Province of British Columbia
WATER ACT

ORDER

Sections 87 and 88

File No. 0277417, 0210420, 0206232, 0156743, 0189364, 0207076, 1002912, 1002913, 0210707, 0211521, 0211222 and 0211522

WHEREAS British Columbia Hydro and Power Authority (BC Hydro) is the operator of the Campbell River hydroelectric system (the "System") which comprises the Strathcona, Ladore and John Hart Generating Stations, the Strathcona, Ladore and John Hart Dams, the Upper Campbell Lake and Buttle Lake, Campbell Lake, John Hart Lake and Wokas Lake and Upper Quinsam Lake Reservoirs, and the Heber, Crest, Salmon, and Quinsam Diversion Dams and Quinsam Storage Dam, in respect of which it holds Final Water Licences 126726, 126725, 126722, 126724, 126713, 126721, 126751, 126727, 126757, 126764, 126759, 126765, 126761 and Conditional Water Licence 23265;

WHEREAS BC Hydro has engaged in public consultation to determine parameters and procedures for the operation of the System which may provide benefits as described below;

WHEREAS the operation of the works has been regulated by an order dated October 3, 1997 on the Campbell River, order dated December 22, 1998 on the Heber River, order dated December 22, 1998 on the Salmon River, order dated May 23, 1963 on Quinsam River and order dated May 23, 1963 on Wokas Lake and Upper Quinsam Lake Reservoir;

WHEREAS BC Hydro has submitted the Campbell River Project Water Use Plan dated November 21, 2012:

WHEREAS the Campbell River Water Use Plan recommends operational changes to the System, and additional works in the area influenced by the System with the intent of providing benefits to fisheries and wildlife habitat, shoreline conditions, flood mitigation and recreation;

WHEREAS the Campbell River Water Use Plan recommends a monitoring programme to determine whether the recommended operational changes to the System and recommended additional works in the area influenced by the System will provide the expected benefits;

WHEREAS the Campbell River Water Use Plan recommends decommissioning of the Heber Dam and pipeline that are part of the works authorized for the diversion of water from Heber River into the Campbell River basin;

WHEREAS the Heber Dam and pipeline are being decommissioned following procedures set out in section 9 of the *Water Act* BRITISH COLUMBIA DAM SAFETY REGULATION, which process is separate from the implementation of the remainder of the recommendations of the Campbell River Water Use Plan;

WHEREAS I have accepted the Campbell River Project Water Use Plan dated November 21, 2012;

I HEREBY ORDER THAT:

1. The following orders are revoked:
   a) The order dated October 3, 1997 regulating the various works on the Campbell River;
   b) The order dated December 22, 1998 on the Heber River;
   c) The order dated December 22, 1998 on the Salmon River;
   d) The order dated May 23, 1963 on the Quinsam River; and
   e) The order dated May 23, 1963 on Wokas Lake Reservoir.

Strathcona

2. The maximum and minimum operating levels for the Upper Campbell Lake and Buttle Lake Reservoir (the "Upper Reservoir") to meet fisheries, recreation, shoreline and flood mitigation interests are as set out in the following table and measured at Strathcona Dam using Geodetic Survey of Canada (GSC) datum:

Period	Maximum Operating Level (m)[a]	Minimum Operating Level (m)
Jan 1 to Dec 31	220.5	212.0

[a] metres

3. Within the range of operating levels specified in clause 2 is a Preferred Zone, shown in Figure 1 of Schedule A. Specifically for summer recreation, the upper and lower bounds of the Preferred Zone for the Upper Reservoir are:

Period	Preferred Zone	
	Maximum (m)	Minimum (m)
Jun 21 to Sep 10	220.5	217.0

4. Guidelines for the operation of the System to manage the levels of the Upper Reservoir to the Preferred Zone are set out in Schedule B.

5. The operation of the Upper Reservoir to the Preferred Zone in accordance with Schedule B replaces the drafting requirement for the Upper Reservoir specified in clause e) v) of Final Water Licence 126751.

6. The discharge from the Strathcona Dam spillway shall be changed to meet fishery interests at rates not exceeding those in the following table:

Spillway Discharge(m^3/s)[a]	Maximum Ramp Down ($m^3/s/hr$)[b]	Maximum Ramp Up ($m^3/s/hr$)
> 5.0	no constraint	no constraint
0.0 to 5.0	2.5	no constraint

[a] cubic metres per second
[b] cubic metres per second per hour

Ladore

7. The maximum and minimum operating levels for the Campbell Lake Reservoir (the "Lower Reservoir") to meet fisheries, recreation, shoreline and flood mitigation interests are as set out in the following table and measured at Ladore Dam using GSC datum:

Period	Maximum Operating Level (m)	Minimum Operating Level (m)
Jan 1 to Dec 31	178.3	174.0

8. Within the range of operating levels specified in clause 7 is a Preferred Zone, shown in Figure 2 of Schedule A. Specifically for summer recreation, the upper and lower bounds of the Lower Reservoir Preferred Zone are:

Period	Preferred Zone	
	Maximum (m)	Minimum (m)
Jun 21 to Sep 10	177.5	176.5

9. Guidelines for the operation of the System to manage the levels of the Lower Reservoir within the Preferred Zone are set out in Schedule B.

10. The discharge from the Ladore Dam spillway shall be changed to meet fisheries interests at rates not exceeding those in the following table:

Spillway Discharge m^3/s	Maximum Ramp Down ($m^3/s/hr$)	Maximum Ramp Up ($m^3/s/hr$)
> 8.0 m^3/s	no constraint	no constraint
0.0 to 8.0	2.0	no constraint

John Hart

11. The minimum discharge from the John Hart Dam Spillway to Elk Falls Canyon, which is the portion of Campbell River from John Hart Dam to the confluence with the tailrace of the John Hart Generating Station, measured in the vicinity of Water Survey of Canada Station (WSC) 08HD029, to meet fisheries interests shall be as set out in the following table:

Period	Minimum Discharge (m^3/s)
Apr 16 to Mar 31	4.0 (habitat)
Apr 1 to Apr 15	7.0 (habitat and spawning)

The minimum discharge may be included as part of the requirements for pulses of water discharged to Elk Falls Canyon as set out in clause 12.

12. Pulses of water shall be discharged from the John Hart Dam Spillway to Elk Falls Canyon to meet fisheries interests as set out in the following table:

Period	Minimum Discharge (m^3/s)	Pulse Duration	Pulses per Period	Time Between Pulses
Feb 15 to Apr 15	10.0	48 hrs	5	5 to 12 days
Sep 15 to Nov 15	7.0	48 hrs	9	3 to 5 days

13. The John Hart Generating Station and John Hart Dam Spillway shall be operated jointly to provide a combined discharge to meet fisheries interests in Lower Campbell River, below the confluence of Elk Falls Canyon and tailrace of John Hart Generating Station measured in the vicinity of WSC 08HD003, as set out in the following table:

Period	Preferred Minimum (m^3/s)	Fisheries Target (m^3/s)	Preferred Maximum (m^3/s)
January 1 to February 15	80	122	124
February 16 to February 28	80	106	124
March 1 to April 14	60	100	104
April 15 to April 30	80	80	124
May 1 to June 30	100	100	124
July 1 to July 19	28	40	124
July 20 to September 14	28	40	124
September 15 to September 21	28	40	124
September 22 to October 14	28	100	104
October 15 to November 15	80	122	124
November 16 to December 31	80	106	124

The range in flow from minimum to maximum shown in the above table is the Preferred Zone for flow in the Lower Campbell River as shown in Figure 3 of Schedule A.

14. The minimum discharge to Elk Falls Canyon in clause 11 and the pulse flow requirements of clause 12 may be in addition to the maximum flow in Lower Campbell River in clause 13.

15. Guidelines for the operation of the System to manage the flow of the Lower Campbell River to the Preferred Zone are set out in Schedule B.

16. The turbine discharge from the John Hart Generating Station shall be changed to meet fisheries interests at the rates not exceeding the following:

Turbine Discharge (m^3/s)	**Maximum Turbine Ramp Down ($m^3/s/hr$)**	**Minimum # Approximately Equal Changes per Hour**
> 76.0	42.0	4
76.0 to 60.0	7.0	2
< 60.0	2.0[a]	1

[a] Maximum 6.0 $m^3/s/day$

Turbine Discharge (m^3/s)	**Maximum Turbine Ramp Up ($m^3/s/hr$)**	**Minimum # Approximately Equal Changes per Hour**
> 76.0	42.0	4
≤ 76.0	14.0	2

17. The restrictions in clause 16 are not applied to the turbine discharge from the John Hart Generating Station from January 1 to February 15 provided that minimum flow in Lower Campbell River exceeds 80 m^3/s.

18. The discharge from the John Hart Dam spillway to Elk Falls Canyon shall be changed to meet fisheries interests at rates not exceeding those in the following table:

Discharge to Elk Falls Canyon (m^3/s)	Ramp Rates
> 100.0	No Ramp Up Constraint
4.0 to 100.0	Increase at 20.0 $m^3/s/hr$
≥ 8.0	No Ramp Down Constraint
8.0 to 4.0	Decrease at 1 $m^3/s/hr$

The discharge to Elk Falls Canyon shall be changed according to the rates set out in clause 16 when the flow required under clause 13 is provided in full by discharge to Elk Falls Canyon.

Salmon River and Salmon Diversion

19. When flows are naturally available, the Salmon Diversion Dam shall be operated to discharge a minimum of 4.0 m^3/s into the Salmon River measured in the vicinity of the WSC 08HD032.

20. The maximum diversion into the canal at the Salmon Diversion Dam, as measured in the vicinity of WSC 08HD020, shall be as follows:

Period	Maximum Diversion (m^3/s)	Operation of Fish Screen
Jan1 to Mar 31	43.0	Not required
April 1 to Dec 31	15.0 [a]	Required

[a]Maximum diversion may be increased from 15 to 30 m^3/s if fish screen operation is improved in accordance with Schedule F.

21. The discharge into the canal at the Salmon Diversion Dam may be decreased at a maximum rate of 10.0 $m^3/s/hr$ with 4 discrete and approximately equal changes per hour.

22. For diverting water into the canal at the Salmon Diversion Dam, the flow in the Salmon River below the dam shall be decreased at rates not exceeding those set out in the following table:

Salmon River Flow (m^3/s)	Maximum Ramp Down ($m^3/s/hr$)	Minimum # of Approximately Equal Changes per Hour
> 10.0	10.0	4
10.0 to 8.0	2.0	4
< 8.0	1.0	4

23. The rates for changing the flow in the Salmon River as set out in clause 21 and 22 are not applied during the flushing operation to clean the Salmon Diversion Dam trash rack.

Quinsam River, Quinsam Diversion and Quinsam Storage Dam

24. When flows are naturally available at Quinsam Diversion Dam and Quinsam Storage Dam, the Quinsam Diversion Dam shall be operated to discharge to the Quinsam River, for fisheries interests, the following minimum flow set as measured in the vicinity of WSC 08HD021:

Period	Minimum Discharge to Quinsam River (m^3/s)
Jan1 to Apr 30	2.0
May 1 to Oct 31	1.0
Nov 1 to Dec 31	0.6

25. The minimum discharge to Quinsam River for the period May 1 to October 31 may be reduced from 1.0 m^3/s upon consultation with federal and provincial fishery agencies and as approved by the Comptroller of Water Rights to ensure flow continuity for fishery interests.

26. The diversion into the canal at the Quinsam Diversion Dam shall be decreased at rates not exceeding those in the following table:

Diversion from Quinsam River (m^3/s)	Maximum Decrease (m^3/s/hour)	Minimum # of Approximately Equal Changes per Hour
>2.0	No constraint	n/a
≤ 2.0	1.0	4

27. The diversion into the canal at the Quinsam Diversion Dam shall not decrease the flow in the Quinsam River below the diversion dam at rates exceeding those set out in the following table:

Quinsam River Flow (m^3/s)	Maximum Decrease ($m^3/s/hr$)	Minimum # of Approximately Equal Changes per Hour
>4.0	8.5	4
≤ 4.0	1.0	4

Priorities

28. BC Hydro shall implement the above clauses:

    a) using the following priorities, from highest to lowest:

        i) dam safety requirements defined in the Operation, Maintenance and Surveillance Manuals for Strathcona, Ladore and John Hart Dams, Salmon River, Crest Creek and Quinsam River Diversion Dams and Quinsam Storage Dam;

        ii) maintain minimum flows in the Salmon River, Quinsam River and Elk Falls Canyon, when naturally available;

        iii) manage high inflow and reservoir routing criteria according to the guidelines in Schedule B;

        iv) operate Strathcona, Ladore and John Hart Generating Stations to manage the flow in Lower Campbell River to the Preferred Zone shown in Figure 3, Schedule A according to the guidelines of Schedule B;

        v) maintain all specified ramping rates;

        vi) operate Strathcona, Ladore and John Hart Generating Stations to manage the level of the Upper Reservoir to the Preferred Zone shown in Figure 1, Schedule A; and

        vii) operate Strathcona, Ladore and John Hart Generating Stations to manage the level of the Lower Reservoir to the Preferred Zone shown in Figure 2, Schedule A.

    b) following Schedule B for operations beyond the Preferred Zones.

Works and Monitoring

29. BC Hydro shall submit for approval by the Comptroller, terms of reference for works, feasibility and monitoring studies for:

    a) Upper Campbell Lake and Buttle Lake Reservoir as described in Schedule C;

    b) Campbell Lake Reservoir as described in Schedule D;

    c) John Hart Lake Reservoir and Campbell River as described in Schedule E; and

    d) Salmon and Quinsam Diversions as described in Schedule F.

30. BC Hydro shall submit, within 6 months of the date of this Order, for approval by the Comptroller, terms of reference for assessing any deficiencies in the existing water release facilities with regard to meeting ramping rate criteria specified in this Order.

31. Upon receiving, from the Comptroller, approval of the above terms of reference and leave to commence, BC Hydro shall:

a) implement the works, feasibility studies, and effectiveness monitoring programs in accordance with approved terms of reference; and

b) submit annual reports in February of each year to the Comptroller of Water Rights on the results of the approved works, studies, plans and monitoring until the conclusion of the programmes as specified in each terms of reference.

Records

32. With respect to the maintenance and provision of records BC Hydro shall:

a) Keep records of:

i) elevations of the Upper Campbell and Buttle Lake Reservoir, Campbell Lake Reservoir and John Hart Lake Reservoir;

ii) discharge from the spillways at Strathcona Dam, Ladore Dam and John Hart Dam;

iii) discharge from the turbines at Strathcona, Ladore and John Hart Generating Stations;

iv) the combined flow in the Lower Campbell River measured downstream of the confluence of the discharge from John Hart spillway and the John Hart Generating Station in the vicinity of WSC 08HD003;

v) flow released to the Salmon River below Salmon Diversion in the vicinity of WSC 08HD032 and flow diverted at the Salmon Diversion into the canal measured in the vicinity of WSC 08HD020;

vi) flow in Quinsam River below the Quinsam diversion in the vicinity of WSC 08HD021 and flow diverted at the Quinsam diversion measured in the vicinity of WSC 08HD026; and

vii) flow in the Campbell River downstream of the confluence of the Quinsam River.

b) Provide a written report to the Comptroller of Water Rights in February of each year summarizing the records from the previous calendar year; and

c) Provide on request of the Comptroller of Water Rights records collected under clause 32 a).

Emergency Operation

33. BC Hydro may operate the System in a manner other than set out above or in Schedule B in the event of an emergency, dam safety matter, or an extreme hydrological event.

Notice

34. Any emergency or dam safety matter that causes deviations from operations ordered above shall be reported to the Comptroller of Water Rights in a timely manner.

35. The Comptroller of Water Rights shall be notified:

    a) When the level of the Upper Reservoir or Lower Reservoir is forecast to fall outside the Preferred Zones referred to in clause 3 and clause 8; and

    b) When the flow in the Lower Campbell River is forecast to fall outside the Preferred Zone in any period as set in clause 13.

Dated at Victoria, B.C., this 21st day of November, 2012.

Pieter Bekker
Deputy Comptroller of Water Rights

Schedule A

Figure 1
Upper Campbell Lake and Buttle Lake Reservoir (Upper Reservoir)

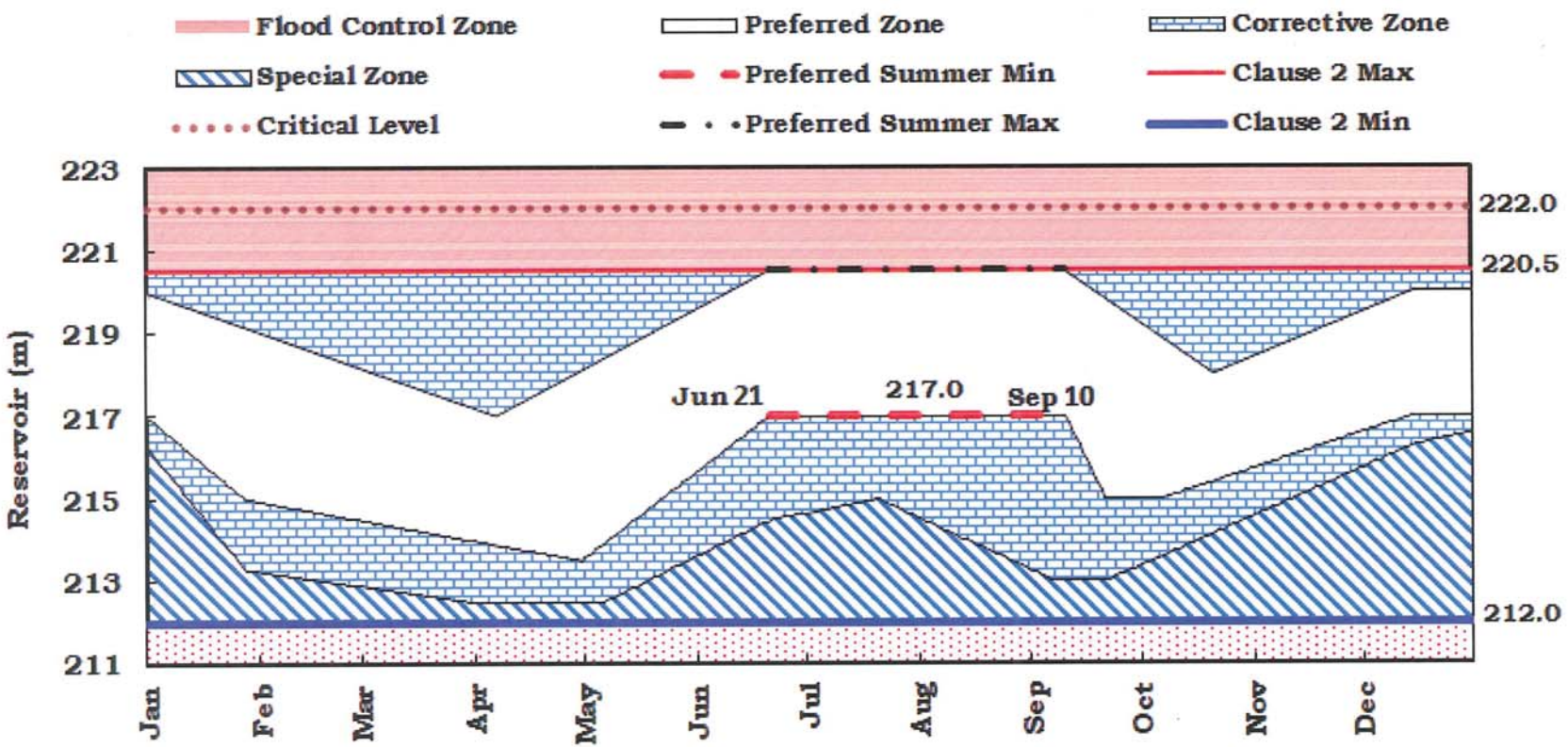


Figure 2
Campbell Lake Reservoir (Lower Reservoir)

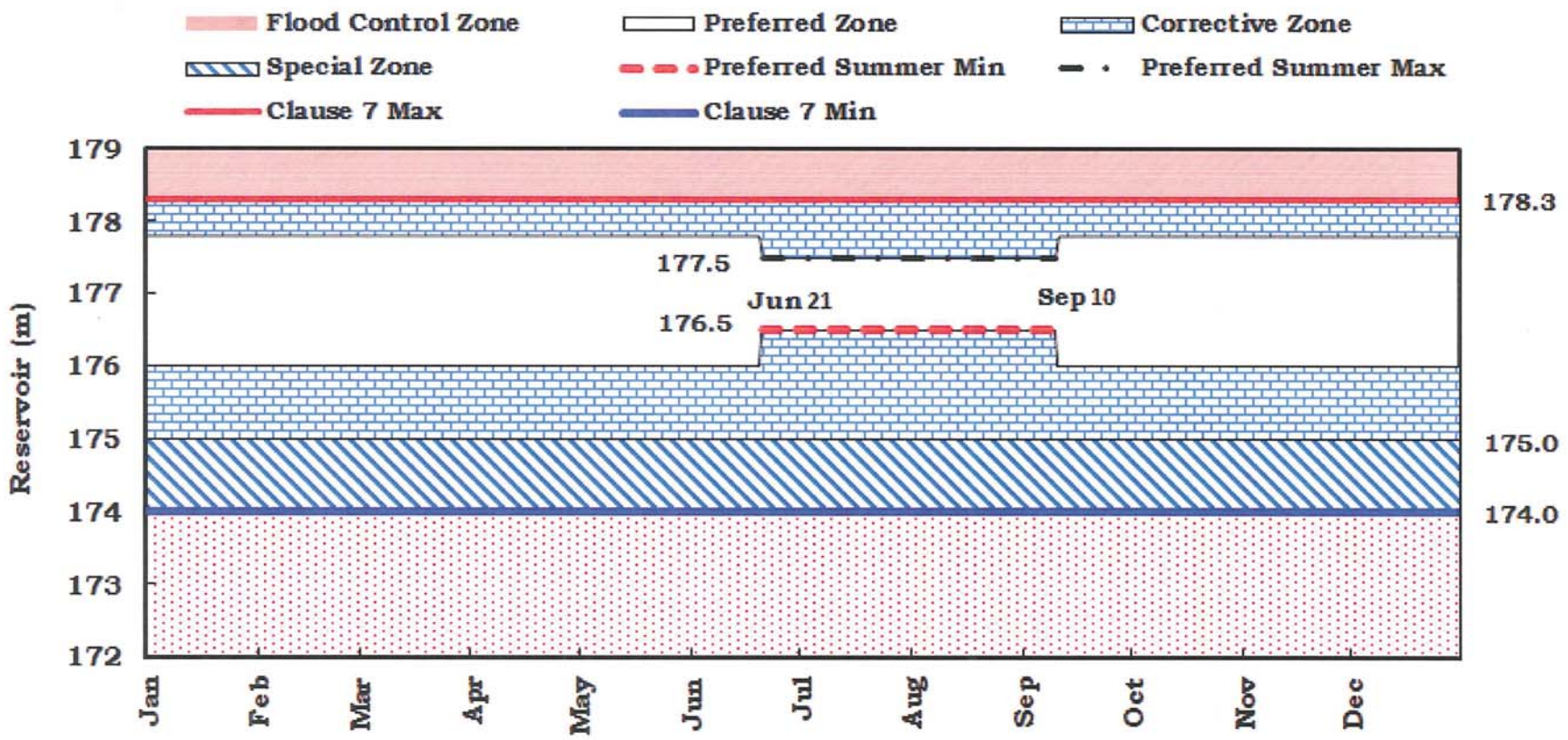
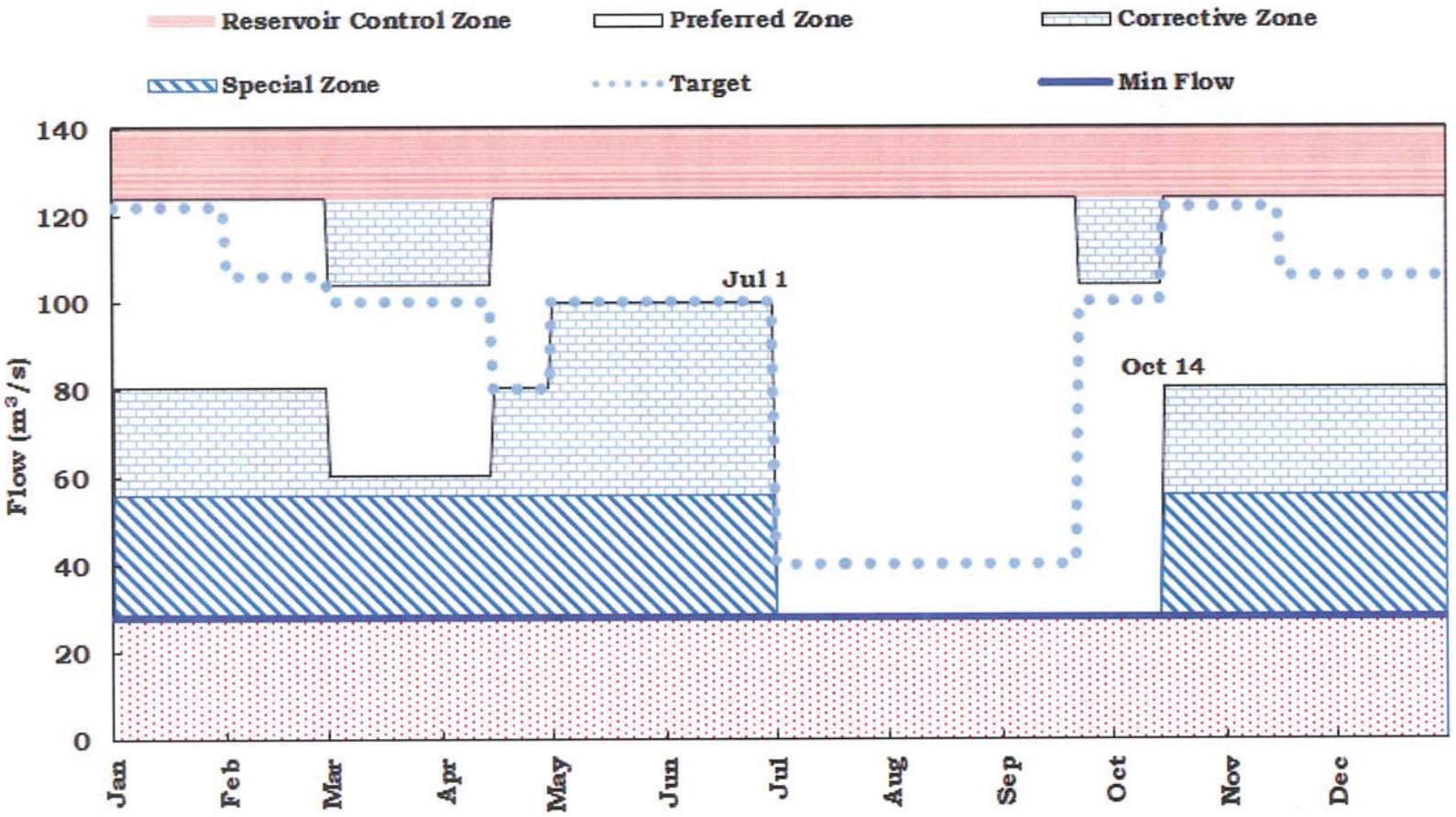


Figure 3
Lower Campbell River



*Min discharge into Elk Canyon under clause 11 and 12 may be in addition to the Prefered Max for Lower Campbell River.

Schedule B

Corrective Procedures

The licensee will operate within the Preferred Zones shown in Figures 1, 2 and 3 of Schedule A to meet the operating priorities stipulated in clause 28 of this Order.

In the event that inflows preclude operations in the Preferred Zones, the following Corrective Procedures will guide management under high and low inflows affecting the Upper Reservoir and Lower Reservoir (the "Reservoirs") and downstream discharge in Lower Campbell River from John Hart Spillway and John Hart Generating Station ("John Hart").

Corrective Operations

1. In the event that the elevations of the Reservoirs are expected to enter the upper or lower Corrective Zone (see Figures 1 and 2) within the next 5 days, the licensee will operate John Hart in a manner to avoid this while still maintaining the Lower Campbell River flow regime within the Preferred Zone (see Figure 3).

2. In the event that the elevations of the Reservoirs are in the Corrective Zone the licensee will operate John Hart in such manner to restore the Reservoirs to the Preferred Zone by allowing the Lower Campbell River flow regime to enter the Corrective Zone (see Figure 3).

Low Reservoir Operations

3. In the event that the elevation of the Reservoirs is in the Special Zone (see Figures 1 and 2), the licensee will operate John Hart in such manner as to restore the Reservoirs to the Corrective Zone by allowing the Lower Campbell River flow to enter the Special Zone (see Figure 3).

4. In the event that the Reservoirs are operating below their Minimum operating level (see Figures 1 and 2), the licensee will operate John Hart in such manner as to reduce the flow in Lower Campbell River to less than 28 m^3/s.

5. The licensee will notify the Comptroller of Water Rights in advance of operations in 3 and 4 above.

High Reservoir Operations

6. In the event that the Upper Reservoir is expected to enter the Flood Control Zone shown in Figure 1 within the next 5 days, the licensee will shut off all diversions into storage from Quinsam and Salmon.

7. In the event that the Upper Reservoir enters the Flood Control Zone shown in Figure 1, the licensee will operate John Hart in such manner as to return the Upper Reservoir below the Flood Control Zone in 7 days or less by allowing the flow regime at John Hart to enter the Reservoir Control Zone shown in Figure 3 up to a maximum of 453 m^3/s, as measured in the Campbell River downstream of the confluence of the Quinsam River.

8. In the event that the Upper Reservoir exceeds the Critical Level of 222.0 metres shown in Figure 1, the licensee will increase spill through the system to pass inflows until the maximum spillway capacity is reached.

9. The licensee will notify the Comptroller of Water Rights in advance of operations under 7 and 8 above.

Schedule C

Upper Campbell Lake and Buttle Lake Reservoir Works and Monitoring

Recreation and Erosion

1. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following works and feasibility studies:
   a) identification of sites with erosion concerns at Cedar Creek Subdivision, Strathcona Park Subdivision and Strathcona Park Lodge, and plans to address the erosion concerns;
   b) feasibility of upgrading boat ramps and beaches in Provincial Park sites and Forest recreation sites in the Upper Reservoir, prioritize and implement as ordered by the Comptroller;
   c) identify, prioritise and re-vegetate highly visible reservoir perimeter sites within the drawdown zone; and
   d) assess boating related recreation hazards for the Upper Reservoir.
2. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) monitor rates of erosion at selected sites on the Upper Reservoir
   b) measure public response to the operation of the System and the additional works constructed within the area influenced by the System through public use and perception surveys.

Reservoir Fish Studies

3. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) monitor spawning success in tributaries to the Upper Reservoir;
   b) monitor littoral productivity in the reservoir; and
   c) assess fish productivity in relation to littoral and pelagic productivity and residence time.

Wildlife and Riparian Studies

4. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) assess response of amphibians to the operation of the System; and
   b) monitor shoreline vegetation to validate model used to predict response of vegetation to reservoir operations.

Schedule D

Campbell Lake Reservoir Works and Monitoring

Recreation and Erosion

1. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following works and monitoring studies:
   a) Feasibility of upgrading boat ramps and beaches in Provincial Park sites and Forest recreation sites on Campbell Lake Reservoir, prioritize and upgrade as ordered by the Comptroller;
   b) assess boating related recreation hazards for Campbell Lake Reservoir; and
   c) measure public response to the operation of the System and the additional works constructed within the area influenced by the System through public use and perception surveys.

Reservoir Fish Studies

2. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) monitor spawning success in tributaries to Campbell Lake Reservoir, and
   b) assess fish productivity in relation to littoral and pelagic productivity and residence time.

Wildlife and Riparian Studies

3. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) assess response of amphibians to the operation of the System; and
   b) monitor shoreline vegetation to validate model used to predict response of vegetation to reservoir operations.

Schedule E

John Hart Lake Reservoir and Lower Campbell River Works and Monitoring

John Hart Lake Reservoir

1. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programmes:
   a) monitor littoral productivity in the reservoir; and
   b) assess fish productivity in relation to littoral and pelagic productivity and residence time.

Effectiveness Studies

2. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for measuring public response to the operation of the System with regard to its effect on recreation and tourism in Elk Falls Canyon and Lower Campbell River.

River Fish Studies

3. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring programs:
   a) monitor the correlation between instream flow and fish habitat;
   b) monitor the correlation between flow, rearing habitat and behavioural response in fish;
   c) correlate quantity and quality of spawning and rearing habitat with John Hart ramp rates and tripping events;
   d) measure effects of proposed load factoring on spawning behaviour and spawning success; and
   e) monitor spawner and smolt abundance in Elk Falls Canyon.

Schedule F

Salmon and Quinsam River Diversions Works and Monitoring

Access, Erosion and Fish Screen Studies

4. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following works:
   a) improve access and signage along portage routes on the Salmon River Diversion to reduce public safety risks;
   b) monitor erosion rates at selected sites on the Salmon Diversion portion of the Sayward Canoe route;
   c) install bank protection to address erosion and improve public safety along the Salmon Diversion portion of the Sayward Canoe route; and
   d) upgrade the fish screen at the Salmon Diversion to reduce damage to fish and to improve its fishing efficiency;

River Fish Studies

5. The licensee shall submit within 9 months of the date of this Order, for approval by the Comptroller, terms of reference for the following effectiveness monitoring studies:
   a) monitor spawner and smolt abundance in each of Quinsam River and Salmon River; and
   b) assess fish production in relation to littoral and pelagic productivity and residence time.