

**THE 2006 SUMMER WATER TEMPERATURE
AND FLOW MANAGEMENT PROJECT**

*NECHAKO FISHERIES CONSERVATION PROGRAM
Technical Report No. RM06-1*

Prepared by:
Triton Environmental Consultants Ltd.

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ABSTRACT

The 2006 Nechako River Summer Water Temperature and Flow Management Project (the Project) was undertaken to attempt to prevent mean daily water temperatures in the Nechako River above the Stuart River confluence (at Finmoore) from exceeding 20.0°C (68.0°F) between July 20 and August 20. Water temperatures were managed by regulating Skins Lake Spillway releases to control flows in the Nechako River below Cheslatta Falls and at Vanderhoof. Mean daily water temperatures in the Nechako River above the Stuart River confluence did exceed 20.0°C (68.0°F) on July 22 through July 27, 2006, reaching a maximum temperature of 21.72°C (71.1°F) on July 23.

Over the duration of the 2006 Summer Water Temperature and Flow Management Project (July 10 to August 20), the total volume of water released was 7.659.9 m³/s-d, (270,509 cfs-d), and the average release during the Project was 182.4 m³/s (6,440.7 cfs).

INTRODUCTION

The Nechako River Summer Water Temperature and Flow Management Project ("STMP") was designed and developed in 1982 and has been successfully implemented since 1983. Since 1988, water temperature and flow management projects (Triton 1995a through Triton 1995h; Triton 1996 through Triton 2005) have been carried out under the auspices of the Nechako Fisheries Conservation Program (NFCP).

The objective of the Project is to attempt to prevent mean daily water temperatures in the Nechako River above the Stuart River confluence (at Finmoore) from exceeding 20.0°C (68.0°F) by regulating releases from the Skins Lake Spillway to control flows in the Nechako River below Cheslatta Falls and at Vanderhoof. The Project is operated from July 10 to August 20 (the operational period) with the goal of managing water temperatures in the Nechako River at Finmoore between July 20 and August 20 (the water temperature control period, hereafter referred to as the control period). These dates may vary as directed by the NFCP in accordance with the timing of sockeye runs in the system. Flows in the Nechako River at Cheslatta Falls are reduced to fall spawning flows by early September.

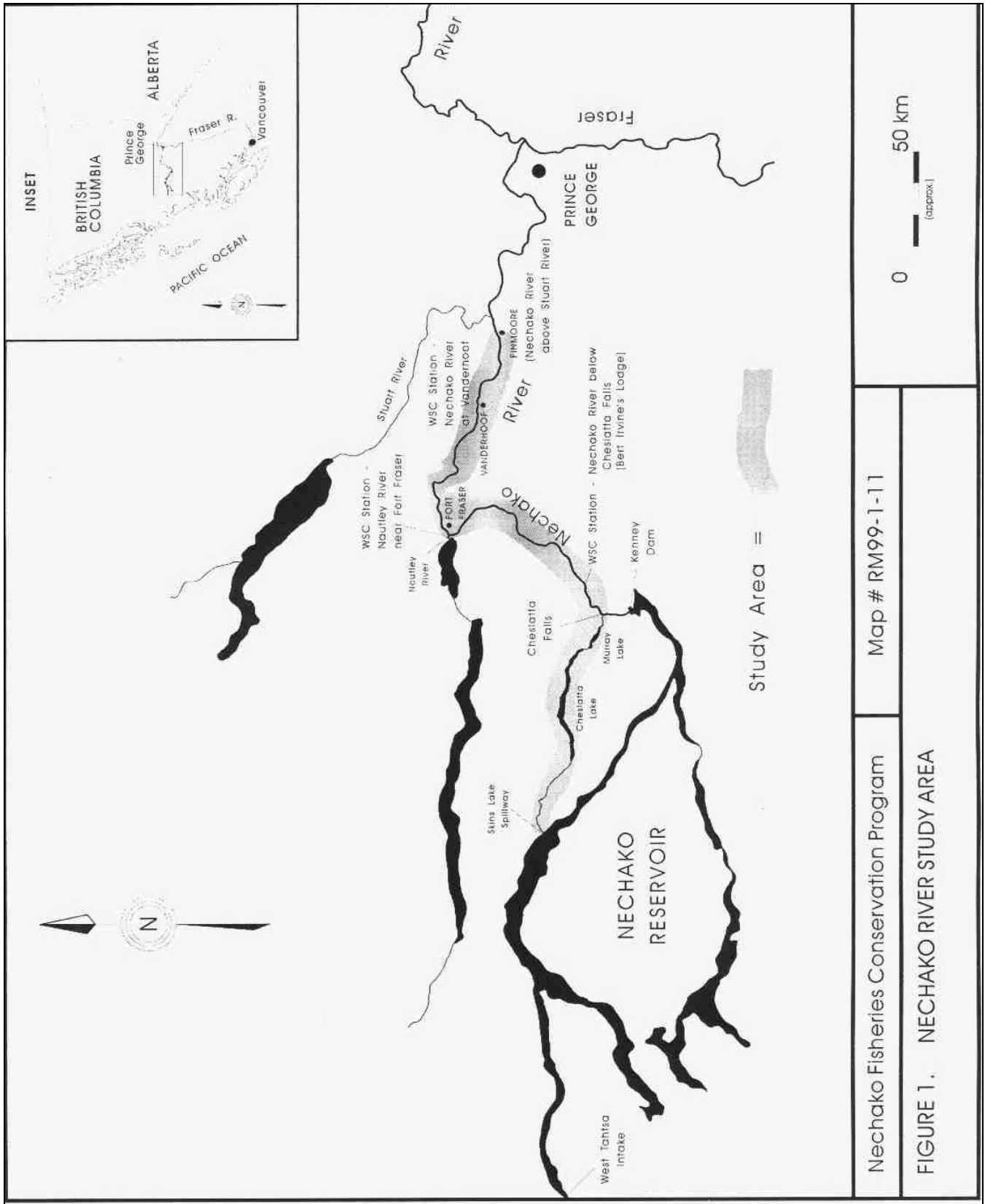
The Project study area is shown in Figure 1. Unless otherwise stated, references to water

temperature, flow (including releases) and meteorological data are mean daily values. Note that water temperature measurements for the Nechako River above the Stuart River confluence are made at Finmoore (the closest readily accessible location), while river discharge measurements are made at Vanderhoof (at the Water Survey of Canada discharge measuring site).

This report reviews the 2006 Summer Water Temperature and Flow Management Project and includes an outline of the method for determining Skins Lake Spillway releases and summaries of the 2006 Skins Lake Spillway releases for the period July 10 to September 6 inclusive; recorded flows (July 10 to September 6) and water temperatures (July 10 to August 20) at various locations along the Nechako River; and the volume of cooling water used in the 2006 Summer Water Temperature and Flow Management Project.

METHODS

Management of the Nechako River flows and water temperatures used water temperature predictions based on five-day meteorological forecasts from Pelmorex Inc. (The Weather Network) to determine the schedule of Skins Lake Spillway releases required to meet project objectives.



Nechako Fisheries Conservation Program

Map # RM99-1-11

FIGURE 1. NECHAKO RIVER STUDY AREA

The Summer Water Temperature and Flow Management uses an unsteady-state flow routing model and an unsteady-state water temperature prediction model designed to compute flows and water temperatures in the Nechako River daily during the entire operational period (Envirocon Limited, 1984a,b,c and 1985).

Daily operations followed the protocol defined in the Settlement Agreement (Anon. 1987), and involved collection of water temperature and river stage data from several locations in the study area, as well as development of five-day meteorological forecasts. Water temperatures were obtained daily from thermographs maintained in the Nechako River below Cheslatta Falls (at Bert Irvine's Lodge), in the Nechako River at Fort Fraser (upstream of the Nautley River), in the Nechako River above the Stuart River confluence, and in the Nautley River. River stages were obtained daily from Water Survey of Canada recorders maintained in the Nechako River below Cheslatta Falls, in the Nechako River at Vanderhoof, and from a staff gauge in the Nautley River. Five-day meteorological forecasts were e-mailed daily by World Weatherwatch (Pelmorex Inc., www.theweathernetwork.com).

River stage and minimum and maximum water temperature data were obtained daily for each identified location except the Nechako River below Cheslatta Falls. At that location, recorded hourly water temperature and river stage data were obtained from the data collection platform via a routine e-mail from Environment Canada (Water Survey of Canada, WSC), Vancouver. Water levels recorded hourly by WSC in Cheslatta Lake at West End were also obtained from the station's data collection platform. These lake level data were used to assist in the analysis of daily predictions of flow produced by the flow routing model for the Nechako River below Cheslatta Falls, and to account for local inflow to the Cheslatta/Murray Lakes system.

In addition, spot temperatures measured with a calibrated mercury thermometer (+/- 0.1°C)

and corresponding recorded water temperatures were collected daily at each location used to adjust the recorded water temperatures. The spot data enabled an ongoing check of each thermograph. If the spot temperature was higher than the thermograph record, the thermograph record was adjusted to agree with the recorded spot temperature for that day. If the thermograph record was higher than the spot temperature, the thermograph record was not adjusted. This procedure was implemented as a conservative measure.

The first 10 days of the operational period, July 10 to July 19, were utilized for system start up, for initialization of the database required to schedule Skins Lake Spillway releases, and to increase flows in the Nechako River from spring flows to the minimum cooling flow of 170 m³/s (6,000 cfs) below Cheslatta Falls. The 2006 Skins Lake Spillway spring base release as directed by the NFCP was 49.0 m³/s (1,730 cfs). Upon commencement of the operational period on July 10, the recorded flow in the Nechako River below Cheslatta Falls was 46.5 m³/s (1,642 cfs). On July 11, 2006, the Skins Lake Spillway release was increased to 226.5 m³/s (8,000 cfs) to ensure flows in the Nechako River below Cheslatta Falls reached the minimum cooling flow of 170 m³/s (6,000 cfs) by July 20 (the beginning of the water temperature control period).

Throughout the operational period, water temperatures in the Nechako River were calculated daily for the previous day, the current day and each of the next four days using the unsteady-state flow routing and water temperature prediction models. These calculations were based on recorded and five-day forecast meteorological data, recorded water temperature and computed flow data. Forecast water temperature predictions were tabulated and reviewed daily to identify trends in water temperature changes. These trends are the same as those used in the water temperature and flow management projects since 1984 (Envirocon Ltd. 1985), and are best explained through reference to Table 1.

Table 1 Daily Operations to Manage Water Temperatures in the Nechako River above the Stuart River Confluence										
Date	11-Jul	12-Jul	13-Jul	14-Jul	15-Jul	16-Jul*	17-Jul	18-Jul	19-Jul	20-Jul
Fifth Day's Predicted Water Temperature @ Date + 4 Days								a5	b5	c5
Fourth Day's Predicted Water Temperature @ Date + 3 Days							a4	b4	c4	
Third Day's Predicted Water Temperature @ Date + 2 Days						a3	b3	c3		
Second Day's Predicted Water Temperature @ Date + 1 Day					a2	b2	c2			
Current Day's Predicted Water Temperature @ Date				a1	b1	c1				
Previous Day's Calculated Water Temperature @ Date - 1 Day		as	bs	cs						
Previous Day's Recorded Water Temperature @ Date - 1 Day			ao	bo	co					
Current Day's Release @ Date				ra	rb	rc				

—→ observed trend
 -·-·→ predicted trend
 - - - → forecast trend

* The current day (i.e., the day of operation) for this example is July 16.

Assuming the current day is July 16, entries corresponding to the current day's operation are represented by the letter *c*. Entries *co* and *cs* represent the recorded and calculated water temperatures, respectively, for the previous day (July 15). Entries *c1* through *c5* represent predicted water temperatures computed using the current day's five-day meteorological forecast and an assumed current day's flow regime. The entry *rc* represents the current day Skins Lake Spillway release required to meet Project objectives.

The following three trends in water temperature changes were reviewed on a day-by-day basis:

1. Observed trend - developed from recorded mean daily water temperatures measured in the Nechako River above the Stuart River confluence each day (*bo* and *co* in Table 1). The difference in recorded water temperatures for the previous two days is extrapolated over the next five days to

determine the observed water temperature trend.

2. Predicted trend - developed from the predicted water temperatures for the previous day and the following five days (*cs*, *c1*, *c2*, *c3*, *c4*, *c5*, in Table 1). These data represent the predicted trend.
3. Forecast trend - developed from the difference between the current five-day and previous five-day predictions for the same calendar days (*c3* and *b4*, *c2* and *b3*, *c1* and *b2* in Table 1). Differences between forecasted data on coincident dates for the current day and the next two days only are averaged and added to the fifth day predicted temperature to determine the trend in forecasted temperatures.

A numerical example of how the trends are calculated is presented in Appendix A.

Each day predicted water temperatures for the five-day forecast period were checked and the three trends calculated. If two of the three trends indicated that the water temperature in the Nechako River above the Stuart River confluence could potentially exceed 19.4°C (67.0°F) then an increase in the Skins Lake Spillway release was required. When this occurred the current day's release was revised and the flow and temperature models were re-run using the modified flow regime. Results of each day's final computer run were subsequently used to initialize water temperatures for the following day's computations. Entries in Table 1 represent each day's final cooling water release and resultant predicted water temperatures.

The following release criteria were used with the three trends identified above to determine the timing and magnitude of Skins Lake Spillway releases:

1. When two of the three trends show an increase in water temperature in the Nechako River above the Stuart River confluence, and these trends show that potentially the water temperature could exceed 19.4°C (67.0°F), increase the Skins Lake Spillway release according to criteria 2 and 3 below.
2. Operate Skins Lake Spillway such that flow in the Nechako River below Cheslatta Falls ranges between 170 m³/s (6,000 cfs) and 283 m³/s (10,000 cfs) as required, and flow in the Nechako River above the Stuart River confluence (as measured at Vanderhoof) does not exceed 340 m³/s (12,000 cfs). It is understood that the flow in the Nechako River below Cheslatta Falls is to be not less than 170 m³/s (6,000 cfs) by the beginning of the control period, and is to be reduced to approximately 31.2 m³/s (1,100 cfs) by September 6.
3. At any time, increase the Skins Lake Spillway release from the current level to 453 m³/s (16,000 cfs) to achieve the flow changes in the Nechako River as fast as possible.
4. During cooling periods when two of three trends in forecasted water temperatures are decreasing and these trends indicate that potentially the water temperature could drop below 19.4°C (67.0°F) within the forecast period (five days), reduce the Skins Lake Spillway release from the current level to 14.2 m³/s (500 cfs).

RESULTS

Predicted and recorded mean daily water temperatures for the Nechako River above the Stuart River confluence, Skins Lake Spillway releases and changes in Skins Lake Spillway releases over the duration of the Project operational period are summarized in Table 2.

Recorded mean daily water temperatures in the Nechako River above the Stuart River confluence (Figure 2 and Table 3) exceeded 20.0°C (68.0°F) July 22 through July 27. The respective maximum and minimum mean daily water temperatures recorded during the control period were 21.7°C (71.1°F) on July 23, and 17.3°C (63.1°F) on July 31 and August 3, 2006. Mean daily water temperatures in the Nechako River below Cheslatta Falls, near Fort Fraser and above the Stuart River confluence, and in the Nautley River near Fort Fraser are presented in Appendix B.

Skins Lake Spillway releases and their corresponding flows in the Nechako River below Cheslatta Falls and at Vanderhoof are plotted in Figure 3 (source data are provided in Appendix C). Changes in Skins Lake Spillway releases during the STMP were made on the following dates:

1. July 11 - Increase to 226.5 m³/s - to increase flow in Nechako River below Cheslatta Falls to STMP base flow by July 20.
2. July 18 - Increase to 453 m³/s - to increase flow in Nechako River below Cheslatta Falls in response to warming trend.
3. July 21 - Decrease to 283 m³/s - to limit flow in Nechako River below Cheslatta Falls to maximum of 283 m³/s.
4. July 24 - Decrease to 14.2 m³/s - to decrease flow in Nechako River below Cheslatta Falls in response to cooling trend.
5. July 27 - Increase to 170 m³/s - to ensure flow in Nechako River below Cheslatta Falls is maintained at summer base flow.
6. August 18 - Decrease to 14.2 m³/s - to decrease flow in Nechako River below Cheslatta to fall spawning flow.
7. September 1 - Increase to 32.4 m³/s - to ensure flow in Nechako River below Cheslatta Falls is maintained at fall spawning flow.

During the control period, measured flows in the Nechako River below Cheslatta Falls (based on preliminary WSC data from the WSC data collection platform at Bert Irvine's Lodge) ranged between a maximum of 288 m³/s (10,171 cfs) on July 24 and a minimum of 143 m³/s (5,050 cfs) on August 20. Flows measured in the Nechako River at Vanderhoof ranged between a maximum of 362 m³/s (12,784 cfs) on July 25 and 26 and a minimum of 201 m³/s (7,098 cfs) on August 20. Following the control period, the mean daily flow in the Nechako River below Cheslatta Falls was reduced to 37.7 m³/s (1,331 cfs) by September 6.

DISCUSSION

The discussion of the 2006 Summer Water Temperature and Flow Management Project has been divided into three sections. The first section reviews the collection and use of recorded field data, including water temperature, flow, and meteorological data (recorded and forecast). The second section discusses the volume of water used during the 2006 Summer Water Temperature and Flow Management Project. The third section provides a brief discussion of the application of the Project release criteria.

Recorded Data

The modelling procedure was initialized using recorded conditions. The quality of the field data used in the modelling process directly affects the accuracy of the computed water temperatures. Therefore, data must be collected accurately and consistently to ensure that random errors are kept to a minimum. Further, consistency in data collection techniques also ensures that, if a bias exists in the data, it remains relatively constant throughout the project.

In 2006, river discharges in the Nechako River below Cheslatta Falls and at Vanderhoof as recorded by the Water Survey of Canada changed as expected in response to Skins Lake

Table 2
 Predicted and Recorded Mean Daily Water Temperatures in the Nechako River above the Stuart River Confluence, July 10 to August 20, 2006

	JULY																					
Date	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
5th Day's Predicted Water Temperature at Date + 4 Days					18.2	17.3	17.6	18.2	18.2	18.8	19.1	19.2	20.2	20.1	20.1	20.2	19.8	19.3	19.2	19.2	19.0	18.7
4th Day's Predicted Water Temperature at Date + 3 Days				18.4	16.8	17.1	17.7	17.8	18.4	18.9	18.9	19.8	20.0	19.8	20.7	20.9	20.0	19.4	19.3	19.2	19.1	17.6
3rd Day's Predicted Water Temperature at Date + 2 Days			19.0	17.2	17.1	17.5	17.8	18.0	18.9	18.8	19.1	19.7	19.4	21.1	21.8	21.2	20.1	19.5	19.4	19.3	17.9	17.7
2nd Day's Predicted Water Temperature at Date + 1 Day		20.0	18.3	17.6	17.7	18.1	17.8	18.8	19.2	18.8	19.6	18.9	21.2	22.5	22.3	21.4	20.3	19.9	19.8	18.7	18.7	16.4
Current Day's Predicted Water Temperature at Date	21.2	19.3	18.4	18.3	18.0	18.0	18.3	19.2	19.0	19.4	18.8	20.4	22.1	22.5	22.1	21.4	20.6	20.2	19.7	19.5	17.8	17.3
Previous Day's Calculated Water Temperature at Date - 1 Day	21.4	19.3	18.6	18.3	18.0	18.2	18.5	19.0	19.3	19.0	19.1	20.6	22.0	22.4	22.1	21.3	20.5	20.1	20.0	19.3	17.9	17.8
Previous Day's Recorded Water Temperature at Date - 1 Day	18.4	18.8	18.9	18.3	17.7	17.6	17.7	18.6	18.4	18.4	18.8	19.8	21.1	21.7	21.4	21.1	20.3	19.8	19.4	19.0	18.3	17.3
Current Day's Skins Lake Spillway Release at Date (m ³ /s)	1730	1730	8000	8000	8000	8000	8000	8000	8000	16000	16000	16000	10000	10000	10000	500	500	500	6000	6000	6000	6000
	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to	to
	8000	8000	8000	8000	8000	8000	8000	8000	16000	16000	10000	10000	10000	10000	500	500	500	6000	6000	6000	6000	6000
	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@	@
	1100	1100	1100	1100	1100	1100	1100	1100	1600	1600	1100	1100	1100	1600	1600	1600	1300	1300	1300	1300	1300	1300
	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs	hrs

Table 2 (continued)

AUGUST

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
5th Day's Predicted Water Temperature at Date + 4 Days	17.6	17.5	16.9	17.3	17.7	18.0	18.0	18.6	18.1	18.3	17.4	17.4	17.9	18.1	18.1	17.3	17.4	17.8	17.8	17.8	
4th Day's Predicted Water Temperature at Date + 3 Days	17.4	16.6	16.9	17.2	17.6	17.6	18.1	18.3	18.5	17.4	17.1	17.7	18.3	18.6	17.6	17.7	17.7	18.1	18.2	17.9	
3rd Day's Predicted Water Temperature at Date + 2 Days	16.4	16.7	16.9	17.2	17.5	17.5	18.2	18.9	17.3	16.8	17.7	18.1	18.8	18.0	17.9	17.8	18.1	18.4	18.1	18.2	
2nd Day's Predicted Water Temperature at Date + 1 Day	16.7	17.1	17.2	17.8	17.4	18.4	19.2	17.8	17.0	18.1	18.1	18.9	18.6	18.3	18.2	18.0	18.6	18.7	18.8	18.5	
Current Day's Predicted Water Temperature at Date	17.6	17.6	17.9	17.7	18.4	18.9	18.4	17.4	18.1	18.3	18.5	18.5	18.3	18.5	18.0	18.4	18.8	19.0	18.9	18.6	
Previous Day's Calculated Water Temperature at Date - 1 Day	17.7	17.8	17.7	18.2	18.5	18.5	18.1	17.9	18.0	18.3	18.3	18.3	18.3	18.5	18.1	18.3	18.8	19.1	18.9		
Previous Day's Recorded Water Temperature at Date - 1 Day	17.5	17.4	17.3	17.7	17.6	17.8	17.7	17.6	17.6	17.6	17.4	17.5	17.8	17.8	17.6	17.8	17.8	18.3	18.1		
Current Day's Skins Lake Spillway Release at Date (m ³ /s)	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	500	500	
																				to	
																					500
																					@
																					0800
																					hrs

Table 3
 Recorded Mean Daily Water Temperatures in the Nechako River
 above the Stuart River Confluence, July 10 to August 20, 2006

Date	Water Temperature (°C)	Date	Water Temperature (°C)
10-Jul	18.4	1-Aug	17.5
11-Jul	18.8	2-Aug	17.4
12-Jul	18.9	3-Aug	17.3
13-Jul	18.3	4-Aug	17.7
14-Jul	17.7	5-Aug	17.6
15-Jul	17.6	6-Aug	17.8
16-Jul	17.7	7-Aug	17.7
17-Jul	18.6	8-Aug	17.6
18-Jul	18.4	9-Aug	17.6
19-Jul	18.4	10-Aug	17.6
20-Jul	18.8	11-Aug	17.4
21-Jul	19.8	12-Aug	17.5
22-Jul	21.1	13-Aug	17.8
23-Jul	21.7	14-Aug	17.8
24-Jul	21.4	15-Aug	17.6
25-Jul	21.1	16-Aug	17.8
26-Jul	20.3	17-Aug	17.8
27-Jul	19.8	18-Aug	18.3
28-Jul	19.4	19-Aug	18.1
29-Jul	19.0	20-Aug	
30-Jul	18.3		
31-Jul	17.3		

Figure 2: Recorded Mean Daily Temperatures in the Nechako River above the Stuart River Confluence
July 10 to August 20, 2006

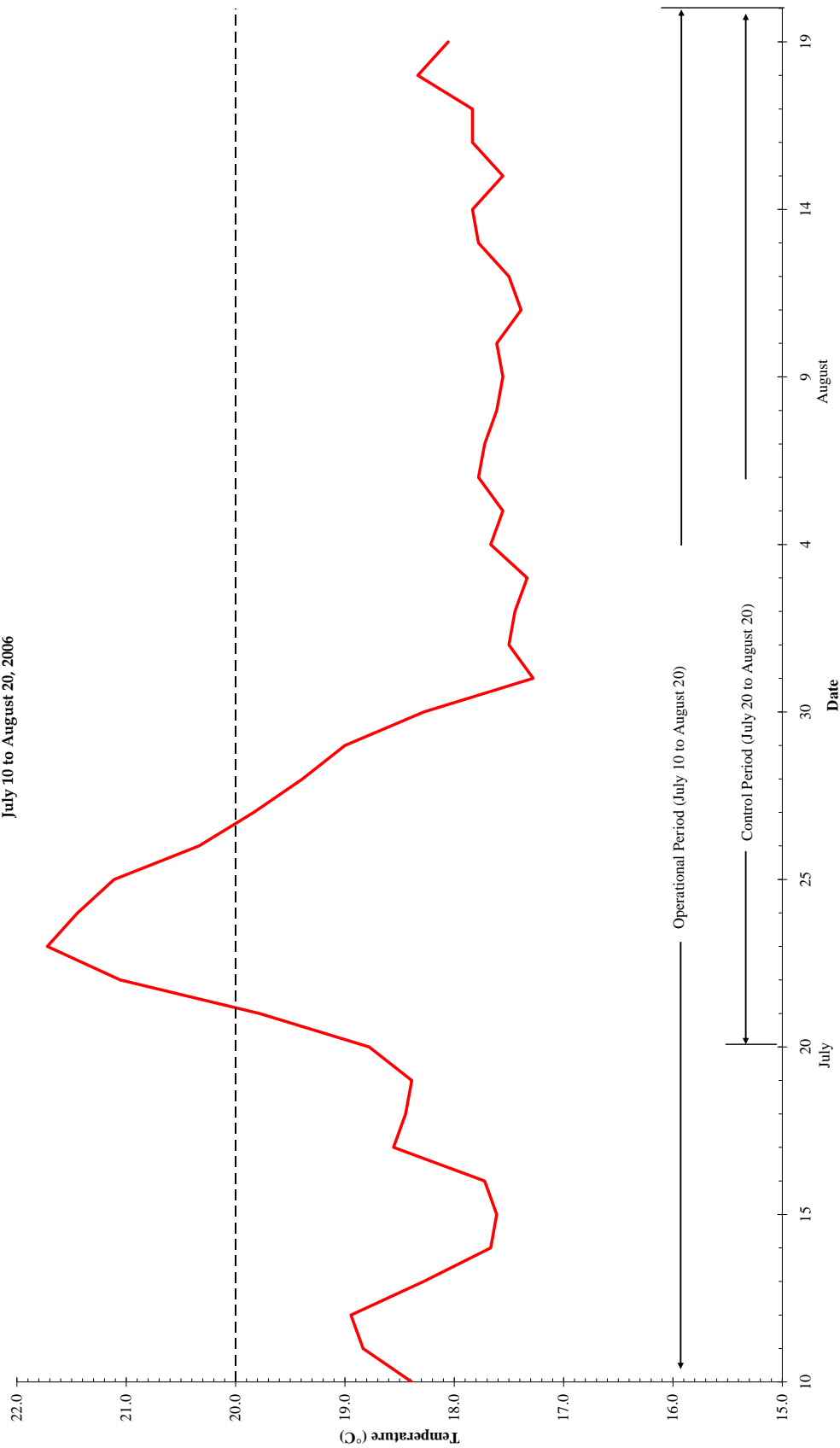
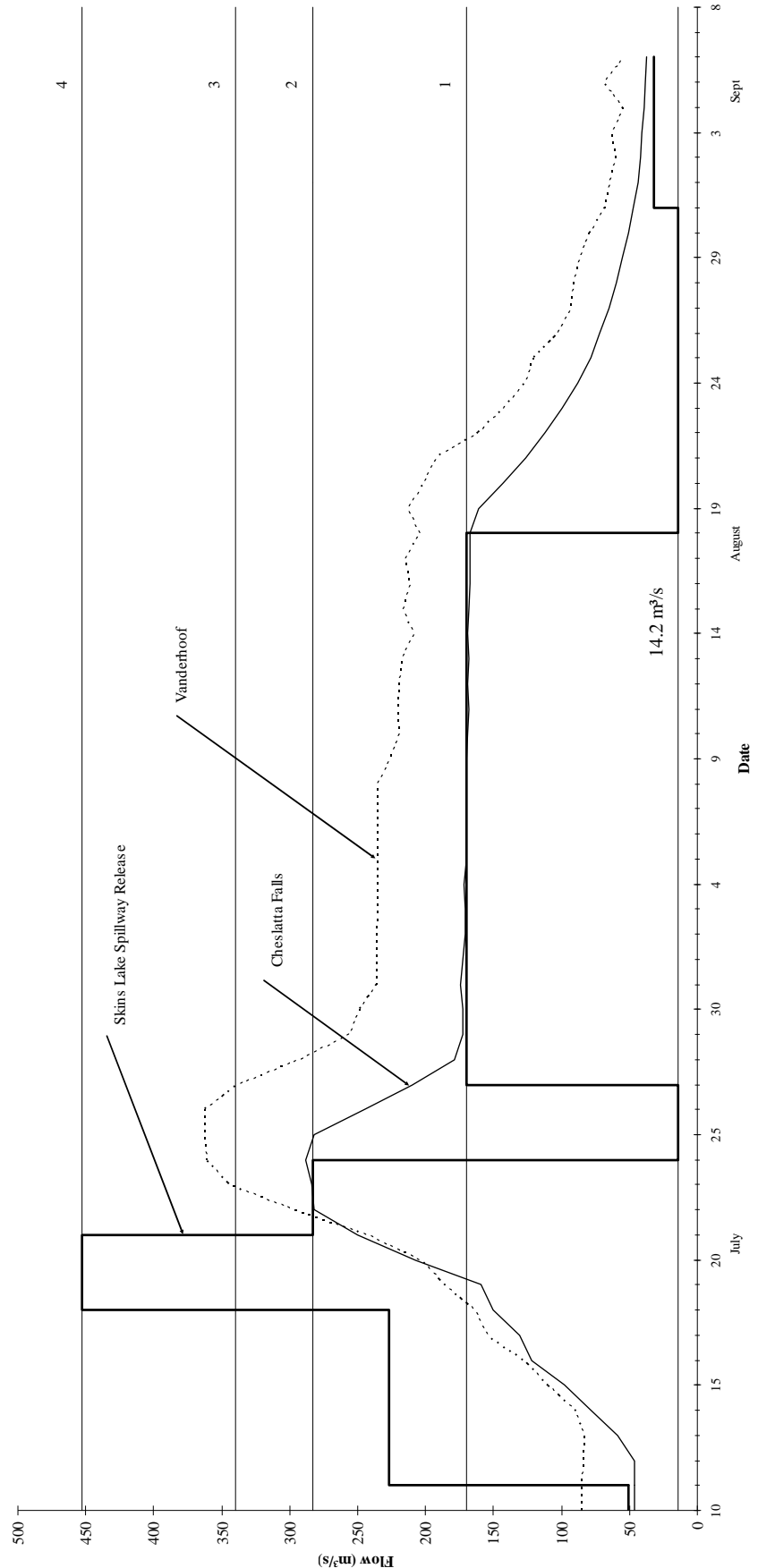


Figure 3: Skins Lake Spillway Releases and Flows in the Nechako River below Cheslatta Falls and at Vanderhoof
 July 10 to September 6, 2006



Spillway releases (Figure 3). The hourly stage data from the gauging stations located on the Nechako River below Cheslatta Falls and at the west end of Cheslatta Lake proved very useful in verifying the daily predictions of the flow routing model and to account for changes in the local inflow to the Cheslatta/Murray Lakes system.

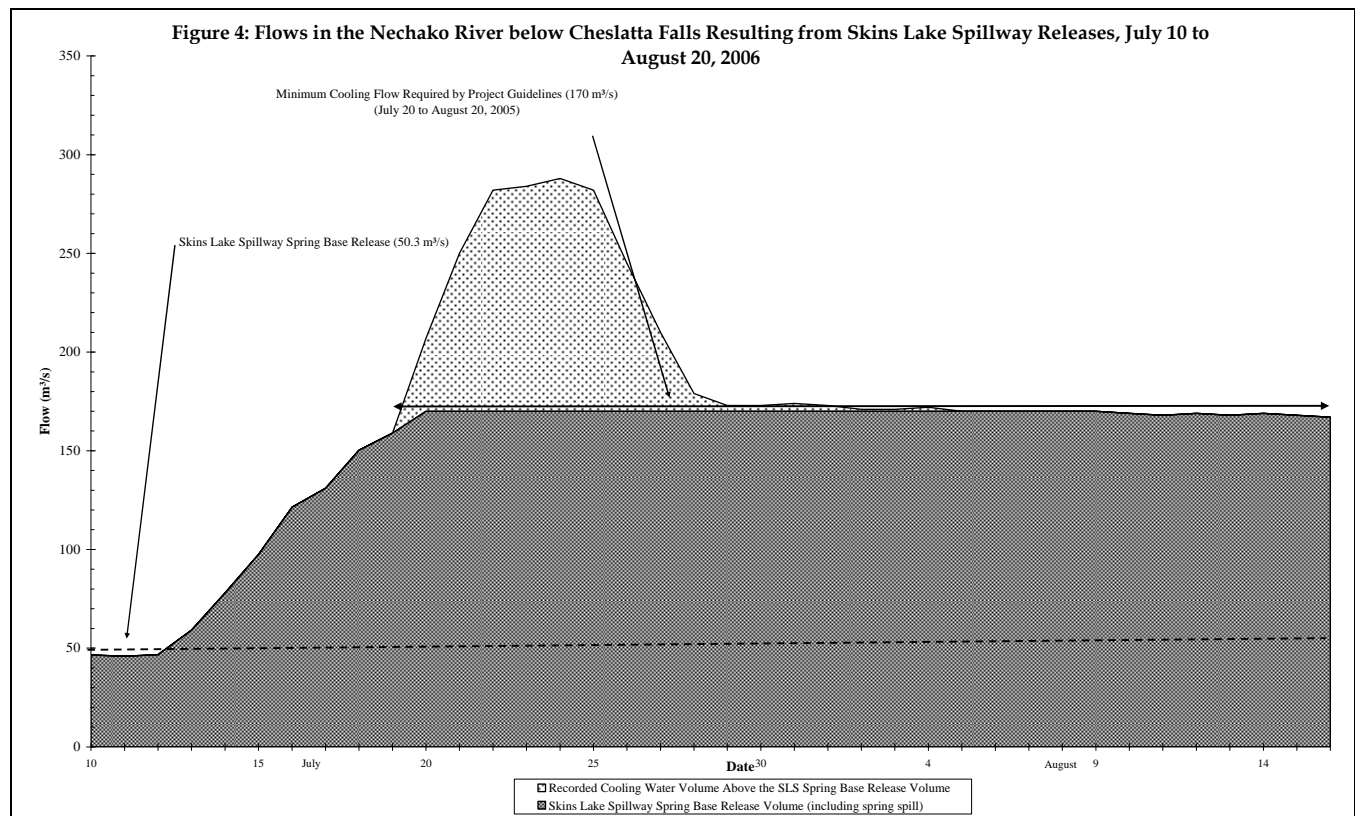
As previously stated, spot and corresponding recorder (thermograph) water temperatures were collected during each site visit. The thermograph water temperatures were not consistently higher or lower than their associated spot temperatures.

Volume of Water Used

Figure 4 presents the recorded flows in the Nechako River below Cheslatta Falls for the 2006 Summer Water Temperature and Flow Management Project. Also indicated is the minimum cooling flow of 170 m³/s (6,000 cfs)

in the Nechako River below Cheslatta Falls, and the Skins Lake Spillway spring base release of 49.0 m³/s (1,730 cfs) as determined by the NFCP Technical Committee as part of the "Annual Water Allocation" defined in the 1987 Settlement Agreement (Anon. 1987).

The total volume of water released during the 2006 Summer Water Temperature and Flow Management Project operational period was 7,659.9 m³/s-d, (270,509 cfs-d). The volume released for cooling purposes was 5,622.6 m³/s-d (198,561 cfs-d), and is based on an assumed Skins Lake Spillway release of 49.0 m³/s (1,730 cfs) for the period July 10 to August 18, inclusive, with a reduction to 14.2 m³/s (500 cfs) until August 20. The average release during the operational period was 182.4 m³/s (6,440.7 cfs). Volume calculations are presented in Appendix E.



**Application of the Summer Water
Temperature and Flow Management
Project Release Criteria**

283 m³/s (10,000 cfs), and thus no further action could be taken.

The Summer Water Temperature and Flow Management Project is very sensitive to the accuracy of meteorological forecasting. If an increase or decrease in temperature occurs over a prolonged period of time (three or four days), inaccurate meteorological forecasts may predict the reversal of the temperature change prematurely. In these instances, it may be required to exercise judgment when applying the Summer Water Temperature and Flow Management Project release criteria used with the three water temperature trends. This judgment is based on experience gained in the operation of the Summer Water Temperature and Flow Management Project since 1984 and may result in exceptions to the decision based on strict adherence to the release criteria.

One exception was made to the application of the release criteria during the 2006 operational period, on July 20, 2006. On July 20, 2006, one of three water temperature trends indicated that the water temperature could exceed 19.4°C (67.0°F) in the Nechako River above Stuart River within the forecast period (five days). The remaining two trends showed that the water temperature could hit 19.4°C (66.9°F) and 18.1°C (64.6°F). Following the release criteria under these conditions, the release from Skins Lake Spillway should have been decreased from the current release of 453 m³/s (16,000 cfs) to 14.2 m³/s (500 cfs). However, there was no strong indication that a cooling trend would actually occur. Therefore, as a conservative measure, it was decided to maintain the spillway release at 453 m³/s (16,000 cfs) until the cooling trend was clearly established.

Mean daily water temperatures in the Nechako River above Stuart River exceeded 20.0°C (68.0°F) on July 22 through July 27, 2006; reaching maximum temperatures of 21.72°C (71.1°F) on July 23. During this period, flow in the Nechako River below Cheslatta Falls was at or exceeded the maximum allowable level of

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APPENDIX A

Numerical Example of Water Temperature Trend Calculation

Appendix A

Numerical Example of Water Temperature Trend Calculation

From data for July 16 date of operation (Table A1).

1. Observed Trend

The observed trend is down by 0.1°C from 17.7°C (J14) to 17.6°C (J15). Take the previous day's recorded temperature 17.6°C (J15) and extrapolate the trend for five days at -0.1°C. The observed trend shows that the water temperature could potentially reach $17.7^{\circ}\text{C} + 5(-0.1^{\circ}\text{C}) = 17.2^{\circ}\text{C}$.

2. Predicted Trend

The predicted trend is the difference between the previous day's calculated water temperature (J15) and the fifth day predicted water temperature (J20). The predicted trend is up from 17.6°C to 19.1°C with the potential to reach 19.1°C.

3. Forecast Trend

The forecast trend for the current day of July 16 is based on the first, second and third day forecasts.

July 16	17.8 to 18.3	=	up	0.5°C
July 17	18.0 to 18.8	=	up	0.8°C
July 18	18.4 to 18.9	=	up	0.5°C

Mean of 3 differences = up 0.6°C

This mean of 0.6°C is added to the fifth day predicted water temperature to give $19.1^{\circ}\text{C} + (0.6^{\circ}\text{C}) = 19.7^{\circ}\text{C}$.

Table A1: Predicted and Recorded Mean Daily Water Temperatures in the Nechako River above the Stuart River Confluence, 2006

Date	JULY										
	10	11	12	13	14	15	16	17	18	19	20
5th Day's Predicted Water Temperature at Date + 4 Days					18.2	17.3	17.6	18.2	18.2	18.8	19.1
4th Day's Predicted Water Temperature at Date + 3 Days				18.4	16.8	17.1	17.7	17.8	18.4	18.9	
3rd Day's Predicted Water Temperature at Date + 2 Days			19.0	17.2	17.1	17.5	17.8	18.0	18.9		
2nd Day's Predicted Water Temperature at Date + 1 Day		20.0	18.3	17.6	17.7	18.1	17.8	18.8			
Current Day's Predicted Water Temperature at Date	21.2	19.3	18.4	18.3	18.0	18.0	18.3				
Previous Day's Calculated Water Temperature at Date - 1 Day	21.4	19.3	18.6	18.3	18.0	18.2					
Previous Day's Recorded Water Temperature at Date - 1 Day	18.4	18.8	18.9	18.3	17.7	17.6					
Current Day's Skins Lake Spillway Release at Date (m ³ /s)	1730	1730	8000	8000	8000	8000	8000	8000	8000	16000	16000
		to							to		
		8000							16000		
		@							@		
		1100							1600		
		hrs							hrs		

APPENDIX B
Mean Daily Water Temperatures in the
Nechako and Nautley Rivers, 2006

Appendix B

Mean Daily Water Temperatures in the Nechako and Nautley Rivers, 2006

Date	Nechako River			Nautley	Date	Nechako River			Nautley
	Cheslatta Falls (°C)	Fort Fraser (°C)	above the Stuart River (°C)	Fort Fraser (°C)		Cheslatta Falls (°C)	Fort Fraser (°C)	above Stuart River (°C)	Fort Fraser (°C)
10-Jul	18.4	18.8	18.4	16.9	1-Aug	17.2	17.8	17.5	17.2
11-Jul	17.7	18.3	18.8	18.2	2-Aug	16.9	17.6	17.4	16.7
12-Jul	17.6	17.9	18.9	18.1	3-Aug	16.9	17.8	17.3	16.9
13-Jul	17.2	17.8	18.3	17.9	4-Aug	16.8	18.3	17.7	17.1
14-Jul	17.4	17.4	17.7	17.7	5-Aug	16.7	18.4	17.6	17.2
15-Jul	17.4	17.6	17.6	17.1	6-Aug	16.7	18.0	17.8	17.3
16-Jul	17.4	18.5	17.7	17.5	7-Aug	16.5	17.6	17.7	17.3
17-Jul	17.4	18.4	18.6	17.0	8-Aug	16.4	17.8	17.6	17.4
18-Jul	17.0	18.0	18.4	17.1	9-Aug	16.4	17.5	17.6	17.3
19-Jul	16.8	18.2	18.4	17.4	10-Aug	16.6	17.9	17.6	17.3
20-Jul	17.1	18.5	18.8	18.4	11-Aug	16.7	18.4	17.4	17.5
21-Jul	17.5	19.8	19.8	20.0	12-Aug	16.5	17.9	17.5	16.9
22-Jul	17.9	20.4	21.1	21.7	13-Aug	16.5	17.8	17.8	17.4
23-Jul	18.2	20.5	21.7	20.8	14-Aug	16.5	18.2	17.8	17.3
24-Jul	18.4	20.3	21.4	20.3	15-Aug	16.0	17.5	17.6	16.7
25-Jul	18.4	19.9	21.1	20.4	16-Aug	16.6	18.0	17.8	17.4
26-Jul	18.4	19.8	20.3	19.7	17-Aug	16.9	18.7	17.8	18.1
27-Jul	18.2	19.3	19.8	19.3	18-Aug	17.0	18.6	18.3	18.2
28-Jul	18.2	19.3	19.4	19.4	19-Aug	16.9	18.2	18.1	17.8
29-Jul	17.8	17.9	19.0	18.6	20-Aug				
30-Jul	17.4	17.4	18.3	17.8					
31-Jul	17.4	17.4	17.3	17.5					

APPENDIX C
Mean Daily Skins Lake Spillway Releases and Flows
in the Nechako and Nautley Rivers, 2006

Appendix C

Mean Daily Skins Lake Spillway Releases and Flows in the Nechako and Nautley Rivers, 2006

Date	Skins Lake Spillway Release (m ³ /s)	Nechako River		Nautley River
		Cheslatta Falls (m ³ /s)	At Vanderhoof (m ³ /s)	Fort Fraser (m ³ /s)
10-Jul	50.3	46.5	84.4	29.5
11-Jul	50.3 to 226.5 @ 1100 hrs	45.9	84.2	29.4
12-Jul	226.5	46.7	84	28.2
13-Jul	226.5	59.1	82.7	29.4
14-Jul	226.5	78.0	89.2	23.1
15-Jan	226.5	97.5	109.0	28.6
16-Jan	226.5	121.5	126.0	27.8
17-Jan	226.5	131.0	154.0	27.5
18-Jan	226.5 to 453 @ 1600 hrs	150.3	162.4	27.1
19-Jul	453	159.0	185.0	26.0
20-Jul	453	207.0	202.0	25.3
21-Jul	453 to 283 @ 1100 hrs	250.0	241.0	25.0
22-Jul	283	282.0	295.0	25.0
23-Jul	283	284.0	343.0	24.3
24-Jul	283 to 14.2 @ 1600 hrs	288.0	360.0 360.0	23.9
25-Jul	14.2	282.0	362.0	23.3
26-Jul	14.2	245.0	362.0	23.3
27-Jul	14.2 to 170 @ 1300 hrs	210.0	338.0	22.3
28-Jul	170	179.0	293.0	21.6
29-Jul	170	173.0	255.0	22.0
30-Jul	170	173.0	248.0	22.9
31-Jul	170	174.0	236.0	22.3
1-Aug	170	173.0	236.0	22.6
2-Aug	170	171.0	236.0	22.3
3-Aug	170	171.0	235.0	22.3
4-Aug	170	172.0	235.0	22.6
5-Aug	170	170.0	235.0	21.6
6-Aug	170	170.0	235.0	21.3
7-Aug	170	170.0	235.0	21.0
8-Aug	170	170.0	235.0	20.7
9-Aug	170	170.0	226.0	20.7
10-Aug	170	169.0	219.0	20.7
11-Aug	170	168.0	220.0	20.0
12-Aug	170	169.0	219.0	19.7
13-Aug	170	168.0	217.0	19.0
14-Aug	170	169.0	208.0	18.7

Appendix C (Continued)

Mean Daily Skins Lake Spillway Releases and Flows in the Nechako and Nautley Rivers, 2006

Date	Skins Lake	Nechako River		Nautley River
	Spillway Release (m ³ /s)	Cheslatta Falls (m ³ /s)	At Vanderhoof (m ³ /s)	Fort Fraser (m ³ /s)
19-Aug	14.2	161.0	213.0	17.2
20-Aug	14.2	143.0	201.0	16.3
21-Aug	14.2	126	192	
22-Aug	14.2	112	161	
23-Aug	14.2	99.9	142	
24-Aug	14.2	88.5	126	
25-Aug	14.2	78.6	120	
26-Aug	14.2	72	102	
27-Aug	14.2	64.8	92.5	
28-Aug	14.2	59.6	91.1	
29-Aug	14.2	55	85.9	
30-Aug	14.2	50.4	79.4	
31-Aug	14.2 to 32.3 @ 0800 hrs	47.1	67.2	
1-Sep	32.3	43.9	63.8	
2-Sep	32.3	41.6	59.7	
3-Sep	32.3	40.5	62.6	
4-Sep	32.3	39.2	54.6	
5-Sep	32.3	38.4	68.7	
6-Sep	32.3	37.7	53.3	

APPENDIX D
Recorded and Forecast Meteorological Data

Appendix D
Recorded and Forecast Meteorological Data 2006

17.40	379.70	0.90	10.20	5.30	93.40	64.70	9 07 06
15.50	360.00	0.80	9.00	9.00	92.80	65.00	10 07 06
14.50	450.00	0.65	6.60	7.50	92.60	57.00	
14.50	360.00	0.80	7.50	7.50	92.60	63.00	
14.50	440.00	0.70	6.50	8.00	92.90	59.00	
16.00	470.00	0.60	6.00	8.00	92.90	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY

WORLD WEATHERWATCH FORECAST ISSUED JUL 10/06

14.30	645.00	0.78	8.90	11.50	92.90	72.40	10 07 06
12.50	265.00	0.90	8.00	8.00	92.80	74.00	11 07 06
12.00	260.00	0.90	8.50	8.00	92.70	79.00	
13.50	330.00	0.80	7.00	9.00	92.90	65.00	
14.00	435.00	0.60	5.50	8.00	93.30	57.00	
14.50	570.00	0.30	6.00	7.00	93.90	57.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY

WORLD WEATHERWATCH FORECAST ISSUED JUL 11/06

12.70	343.90	0.85	7.30	8.40	92.90	70.90	11 07 06
12.60	265.00	0.90	9.50	9.00	92.70	81.40	12 07 06
12.50	330.00	0.80	8.50	9.50	93.10	76.50	
13.50	395.00	0.70	6.50	7.50	93.30	62.60	
14.00	490.00	0.50	6.00	7.00	93.70	58.50	
14.50	475.00	0.50	5.50	6.00	93.90	54.70	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY

WORLD WEATHERWATCH FORECAST ISSUED JUL 12/06

14.30	248.10	0.98	10.00	9.50	92.80	77.30	12 07 06
13.00	330.00	0.80	9.00	9.00	93.00	76.00	13 07 06
13.50	390.00	0.70	8.00	8.00	93.30	69.00	
13.70	440.00	0.60	6.50	7.50	93.60	62.00	
13.80	530.00	0.40	6.00	7.00	94.00	59.00	
14.20	570.00	0.30	7.00	4.00	93.70	62.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY

WORLD WEATHERWATCH FORECAST ISSUED JUL 13/06

12.20	385.20	0.90	9.40	9.60	93.10	84.20	13 07 06
13.20	420.00	0.60	8.00	10.00	93.20	70.70	14 07 06
14.00	430.00	0.60	6.50	10.50	93.60	60.60	
14.20	510.00	0.40	6.50	7.00	93.90	59.80	
14.50	480.00	0.50	7.50	6.50	93.90	62.80	
15.30	460.00	0.50	8.50	5.00	93.80	63.90	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY

WORLD WEATHERWATCH FORECAST ISSUED JUL 14/06

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

11.40	435.00	0.71	8.40	5.50	93.30	84.20	14 07 06
13.00	430.00	0.70	7.00	10.50	93.50	64.00	15 07 06
14.50	500.00	0.50	8.00	7.50	93.50	65.00	
14.20	510.00	0.50	8.00	6.50	93.90	66.00	
15.50	480.00	0.50	9.00	6.00	93.80	66.00	
15.50	570.00	0.30	10.00	5.50	93.70	68.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 15/06							
13.30	562.00	0.55	6.30	11.60	93.80	67.20	15 07 06
14.30	620.00	0.20	9.20	12.50	93.80	71.00	16 07 06
15.50	520.00	0.40	10.00	10.00	93.30	70.00	
14.00	480.00	0.50	10.00	8.00	93.40	77.00	
15.00	550.00	0.20	11.00	9.00	93.60	77.00	
15.50	560.00	0.20	11.00	9.00	93.70	75.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 16/06							
14.70	674.90	0.24	5.90	10.40	94.20	59.60	16 07 06
14.10	420.00	0.70	8.00	8.50	93.50	67.00	17 07 06
14.50	480.00	0.70	9.50	9.00	93.50	72.00	
16.00	520.00	0.30	10.50	8.50	93.30	66.00	
16.00	520.00	0.30	11.00	8.00	93.50	70.00	
17.00	540.00	0.20	11.00	9.00	93.60	66.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 17/06							
12.80	382.00	0.67	7.70	7.40	93.80	72.20	17 07 06
14.50	540.00	0.40	8.00	10.00	93.60	73.00	18 07 06
17.00	550.00	0.30	10.50	8.00	93.30	67.00	
17.50	560.00	0.30	11.00	7.00	93.80	66.00	
18.00	570.00	0.30	11.00	7.00	94.10	64.00	
18.00	620.00	0.20	10.00	8.00	93.80	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 18/06							
16.10	594.00	0.42	5.90	7.80	93.90	52.50	18 07 06
15.20	630.00	0.35	7.00	4.00	93.70	58.00	19 07 06
17.00	550.00	0.50	8.00	6.00	93.90	57.00	
18.50	650.00	0.30	9.00	6.00	94.10	55.00	
19.00	650.00	0.30	9.50	8.00	93.90	55.00	
19.00	600.00	0.50	9.80	9.00	93.70	57.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 19/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

15.00	431.00	0.42	7.00	6.20	93.70	60.00	19 07 06
17.20	550.00	0.39	8.00	5.00	94.10	55.00	20 07 06
18.00	650.00	0.20	7.50	6.00	94.20	51.00	
19.00	600.00	0.30	8.50	8.00	93.90	52.00	
20.00	700.00	0.15	8.80	9.00	93.70	48.00	
20.50	650.00	0.23	9.00	10.00	93.40	48.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 20/06							
19.20	538.30	0.35	9.30	5.70	94.10	57.00	20 07 06
21.80	600.00	0.25	12.00	3.00	94.20	55.00	21 07 06
22.00	650.00	0.25	11.50	6.00	93.90	52.00	
21.50	600.00	0.30	11.00	6.00	93.80	52.00	
21.00	550.00	0.35	11.00	8.00	93.60	54.00	
20.50	520.00	0.40	11.00	10.00	93.40	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 21/06							
22.90	650.00	0.15	12.10	3.00	94.30	55.40	21 07 06
25.00	700.00	0.26	13.30	6.00	94.00	55.00	22 07 06
23.50	600.00	0.35	12.50	7.00	93.60	55.00	
21.00	550.00	0.40	11.50	8.00	93.20	57.00	
19.00	450.00	0.50	10.00	10.00	93.00	54.00	
17.00	400.00	0.60	8.50	12.00	92.80	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 22/06							
24.80	673.40	0.29	12.50	5.90	93.80	51.20	22 07 06
23.50	660.00	0.25	12.00	7.50	93.60	52.00	23 07 06
21.60	600.00	0.35	11.00	8.00	93.20	54.00	
19.00	420.00	0.60	10.00	9.00	92.80	55.00	
17.00	400.00	0.70	8.50	9.00	92.70	55.00	
17.40	500.00	0.55	8.30	11.00	92.90	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 23/06							
24.10	667.80	0.25	11.30	9.90	93.60	48.30	23 07 06
21.60	600.00	0.35	11.50	8.50	93.30	53.00	24 07 06
19.00	420.00	0.65	10.50	8.50	92.90	56.00	
18.00	390.00	0.75	9.00	9.00	92.80	56.00	
17.70	470.00	0.60	8.60	10.00	93.00	55.00	
17.50	390.00	0.70	7.50	10.00	92.60	52.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 24/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

22.00	663.70	0.24	9.30	8.60	93.40	47.00	24 07 06
18.80	420.00	0.68	10.00	7.50	93.00	57.00	25 07 06
18.20	390.00	0.75	9.50	8.50	92.90	57.00	
17.70	440.00	0.65	8.50	9.00	93.00	55.00	
17.50	420.00	0.70	7.50	9.00	92.60	52.00	
17.00	440.00	0.65	8.00	7.00	92.40	55.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 25/06							
19.00	440.00	0.50	10.00	6.00	93.20	57.50	25 07 06
18.20	380.00	0.80	10.50	8.50	93.10	59.00	26 07 06
17.40	450.00	0.60	9.00	8.00	93.10	56.00	
17.00	390.00	0.75	8.20	8.00	92.70	54.00	
17.00	420.00	0.70	8.50	7.00	92.40	56.00	
16.00	340.00	0.85	9.50	10.00	92.30	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 26/06							
18.40	299.80	0.51	10.70	8.30	93.30	63.30	26 07 06
17.20	480.00	0.55	8.80	8.50	93.20	58.00	27 07 06
16.80	420.00	0.70	8.50	8.00	92.90	56.00	
17.00	390.00	0.75	9.00	8.00	92.50	57.00	
15.50	340.00	0.85	9.50	9.00	92.30	66.00	
15.00	370.00	0.80	7.50	12.00	92.70	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 27/06							
17.70	477.70	0.30	6.50	9.10	93.40	49.80	27 07 06
15.50	410.00	0.60	6.00	7.00	93.10	53.10	28 07 06
14.50	240.00	0.90	10.00	9.00	92.70	74.30	
14.50	325.00	0.75	8.50	8.00	92.80	67.20	
14.00	350.00	0.70	7.50	8.50	93.30	64.90	
13.50	375.00	0.65	6.00	6.00	93.50	60.50	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 28/06							
16.50	609.80	0.44	5.60	10.10	93.20	52.20	28 07 06
15.00	240.00	0.90	12.00	13.00	92.80	82.20	29 07 06
13.50	250.00	0.90	9.00	7.00	92.80	74.20	
13.00	350.00	0.70	6.50	8.00	93.10	64.60	
13.20	360.00	0.70	5.00	6.00	93.40	57.50	
12.50	520.00	0.40	4.50	8.00	93.80	58.10	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 29/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

14.30	111.60	0.97	11.70	10.80	92.90	85.50	29 07 06
12.50	325.00	0.75	7.50	10.00	92.90	71.50	30 07 06
13.50	250.00	0.90	7.00	12.00	93.10	64.80	
13.50	310.00	0.75	6.50	8.00	93.30	62.60	
12.50	420.00	0.60	4.50	8.00	93.80	58.10	
12.00	390.00	0.60	5.00	6.00	93.70	62.20	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 30/06							
11.90	205.80	0.79	7.90	9.20	93.00	78.10	30 07 06
14.50	300.00	0.80	7.00	12.50	93.20	60.70	31 07 06
13.70	330.00	0.75	6.00	10.00	93.30	59.70	
12.70	480.00	0.40	5.00	9.00	93.80	59.40	
12.30	430.00	0.50	6.00	5.00	93.90	65.40	
13.00	520.00	0.30	6.00	5.00	93.60	62.40	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED JUL 31/06							
14.70	510.90	0.71	8.80	13.90	93.20	69.90	31 07 06
13.70	350.00	0.70	7.50	10.50	93.30	66.10	01 08 06
12.30	400.00	0.60	5.00	10.00	93.80	61.00	
12.10	480.00	0.40	5.50	7.00	93.90	64.00	
12.80	550.00	0.20	6.00	4.00	93.70	63.30	
15.00	470.00	0.40	6.50	6.00	93.10	56.80	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 01/06							
12.90	406.90	0.63	8.00	11.70	93.40	73.20	01 08 06
13.10	450.00	0.45	5.00	11.00	93.80	57.90	02 08 06
12.50	480.00	0.40	4.50	9.00	93.70	58.20	
13.00	550.00	0.20	7.00	4.00	93.60	66.90	
14.50	410.00	0.55	7.00	5.00	93.40	60.70	
15.50	460.00	0.40	9.00	4.00	93.50	65.20	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 02/06							
12.40	485.90	0.58	5.50	10.00	93.90	65.60	02 08 06
11.70	530.00	0.50	5.80	5.00	93.80	67.00	03 08 06
13.00	450.00	0.60	6.50	5.00	93.60	65.00	
13.50	380.00	0.70	7.50	6.00	93.50	67.00	
14.50	500.00	0.50	8.00	3.00	93.40	65.00	
15.00	450.00	0.60	8.50	3.00	93.20	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 03/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

12.00	403.00	0.55	5.10	5.20	93.80	65.80	03 08 06
13.30	380.00	0.69	7.40	8.80	93.60	67.00	04 08 06
13.50	420.00	0.63	7.80	6.00	93.50	68.00	
15.00	550.00	0.45	7.80	3.00	93.30	62.00	
16.00	500.00	0.55	8.00	3.00	93.10	59.00	
16.00	450.00	0.60	8.50	4.00	92.90	61.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 04/06							
13.50	600.00	0.60	7.10	7.70	93.70	68.30	04 08 06
12.50	400.00	0.58	7.00	5.50	93.50	70.00	05 08 06
14.00	550.00	0.50	7.40	3.00	93.40	64.00	
15.00	500.00	0.55	7.80	3.00	93.10	62.00	
15.50	400.00	0.65	8.20	4.00	93.00	62.00	
15.00	350.00	0.70	8.50	8.00	93.10	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 05/06							
13.80	527.10	0.51	7.40	7.40	93.60	67.70	05 08 06
15.50	650.00	0.17	6.70	3.00	93.40	56.00	06 08 06
16.00	550.00	0.40	7.50	5.00	93.20	58.00	
15.50	400.00	0.65	8.20	6.00	93.10	62.00	
15.30	500.00	0.55	8.00	8.00	93.40	62.00	
15.00	480.00	0.60	7.80	10.00	93.30	61.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 06/06							
14.80	469.70	0.26	6.40	4.30	93.50	61.80	06 08 06
15.50	400.00	0.70	8.00	9.80	93.10	63.00	07 08 06
14.50	280.00	0.85	9.50	6.00	93.20	74.00	
14.50	450.00	0.65	8.50	8.00	93.50	68.00	
14.00	480.00	0.40	7.00	10.00	93.60	63.00	
14.20	450.00	0.45	6.00	6.00	93.40	59.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 07/06							
15.70	206.50	0.84	8.90	12.20	93.20	65.50	07 08 06
14.70	240.00	0.80	10.00	6.50	93.20	73.00	08 08 06
14.00	390.00	0.65	8.00	7.00	93.50	67.00	
13.00	440.00	0.50	6.70	10.00	93.50	66.00	
13.50	530.00	0.45	6.00	7.00	93.40	63.00	
12.50	560.00	0.40	5.50	10.00	93.50	63.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 08/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

15.10	441.30	0.94	11.50	9.90	93.40	80.60	08 08 06
14.00	540.00	0.40	7.20	9.00	93.50	64.00	09 08 06
14.00	450.00	0.50	7.00	10.00	93.50	63.00	
14.50	560.00	0.40	5.00	9.00	93.60	53.00	
13.50	600.00	0.30	6.00	8.00	93.70	60.00	
14.00	550.00	0.40	6.00	8.00	93.60	59.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 09/06							
14.20	540.80	0.30	6.20	7.70	93.90	60.90	09 08 06
13.50	540.00	0.30	8.00	9.00	93.50	69.00	10 08 06
14.50	520.00	0.40	10.00	9.00	93.60	74.00	
14.50	600.00	0.30	7.00	8.00	93.70	61.00	
14.00	550.00	0.40	7.00	8.00	93.60	63.00	
14.00	400.00	0.60	7.00	10.00	93.50	63.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 10/06							
12.40	628.00	0.26	5.20	4.30	93.80	65.20	10 08 06
14.00	630.00	0.25	7.00	10.00	93.80	63.00	11 08 06
15.00	620.00	0.30	7.50	7.00	93.80	61.00	
14.00	600.00	0.30	6.00	8.00	93.60	59.00	
14.00	560.00	0.50	6.00	10.00	93.50	59.00	
13.50	400.00	0.70	7.00	12.00	93.40	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 11/06							
13.60	600.70	0.25	4.70	7.40	93.50	59.70	11 08 06
15.70	460.00	0.50	6.20	7.00	93.70	54.00	12 08 06
15.50	550.00	0.35	6.80	8.00	93.50	57.00	
14.50	400.00	0.65	7.50	10.00	93.30	65.00	
13.50	420.00	0.63	6.80	7.00	93.40	66.00	
13.00	450.00	0.60	6.20	9.00	93.50	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 12/06							
14.70	417.00	0.65	6.80	9.80	93.60	61.50	12 08 06
16.40	560.00	0.43	7.60	7.50	93.60	57.00	13 08 06
15.50	380.00	0.68	8.00	6.00	93.40	65.00	
14.00	450.00	0.60	6.80	7.00	93.50	63.00	
13.80	480.00	0.55	6.20	8.00	93.60	61.00	
14.50	350.00	0.70	6.60	10.00	93.70	60.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 13/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

16.60	462.80	0.44	8.00	8.60	93.70	60.30	13 08 06
15.90	380.00	0.68	9.40	4.00	93.40	65.00	14 08 06
14.50	450.00	0.55	7.80	6.00	93.50	63.00	
14.00	500.00	0.50	6.80	8.00	93.60	62.00	
14.80	450.00	0.60	7.00	10.00	93.70	60.00	
15.50	500.00	0.50	7.30	6.00	93.50	58.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 14/06							
15.20	493.40	0.65	8.40	8.30	93.40	65.90	14 08 06
13.30	550.00	0.28	6.20	6.00	93.60	62.00	15 08 06
14.00	550.00	0.30	6.40	4.00	93.60	60.00	
15.00	500.00	0.35	7.00	7.00	93.60	59.00	
15.50	450.00	0.50	8.00	10.00	93.70	61.00	
14.50	450.00	0.55	7.50	15.00	93.60	63.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 15/06							
13.60	597.60	0.27	5.50	7.30	93.70	61.30	15 08 06
14.00	630.00	0.15	5.70	4.00	93.70	57.00	16 08 06
15.50	580.00	0.30	6.50	7.00	93.60	55.00	
16.00	480.00	0.50	8.00	8.00	93.50	60.00	
15.00	400.00	0.60	8.50	8.00	93.30	65.00	
14.00	450.00	0.50	7.50	6.00	93.50	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 16/06							
14.60	557.20	0.15	5.10	3.80	93.70	58.30	16 08 06
16.00	540.00	0.10	7.00	8.00	93.60	55.10	17 08 06
16.50	460.00	0.30	7.00	9.00	93.80	53.40	
14.50	520.00	0.30	7.50	6.00	93.80	62.80	
14.00	510.00	0.10	8.00	4.00	93.90	67.10	
15.00	510.00	0.10	8.00	5.00	93.60	62.90	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 17/06							
17.10	531.00	0.17	7.60	6.20	93.80	56.90	17 08 06
16.30	500.00	0.20	7.00	9.00	93.80	54.00	18 08 06
13.80	525.00	0.10	5.00	7.00	93.70	55.00	
14.50	515.00	0.10	7.00	3.00	93.70	60.00	
16.00	505.00	0.10	9.00	4.50	93.50	63.00	
16.00	420.00	0.30	10.00	8.00	93.50	67.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 18/06							

Appendix D (Continued)
Recorded and Forecast Meteorological Data 2006

18.00	547.40	0.20	6.10	9.50	93.90	48.40	18 08 06
14.30	535.00	0.10	4.00	6.50	93.70	50.00	19 08 06
15.50	515.00	0.10	6.00	4.00	93.50	53.00	
16.70	450.00	0.30	9.00	4.00	93.30	60.00	
16.20	350.00	0.60	9.50	8.00	93.30	64.00	
15.00	300.00	0.70	8.50	8.00	93.70	65.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 19/06							
13.70	566.10	0.07	3.00	5.20	93.80	53.70	19 08 06
14.00	570.00	0.07	3.00	3.00	93.80	47.00	20 08 06
15.00	500.00	0.20	5.50	5.50	93.50	54.00	
14.50	450.00	0.40	7.50	7.50	93.30	63.00	
14.00	300.00	0.70	8.50	8.50	93.50	69.00	
13.50	500.00	0.60	7.80	7.80	93.70	68.00	
ATEMP(C)	RAD(LY)	CC(TTHS)	DPT(C)	SPD(KH)	SPR(KPA)	RH(%)	DD MM YY
WORLD WEATHERWATCH FORECAST ISSUED AUG 20/06							

APPENDIX E

**Summer Water Temperature and Flow Management Project Reservoir Release
Volume Calculations for July 10 to August 20, 2006**

Appendix E

Summer Water Temperature and Flow Management Project Reservoir Release Volume Calculations
for July 10 to August 20, 2006

Skins Lake Spillway base release for the period July 10 (190) to August 20 (231) = 50.3 m³/s (1,730 cfs)

Summer Water Temperature and Flow Management Project Base Release Volume = (JD 231 - JD 190) * 50.3 + (JD 231 - JD 229) * 14.16
= 2,090.62 m³/s*days

Time period (Julian Day)	Time (hrs)	Flow Rate (m ³ /s)	Volume (m ³ /s*hrs)
July 10 (190) @ 2400 hrs to July 11 (191) @ 1100 hrs	35.0	49.0	1,715
July 11 (191) @ 1100 hrs to July 18 (198) @ 1600 hrs	173.0	226.5	39,184
July 18 (198) @ 1600 hrs to July 21 (201) @ 1100 hrs	67.0	453.0	30,351
July 21 (201) @ 1100 hrs to July 24 (204) @ 1600 hrs	77.0	283.0	21,791
July 24 (204) @ 1600 hrs to July 27 (207) @ 1300 hrs	69.0	14.2	980
July 27 (207) @ 1600 hrs to August 18 (229) @ 0800 hrs	523.0	170.0	88,910
August 18 (229) @ 0800 hrs to August 20 (231) @ 2400 hrs	64.0	14.2	906

Total 1,008 (42.0 days) 183,838

Total Release Volume = 183,838 m³/s*hrs
= 7,659.9 m³/s*days
= 270,509 cfs*days

Volume Released for Cooling Purposes = Total Volume - Base Volume
= 7,659.9 - 2,037.3
= 5,622.6 m³/s*days
= 198,561 cfs*days

Average Release over Summer Management Period (July 10 to August 20) = 7,659.9 m³/s*days / 42 days
= 182.4 m³/s
= 6,440.7 cfs