow state
Clowhom River	12.8 79%	cms %mad	















**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)

**To:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron  
ENV:EX (Ron.Ptolemy@gov.bc.ca)

**Subject:** FW: LR Preliminary Report

**Sent:** 12/06/2007 21:40:47

**Attachments:** Preliminary Report Day 1.doc

**Message Body:**

FYI - I now understand that they have found at least one redd in the estuary. It is only wetted tidally. Debbie indicated that the gate would have to be opened significantly to wet this redd using water from the dam, and that this amount of water would not be sustainable/available through until Spring. They are considering building a small channel to direct water to the redd(s).

Thoughts?

-----Original Message-----

From: Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]

Sent: December 6, 2007 1:01 PM

To: Nanson, Dave

Subject: FW: LR Preliminary Report

Here is the report from our Biologist from the Lois River yesterday. The spill gate was closed at approximately 2:30pm. We have sent him back to the river again today to resurvey the area and expect a report from him later this afternoon.

5 December 2007

Dear Debbie:

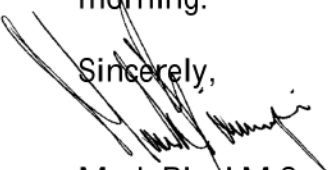
Here is a preliminary report of what I found today as I surveyed the lower reach of the Lois River as the dam was being closed.

We arrived at the mouth of the river at 13:00 hrs. At this time the gates were opened to approximately 60 cm. We proceeded up stream while carefully inspecting the shores for the presence of reds and fish carcasses (species identification). We traveled all the way up the river until we reached a narrow crossing (3.5 m) wide approximately 150 m. from the falls. The water follow was rapid with an estimated flow of 3 to 3.5 m<sup>3</sup>/sec. We reached this area at approximately 15:30. By this time the gates at the dam had been closed for at least one and one half hours. The water flow characteristics at this time can be considered a natural flow for this time of the year without any additional contribution from the dam.

We inspected the banks of the river above the water level, at the rivers edge and below the water line as far as safely possible. We saw no evidence of reds above the current water level at the water level or at about 0.6 m. depth from the bank (please note that at this depth it was difficult to get a detailed look due to the disturbance by the rushing water); however, it is my opinion that at this time there are no reds that are exposed to air or reds that are in danger of being exposed.

This is a very preliminary report and I will be sending you more detailed report with photos of everything we observed after our second inspection tomorrow morning.

Sincerely,



Mark Biagi M.Sc., R.P.Bio  
Senior Consultant  
Vision Marine Consulting Ltd.

SDG

**From:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Lois Study  
**Sent:** 06/21/2007 16:41:34  
**Message Body:**

I'll leave it to you to respond. I assume that the base flow ( which will be very small anyway) without a dam release will be measured first and then they could release the designated flows from the dam

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration  
Direction des oceans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

-----Original Message-----  
**From:** Swift, Doug  
**Sent:** June 21, 2007 8:21 AM  
**To:** 'Stanyer, Debbi'  
**Cc:** Sheng, Mel; 'Ptolemy, Ron ENV:EX'  
**Subject:** RE: Lois Study

I have cc this to Mel and Ron for their response to your question.

-----Original Message-----  
**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Wednesday, June 20, 2007 2:55 PM  
**To:** Swift, Doug  
**Subject:** Lois Study

A question – are we to release 400,800,1600 and 3200 L/s or are the stream flows to be these for the survey (i.e. stream flow plus release equals the listed flows)?

**Debbi Stanyer, M.A.Sc., R.P.Bio.**

Water Resource & Environment Manager

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                                 >°))-----'<      >°))-----'<      <°))-----'<  
>°))-----'<

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**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Lois River, Site Visit on May 1  
**Sent:** 04/23/2007 18:05:04  
**Message Body:**

FYI ? I have a message in to Greg Rahier in Powell River to see if he is available.

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Monday, April 23, 2007 10:58 AM  
**To:** Swift, Doug  
**Subject:** RE: Lois River, Site Visit on May 1

Thanks for the offer however we feel that your Fisheries Officer would have better knowledge of the river. We look forward to your evaluation and comments at our meeting.

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Monday, April 23, 2007 8:48 AM  
**To:** Stanyer, Debbi  
**Subject:** RE: Lois River, Site Visit on May 1

Yes that would work fine ? will someone be able to show us around the Lois River in the AM?

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Monday, April 23, 2007 8:44 AM  
**To:** Swift, Doug  
**Subject:** RE: Lois River, Site Visit on May 1

Can we set up a lunch meeting at 12:30 in our office for 2 hours?

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Friday, April 20, 2007 2:59 PM  
**To:** Stanyer, Debbi  
**Cc:** Dyer, Susan; Sheng, Mel; Ptolemy, Ron ENV:EX  
**Subject:** RE: Lois River, Site Visit on May 1

We will come over April 30 and will tour the Lois River and Dam in the AM of May 1, 2007. If we could meet with Brookfieldpower in the afternoon of May 1 for a couple of hours that would be appreciated. I would think that we would catch the 5:15 pm ferry from Powell River on May 1. Although I have been to the Lois Lake dam and Lois River in the past, I am not very familiar with the area and what access points are available so if someone from your company is available to assist that would be appreciated. If not then please let me know and I will ask a Fishery Officer from Powell River if they can assist as they will know the area better than I do. The locations we would like to visit are from the dam downstream, the extent will depend on what access is available.

From our end there would be Mel Sheng and me from DFO and Ron Ptolemy from the Ministry of Environment. Possibly a Fishery Officer if we need to have help with the access locations although I doubt the FO would attend the meeting in the pm. I have not informed anyone else outside of the agencies or invited anyone else to attend. This visit is so that the appropriate people, with the expertise in flow and habitat related matters, can familiarize themselves with the river, the dam and its limitations and to provide advice regarding a formal fish habitat study.

I do not know what the flows are in the Lois River at this time but if they are high would it be possible to ramp them down to a rate that provides good visibility in the river channel for May 1?

Ron and Mel, do you have anything to add?

Thank you.

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Friday, April 20, 2007 11:44 AM  
**To:** Swift, Doug  
**Cc:** Dyer, Susan  
**Subject:** FW: Lois River, Site Visit on May 1

In order to make arrangements and check our availability for May 1st can you please reply to the following questions:

What time were you planning on arriving and leaving Powell River?  
Who is going on the tour, who is leading the tour and what part of the river are you going to?  
How much time did you plan for this meeting?

Thanks

---

**From:** Dyer, Susan  
**Sent:** Friday, April 20, 2007 10:42 AM  
**To:** Stanyer, Debbi  
**Subject:** FW: Lois River, Site Visit on May 1

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Wednesday, April 18, 2007 3:23 PM  
**To:** Dyer, Susan  
**Cc:** Sheng, Mel; Ptolemy, Ron WLAP:EX  
**Subject:** Lois River, Site Visit on May 1

Hello Susan,

I heard back from both Mel Sheng and Ron Ptolemy and they are available on May 1 for a Lois River tour. Would Debbie Stanyer or you be available for this tour? I do not know the access points very well. Once the field trip is over, if possible, it would be beneficial to have a meeting to go over the next steps. **Now, the question is, are you available on May 1?**

This would also be a good time for Mel to look at the channel at the Theodosia if there is transportation.

Please confirm if you are available on May 1, thank you.

Doug Swift

Habitat Management Technologist/Technologist, gestion de l'habitat

Fisheries and Oceans Canada/Pêches et Océans Canada

South Coast Area

148 Port Augusta Street

Comox BC V9M 3N6



**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Lois River flows  
**Sent:** 12/04/2007 17:54:38  
**Message Body:**

FYI

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** December 4, 2007 8:31 AM  
**To:** Nanson, Dave  
**Subject:** RE: Lois River flows

Thank you for your guidance. As you may or may not know there is no gauging station on the Lois River. We will be proceeding with our plans to shut the Lois spillway gates and survey the river for fish and redds.

---

**From:** Nanson, Dave [mailto:NansonD@pac.dfo-mpo.gc.ca]  
**Sent:** Monday, December 03, 2007 12:29 PM  
**To:** Stanyer, Debbi  
**Cc:** Ptolemy, Ron ENV:EX; Sheng, Mel; Swift, Doug  
**Subject:** RE: Lois River flows

Hi Debbi

We have not met, but I am taking over the Powell River area from Doug. I have discussed this issue with Doug, Mel and Ron. Neither DFO nor MoE support redd recovery/egg relocation. Maintenance of a baseflow that covers the channel toe width is highly recommended as a mitigation action while ramping down. Redds are very specific environments that should not be disturbed.

Although it is difficult to speculate what a "safe" base flow should be, we know that confined channels like Lois River can safely operate for incubation at flows reduced to near 5% MAD. My understanding from Ron is that MAD at Lois reservoir outlet is about 35500 L/s, so 5%MAD would be about 1775 L/s or 63 cfs.

I understand that you have retained consultants to assist you with this issue and that there will be a riffle analysis conducted in the spring. Please let us know if they have any other information to add to this discussion.

Thank you

Dave Nanson  
Habitat Biologist  
Oceans, Habitat and Enhancement  
Fisheries & Oceans Canada  
Madeira Park, B.C.  
Phone: 604-883-0454  
Fax: 604-892-2378

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** November 30, 2007 11:55 AM  
**To:** Swift, Doug; Nanson, Dave  
**Cc:** Dyer, Susan  
**Subject:** RE: Dave Nanson  
**Importance:** High

Doug here is a quick idea of what we are after.

Our Lois #2 generator was returned to service on the 28th and we are now at full generating capacity at the Lois Powerhouse.



We have had the large spillway gate at the Lois dam cracked open providing 40cms of additional flow to the river since September 20th. This was done to avoid having to open the spillway gates during the maintenance outage and fluctuate the flow regime in the Lois River during spawning.

We are now dropping the level of the Lois Lake at a rate of 0.4 ft/day and need to close the spillway gate to sustain operation of the generators and upstream activities and habitats.

We propose to ramp down the flow at a rate of 20cms /hr. Once the flow has been lowered we will survey the river for isolated redds and for stranded fish. We will return the fish to wetted areas, do you have any opinion on relocating isolated redds?

We would like to complete this as soon as possible.

Thanks

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]

**Sent:** Friday, November 30, 2007 11:22 AM

**To:** Stanyer, Debbi

**Subject:** Dave Nanson

Hi Debbi, I left a message for Dave on his voice mail. I have a meeting with the Highways people quite soon but will check to see if he has called when I get back. If not then it may be Monday before we can talk.

Doug Swift

Habitat Management Technologist/Technologist, gestion de l'habitat

Fisheries and Oceans Canada/Pêches et Océans Canada

South Coast Area

148 Port Augusta Street

Comox BC V9M 3N6

Ph. (250)339-4905/Facsimile (250)339-4612

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Lois River  
**Sent:** 07/24/2007 22:53:22  
**Message Body:**

FYI

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Tuesday, July 24, 2007 3:38 PM  
**To:** Swift, Doug  
**Subject:** RE: Lois River

No plans for Theo until later in the summer. The water was really high up there and here in town. This month we have received over 300% our normal rainfall and over 150% of our typical inflows.

---

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Tuesday, July 24, 2007 2:31 PM  
**To:** Stanyer, Debbi  
**Subject:** RE: Lois River

Ok, thanks for the response, have you been able to get up to the Theo yet or has the water been too high?

-----Original Message-----

**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Tuesday, July 24, 2007 11:53 AM  
**To:** Swift, Doug  
**Subject:** RE: Lois River

We are working through the scope with consultants right now. Not sure where our legal is sitting with this.

-----Original Message-----

**From:** Swift, Doug [mailto:SwiftD@pac.dfo-mpo.gc.ca]  
**Sent:** Thursday, July 19, 2007 9:01 AM  
**To:** Stanyer, Debbi  
**Subject:** Lois River

Hello Debbi

I was wondering where things are with the Lois Flow study? I was talking to John Clark, our counsel (about other items) yesterday and he mentioned that he has not talked to PR Energy as yet. I told him earlier that you may call.

Doug Swift

Habitat Management Technologist/Technologist, gestion de l'habitat

Fisheries and Oceans Canada/Pêches et Océans Canada

South Coast Area

148 Port Augusta Street

Comox BC V9M 3N6

Ph. (250)339-4905/Facsimile (250)339-4612

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Lois Lake Dam Operating Plan  
**Sent:** 09/10/2007 15:34:39  
**Attachments:** DFO Lois Lake Level Plan 2007.doc  
**Message Body:**

Hello Mel/Ron,

If you have a chance would you review this document and let me know what your thoughts are regarding the operation of the Lois Lake Dam before I respond. Thank you.

-----Original Message-----  
**From:** Stanyer, Debbi [mailto:debbi.stanyer@brookfieldpower.com]  
**Sent:** Thursday, September 06, 2007 3:42 PM  
**To:** Swift, Doug  
**Subject:** Lois Lake Dam Operating Plan

<<DFO Lois Lake Level Plan 2007.doc>>

**Debbi Stanyer, M.A.Sc., R.P.Bio.**

Water Resource & Environment Manager

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Brookfield Power  
  
Powell River Energy  
  
202-4400 Marine Avenue  
  
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**Brookfield Power**

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September 5, 2007

Mr. Doug Swift  
Fisheries and Oceans Canada  
Habitat and Enhancement Branch  
148 Port Augusta Street  
Comox, BC  
V9M 3N6

Dear Doug:

Our Lois #1 generator will be taken out of service on October 9<sup>th</sup> to complete the repairs required to operate the generator at full capacity. The work is scheduled to be complete on November 24<sup>th</sup>.

Due to the extraordinary amount of inflow into Lois Lake this year (Table 1) in combination with our reduced generation, the lake level is above long term average (LTA).

Table 1.2007 Lois Lake Inflows versus Long Term Average

	<b>2007 inflow</b>	<b>LTA inflow</b>	<b>% of LTA</b>
	cms/day	cms/day	
January	47.7	33.7	142
February	37.0	30.3	122
March	57.0	26.9	212
April	35.8	28.9	124
May	31.5	31.7	99
June	38.6	24.7	156
July	29.2	13.4	217
August	7.4	7.3	101

Figure 1 below outlines the predicted lake level from October 1<sup>st</sup> to December 31<sup>st</sup>



under five different scenarios.



Figure 1. Predicted Lois Lake Level

**Scenario 1 (Red):**

At 100% of the average inflows the lake level will rise continually and will overtop the dam. This is an unacceptable outcome.

The absolute maximum operating level of the dam is 520 feet at which point the large gate(s) will have to be opened to mitigate the inflows and protect the structural integrity of the dam and the safety of the downstream residents.

**Scenario 2 (Dark Blue):**

Assuming that the lake level is drawn down to 511 feet (the bottom of the sill of the small gate) by October 1<sup>st</sup> and the small gate is left open, at 100% of the average inflows the lake level will rise to approximately 514 feet until December when the second Lois generator is returned to service. This is an acceptable outcome but the probability based on the inflow pattern this year is unlikely and the large gate(s) will have to be opened.

**Scenario 3 (Pink):**

Assuming that the lake level is drawn down to 511 feet by October 1<sup>st</sup> and the small gate is left open, at 125% of the average inflows, there will be a steady increase in the lake level until December when the second Lois generator is

returned to service. Though this more realistic than scenario 2 there is still a high probability that the inflows will exceed 125% of the LTA and the large gate(s) will have to be opened to control the lake level.

Scenario 4 (Yellow):

Assuming that the lake level is drawn down to 511 feet by October 1<sup>st</sup> and the small gate is left open, at 150% of the average inflows which equates to the average inflow rate for this year the lake level will rise continually and will overtop the dam. This is an unacceptable outcome.

Scenario 5 (Purple):

Assuming that the lake level is drawn down to 500 feet by October 1<sup>st</sup> using the large gate and the small gate is left open, at 150% of the average inflows the lake level will rise slowly to approximately 519 feet between October and December. In this scenario the lake level will continue to rise through January when the large gate will need to be opened.

Based on these scenarios we have concluded that scenario 5 presents the best option to manage the lake level and reduce risks to dam and public safety. We therefore plan to lower the lake level using the small and large gates to achieve 500 feet prior to the beginning of October and will keep the small gate open to mitigate the inflows during October to December. The weather however, can be very unpredictable and if the inflows exceed the predicted rates and the lake level approaches the 520 foot level we will be required to open the large gate(s) to mitigate the flows and protect the dam and the public.

Due to the recently expressed concerns regarding the large gate openings, we are looking for DFO's support on our operational decision.

Please contact me to discuss.

Sincerely,

A handwritten signature in black ink, appearing to read "D Stanyer". The signature is written in a cursive, flowing style.

Debbi Stanyer, R.P. Bio.  
Water Resource and Environment Manager

cc. Scott Morgan, Dam Safety Officer

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**Subject:** FW: Friends of Eagle River Habitat Report  
**Sent:** 04/17/2007 20:19:55  
**Message Body:**

For your file

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:57 AM  
**To:** Adkins, Bruce; Russell, Lloyd Rob  
**Subject:** FW: Friends of Eagle River Habitat Report

FYI

-----Original Message-----

**From:** Swift, Doug  
**Sent:** Tuesday, April 17, 2007 10:56 AM  
**To:** 'Dyer, Susan'  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca; Sheng, Mel  
**Subject:** RE: Friends of Eagle River Habitat Report

Hello Susan,

Thank you for your email and continuing support in this matter. From our end Mel Sheng, who was with me when we last met, has been in contact with Ron Ptolemy of the Ministry of Environment regarding this matter as we are seeking his input. Ron has been heavily involved with flow related projects for a number of years. It is our intention to make another visit to Powell River and meet with you in conjunction with a field review of the Lois River so that both Ron and Mel can familiarize themselves with its features. I would expect the fish study parameters to follow after that time. Initially we were hoping to do this in April 2007 but as yet we have not set a date due to workloads.

As soon as we can establish a date to come over I will contact you ? hopefully we can provide a couple of different dates to choose from as I know you are busy as well. I have told the Friends of Eagle River that this is what we intend to do plus I have discussed this approach with my Manager and he is in agreement.

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]  
**Sent:** Tuesday, April 17, 2007 8:08 AM  
**To:** Swift, Doug  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca  
**Subject:** FW: Friends of Eagle River Habitat Report  
**Importance:** High

Hello Doug,

I have drafted a response to the Friends of Eagle River and will cc you when I send it out to them today. I also have the following comments with respect to their report as noted below. It is important that PREI receives the fish study parameters from DFO ASAP so we know how best to apply funding for the benefit of fish habitat. Please note that the spill is required at this time because of unusually high anticipated inflows and that PREI are currently responding to spill with respect to dam safety principals. I am interested in your comments and look forward to proceeding with the fish study.  
Regards Sue

Susan Dyer, P.Eng., MBA, PMP  
Brookfield Power  
General Manager  
#202 - 4400 Marine Ave,  
Powell River, B.C. V8A 2K1  
Office: 604-489-2213  
Cell: 604-483-1282  
Fax: 604-485-2996

-----Original Message-----

**From:** Stanyer, Debbi  
**Sent:** Monday, April 16, 2007 5:36 PM  
**To:** Dyer, Susan  
**Subject:** FW: Friends of Eagle River Habitat Report

The latest correspondence from the Friends of Eagle River.

---

**From:** Jude Abrams [mailto:[s.22](mailto:s.22)] ]  
**Sent:** Friday, April 13, 2007 4:27 PM  
**To:** Stanyer, Debbi  
**Cc:** Colin Palmer; Doug Swift  
**Subject:** Friends of Eagle River Habitat Report

Hello Debbi,

Following up on our phone conversation of Wednesday April 11th I'm sending you our observations on Eagle River habitat after the many large gate openings this winter. As well I'm ccing this to various people, We've sent the observations to Doug Swift of Fisheries and Oceans Canada as well. After you've read what we've found I'm sure you will understand our dismay.

Jude Abrams and Terry L. Brown have taken a good look at the river from the estuary to the canyon below the highway bridge. This was on April 6th 2007. We are trained Streamkeepers and have been doing salmon survey projects since 1997, so we know what we are looking at and talking about. What we saw follows:

#### OBSERVATIONS OF EAGLE RIVER SALMON SPAWNING HABITAT [FROM ESTUARY TO POOL UNDER THE TRANSMISSION WIRES]

- 1) Major salmon spawning gravel beds have been swept completely away in the lower pool, with the largest one, where chum salmon spawned last fall, scoured to large cobbles. All the developing alevins/fry would have been swept away. Only one of the four areas which formerly had suitable gravel still has gravel. The area where pink salmon spawned (in a non-pink year) now has little gravel with mostly cobble remaining, again no fry would have survived.[Dyer, Susan] Under the current high inflows and above average snow pack the natural flows would have been extreme and flashy causing gravel and wooded debris to be flushed out of the stream system even if the dam did not exist. PREI is modeling the current conditions in an attempt to lessen the impact and therefore lessen the number of gates that will be required to pass the event. PREI opens the small spillway gate first and then if required due to 'rate of rise' will open the large spillway gate. It has only been necessary to open the combination of the small spillway gate and the one large spillway gate to date in order to keep the dam from overtopping. It will be necessary to open additional gates this spring if the snow melt is fast and accompanied by high precipitation.
- 2) Gravel in the canyon pool above the transmission line crossing is swept away while the large pile of gravel in the pool beneath the hydro line has been washed further up the bank, with much of it now above the early fall water line.[Dyer, Susan] Anticipate that the current natural flashy inflows would have caused the gravel to be flushed out even if the dam was not there.
- 3) All LWD (Large Woody Debris) has been swept down to the estuary or ocean, there is none instream now. In a mainstem stream such as this, with no tributaries or available offchannel habitat LWD is a critical factor in juvenile survival and pool formation.[Dyer, Susan] same comment as 2).
- 4) A large section of canyon wall has slid, part of it falling into one of the few quiet eddy pools under the hydro line.[Dyer, Susan] PREI will follow up on this, concern for stability of channel walls.
- 5) We observed a large sea-run cutthroat or steelhead [viewed from above water], in the lower pool, the only fish observed. Not even any sticklebacks. This sea-run, whether blue-listed coastal cutthroat or severely diminished steelhead is a precious fish. But will it have any suitable spawning ground?
- 6) In June 2006, we observed stickleback nests made of leaf and twig debris. These were guarded by



males. Recently hatched fry were also observed here.[also on video] The leaf and twig debris has been completely swept from the river and deposited on Palm Beach. The riverbed has lost all organic matter.

7) No caddis fly larvae were observed, nor have we seen the resident dipper birds during the past 3 weeks.

It remains to be seen whether any chum or coho or pink fry survived, and whether any coho smolts survived. Due to long-term colds and an ear infection we haven't snorkeled the river since December but in our numerous river walks lately we have seen no young fish in the river. In fact as already noted we have only seen one fish!!!! Last summer there were many juvenile coho, and lots of juvenile and subadult and adult cutthroat, possibly rainbows. That was after two winters where only the small gate had been opened, when there was still spawning gravel available.[Dyer, Susan] The quality of the fish habitat is questionable at this time until the fish study can be completed. PREI is awaiting the study parameters from DFO so we can start the study.

To observe this kind of destruction now, after our conversations with you about restoring the health of the river and actively working to prevent harm to the fish is very disheartening. It is a legacy we are stuck with from 70 years of abuse by corporations and the blind eye of government 'watching over' our land and waters.[Dyer, Susan] PREI is committed to continue working with the Friends of Eagle River and take their concerns seriously. The results of the fish study are so important, we need to know that we are applying the best solution for fish habitat not just reacting to political pressure.

During the boom years of logging and milling in Powell River, when it was a company town, the locals didn't have much to say about company practices. Still, it's hard to imagine how anyone could NOT notice the harm that these unnatural flooding and dewatering practices have had on the river and fish. PR Energy may say the cause this winter was generator repairs and an unusually high rainfall winter. However, as climate change is upon us we need to use the precautionary principle and plan for the "unusual" because "unusual" is becoming usual. Water could have been spilling gradually and continuously from the small gate since last fall to ensure dangerously high levels didn't develop as the generator was repaired. Attempting to maximize profits at the expense of river ecosystems may have been acceptable to the public decades ago, but this is a new era. Fresh water is being recognized as a precious resource, salmon are dwindling and anadromous coastal cutthroat trout are a blue-listed species.[Dyer, Susan] Not possible to spill continuously from the small spill way gate, for at least 4 months last fall the spillway was high and dry. There is a significant financial burden to PREI if we now maintain the reservoir 10 feet lower in order to accommodate the Friends of Eagle River and use the small spillway gate as a weir. Essentially we lose a significant portion of our storage capability.

We all know that DFO is understaffed and overworked. But it doesn't take a flow regime specialist to figure out that just one change at the dam, which would cost nothing extra and could be implemented immediately, would have SIGNIFICANT BENEFICIAL RESULTS. This immediate solution is to LEAVE THE SMALL GATE OPEN PERMANENTLY, so it can continuously spill water. When the reservoir level gets just above the lip it will start spilling GRADUALLY and CONTINUOUSLY, mimicking natural rises. Perhaps this would be enough to prevent openings of the large gate. It would restore winter flow levels, perhaps similar to pre-dam flows. It wouldn't address summer or early fall levels at pink and chum spawning times, but it would be an IMMEDIATE solution which WOULDN'T COST EXTRA MONEY to implement! It would also help the recovery of the river during the longer process of retrofitting the dam for summer/fall flows.[Dyer, Susan] PREI does attempt to gradually spill by opening the small gate first and then depending on how fast the lake level is rising will determine if the large gate is required. PREI will be bringing the lake level down to long term average lake levels in order to help contain the larger than normal anticipated high spring inflows. The modeling to date shows the worst case being snow melt combined with ambient temperatures greater than 25 deg C and unusual precipitation. Our main concern is dam safety at this time and limiting the amount of spill way gates that need to be opened.

This can be done NOW without any studies needed first. It could have been done last fall when PR energy was repairing their generator and there was danger of major flood events over the winter. Unfortunately, damage has been done, let's see how we can keep it from ever happening again.

Thanks for your attention to this matter, we await your response.

Terry L. Brown

s.22

[www.TerryLBrown.com](http://www.TerryLBrown.com)

"Connecting You with Wonder"

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**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca); Russell, Lloyd Rob (RussellL@pac.dfo-mpo.gc.ca)  
**Cc:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** FW: Friends of Eagle River Habitat Report  
**Sent:** 04/17/2007 18:50:11  
**Message Body:**

FYI  
Ron and Mel ? can we set a date to go to Powell River?

-----Original Message-----

**From:** Dyer, Susan [mailto:Susan.Dyer@brookfieldpower.com]  
**Sent:** Tuesday, April 17, 2007 11:12 AM  
**To:** s.22  
**Cc:** Stanyer, Debbi; McPhee, Andy; Pettipas, Meghan; william.jolley@gov.bc.ca; scott.morgan@gov.bc.ca; Sheng, Mel; Swift, Doug  
**Subject:** RE: Friends of Eagle River Habitat Report

To: Friends of Eagle River

Dear Jude Abrams and Terry Brown,

I want to thank you for comments below and for keeping Debbi informed of your concerns. At this time PREI has no intention of continuous spill from the small spillway gate or retrofitting the dam for a low level spillway system. PREI has committed to DFO with respect to performing a formal fish study to look at the quality of fish habitat on the lower section of the Eagle River and are currently awaiting the study parameters from DFO before the study can begin. The results of the study will determine if funding is available for retrofitting Lois or if compensation is better spent in a more productive stream system for enhancement of fish habitat.

You need to be aware that the unusually high snow pack and high inflows will require PREI to open additional gates beyond the traditional combination of the small gate and one large gate for dam safety reasons. PREI is currently modelling the river in order to limit the number of gates but will need to draw down the reservoir in order to prepare for the possible high flow event. I will have Debbi followup with the stability issue you mention with the slide on the canyon wall.

I want to reinforce that PREI is committed to safety and the environment and will continue to work with you on these issues.  
Regards Sue

Susan Dyer, P.Eng., MBA, PMP  
Brookfield Power  
General Manager  
#202 - 4400 Marine Ave,  
Powell River, B.C. V8A 2K1  
Office: 604-489-2213  
Cell: 604-483-1282  
Fax: 604-485-2996

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- 6) In June 2006, we observed stickleback nests made of leaf and twig debris. These were guarded by males. Recently hatched fry were also observed here.[also on video] The leaf and twig debris has been completely swept from the river and deposited on Palm Beach. The riverbed has lost all organic matter.
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"unusual" is becoming usual. Water could have been spilling gradually and continuously from the small gate since last fall to ensure dangerously high levels didn't develop as the generator was repaired. Attempting to maximize profits at the expense of river ecosystems may have been acceptable to the public decades ago, but this is a new era. Fresh water is being recognized as a precious resource, salmon are dwindling and anadromous coastal cutthroat trout are a blue-listed species.

We all know that DFO is understaffed and overworked. But it doesn't take a flow regime specialist to figure out that just one change at the dam, which would cost nothing extra and could be implemented immediately, would have SIGNIFICANT BENEFICIAL RESULTS. This immediate solution is to LEAVE THE SMALL GATE OPEN PERMANENTLY, so it can continuously spill water. When the reservoir level gets just above the lip it will start spilling GRADUALLY and CONTINUOUSLY, mimicking natural rises. Perhaps this would be enough to prevent openings of the large gate. It would restore winter flow levels, perhaps similar to pre-dam flows. It wouldn't address summer or early fall levels at pink and chum spawning times, but it would be an IMMEDIATE solution which WOULDN'T COST EXTRA MONEY to implement! It would also help the recovery of the river during the longer process of retrofitting the dam for summer/fall flows.

This can be done NOW without any studies needed first. It could have been done last fall when PR energy was repairing their generator and there was danger of major flood events over the winter. Unfortunately, damage has been done, let's see how we can keep it from ever happening again.

Thanks for your attention to this matter, we await your response.  
Terry L. Brown & Jude Abrams Friends of Eagle River

Terry L. Brown

s.22

[www.TerryLBrown.com](http://www.TerryLBrown.com)  
"Connecting You with Wonder"

--

**From:** Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**Subject:** FW: Friends of Eagle River Complaint  
**Sent:** 12/07/2007 00:55:53  
**Message Body:**

I think we should have a brief conference call with the company tomorrow morning. Let me know if you are available.

Thank you

-----Original Message-----

**From:** Gibson, Jason  
**Sent:** December 6, 2007 3:40 PM  
**To:** Rahier, Gregory; Webb, John  
**Cc:** Nanson, Dave  
**Subject:** Friends of Eagle River Complaint

Hi Guys,

Just received a call from Terry Braun, Friends of Eagle River. He says the water level has dropped because the "large gates" are closed. He says that salmon redds are exposed, or soon will be exposed.

He said he has left messages with Doug Swift and at the Hydro Dam administration office itself.

Terry Brauns.22

JG

**Jason Gibson**  
**Fishery Officer, C&P Supervisor**  
**Nanaimo Detachment**  
Fisheries & Oceans Canada  
Nanaimo, BC  
Tel: (250) 754-0206  
Cell: (250) 713-3627  
Fax: (250) 754-0309

**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)

**To:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Adkins, Bruce (AdkinsBr@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca); Nanson, Dave (NansonD@pac.dfo-mpo.gc.ca)

**Subject:** FW: Eagle River flow modifications

**Sent:** 10/12/2007 15:13:00

**Attachments:** thanks debbi.pdf

**Message Body:**

FYI ? things are improving.

-----Original Message-----

**From:** Nadja Hocking [mailto:ns.22]

**Sent:** Thursday, October 11, 2007 11:32 AM

**To:** susan.dyer@Brookfieldpower.com; Debbi Stanyer

**Cc:** nicholas.simons.mla@leg.bc.ca; env.minister@gov.bc.ca; Shane Dobler; Wesley Bingham; squinn@sechelnation.net; Eagle Walz; Swift, Doug; Michael Thoms

**Subject:** Eagle River flow modifications

<<thanks debbi.pdf>>

# FRIENDS OF EAGLE RIVER

PO Box 404  
Powell River, BC, V8A 5C1

Debbi Stanyer and Susan Dyer  
Powell River Energy Inc  
201-4400 Marine Avenue,  
Powell River, BC V8A 2K1  
Telephone: 604-485-2223

October 11, 2007

## **Re: thank you for stream flow modifications**

Dear Debbi Stanyer and Susan Dyer,

Friends of Eagle River sincerely thank Powell River Energy for taking measures to regulate water flow for the benefit of salmon and begin the mitigation of deleterious effects on Eagle River fish habitat from the opening and closing of the gates. Various members are observing the salmon in the pools. Just recently Terry Brown and Jude Abrams identified Chinook and Coho in the pulpit rock pool. Terry states that Chinook and Coho are the most depleted species of salmon in Georgia Strait. This means that this year the river has spawning runs of Chinook, Coho, Pink and Chum. It is a credit to you that the habitat is improving. Terry Brown will send you a longer stream report.

At this point we express our sincere gratitude to all and hope to continue together to eliminate deleterious effects on Eagle River salmon habitat.

Yours truly

Nadja Hocking  
Representing Friends of Eagle River

CC:

Nicholas Simons, MLA Powell River-Sunshine Coast    [nicholas.simons.mla@leg.bc.ca](mailto:nicholas.simons.mla@leg.bc.ca)  
Ministry of Environment, Barry Penner, MLA    [env.minister@gov.bc.ca](mailto:env.minister@gov.bc.ca)  
Shane Dobler, Powell River Salmon Society    [prssociety@prcn.org](mailto:prssociety@prcn.org)  
Wes Bingham Sierra Club  
Sid Quinn, Sechelt Indian Band    [squinn@secheltnation.net](mailto:squinn@secheltnation.net)



Eagle Walz, Powell River Parks and Wilderness Society

Doug Swift, Department of Fisheries and Oceans, [SwiftD@pac.dfo-mpo.gc.ca](mailto:SwiftD@pac.dfo-mpo.gc.ca)

Colin Palmer, Chair, Powell River Regional District

Dr. Michael Thoms, environmental and legal historian, Malaspina University, College,  
[thomsm@mala.bc.ca](mailto:thomsm@mala.bc.ca)

**From:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca)  
**To:** Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** Lois  
**Sent:** 06/04/2007 16:26:31  
**Attachments:** LoisRiverToR\_RiffleAnalysis.doc  
**Message Body:**

Hi Ron:

Sorry, I have been away for the last week and a half. The TOR looks good. Made a few comments

<<LoisRiverToR\_RiffleAnalysis.doc>>

You should send this to Brookfield and Doug Swift at your earliest convenience

Thanks, Mel

Mel Sheng  
Oceans, Habitat Enhancement Branch  
Resource Restoration  
Direction des océans, de l'habitat et de la mise en valeur/Restauration de la ressource  
Tel: 250-756-7016; facsimilé /  
télécopieur 250-756-7088  
Fisheries and Oceans Canada/Pêches et Océans Canada  
4166 Departure Bay Rd, Nanaimo, B.C.  
V9T 4B7

## **Habitat-flow survey terms-of-reference (ToR) that address partial flow restoration in the Lois River with emphasis on riffle-dependent fish and aquatic insects, in addition to fish passage/spawning flow needs**

### **Background**

The May 1, 2007 field reconnaissance by members of Fisheries and Oceans Canada and BC Ministry of Environment established a basis for future study of fish conservation flows on lower Lois River to support partial river flow restoration. This scoping exercise constrained the level and breadth of habitat-flow surveys that are required before a decision to re-water a diversion reach downstream of Scanlon Dam, the point of diversion (POD) at the outlet of Lois Lake is made. This is one of many older, large water diversion projects in the Province of British Columbia that does not release any prescribed flows for fisheries purposes. Details of the study area and available fish habitat are described in the report by Redden and Pollard (2000) "Habitat Assessment of Lois River". The maximum allowable annual licensed flow at the point-of-diversion is about 36.7 cms from a watershed area of 468 km<sup>2</sup>. The licensed quantity is larger than the estimated mean annual discharge prior to regulation (35.5 cms) and much greater than the mean prior to 1929 (26 cms). The original purpose of flow regulation was for power generation for the Powell River paper mill in 1930. Present day power specifications are Lois Lake (Lois River), 36 MW, 2 units

Restored baseflows potentially improve benthic invertebrate production of prey (food) items necessary for stream fish growth, sustained biomass and survival. The mechanism for improved insect abundance is through creation of preferred depths (>10 cm) and velocities (>50 cm/s) over riffle sites (Instream Flow Council 2002). Benthic insects form "drift" from riffles that are sought by juvenile salmonids within riffles and in downstream glides/pools utilized by salmonids. Food supply (drift rate) is understood to limit fish production and survival in the Lois River consistent with the ecology of the animals and their minimum territorial space needs. Improvements in the extent (width) and quality of fast-water habitats (riffles/rapids/cascades) are also expected to directly benefit fish rearing space such as used by resident trout and steelhead parr that prefer these habitats. The question remains whether modest flow releases in combination with various inflows along the 4.2 km river length of the Lois River will have the desired effect of significantly improving fish biomass and production to levels associated with an unregulated stream. At present we understand the natural or innate productivity of the stream to support fish is limited (low alkalinity) and assured adult salmon or steelhead passage at various barriers is uncertain. If passage for (example) summer steelhead were accomplished with timely pulse flows, provision of spawning flows would also be necessary. Regardless, successful fish reproduction for resident trout require adequate and timely spawning flows. For the purposes of Project transparency by the public, it is

recommended that this investigation follow the Provincial guidelines on Water Use Planning; see

[http://www.env.gov.bc.ca/wsd/plan\\_protect\\_sustain/water\\_use\\_planning/index.html](http://www.env.gov.bc.ca/wsd/plan_protect_sustain/water_use_planning/index.html)

The work scope of the habitat-flow survey is to complete a Riffle Analysis (page 114; Stalnaker and Arnette 1976) at three qualifying Riffle cross-sections in Reach 3 (near Herondale Bed and Breakfast) over a limited range in stream flows (400-3200 L/s). Survey results should capture flows that are stepped in a geometric series from 400, 800, 1600 to 3200 L/s. Office-based analysis of instream flow needs suggest a value near 1800 L/s is required based on in situ channel geometry and previous findings for similar-sized streams. The analysis will follow procedures outlined in

[http://www.env.gov.bc.ca/wld/documents/bmp/guidelinesIFRv5\\_2.pdf](http://www.env.gov.bc.ca/wld/documents/bmp/guidelinesIFRv5_2.pdf)

which allows a plot of usable stream width or wetted width with flow to assess optimum rearing flows for insects and fish; see below for hypothetical fish or usable width response to flow increases. The companion glide cross-section that provides accurate discharge information will also be used to qualify spawning flows. This will be done in a similar manner to the Riffle Analysis and will differ by its use of appropriate depth-velocity spawning criteria (steelhead) over gravel.



**Figure 1.** Hypothetical responses to flow. The shape of the response curve will dictate recommendations regarding water use and protection of aquatic resources.

In the course of field surveys, the contractor will provide “at-station” photographs at known flows at several vantage points and will include photographs at both barriers below Highway 101 should spill flows be experienced. The intent is to provide a visual, non-technical appraisal of fish rearing habitat at known flows, at similar perspectives as per Tennant (1975). It is also designed to provide further evidence for canyon back-flooding and reduced leap heights or improved adult passage conditions.

Should the usable width for spawning at riffles show no discernable plateau as discharge increases, additional transect replications specific to glides will be assessed at higher flows. The estimated requirement for spawning flows is about 67%*mad* or 6 cms. However, gravel in Reach 3 tended to be in narrow pool tail-out positions which suggests this approximation may be over estimated.

## **Services**

### *Riffle Analysis*

Riffle cross-section information will be collected at a minimum of four different flows (as above) with one glide cross-section to be used as the primary flow determination site. It is expected all transect data at a particular flow will be surveyed within one day once transects are selected and bench-marked. At the beginning of the survey, a stream stage level will be installed and periodically checked to provide evidence that stream stage is static during the collection of cross-section information. The expected duration of surveys will take about four days assuming that the tested discharges (i.e. 400, 800, 1600 to 3200 L/s) can be held steady for a 16 hour period. The duration taken to establish constant flows at particular levels may take longer as constrained by the ability to supply constant releases from the dam or spill gates. Brookfield Power engineers will be required to develop a plan for scheduled releases and should consider releasing the highest discharge first and then ramping down to each predetermined level. It is conceivable that natural inflows in the magnitude of 300%*mad* or 3x(80L/s per 1 km<sup>2</sup>) from 5.37 km<sup>2</sup> or 1300 L/s can occur on a seasonal basis for a 24 hr period.

Office reduction of field transects will utilize existing Excel spreadsheets and MoE habitat criteria for reporting purposes.

### *Flow Metering and Spawning Flow Assessment*

Metering of streamflows will utilize a single glide cross-section in Reach 3 that has minimal turbulence and measurement error associated with it. The measurements will be in accordance with existing provide full words (RISC) hydrometric standards using a calibrated flow meter.

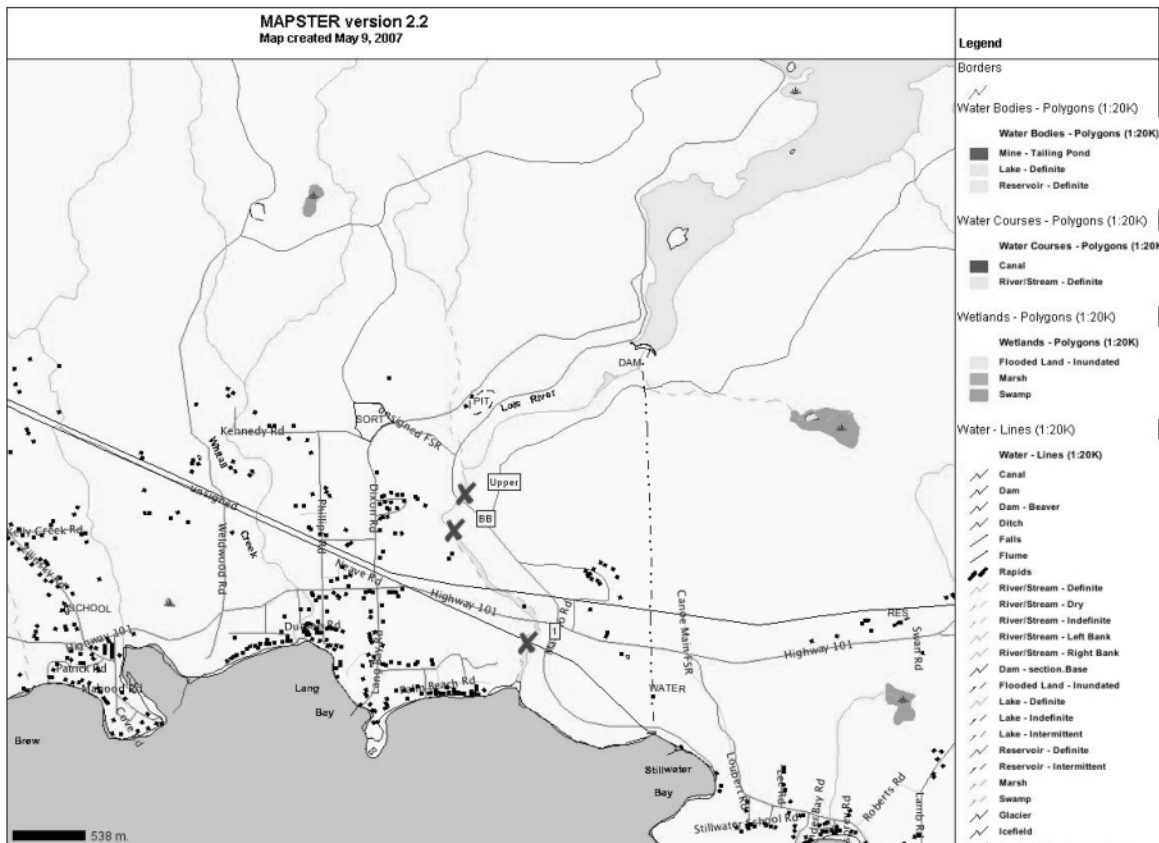
See: <http://ilmbwww.gov.bc.ca/risc/pubs/aquatic/hydro/index.htm>

*Confirmation of natural hydrograph and unit runoff from a reconstruction of flows from diversions and spills*

From whatever diversion and spill records available from Brookfield Power, the constant will confirm the actual mean annual discharge at POD and annual hydrograph in contrast to hydrometric records prior to 1929. The purpose is to qualify how recommended flow restoration compares with the natural hydrograph.

Potential Service providers (contacts):

1. [ecofish@telus.net](mailto:ecofish@telus.net)
2. [DBurt\\_and\\_Assoc@telus.net](mailto:DBurt_and_Assoc@telus.net)
3. [pier.vandishoeck@amec.com](mailto:pier.vandishoeck@amec.com)
4. [mjl@telus.net](mailto:mjl@telus.net)
5. [onstream@telus.net](mailto:onstream@telus.net)
6. [hatfield@solander.bc.ca](mailto:hatfield@solander.bc.ca)



**From:** Swift, Doug (SwiftD@pac.dfo-mpo.gc.ca)  
**To:** Dyer, Susan (Susan.Dyer@brookfieldpower.com)  
**Cc:** Sheng, Mel (ShengM@pac.dfo-mpo.gc.ca); Ptolemy, Ron ENV:EX (Ron.Ptolemy@gov.bc.ca)  
**Subject:** Lois River, Site Visit on May 1  
**Sent:** 04/18/2007 22:23:04  
**Message Body:**

Hello Susan,

I heard back from both Mel Sheng and Ron Ptolemy and they are available on May 1 for a Lois River tour. Would Debbie Stanyer or you be available for this tour? I do not know the access points very well. Once the field trip is over, if possible, it would be beneficial to have a meeting to go over the next steps. **Now, the question is, are you available on May 1?**

This would also be a good time for Mel to look at the channel at the Theodosia if there is transportation.

Please confirm if you are available on May 1, thank you.

Doug Swift

Habitat Management Technologist/Technologist, gestion de l'habitat

Fisheries and Oceans Canada/Pêches et Océans Canada

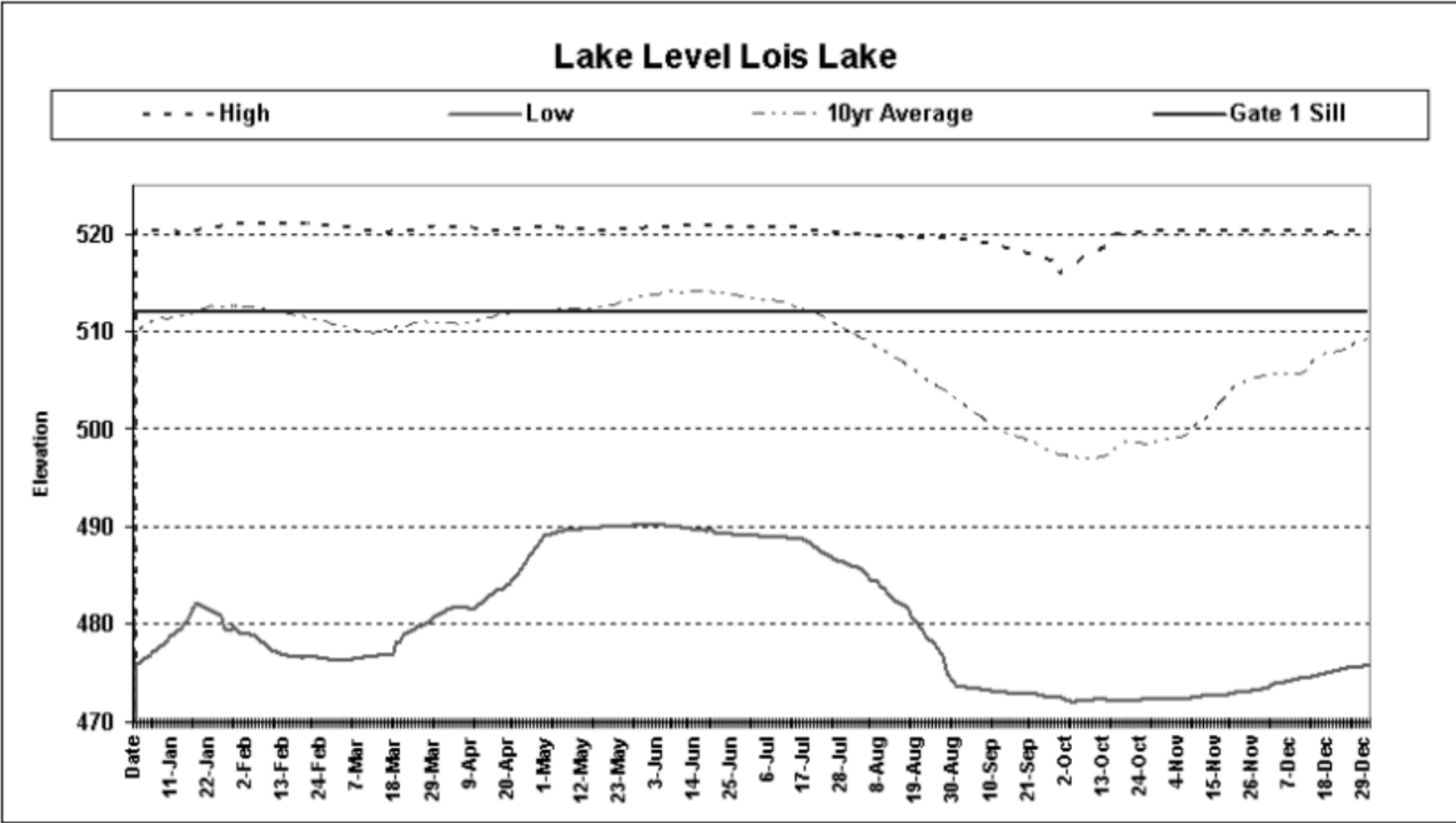
South Coast Area

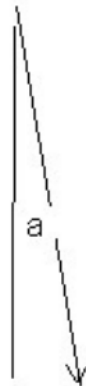
148 Port Augusta Street

Comox BC V9M 3N6

Ph. (250)339-4905/Facsimile (250)339-4612





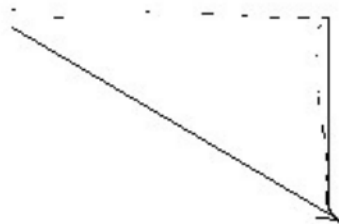


$$\text{Angle } a = 90 - 73 = 17$$

$$\cos(A) = b/c$$

$$b = c \cdot \cos(17) = 15\text{m} \cdot (0.9563)$$

$$b \text{ (top of canyon to pool surface)} = 14.3 \text{ m}$$



$$\sin A = a/c$$

$$c = 15\text{m}$$

$$a = 15 \cdot (\sin 31) = 15 \cdot (0.5150)$$

$$a = \text{top canyon to top Falls} = 7.73\text{m}$$

$$\text{Falls Height} = 14.3 - 7.73 = 6.57 \text{ m}$$

$$\text{Height of log above pool surface} = 3.6 \text{ m}$$

$$\text{Leap height under high flows} = 6.57 - 3.6 = 2.97 \text{ m}$$