Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:31 AM
To: Becker, Judy S ENV:EX
Subject: FW: Information for Francesca Knight

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, September 15, 2011 10:10 AM
To: Babakaiff, Scott C FLNR:EX; Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX
Subject: FW: Information for Francesca Knight

recent Mamquam flow data, including the Sept. 12 event,
C

From: Barb Schmidtke [mailto:BSCHMIDTKE@capitalpower.com]
Sent: September 14, 2011 8:38 AM
To: Knight, Francesca
Cc: Marc Nering; Kelly Fyhn
Subject: FW: Information for Francesca Knight

Hi Francesca, here is the data from Monday. I should have a table for Tuesday shortly.

Barb

From: Elyse Macdonald [mailto:emacdonald@ecofishresearch.com]
Sent: Tuesday, September 13, 2011 10:00 AM
To: Barb Schmidtke
Cc: Marc Nering; Kelly Fyhn
Subject: RE: Information for Francesca Knight

Good morning Barb,

Here is the table of information with yesterday's data added. This includes the ramping event yesterday morning, though a separate report will follow today that details our findings for this event. Based on my conversations with Elspeth yesterday, the plant is now offline until approximately Friday.

Table 1. Maximum, minimum, average and standard deviation values for discharge and stage at MQM-DSLG01 for August 29 – September 12, 2011.

Date (2011)	Standard Deviation (Discharge, cms)	Maximum Discharge (	Minimum Discharge (cms)	Average Discharge (cms)	Standard Deviation (Level, m)	imum el (m)	Minimum Level (m)	Average Level (m)
29-Aug	1.021	24.638	20.514	21.995	0.022	1.037	0.949	0.981
30-Aug	0.767	21.955	18.795	20.132	0.017	0.981	0.909	0.941
31-Aug	0.77	19.558	16.975	18.048	0.019	0.934	0.864	0.891
01-Sep	0.596	17.489	14.729	16.114	0.016	0.877	0.804	0.841
02-Sep	0.39	15.566	13.956	14.69	0.011	0.827	0.782	0.803
03-Sep	0.394	14.673	13.276	14.011	0.011	0.808	0.762	0.783
04-Sep	0.496	15.566	13.545	14.364	0.014	0.827	0.77	0.794
05-Sep	0.539	15.715	13.749	14.768	0.015	0.831	0.776	0.805
06-Sep	0.63	16.166	13.784	14.862	0.017	0.843	0.777	0.807
07-Sep	0.534	15.603	13.545	14.445	0.015	0.825	0.77	0.796
08-Sep	0.506	15.64	13.511	14.368	0.013	0.829	0.769	0.795
09-Sep	0.975	16.166	4.169	14.373	0.03	0.843	0.387	0.793
10-Sep	0.665	16.315	13.613	14.611	0.019	0.847	0.772	0.8
11-Sep	0.735	16.242	13.715	14.667	0.021	0.845	0.775	0.802
12-Sep	0.533	15.053	12.391	13.973	0.016	0.813	0.735	0.783

Figure 1. Discharge (cms) for MQM-DSLG01 September 9 –12, 2011.

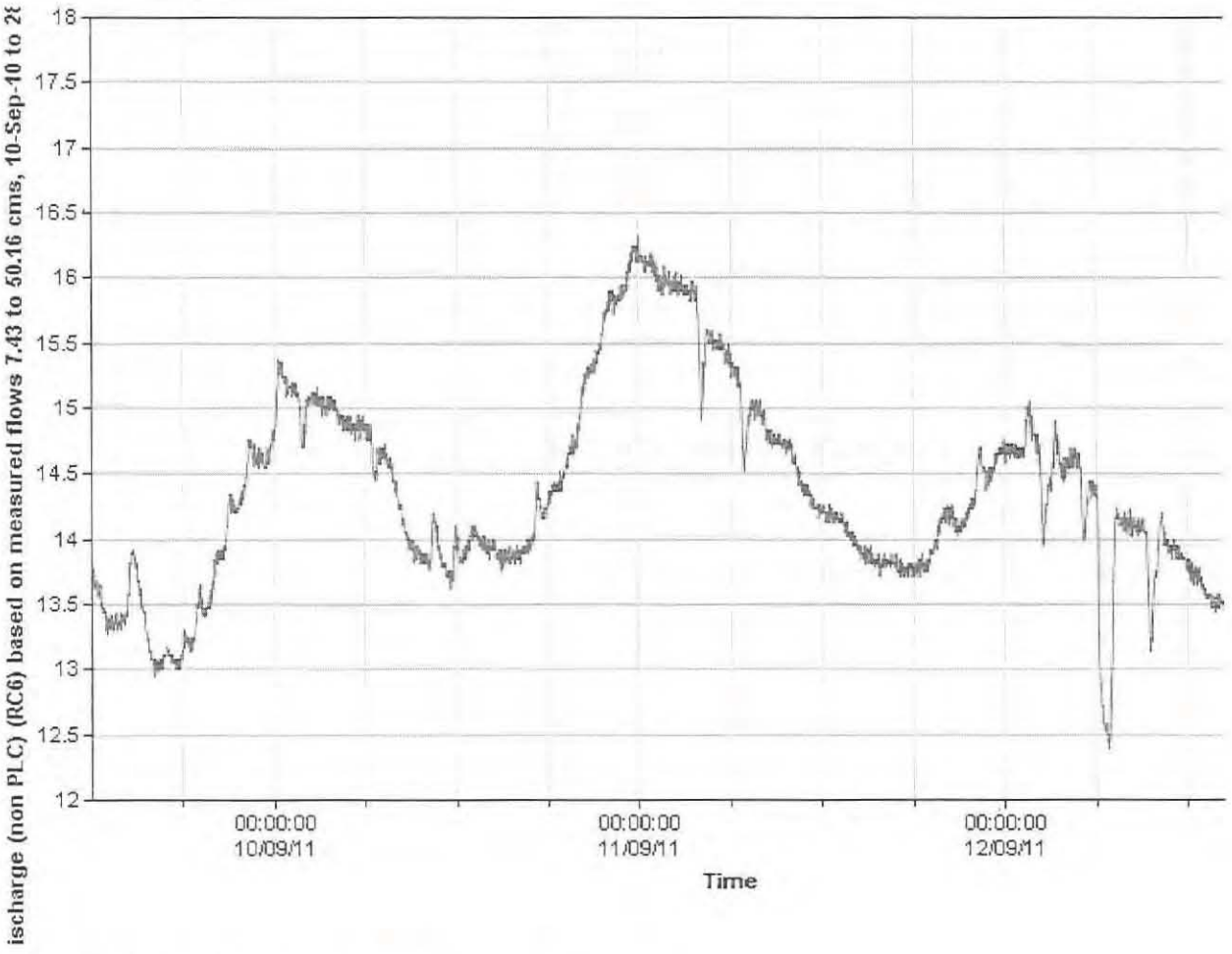
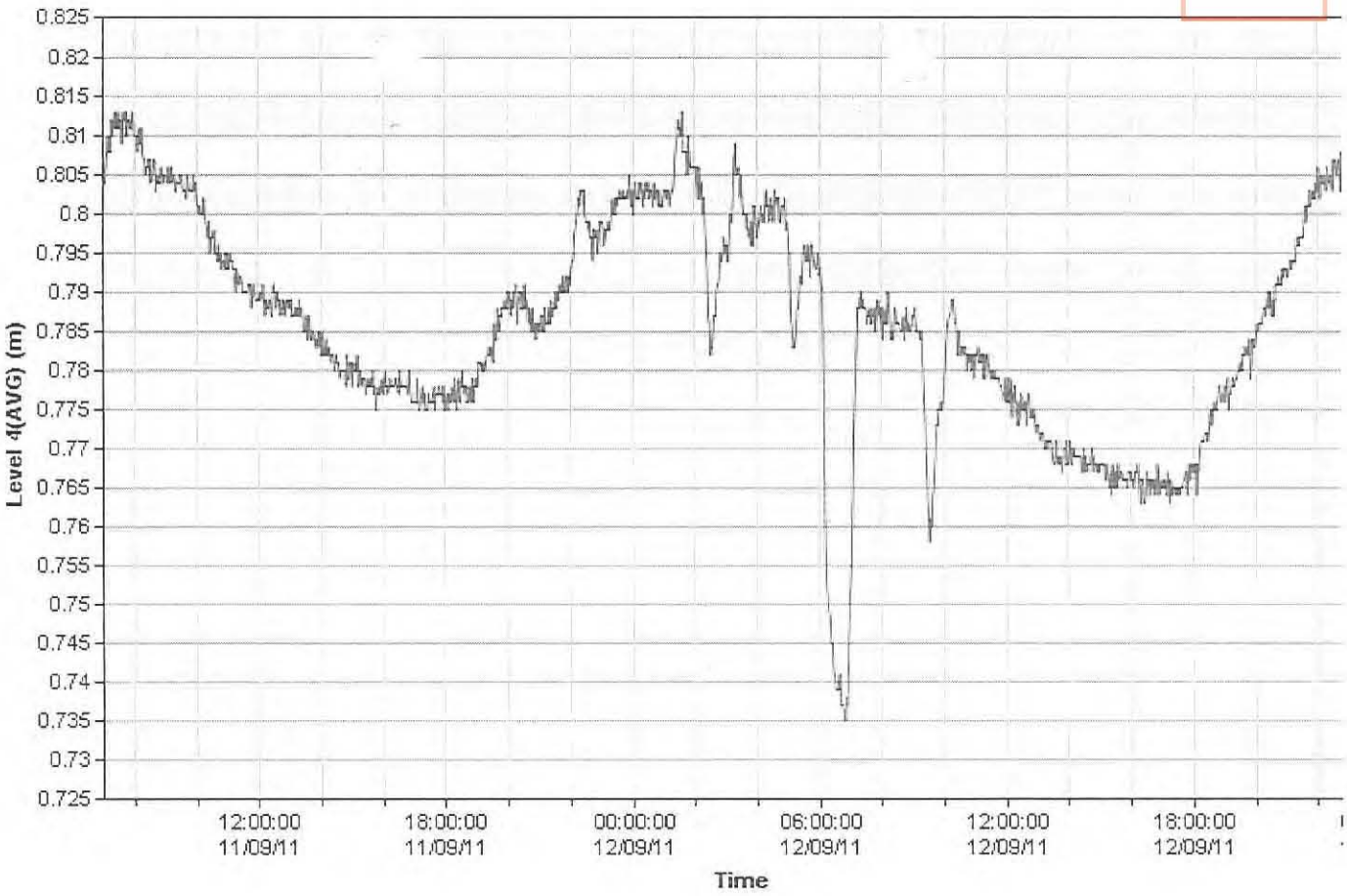


Figure 2. Level (m) for MQM-DSLG01 September 9 –12, 2011.



Please note the stage change criteria for MQM-DSLG01 is 3.6 cm/hr. Please also note all times on the graphs are PST.

Please let me know if you have any questions.

Kind regards,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

Ecofish Research Ltd.

emacdonald@ecofishresearch.com
www.ecofishresearch.com

Suite 1000 - 355 Burrard Street, **Vancouver, BC**, V6C 2G8
Voice: 604 608-6180; Fax: 604 608-6163; Cell: 604 785-6726

From: Barb Schmidtke [mailto:BSCHMIDTKE@capitalpower.com]
Sent: September-07-11 4:43 PM
To: Elyse Macdonald
Cc: Marc Nering; Kelly Fyhn
Subject: Information for Francesca Knight

Hi Elyse,

Marc said to go ahead and supply the information on the max, min and average flows that Francesca asked for. You can send it to me to forward to her. I know you mentioned it doesn't take much time for you to cut and paste this information into an email, but if this is going to take a significant amount of your time over the time period she has requested- last week to at least mid- October, there should perhaps be provision for regulator information requests in the scope of the Mamquam monitoring program.

Barb

Barb Schmidtke B.Sc.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5468 | bschmidtke@capitalpower.com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This email message, including any attachments, is for the intended recipient(s) only, and contains confidential and proprietary information. Unauthorized distribution, copying or disclosure is strictly prohibited. If you have received this message in error, or are obviously not one of the intended recipients, please immediately notify the sender by reply email and delete this email message, including any attachments. Thank you.

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:31 AM
To: Becker, Judy S ENV:EX
Subject: FW: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Importance: High

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Barb Schmidtke [mailto:BSCHMIDTKE@capitalpower.com]
Sent: Wednesday, September 14, 2011 9:56 AM
To: 'Busto, Vince (Vince.Busto@dfo-mpo.gc.ca)'; 'Knight, Francesca (Francesca.Knight@dfo-mpo.gc.ca)'
Cc: Marc Nering; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; 'Loop, Dave'; Kate Chisholm; 'mrankin@heenan.ca'; Rudy Barrett; David Hermanson; Michael Smith; Kelly Fyhn
Subject: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish
Importance: High

Dear Vince and Francesca,

This is a follow-up to Capital Power's request for an urgent meeting with you this week to discuss the basis for your request to raise the IFR at Lower Mamquam from 1 cms to 7-10 cms.

Would you be available to meet with us this week?

Looking forward to your response, regards,
Barb

Barb Schmidtke B.Sc.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5468 | bschmidtke@capitalpower.com


Please consider the environment before printing this e-mail

please immediately notify the sender by reply email and delete this email message, including any attachments. Thank you.

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:31 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Ramping Event results

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Barb Schmidtke [mailto:BSCHMIDTKE@capitalpower.com]
Sent: Monday, September 12, 2011 5:06 PM
To: 'Knight, Francesca (Francesca.Knight@dfo-mpo.gc.ca)'; 'Busto, Vince (Vince.Busto@dfo-mpo.gc.ca)'; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Bennett, Timothy A FLNR:EX
Cc: Marc Nering; Michael Smith; David Hermanson; Kelly Fyhn; 'Adam Lewis (fjalewis@ecofishresearch.com)'; 'Elyse Macdonald (emacdonald@ecofishresearch.com)'
Subject: FW: Mamquam Ramping Event results

Hello all,

The Lower Mamquam hydroelectric power plant shut down for outage on September 12, 2011. During shutdown the turbines ramp down to 2 MW and then have to be shut off completely. When the turbine was shut off after ramping down to 2 MW this morning, the resulting drop in river level triggered the monitoring alarms. Ecofish crews searched the stranding hotspots and at the downstream (MQM-DSSD02), highway bridge site found one deceased fry that could have been stranded during this event. An incident report will follow.

Barb

Barb Schmidtke B.Sc.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5468 | bschmidtke@capitalpower.com

From: Elyse Macdonald [mailto:emacdonald@ecofishresearch.com]
Sent: Monday, September 12, 2011 3:29 PM
To: Marc Nering; Barb Schmidtke
Cc: Adam Lewis
Subject: Mamquam Ramping Event results

Good afternoon Marc and Barb,

Our crews searched the downstream (MQM-DSSD02), highway bridge site following the shutdown of the Lower Mamquam facility this morning. We found one stranded, deceased, fry. I am preparing an incident report this afternoon and this should be ready for agency submission later tonight or early tomorrow. The onsite crew indicated the fry is relatively fresh looking, which could indicate it was stranded due to the ramping event this morning.

Agencies should be notified that a deceased fry was found within 24hrs.

Please let me know if you have any questions.

Kind regards,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

Ecofish Research Ltd.

ECOFISH RESEARCH LTD

emacdonald@ecofishresearch.com
www.ecofishresearch.com

Suite 1000 - 355 Burrard Street, **Vancouver, BC**, V6C 2G8
Voice: 604 608-6180; Fax: 604 608-6163; Cell: 604 785-6726

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam IFR flow deviation

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: Friday, September 9, 2011 2:44 PM
To: (Vince.Busto@dfo-mpo.gc.ca); Bennett, Timothy A FLNR:EX; Knight, Francesca (Francesca.Knight@dfo-mpo.gc.ca); Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX
Cc: Adam Lewis; Elyse Macdonald; Kevin Ganshorn; Rudy Barrett; Barb Schmidtke; Kate Chisholm; David Hermanson; Michael Smith; Robert Brassard; David Carlin; David Griffioen; Elspeth Miller; Wayne Moffatt
Subject: Mamquam IFR flow deviation

Further refinement of the discharge curves downstream of the Mamquam intake is showing a slight deviation from the IFR discharge (as noted below in the Email from Ecofish's Kevin Ganshorn). The Mamquam IFR has been measured on several occasions.

1. May 2005 - Brian James of Triton Environmental measured/set the IFR (Manning's Equation measuring technique plus actual measurements)
2. Summer 2005 – Scott Babakaiff of MOE twice measured the IFR for compliance (salt dispersion technique).
3. Sept 2006 – Peter Ward of Ward Associates re-measured IFR and recommended increasing slightly to ensure flows exceeded margin of error. The flow setting was increased (Flow gauge measurement technique)
4. August 2008 – Plant installed flow monitoring on riparian bypass piping (Doppler measurement technique)
5. June 2009 - Riparian Bypass piping calibrated retested OK. The riparian bypass monitor currently measures 1.2cms
6. Ecofish 2010/2011 – Multiple tests of IFR conducted with no apparent issues. Ecofish installed PLC gauges read between 1.1-1.3 cms (flow gauge technique)
7. Ecofish September 8, 2011 – Latest test shows IFR flow deviation

The Mamquam intake IFR equipment is functioning normally, the head pond set point is now higher than when earlier testing was completed (meaning flow rates should be even higher than measured due to increased head). There is no chance of pluggage, etc., of the piping due to the size of the opening and its position behind the trashracks.

Different testing methods/testers have reached slightly different results. However, according to Ecofish, the testing completed late yesterday used the latest discharge curve results and extremely diligent testing. As a result, we will be increasing the IFR flows using Ecofish's latest data.

Marc Nering

From: Kevin Ganshorn [mailto:kganshorn@ecofishresearch.com]
Sent: Thursday, September 08, 2011 5:09 PM
To: Marc Nering
Cc: Adam Lewis; Elyse Macdonald
Subject: Mamquam IFR flow deviation

Hi Marc,

As discussed earlier today, we had a crew onsite this morning to collect a discharge measurement between 10:07 – 11:42 (PDT) with a USGS/Water Survey Canada standard Price AA meter. Given that the IFR is 1 cms and the hydrometric gauge below the intake was reporting a discharge of ~0.92 cms (based on the most current stage-discharge curve), the field crew was very diligent in the collection of data. Velocity measurements were collected at 20%, 60%, and 80% of the stream depth whenever the depth was greater than 0.60 m (i.e., across most of the channel). Measured velocities were also well above the minimum recommended velocity of 0.08 m/s for the Price AA meter (the mean measured velocity was 0.36 m/s). Each panel in the transect represented between 0% to 6.93% of the flow (average of 4.17%, provincial standards are 10%).

Considering the stage at which the measurement was taken, it appears to fall in line with other measurements taken around the same flow, and the point fits well on the established stage-discharge curve suggesting that there have been no changes in the relationship between stage and discharge at the gauging location in the last year.

Date	Start Time (PST)	End Time (PST)	Method	Stage (m)	Measured Discharge (cms)
9-Sep-10	3:40 PM	4:14 PM	Wading/Price AA	0.718	1.12
22-Sep-10	1:33 PM	2:15 PM	Wading/Price AA	0.700	0.98
8-Sep-11	9:06 AM	10:43 AM	Wading/Price AA	0.687	0.90

We suggest that Capital Power notify agencies of this result, saying that the gauge below the intake is showing a slight deviation from the IFR, and that Capital Power is examining any operational factors which may be contributing to the deviation.

Regards,
Kevin

Kevin Ganshorn, M.Sc.
Biologist & Project Manager
Ecofish Research Ltd.

kganshorn@ecofishresearch.com
www.ecofishresearch.com
Suite 1000 355 Burrard Street, **Vancouver, BC**, V6C 2G8
Cell: 778 866-7795; Voice: 604 608-6180; Fax: 604 608-6163

please immediately notify the sender by reply email and delete this email message, including any attachments. Thank you.

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: Friday, September 9, 2011 4:52 PM
To: Busto, Vince; Kelly Lail
Cc: Barb Schmidtke; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Knight, Francesca; Kate Chisholm; mrankin@heenan.ca; Rudy Barrett; David Hermanson; Michael Smith
Subject: RE: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Dear Vince and Francesca,

In reply to your letter of today's date, we wish to advise that we are complying immediately with your request to increase the IFR from 1cms to 7-10 cms.

Please be advised that we started the increase in IFR flow around noon today upon receipt of your letter. We expect to reach 7 cms at around 04:00 tomorrow Sept. 10. We shall send the hydrometric data on a daily basis (displaying the previous days results) with weekend results being sent Monday.

Capital Power requests an urgent meeting with you next week to discuss the basis for your request. Please note that the ramping incidents mentioned in your letter were part of the monitoring/testing to determine appropriate ramping levels, and only small numbers of very small fry were affected. We have made many changes to the operation of the plant and have replaced equipment to prevent these ramping incidents from occurring.

Would you be available to meet next Wednesday or Thursday?

Thank you.

Regards,

Marc Nering

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: Friday, September 09, 2011 9:43 AM

To: Kelly Lail
Cc: Marc Nering; Barb Schmidtke; iddard, Erin M FLNR:EX; Bennett, Timothy FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Knight, Francesca
Subject: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Mr. Lail

Please refer to the attached letter, signed by both Francesca Knight and me.

Vince Busto, B.A.Sc., P.Eng.

Habitat and Hydrotechnical Engineer	Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch	Protection et mise en valeur des habitats
Lower Fraser River	Le bas Fraser
Fisheries and Oceans Canada	Pêches et Océans Canada
100 Annacis Parkway, Unit 3	100 Annacis Parkway, Unit 3
Delta, BC V3M 6A2	Delta (C.-B.) V3M 6A2
Government of Canada	Gouvernement du Canada

Telephone/Téléphone 604-666-8281
Facsimile / Télécopieur 604-666-6627

Pacific Region 'Working Near Water' website

http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

<<11-176 DFO letter to Capital Power - Sept 9-2011.pdf>>

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Kelly Lail [mailto:klail@capitalpower.com]
Sent: Friday, September 9, 2011 6:17 PM
To: 'Busto, Vince'
Cc: Marc Nering; Barb Schmidtke; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Knight, Francesca
Subject: RE: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Vince:

This matter has been referred to Marc Nering, the plant manager for our Mamquam Power Plant and he will be in communication with you on this.

Regards,
Kelly

Kelly S. Lail
Vice President
Capital Power Corporation
10451 Shellbridge Way, Suite 215
Richmond, BC V6X 2W8
T: 604.232.2241 | F: 238-2003
E: klail@capitalpower.com

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: September 9, 2011 9:43 AM
To: Kelly Lail
Cc: Marc Nering; Barb Schmidtke; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Knight, Francesca
Subject: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Mr. Lail

Please refer to the attached letter, signed by both Francesca Knight and me.

Vince Busto, B.A.Sc., P.Eng.
Habitat and Hydrotechnical Engineer | Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch | Protection et mise en valeur des habitats
Lower Fraser River | Le bas Fraser
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Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish
Attachments: 11-176 DFO letter to Capital Power - Sept 9-2011.pdf

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Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
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Sent: Friday, September 9, 2011 9:43 AM
To: Kelly Lail
Cc: Marc Nering; Barb Schmidtke; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Knight, Francesca
Subject: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Mr. Lail

Please refer to the attached letter, signed by both Francesca Knight and me.

Vince Busto, B.A.Sc., P.Eng.

Habitat and Hydrotechnical Engineer	Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch	Protection et mise en valeur des habitats
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Fisheries and Oceans Canada | Pêches et Océans Canada

Unit #3 – 100 Annacis Parkway
Delta, BC V3M 6A2

September 9, 2011

Mr. Kelly Lail
Director, Commercial Management
Capital Power Corporation
PO Box 5383
Squamish, BC V8B 0C2

11-HPAC-PA2-00176

Subject: Ramping rate concerns, Lower Mamquam IPP, Squamish

Dear Mr. Lail,

DFO has been aware of impacts to fish and fish habitat as a result of plant ramping operations since the fall of 2010. Ramping events in the spring of 2011 resulted in the death of newly emerged anadromous salmonid fry, and are of great concern to DFO. As well, the recent ramping event reported on August 17, 2011 resulted in the stranding and death of salmonid fry. In total, DFO is aware of eight ramping incidents through the late summer and fall of 2010 (fish were found stranded and/or killed at half of those events, corresponding with the river low flow period following freshet), an additional five events in the spring of 2011 (affecting newly emerged fry and when the river is at low flows), and the recent August event (again, river at low flows and juvenile fish in the mainstem).

Please be advised that the stranding and / or killing of fish is in contravention of the *Fisheries Act* (S. 32). We require that Capital Power operate in such a manner that no harmful alteration, disruption or destruction (HADD) of fish or fish habitat occurs. As well, S. 22(3) of the Fisheries Act allows DFO to direct the owner or occupier of an obstruction [dam, diversion weir] as follows:

> *permit the escape into the river-bed below the obstruction of such quantity of water, at all times, as will, in the opinion of the Minister, be sufficient for the safety of fish and for the flooding of the spawning grounds to such depth as will, in the opinion of the Minister, be necessary for the safety of the ova deposited thereon.*

We direct your attention to this section of the Act particularly due to DFO's concerns pertaining to pink salmon spawning throughout the lower river and associated side channels. DFO is requesting, without at this time making a statutory order under section 22(3), that Capital Power provide an interim instream flow release (IFR) of between 7 and 10 m^3/s, from today until the flows in the river come up with the fall rains; which we would define as a discharge of $\geq$20 m^3/s that is maintained or exceeded for more than 72 hours. During this period, we request that you provide DFO with the following

Canada

hydrometric data on a daily basis: daily discharge (summarized as minimum, maximum and average) at gauges MQM-DSLG01 (downstream of the powerhouse) and MQM-DVLG-02 (lower diversion reach). We would appreciate you advising us at your earliest opportunity if you will be operating in the manner described above.

Please note that DFO Conservation & Protection staff may be investigating the above described stranding events and nothing in this letter should be taken to preclude DFO from pursuing charges for same under the Federal *Fisheries Act*.

If you have any questions please contact either of the undersigned at the contact information below.

regards,

Vince Busto, P.Eng.
Hydrotechnical Engineer
Vince.Busto@dfo-mpo.gc.ca
604-666-8281

Francesca Knight, M.Sc., R.P. Bio.
Habitat Biologist
Francesca.Knight@dfo-mpo.gc.ca
604-892-2040

cc: Marc Nering, Capital Power Corporation, Lower Mamquam Plant Operator
Barb Schmidtke, Capital Power Corporation, Environmental Associate
Tim Bennet, BC Ministry of Forests, Natural Resource Operations, Water Stewardship Division
Scott Babakaiff, BC Ministry of Forests, Natural Resource Operations, Ecosystems Division
Erin Stoddard, BC Ministry of Forests, Natural Resource Operations, Ecosystems Division
David Loop, Conservation and Protection, Squamish Field Supervisor

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:31 AM
To: Becker, Judy S ENV:EX
Subject: FW: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, September 15, 2011 10:14 AM
To: Barb Schmidtke; Busto, Vince
Cc: Marc Nering; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Loop, Dave; Kate Chisholm; mrankin@heenan.ca; Rudy Barrett; David Hermanson; Michael Smith; Kelly Fyhn
Subject: RE: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish

Hello Barb,
I'll wait and see what Vince's availability it, but perhaps a conference call?
The reason for the requested increase in IFR is to mitigate the effects of unplanned shutdowns/partial shutdowns in the lower river (downstream of the powerhouse), as there have been so many events this year that have adversely affected fish in this area.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Ecosystems Management Branch
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Barb Schmidtke [mailto:BSCHMIDTKE@capitalpower.com]
Sent: September 14, 2011 9:56 AM
To: Busto, Vince; Knight, Francesca
Cc: Marc Nering; 'Stoddard, Erin M FLNR:EX (Erin.Stoddard@gov.bc.ca)'; 'Timothy.Bennett@gov.bc.ca'; 'Babakaiff, Scott C FLNR:EX (Scott.Babakaiff@gov.bc.ca)'; Loop, Dave; Kate Chisholm; 'mrankin@heenan.ca'; Rudy Barrett; David Hermanson; Michael Smith; Kelly Fyhn
Subject: Ramping rate concerns, Lower Mamquam hydropower project, Capital Power Corp., Squamish
Importance: High

Dear Vince and Francesca,

This is a follow-up to Capital Power's request for an urgent meeting with you this week to discuss the basis for your request to raise the IFR at Lower Mamquam from 1 cms to 7-10 cms.

Would you be available to meet with us this week?

Looking forward to your response, regards,
Barb

Barb Schmidtke B.Sc.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5468 | bschmidtke@capitalpower.com
Please consider the environment before printing this e-mail

Becker, Judy S ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Wednesday, September 28, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: OPP Template
Attachments: OPP template (2010-11-30 r2).doc

Please print and file under 2000966.

Thanks.

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Babakaiff, Scott C FLNR:EX
Sent: Monday, August 8, 2011 2:58 PM
To: 'Jena Tufts'; 'Marc Nering'; Bennett, Timothy A FLNR:EX
Cc: Stoddard, Erin M FLNR:EX; 'Knight, Francesca'; 'Busto, Vince'; Barrett, Scott FLNR:EX; 'Elyse MacDonald'
Subject: OPP Template

Folks,

Per my promise earlier today, find attached the latest version of the OPP Template I was able to find. I suggest that this template be used to guide the imminent re-composition & re-submission of the OPPR (aka. 'O&M') for Lower Mamquam...as a general comment, there is alot of operational detail included in the February 2011 version of the OPPR, but much of the key information regarding compliance monitoring & reporting for water license conditions (ie. data collection & analysis & reporting on IFR, ramping rates & diversion rates), including commitments regarding mitigative actions & deadlines in the event of non-compliance.

Please be aware, that Tim Bennett MAY have an updated version of this template, and some details (e.g. ramping rate data collection & analysis) are best informed by recent (Summer 2011) work undertaken by Ecofish at nearby facilities. For example, as discussed in today's conference call, details regarding operation & data management of the real-time stream gauge installed by Ecofish on the Lower Mamquam (diversion & downstream reaches) should be included in the OPPR. Accordingly, I recommend that Ecofish be involved in re-composition of the OPPR, and that the proponent make a commitment (read: deadline) for OPPR re-submission be made to regulatory agencies (Tim & Vince/Chessy).

Scott

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Monday, June 27, 2011 10:58 AM
To: Babakaiff, Scott C FLNR:EX; 'Elyse MacDonald'; Bennett, Timothy A FLNR:EX
Cc: Stoddard, Erin M FLNR:EX; 'Knight, Francesca'; 'Busto, Vince'; Barrett, Scott FLNR:EX; Marc Nering; Rudy Barrett; Michael Smith; Serkan Fikirdanis
Subject: RE: Interim Monitoring report

Hello Scott,

Please find attached the Mamquam O&M manual and email from Marc Nering on February 18, 2011.

Please don't hesitate to contact me should you have any questions.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

Proponent (Licensee)

IPP Facility Name

Operating Parameters and Procedures

Date 2010

TABLE OF CONTENTS

SECTION 1.0 - INTRODUCTION

1.1 BACKGROUND

Information includes Proponent, stream/location, water license and water file number(s).

It is a condition of the licence that the licensee must submit a report "on the parameters and procedures for the operations of the works", demonstrating that the planned operations are consistent with the information incorporated in the issuance of the licence with respect to energy generation as well as social and environmental values considered.

This document must clearly specify: key operating parameters / requirements, as identified in appropriate permits and licences; how the project will be operated and monitored to meet those requirements; and identify reporting commitments.

The proponent will be required to operate the facility in accordance with an approved / accepted OPP; and no modifications accepted without prior approval of MoE.

1.2 PROJECT DESCRIPTION

Must include description of all works, authorized under the Water Licence, and any other infrastructure associated with monitoring or confirmation of regulatory/licence requirements.

1.2.1 Intake Weir

1.2.2 IFR Gauging Weir

1.2.3 Penstock

1.2.4 Powerhouse

1.2.5 Tailrace

1.2.6 Generating Equipment

1.2.7 Switchyard and Interconnection

1.2.8 Access Roads

SECTION 2.0 - OPERATING PARAMETERS

2.1 DESIGN PARAMETERS

2.1.1 Instream Flow Release ("IFR")

2.1.2 Ramping Rates

Ramping rates are specified to ensure that changes in flow diversions have a low potential for increasing the risk of fish stranding both within the diversion reach and downstream of the powerhouse. Diversion will be conducted to achieve the objective of ensuring that stage changes within the stream, measured at locations which correspond to appropriately conservative / representative sections, **do not result in exceedance** of average **rates** of [DFO default value or pre-specified] cm/hr [or **rate(s)** specified for varying instream flows] as determined by [X consecutive readings ***or*** readings collected at Y frequency] averaged over a [15 minute] time interval, **sampled at no less than a [1 minute] interval**.

This ramping rate requirement (x cm/hr at location x [appropriate, sensitive sections]) will not be modified unless approved by MoE, and upon completion and submission of an appropriate ramping rate study.

Control of diversion rates (e.g., change in diversion flows through the plant as specified in the PLC) is directly tied to:

- [in-stream stage monitoring at the appropriate sensitive locations within the stream]
- [in-stream stage monitoring point at location(s) X, which have been determined to correspond to stages at the appropriate sensitive locations via a empirically derived relationship] or
- [an empirical relationship derived between change in diversion rate and stage at specified monitoring points {either at sensitive location or operational monitoring points}. The change in diversion rate is defined as the rate of change of penstock discharge, measured as a change in flow per unit time (i.e. m^3/s per hour).]

[provide details of stage correlations between monitoring point and sensitive sections, and tie to operations ***or*** relationship between stage at sensitive section(s) and change in diversion rate]

The locations of the conservative (sensitive) sections and associated gauges, and operational monitoring gauges, are shown on Dwg X.

The **maximum allowable ramping rates** at operational monitoring points and flow diversions, for varying stream flows are shown in the table below, **where the mean annual discharge (MAD) has been defined as [x m3/s]:**

Intake Flow	Maximum **allowable ramping rate** at [sensitive] section location X	Maximum **allowable ramping rate** at operational monitoring point	**Estimated maximum allowable** change in diverted flows
< X% MAD (Q < Y m3/s)	C cm/hr	A cm/hr	E $m^3/s/hr$
X **to** Y% MAD (Q < Y m3/s)	D cm/hr	B cm/hr	F $m^3/s/hr$
Y **to** Z% MAD (Q < Z m3/s)	G cm/hr	H cm/hr	I $m^3/s/hr$

Ramping rate data will be collected at X locations within the diversion reach and downstream of the tailrace to confirm compliance with ramping rate criteria. If fish are able to access the tailrace, compliance Stage data will be collected at X frequency, and downloaded and reviewed on a xxx basis. The ramping rate will be calculated as the change in **water depth [to nearest 0.1 cm]** averaged over a 15 minute period. A potential, reportable ramping non-compliance is defined as:

1. any two consecutive 15 minute average ramping rates (**expressed in** cm/hr) exceeding the values noted in the tables above;
2. any single reading (ie. **one 15-minute average ramping rate, expressed in cm/hr)** that exceeds [1.5[1]] times the value noted in the table;

Changes in natural stream flows will also be determined by [calculation from headpond levels, IFR and spill flows, and diverted flows or other method] at a frequency of x (equal to or greater than the frequency of instream stage monitoring), in order to evaluate whether non-compliance of ramping rates is attributable to natural fluctuations or flow diversion.

If the non-compliance is attributed to natural **stage changes [we need more detail here, on how natural stage changes are defined]** and the units are operating in steady state or flow following, the ramping event will be noted as such in the annual MoE report. If the ramping non-compliance is facility induced (i.e. shutdown, startup or operation outside of approved ramping rates), MoE will be notified within 24 hours. A report must be submitted within **[one week of the non-compliance] including [one-minute] data for intake flows, diversion flows & operational monitoring points, over the full period of non-compliance, along with a desciption of the mitigative steps taken to reduce the likelihood of (1) such non-compliance from occurring in the future, and (2) environmental impacts (e.g. fish salvage) associated with the non-compliance.**

2.1.3 Fish Passage

2.1.4 Sediment Transport

[1] Short-term exceedances/multiplier must be justified on basis of environmental impacts and operational constraints

SECTION 3.0 - OPERATING PROCEDURES

SECTION 5.0 - MONITORING AND REPORTING

5.1 FLOW MONITORING

5.1.1 IFR Monitoring

Confirmation of releases and Instream Flow Requirements will be undertaken using all of the following methods:

- IFR weir and/or other engineered structures / means, if specified
- In-stream flow monitoring / stations

Must specify details of flow monitoring stations, rating curve establishment and maintenance, and methodology.

5.1.1 Ramping Monitoring

5.1.2 Fish Passage monitoring

5.1.3 Sediment Transport Monitoring

5.1.4 Fish Stranding Monitoring

As applies, if identified as a potential concern within structures (e.g., spillway, tailrace).

5.2 TELECOMMUNICATIONS

5.3 OPERATIONS REPORTS

5.4 ENVIRONMENTAL REPORTING REQUIREMENTS

This document must document the proponent's commitment to submit to MoE, on an annual basis, the following:

- A copy of the Annual Long Term Aquatic Monitoring Report. The Aquatic monitoring report will include details of stream flow and IFR flow and interim assessments of aquatic impacts.
- An electronic and hard copy of all monitoring gauge and flow data (e.g., stage and discharge downstream of intake and powerhouse, including rating curve data), to confirm compliance with regulatory/licence requirements for IFR and ramping.
- water licence returns detailing energy production.

- a table detailing the number of plant shut-downs experienced in the year and the type of shutdown as defined in section 3.5
- copies of all other provincial reporting requirements including Annual Dam Safety Reports and Spill Reports.

At the end of the long term monitoring program, the proponent will provide MoE with a final report.

In the event of a non-compliance with any criteria or parameter specified in Section 2 (e.g., IFR, ramping rates) or non-adherence to any procedures or monitoring requirement within Sections 3 and 4, the Engineer or Regional Water Manager (MoE-WSD) will be notified as soon as possible but within 48 hours. This includes non-compliance resulting from freezing of equipment located at the intake.

After one year of operation, the proponent will produce a report on the performance of the flow monitoring equipment.

The tailrace will be inspected annually and a report describing its condition will be provided as part of the submission of the annual summary of plant shutdowns. A table summarizing any instances of fish stranding or mortality will be included as part of this report. Corrective actions taken, or those to be implemented, to improve tailrace fish management will also be part of this report.

SECTION 6.0 - KEY PERSONNEL

6.1 PROJECT OWNERS

6.2 PROJECT OPERATORS

6.3 PROVINCIAL AGENCIES

6.4 FEDERAL AGENCIES

6.5 FIRST NATIONS

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Squamish Sediment Management - Technical Working Committee

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Mike Nelson [mailto:mnelson@cerg.ca]
Sent: Wednesday, July 27, 2011 4:45 PM
To: Bennett, Timothy A FLNR:EX
Cc: Berardinucci, Julia F FLNR:EX
Subject: RE: Squamish Sediment Management - Technical Working Committee

Tim / Julia,
I have added Julia to the distribution list, and will be emailing out an agenda by the end of the week.
Cheers,

MIKE NELSON, R.P.BIO.
Principal
Cascade Environmental Resource Group Ltd.
Whistler and Squamish, BC | Whitehorse, YT | San Diego, CA
Unit 203 - 38026 2nd Avenue | Squamish | BC | Canada | V8B 0C3
TEL: 604 815-0901 | CELL: 604 815-9973 | FAX: 604 815-0904
mnelson@cerg.ca | www.cascade-environmental.ca

From: Bennett, Timothy A FLNR:EX [mailto:Timothy.Bennett@gov.bc.ca]
Sent: July-27-11 4:37 PM
To: Mike Nelson
Cc: Berardinucci, Julia F FLNR:EX
Subject: RE: Squamish Sediment Management - Technical Working Committee

Hi Mike,

Thank you for the invite.

I've passed it along to our District Manager for MetroVan-Squamish, Julia Berardinucci (also formerly our Regional Water Manager), and understand that she will be attending the meeting in person. She's likely followed up with you already, but I thought I would let you know just in case.

Julia: if I've misunderstood this, or if plans have changed, please let me know.

Could you also add Julia to your contact list, and cc her on information related to this file.

Regards,

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Mike Nelson [mailto:mnelson@cerg.ca]
Sent: Monday, July 25, 2011 4:23 PM
To: Mike Nelson; 'paul_wick@squamish.net'; XT:Busto, Vince DFO EAO:IN; Knight, Francesca; Brent Magee (brent.magee@tc.gc.ca); Pattle, John R FLNR:EX; Flint-Petersen, Lotte FLNR:EX; Bennett, Timothy A FLNR:EX; Barrett, Scott FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; David Roche; Jensen, Sandra L.S. FLNR:EX; Greig Garland; Robbins, Kristina FLNR:EX; Brian Barnett
Subject: RE: Squamish Sediment Management - Technical Working Committee

The initial meeting for the Squamish Sediment Management – Technical Working Committee has been set for Thursday August 4. Tentatively, the meeting will be 9:30 a.m. at the District of Squamish council chambers – timing and location to be confirmed later this week. For those who would like to attend the meeting by conference call, phone numbers/codes will also be sent out later this week. Lastly an agenda will be sent out to all people who expressed an interest in attending or being kept informed. At present the following people have expressed an interest in this committee:

Attendees
Francesca Knight, DFO
Vince Busto, DFO
Greif Garland, District of Squamish
Brian Barnett, District of Squamish
David Roche, KWL
Mike Nelson, Cascade Environmental

Attending by Phone
Lotte Flint-Petersen, MFLNRO, Water Management
John Pattle, MFLNRO, Water Management

Unable to attend but want to be kept appraised
Brent Magee, Navigable Waters
Paul Wick, Squamish Nation

It is not too late to join this exciting group, just inform the undersigned.
Cheers,

MIKE NELSON, R.P.BIO.
Principal
Cascade Environmental Resource Group Ltd.
Whistler and Squamish, BC | Whitehorse, YT | San Diego, CA
Unit 203 - 38026 2nd Avenue | Squamish | BC | Canada | V8B 0C3
TEL: 604 815-0901 | CELL: 604 815-9973 | FAX: 604 815-0904
mnelson@cerg.ca | www.cascade-environmental.ca

From: Mike Nelson
Sent: July-18-11 5:18 PM
To: 'paul_wick@squamish.net'; Vince Busto (bustov@pac.dfo-mpo.gc.ca); 'Knight, Francesca'; Brent Magee (brent.magee@tc.gc.ca); Pattle, John R ENV:EX; Lotte Flint-Petersen (Lotte.Flint-Petersen@gov.bc.ca); Bennett, Timothy A ENV:EX; Scott Barrett (scott.barrett@gov.bc.ca); Scott.Babakaiff@gov.bc.ca; Erin Stoddard (Erin.Stoddard@gov.bc.ca); 'David Roche'; Jensen, Sandra L.S. ENV:EX; 'Greig Garland'; Kristina Robbins (Kristina.Robbins@gov.bc.ca); 'Brian Barnett'
Subject: RE: Squamish Sediment Management - Technical Working Committee

Further to my email of July 11 (atta d below), I would appreciate hearing fro ou if you would like to participate in the Squamish Sediment Management – Technical Working Committee. To date I have only heard from Francesca Knight, Lotte Flint Petersen and John Pattle. From this small response it looks like the meeting would be in the first week of August. If you would like to participate, either in person or via teleconference, please advise the undersigned by Wednesday July 20 of date that you are available during that week, so that we can set up a time and date for the meeting.
Cheers,

MIKE NELSON, R.P.BIO.
Principal
Cascade Environmental Resource Group Ltd.
Whistler and Squamish, BC | Whitehorse, YT | San Diego, CA
Unit 203 - 38026 2nd Avenue | Squamish | BC | Canada | V8B 0C3
TEL: 604 815-0901 | CELL: 604 815-9973 | FAX: 604 815-0904
mnelson@cerg.ca | www.cascade-environmental.ca

From: Mike Nelson
Sent: July-11-11 12:31 PM
To: 'paul_wick@squamish.net'; Vince Busto (bustov@pac.dfo-mpo.gc.ca); 'Knight, Francesca'; Brent Magee (brent.magee@tc.gc.ca); Pattle, John R ENV:EX; Lotte Flint-Petersen (Lotte.Flint-Petersen@gov.bc.ca); Bennett, Timothy A ENV:EX; 'Eedy, Rachael FLNR:EX'; Scott Barrett (scott.barrett@gov.bc.ca); Scott.Babakaiff@gov.bc.ca; Erin Stoddard (Erin.Stoddard@gov.bc.ca); David Roche; 'Greig Garland'; Brian Barnett; Mike Nelson
Subject: Squamish Sediment Management - Technical Working Committee

To all,
In early April of this year, the District of Squamish was notified that Emergency Management BC (EMBC) had approved a funding proposal to undertake sediment management works at three locations on the Squamish River and one location at the mouth of the Cheekye River. This application was part of a coordinated program to address flood protection deficiencies recognized in the District since the October 2003 flood event.

An application for approval to undertake works at one of the selected sites, the mouth of the Mamquam River, was made, to which the District of Squamish has received comments from both the Ministry of Forest, Lands and Natural Resource Operations (MFLNRO) and from Fisheries and Oceans Canada (DFO) earlier this year. In reviewing the responses received to date, the District of Squamish will not be pursuing sediment management on the three Squamish River sites during this year's fisheries window; although they would like to pursue DFO's suggestion to form a technical working group, such has been done for the Vedder River and Fitzsimmons Creek, to access the potential merits of gravel removal, associated risks to fish and fish habitat, and other flood management issues.

This invitation is being emailed to the various jurisdictions and government agencies to determine if you and your agency would like to participate in this process. It is the intention of the District of Squamish to host an initial meeting as soon as possible to define the roll and scope of the committee. An initial meeting agenda and list of potential attendees is attached. The District of Squamish intends to distribute a draft "scope" to the attendees prior to the meeting date for a discussion item.

Please advise the undersigned if you or your designate would like to participate in this committee and/or if you know of additional people or agencies that should be contacted. Please also advise if you are available for a meeting in Squamish (or available by conference call) in the last week of July (25th to 29th) or the first week of August (2nd to 5th).

On behalf of the District of Squamish,

MIKE NELSON, R.P.BIO.
Principal
Cascade Environmental Resource Group Ltd.
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Tentative Agenda – Initial Meeting

Squamish River Management Technical Committee

1. Why a committee?
    a. Background

   b. Multi jurisdictions
   c. Coordination of rev
   d. Attendees
   e. Expected benefits
2. Mission?
   a. Area of Interest – physical boundaries
   b. Scope of review – i.e. gravel management, other issues
3. Responsibilities
   a. Funding for technical support work
   b. Agencies and attendees to be self supporting?
   c. Future meeting location and timing
4. Issues at hand
   a. Rationale for sediment management – flood reduction
   b. Option to current proposal
   c. Mitigation of habitat impacts
   d. Agency information needs
5. Future Issues

Invitees:

- Paul Wick – Squamish Nation
- Vince Busto – DFO
- Francesca Knight – DFO
- Brent Magee – Navigable Waters, DOT
- John Pattle – MFLNRO, Water Management
- Lotte Flint-Petersen – MFLNRO, Water Management
- Timothy Bennett – MFLNRO, Resource Authorizations, Water
- Rachael Eedy – MFLNRO, Resource Authorizations, Water
- Scott Barrett – MFLNRO, Ecosystems
- Scott Babakaiff – MFLNRO, Ecosystems
- Erin Stoddard – MFLNRO, Ecosystems
- Mike Nelson – Cascade Environmental
- David Roche – KWL
- Greig Garland – District of Squamish
- Brian Barnett – District of Squamish

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - July 13, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, July 13, 2011 2:46 PM
To: 'Knight, Francesca'; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Update - July 13, 2011

Hello Francesca and Vince,

I believe this will be one of my last bi-weekly updates since the corrective actions for Mamquam have now been completed with the exception of the submission of the commissioning report. Please accept my apologies regarding the Mamquam commissioning report. I was recently provided a further update from Ecofish that mentioned they identified some irregularities in the data and are re-analyzing the information. I will send this report along once it is finalized.

A significant amount of work has been placed into the refinement of the PLC programming and the finishing touches are being completed this week.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed

5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Completed
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	Completed
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	As Soon As Possible
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	Completed
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

Please don't hesitate to contact me should you have any questions. As I mentioned above, I will be sending out the commissioning report as soon as I receive the finalized copy.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 30, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Thursday, June 30, 2011 2:18 PM
To: 'Knight, Francesca'; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Update - June 30, 2011

Hello Francesca and Vince,

Unfortunately, I am unable to provide the report from Ecofish detailing the monitoring results for unit 2 commissioning today, however, I will be sending you this report early next week. At this time, the PLC programming update is expected to be completed by the July 15, 2011 target date. If there are any challenges with meeting this target date, I will communicate them to you at that time.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Completed
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	Completed

7	During commissioning of unit 2, determine and provide the relationship between rough . .e ramping, vibrations and flow monitoring.	Marc Nering	6-July-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	15-July-11 Original date 30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

Please feel free to contact me should you have any questions or concerns.

Have a safe long weekend,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
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Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

~~Ha~~, Diana ENV:EX

From: Marc Nering
Sent: Monday, June 27, 2011 10:40 AM
To: Jena Tufts
Subject: FW: Mamquam Operating Parameters and Procedures

From: Marc Nering
Sent: Friday, February 18, 2011 3:56 PM
To: Timothy.Bennett@gov.bc.ca
Cc: Rudy Barrett; Paul Trinh; Kelly Lail; Serkan Fikirdanis
Subject: Mamquam Operating Parameters and Procedures

Hello Tim,

See attached for the updated Mamquam OP&P manual. Since we never did receive a template we used our recently updated Miller Creek manual as a template. This document is accurate as of today, however we will be making changes to the plant's operation as new operational knowledge and best practices dictate. We are planning further PLC control changes as additional river level/flow sensors are installed. The goal of these changes is to minimize the Mamquam's plant impact on the Mamquam River.

Best Regards,

Marc Nering

Mamquam OM Manual rev 3.doc

Not Responsive

From: Nering, Marc
Sent: Thursday, November 25, 2010 12:51 PM
To: 'Timothy.Bennett@gov.bc.ca'
Cc: Barrett, Rudy; Trinh, Paul; Lail, Kelly; Fikirdanis, Serkan
Subject: Mamquam Operating Parameters and Procedures

Hello Tim,

As per our discussion earlier today, please provide a sample or template of an existing OP&P that is acceptable to MOE. I understand that this will take a week or so to sanitize and prepare.

As discussed, creating an accurate, fully documented OP&P is going to push Capital Power Corporation (CPC) past the original deadline of December, 31. Updating the PLC alone will take approx. 500 man hours. With your approval, CPC would like to establish a deliverable date of Feb 18 for the new OP&P.

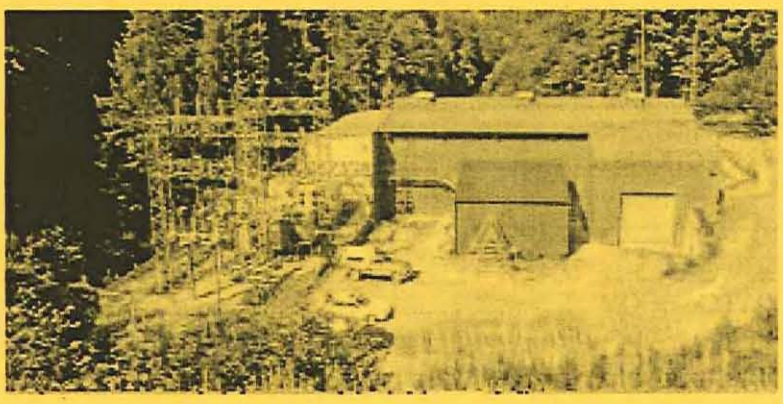
Thank you,

Marc Nering
Mamquam Plant Manager
Capital Power Corp.
604 898 2761 office

Capital Power Corporation

MAMQUAM GENERATING STATION

OPERATIONS & MAINTENANCE MANUAL



Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Interim Monitoring report

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Babakaiff, Scott C FLNR:EX
Sent: Friday, June 24, 2011 11:46 AM
To: 'Elyse MacDonald'; Bennett, Timothy A FLNR:EX
Cc: Stoddard, Erin M FLNR:EX; 'Knight, Francesca'; 'Busto, Vince'; Barrett, Scott FLNR:EX; 'jtufts@capitalpower.com'; 'mnering@capitalpower.com'
Subject: RE: Interim Monitoring report

Elyse & Tim,

Unfortunately, my present workload does not allow a detailed review of Ecofish's Lower Mamquam Interim Monitoring Report Year 1 (dated March 31 2011), hereafter referenced as Ecofish (2011), to be completed in a timely manner.
However, I've briefly reviewed the report, and offer the following observations & recommendations on hydrology, instream flow, and ramping-related issues:

1. I agree with recommendations made in Sections 5.1 (IFR monitoring-gauge installation) & 5.2 (Ramping Rate Test) of Ecofish (2011) regarding ongoing efforts in 2011. I recommend that the statutory decision makers for WSD & DFO (ie. Tim Bennett, Vince Busto/Francesca Knight, respectively) 'enshrined' these as obligations or commitments via the respective administrative tools (ie. an updated Operational Parameters & Procedures Report (OPPR)).

2. It is essential these recommendations be acted upon in a timely manner, as the reliability of ongoing data collection efforts depend upon their implementation. For instance, in the absence of additional data collection to develop & refine the stage-discharge rating curves for the various hydrometric gauges, data submitted to the agencies to confirm compliance with IFR & ramping criteria will be of questionable reliability. This data is also needed to help resolve & address issues identified in Ecofish's Lower Mamquam Ramping Study (v2: December 20 2010).

3. I do not disagree with other recommendations in Ecofish (2011), such as those on monitoring of Water Temperature (Section 5.3), Fish Abundance (Section 5.4), Fish Entrainment (Section 5.5) and SAR (Section 5.6). However, be reminded that I do not have the professional qualifications nor expertise to provide review & advise on these issues, and request that agency biologists (ie. Francesca Knight or Erin Stoddard).

Finally, I note that my records do not indicate that an updated OPPR was ever submitted to agencies, despite an obligation made by the proponent in our Sept. 30 2010 meeting to do so. If my records are not

current, and an updated OPPR was in fact submitted, please correct my understanding and provide me with a copy of this document.

Scott

Scott Babakaiff, M.Sc. P.Geo.
Fish Hydrologist
Ministry of Natural Resource Operations
South Coast Region
2nd Floor- 10470 152nd Street
Surrey, BC, V3R 0Y3

604-930-7121

From: Elyse MacDonald [mailto:emacdonald@ecofishresearch.com]
Sent: Tuesday, June 14, 2011 9:07 AM
To: Bennett, Timothy A FLNR:EX
Cc: 'Nering, Marc'; 'Jena Tufts'; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX
Subject: RE: Interim Monitoring report

Good Morning Tim,
As for my email just now regarding Miller Creek, I am following up DFO's comments to see if we might expect MOE's review of the Mamquam River Interim Report so that we may address all comments at the same time.

Thank you very much,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

Ecofish Research Ltd.

emacdonald@ecofishresearch.com
www.ecofishresearch.com

Suite 1000 - 355 Burrard Street, **Vancouver, BC**, V6C 2G8
Voice: 604 608-6180; Fax: 604 608-6163; Cell: 604 785-6726

-----Original Message-----
From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: May-30-11 6:11 PM
To: Busto, Vince; Lail, Kelly; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Timothy.Bennett@gov.bc.ca
Cc: Fikirdanis, Serkan; Nering, Marc; Jena Tufts; fjalewis@ecofishresearch.com; Elyse MacDonald
Subject: Interim Monitoring report

Hello folks,

Thanks very much for the recent Ecofish interim monitoring report for Lower Mamquam. It's a good piece of work, and really helping to inform us all on the future management of the facility. I have a few comments, and also will refer back to some of my earlier comments

on the effects monitoring program study design (the OEMP, Ecofish, January 29, 2010). Also, I don't have a lot o ime for report review these day: and I think these comments reflect that.

1. An IFR suitability evaluation should be conducted.
The installation of the instream flow gauges is fantastic. Currently, the plant is operating with an IFR in the diversion reach of 1cms = about 5% MAD; I don't know that this IFR is sufficiently protective of fish and fish habitat, and the question warrants detailed examination. Ecofish indicates that this IFR may have been set based on the results of fish sampling in the early 1990s, which concluded that the biological productivity of the river was low. Improved methods in both the Lower and Upper Mamquam sampling programs certainly indicate that in fact, productivity in the river is not as low as originally thought, given the numbers of fish caught in the two recent sampling programs (lower Mamquam in 2010, Upper Mamquam 2009 report and, I suspect, the pending 2010 report). The suitability of the year-'round IFR of 1 cms needs to be critically evaluated.

2. Fish entrainment.
I found the literature search on fish entrainment, wherein species-and-life stage specific considerations of risk of entrainment were discussed, very interesting. However, in reading this material, I as reminded of a comment that I made in review of the OEMP:

"The Upper and Lower Mamquam IPP effect monitoring programs should be integrated. The operation of the upper plant will absolutely confound the effects monitoring program for the lower plant. As well, the lower plant may influence the findings of the effects monitoring program for the upper plan (for example, via no fish passage at lower plant intake). To conduct a monitoring program on the lower plant without knowledge and consideration of the upper plant effects monitoring is a waste of time and money, and vice versa."

The lower Mamquam river intake structure poses both a risk of entrainment as well as a barrier to upstream movement / migration. Both of these risks cannot be adequately assessed without considering the findings of the Upper Mamquam monitoring program.

3. Fish abundance and biomass.
I'm not really sure I agree with the use of the adjusted fish abundance and biomass as the focus for the majority of the comparisons and discussion. However, I am willing to concede ERL's point that there's not a whole lot to say just yet on fish abundance and biomass in the diversion reach and upstream, given that there's not been much data collected. I'm going to have to think about this more as the monitoring program progresses. In addition, there may be something going on in the diversion reach relative to upstream, and not just for rainbow trout 1+ fish, but also possibly for 2+. While the findings of the statistical test for differences indicated no difference for both adjusted abundance and biomass, it's clear that high variability is driving this result (table 17). Figure 20 shows a grimmer picture of fish density; we'll have to keep an eye on both the 1+ and 2+ rainbow in the diversion reach relative to upstream.

I have to bring up another comment from the OEMP, in particular, this comment's relevance to assessing additional lines of evidence:

"You all know that my default position is that monitoring of invertebrates has its own intrinsic merit, beyond that of just determining whether there is adequate food for fish. Regardless, invertebrate monitoring should remain in the lower Mamquam plant monitoring program, and I'll tell you why:
* Because of the confounding influences of the upper plant, all available lines of evidence should be utilized in evaluating the effects of the lower plant on fish and fish habitat.
* Some interesting findings came out of the 2009 monitoring work done on the Upper River site by Summit Environmental. Fish condition factors for rainbow trout [illegible] in the

diversion reach were lower than in the upstream control (ANOVA showed statistically significant difference). As ll, the make up of the inverteb e community is quite different in the diversion reach and downstream, relative to the control site. EPT taxa (mayflies, stoneflies and caddisflies) are the community structure drivers in the upstream control, and Dipterans (midges and crane flies). These two lines of evidence, when looked at together, may be indicative of an impact "signal" related to IPP operations."

All elements of this comment are applicable.

4. Anadromous effects downstream of the powerhouse.
Given the considerable disturbance to anadromous reaches downstream of the powerhouse [as a result of ramping] ERL / Capital Power should be giving consideration to monitoring indicators that can be utilized to evaluate fish abundance/biomass. We are all anxiously awaiting the results of the turbine retrofit commissioning. Is it going to solve the rough zone ramping problem?? I suppose some might say, "why bother trying to monitor downstream reaches affected by ramping rates [that we know were harmful to fish], and for so many years - especially when there is no baseline?". Under the circumstances, I don't think that rationale is appropriate. There's got to be some analysis of the potential impacts over the years (via picking through historical flow data and fish life stage presence in the affected areas) and then some way to demonstrate improvement.

5. Other outstanding items, as relevant to the Fisheries Act Authorization process:
- need to further ascertain the anadromous species use in the diversion reach (upstream of the tailrace, downstream of the barrier above the powerhouse bridge). Will pink salmon presence in this area be evaluated this year?
- is the plan only to evaluate spawning, or rearing as well?

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
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Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 15, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, June 16, 2011 5:01 PM
To: Jena Tufts; Busto, Vince
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Elyse MacDonald; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

great news, thanks for the update Jena.
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: June 16, 2011 12:11 PM
To: Knight, Francesca; Busto, Vince
Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

Hello Francesca,

Yes, there is a rough zone on the upgraded unit. However, as mentioned in my previous email regarding the June 1 update, the initial commissioning results show that the rough zone is narrower (9.5 MW to 13.5 MW) and it appears that the unit can be ramped through this rough zone at the 2.5 cm/hr or the 5 cm/hr rate due to lower vibration levels.

Please don't hesitate to give me a call if you would like to discuss further.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, June 16, 2011 9:47 AM
To: Jena Tufts; Busto, Vince
Cc: Timothy.Bennett@gov.bc.ca; Stoddard, Erin ; Babakaiff, Scott; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Elyse MacDonald; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

Hello Jena, thank you for the update. I look forward to reading the Ecofish report on the results of the commissioning.Your note that no rough zone ramping is anticipated until late summer low-flows leads me to believe that even with the upgrades to unit 2, a rough zone is still expected. Is this correct?
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: June 15, 2011 10:08 AM
To: Busto, Vince; Knight, Francesca
Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Marc Nering; Michael Smith; Rudy Barrett;

Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Up - June 15, 2011

Hello Vince and Francesca,

The commissioning of unit 2 has been progressing well; operations are determining the upper limits to the unit. The only two outstanding items in the table below are tasks 7 and 10. For task 7, Ecofish is compiling a report that discusses the results of the commissioning. We should have this report to you by the end of the month.

As for Task 10, the programming of the PLC is under way, the river gauges have been integrated into the system but the programmer is continuing to fine tune the program. We hope to have this task fully completed by July 15, 2011.

If there are any challenges that arise that would change these two remaining target dates, I will communicate those issues to you.

Additionally, operations do not anticipate any rough zone ramping until flows decrease in the fall.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Completed
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	Completed
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	30-Jun-11 Original date 15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	15-July-11 Original date 30-Jun-11
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12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

As always, please don't hesitate to contact me should you have any questions or concerns.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:32 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 15, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Thursday, June 16, 2011 12:11 PM
To: 'Knight, Francesca'; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

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Best Regards,
Jena

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Environmental Associate
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(780) 392-5522 | jtufts@capitalpower.com

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Sent: Thursday, June 16, 2011 9:47 AM
To: Jena Tufts; Busto, Vince
Cc: Timothy.Bennett@gov.bc.ca; Stoddard, Erin ; Babakaiff, Scott; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Elyse MacDonald; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

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Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: June 15, 2011 10:08 AM
To: Busto, Vince; Knight, Francesca
Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Update - June 15, 2011

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Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
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)iana ENV:EX

Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 15, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, June 16, 2011 8:47 AM
To: Jena Tufts; Busto, Vince
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Elyse MacDonald; Serkan Fikirdanis
Subject: RE: Mamquam Bi-Weekly Update - June 15, 2011

Hello Jena, thank you for the update. I look forward to reading the Ecofish report on the results of the commissioning.Your note that no rough zone ramping is anticipated until late summer low-flows leads me to believe that even with the upgrades to unit 2, a rough zone is still expected. Is this correct?
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: June 15, 2011 10:08 AM
To: Busto, Vince; Knight, Francesca

Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishr arch.com'; 'Elyse MacDonald'; Serkan Fiki nis
Subject: Mamquam Bi-Weekly Update - June 15, 2011

Hello Vince and Francesca,

The commissioning of unit 2 has been progressing well; operations are determining the upper limits to the unit. The only two outstanding items in the table below are tasks 7 and 10. For task 7, Ecofish is compiling a report that discusses the results of the commissioning. We should have this report to you by the end of the month.

As for Task 10, the programming of the PLC is under way, the river gauges have been integrated into the system but the programmer is continuing to fine tune the program. We hope to have this task fully completed by July 15, 2011.

If there are any challenges that arise that would change these two remaining target dates, I will communicate those issues to you.

Additionally, operations do not anticipate any rough zone ramping until flows decrease in the fall.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Completed
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	Completed
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	30-Jun-11 Original date 15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	15-July-11 Original date 30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

As always, please don't hesitate to contact me should you have any questions or concerns.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 15, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, June 15, 2011 10:08 AM
To: 'Busto, Vince'; 'Knight, Francesca'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Update - June 15, 2011

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12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

As always, please don't hesitate to contact me should you have any questions or concerns.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Interim Monitoring report

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Elyse MacDonald [mailto:emacdonald@ecofishresearch.com]
Sent: Tuesday, June 14, 2011 9:07 AM
To: Bennett, Timothy A FLNR:EX
Cc: 'Nering, Marc'; 'Jena Tufts'; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX
Subject: RE: Interim Monitoring report

Good Morning Tim,
As for my email just now regarding Miller Creek, I am following up DFO's comments to see if we might expect MOE's review of the Mamquam River Interim Report so that we may address all comments at the same time.

Thank you very much,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

Ecofish Research Ltd.

emacdonald@ecofishresearch.com
www.ecofishresearch.com

Suite 1000 - 355 Burrard Street, **Vancouver, BC**, V6C 2G8
Voice: 604 608-6180; Fax: 604 608-6163; Cell: 604 785-6726

-----Original Message-----
From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: May-30-11 6:11 PM
To: Busto, Vince; Lail, Kelly; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Timothy.Bennett@gov.bc.ca
Cc: Fikirdanis, Serkan; Nering, Marc; Jena Tufts; fjalewis@ecofishresearch.com; Elyse MacDonald
Subject: Interim Monitoring report

Hello folks,

Thanks very much for the recent Ecofish interim monitoring report for Lower Mamquam. It's a good piece of work, and really helping to inform us all on the future management of the facility. I have a few comments, and also will refer back to some of my earlier comments on the effects monitoring program study design (the OEMP, Ecofish, January 29, 2010). Also, I don't have a lot of time for report review these days, and I think these comments reflect that.

1. An IFR suitability evaluation should be conducted.
The installation of the instream flow gauges is fantastic. Currently, the plant is operating with an IFR in the diversion reach of 1cms = about 5% MAD; I don't know that this IFR is sufficiently protective of fish and fish habitat, and the question warrants detailed examination. Ecofish indicates that this IFR may have been set based on the results of fish sampling in the early 1990s, which concluded that the biological productivity of the river was low. Improved methods in both the Lower and Upper Mamquam sampling programs certainly indicate that in fact, productivity in the river is not as low as originally thought, given the numbers of fish caught in the two recent sampling programs (lower Mamquam in 2010, Upper Mamquam 2009 report and, I suspect, the pending 2010 report). The suitability of the year-'round IFR of 1 cms needs to be critically evaluated.

2. Fish entrainment.
I found the literature search on fish entrainment, wherein species-and-life stage specific considerations of risk of entrainment were discussed, very interesting. However, in reading this material, I as reminded of a comment that I made in review of the OEMP:

"The Upper and Lower Mamquam IPP effect monitoring programs should be integrated. The operation of the upper plant will absolutely confound the effects monitoring program for the lower plant. As well, the lower plant may influence the findings of the effects monitoring program for the upper plan (for example, via no fish passage at lower plant intake). To conduct a monitoring program on the lower plant without knowledge and consideration of the upper plant effects monitoring is a waste of time and money, and vice versa."

The lower Mamquam river intake structure poses both a risk of entrainment as well as a barrier to upstream movement / migration. Both of these risks cannot be adequately assessed without considering the findings of the Upper Mamquam monitoring program.

3. Fish abundance and biomass.
I'm not really sure I agree with the use of the adjusted fish abundance and biomass as the focus for the majority of the comparisons and discussion. However, I am willing to concede ERL's point that there's not a whole lot to say just yet on fish abundance and biomass in the diversion reach and upstream, given that there's not been much data collected. I'm going to have to think about this more as the monitoring program progresses. In addition, there may be something going on in the diversion reach relative to upstream, and not just for rainbow trout 1+ fish, but also possibly for 2+. While the findings of the statistical test for differences indicated no difference for both adjusted abundance and biomass, it's clear that high variability is driving this result (table 17). Figure 20 shows a grimmer picture of fish density; we'll have to keep an eye on both the 1+ and 2+ rainbow in the diversion reach relative to upstream.

I have to bring up another comment from the OEMP, in particular, this comment's relevance to assessing additional lines of evidence:

"You all know that my default position is that monitoring of invertebrates has its own intrinsic merit, beyond that of just determining whether there is adequate food for fish. Regardless, invertebrate monitoring should remain in the lower Mamquam plant monitoring program, and I'll tell you why:

* Because of the confounding influences of the upper plant. all available lines of evidence should be utilizec , evaluating the effects of the er plant on fish and fish habitat.
* Some interesting findings came out of the 2009 monitoring work done on the Upper River site by Summit Environmental. Fish condition factors for rainbow trout fry in the diversion reach were lower than in the upstream control (ANOVA showed statistically significant difference). As well, the make up of the invertebrate community is quite different in the diversion reach and downstream, relative to the control site. EPT taxa (mayflies, stoneflies and caddisflies) are the community structure drivers in the upstream control, and Dipterans (midges and crane flies). These two lines of evidence, when looked at together, may be indicative of an impact "signal" related to IPP operations."

All elements of this comment are applicable.

4. Anadromous effects downstream of the powerhouse.
Given the considerable disturbance to anadromous reaches downstream of the powerhouse [as a result of ramping] ERL / Capital Power should be giving consideration to monitoring indicators that can be utilized to evaluate fish abundance/biomass. We are all anxiously awaiting the results of the turbine retrofit commissioning. Is it going to solve the rough zone ramping problem?? I suppose some might say, "why bother trying to monitor downstream reaches affected by ramping rates [that we know were harmful to fish], and for so many years - especially when there is no baseline?". Under the circumstances, I don't think that rationale is appropriate. There's got to be some analysis of the potential impacts over the years (via picking through historical flow data and fish life stage presence in the affected areas) and then some way to demonstrate improvement.

5. Other outstanding items, as relevant to the Fisheries Act Authorization process:
- need to further ascertain the anadromous species use in the diversion reach (upstream of the tailrace, downstream of the barrier above the powerhouse bridge). Will pink salmon presence in this area be evaluated this year?
- is the plan only to evaluate spawning, or rearing as well?

Francesca Knight, M.Sc., R.P.Bio.
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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Comments RE: Lower Mamquam

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, June 13, 2011 12:28 PM
To: Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Bennett, Timothy A FLNR:EX
Subject: Comments RE: Lower Mamquam

Hi guys,
Here are the comments recently submitted from DFO to Capital Power RE: Lower Mamquam interim monitoring report (Ecofish, March 31, 2011)

Hello folks,

Thanks very much for the recent Ecofish interim monitoring report for Lower Mamquam. It's a good piece of work, and really helping to inform us all on the future management of the facility. I have a few comments, and also will refer back to some of my earlier comments on the effects monitoring program study design (the OEMP, Ecofish, January 29, 2010). Also, I don't have a lot of time for report review these days, and I think these comments reflect that.

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Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Upper Mamquam incident info - May 6 2011
Attachments: FW: Plant trip event on May 6; Plant trip event on May 6; RE: Mamquam - Rough zone ramping May 6, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, June 13, 2011 12:24 PM
To: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX
Subject: Upper Mamquam incident info - May 6 2011

Hi guys,
Here is the information that we have on the May 6 incident at upper Mamquam. As a result of the computer malfunction at Upper Mamquam that closed the bypass valve for 30-45 minutes, Lower Mamquam had to drop their power production. In so doing, they were forced to ramp through the rough zone, and fish were stranded/killed. One of the attached emails contains information from Trans Alta regarding the incident; the three emails sum up events fairly well.

C

<<FW: Plant trip event on May 6>> <<Plant trip event on May 6>> <<RE: Mamquam - Rough zone ramping May 6, 2011>>

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Ha, Diana ENV:EX

From: Aleta Corbett [Aleta_Corbett@transalta.com]
Sent: Wednesday, June 1, 2011 12:25 PM
To: Knight, Francesca; Babakaiff, Scott C FLNR:EX
Cc: Glenn Isaac; Matthew Holder
Subject: FW: Plant trip event on May 6
Attachments: Upper Mamquam_June 1 2011.doc

Hi Francesca and Scott,

Attached is a memo summarizing the flow data for the May 6, 2011 plant trip. Please let me know if you have any questions or require further information. Thanks,

Aleta Corbett, B.Sc., P. Biol
Environmental Coordinator
110-12th Ave SW
Calgary, AB T2P 2M1
w. (403) 267-7647
c. (587) 226-0549
Toll Free: 1.800.547.3365
aleta_corbett@transalta.com

TransAlta

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, May 31, 2011 9:11 AM
To: Matthew Holder; Randall Vriend; Glenn Isaac
Cc: Busto, Vince; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Timothy.Bennett@gov.bc.ca
Subject: RE: Plant trip event on May 6

Hello gentlemen,
I am writing to follow up on this information request for flow and stage data from the May 6, 2011 flow interruption event.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Pacific Region 'Working Near Water' website
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From: Knight, Francesca
Sent: May 13, 2011 8:31 AM
To: 'Matthew Holder'
Cc: Glenn Isaac
Subject: RE: Plant trip event on May 6

thanks Matt and Glenn,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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From: Matthew Holder [mailto:Matthew_Holder@transalta.com]
Sent: May 13, 2011 7:12 AM
To: Knight, Francesca
Cc: Glenn Isaac
Subject: RE: Plant trip event on May 6

Hi Francesca:

Thank you for your voicemails and emails. Unfortunately, I was traveling yesterday afternoon and was not able to respond until this morning. I have passed on your messages to my colleague, Glenn Isaac, who will be working with our Hydro Operations staff to address your questions and concerns.

Matt

Matt Holder . Manager, Environment . TransAlta Corporation . 110-12th Ave SW, Calgary, AB T2P 2M1 . 403-267-7495 (o) . 403-870-7615 (c) . 403-267-2005 (f) . matt_holder@transalta.com

---

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 4:55 PM
To: Randall Vriend
Cc: Christine Nicholls; Matthew Holder; Busto, Vince
Subject: Plant trip event on May 6

Hell Randy,
Thanks for the chat this afternoon. Basically, as I understand it, the plant tripped off-line, and was offline for about 2

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As we discussed on the phone, we would like to see the flow/stage data from your gauging stations (according to Summit Environmental's report, there is a gauge about 100m upstream of the powerhouse and just downstream of the tailrace). These data will help us to better understand the duration of flow interruptions.

regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

Ha, Diana ENV:EX

From: Knight, Francesca [Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 3:55 PM
To: Randall_Vriend@transalta.com
Cc: Christine Nicholls; Matt_Holder@transalta.com; Busto, Vince
Subject: Plant trip event on May 6

Hell Randy,
Thanks for the chat this afternoon. Basically, as I understand it, the plant tripped off-line, and was off-line for about 2 hours. The bypass valve did not function properly, remaining mostly closed, for about 45 minutes. I believe shortly after the plant tripped, you started spilling from your headpond, but there would have been a lag time associated with that water making it the 2km to down below the tailrace. The plant was releasing an IFR of just under 2 cms, and the river inflows into your headpond were about 15-18 cms. It's a distance of about 700m from your tailrace down to the Lower Mamquam headpond, with Raffuse Creek providing input to the Mamquam about 500m downstream of your tailrace.

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Ha, Diana ENV:EX

From: Knight, Francesca [Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 3:10 PM
To: Jena Tufts; Busto, Vince; Bennett, Timothy A FLNR:EX
Cc: Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Serkan Fikirdanis
Subject: RE: Mamquam - Rough zone ramping May 6, 2011

Hi Jena, thank you for the notification of this event. It would be helpful to know just what happened at Upper Mamquam that resulted in the flow interruption. I have tried to contact some folks at transAlta, but am not having any luck. I don't suppose yourself or Marc would have a name and number for the Upper Mamquam operator?
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
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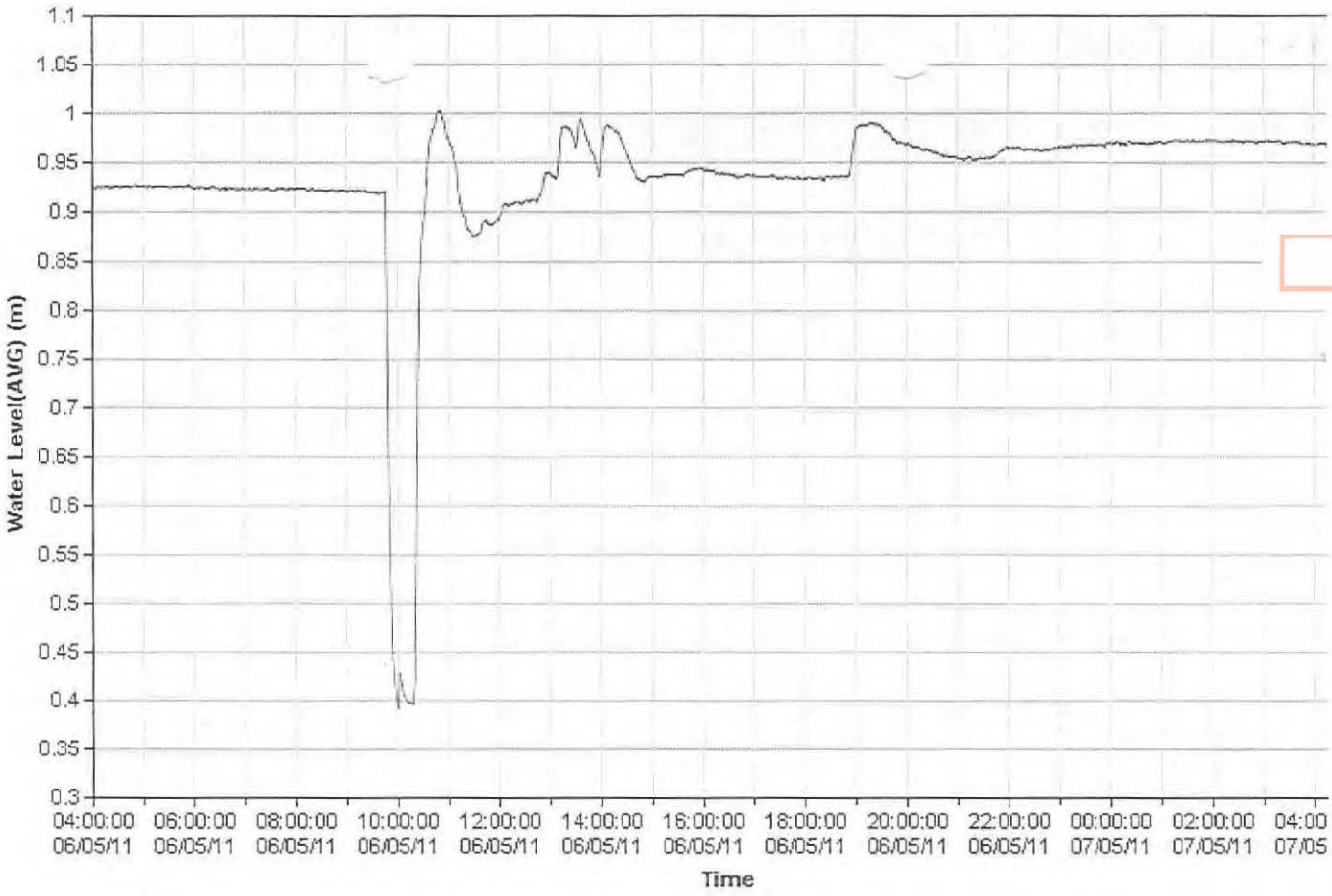
From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: May 12, 2011 11:28 AM
To: Busto, Vince; Knight, Francesca; 'Timothy.Bennett@gov.bc.ca'
Cc: Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; Serkan Fikirdanis
Subject: Mamquam - Rough zone ramping May 6, 2011

Hello Vince and Francesca,

In our April 6 meeting at Mamquam, you requested to be notified of all rough zone ramping events that occur at our Mamquam facility. On May 6, the Upper Mamquam facility informed our operations that they were having operational issues. Mamquam staff immediately observed a drop in river flows and took emergency measures to mitigate the downstream impacts of this event. Due to the operational issues at the Upper Mamquam facility, our Lower Mamquam facility was required to drop through the rough zone to match flows and avoid tripping offline due to low head pond levels. Ecofish crews were on site to monitor the rough zone ramping event and subsequently found 2 dead fry at the upstream site near the powerhouse.

Please find attached the memo prepared by Ecofish detailing this rough zone ramping event. I have also attached a graph showing the drop in river levels from the gauge upstream of Raffuse Creek.



Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com

Please consider the environment before printing this e-mail

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 1, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region) Ministry of Forests, Lands and Natural Resource Operations 10470 - 152 Street, Surrey, BC V3R 0Y3 Ph. (604) 582-5227 Fx. (604) 582-5235

-----Original Message-----
From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, June 1, 2011 6:29 AM
To: Bennett, Timothy A FLNR:EX
Subject: Automatic reply: Mamquam Bi-Weekly Update - June 1, 2011

I will be in training June 1 and 2 and will have limited access to email. I will respond to your message at my earliest convenience.

Thanks,
Jena

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - June 1, 2011
Attachments: Memo to Marc Nering re May 18 2011 Ramping Rate Monitoring.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, June 1, 2011 6:28 AM
To: 'Knight, Francesca'; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; 'Elyse MacDonald'; Serkan Fikirdanis
Subject: Mamquam Bi-Weekly Update - June 1, 2011

Good morning Francesca and Vince,

The runner for Unit 2 is now fully installed with commissioning continuing. Ecofish was on site May 18 to start the commissioning process and have provided a memo describing their observation on that day; I have attached this memo for your records.

Initial commissioning results show that the rough zone is narrower, 9.5 MW to 13.5 MW compared to the original rough zone of 9 MW to 16 MW, and it appears that the unit can be ramped through the rough zone at the 2.5 cm/hr or the 5 cm/hr rate due to lower vibration levels.

The river level sensors downstream of the intake and powerhouse are now connected to the PLC, however, further tuning and calibration is still required.

Below is the corrective action table to indicate the upcoming corrective actions and the items that have already been completed.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed

4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion . ch.	Jena Tu.	Completed	
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Completed	
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	Completed	
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	15-Jun-11	
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed	
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed	
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	30-Jun-11	
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required	
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing	

Please don't hesitate to contact me if you have further questions. Please note that I will be in training June 1 and 2 with no access to email, I will be back in the office the morning of June 3.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

ECOFISH RESEARCH

MEMORANDUM

TO: Marc Nering
FROM: Elyse MacDonald
DATE: May 18, 2011
FILE: 1071-04.09

RE: Mamquam River Ramping Rate Monitoring

This memo briefly describes the observations made during ramping rate monitoring conducted for Capital Power on the Mamquam River run-of-river hydroelectric project on May 18, 2011. This rough zone event was the results the required shutdown to facilitate upgrades to Generator 2. The shutdown was planned to coincide with high discharge in the river to mitigate loss of wetted width associated with stage change as much as possible downstream.

Stage change was assessed based on recorded stage downstream of the powerhouse (Figure 1). Table 1, summarizes the ramping incidence based on data from the downstream hydrometric gauge (MQM-DSLG01). Two non-compliance events were recorded, with the first from 7:04 hrs until 7:12 hrs and the second from 8:30 hrs until 8:44 hrs (Table 1 and Figure 1). The first event was due to the anticipated rough zone ramping. The second event occurred to an unanticipated event during shutdown, causing the turbine inlet valve (TIV) to close. The second event was most severe with a stage decrease of 9.9 cm in 14 minutes and a stage change of -9.9 cm was recorded in one hour. Stage began to rise quite quickly and so, the average stage change rate over this time would not adequately convey this event.

Crews were onsite to monitor potential fish stranding before, during and after the rough zone ramping event and TIV closure. The site downstream of the powerhouse (MQM-DSSD01) was monitored between 7:15 and 10:05 hrs. Very little wetted width was dried during the monitoring and no fish were observed stranded or isolated.

Monitoring was also conducted at the site upstream and downstream of the Highway 99 Bridge (MQM-DSSD02) between 6:45 and 11:20 hrs. An area of 100 m^2 of the stream margin and overland channel on river right was hand searched by two people. Due to the higher start stage, loss of wetted width due to the two ramping induced stage changes was minimized. No fish were observed stranded or isolated, however five live fish were seen in search areas upstream of the bridge.

ECOFISH RESEARCH

Figure 1. Water levels recorded at MQM-DSLG01 during the ramping events on May 18, 2011.

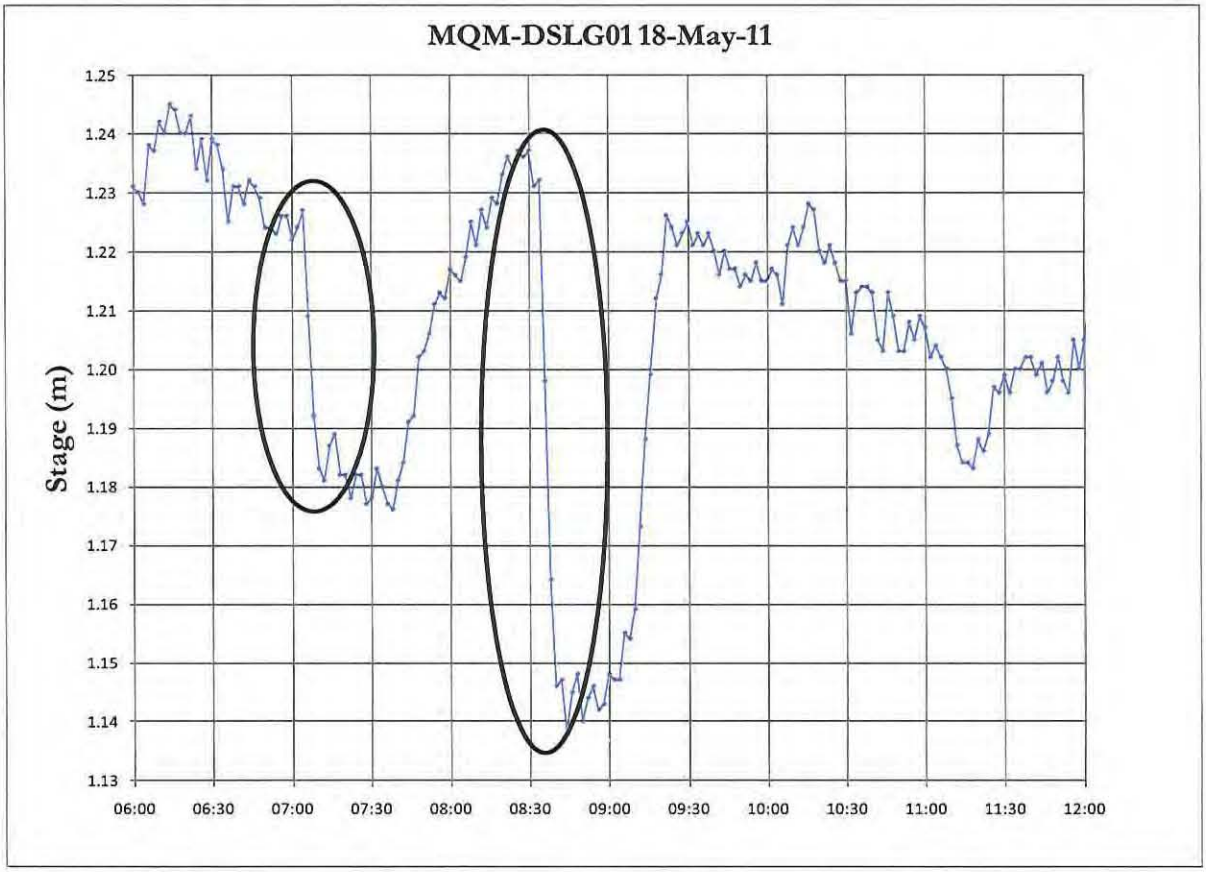


Table 1. Summary of stage change, incident duration, and rate of change on May 18, 2011

Compliance Point	Start Time (PDT)	End Time (PDT)	Duration (Hours)	Stage Start (cm)	Stage End (cm)	Total Stage Change[1] (cm)	Hourly Stage Change[1] (cm in one hour)	Non-Compliance (Stage decrease of > 3.6 cm in one hour)	Discharge Start[2] (cms)	Discharge End[2] (cms)	Total Discharge Change (cms)
MQM-DSLG01	07-Apr-11 22:34	07-Apr-11 22:56	00:22	64.7	56.8	-7.9	-7.9	Yes	9.76	7.91	1.85
MQM-DSLG01	18-May-11 06:14	18-May-11 07:12	00:58	124.5	118.1	-6.4	-6.4	Yes	24.9	22.9	2
MQM-DSLG01	18-May-11 08:30	18-May-11 08:44	00:14	123.7	113.8	-9.9	-9.9	Yes	25.2	21.1	4.1

[1] Negative number indicates stage decrease

[2] For April event, discharge equation is: $Q = 8.634*(Stage + 0.4)^{2.677}$, for May, when PLC gauge was installed, equation is: $Q = 8.634*(Stage + 0.259)^{2.677}$

ECOFISH RESEARCH

Yours truly,

Ecofish Research Ltd.

signed

Elyse MacDonald, M.Sc., R.P.Bio., CPESC

Environmental Biologist, Project Manager

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Plant trip event on May 6

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, May 31, 2011 8:11 AM
To: Matthew Holder; Randall_Vriend@transalta.com; Glenn Isaac
Cc: Busto, Vince; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX
Subject: RE: Plant trip event on May 6

Hello gentlemen,
I am writing to follow up on this information request for flow and stage data from the May 6, 2011 flow interruption event.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Government of Canada - Gouvernement du Canada

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From: Knight, Francesca
Sent: May 13, 2011 8:31 AM
To: 'Matthew Holder'

Cc: Glenn Isaac
Subject: RE: Plant trip event on M 5

thanks Matt and Glenn,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Matthew Holder [mailto:Matthew_Holder@transalta.com]
Sent: May 13, 2011 7:12 AM
To: Knight, Francesca
Cc: Glenn Isaac
Subject: RE: Plant trip event on May 6

Hi Francesca:

Thank you for your voicemails and emails. Unfortunately, I was traveling yesterday afternoon and was not able to respond until this morning. I have passed on your messages to my colleague, Glenn Isaac, who will be working with our Hydro Operations staff to address your questions and concerns.

Matt

Matt Holder . Manager, Environment . TransAlta Corporation . 110-12th Ave SW, Calgary, AB T2P 2M1 . 403-267-7495 (o) . 403-870-7615 (c) . 403-267-2005 (f) . matt_holder@transalta.com

---

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 4:55 PM
To: Randall Vriend
Cc: Christine Nicholls; Matthew Holder; Busto, Vince
Subject: Plant trip event on May 6

Hell Randy,
Thanks for the chat this afternoon. Basically, as I understand it, the plant tripped off-line, and was off-line for about 2 hours. The bypass valve did not function properly, remaining mostly closed, for about 45 minutes. I believe shortly after the plant tripped, you started spilling from your headpond, but there would have been a lag time associated with that water making it the 2km to down below the tailrace. The plant was releasing an IFR of just under 2 cms, and the river inflows into your headpond were about 15-18 cms. It's a distance of about 700m from your tailrace down to the Lower Mamquam headpond, with Raffuse Creek providing input to the Mamquam about 500m downstream of your tailrace.

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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Interim Monitoring report

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region) Ministry of Forests, Lands and Natural Resource Operations 10470 - 152 Street, Surrey, BC V3R 0Y3 Ph. (604) 582-5227 Fx. (604) 582-5235

-----Original Message-----
From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, May 30, 2011 6:11 PM
To: Busto, Vince; Lail, Kelly; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX
Cc: Fikirdanis, Serkan; Nering, Marc; Jena Tufts; fjalewis@ecofishresearch.com; Elyse MacDonald
Subject: Interim Monitoring report

Hello folks,

Thanks very much for the recent Ecofish interim monitoring report for Lower Mamquam. It's a good piece of work, and really helping to inform us all on the future management of the facility. I have a few comments, and also will refer back to some of my earlier comments on the effects monitoring program study design (the OEMP, Ecofish, January 29, 2010). Also, I don't have a lot of time for report review these days, and I think these comments reflect that.

1. An IFR suitability evaluation should be conducted.
The installation of the instream flow gauges is fantastic. Currently, the plant is operating with an IFR in the diversion reach of 1cms = about 5% MAD; I don't know that this IFR is sufficiently protective of fish and fish habitat, and the question warrants detailed examination. Ecofish indicates that this IFR may have been set based on the results of fish sampling in the early 1990s, which concluded that the biological productivity of the river was low. Improved methods in both the Lower and Upper Mamquam sampling programs certainly indicate that in fact, productivity in the river is not as low as originally thought, given the numbers of fish caught in the two recent sampling programs (lower Mamquam in 2010, Upper Mamquam 2009 report and, I suspect, the pending 2010 report). The suitability of the year-'round IFR of 1 cms needs to be critically evaluated.

2. Fish entrainment.
I found the literature search on fish entrainment, wherein species-and-life stage specific considerations of risk of entrainment were discussed, very interesting. However, in reading this material, I as reminded of a comment that I made in review of the OEMP:

"The Upper and Lower Mamquam IPP effect monitoring programs should be integrated. The operation of the upper plant will absolutely confound the effects monitoring program for

the lower plant. As well, the lower plant may influence the findings of the effects monitoring program for the upper plant (for example, via no fish passage at lower plant intake). To conduct a monitoring program on the lower plant without knowledge and consideration of the upper plant effects monitoring is a waste of time and money, and vice versa."

The lower Mamquam river intake structure poses both a risk of entrainment as well as a barrier to upstream movement / migration. Both of these risks cannot be adequately assessed without considering the findings of the Upper Mamquam monitoring program.

3. Fish abundance and biomass.

I'm not really sure I agree with the use of the adjusted fish abundance and biomass as the focus for the majority of the comparisons and discussion. However, I am willing to concede ERL's point that there's not a whole lot to say just yet on fish abundance and biomass in the diversion reach and upstream, given that there's not been much data collected. I'm going to have to think about this more as the monitoring program progresses. In addition, there may be something going on in the diversion reach relative to upstream, and not just for rainbow trout 1+ fish, but also possibly for 2+. While the findings of the statistical test for differences indicated no difference for both adjusted abundance and biomass, it's clear that high variability is driving this result (table 17). Figure 20 shows a grimmer picture of fish density; we'll have to keep an eye on both the 1+ and 2+ rainbow in the diversion reach relative to upstream.

I have to bring up another comment from the OEMP, in particular, this comment's relevance to assessing additional lines of evidence:

"You all know that my default position is that monitoring of invertebrates has its own intrinsic merit, beyond that of just determining whether there is adequate food for fish. Regardless, invertebrate monitoring should remain in the lower Mamquam plant monitoring program, and I'll tell you why:

* Because of the confounding influences of the upper plant, all available lines of evidence should be utilized in evaluating the effects of the lower plant on fish and fish habitat.
* Some interesting findings came out of the 2009 monitoring work done on the Upper River site by Summit Environmental. Fish condition factors for rainbow trout fry in the diversion reach were lower than in the upstream control (ANOVA showed statistically significant difference). As well, the make up of the invertebrate community is quite different in the diversion reach and downstream, relative to the control site. EPT taxa (mayflies, stoneflies and caddisflies) are the community structure drivers in the upstream control, and Dipterans (midges and crane flies). These two lines of evidence, when looked at together, may be indicative of an impact "signal" related to IPP operations."

All elements of this comment are applicable.

4. Anadromous effects downstream of the powerhouse.

Given the considerable disturbance to anadromous reaches downstream of the powerhouse [as a result of ramping] ERL / Capital Power should be giving consideration to monitoring indicators that can be utilized to evaluate fish abundance/biomass. We are all anxiously awaiting the results of the turbine retrofit commissioning. Is it going to solve the rough zone ramping problem?? I suppose some might say, "why bother trying to monitor downstream reaches affected by ramping rates [that we know were harmful to fish], and for so many years - especially when there is no baseline?". Under the circumstances, I don't think that rationale is appropriate. There's got to be some analysis of the potential impacts over the years (via picking through historical flow data and fish life stage presence in the affected areas) and then some way to demonstrate improvement.

5. Other outstanding items, as relevant to the Fisheries Act Authorization process:

- need to further ascertain the anadromous species use in the diversion reach (upstream of the tailrace, downstream of the barrier above the powerhouse bridge). Will pink salmon presence in this area be evaluated this year?

· is the plan only to evaluate spawning, or rearing as well?

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - May 17

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Tuesday, May 17, 2011 9:45 AM
To: 'Knight, Francesca'; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'Elyse MacDonald'; 'fjalewis@ecofishresearch.com'
Subject: Mamquam Bi-Weekly Update - May 17

Hello Francesca and Vince,

Runner installation is expected to be completed May 18 with commissioning starting soon after. There are no other updates at this time.

Below is the corrective action table to indicate the upcoming corrective actions and the items that have already been completed.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	Expected to be completed May 18, 2011
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	31-May-11

7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	—	15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed	
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed	
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering		30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required	
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing	

Please don't hesitate to contact me if you have any questions. However, please note that I will be away from the office later today until May 19.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:33 AM
To: Becker, Judy S ENV:EX
Subject: FW: Plant trip event on May 6

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 6:03 PM
To: Knight, Francesca
Cc: Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX
Subject: RE: Plant trip event on May 6

Francesca

Good direction. I will call you to discuss this tomorrow.

So ... we have another 2 or three powerplants slated for this system?

Vince Busto, B.A.Sc., P.Eng.
Habitat and Hydrotechnical Engineer | Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch | Protection et mise en valeur des habitats
Lower Fraser River | Le bas Fraser
Fisheries and Oceans Canada | Pêches et Océans Canada
100 Annacis Parkway, Unit 3 | 100 Annacis Parkway, Unit 3
Delta, BC V3M 6A2 | Delta (C.-B.) V3M 6A2
Government of Canada | Gouvernement du Canada

Telephone/Téléphone 604-666-8281
Facsimile / Télécopieur 604-666-6627

-----Original Message-----
From: Knight, Francesca
Sent: Thu 5/12/2011 3:55 PM
To: 'Randall_Vriend@transalta.com'
Cc: 'Christine Nicholls'; 'Matt_Holder@transalta.com'; Busto, Vince
Subject: Plant trip event on May 6

Hell Randy,
Thanks for the chat this afternoon. Basically, as I understand it, the plant tripped off-line, and was off-line for about 2 hours. The bypass valve did not function properly, remaining mostly closed, for about 45 minutes. I believe shortly after the plant tripped, you started spilling from your headpond, but there would have been a lag time associated with that water making it the 2km to down below the tailrace. The plant was releasing an IFR of just under 2 cms, and the river inflows into your headpond were about 15-18 cms. It's a distance of about 700m from your tailrace down to the Lower Mamquam headpond, with [illegible]

providing input to the Mamquam about 500m downstream of your tailrace.

As we discussed on the phone, we would like to see the flow/stage data from your gauging stations (according to Summit Environmental's report, there is a gauge about 100m upstream of the powerhouse and just downstream of the tailrace). These data will help us to better understand the duration of flow interruptions.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
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Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam - Rough zone ramping May 6, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: Thursday, May 12, 2011 3:20 PM
To: Knight, Francesca; Jena Tufts; Busto, Vince; Bennett, Timothy A FLNR:EX
Cc: Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Serkan Fikirdanis
Subject: RE: Mamquam - Rough zone ramping May 6, 2011

Hi Francesca,

My understanding is that their plant tripped offline and the bypass did not open, cutting off the flow in the Mamquam river until their intake spill reached downstream. The only inflow into our headpond was the Raffuse Creek.

Transalta contact numbers are:

604 898 8297 plant
604 [redacted] operator cell (Randy)
604 s.22 operator cell (Sal)

Regards,

Marc

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, May 12, 2011 3:10 PM
To: Jena Tufts; Busto, Vince; Timothy.Bennett@gov.bc.ca
Cc: Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com; Serkan Fikirdanis
Subject: RE: Mamquam - Rough zone ramping May 6, 2011

Hi Jena, thank you for the notification of this event. It would be helpful to know just what happened at Upper Mamquam that resulted in the flow interruption. I have tried to contact some folks at transAlta, but am not having any luck. I don't suppose yourself or Marc would have a name and number for the Upper Mamquam operator?
regards,
Francesca

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From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: May 12, 2011 11:28 AM
To: Busto, Vince; Knight, Francesca; 'Timothy.Bennett@gov.bc.ca'
Cc: Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; Serkan Fikirdanis
Subject: Mamquam - Rough zone ramping May 6, 2011

Hello Vince and Francesca,

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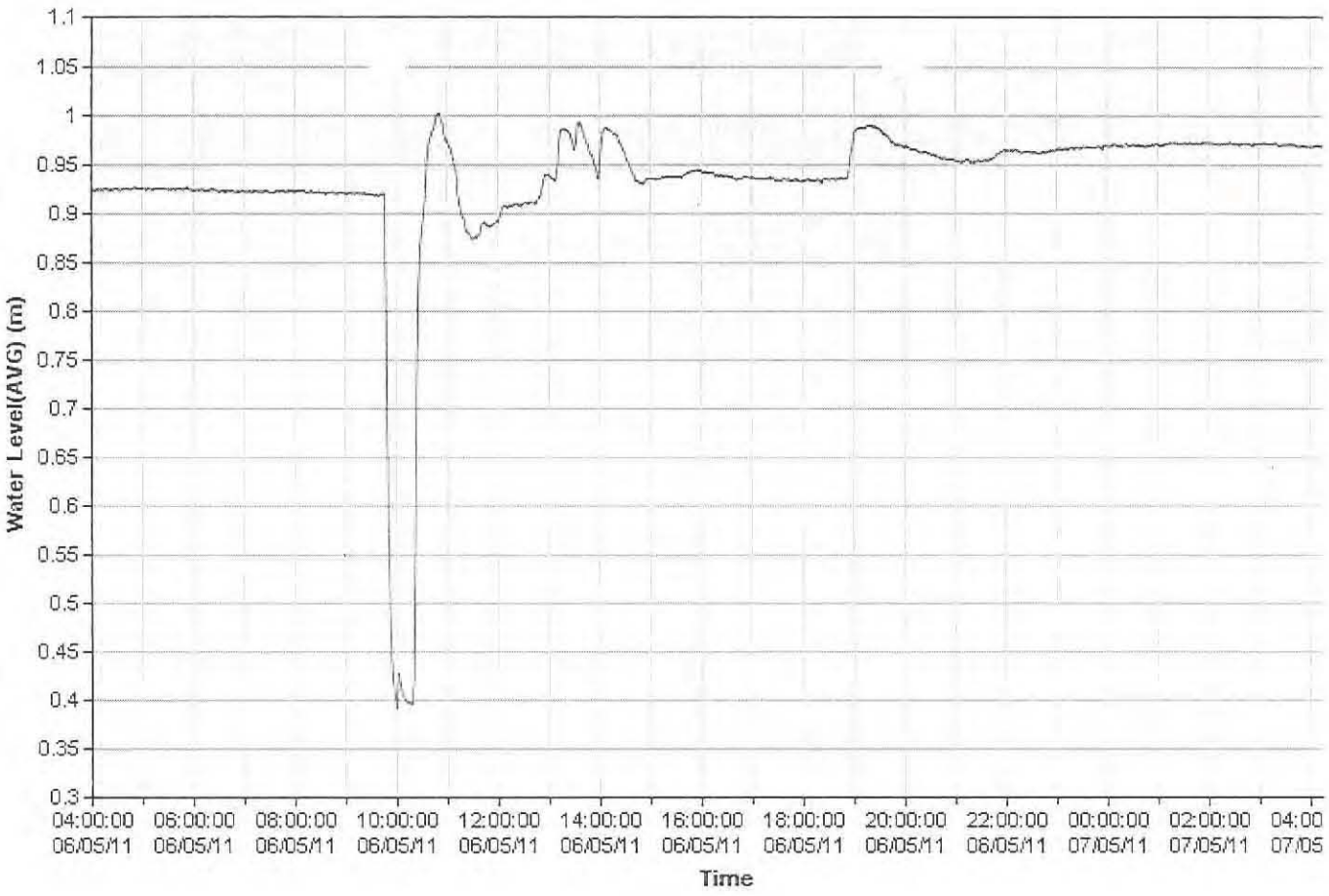
Please find attached the memo prepared by Ecofish detailing this rough zone ramping event. I have also attached a graph showing the drop in river levels from the gauge upstream of Raffuse Creek.



Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com

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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam - Rough zone ramping May 6, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
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Ph. (604) 582-5227 *Fx.* (604) 582-5235

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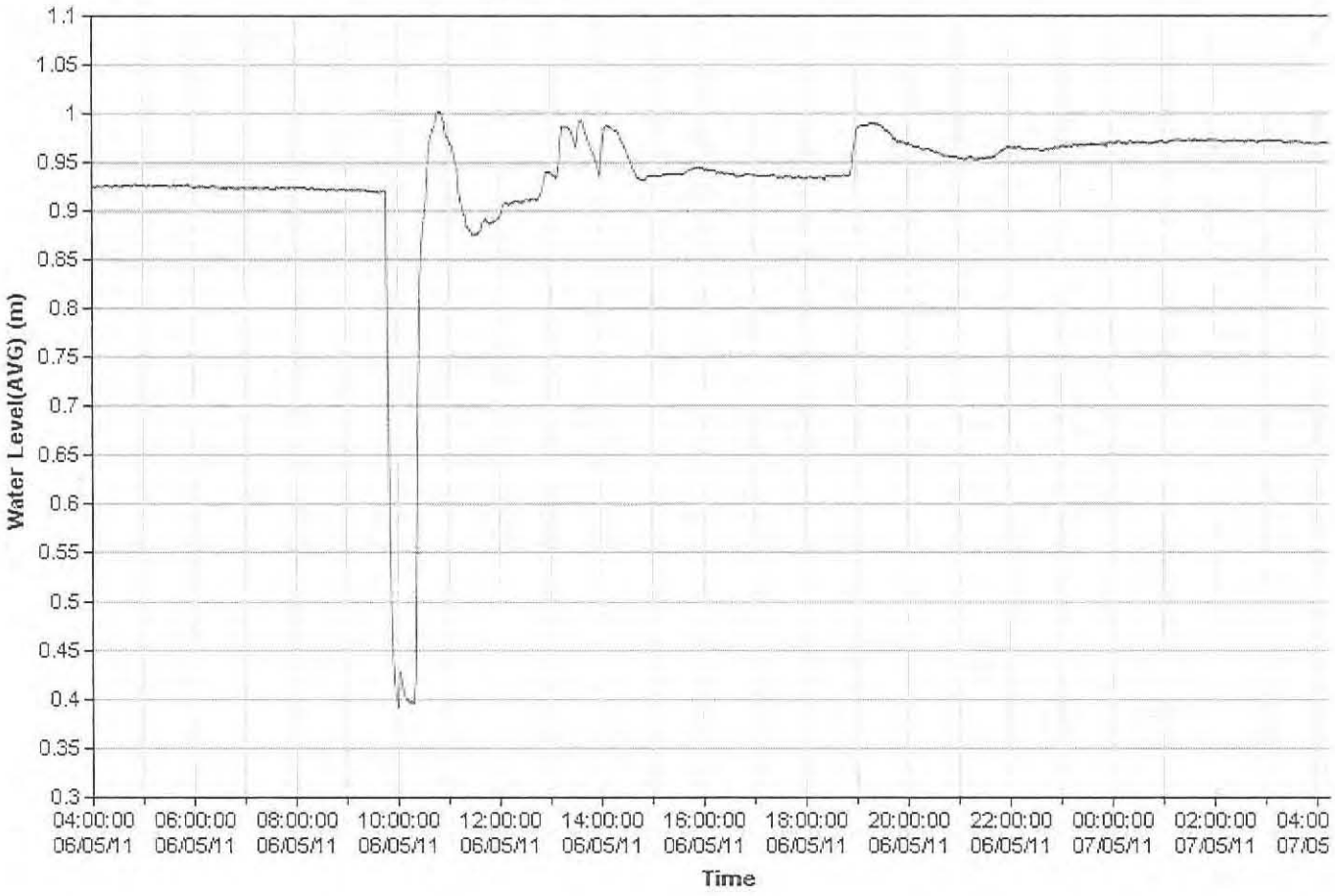

Best Regards,
Jena

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Environment, Health and Safety
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(780) 392-5522 | jtufts@capitalpower.com

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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam - Rough zone ramping May 6, 2011
Attachments: Memo to Marc Nering re May 6 2011 Ramping Rate Monitoring.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

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Cc: Marc Nering; Michael Smith; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'; Serkan Fikirdanis
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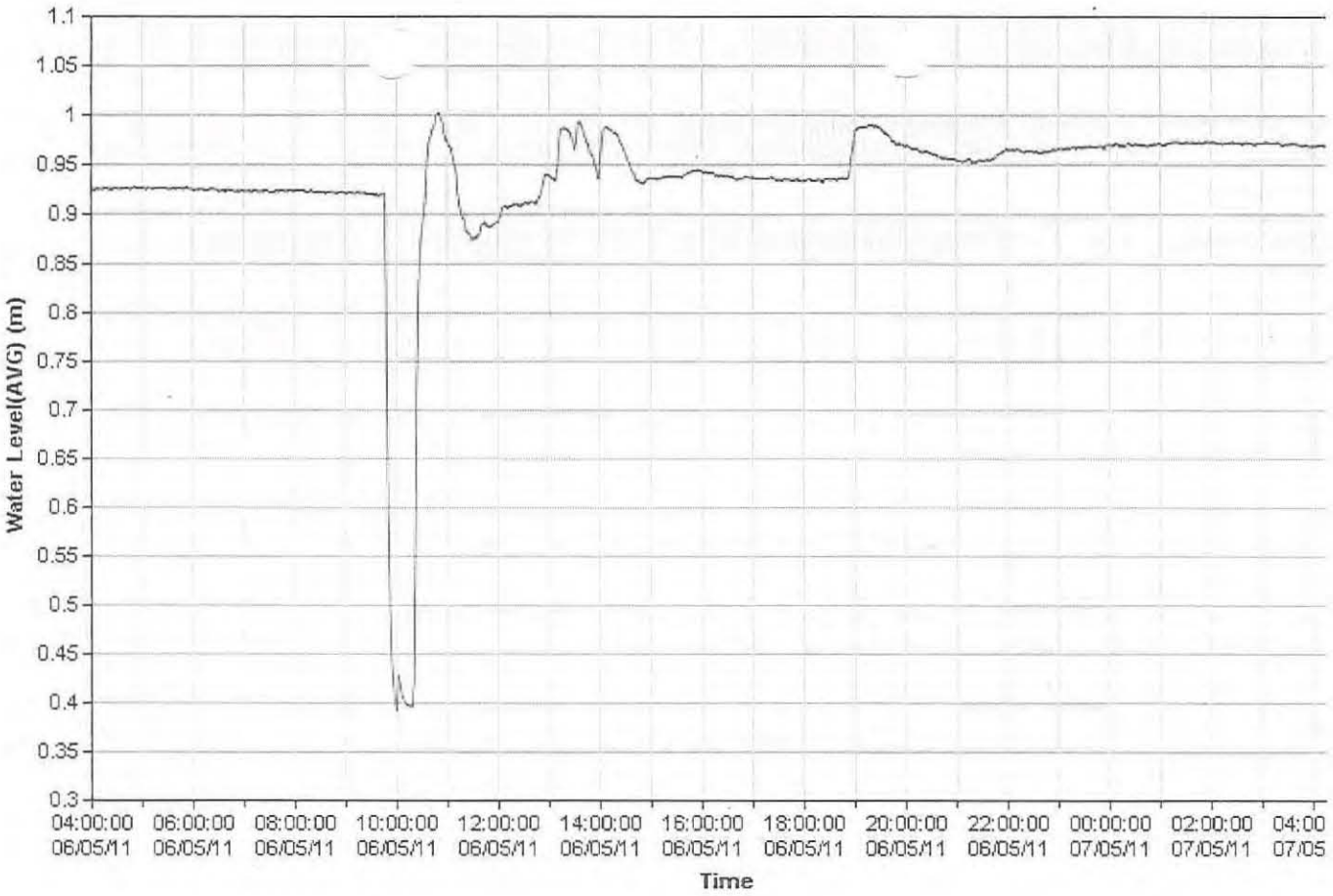

Best Regards,
Jena

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(780) 392-5522 | jtufts@capitalpower.com

Please consider the environment before printing this e-mail

ECOFISH RESEARCH

MEMORANDUM

TO: Marc Nering
FROM: Elyse MacDonald
DATE: May 8, 2011
FILE: 1071-04.09

RE: Mamquam River Ramping Rate Monitoring

This memo briefly describes the observations made during ramping rate monitoring conducted for Capital Power on the Mamquam River run-of-river hydroelectric project on May 6, 2011. This rough zone event was the results of operations of the Upper Mamquam River project. CPC was notified in the morning of May 6 that flow release downstream of the Upper project tailrace and thus the Lower Mamquam Proejct used their headpond to lessen the downstream impact by releasing some of the stored water. Generation at the Lower project was immediately curtailed from 28 MW to 14 MW, in an attempt to avoid rough zone ramping, however, flow was not restored upstream and the Lower project shut down generation.

Stage change was assessed based on recorded stage downstream of the powerhouse (Figure 1). Table 1, summarizes the ramping incidence based on data from the downstream hydrometric gauge (MQM-DSLG01). Three non-compliance events were recorded, with the first from 10:58 hrs until 11:34 hrs and the second from 11:54 hrs until 12:50 hrs and the third from 13:02 hrs until 13:50 hrs (Table 1 and Figure 1). During the first event was most severe with stage decrease of 23.2 cm in 36 minutes and a stage change of -23.5 cm was recorded in one hour. Stage began to rise quite quickly and so, the average stage change rate over this time would not adequately convey this event.

Crews were onsite to monitor potential fish stranding during and after the rough zone ramping event. The site downstream of the powerhouse (MQM-DSSD01) was also hand-searched between 12:00 and 12:40 hrs. A total area of 100 m^2 was sampled and two dead and two live fry were found. One dead fry appeared fresh (Figure 2) while the other appeared to be in poor condition. Both dead fry were found in approximately 5 cm depth in isolated pools and measured 30 mm and 32 mm (fork length). Two live fry were found in isolated pools, one in the same pool as the dead fry in good condition. Both were captured and returned to the mainstem.

A hand-based search was conducted at the previously established site upstream and downstream of the Highway 99 Bridge (MQM-DSSD02) between 13:30 and 14:50 hrs. An area of 200 m^2 of the stream margin and overland channel on river right was hand searched for a total of 71 minutes at this site by three people (100 m^2 upstream and 100 m^2 downstream of the bridge). No dead fish were found, but two live fish were seen in search areas upstream of the bridge. One of the two live fish was caught and recorded to be healthy and of approximately 35 mm (fork length). The second live fish appeared to be similar in size.

ECOFISH RESEARCH

Figure 1. **Water levels recorded at MQM-DSLG01 during the ramping events on May 6, 2011.**

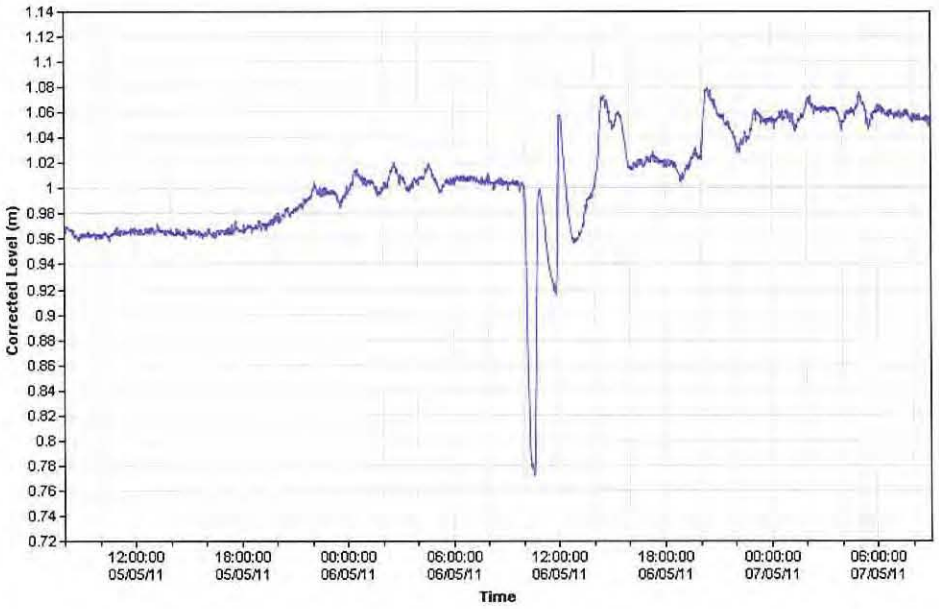

Table 1. **Summary of stage change, incident duration, and rate of change on May 6 compared to ramping the rough zone ramping event on April 7, 2011.**

Compliance Point	Start Time (PDT)	End Time (PDT)	Duration (Hours)	Stage Start (cm)	Stage End (cm)	Total Stage Change (cm)*	Hourly Stage Change (cm in one hour)	Non-Compliance	Discharge Start (cms)	Discharge End (cms)
MQM-DSLG01	07-Apr-11 22:34	07-Apr-11 22:56	00:22	64.7	56.8	-7.9	-7.9	Yes	6.32	4.53
MQM-DSLG01	06-May-11 10:58	06-May-11 11:34	00:36	100.3	77.1	-23.20	-23.5	Yes	18.4	9.8
MQM-DSLG01	06-May-11 11:54	06-May-11 12:50	00:56	99.9	91.6	-8.3	-8.3	Yes	18.3	14.8
MQM-DSLG01	06-May-11 13:02	06-May-11 13:50	00:48	105.8	95.6	-10.2	-10.2	Yes	20.9	16.4

* Negative number indicates stage decrease

Figure 2. Dead fry found in good condition at MQM-DSSD01.

Yours truly,

Ecofish Research Ltd.

signed

Elyse MacDonald, M.Sc., R.P.Bio., CPESC

Environmental Biologist, Project Manager

Ila, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-weekly Update - May 4, 2011
Attachments: Mamquam Commissioning Procedure - G2.doc

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, May 4, 2011 3:35 PM
To: 'Busto, Vince'; 'Knight, Francesca'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'Elyse MacDonald'; 'fjalewis@ecofishresearch.com'
Subject: Mamquam Bi-weekly Update - May 4, 2011

Hello Vince and Francesca,

Runner installation at Mamquam is progressing, however, the contractor is behind schedule; commissioning of the unit is expected to begin between May 9 and May 16. As requested, please find attached a procedure outlining both the operational and environmental considerations for unit 2 commissioning. The environmental considerations outlined in the attached procedure were taken from the project proposal and cost estimate that Ecofish provided for the commissioning of unit 2.

The following table summarizes the corrective actions, task owner and target date.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	7-May-11

6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	31-May-11
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

Best Regards,
Jena

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Capital Power Corporation
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Capital Power Corporation

Mamquam Generating Station

Operations Procedure

SUBMITTED BY:	JENA TUFTS	DATE:	MAY 3, 2011
APPROVED BY:	MARC NERING	DATE:	May 3, 2011
REVISION NO. 1		REVISED BY:	DATE REVISED:

UNIT 2 COMMISSIONING – MAY 2011

INTRODUCTION: This procedure details the operational and environmental steps for commissioning unit 2.

RESPONSIBILITIES: Operations staff are required to follow this procedure

DEFINITIONS:

Rough Zone – Between 9-16MW the Mamquam units experience resonance. This causes high vibrations which are highly detrimental to the turbine.

Ramping – The process of raising or lowering unit output, and the time it takes to achieve this.

River staff gauge – The gauge in the river that operators can view to determine water level

HMI – Human Machine Interface (the unit control screen)

OPERATIONAL PROCEDURE:

Step One

Ensure unit is ready for operation:

- All unit parameters in spec (bearing clearances, brush gear, etc.)
- Receiving correct signal from all rtd's (bearings, bearing sumps, stator, etc.)
- Receiving correct readings from vibration probes
- Cooling water system checked for leaks
- Tyton seal pressured up check for leaks (seal air/barrier water/flush water)
- Oil reservoirs filled to correct level and reading correctly on HMI
- 86R trip wire re-connected
- Brake lines installed
- Speed sensor installed
- Brush gear/grounding brush installed
- Purge air/vac extract working
- etc

Step 2

Take plant offline:

- Ramp down G1
- Do not exceed 2.5cm/hr river level change while ramping
- Take plant offline and lock out units for diver entry

Water Up G2:

- Divers to remove PRV plug
- Cross flood G2 draft tube
- Check for leaks in shaft seal, head cover area, and draft tube
- Lift stop log

Restart G1:

- Remove lockout G1
- Bring G1 back online and ramp at allowable rate

Step Three

Perform functional checks G2:

- Create temporary lift on lockout for HPU/lift pump operation
- Check wetted wicket gate/PRV operation and timing (SKT to set up recording equipment)
- Check lift pump/pressure switch operation
- Check seal pump operation
- Check air seal operation
- Check brake operation
- Check speed pickup operation
- Etc.

Step Four

Stage 1 Unit Rolling Procedure:

- Remove lockout
- Prepare log sheet for recording unit rpm/bearing temps/vibration
- Vibration technician to set up recording equipment
- Have operations staff at all levels to check for leaks/noises/ etc.
- Ensure lift pump is operational (should be known already, since they will have done rotations)
- Open TIV seals
- Open wicket gates to initiate slow roll
- Once rolling, continually monitor/record all operating parameters
- Open wicket gates in increments to 100% while recording operating parameters
- Let unit roll at 100% for 15 minutes to ensure proper operation
- Once satisfied, close seals and wicket gates
- Ensure brakes work while stopping unit

Stage 2 Unit Rolling Procedure:

- Open TIV
- Open wicket gates to start unit rolling
- Record unit parameters
- Open wicket gates in increments to achieve 50/100/150/200 etc. until 650 rpm is reached (while recording unit parameters throughout)
- Remain at 650 rpm for 30 minutes to heat soak unit and continue monitoring unit parameters
- Quickly ramp unit to 900 rpm (to simulate transient over-speed condition during a load rejection) and then immediately drop back to 650 rpm
- Monitor unit parameters again at 650 rpm for 10 minutes

- Once satisfied, ramp down and close TIV and stop unit

Step Five

Start Unit:

- Bring unit online following normal procedure (while recording and monitoring all unit parameters and with operations staff checking for noises/leaks/etc.)
- Ramp unit from 2MW upwards in 0.5 MW increments while monitoring/recording unit parameters. Ramping to follow allowable environmental ramping guidelines.
- While ramping occurs, bearing/draft tube vibration levels to be monitored
- Technicians to be alert for rough zone operation/critical frequencies/cavitation/vibration etc.
- Engineering/vibration staff to determine rough zone avoidance areas, maximum permissible output, and any other operational parameters and limitations (max vibration/temperatures/etc.)

Step Six

Trip Test:

- Ensure water flows are sufficient for trip testing
- Have all testing gear installed/ready
- Operate unit in 7-8 MW range
- Initiate unit trip that will not close TIV
- Record results to ensure correct operation of wicket gates/intensifier/PRV
- Ensure PRV ramp timing is correct and matches allowable ramping for river.

ENVIRONMENTAL PROCEDURE (as per project scope and cost estimate provided by Ecofish Research Ltd):

Testing and commissioning procedures for upgrades to G2 are estimated to take between two to four days. Ecofish staff will be on site for Steps 2, 4, 5, and 6 of the operation procedure. Steps 1 and 3 do not require significant ramping, start-up, or shutdown of either generator units, therefore monitoring is not required.

Step 2 will include shutting the plant down and then starting at least one generator. After shutting the plant down, a significant amount of work (~3 hours) is required to remove the pressure release value (PRV) plug. To monitor the shutdown, one crew of two staff will be stationed at each of the two established downstream fish stranding monitoring sites (MQM-DSSD01 and MQM-DSSD02), for four staff total. To monitor the start-up, crews monitoring the downstream sites will have time to move into the diversion reach, which requires a minimum of three hours to safely access from the road, and monitor the pre-established monitoring sites within the canyon. Step 2 is anticipated to take one day to complete.

Step 4 will require starting up and shutting down each of the two generators. Four crews of two staff (eight staff total) will monitor fish stranding at the same upstream and diversion sites as during Step 2. Given the short time anticipated between start-up and shutdown, crews will not have time to move between the upstream and diversion sites, and so will monitor the same sites throughout the day. Step 4 is anticipated to require one to two days to complete.

Steps 5 and 6 will start up both generators and complete load testing for the upgraded G2. This will require staff downstream and in the diversion to monitor fish stranding in case of sudden shutdowns during load testing and to monitor ramping generators up between load tests. A full load rejection is not anticipated, however, crews will monitor MQM-DSSD01 and MQM-DSSD02 as a contingency measure in case of emergency shutdown. Steps 5 and 6 combined are anticipated to be completed in one day with monitoring by four crews of two staff (eight staff total).

Methodology for ramping monitoring will follow the scope of work for Ecofish's September 2010 ramping tests, with staff recording stage and wetted width measurements at regular intervals and a portable pressure transducer recording stage at each monitoring site (10 second intervals).

Schedule

Step 2 is anticipated to commence between May 9 and May 16, 2011. If testing is completed when monitoring sites are at bankfull width, it may only be necessary to have crews in place for the commencement of Step 4 to determine whether or not stage change will be significant enough to dry river margins. If stranding potential is deemed to be a non-issue due to high discharge, monitoring fish stranding will not be required for the remainder of commissioning.

Procedure Administration Page
(INSERT PROCEDURE NUMBER HERE)

REVISION 0

Submitted By: Jena Tufts Date: May 3, 2011

Checked By: _____ Date: _____

Details of Change: _____

REVISION _____

Submitted By: _____ Date: _____

Checked By: _____ Date: _____

Details of Change: _____

REVISION _____

Submitted By: _____ Date: _____

Checked By: _____ Date: _____

Details of Change: _____

REVISION _____

Submitted By: _____ Date: _____

Checked By: _____ Date: _____

Details of Change: _____

REVISION _____

Submitted By: _____ Date: _____

Checked By: _____ Date: _____

Details of Change: _____

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam River Plant

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Shum, KT FLNR:EX
Sent: Thursday, April 21, 2011 3:13 PM
To: Bennett, Timothy A FLNR:EX
Subject: FW: Mamquam River Plant

Tim,
Did you get a chance to look into this? If not who else in your office could I contact?

From: Shum, KT ENV:EX
Sent: Wednesday, March 30, 2011 4:26 PM
To: Bennett, Timothy A ENV:EX
Subject: RE: Mamquam River Plant

Tim,

I'm working to clear up the water rental billing for installed capacity of the Mamquam River Plant (no. 3940) of the Coastal Rivers Power Ltd Partnership (client no. 69731) (Capital Power). I'd like your input to clarify the situation. Specifically, had the plant been exceeding the authorized diversion in the first licence before the second licence was issued in 2009?

For CY 2009 and subsequent water rental, the installed capacity was prorated from 50 MW to 64 MW effective upon the issuance of the second licence in March 2009 (which increased the total authorized diversion to 30 cms). The March 2009 licence did not indicate any new construction, or that a LCO would be required for the additional capacity.

The client, however, indicated that the generation was no higher than 55 MW (email below). He did indicate though upgrades in these two years would increase the generation capacity. I'd like to know if the plant had been generating above 50 MW all these years before deciding on whether to adjust the water rental for CY 2009 and 2010.

As you recall, CWL102850 (file 2000966) for 23.45 cms (828.1 cfs) was issued on May 26, 1994 (priority date May 26, 1994) and CWL 123692 (file 2003040) for 6.55 cms (231.3 cfs) was issued on Mar 5, 2009 (priority date Mar 6, 2008).

Thanks.
KT

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: Friday, January 7, 2011 8:54 AM
To: Shum, KT ENV:EX
Subject: RE: Mamquam River Plant

Hello,

The reason for the discrepancies in reported generation are as follows:

EMetered power, sold to BC Hydro, for 2009 was **214,499.3MWh**
Plant Records (calculated from the plant meter x 38.115) was **214,435MWh**
These differences are time dependent, as the BC Hydro Emeter takes its readings at different times than operations staff read the plant meter.

Regarding plant capacity, the current installed capacity is 55MW as the turbine runners are at the end of their lifecycle and are less efficient than new, and running at higher outputs causes unacceptably high vibration.

We are installing a new runner (water wheel) in unit 2 this year, and a new runner in unit 1 in 2012 which should return the plant to a higher installed capacity. Until the new runners are performance tested we are unsure of their total output capacity, as they are a slightly different and a hopefully higher efficiency runner.

The monthly values for 2009 and 2010 for installed capacity should be 55MW as the units never operated above that range.

Marc Nering

From: Shum, KT ENV:EX [mailto:KT.Shum@gov.bc.ca]
Sent: Thursday, January 06, 2011 4:25 PM
To: Marc Nering
Subject: Mamquam River Plant

Mr. Nering:

Thank you for submitting the Beneficial Use Declaration for the Mamquam River Plant dated Nov 17, 2010. The installed capacity stated in that form is 55 MW and is considerably less than the 64 MW in our record. The stated power generation in CY 2009 is 214,435 MW-Hr is also slightly different from the 214,499 MW-Hr reported to the Water Revenue Unit earlier in 2010. Please confirm the numbers. If the installed capacity is different from 64 MW, please (1) advise if there are future plans to increase the generating capacity and (2) provide the monthly values of peak generation in 2009 and 2010 and I would adjust our data accordingly.

KT Shum, Head, Water Licensing

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - April 20, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Rudy Barrett [mailto:rbarrett@capitalpower.com]
Sent: Thursday, April 21, 2011 8:57 AM
To: 'Knight, Francesca'; Jena Tufts; 'Busto, Vince'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Michael Smith; Marc Nering; Robert Brassard; 'fjalewis@ecofishresearch.com'
Subject: RE: Mamquam Bi-Weekly Update - April 20, 2011

For clarification, Plant operation decisions are the responsibility of Marc Nering, Hydro Plant Manager.

Rudy Barrett
General Manager, Western Operations

Capital Power Corporation
T: 604-232-2240 **C:** 604-240-2821
A: Unit 215, 10451 Shellbridge Way
Richmond, BC

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Thursday, April 21, 2011 8:54 AM
To: Jena Tufts; Busto, Vince
Cc: Timothy.Bennett@gov.bc.ca; Stoddard, Erin ; Babakaiff, Scott; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com
Subject: RE: Mamquam Bi-Weekly Update - April 20, 2011

Hi Jena,
thank you for making the operational decision to maintain the plant operation at or below 9 MW until natural flows are sufficient to enable safer ramping through the rough zone.
I look forward to reviewing the commissioning procedure.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: April 20, 2011 3:42 PM
To: Busto, Vince; Knight, Francesca
Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'
Subject: Mamquam Bi-Weekly Update - April 20, 2011

Hello Francesca and Vince,

In response to the latest incident that occurred on April 15, 2011, Mamquam operations will remain under 9 MW until freshet flow from melting snow (not rainfall) guarantees uninterrupted operation well above the rough zone (25 MW minimum).

Since our meeting at Mamquam on April 6, the corrective actions that were provided in the letter dated April 8, 2011 are progressing.

1. The river level gauges have been installed.
2. The communication cable has been installed.
3. The PLC cards, which connect the river level gauges, have been ordered; unfortunately, we do not have an estimated time of delivery for these PLC cards.
4. Mamquam runner installation is progressing, however, due to some unforeseen delays and issues in re-assembling the unit, the expected target date for the runner installation to be completed is May 7. A draft commissioning procedure has been developed and Ecofish is currently reviewing this procedure.

5. Mamquam operations dropped through the rough zone on April 7, 2011; no stranded fish were found. The memo provided from Ecofish for this rough zone ramping event is attached.
The following table summarizes the corrective actions, task owner and target date.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed

3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-1. IW.	Marc Nerin.	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	Completed
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	**7-May-11** changed from May 1, 2011
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	31-May-11
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping, vibrations and flow monitoring.	Marc Nering	15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	Completed
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	Completed
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

Please don't hesitate to contact me if you have any questions.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - April 20, 2011

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

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Sent: Thursday, April 21, 2011 8:54 AM
To: Jena Tufts; Busto, Vince
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; fjalewis@ecofishresearch.com
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Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
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From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: April 20, 2011 3:42 PM
To: Busto, Vince; Knight, Francesca
Cc: 'Timothy.Bennett@gov.bc.ca'; 'Stoddard, Erin '; 'Babakaiff, Scott'; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'
Subject: Mamquam Bi-Weekly Update - April 20, 2011

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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Bi-Weekly Update - April 20, 2011
Attachments: Memo to Marc Nering re 7-April 2011 Ramping Rate Monitoring.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: Wednesday, April 20, 2011 3:42 PM
To: 'Busto, Vince'; 'Knight, Francesca'
Cc: Bennett, Timothy A FLNR:EX; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'fjalewis@ecofishresearch.com'
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Please don't hesitate to contact me if you have any questions.

Best Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


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ECOFISH RESEARCH

MEMORANDUM

TO: Marc Nering
FROM: Elyse MacDonald
DATE: April 18, 2011
FILE: 1071-04.09

RE: Mamquam River Ramping Rate Monitoring

This memo briefly describes the observations made during ramping rate monitoring conducted for Capital Power on the Mamquam River run-of-river hydroelectric project on April 7, 2011. Ramping through the rough zone occurred on April 7 at approximately 21:34 hrs (all times PDT).

Crews were onsite to monitor potential fish stranding after the rough zone ramping event. A hand-based search was conducted at the previously established site downstream of the Highway 99 Bridge (MQM-DSSD02) between 22:45 hrs and 00:15 hrs. An area of 200 m^2 of the stream margin was hand searched for a total of 40 minutes at this site by two people (100 m upstream and downstream of the bridge). No fish were found.

The site downstream of the powerhouse (MQM-DSSD01) was not searched due to safety concerns associated with access after dark.

Stage change was assessed based on recorded stage downstream of the powerhouse (Figure 1). Table 1, below summarizes the stage change and rate of change as a result of ramping down through the rough zone for the April 7, 2011 incident. The largest decline rate occurred at approximately 21:34 –21:56 hrs and was -7.9 cm (64.7 cm to 56.8 cm in 22 min). Discharge at the beginning of the incident was 6.32 cms and 4.53 cms at the end of the incident.

This rough zone incident was minimized as operations continued at 14 MW until it was clear stage increases due to snow melt or forecast rain would not be realized and generation was required to be reduced to 9 MW.

ECOFISH RESEARCH

Figure 1. Water levels recorded at MQM-DSLG01 during the ramping event on March 20, 2011.

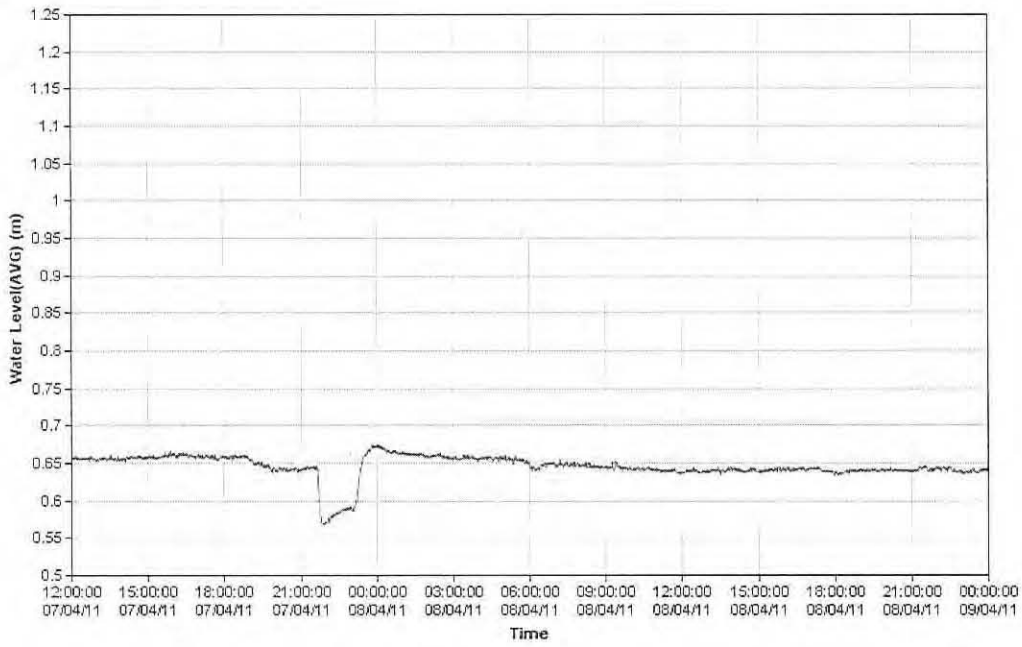

Table 1. Summary of stage change, incident duration, and rate of change on April 7, 2011.

Logger	Date, Incident Start Time (mins)	Date, Incident End Time (mins)	Event Duration (mins)	Stage Start (m)	Stage End (m)	Total Stage Change (cm)*	Avg. Rate of Stage Change (cm/hr)*	Discharge Start (cms)	Discharge End (cms)
MQM-DSLG01	April 7, 21:34	April 7, 21:56	22	0.647	0.568	-7.9	-21.55	6.32	4.53

* Negative number indicates stage decrease

ECOFISH RESEARCH

Yours truly,

Ecofish Research Ltd.

signed

Elyse MacDonald, M.Sc., R.P.Bio., CPESC

Environmental Biologist, Project Manager

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: HADD's and fish kills (RE: Mamquam rough zone ramping memo for April 15, 2011)

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: Tuesday, April 19, 2011 2:33 PM
To: Marc Nering; Knight, Francesca; Bennett, Timothy A FLNR:EX
Cc: Jena Tufts; Michael Smith; Rudy Barrett; emacdonald@ecofishresearch.com; Clark, John
Subject: HADD's and fish kills (RE: Mamquam rough zone ramping memo for April 15, 2011)

Marc

Thank you for the draft report.

I have read through the draft and stand by the comments presented by DFO to Capital Power in the e-mail we sent yesterday afternoon. The plant must be operated in a manner that does not harmfully alter, disrupt or destroy (HADD) fish habitat, or kill fill. Operation of the plant that results in a HADD or kills fish, that is not specifically permitted through a Fisheries Act Authorization provided to Capital Power, is a contravention of the Fisheries Act. DFO provided two suggestions as that may allow Capital Power to operate without contravening sections 35 and/or 32 of the Fisheries Act. As you recall, those suggestions were:

1. operating below 9 MW during times of the year when fry are present (such as in the fall for newly emerged steelhead and during the late winter-early spring for other species of anadromous salmonids); or

2. operating with a higher IFR ("riparian flow release" from the intake) such that ramping effects will not adversely impact fry.

DFO expects that Capital Power will investigate, without delay, which of the two suggestions would allow the plant to maintain acceptable ramping rates downstream of the plant, or sufficient flow such that plant operation impacts to fry and juvenile fish are mitigated.

As far as the draft report by Ecofish is concerned, it would be useful to know what he flows were within the diversion reach and downstream of the power plant during the incident of April 15, 2011.

I look forward to continuing our further discussion and resolution of this matter.

Vince Busto, B.A.Sc., P.Eng.
Habitat and Hydrotechnical Engineer | Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch | Protection et mise en valeur des habitats
Lower Fraser River | Le bas Fraser
Fisheries and Oceans Canada | Pêches et Océans Canada
100 Annacis Parkway, Unit 3 | 100 Annacis Parkway, Unit 3

Delta, BC V3M 6A2 | Delta (C.-B.) V3M 6A2
Government of Canada | Gouvernement du Cana

Telephone/Téléphone 604-666-8281
Facsimile / Télécopieur 604-666-6627

Pacific Region 'Working Near Water' website

http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: April 19, 2011 6:11 AM
To: Busto, Vince; Knight, Francesca; 'Timothy.Bennett@gov.bc.ca'
Cc: Jena Tufts; Michael Smith; Rudy Barrett
Subject: FW: Mamquam rough zone ramping memo for April 15, 2011

Vince/Francesca,

Please see attached for Ecofish report on April 11 ramping.

Marc

From: Elyse MacDonald [mailto:emacdonald@ecofishresearch.com]
Sent: Monday, April 18, 2011 3:38 PM
To: Marc Nering; Jena Tufts
Subject: Mamquam rough zone ramping memo for April 15, 2011

Good afternoon,
Attached please find the rough zone ramping memo for the event last Friday. As mentioned to Marc by phone on Friday night, we found stranded fish. Two stranded fish were found at the site closest to the powerhouse and 8 fish were found at the highway bridge, however 3 of these fish were found alive and returned to the Mamquam River. In total, 7 dead fish were found.

Please see the attached memo for more description of the event.

Please let me know if you have any questions.

Regards,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

Ecofish Research Ltd.

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F-450 8th Street, **Courtenay, BC**, V9N 1N5

Voice: 250 334-3042; Fax: 250 897-17 '2

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam rough zone ramping memo for April 15, 2011
Attachments: Memo to Marc Nering re 15-Apr-11 Ramping Rate Monitoring.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: Tuesday, April 19, 2011 6:11 AM
To: Busto, Vince; 'Knight, Francesca'; Bennett, Timothy A FLNR:EX
Cc: Jena Tufts; Michael Smith; Rudy Barrett
Subject: FW: Mamquam rough zone ramping memo for April 15, 2011

Vince/Francesca,

Please see attached for Ecofish report on April 11 ramping.

Marc

From: Elyse MacDonald [mailto:emacdonald@ecofishresearch.com]
Sent: Monday, April 18, 2011 3:38 PM
To: Marc Nering; Jena Tufts
Subject: Mamquam rough zone ramping memo for April 15, 2011

Good afternoon,
Attached please find the rough zone ramping memo for the event last Friday. As mentioned to Marc by phone on Friday night, we found stranded fish. Two stranded fish were found at the site closest to the powerhouse and 8 fish were found at the highway bridge, however 3 of these fish were found alive and returned to the Mamquam River. In total, 7 dead fish were found.

Please see the attached memo for more description of the event.

Please let me know if you have any questions.

Regards,

Elyse MacDonald, B.Sc., R.P.Bio., CPESC
Environmental Biologist, Project Manager

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MEMORANDUM

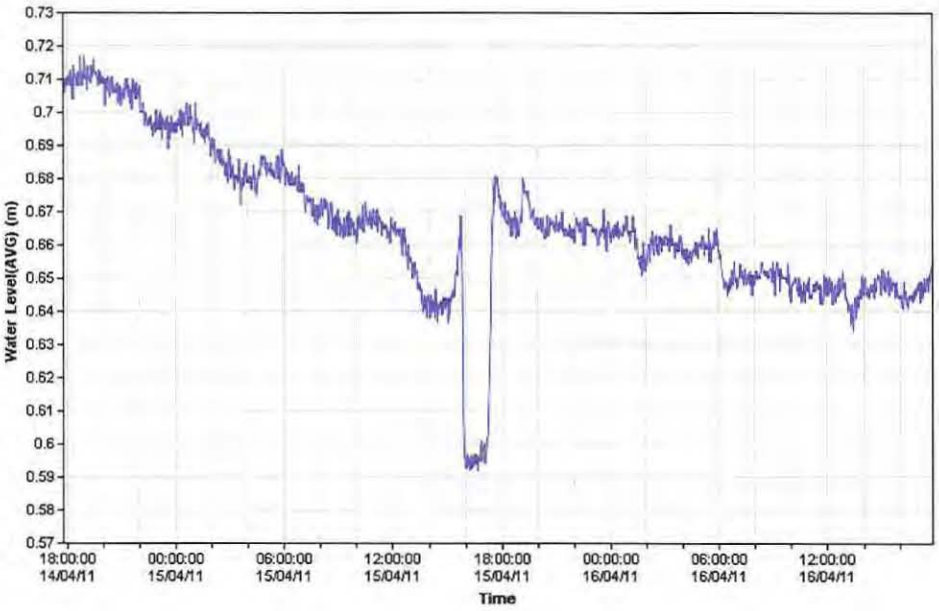
TO: Marc Nering
FROM: Elyse MacDonald
DATE: April 18, 2011
FILE: 1071-04.09

RE: Mamquam River Ramping Rate Monitoring

This memo describes the observations made during ramping rate monitoring conducted for Capital Power on the Mamquam River run-of-river hydroelectric project. Ramping through the rough zone occurred in the evening of April 15. The plant was held at 15MW for as long as possible, and then ramped at a rate to effect 2.5 cm/hr at the downstream permanent gauge (MQM-DSLG01) until generation was 14 MW. At approximately 16:00 hrs, the plant quickly ramped through the rough zone to 9 MW.

Crews were onsite to monitor fish stranding during the event. Broad-based and 'hot spot' searches for stranded fish were conducted at the most upstream site (MQM-DSSD01), ~585 m downstream of the tailrace, first, arriving at 16:50 hrs. A total of 100 m^2 was searched in 70 min. Crews then moved to the furthest downstream site, MQM - DSDS02 ~5.1 km downstream of the tailrace, and arrived at 18:08 hrs. 80 m^2 was searched in 60 min.

The downstream, permanent gauge (MQM-DSLG01) recorded the events:



Stage change was assessed based on recorded stage at MQM-DSLG01. Stage at 15:00 hrs was 0.642 m. The stage rose to 0.669 m at 15:46, before ramping down through the rough zone. Ramping through the rough zone occurred between 15:46 – 17:06 hrs with a total stage decrease of 10.5 cm, however, given the preceding rise in stage between 15:00 – 15:46 hrs, the total stage decrease from 15:00 hrs to 17:06 hrs was 4.8 cm. Stage returned to pre-ramping levels, 0.669 m, by 18:04 hrs.

Table 1, below summarizes the stage change and rate of change as a resulting of the stage increase prior to the rough zone ramping, ramping down through the rough zone, and the return to pre-ramping stage. The total stage change and rate of change is also calculated for the overall rate between 15:00 – 17:06 hrs, as it is unlikely fish would move into marginal area in the 46 min of stage increase prior to rough zone ramping. All rates are estimates based on 2 minute interval gauge data.

Table 1. Summary of stage change, incident duration, and rate of change during ramping April 15, 2011

Date, Incident Start Time (hrs)	Date, Incident End Time (hrs)	Stage Start (m)	Stage End (m)	Total Stage Change (m)*	Duration of Stage Change (hr)	Rate of Stage Change (m/hr)*
Apr.15, 15:00	Apr.15, 15:46	0.642	0.669	0.027	0.767	0.035
Apr.15, 15:46	Apr.15, 17:06	0.699	0.594	-0.105	1.333	-0.079
Apr.15, 17:06	Apr.15, 18:04	0.594	0.669	0.075	0.967	0.078
Apr.15, 15:00	Apr.15, 17:06	0.642	0.594	-0.048	2.100	-0.023

* negative numbers indicate stage decrease

Water temperature was approximately 4.0 °C during the evening in the Mamquam River. At MQM-DSSD01, two stranded salmonids (Figure 1) were found (60 mm and 40 mm fork length) in the area that had dewatered (Figure 2) while crews were onsite and had observed decreasing stage change. At MQM-DSSD02, crews found a total of 8 stranded fry, 3 of which were salvaged and returned to the river alive (Figure 3 and Figure 4). Crews searched in marginal habitat where substrate was wet, indicating the dried area due to ramping (Figure 5).

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Figure 1. **Stranded salmonid fish found at MQM-DSSD01.**

Figure 2. **Red arrow indicates area of observed dried habitat where stranded salmonids fish were found at MQM-DSSD01.**

Figure 3. Stranded salmonid fish found at MQM-DSSD02.

Figure 4. Stranded salmonid mortalities found at MQM-DSSD02.

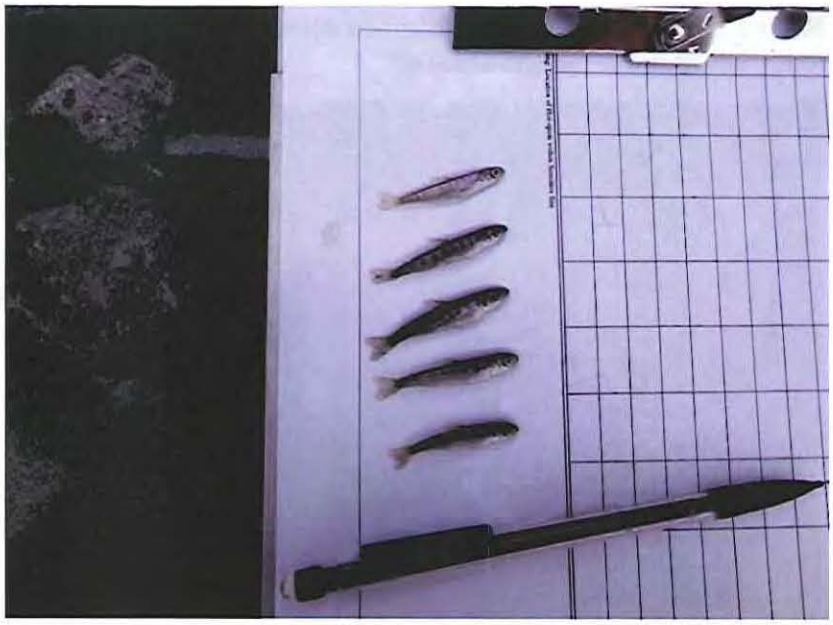

Figure 5. **Red arrow indicates area of observed dried habitat where stranded fish were found at MQM-DSSD02.**

We recommend that Ministry of Environment and Ministry of Natural Resource Operations as well as Fisheries and Oceans Canada be notified of this stranding event as soon as possible.

Yours truly,

Ecofish Research Ltd.

signed

Elyse MacDonald, B.Sc., R.P.Bio., CPESC

Project Manager, Environmental Biologist

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: DFO response - RE: Mamquam Rough Zone Ramping Strands Fry

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: Monday, April 18, 2011 3:32 PM
To: Marc Nering
Cc: Rudy Barrett; Michael Smith; Jena Tufts; Knight, Francesca; Bennett, Timothy A FLNR:EX
Subject: DFO response - RE: Mamquam Rough Zone Ramping Strands Fry

Thank you for the update, Marc. Please submit Ecofish's ramping report as soon as possible.

DFO's expectation in the absence of a Fisheries Act authorization is that the plant is operated in a manner that does not adversely effect fish or fish habitat. In keeping with the intent of our previous letter RE: ramping rate concerns, DFO expects that Capital Power will operate in a manner that avoids stranding and /or killing of fish, especially at times of the year when fry are present. In DFO's opinion, Capital Power may best avoid stranding and/or killing of fish at this time by:

1. operating below 9 MW during times of the year when fry are present (such as in the fall for newly emerged steelhead and during the late winter-early spring for other species of anadromous salmonids); or

2. operating with a higher IFR ("riparian flow release" from the intake) such that ramping effects will not adversely impact fry.

regards,
Francesca Knight
Vince Busto

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Vince Busto, B.A.Sc., P.Eng
Habitat and Hydrotechnical Engineer | Ingénieur de l'habitat et de l'hydrotechnique
Habitat and Enhancement Branch | Protection et mise en valeur des habitats
Lower Fraser River | Le bas Fraser
Fisheries and Oceans Canada | Pêches et Océans Canada
100 Annacis Parkway, Unit 3 | 100 Annacis Parkway, Unit 3
Delta, BC V3M 6A2 | Delta (C.-B.) V3M 6A2
Government of Canada | Gouvernement du Canada

Telephone/Téléphone 604-666-8281
Facsimile / Télécopieur 604-666-6627

Pacific Region 'Working Near Water' website

http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Marc Nering [mailto:mnering@capitalpower.com]
Sent: April 17, 2011 9:49 PM
To: Busto, Vince; Knight, Francesca; 'Timothy.Bennett@gov.bc.ca'
Cc: Rudy Barrett; Michael Smith; Jena Tufts
Subject: FW: Mamquam Rough Zone Ramping Strands Fry

On April 15 at 16:30, Mamquam operations ramped G1 down through the rough zone due to falling river levels. A very circumspect ramping procedure was followed, and Ecofish was notified and had personnel standing by in the river channel at the 2 stranding hot spots prior to ramping . I received verbal notification late Friday night from Ecofish that 2 fry in the upstream location, and 8 fry by the highway bridge location were stranded and killed. I have not yet received a written report from Ecofish with analysis confirming that the Mamquam plant is responsible.

The ramp procedure submitted to DFO was to ramp from 16MW down to 9MW. Trying to improve on that, when river levels dropped plant output to 16MW, operations ramped down to 14MW at the allowable ramping rate of 2.5cm/hour level change using the PLC programming installed earlier this year. Once the unit stabilized at 14MW, operations waited for spill to occur over the intake weirs, and flow down to the powerhouse. This took almost two hours.

When the spill was confirmed reaching the powerhouse, the unit was then rapidly ramped from 14MW down to 9MW to avoid damage to the turbine. To improve on this by further narrowing the rough zone could damage the turbine. A similar ramp through the rough zone 1 week ago stranded no fish/fry.

At this point in time there were no other options available to the plant but to drop through the rough zone due to falling river levels. Continuous operation below 14MW in power range could damage the turbine, as vibration levels peaked at maximum operable levels at 14MW (120 micrometers displacement).

Engineering is evaluating reprogramming the PRV (bypass valve) to open during rough zone ramping, but that has not been completed yet. In addition, G2's new runner which is expected to have a narrower rough zone, has not been commissioned yet, and has exceeded the project scheduled completion date due to a number of issues. Commissioning is expected to start April 26.

Additionally, river flows are significantly lower than normal for this time of the year due to unseasonably cold weather for the area. Typically rough zone ramping doesn't occur beyond early April due to higher flows from snow melt. We received fresh snow in the higher elevations April 14 and freezing temperatures overnight, causing the reduction in river flows.

Marc Nering

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:34 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Rough Zone Ramping Strands Fry

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

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Sent: Sunday, April 17, 2011 9:49 PM
To: Busto, Vince; 'Knight, Francesca'; Bennett, Timothy A FLNR:EX
Cc: Rudy Barrett; Michael Smith; Jena Tufts
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Sent: Sunday, April 17, 2011 9:49 PM
To: Busto, Vince; 'Knight, Francesca'; Bennett, Timothy A FLNR:EX
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Marc Nering

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Rough Zone Monitoring - Diversion Reach
Attachments: Ecofish - Mamquam Diversion Reach Rough Zone Monitoring Opinion.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Adam Lewis [mailto:fjalewis@ecofishresearch.com]
Sent: Friday, April 15, 2011 7:38 PM
To: 'Jena Tufts'; 'Knight, Francesca'; 'Busto, Vince'
Cc: 'Michael Smith'; 'Marc Nering'; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; 'Elyse MacDonald'
Subject: RE: Mamquam Rough Zone Monitoring - Diversion Reach

Hello:

Further to a request made by DFO regarding the rationale for not monitoring rough zone events in the diversion reach of the lower Mamquam Hydroelectric project, attached please find our opinion on this issue.

Regards, Adam

FJ Adam Lewis, M.Sc. R.P.Bio.
Principal, Senior Biologist

Ecofish Research Ltd.

fjalewis@ecofishresearch.com
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April 15, 2011

Reference: 1071-04.09

Capital Power Corporation
P.O. Box 5383
Squamish, B.C.
V8B 0C2

Attention: Jena Tufts and Marc Nering

Dear Sir/Madam:

Re: Lower Mamquam Hydroelectric Project Diversion Rough Zone Ramping Monitoring

Capital Power Corp. (CPC) has retained Ecofish Research Ltd. (Ecofish) to assess rough zone ramping issues at the Lower Mamquam Hydroelectric Project (the Project) in the diversion reach, downstream of the intake, and upstream of the tailrace. Fisheries and Oceans Canada (DFO) requires a letter documenting knowledge of stranding events in the diversion reach, specifically explaining difficulties associated with monitoring risk (i.e., safety issues of night-time access for rough zone events) and risk to fish due to rough zone ramping.

Ecofish has completed ramping monitoring downstream of the tailrace for numerous events and has collected fish abundance data for the upstream, diversion, and downstream areas of the Project. One rough zone ramping event was monitored in the diversion reach. Background information regarding diversion reach fish abundance, fish habitat, and previous ramping monitoring is presented in Lewis *et al.* (2011).

The diversion reach is located above a 20 m falls, which is an impassible migratory barrier for anadromous fish. Baseline sampling detected Dolly Varden sub-adults, but no fry and no rainbow trout, thus the diversion reach originally lacked the life stages expected to be sensitive to ramping. However, sampling during 2010 detected rainbow trout fry in the diversion reach, as summarized in Lewis *et al.* (2011).

On October 22, 2010, Ecofish crews were conducting fish sampling in the diversion reach and a rough zone start up event occurred, causing a rapid stage decrease in the diversion. Crews searched for stranded or isolated fish in the four electrofishing sample sites following the ramping event. There are only two possible routes into the canyon that don't require rappelling, and limited access to the canyon at its upstream and downstream ends. Once crews had accessed the monitoring sites, the rough zone event was complete and discharge was constant.

The field crew performed searches by hand and visually searched a broad area of 240 m^2 at MQM-DVEF01 and MQM-DVEF02 for approximately 60 minutes. During this time, crew turned over rocks and looked for hotspots, although neither potential stranding areas nor hotspots were identified due to the channelized morphology and lack of gravel. No stranded or isolated fish were observed. Closed site electrofishing was completed at all four sites (MQM-DVEF01-04) and photos of all sites are included in Appendix A. Data from the permanent gauge (MQM-DVLG02) located slightly upstream of the powerhouse were used to calculate total stage change, maximum stage change rate, and average stage change, which is presented in Table 1. Plots of the rate of stage change in the lower diversion at MQM-DVLG02 and of discharge at the downstream gauge (MQM-DSLG01, stage-discharge curve has not yet been developed for MQM-DVLG02) are provided in Figure 1 and Figure 2, respectively.

Table 2 provides a summary of the monitoring sites searched on October 22, 2010. Also provided in the table are the fish species and life stages known to be present at the monitoring sites.

Table 1. Total stage change, maximum stage change rate, and average stage change rate observed at MQM-DVLG02 during the rough zone start up event on October 22, 2010.

Start Time	End Time	Duration (min)	Stage Start (cm)	Stage End (cm)	Stage Change		
					Total (cm)	Max Rate (cm/hr)	Average (cm/hr)
7:00	10:15	195.0	101.4	55.0	-46.40	-34.30	-14.28

Figure 1. **Plot of rate of stage change recorded at MQM-DVLG02 during the rough zone start up event on October 22, 2010.**

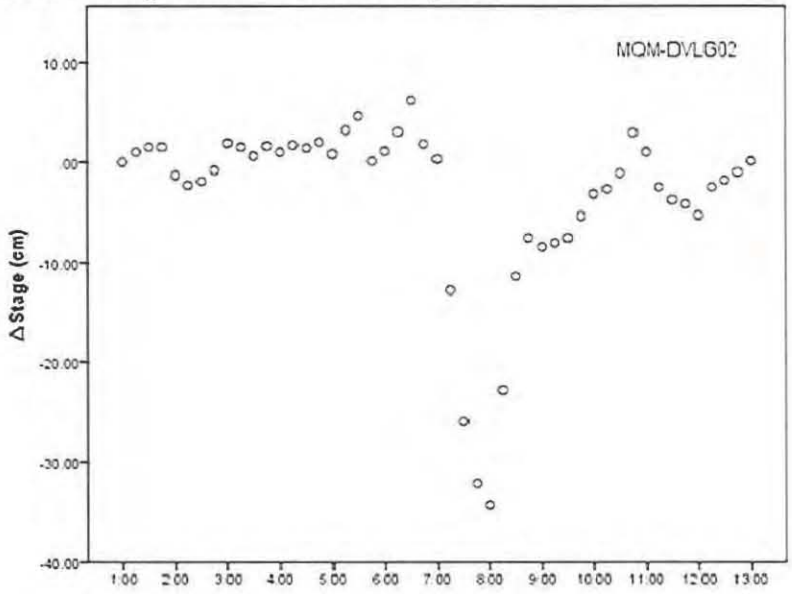

Figure 2. **Plot of discharge recorded at MQM-DSLG01 and operational flow (flow diverted through the penstock to the powerhouse) during the rough zone start up event on October 22, 2010.**

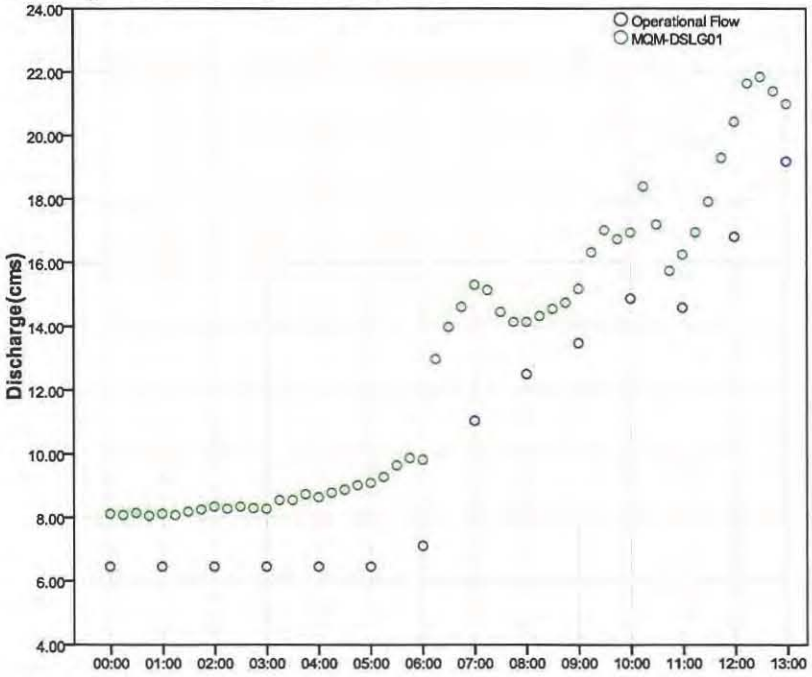

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Table 2. Summary of monitoring sites, broad based search time, hot spot search time and area, fish species and life stages known to be present at the sites.

Monitoring Site	Broadbased Search* (sec)	Hot Spot Search		Fish Presence	
		Time (Min)	Area (m^2)	Species	Life Stage
MQM-DVEF01	1891	30	120	RT	Fry
				DV	Parr 1+
MQM-DVEF02	1836	30	120	RT	Fry
				DV	N/a
MQM-DVEF03	1000	0	0	RT	Fry, Parr 1+
				DV	Fry
MQM-DVEF04	2464	0	0	RT	Fry
				DV	Fry, Parr 2+

' - ' No searching conducted RT= Rainbow Trout DV = Dolly Varden

*time represents total electrofishing seconds as a measure of level of effort

Conclusion

The Project's rough zone is a concern during both startup and shutdown events. To date, rough zone monitoring has concentrated on shutdown events due to the stranding risk and observed stranding in the downstream reach, which is anadromous salmon spawning habitat. The Project's diversion reach is difficult to access, and access poses a significant safety concern, particularly during winter, when ice and snow cover felled trees and safe footing is not always available. Under circumstances when rough zone monitoring must be conducted at night, access to the diversion reach under any conditions is also deemed to be unsafe.

Given that baseline fish sampling showed that the diversion reach did not support fry, the diversion reach was assumed to have a low risk of significant mortality from stranding. The presence of fry during operational monitoring suggests that the channel is now suitable for this life stage, however, the channelized morphology lacks significant amounts of habitat that typically pose a risk to stranding. During the October 22, 2010 event, rainbow trout fry were confirmed present at the monitoring sites, but none were found to be stranded or isolated during the broad based or hot spot searches. Given these observations, the risk to fish stranding in the diversion reach is low.

The difficulty in accessing the diversion reach and the requirement to do so during winter or at night during any season creates unsafe conditions. The combination of the low risk of stranding and safety issues leads us to recommend no monitoring of rough zone events in the diversion reach. However, if future ramping tests are conducted, diversion reach monitoring may be included, as these can be timed during daylight conditions and ice/snow-free conditions, when safe access can be assured.

Yours truly,
Ecofish Research Ltd.

Adam Lewis, M.Sc., R.P.Bio.
Fisheries Biologist/Principal

Elyse MacDonald
Biologist/Project Manager
B.Sc., R.P.Bio.

ECOFISH RESEARCH

References

Lewis, A., K. Ganshorn, A. O'Toole, A. Newbury, D. Lacroix, and L. Walker. 2011. Lower Mamquam Hydroelectric Project: Interim Monitoring Report – Year 1. Consultant's report prepared for Capital Power Corporation by Ecofish Research Ltd, March 31, 2011.

Lewis, A. and A.J. Harwood. 2009. Operational Environmental Aquatic Monitoring Guidelines for New and Upgraded Hydroelectric Projects, Draft V3. Consultant's report prepared for DFO.

Triton Environmental Consultants Ltd. 1992. Mamquam River hydroelectric impact assessment. Prepared by A.F. Lewis, P.S. Higgins, A.C. Mitchell, and B.T. Guy for Northern Utilities Inc.

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Appendix A

Figure 1. Photo of the diversion reach rough zone ramping monitoring site MQM-DVEF01, October 22, 2010.

Figure 2. Photo of the diversion reach rough zone ramping monitoring site MQM-DVEF02, October 22, 2010.

Figure 3. **Photo of the diversion reach rough zone ramping monitoring site MQM-DVEF03, October 22, 2010.**

Figure 4. **Photo of the diversion reach rough zone ramping monitoring site MQM-DVEF04, October 22, 2010.**

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Corrective Action Plan

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, April 12, 2011 4:05 PM
To: Jena Tufts; Busto, Vince
Cc: Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; Bennett, Timothy A FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Adam Lewis
Subject: RE: Mamquam Corrective Action Plan

Hi Jena,
thank you for your attention to this matter. As I mentioned in my previous email, I believe that the preparation of this commissioning procedure will go easier if Ecofish is involved in its preparation.
regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: April 12, 2011 11:29 AM
To: Knight, Francesca; Busto, Vince
Cc: Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'Timothy.Bennett@gov.bc.ca'; 'Babakaiff, Scott'; 'Stoddard, Erin '; 'Adam Lewis'
Subject: RE: Mamquam Corrective Action Plan

Hello Francesca,

I will work with Marc to create a commissioning procedure for the G2 startup. The role of the environmental monitor during commissioning will also be addressed. I will send this project plan along once completed.

Regards,
Jena

Jena Tufts, M.Sc., E.I.T.
Environmental Associate
Environment, Health and Safety
Capital Power Corporation
(780) 392-5522 | jtufts@capitalpower.com


Please consider the environment before printing this e-mail

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, April 11, 2011 3:47 PM
To: Jena Tufts; Busto, Vince
Cc: Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; Timothy.Bennett@gov.bc.ca; Babakaiff, Scott; Stoddard, Erin ; Adam Lewis
Subject: RE: Mamquam Corrective Action Plan

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From: Jena Tufts [mailto:jtufts@capitalpower.com]
Sent: April 11, 2011 2:13 PM
To: Busto, Vince; Knight, Francesca
Cc: Michael Smith; Marc Nering; Rudy Barrett; Robert Brassard; 'Timothy.Bennett@gov.bc.ca'; 'Babakaiff, Scott'; 'Stoddard, Erin '; 'Adam Lewis'
Subject: Mamquam Corrective Action Plan

Good Afternoon Vince and Francesca,

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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Corrective Action Plan

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

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To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Corrective Action Plan

Please print and file under water file 2000966.

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Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

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'Stoddard, Erin '; 'Adam Lewis'
Subject: Mamquam Corrective Act... Plan

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I will be providing a bi-weekly update on the progress and challenges that we may experience during the implementation of these corrective actions.

Please do not hesitate to contact me if you have any questions or concerns.

Best Regards,
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(780) 392-5522 | jtufts@capitalpower.com


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Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Mamquam Corrective Action Plan
Attachments: Mamquam Corrective Action Response Letter 8-Apr-2011.pdf

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
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Capital Power Corporation
8th Floor, 10065 Jasper Avenue
Edmonton, AB T5J 3B1
www.capitalpower.com

Capital Power Corporation

April 8, 2011

Mr. Vince Busto
Fisheries and Oceans Canada
Unit #3 – 100 Annacis Parkway
Delta, BC V3M 6A2

Ms. Francesca Knight
Fisheries and Oceans Canada
Unit #3 – 100 Annacis Parkway
Delta, BC V3M 6A2

Dear Mr. Busto and Ms. Knight:

RE: Ramping Rate Concerns, Lower Mamquam IPP, Squamish

Thank you for meeting with us at our Mamquam generating station on Wednesday, April 6, 2011. I would like to emphasize that CPC is taking the incident that occurred on March 21, 2011 very seriously. CPC has completed an internal investigation of the incident and have determined the following corrective actions and associated target dates necessary to address our concerns regarding ramping and fish stranding.

	Corrective Action	Task Owner	Target Date
1	Update manual control procedure to prevent future re-occurrence of plant ramping up through rough zone, flows not able to sustain increased generation and then ramping down through rough zone.	Marc Nering	Completed
2	CPC to provide Fisheries and Oceans and the B.C. Ministry of Environment the corrective action schedule that was developed to mitigate ramping and fish stranding concerns.	Michael Smith	Completed
3	CPC to confirm viability of reducing the rough zone ramping range from 9-16 MW to 9-15 MW.	Marc Nering	Completed
4	CPC to provide a professional biologist's opinion regarding monitoring in the diversion reach.	Jena Tufts	15-Apr-11
5	A new runner on Unit 2 turbine is currently being installed. This new runner will reduce the rough zone avoidance range that is currently causing high vibrations that are detrimental to the turbine.	Marc Nering	1-May-11
6	Vibration testing of new runner to determine new rough zone avoidance range.	Marc Nering	31-May-11
7	During commissioning of unit 2, determine and provide the relationship between rough zone ramping and flow monitoring.	Marc Nering	15-Jun-11
8	Six new flow/level sensors, 3 below intake to measure spill and 3 below the powerhouse to measure total river flow, will be installed.	Marc Nering	1-Jun-11
9	Cable will be installed to directly connect the river flow gauges to the PLC programming.	Marc Nering	15-Jun-11

Capital Power Corporation

Corrective Action (cont'd)		Task Owner	Target Date
10	PLC programming will be updated to include the live data from the river level gauges.	Marc Nering	30-Jun-11
11	CPC to notify Fisheries and Oceans and the Ministry of Environment of any subsequent rough zone ramping events that occur until the corrective actions have been fully implemented.	Marc Nering	As Required
12	CPC to provide bi-weekly updates on the progress and challenges occurring at Mamquam.	Jena Tufts	Ongoing

As discussed in the April 6, 2011 site visit, CPC will provide bi-weekly updates on the progress of implementing these corrective actions as well as any challenges that we are experiencing that may affect the current target dates.

I look forward to working with you to mitigate the concerns regarding ramping and fish stranding at the Mamquam generating facility. Please don't hesitate to contact me (780-392-5169) or Jena Tufts (780-392-5522) if you have further questions.

Sincerely,

Michael J. Smith
Senior Manager, Environmental Programs & Compliance
Capital Power

cc: Tim Bennett – Ministry of Environment
Scott Babakaiff – Ministry of Environment
Erin Stoddard – Ministry of Environment
Adam Lewis – Ecofish Research Ltd.
Marc Nering – Capital Power
Rudy Barrett – Capital Power
Rob Brassard – Capital Power
Jena Tufts – Capital Power

Ha, Diana ENV:EX

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Lower Mamquam meeting today

Please print and file under water file 2000966.

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Babakaiff, Scott C FLNR:EX
Sent: Thursday, April 7, 2011 7:33 AM
To: Knight, Francesca; Stoddard, Erin M FLNR:EX; Bennett, Timothy A FLNR:EX
Cc: Busto, Vince
Subject: RE: Lower Mamquam meeting today

I'm sure we'll have more chats on this next week, but I reckon it'd be useful to have some certainty regarding Ecofish's onsite involvement & reporting during (and following) the commissioning. s.13, s.17

s.13, s.17

From: Knight, Francesca [Francesca.Knight@dfo-mpo.gc.ca]
Sent: April 6, 2011 6:08 PM
To: Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Bennett, Timothy A FLNR:EX
Cc: Busto, Vince
Subject: Lower Mamquam meeting today

Hi guys, today Vince and I met with folks from Capital Power, and toured the powerhouse.
The tour was very useful, as we were able to see the old turbine parts being changed over to the new. Quite complex in there, no doubt, but I learned a lot.
Our meeting included Marc Nering, as well as Michael Smith (Senior Manager, Environmental Programs and Compliance) and Jena Tufts (Environmental Associate)... Mike and Jena work out of the Edmonton office.
We started by discussing DFO's letter, and while Vince and I acknowledged the efforts that Capital has undertaken at the plant since the fall, we are concerned enough about the rough zone ramping issues to provide our official position, in writing. We also noted that you folks at MFLNRO equally share these concerns. Following that, we discussed a number of items related to the ongoing upgrades to turbine 1 (turbine 2 will be upgraded next year):
1. As I understand it, the intent of the upgrade is to either, a) reduce the size of the rough zone (say from 9-16 MW to more on the order of 9-14 MW, or even less), thereby reducing the severity of the ramping event by reducing the magnitude of stage change OR b) reduce the rough zone entirely. To accomplish this objective the plant is being fitted with a new runner and wicket gates, among other things. Capital is unsure as to exactly what improvements will be gained; commissioning of the new equipment this spring / summer will reveal the gains. As well, Marc was mentioning use of the bypass valve as an aid in rough zone ramping, but he was unsure as to the contribution the bypass valve could make to solving the problem. Similar vibration problems affect the bypass valve, although some retrofits to the bypass valve foundation are already completed. As yet, though, I don't believe the bypass valve has been used to help reduce rough zone ramping.
2. The turbine upgrades will go through a commissioning period (this spring / summer) , including tests of how much the turbine vibrates with the new parts, which will help to determine just how successful the upgrades can be at solving the rough zone problem. As well, the commissioning period will involve evaluating the efficacy of the bypass

valve at assisting in ramping. It is understood that Ecofish will be onsite during these commissioning tests, and providing feedback to the DFO / MFLNRO on how the upgrades function for fish (good, bad, same?).
3. Capital will provide DFO and MFLNRO with updates every 2 weeks through the completion and commissioning of the plant upgrades. Given the time of year, Capital does not expect any additional rough zone ramp events will be required (notwithstanding an unplanned shut down). If ramping through the rough zone is required before upgrades are completed and commissioned, Capital will inform the agencies.
4. I asked some questions about rough zone flow following (plant generation going up and down when operating between the 9 - 16 MW rough zone), and the implications for fish. We can worry about that this fall, if the upgrades prove to be unsuccessful in addressing rough zone problems.
Chessy

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Sent: Wednesday, April 6, 2011 6:09 PM
To: Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Bennett, Timothy A FLNR:EX
Cc: Busto, Vince
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Becker, Judy S ENV:EX

From: Ha, Diana ENV:EX
Sent: Tuesday, September 27, 2011 4:20 PM
To: Becker, Judy S ENV:EX
Subject: FW: Lower Mamquam discharge data
Attachments: 08ga075_sep_dec_2010_15min.xls; 08ga075_prelim_2011_15min.xls

Categories: NEEDS CD

Hi Judy,

Not Responsive

Thanks

Diana

Not Responsive

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Lower Mamquam discharge data

Please print and file under water file 2000966. Report

Thanks!

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Section Head, Water Allocation (South Coast Region)
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10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 Fx. (604) 582-5235

From: Hutchinson,David [PYR] [mailto:David.Hutchinson@ec.gc.ca]
Sent: Wednesday, March 30, 2011 2:57 PM
To: Babakaiff, Scott C ENV:EX; Stuart Hamilton; kevin@aquaticinformatics.com; Naumann,Curt [PYR]; Tassone,Bruno [PYR]
Cc: Knight, Francesca; Busto, Vince; Stoddard, Erin M ENV:EX; Bennett, Timothy A ENV:EX
Subject: RE: Lower Mamquam discharge data

Hi Scott,

Lynne Campo has provided me with 15 minute water level and discharge data for the period September 2010 to present (most recently available since the last technician download). The 2010 data have been approved, however the period from October 1 - 12, 2010 is missing because the technician used override corrections for this period due to a power failure at the station. The period January 1, 2011 to present is preliminary and subject to future revision.

If you have any questions about the data set, please contact Curt Naumann, Area Head, Lower Mainland Hydrometric Operations at (604) 664-9372.

Sincerely,

David Hutchinson
A/Coordinator, Environmental Programs
Water Survey of Canada | Relevés hydrologiques du Canada
Meteorological Service of Canada | Service météorologique du Canada
201 401 Burrard Street | 401, rue Burrard, bureau 201
Vancouver (B.C. | C.-B.) V6C 3S5
David.Hutchinson@ec.gc.ca
telephone | téléphone 604-713-9548
facsimile | télécopieur 604-664-9004

From: Babakaiff, Scott C ENV:EX [mailto:Scott.Babakaiff@gov.bc.ca]
Sent: Wednesday, March 30, 2011 10:09 AM
To: Hutchinson,David [PYR]; 'Stuart Hamilton'; 'kevin@aquaticinformatics.com'
Cc: 'Knight, Francesca'; 'Busto, Vince'; Stoddard, Erin M ENV:EX; Bennett, Timothy A ENV:EX
Subject: Lower Mamquam discharge data

Dave, Stu & Kevin: thanks again for spending some time yesterday afternoon to discuss/review the high-frequency discharge data collected at the WSC Lower Mamquam (above Ring Creek) gauge. Very much appreciated, particularly on such short notice.

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Francesca, Vince & Tim: based on yesterday's cursory review of the high-frequency discharge data collected at the WSC Lower Mamquam (above Ring Creek) gauge, we identified approximately two dozen 'events' since September 2010 that seem likely attributable to ramping incidents at the hydropower facility immediately upstream of the gauge. It is my understanding that Kevin Swersky (cc'd herein) had recently completed analyses of this data, and he may be providing a summary (e.g. number of 'events'; dates & duration of 'events') of this analysis for DFO/MOE.

Scott

Scott Babakaiff, M.Sc. P.Geo.
Fish Hydrologist
Ministry of Natural Resource Operations
South Coast Region
2nd Floor- 10470 152nd Street
Surrey, BC, V3R 0Y3

604-930-7121

Unapproved data - subject to revision

Date Time	Water Lev	Discharge
2011-01-01 0:00	1.8	11.501
2011-01-01 0:15	1.801	11.531
2011-01-01 0:30	1.801	11.522
2011-01-01 0:45	1.801	11.514
2011-01-01 1:00	1.796	11.393
2011-01-01 1:15	1.793	11.313
2011-01-01 1:30	1.788	11.188
2011-01-01 1:45	1.788	11.204
2011-01-01 2:00	1.791	11.277
2011-01-01 2:15	1.791	11.27
2011-01-01 2:30	1.791	11.257
2011-01-01 2:45	1.79	11.245
2011-01-01 3:00	1.79	11.232
2011-01-01 3:15	1.787	11.159
2011-01-01 3:30	1.786	11.15
2011-01-01 3:45	1.786	11.146
2011-01-01 4:00	1.786	11.141
2011-01-01 4:15	1.786	11.137
2011-01-01 4:30	1.786	11.133
2011-01-01 4:45	1.786	11.129
2011-01-01 5:00	1.785	11.124
2011-01-01 5:15	1.785	11.12
2011-01-01 5:30	1.785	11.116
2011-01-01 5:45	1.785	11.111
2011-01-01 6:00	1.785	11.107
2011-01-01 6:15	1.785	11.103
2011-01-01 6:30	1.781	11.007
2011-01-01 6:45	1.782	11.048
2011-01-01 7:00	1.783	11.051
2011-01-01 7:15	1.783	11.051
2011-01-01 7:30	1.783	11.051
2011-01-01 7:45	1.783	11.051
2011-01-01 8:00	1.783	11.051
2011-01-01 8:15	1.783	11.051
2011-01-01 8:30	1.783	11.051
2011-01-01 8:45	1.783	11.051
2011-01-01 9:00	1.779	10.955
2011-01-01 9:15	1.779	10.949
2011-01-01 9:30	1.779	10.949
2011-01-01 9:45	1.779	10.949
2011-01-01 10:00	1.778	10.949
2011-01-01 10:15	1.778	10.949
2011-01-01 10:30	1.778	10.949
2011-01-01 10:45	1.778	10.948
2011-01-01 11:00	1.778	10.948
2011-01-01 11:15	1.778	10.948
2011-01-01 11:30	1.778	10.948
2011-01-01 11:45	1.778	10.948
2011-01-01 12:00	1.778	10.948
2011-01-01 12:15	1.778	10.948

Becker, Judy S ENV:EX

From: Ha, Diana ENV:EX
Sent: Tuesday, September 27, 2011 4:20 PM
To: Becker, Judy S ENV:EX
Subject: FW: Lower Mamquam discharge data
Attachments: 08ga075_sep_dec_2010_15min.xls; 08ga075_prelim_2011_15min.xls

Categories: NEEDS CD

Hi Judy,

Not Responsive

Thanks

Diana

Not Responsive

From: Bennett, Timothy A FLNR:EX
Sent: Tuesday, September 27, 2011 11:35 AM
To: Becker, Judy S ENV:EX
Subject: FW: Lower Mamquam discharge data

Please print and file under water file 2000966. Report

Thanks!

Timothy Bennett, M.Sc., P.Eng.
Section Head, Water Allocation (South Coast Region)
Ministry of Forests, Lands and Natural Resource Operations
10470 - 152 Street, Surrey, BC V3R 0Y3
Ph. (604) 582-5227 *Fx.* (604) 582-5235

From: Hutchinson,David [PYR] [mailto:David.Hutchinson@ec.gc.ca]
Sent: Wednesday, March 30, 2011 2:57 PM
To: Babakaiff, Scott C ENV:EX; Stuart Hamilton; kevin@aquaticinformatics.com; Naumann,Curt [PYR]; Tassone,Bruno [PYR]
Cc: Knight, Francesca; Busto, Vince; Stoddard, Erin M ENV:EX; Bennett, Timothy A ENV:EX
Subject: RE: Lower Mamquam discharge data

Hi Scott,

Lynne Campo has provided me with 15 minute water level and discharge data for the period September 2010 to present (most recently available since the last technician download). The 2010 data have been approved, however the period from October 1 - 12, 2010 is missing because the technician used override corrections for this period due to a power failure at the station. The period January 1, 2011 to present is preliminary and subject to future revision.

If you have any questions about the data set, please contact Curt Naumann, Area Head, Lower Mainland Hydrometric Operations at (604) 664-9372.

Sincerely,

David Hutchinson
A/Coordinator, Environmental Programs
Water Survey of Canada | Relevés hydrologiques du Canada
Meteorological Service of Canada | Service météorologique du Canada
201 401 Burrard Street | 401, rue Burrard, bureau 201
Vancouver (B.C. | C.-B.) V6C 3S5
David.Hutchinson@ec.gc.ca
telephone | téléphone 604-713-9548
facsimile | télécopieur 604-664-9004

From: Babakaiff, Scott C ENV:EX [mailto:Scott.Babakaiff@gov.bc.ca]
Sent: Wednesday, March 30, 2011 10:09 AM
To: Hutchinson,David [PYR]; 'Stuart Hamilton'; 'kevin@aquaticinformatics.com'
Cc: 'Knight, Francesca'; 'Busto, Vince'; Stoddard, Erin M ENV:EX; Bennett, Timothy A ENV:EX
Subject: Lower Mamquam discharge data

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604-930-7121

Date Time	Water Level	Discharge
2010-09-01 0:00	1.828	12.231
2010-09-01 0:15	1.828	12.231
2010-09-01 0:30	1.828	12.231
2010-09-01 0:45	1.825	12.135
2010-09-01 1:00	1.82	12.008
2010-09-01 1:15	1.82	12.011
2010-09-01 1:30	1.82	12.024
2010-09-01 1:45	1.821	12.037
2010-09-01 2:00	1.821	12.05
2010-09-01 2:15	1.827	12.195
2010-09-01 2:30	1.834	12.374
2010-09-01 2:45	1.834	12.381
2010-09-01 3:00	1.834	12.376
2010-09-01 3:15	1.834	12.371
2010-09-01 3:30	1.834	12.366
2010-09-01 3:45	1.833	12.36
2010-09-01 4:00	1.829	12.24
2010-09-01 4:15	1.83	12.279
2010-09-01 4:30	1.835	12.403
2010-09-01 4:45	1.843	12.605
2010-09-01 5:00	1.833	12.353
2010-09-01 5:15	1.83	12.262
2010-09-01 5:30	1.831	12.293
2010-09-01 5:45	1.832	12.332
2010-09-01 6:00	1.844	12.624
2010-09-01 6:15	1.836	12.427
2010-09-01 6:30	1.835	12.396
2010-09-01 6:45	1.834	12.378
2010-09-01 7:00	1.833	12.361
2010-09-01 7:15	1.833	12.348
2010-09-01 7:30	1.832	12.335
2010-09-01 7:45	1.838	12.479
2010-09-01 8:00	1.838	12.489
2010-09-01 8:15	1.846	12.682
2010-09-01 8:30	1.852	12.842
2010-09-01 8:45	1.859	13.024
2010-09-01 9:00	1.852	12.84
2010-09-01 9:15	1.852	12.831
2010-09-01 9:30	1.852	12.836
2010-09-01 9:45	1.852	12.842
2010-09-01 10:00	1.852	12.847
2010-09-01 10:15	1.852	12.852
2010-09-01 10:30	1.853	12.857
2010-09-01 10:45	1.853	12.863
2010-09-01 11:00	1.853	12.868
2010-09-01 11:15	1.853	12.873
2010-09-01 11:30	1.853	12.878
2010-09-01 11:45	1.87	13.304
2010-09-01 12:00	1.857	12.98
2010-09-01 12:15	1.831	12.303

2000966 (R)

ECOFISH RESEARCH

MEMORANDUM

Not Responsive

TO: Marc Nering
FROM: Kevin Ganshorn
DATE: December 21, 2010
FILE: 1071-04.02

RE: Hydrometric Gauge Installation & Data Collection Update for the Lower Mamquam River IPP

1.0 INTRODUCTION

This memo provides a summary of hydrological work conducted for the Lower Mamquam River IPP from September 7, 2010 to the present, including a description of hydrometric gauge locations. Work conducted includes the installation of five hydrometric gauges (downstream of the powerhouse, just upstream of the tailrace, just downstream of the intake, upstream of the intake (above Raffuse Creek), and in Raffuse Creek), direct water level surveys, and discharge measurements. The location of the gauges in the vicinity of the powerhouse is presented in Figure 1, while the location of gauges in the vicinity of the intake is presented in Figure 2.

Sufficient discharge data has been collected to generate preliminary stage-discharge curves for the following gauges: MQM-DSLG01 (downstream of the powerhouse), MQM-DVLG01 (downstream of intake), and MQM-USLG01 (upstream of the intake (above Raffuse Creek)). The stage-discharge curves for these gauges have been uploaded to an online server that stores the data and provides real-time data access. In addition to the discharge measurements already collected, we intend to collect more discharge measurements opportunistically over the coming months to develop an accurate stage-discharge relationship for each of the gauges.

Currently Ecofish receives automatic weekly data reports from the online data server and archives the data on our own server. Data stored on the Ecofish server is backed up daily. We also perform weekly (at a minimum) checks of the condition of the gauges for maintenance purposes.

Ullah, Aman FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 3, 2012 3:07 PM
To: Ullah, Aman FLNR:EX
Subject: FW: Upper Mamquam Incident Today

Aman Ullah

Read, print and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, April 3, 2012 12:00 PM
To: Marc Nering; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX; Matthew Speer; David Hermanson; Charles Wemyss
Subject: RE: Upper Mamquam Incident Today

thanks Marc

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Ecosystems Management Branch
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: April 3, 2012 11:48 AM
To: Knight, Francesca; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; James.Davies@gov.bc.ca; Matthew Speer; David

Hermanson; Charles Wemyss
Subject: RE: Upper Mamquam Incident Today

The first gauge/graph is upstream of our intake (just downstream of Transalta's powerhouse). The second gauge/graph is downstream of our powerhouse.

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, April 03, 2012 11:45 AM
To: Marc Nering; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; James.Davies@gov.bc.ca; Matthew Speer; David Hermanson; Charles Wemyss
Subject: RE: Upper Mamquam Incident Today
Hi Marc, can you tell us what gauge is shown in your figure below... is it the gauge just downstream of the intake?

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
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Pacific Region 'Working Near Water' website
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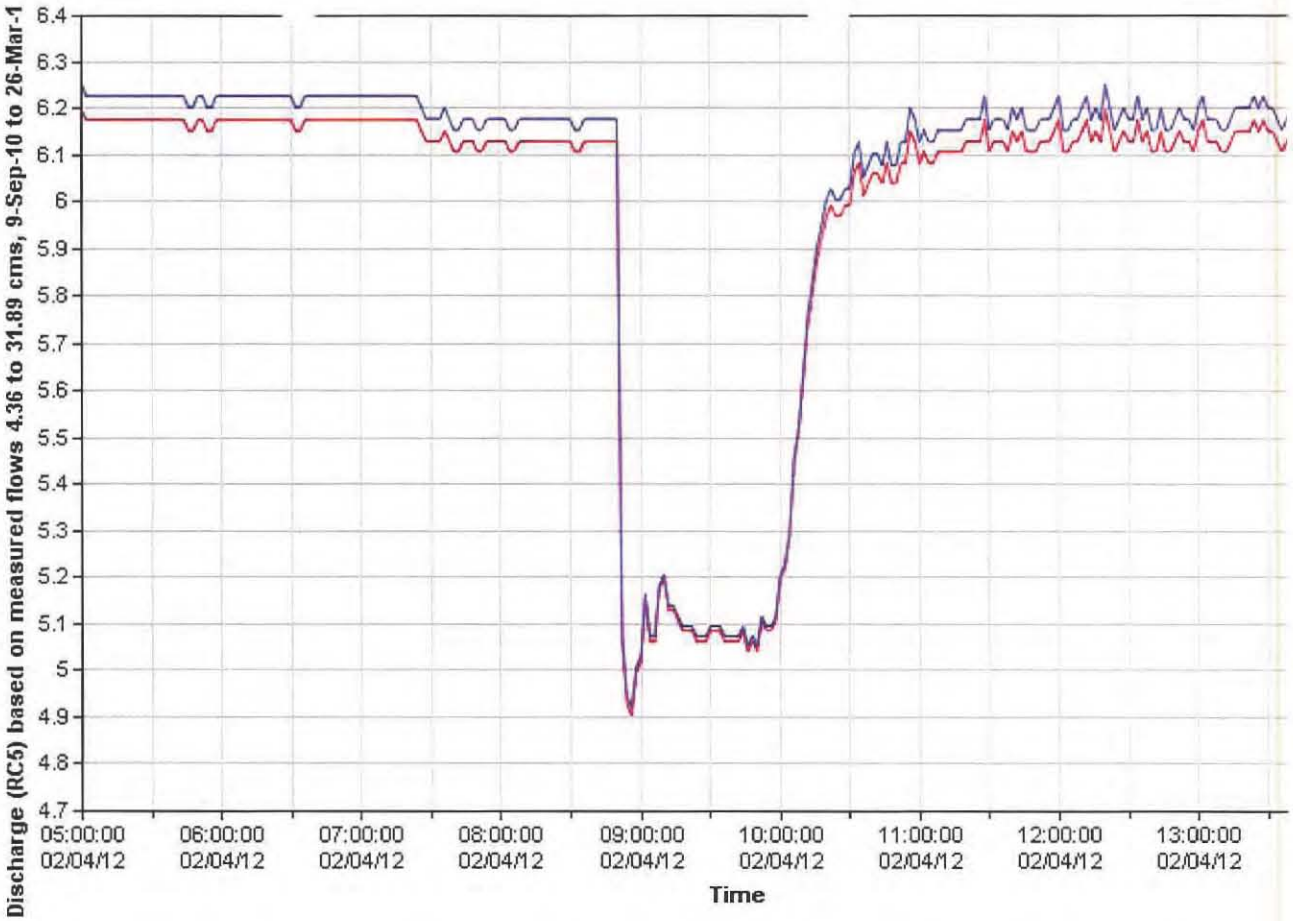
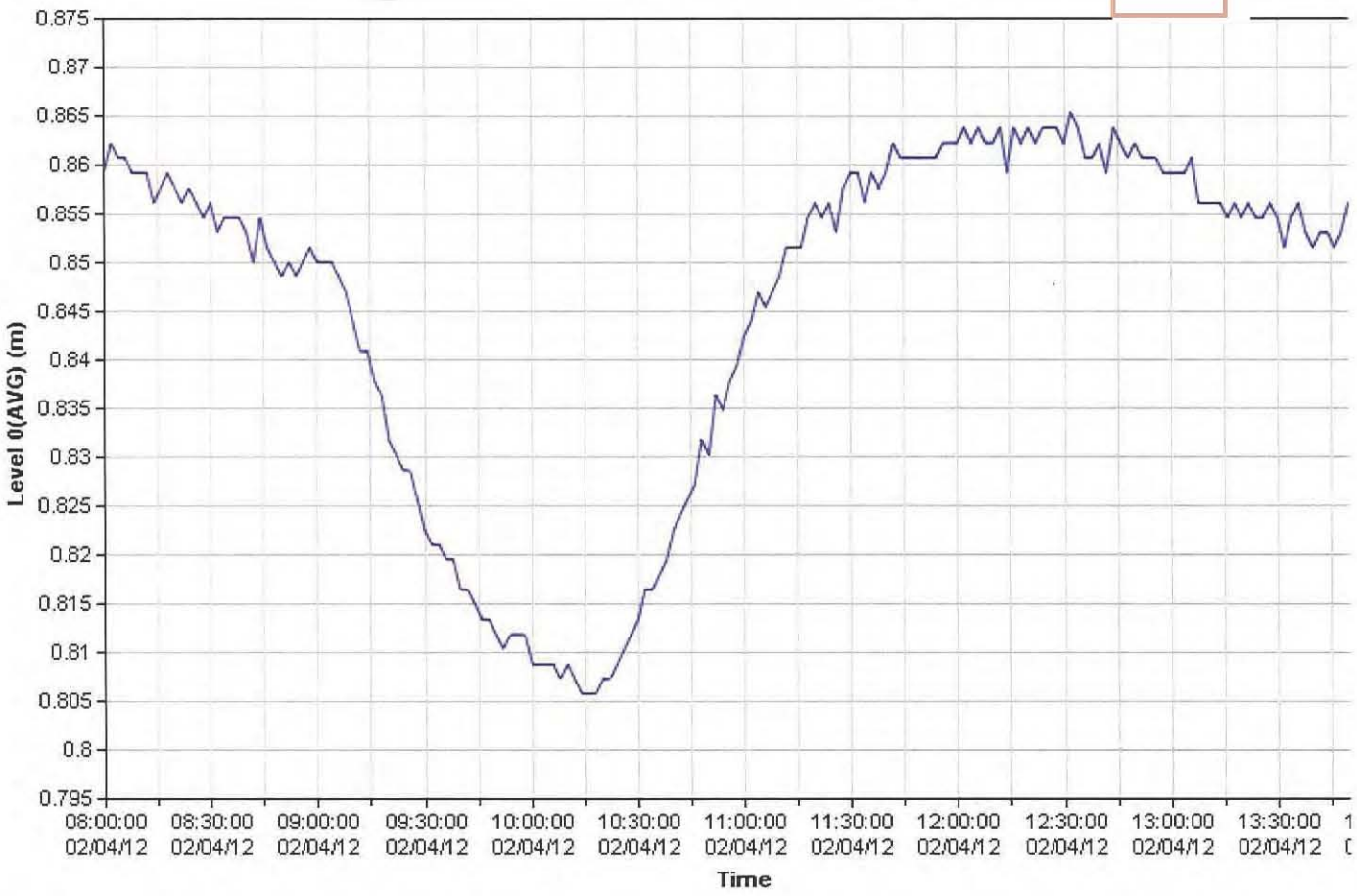
From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: April 2, 2012 3:59 PM
To: Knight, Francesca; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; 'James Davies (James.Davies@gov.bc.ca)'; Matthew Speer; David Hermanson; Charles Wemyss
Subject: Upper Mamquam Incident Today

The upper Mamquam power plant tripped offline today when tree fellers logging in the area dropped a tree across their high voltage transmission lines. When their bypass opened, there was a sharp drop in river flow downstream of their plant of approx 5.5cm for one hour before returning to normal levels.



Lower Mamquam (us) attenuated the incident by drawing down the headpond level while attempting to lower unit output slowly to avoid a sudden drop in river levels. This minimized as best as possible the potential to strand fish downstream of the plant



Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

..ah, Aman FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 3, 2012 3:07 PM
To: Ullah, Aman FLNR:EX
Subject: FW: Upper Mamquam Incident Today

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To: Knight, Francesca; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; 'James Davies (James.Davies@gov.bc.ca)'; Matthew Speer; David Hermanson; Charles Wemyss
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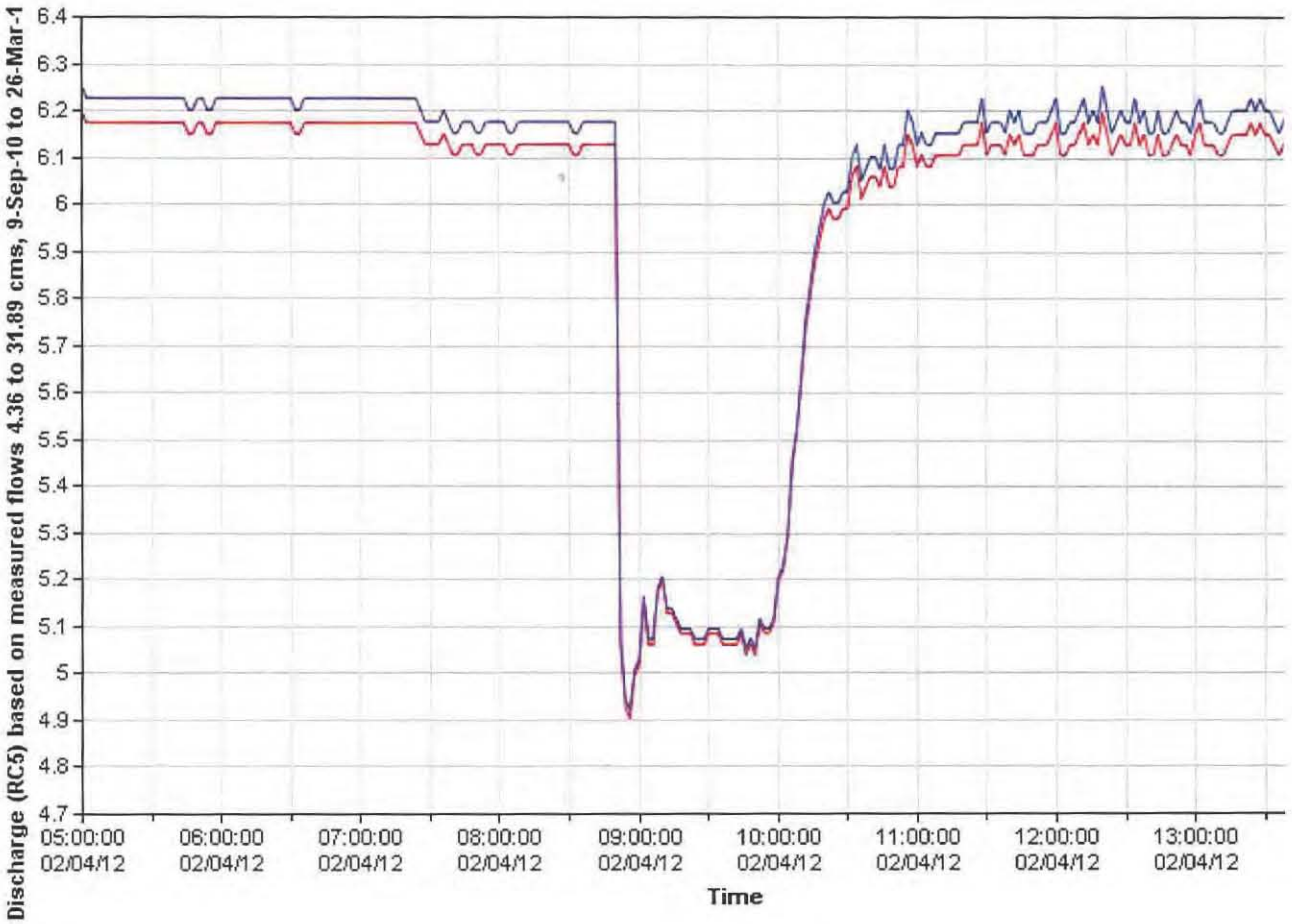

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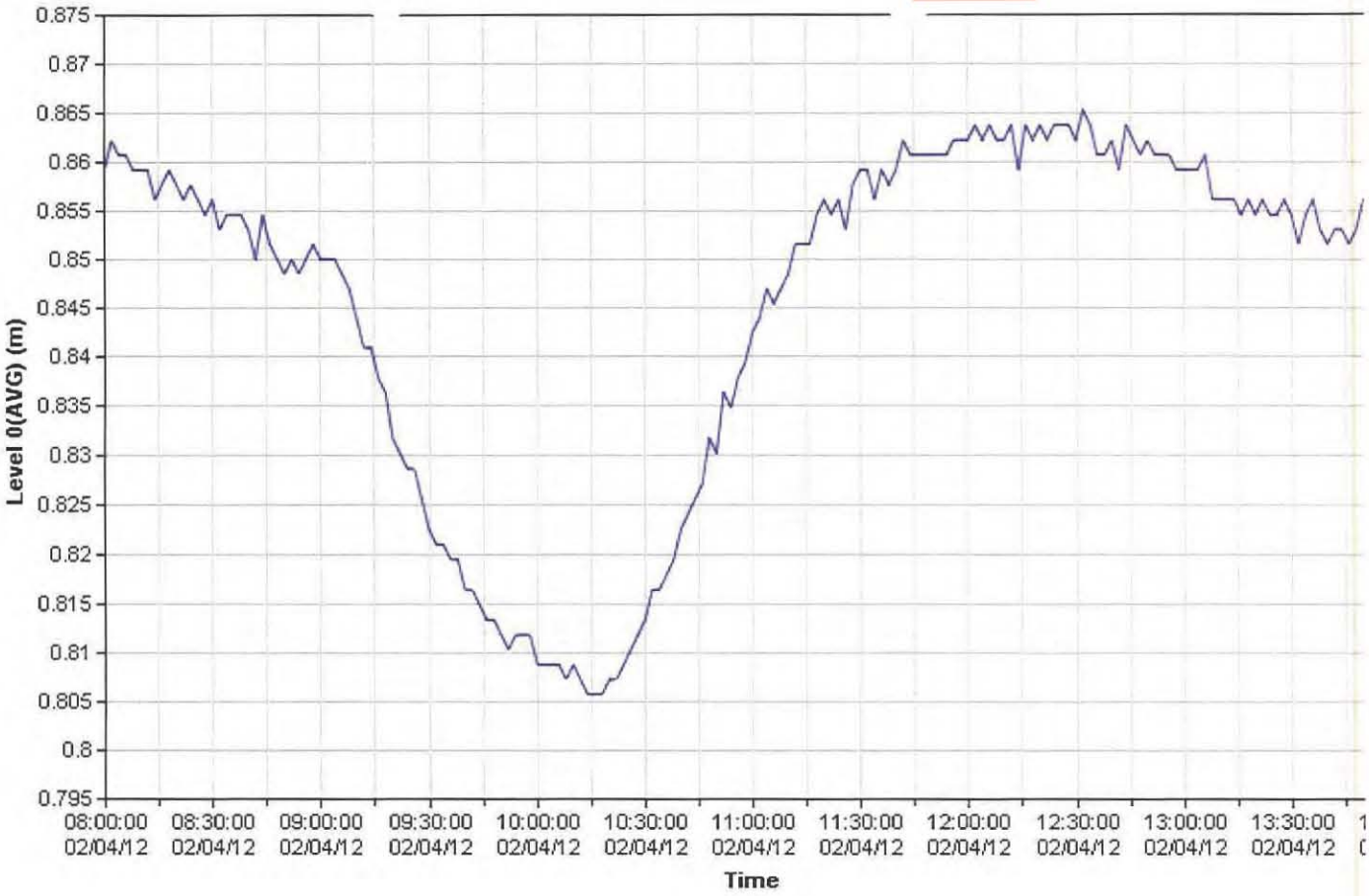

Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

Ullah, Aman FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 3, 2012 3:07 PM
To: Ullah, Aman FLNR:EX
Subject: FW: Upper Mamquam Incident Today
Attachments: image001.png; image002.gif; image003.gif

FN 2000966

Aman Ullah

Read, print and file.

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-----Original Message-----
From: Charles Wemyss [mailto:cwemyss@atlanticpower.com]
Sent: Monday, April 2, 2012 4:15 PM
To: Marc Nering
Cc: Knight, Francesca; (Vince.Busto@dfo-mpo.gc.ca); Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX; Matthew Speer; David Hermanson
Subject: Re: Upper Mamquam Incident Today

Marc,
Thanks for the heads up. Great effort under trying circumstances. Loggers drop a spar on a high voltage line everything goes to Hades fast, so given the circumstances would hope our colleagues at the resource agencies appreciate the quick move to mitigate.
Keep your feet dry,
Charlie

Sent from my iPad

On Apr 2, 2012, at 6:58 PM, "Marc Nering" <mnering@atlanticpower.com<mailto:mnering@atlanticpower.com>> wrote:

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<image003.gif>

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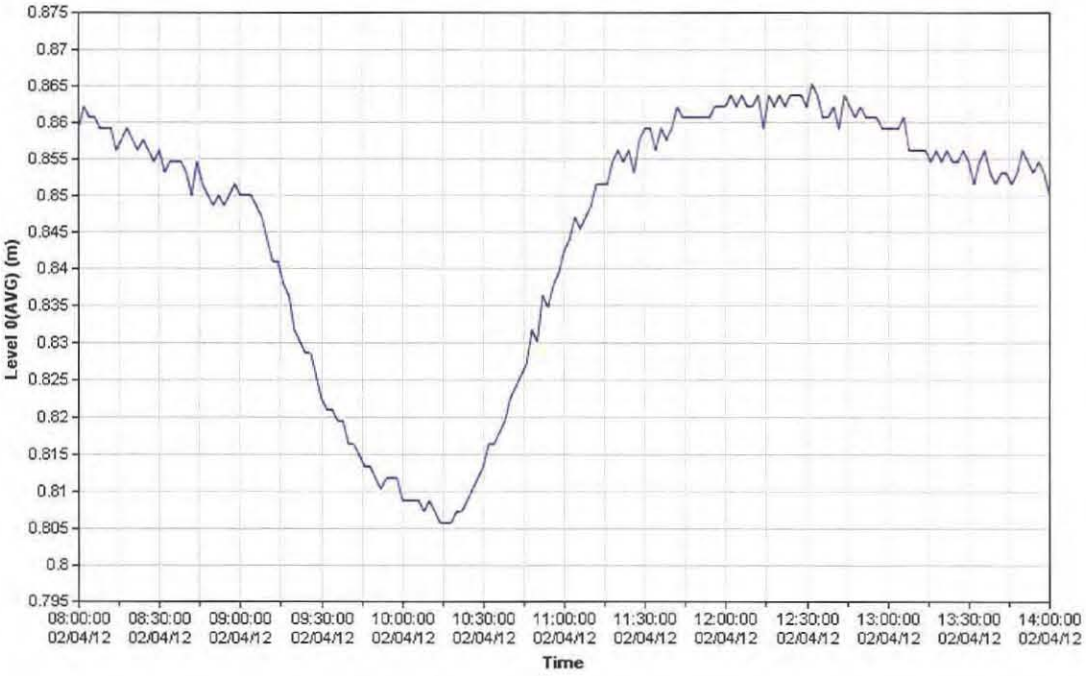
<image002.gif>

Marc Nering

Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile


Level 0(AVG) (m)
0.875
0.87
0.865
0.86
0.855
0.85
0.845
0.84
0.835
0.83
0.825
0.82
0.815
0.81
0.805
0.8
0.795
08:00:00 02/04/12
08:30:00 02/04/12
09:00:00 02/04/12
09:30:00 02/04/12
10:00:00 02/04/12
10:30:00 02/04/12
11:00:00 02/04/12
11:30:00 02/04/12
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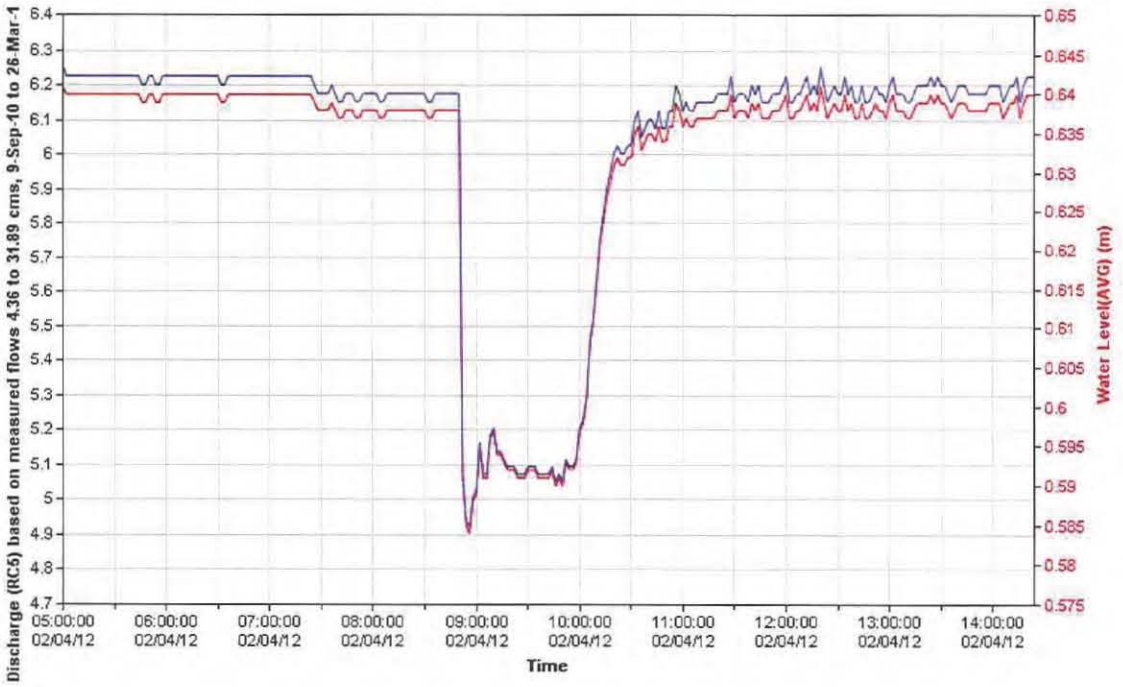
14:00:00 02/04/12
Time



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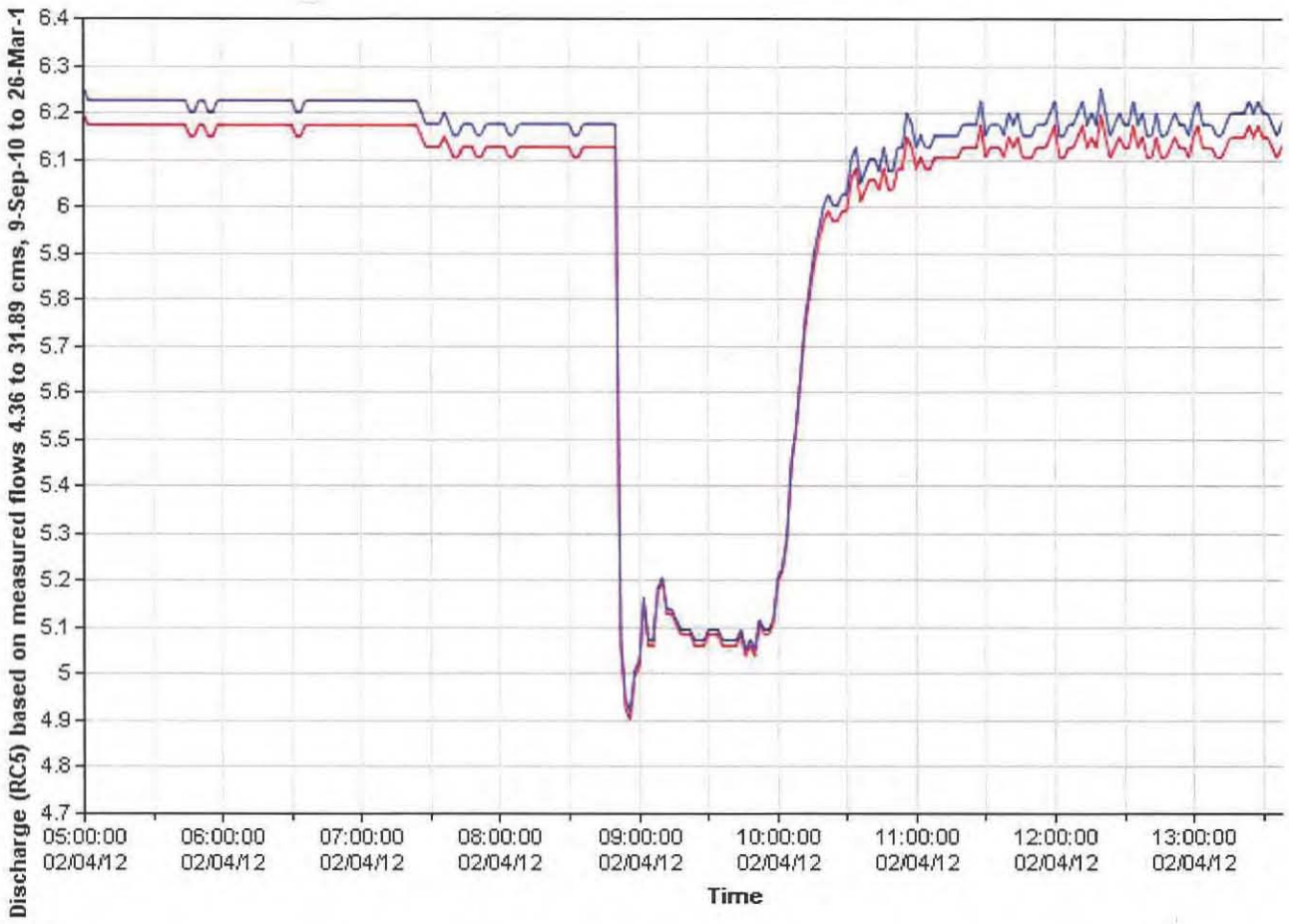

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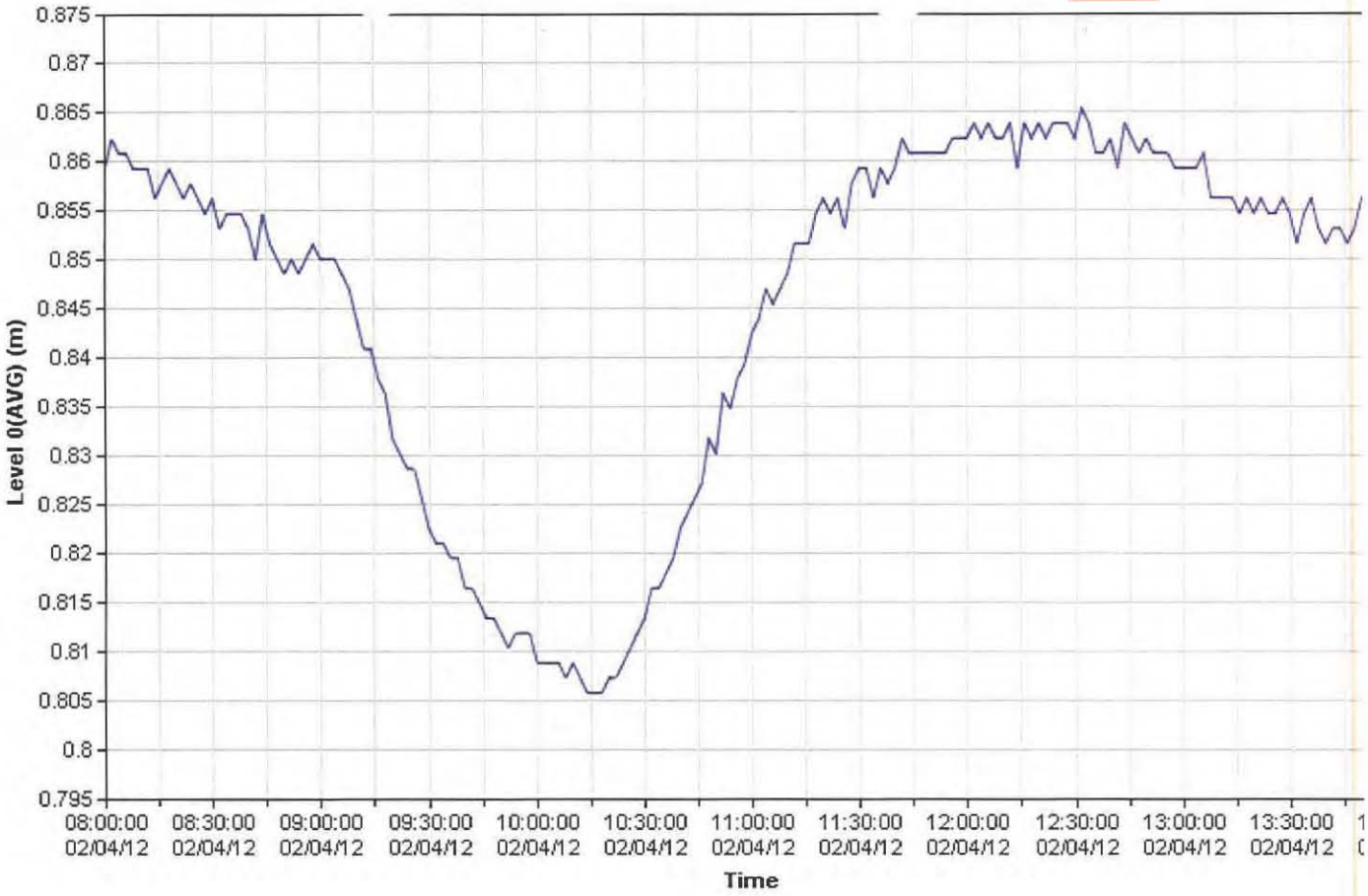

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Subject: FW: Upper Mamquam Incident Today

Aman Ullah

Read, print and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Tuesday, April 3, 2012 11:45 AM
To: Marc Nering; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX; Matthew Speer; David Hermanson; Charles Wemyss
Subject: RE: Upper Mamquam Incident Today

Hi Marc, can you tell us what gauge is shown in your figure below... is it the gauge just downstream of the intake?

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Ecosystems Management Branch
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Government of Canada - Gouvernement du Canada

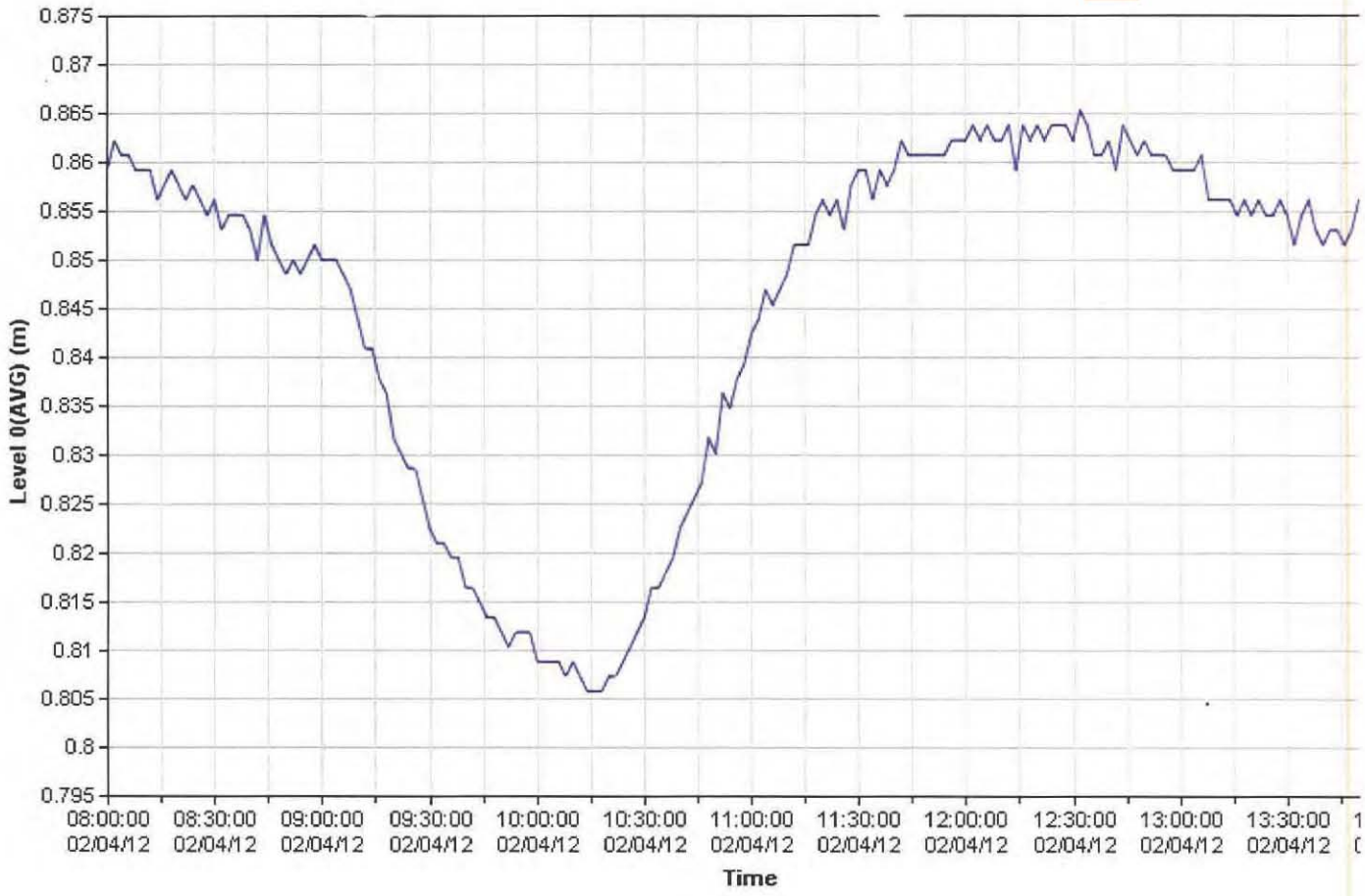
Pacific Region 'Working Near Water' website
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: April 2, 2012 3:59 PM
To: Knight, Francesca; Busto, Vince
Cc: Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; 'James Davies (James.Davies@gov.bc.ca)'; Matthew Speer;

David Hermanson; Charles Wemyss
Subject: Upper Mamquam Incident Today

The upper Mamquam power plant tripped offline today when tree fellers logging in the area dropped a tree across their high voltage transmission lines. When their bypass opened, there was a sharp drop in river flow downstream of their plant of approx 5.5cm for one hour before returning to normal levels.

Lower Mamquam (us) attenuated the incident by drawing down the headpond level while attempting to lower unit output slowly to avoid a sudden drop in river levels. This minimized as best as possible the potential to strand fish downstream of the plant



Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

Ullah, Aman FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 3, 2012 3:07 PM
To: Ullah, Aman FLNR:EX
Subject: FW: Mamquam Ramping Exceedance

Aman Ullah

Read, print and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, April 2, 2012 3:27 PM
To: Marc Nering; Busto, Vince
Cc: Matthew Speer; David Hermanson; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX; Adam Lewis
Subject: RE: Mamquam Ramping Exceedance

Hi folks, well, I think the Ecofish report and associated figures sure clarify what can happen when a plant is generating power while river levels are dropping naturally (flow following on the descending limb of a rain event/period hydrograph). Marc, I think you nailed it saying that plant operations could exacerbate the situation; in this case plant ramping on top of the natural stream stage/discharge reduction appears to be what created the adverse effects on fish. Keep in mind the events of last year; this is an incredibly sensitive time in the river, as evidenced by the photos of the tiny, newly emerged pink fry. This species will be present in the river for the next few weeks/month or so, as they will migrate directly out to the estuary and beyond (not like the coho fry who will spend a year in the off-channel habitats). It's possible that even the ramp rates determined from the Ecofish study are just not conservative enough for the spring pink fry emergence period (these guys will be even a little smaller than newly emerged coho fry).

I noticed some typos in the Ecofish report, so I just want to get some information clarified:

1. The text of the report states that the incident happened at 18:36 on March 20, 2012. Table 1 and the figures indicate that the event happened on March 29, commencing at 17:36. I am assuming that the March 29 info is correct.

2. Orientation figure: it would be very helpful if future incident reports contained an overview figure showing gauge names and locations, as well as stranded fish search sites. We have all of this information in numerous other reports of course, but it would be nice not to have to spend the time refamiliarizing ourselves with this information. In particular, this might help Marc when he is relaying information to agencies-- if we all refer to gauges and sites with a common nomenclature, communications will be that much clearer.

3. The event happened on the night of the 29th, and Ecofish crews were out the following day, around lunch time. Granted, this is not a situation where water levels came back up following an event (making searches for stranded fish more difficult), but getting folks on site the next day to try to find pink fry certainly makes for a complicated stranded fish search. It is very possible that the effects of this incident on fish were worse than we know.

4. Ramping excursion - terminology: DFO is not keen on the terminology "excursion". Either keep calling these incidents "incidents", or perhaps "departures from the approved ramp rates".

Adam, I was taking a look through the Mamquam ramping study, but did not come across a ramping threshold (a discharge above which unrestricted ramping can occur). Has a ramping threshold ever been proposed for lower Mamquam? The reason I am asking here is because flows were in the neighbourhood of 20-30 cms just prior to the incident (depending of course on where one was gauging flows). MAD on the lower Mamquam is around 20cms, and a typical threshold is in the range of 150-160% MAD, yes? In which case, could you not further exacerbate the flow following problem if a plant is following flows down from some point at or above the ramping threshold, and then dropping below the ramping threshold?

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From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: March 31, 2012 7:19 PM
To: Knight, Francesca; Busto, Vince
Cc: Matthew Speer; David Hermanson; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX
Subject: RE: Mamquam Ramping Exceedance

Hi Francesca,

Please see the attached Ecofish report in the accompanying email. The natural drop in river flows was approx. 2.5 cm/hr. at the river gauge When the weirs were inflated by the PLC to maintain head pond levels the ramp rate increased by another 1.7 cm\hr. as the spill was decreased. The combined decrease in flow was 4.2 cm/hr at the river gauge which equals 3 cm/hr at the stranding hot spot areas. 2 fry were found stranded and returned to the river. It is not known at this time whether the natural decline in river levels was responsible for stranding the fry, or whether the plant exasperated the situation causing the stranding. From the report it appears that there was only one slight exceedance of the 2.5cm/hr. ramping guideline

Mamquam's PLC engineers will be onsite Monday to see if the weir inflation pulses can be made in smaller steps to minimize the flow disturbance.

Marc

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: Saturday, March 31, 2012 5:48 PM
To: Marc Nering; Busto, Vince

Cc: Matthew Speer; David Hermanson; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; Davies, James W FLNR:EX
Subject: RE: Mamquam Ramping Exceedance

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From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: March 30, 2012 1:44 PM
To: Busto, Vince; Knight, Francesca
Cc: Matthew Speer; David Hermanson
Subject: Mamquam Ramping Exceedance

Hello Francesca and Vince,

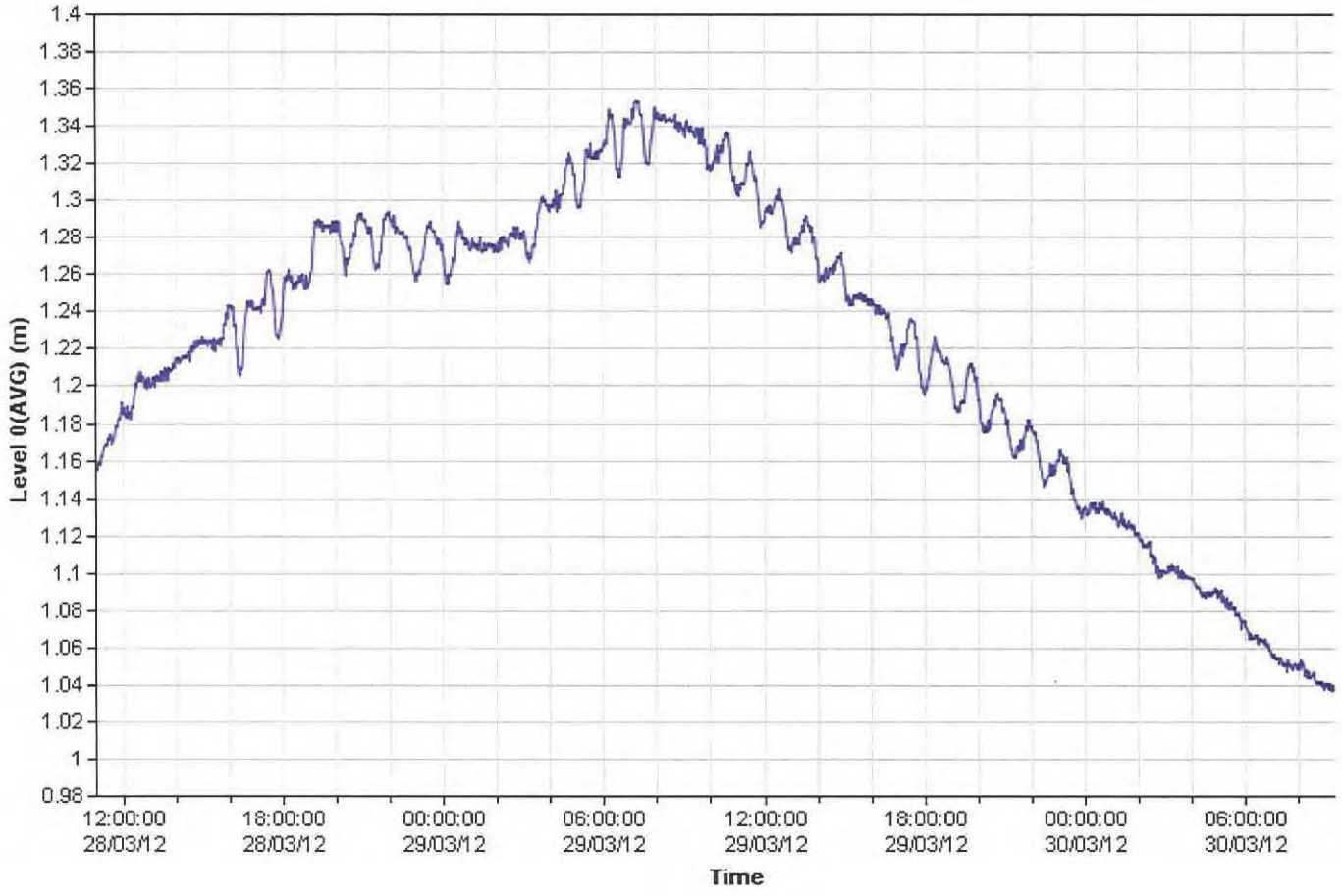
Mamquam had 2-3 slight exceedances of the ramping guideline of 3.6 cm/hr (which correlates to 2.5cm/hr in the stranding hot spots). The worst exceedance was 4.1 cm/hr, which equates to approximately 2.9cm/hr in the stranding areas.

The reason for the ramping exceedance was:

- Intake pond levels started dropping due to diminishing flows
- The weirs inflated to maintain intake levels
- Spill over the intake weirs diminished due to dropping river flows

As seen in the accompanying graph, this occurred several times as the weirs inflated to maintain intake pond levels. This is the first time we have observed the weirs causing ramp rate exceedances, probably due to the high natural rate of the river flow drop. Also, normally we would have had a second unit online so there would be no weir involvement at those flow levels (as there would be no spill), however G2 was offline for repairs.

Ecofish is conducting a stranding search and will provide a report later today or Saturday, although no fish stranding is expected. Mamquam will also work with our PLC programmers to see if the programming can be changed to allow for smaller increments of weir inflation levels.



Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

Ullah, Aman FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 3, 2012 3:08 PM
To: Ullah, Aman FLNR:EX
Subject: FW: Mamquam Ramping Exceedance
Attachments: RE: MQM strandaing search complete

Aman Ullah

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James Davies, P.Eng.
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MFLNRO - South Coast Region - Authorizations - Water Allocation
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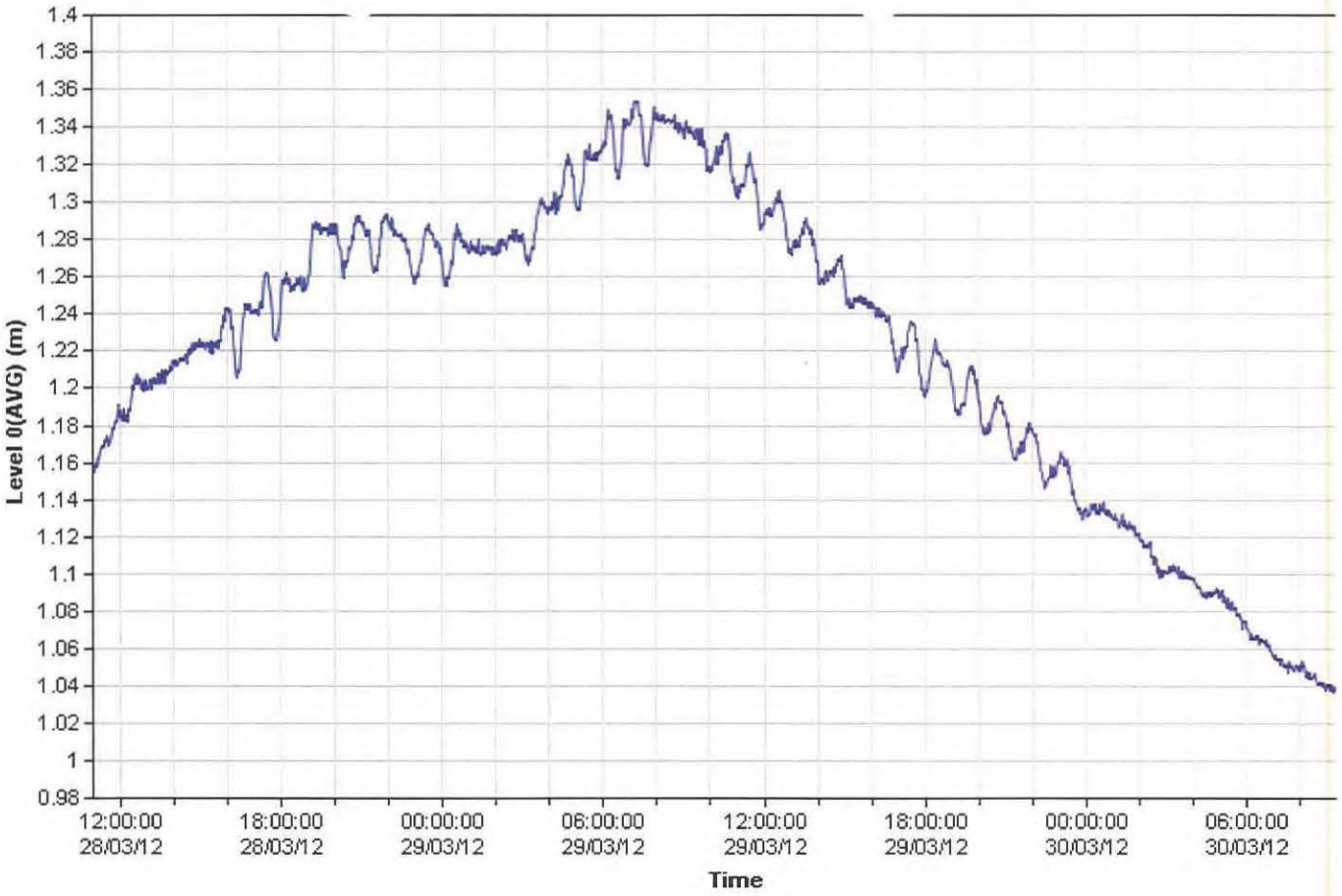

Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

Ullah, Aman FLNR:EX

From: Ian Murphy [imurphy@ecofishresearch.com]
Sent: Saturday, March 31, 2012 9:41 AM
To: Marc Nering
Cc: Adam Lewis; Dorian Turner; Veronica Woodruff; Alison Collins
Subject: RE: MQM strandaing search complete
Attachments: Memo to Marc Nering re 30 Mar 2012 Ramping Incident Response Monitoring.pdf

Marc,

The memo is attached. You make some good points below. We cannot confirm that the ramping excursion did indeed isolate these fry, but it is possible. The fry were found approximately 2 m from the wetted edge, in the substrate. They were still alive because the pocket they were found in was still wet (~1 cm of water) and air temp was not freezing. This uncertainty is discussed in the memo.

We understand that you are concerned that the river may naturally be isolating or stranding fish and that these observations are being attributed to plant activities when, in fact, this may not be the case. I have discussed this briefly and Adam and we have some ideas to address this concern. We will contact you on Monday to discuss this further.

Regards,

Ian Murphy B.Sc. Dip.Tech. EP
Project Manager

Ecofish Research Ltd.

ECOFISH RESEARCH

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imurphy@ecofishresearch.com
www.ecofishresearch.com

From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: March-30-12 6:31 PM
To: Ian Murphy
Cc: Dorian Turner
Subject: RE: MQM strandaing search complete

Ian/Dorian,

Please explain how this could occur? How did the fry survive for over 18 hours? The exceedances occurred at 16:00-22:00 yesterday.

Could they have been stranded as a result of the decrease in the natural flow rate? How close to the river's edge were they found? When was the spot the fish were found in dewatered? The plant increased the natural flow rate drop by 1.6cm/hr max, as the natural decrease in flows was 2.5cm/hr.

Thanks

Marc

From: Ian Murphy [mailto:imurphy@ecofishresearch.com]
Sent: Friday, March 30, 2012 4:54 PM
To: Marc Nering
Cc: Dorian Turner
Subject: Fw: MQM strandaing search complete

Report to come.

From: dturner@ecofishresearch.com [mailto:dturner@ecofishresearch.com]
Sent: Friday, March 30, 2012 07:31 PM
To: Adam Lewis
Cc: Ian Murphy
Subject: MQM strandaing search complete

Hi Adam,

The post event stranding searches are complete on the MQM. During the searched, two fry (salmonids ~30mm) were found alive under substrate on the bank and were successfully returned to the river. Pascale and I are currently working on the event memo and will have it sent out to Adam (cc Ian) this afternoon.

Thanks,

Dorian

ECOFISH RESEARCH

MEMORANDUM

TO:	**Marc Nering, Matt Speer**
FROM:	**Adam Lewis**
DATE:	**March 31, 2012**
FILE:	**1071-04.09**
RE:	**Lower Mamquam River - Ramping Incident Response Monitoring**

This memo describes observations made during a ramping incident response monitoring conducted for Atlantic Power Corporation (APC) on the Lower Mamquam River run-of-river hydroelectric project (the project) on March 30, 2012. Ecofish staff received an automated email alarm notification of the incident at 20:11 hrs (Pacific Daylight Time PDT - local time). The ramping event occurred at approximately 18:36 hrs. During a natural decline in river discharge following a rain event, plant weir inflation operations to adjust headpond depth resulted in water level fluctuations downstream of the plant which triggered the excursion.

In the downstream reach, there was a 4.2 cm stage reduction from 18:36 hrs to 19:00 hrs (PDT) which resulted in an hourly stage change rate at the hydrometric gauge (MQM-DSLG01) of -4.2 cm/hr (Table 1). Ramping rates were calculated following the standard protocol (Appendix A), as the difference between the current data point stage (cm) and the maximum stage in the previous hour (cm).

Time series of discharge, stage, and ramping rates as recorded at the hydrometric gauges during the events are shown for the downstream reach (Table 1).

Crews searched monitoring site MQM-DSSD02, located on either side of the Highway 99 Bridge, between 12:50 and 13:58 hrs on March 30, 2012. As discharge had been decreasing between the time of the incident and the time the search began, the crew inspected the dry steam margin adjacent to the wetted channel as well as the shallow wetted marginal areas to search for stranded fish. Two areas of 100 m (one upstream and one downstream of the bridge) were searched by four people. Broad-based searches were conducted for approximately 49 minutes for an area 8250 m^2 while hotspot, detailed searches were conducted for 85 minutes (210 m^2). No stranded or isolated fish were found, but two free swimming fry were observed at the river margin.

Crews then moved to MQM-DSSD03 downstream of Government Rd. Bridge, and were onsite from 14:06 until 14:58. Two areas of 100 m (both downstream of the bridge, one on river right, one on river left) were searched by four people. Broad-based searches were conducted for approximately 20 minutes for an area 600 m^2 while hotspot, detailed searches were conducted for 84 minutes (213.5 m^2). Two isolated salmon fry (approximately 30 mm fork length) were found on the river right bank approximately 2 m back from the wetted edge. The fry were found in a wetted pocket within the substrate, the condition of the fry was good, and they were quickly returned to the river alive.

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In summary, the Lower Mamquam project ramping excursion on the evening of March 29, 2012 exceeded the recommended 3.6 cm/hr ramping criterion, as measured at MQM-DSLG01. Ecofish crews were onsite the following day and found two isolated fry at MQM-DSSD03. It is possible that the isolation of the fry was a result of the ramping excursion. It is also possible that the fry were isolated as a result of natural stage change as river flow was naturally decreasing at that time; this cannot be confirmed. Both fry were found alive and returned to the river.

Please contact me if you have any questions or need further information.

Yours truly,
Ecofish Research Ltd.

signed

Adam Lewis, Principal

ECOFISH RESEARCH

Table 1. Summary of stage change, incident duration, and rate of change at MQM-DSLG01 during the ramping excursion on March 29, 2012.

Compliance Point	Start Time (PST)	End Time (PST)	Duration (hh:mm)	Stage Start (cm)[4]	Stage End (cm)[4]	Total Stage Change (cm)[1]	Maximum Hourly Stage Change Rate	Estimated Discharge Start (cms)[1]	Estimated Discharge End (cms)[1]
MQM-DSLG01	29-Mar-12 17:36	29-Mar-12 18:00	0hour 24min	103.7	99.5	4.2	-4.2	24.7	22.6

1 Negative number indicates stage decrease.

2 MQM-DSLG01 discharge estimated from Rating Curve 8.0 (RC8.0; Discharge = 8.336 (Stage 0.4) ^ 2.998. Discharge values are estimates.

3 This is the maximum stage change recorded within one hour at the hydrometric gauge.

4 Start and End Times denote stage decrease induced by ramping.

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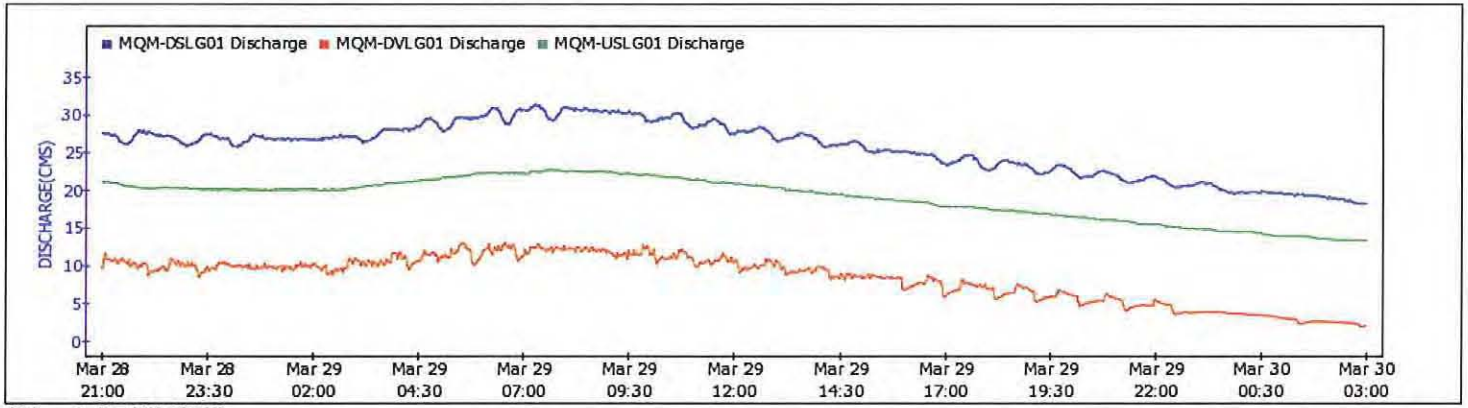
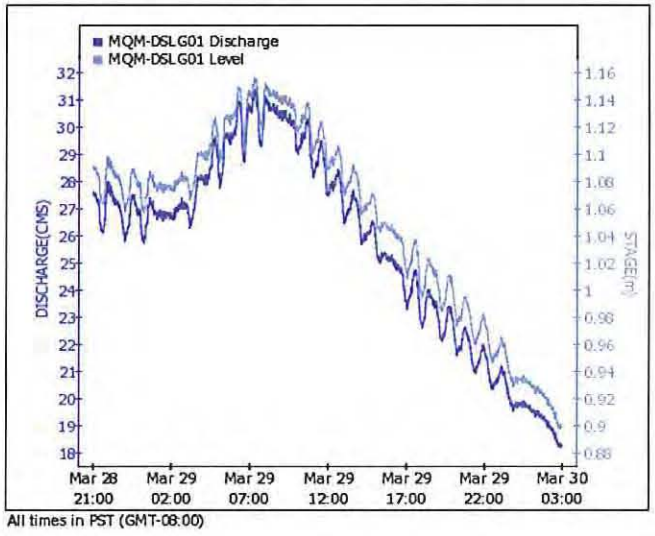
Figure 1. Discharges from March 28 to March 29, 2012; a) at the downstream and diversion permanent gauges over time, b) in relation to stage at the downstream permanent gauge on March 29, and c) in relation to ramping rates at downstream permanent gauge (MQM-DSLG01) on March 29 – the ramping criteria of -3.6 cm/hr is shown by the yellow reference line.

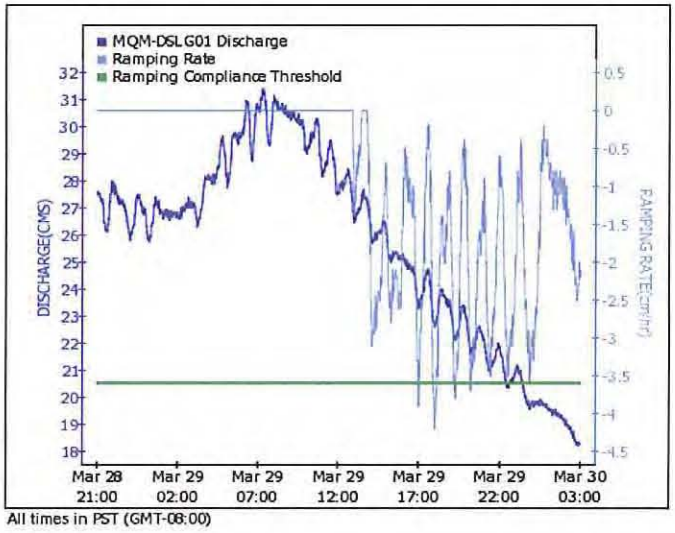
a)



b)



c)



ECOFISH RESEARCH

Photo 1. **Isolated salmon fry (~30 mm fork length) found at approximately 14:20 hrs at site MQM-DSSD03.**

Photo 2. **Isolated salmon fry (~30 mm fork length) found at approximately 14:31 hrs at site MQM-DSSD03.**

ECOFISH RESEARCH

Appendix A. Ramping Rate Violation Measurement

The procedure is as follows:

1. The maximum stage observed over the past hour at time ti, , should be determined for each data point according to the following equation:
   hmax(ti) = max (h(ti-k), ... , h(ti-k))

   where *h* is stage, *k* is the number of data points recorded per hour, and *t* is time, The maximum stage decrease over the past hour relative to time *ti* is then defined by the equation:
   hmax(ti) = max (h(ti-k), ... , h(ti-k))

2. If the maximum stage change *hmax(ti)* exceeds the ramping criterion (e.g. -3.6 cm for MQM-DSLG01), the data are flagged as a potential ramping event. That is the exceedance rule (Rule 1).

3. A mortality event is assumed to occur if the stage remains below for a critical period, which is the dewatering time. The time to asphyxiation is assumed to be 10 minutes considering both air exposure and the time needed for the substrate to drain. This is the dewatering rule (Rule 2).

4. The average stage over some time prior to a ramping event may be used to determine the likelihood of habituation of the affected habitat (we have selected 24 hours). If the maximum level associated with the ramping exceeds the average stage from the past 24 hours, the stage change is recomputed using the 24hr average (as hmax), and violation of Rule 1 is reassessed. If the stage change based on the 24hr average does not exceed the ramping criteria, the event is not flagged as a ramping excursion.

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Sent: Tuesday, April 3, 2012 3:08 PM
To: Ullah, Aman FLNR:EX
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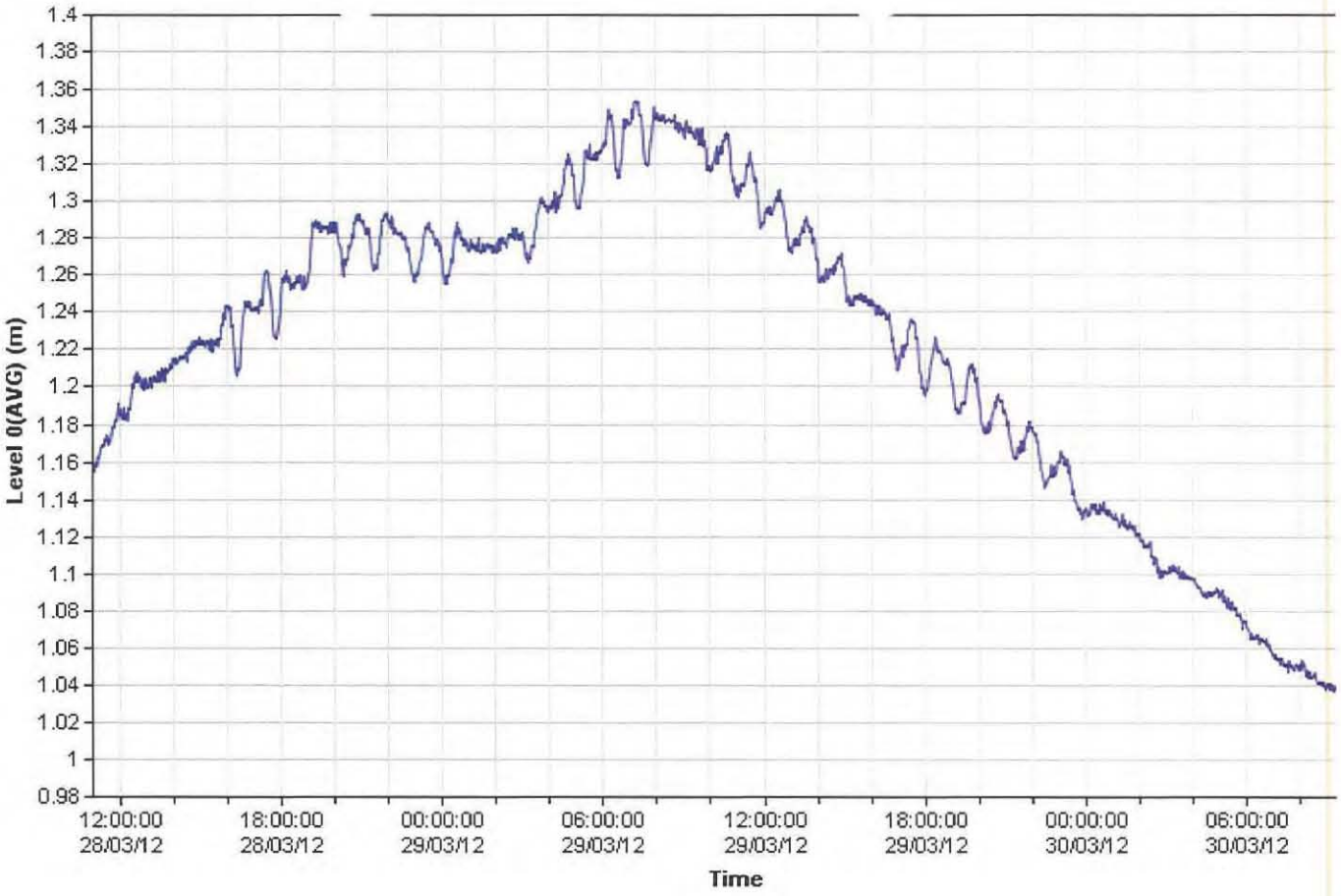
- Intake pond levels started dropping due to diminishing flows
- The weirs inflated to maintain intake levels
- Spill over the intake weirs diminished due to dropping river flows

As seen in the accompanying graph, this occurred several times as the weirs inflated to maintain intake pond levels. This is the first time we have observed the weirs causing ramp rate exceedances, probably due to the high natural rate of the river flow drop. Also, normally we would have had a second unit online so there would be no weir involvement at those flow levels (as there would be no spill), however G2 was offline for repairs.

Ecofish is conducting a stranding search and will provide a report later today or Saturday, although no fish stranding is expected. Mamquam will also work with our PLC programmers to see if the programming can be changed to allow for smaller increments of weir inflation levels.



Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower Corporation

Bennett, Timothy A ENV:EX

From: Knight, Francesca [Francesca.Knight@dfo-mpo.gc.ca]
Sent: Monday, April 4, 2011 4:32 PM
To: Kelly Lail
Cc: Marc Nering; Bennett, Timothy A ENV:EX; Busto, Vince
Subject: Letter RE ramping rate concerns
Attachments: Letter RE Lower Mamquam ramping_signed_April 2011.pdf

Hello Kelly, attached please find DFO's expression of concern regarding the ramping rough zone at the Lower Mamquam IPP, including a direction to immediately address the impacts to fish and fish habitat as a result of rough zone ramping.
<<Letter RE Lower Mamquam ramping_signed_April 2011.pdf>>

Please contact Vince and myself following your review of the letter to discuss Capital's intended remedy of the situation. We do understand that upgrades to the turbines are in process, but until those upgrades are complete and proven to eliminate the rough zone ramping problems, juvenile fish remain vulnerable to stranding and mortality as a result of the plant's ramping through the rough zone.

regards,
Francesca

Francesca Knight, M.Sc., R.P.Bio.
Habitat Biologist
Fisheries and Oceans Canada / Pêches et Océans Canada
Oceans, Habitat and Enhancement Branch / Direction des océans, de l'habitat et de la mise valeur
Lower Fraser River - Le Bas Fraser
Unit 3 - 100 Annacis Parkway
Delta, BC V3M 6A2
Francesca.Knight@dfo-mpo.gc.ca

Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Fisheries and Oceans Canada | Pêches et Océans Canada

Unit #3 – 100 Annacis Parkway
Delta, BC V3M 6A2

March 24, 2010

Mr. Kelly Lail
Director, Commercial Management
Capital Power Corporation
PO Box 5383
Squamish, BC V8B 0C2

11-HPAC-PA2-00176

Subject: Ramping rate concerns, Lower Mamquam IPP, Squamish

Dear Mr. Lail,

DFO has been aware of impacts to fish and fish habitat as a result of plant ramping operations since the fall of 2010. Through both complaints from the public and monitoring reports prepared by your consultant (Ecofish Research ltd.), we are aware of at least four recent ramping incidents that resulted in the stranding and / or killing of fish. Most recently, the ramping events of February 10 and March 21, 2011, resulted in the death of newly emerged anadromous salmonid fry, and are of great concern to DFO.

Please be advised that the stranding and / or killing of fish is in contravention of the *Fisheries Act* (S. 32) and we require that Capital Power take immediate steps to prevent the further stranding and/or killing of fish during the course of plant ramping. Please note that compliance with the direction stated within this letter does not preclude DFO from pursuing charges under the Federal *Fisheries Act*.

If you have any questions please contact either of the undersigned at the contact information below.

regards,

Vince Busto, P.Eng.
Hydrotechnical Engineer
Vince.Busto@dfo-mpo.gc.ca
604-666-8281

Francesca Knight, M.Sc., R.P. Bio.
Habitat Biologist
Francesca.Knight@dfo-mpo.gc.ca
604-892-2040

cc: Marc Neering, Capital Power
Tim Bennet, BC Ministry of Natural Resource Operations, Water Stewardship Division

Canada

Bennett, Timothy A ENV:EX

From: Kelly Lail [klail@capitalpower.com]
Sent: Monday, April 4, 2011 10:31 PM
To: 'Francesca.Knight@dfo-mpo.gc.ca'
Cc: Marc Nering; Bennett, Timothy A ENV:EX; 'Vince.Busto@dfo-mpo.gc.ca'; Rudy Barrett; Keith Boutcher; Robert Brassard
Subject: FW: Letter RE ramping rate concerns
Attachments: Letter RE Lower Mamquam ramping_signed_April 2011.pdf

Francesca:

I acknowledge your letter, and as suggested we will review it and our Operations Group will contact you to have further discussions.

The plant was built in accordance with the requirements and authorizations that were in place at that time. We have continued to seek input from DFO and consistently sought input and authorizations. Most of this communication has been with Vince.

Frankly, we are very disappointed with the letter given that for the last 2 years plus we have been working closely with DFO (Vince) and MOE and have have undertaken significant work and have implemented a long term monitoring plan including ramping tests to determine impacts and to develop measures to minimize impacts. DFO reviewed the plan and provided input before it was finalized and implemented. This monitoring plan has a duration of five years.

In order for us to prepare for our discussions please provide details on any public complaints that you may have received so that we can explore and present to you ways and means of minimizing potential impacts.

We would welcome any suggestion you may have in light of the upgrades that we are currently doing at the facility and any practical suggestions on how we may be able to address ramping issues which are a wider industry issue particularly for older plants.

Regards,
Kelly

Kelly S. Lail
Vice President
Capital Power Corporation
10451 Shellbridge Way, Suite 215
Richmond, BC V6X 2W8
T: 604.232.2241 | F: 238-2003
E: klail@capitalpower.com

From: Knight, Francesca [mailto:Francesca.Knight@dfo-mpo.gc.ca]
Sent: April 4, 2011 4:32 PM
To: Kelly Lail
Cc: Marc Nering; timothy.bennett@gov.bc.ca; Busto, Vince
Subject: Letter RE ramping rate concerns

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regards,
Francesca

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Ph: (604) 666-3191 / Fax: (604) 666-6627
Squamish phone: 604-892-2040
Government of Canada - Gouvernement du Canada

Davies, James W FLNR:EX

From: Davies, James W FLNR:EX
Sent: Wednesday, April 18, 2012 2:22 PM
To: Ullah, Aman FLNR:EX
Subject: FW: MQM strandaing search complete April 05, 2012

Aman Ullah

Read, print, and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

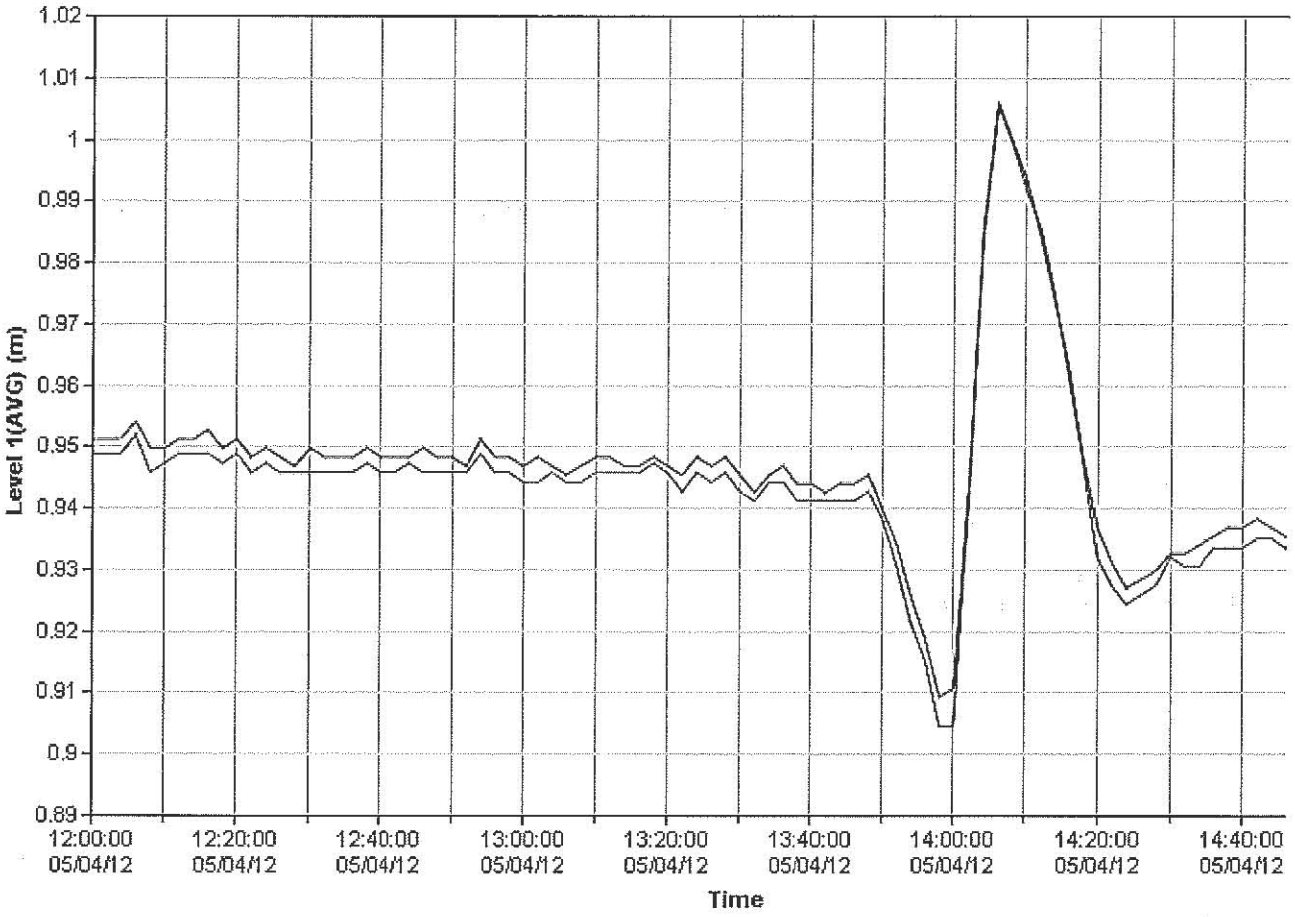
From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: Friday, April 6, 2012 11:10 AM
To: Knight, Francesca; (Vince.Busto@dfo-mpo.gc.ca)
Cc: Davies, James W FLNR:EX; Babakaiff, Scott C FLNR:EX; Stoddard, Erin M FLNR:EX; David Hermanson; Charles Wemyss; Matthew Speer; Wayne Alan Moffatt; David Carlin; David Griffioen; Elspeth Miller
Subject: FW: MQM strandaing search complete April 05, 2012

During the startup of G1 there was a drop in flows as G2 was ramped down to compensate for the increase in flow during the start-up of G1. There was a drop of approx. 3.6 to 4 cm (depending which gauge is used) exceeding the recommended guideline of 3.6cm/hr at the downstream of power plant river gauge. Flows were re-established quickly causing a spike upwards in river level, followed by another subsequent drop to baseline flows.

Two pink salmon fry were found dead and are being analyzed. Three fry were found alive and returned to the river (see initial report below). A detailed report from Ecofish will follow Monday.

Plant operations staff performed this operation manually to the best of their abilities using the data available, however this is a difficult operation.

This function is being automated as part of the PLC replacement project which is currently proceeding. Testing will be performed under higher freshet flows.



From: dturner@ecofishresearch.com [mailto:dturner@ecofishresearch.com]
Sent: Friday, April 06, 2012 10:34 AM
To: Marc Nering
Cc: Adam Lewis; Ian Murphy
Subject: MQM strandaing search complete April 05, 2012

Hi Marc,

From 14:48 to 15:50 April 05, 2012, the stage at the MQM-DSLG01 dropped from 0.742 to 0.702 (-4.0cm) over 12 minutes, the 24 hr average water level was approximately 0.794. There were subsequent spike in the stage following the initial drop. This was a plant induced event that we believed warranted a fish stranding search downstream of the Lower Mamquam Hydroelectric project, especially given the sensitivity and the fact that newly emerged fry are present and most susceptible at this time of year.

The post event stranding searches are complete on the Mamquam from 19:00 to 22:30 April 05, 2012. During the searched, two stranded dead pink salmon fry and three isolated alive pink salmon fry were found under substrate on the bank near the river's edge. The dead fry were collected for analysis whereas the live fry were successfully returned to the river.

I will have a ramping incident response memo out Monday morning.

Please follow up with Adam or I if you have any further questions.

Thanks,

Dorian Turner M.R.M., R.P.Bio.
Fisheries Biologist/Task Manager

Ecofish Research Ltd.

Suite 1000-355 Burrand St.
Vancouver, BC, V6C 2G8
Cell: 778-689-3411
dturner@ecofishresearch.com
www.ecofishresearch.com

Davies, James W FLNR:EX

From: Busto, Vince [Vince.Busto@dfo-mpo.gc.ca]
Sent: Tuesday, April 17, 2012 10:55 AM
To: Marc Nering; Knight, Francesca; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Davies, James W FLNR:EX
Cc: Matthew Speer
Subject: RE: April 05, 2012 RIR memo

I do not understand how a 4 cm stage change in 12 minutes at MQM-DSL-01 results in a reported hourly stage change rate of 4cm/hr. The rate is 20 cm/hr (4cm/0.2hr), which is a very rapid stage change.

Vince Busto, B.A.Sc., P.Eng.
Habitat and Hydrotechnical Engineer | Ingénieur de l'habitat et de l'hydrotechnique
Lower Fraser Area | La bas Fraser
Ecosystem Management Branch | Gestion des écosystèmes
Fisheries and Oceans Canada | Pêches et Océans Canada
100 Annacis Parkway, Unit 3 | 100 Annacis Parkway, Unit 3
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Government of Canada | Gouvernement du Canada

Telephone/Téléphone 604-666-8281
Facsimile / Télécopieur 604-666-6627

Pacific Region 'Working Near Water' website

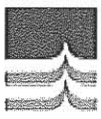
http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm

From: Marc Nering [mailto:mnering@atlanticpower.com]
Sent: April 17, 2012 10:37 AM
To: Knight, Francesca; Stoddard, Erin M FLNR:EX; Busto, Vince; Babakaiff, Scott C FLNR:EX; 'James Davies (James.Davies@gov.bc.ca)'
Cc: Matthew Speer
Subject: April 05, 2012 RIR memo

FYI

See attached for Ecofish's report on the April 5 ramping guideline exceedance.

Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile



AtlanticPower
Corporation

Davies, James W FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 17, 2012 1:05 PM
To: Ullah, Aman FLNR:EX
Subject: FW: April 05, 2012 RIR memo

Aman Ullah

Read, print and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

From: Busto, Vince [mailto:Vince.Busto@dfo-mpo.gc.ca]
Sent: Tuesday, April 17, 2012 10:55 AM
To: Marc Nering; Knight, Francesca; Stoddard, Erin M FLNR:EX; Babakaiff, Scott C FLNR:EX; Davies, James W FLNR:EX
Cc: Matthew Speer
Subject: RE: April 05, 2012 RIR memo

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Cc: Matthew Speer
Subject: April 05, 2012 RIR memo

FYI

See attached for Ecofish's report on the April 5 ramping guideline exceedance.

Marc Nering
Plant Manager
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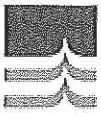

AtlanticPower
Corporation

Davies, James W FLNR:EX

From: Davies, James W FLNR:EX
Sent: Tuesday, April 17, 2012 1:05 PM
To: Ullah, Aman FLNR:EX
Subject: FW: April 05, 2012 RIR memo
Attachments: Memo to Marc Nering re April 05 2012 Ramping Excursion Response Monitoring.pdf

Aman Ullah

FW: April 05, 2012 RIR memo

Read, print and file.

James Davies, P.Eng.
Acting Section Head - Water Allocation
MFLNRO - South Coast Region - Authorizations - Water Allocation
Tel: (604) 582-5203 FAX: (604) 582-5235
email: James.Davies@gov.bc.ca

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FYI

See attached for Ecofish's report on the April 5 ramping guideline exceedance.

Marc Nering
Plant Manager
Hydro Operations BC
604 898 2761 Office
604 815 3469 Mobile

AtlanticPower
Corporation

ECOFISH RESEARCH

MEMORANDUM

TO:	**Marc Nering, Matt Speer**
FROM:	**Adam Lewis**
DATE:	**April 16, 2012**
FILE:	**1071-04.09**
RE:	**Lower Mamquam River - Ramping Incident Response Monitoring**

This memo describes observations made during a ramping incident response monitoring conducted for Atlantic Power Corporation (APC) on the Lower Mamquam River run-of-river hydroelectric project (the project) on April 05, 2012. Ecofish staff received an automated email alarm notification and confirmed a ramping incident had occurred between approximately at 14:48 and 15:00 hrs (Pacific Daylight Time PDT - local time) on April 05, 2012. It was confirmed that plant operations resulted in water level fluctuations downstream of the powerhouse which triggered the ramping incident. An overview map of the Mamquam River (Figure 1) shows the location of the project, the gauging stations, and the stranding search sites.

In the downstream reach, there was a total stage reduction of 4.0 cm from 14:48 hrs to 15:00 hrs (PDT) which resulted in an hourly stage change rate at the hydrometric gauge (MQM-DSLG01) of -4.0 cm/hr (Table 1). The river discharge at the time over the start of the event was 12.5 cms; therefore, the maximum recommended ramping rate criteria at MQM-DSLG01 used to assess the alarm was -3.6 cm/hr (Table 2), which was exceeded. The maximum ramping rate criteria of -3.6 cm/hr at MQM-DSLG01 is assumed to translate into approximately a -2.5 cm/hr ramping rate at sensitive stranding sites in the downstream reach. Ramping rates were calculated following the standard protocol (Appendix A), as the difference between the current data point stage (cm) and the maximum stage in the previous hour (cm).

Time series of discharge, stage, and ramping rates as recorded at the hydrometric gauges during the events are shown for the downstream reach (Table 1).

Crews searched monitoring site MQM-DSSD03 downstream of Government Rd. Bridge, and were onsite from 19:10 until 20:30 PDT on April 05, 2012. As natural river discharge had been declining between the time of the incident and the time the search began, the crew inspected the dry stream margin adjacent to the wetted channel as well as the shallow wetted marginal areas to search for stranded fish. Two stranding areas (both downstream of the bridge, one on river right, one on river left) were searched by two people. Broad-based searches were conducted for approximately 30 minutes for an area 600 m^2 while hotspot, detailed searches were conducted for 80 minutes (207 m^2). One stranded pink salmon fry (29 mm fork length) was on the river right bank. The fry was found dead under substrate above water level and approximately 0.7 m back from the wetted edge. On the river left bank, one stranded pink salmon fry (29 mm fork length) was found dead in a wetted pocket under substrate and approximately 0.4 m back from the wetted edge. The two dead fry were

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collected for further analysis. In addition, three isolated pink salmon fry (~30 mm fork length) were found alive in moist pockets under substrate approximately 0.3 m back from the wetted edge, and were released back into the river in good condition.

Crews moved to monitoring site MQM-DSSD02, located on either side of the Highway 99 Bridge, between 20:45 and 21:50 hrs PDT on April 05, 2012. Search methods were similar to those used on MQM-DSSD03. Broad-based searches were conducted for approximately 32 minutes for an area 700 m^2 while hotspot, detailed searches were conducted for 80 minutes (204 m^2). No stranded or isolated fish were found.

In summary, the Lower Mamquam project ramping incident on the evening of April 05, 2012 exceeded the recommended 3.6 cm/hr ramping criterion, as measured at MQM-DSLG01. Ecofish crews were onsite that evening and found two stranded and three isolated fry at MQM-DSSD03. It is possible that the isolation and stranding of these fry was a result of the ramping excursion. It is also possible that the fry were isolated as a result of natural stage change as river flow was naturally decreasing at that time; this cannot be confirmed.

Please contact me if you have any questions or need further information.

Yours truly
Ecofish Research Ltd.

signed

Adam Lewis, Principal

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Figure 1 Map of the monitoring sites, powerhouse, intake and permanent gauges locations on the Mamquam River.

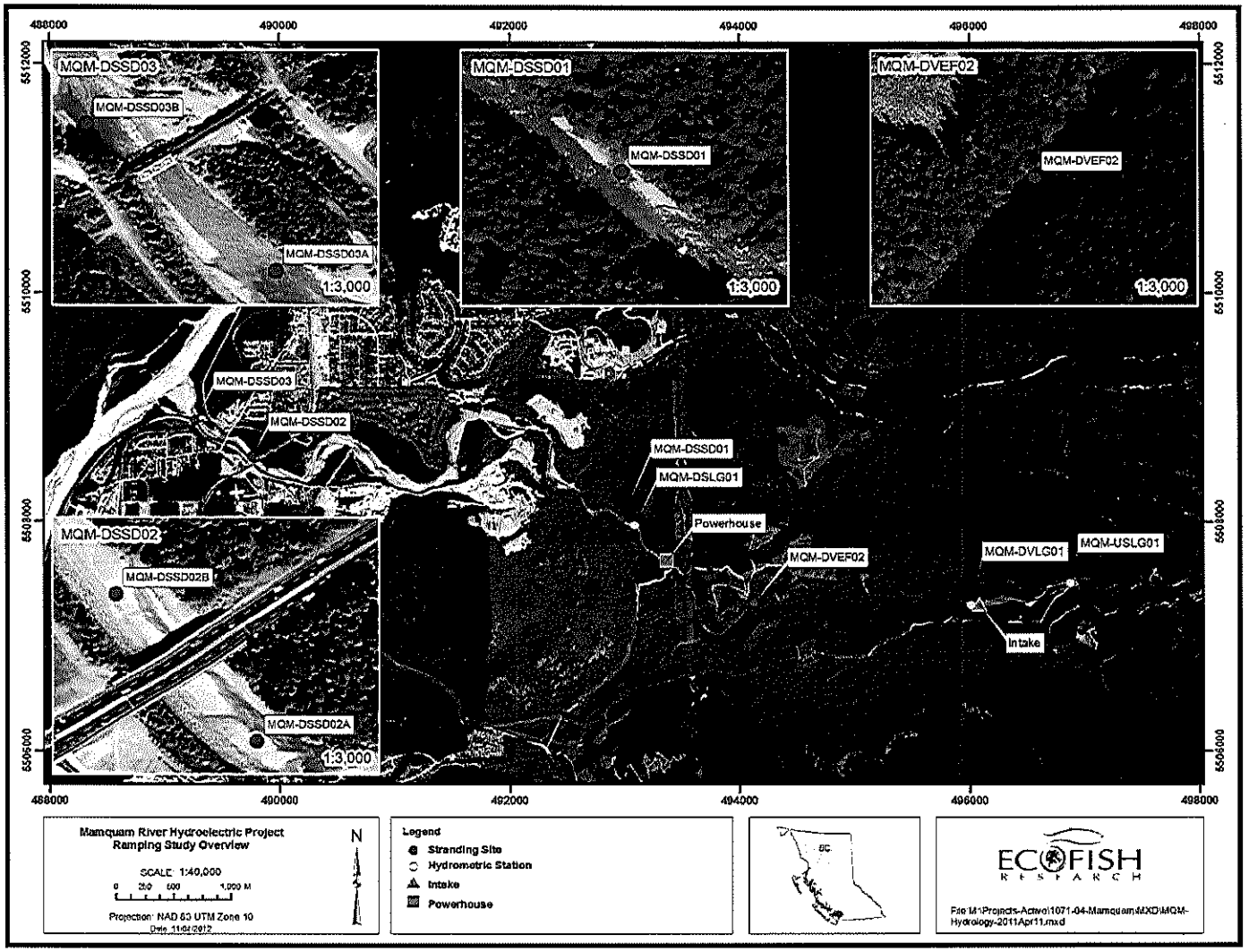

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Table 1 **Summary of stage change, incident duration, and rate of change at MQM-DSLG01 during the ramping excursion on April 05, 2012.**

Compliance Point	Start Time (PDT)	End Time (PDT)	Duration (hh:mm)	Stage Start (cm)[4]	Stage End (cm)[4]	Total Stage Change (cm)[1]	Maximum Hourly Stage Change Rate	Estimated Discharge Start (cms)[1]	Estimated Discharge End (cms)[1]
MQM-DSLG01	05/04/2012 14:48	05/04/2012 15:00	0hour 12min	74.2	70.2	4.0	-4.0	12.5	11.2

1 Negative number indicates stage decrease.

2 MQM-DSLG01 discharge estimated from Rating Curve 9.0 (RC9.0; Discharge = 8.182 (Stage + 0.41) ^ 2.985.

3 This is the maximum stage change recorded within one hour at the hydrometric gauge.

4 Start and End Times denote stage decrease induced by ramping.

Table 2 **Recommended ramping rates for the Lower Mamquam Hydroelectric Project.**

Startup		Shutdown	
Discharge at MQM-DVLG01 (cms)	Maximum recommended stage change rate (cm/hr) at MQM-DVLG01 during	Discharge at MQM-DSLG01 (cms)	Maximum recommended stage change rate (cm/hr) at MQM-DSLG01 during
≤ 10	-7.5	≤ 30	-3.6
> 10 - ≤ 24	-19.9	> 30 - ≤ 50	-9.9
>24	unrestricted	> 50	unrestricted

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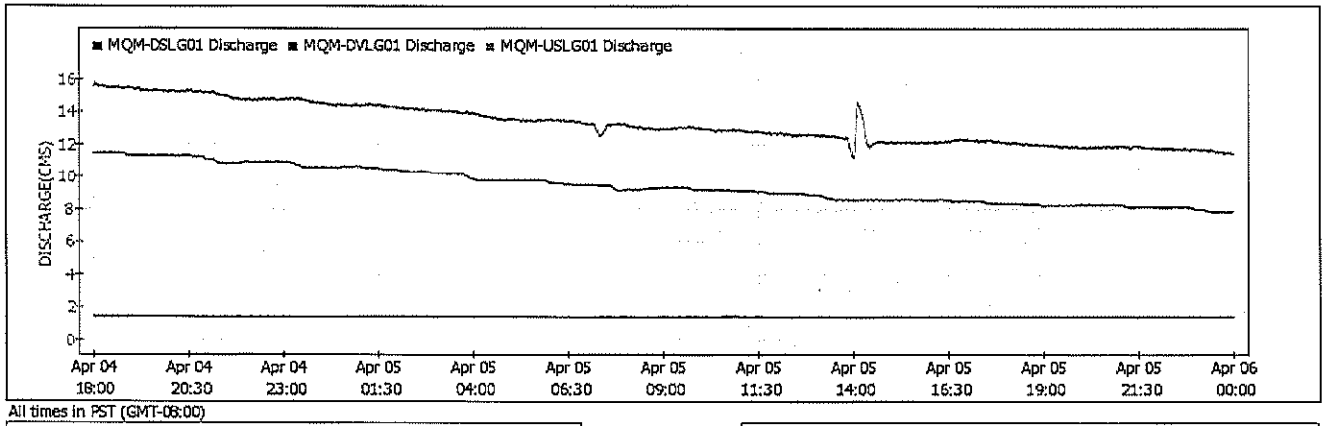
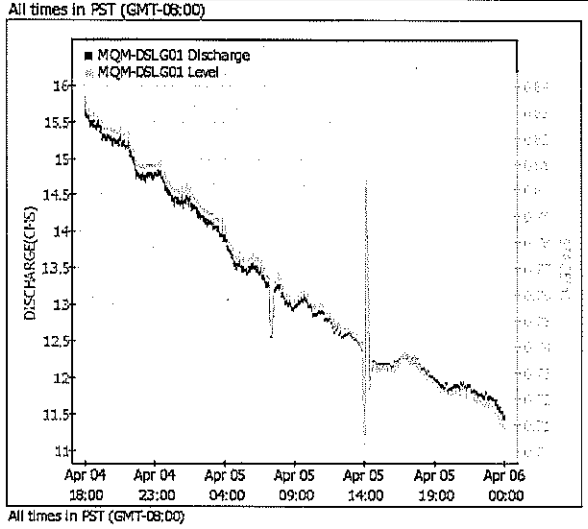
Figure 2 **Discharges on April 05, 2012: a) at the downstream and diversion permanent gauges over time, b) in relation to stage at the downstream permanent gauge on April 05, and c) in relation to ramping rates at downstream permanent gauge (MQM-DSLG01) on April 05 – the ramping criteria of -3.6 cm/hr is shown by the yellow reference line.**

a)



b)



c)

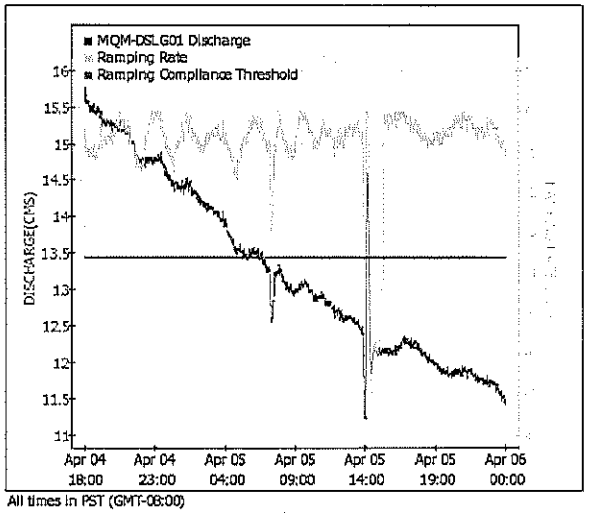


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Photo 1 Stranded (deceased) pink salmon fry (29 mm fork length) found deceased at approximately 19:33 hrs at site MQM-DSSD03.

Photo 2 Stranded pink salmon fry (29 mm fork length) found deceased at approximately 20:04 hrs at site MQM-DSSD03.

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Photo 3 **Isolated pink salmon fry (~30 mm fork length) found alive at approximately 20:20 hrs at site MQM-DSSD03.**

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Appendix A. Ramping Rate Violation Measurement

The procedure is as follows:

1. The maximum stage observed over the past hour at time ti, should be determined for each data point according to the following equation:

$$hmax(ti) = max\ (h(ti-k), \ldots , h(ti-k))$$

where *h* is stage, *k* is the number of data points recorded per hour, and *t* is time, The maximum stage decrease over the past hour relative to time *i* is then defined by the equation:

$$hmax(ti) = max\ (h(ti-k), \ldots , h(ti-k))$$

2. If the maximum stage change *hmax(ti)* exceeds the ramping criterion (e.g. -3.6 cm for MQM-DSLG01), the data are flagged as a potential ramping event. That is the exceedance rule (Rule 1).

3. A mortality event is assumed to occur if the stage remains below for a critical period, which is the dewatering time. The time to asphyxiation is assumed to be 10 minutes considering both air exposure and the time needed for the substrate to drain. This is the dewatering rule (Rule 2).

4. The average stage over some time prior to a ramping event may be used to determine the likelihood of habituation of the affected habitat (we have selected 24 hours). If the maximum level associated with the ramping exceeds the average stage from the past 24 hours, the stage change is recomputed using the 24hr average (as hmax), and violation of Rule 1 is reassessed. If the stage change based on the 24hr average does not exceed the ramping criteria, the event is not flagged as a ramping excursion.