

Appendix 5 – License Amendment Revisions (Shown as Tracked Changes) for License Article 404 and Section 6.0 of FSA as incorporated by License (1995) including a Revised Table C-3

License Article 404 incorporates all the provisions of Section 6.0 from the Fisheries Settlement Agreement as shown below with *tracked changes* identifying the specific license amendment revisions. This is followed by Section 6.3 of the FSA with *tracked changes* showing specific modifications made by the Flow Coordinating Committee pursuant to Section 2.8.2 – Modification of the FSA including a revised Table C-3.

FERC License Article 404

The Licensee, in the Project Fishery Plan, shall address flows for protecting anadromous fishery resources in the mainstem Skagit River downstream of the Gorge powerhouse, in accordance with Section 6.0 of the Fisheries Settlement Agreement. Where minimum flows required for incubation and fry protection for the various species of anadromous salmon or steelhead spawning groups overlap in time, the Licensee shall provide the highest minimum flow indicated on any particular day. [Any subsequent modifications to the Fisheries Settlement Agreement agreed to by the parties thereto shall also be approved by the Commission prior to implementation.](#)

1) Salmon

(a) Salmon Redd Protection. For spawning salmon and subsequent protection of redds in the Skagit River below the Gorge Development, the Licensee shall release water from the Gorge Development so as to limit maximum flow levels during spawning, and maintain minimum flows throughout the incubation period that are adequate to keep most redds covered until the fry emerge, consistent with Section 6.3 of the Fisheries Settlement Agreement, [as modified](#).

(b) Salmon Fry Protection. For newly emerged salmon fry in the Skagit River below the Gorge Development, the Licensee shall release water from the Gorge Development so as to limit the daily downramp amplitude, maintain minimum flows throughout the salmon fry protection period that are adequate to cover areas of gravel bar commonly inhabited by salmon fry, and limit downramping to nighttime hours except in periods of high flow, consistent with Section 6.3 of the Fisheries Settlement Agreement, [as modified](#).

(2) Steelhead

a) Steelhead Redd Protection. For spawning steelhead and subsequent protection of redds in the Skagit River below the Gorge Development, the Licensee shall release water from the Gorge Development so as to limit maximum flow levels during spawning, shape daily flows for uniformity over the extended spawning period, and maintain minimum flows through the incubation period that are adequate to keep most redds covered until fry emerge from the gravel, consistent with Section 6.3 of the Fisheries Settlement Agreement.

b) Steelhead Fry Protection. For newly emerged steelhead fry in the Skagit River below the Gorge Development, the Licensee shall release water from the Gorge Development so as to limit daily downramp amplitude and maintain minimum flows throughout the steelhead fry protection period that are adequate to cover areas of gravel bar commonly inhabited by steelhead fry, and downramping will be limited to a very slow rate when Project discharge is moderately low and limited to a moderate rate when Project discharge is relatively high to minimize or prevent fry

stranding on gravel bars, consistent with Section 6.3 of the Fisheries Settlement Agreement, as modified.

(From Skagit Fisheries Settlement Agreement as modified by the FCC in accordance with the provisions of Section 2.8.2 - Modification)

6.3 FLOW REGULATION

6.3.1 General

The Parties agree that continual provision of adequate instream flows and continued adherence to operating parameters and guidelines are essential for the protection and improvement of anadromous fish habitat and fish production in the Skagit River. Where minimum flows required for incubation and fry protection for the various species of anadromous salmon or steelhead spawning groups overlap in time, the City shall provide the highest minimum flow indicated on any particular day.

6.3.2 Flow Regulation For Salmon

The City shall provide instream flow and limit operations to protect salmon as indicated below.

6.3.2.1 - Salmon Redd Protection

Subject to the exception for Insufficient Months as determined pursuant to Section 6.4 (Flow Insufficiency), the City shall regulate spawning and incubation flows to provide protection of salmon redds and offspring as indicated below.

(1) Salmon Spawning and Incubation Periods

(a) Salmon Spawning Periods—The spawning periods for salmon are defined as follows unless these periods are optionally modified pursuant to Appendix J (Alternative Salmon Spawning Periods). The spawning period of chinook salmon shall start at 0001 hours on August 20 and shall end at 2400 hours on October 15 each year. The spawning period of pink salmon, which occurs only in odd numbered years, shall start at 0001 hours on September 12 and shall end at 2400 hours on October 31 each year. The spawning period of chum salmon shall start at 0001 hours on November ~~16~~1 and shall end at 2400 hours on January 6 each year.

(b) Salmon Incubation Periods—Incubation periods shall start at 0001 hours on the first day of the spawning period and shall end at 2400 hours on April 30 for chinook and pink salmon and on May 31 for chum salmon.

(2) Salmon Spawning Flow

During the spawning period of each salmon species, Daily Spawning Flows shall not exceed 4,500 cfs for chinook salmon, 4,000 cfs for pink salmon, and 4,600 cfs for chum

salmon unless (a) the flow forecast made by the City shows a sufficient volume of water will be available to sustain a higher incubation flow, thereby permitting a higher spawning flow (see Appendix C—Salmon Spawning/Incubation Flow Tables), or (b) uncontrollable flow conditions are present, as described in Sections 6.4 and 6.5.

The Season Spawning Flow for each species shall be defined as the average of the highest ten (10) Daily Spawning Flows at the Newhalem gage during the spawning period of that species. Daily Spawning Flows shall be calculated as shown in Appendix A, Part 1 (General Calculation of Daily Spawning Flow). A sample calculation of Season Spawning Flow is shown in Appendix A, Part 2.

(3) Salmon Incubation Flow

The City shall provide instantaneous minimum incubation flows for each day of the incubation period of each species, as follows, unless higher minimum flows are required as specified under Section 6.3.1 (General Provisions of Flow Regulation).

(a) Salmon Incubation Flow During the Spawning Period—Incubation flow during the first ten (10) days of the spawning period of each species shall be based on the Planned Spawning Flow. After the first ten days, incubation flow for each species shall be based on the average of the highest ten (10) Daily Spawning Flows that have occurred up to that day during the spawning period. For example, the incubation flow for the twentieth day of the spawning period is based on the average of the highest ten (10) Daily Spawning Flows during the preceding 19 days, and so on for the twenty-first, twenty-second, etc. days.

Appropriate incubation flows shall be determined for the spawning flows that are calculated as described above according to Appendix C (Salmon Spawning/Incubation Flow Tables). Sample calculations are shown in Appendix B, Parts 1 and 2.

(b) Salmon Incubation Flow Following the Spawning Period—Incubation flow during days following the spawning period of each species shall be based on the Season Spawning Flow which is calculated as the average of the highest ten (10) Daily Spawning Flows at the Newhalem gage during the spawning period of that species. Appropriate incubation flows shall be determined for the Season Spawning Flow according to Appendix C (Salmon Spawning/Incubation Flow Tables). A sample calculation is shown in Appendix B, Part 3.

6.3.2.2 Salmon Fry Protection

During the period from 0001 hours on ~~February~~January 1 through 2400 hours on May 31 when salmon fry are emerging from redds, which shall be known as the Salmon Fry Protection Period, the City shall implement the following restrictions of downramp conditions and minimum flow for the purpose of protecting salmon fry.

(1) Downramp Amplitude During Salmon Fry Protection Period—The City shall limit the Downramp Amplitude to no more than 4,000 cfs.

(2) Downramping During Salmon Fry Protection Period—The City shall restrict its maximum downramping rate, as measured at Newhalem gage, to protect salmon fry as follows:

(a) Daytime Downramping During the Salmon Fry Protection Period—During the period of time beginning six and one-half hours prior to official sunrise and ending at official sunset (Pacific Standard or Pacific Daylight Time), no downramping is allowed from the moment when Predicted Marblemount Flow is less than or equal to 4,700 cfs. Downramping may proceed at a rate of up to 1,500 cfs per hour as long as Predicted Marblemount Flow is greater than 4,700 cfs

(b) Nighttime Downramping During the Salmon Fry Protection Period—Downramping is allowed at a rate up to 3,000 cfs per hour during all periods other than daytime.

(3) Salmon Fry Protection Flow—Subject to the exception for Insufficient Months as determined in Section 6.4 (Flow Insufficiency), the City shall maintain a minimum flow at the Newhalem gage that is the higher of either the flow that results in a Predicted Marblemount Flow of at least 3,000 cfs or the monthly flows as set forth in Appendix I (Fry Protection Flows At Newhalem gage). For the purpose of salmon fry protection, the City shall not be required to release flows (as measured at Newhalem gage) greater than 2,600 cfs. Sample calculations are included in Appendix D, Parts 1, 2, and 3.

6.3.3 Steelhead

The City shall provide instream flows and limit operations to protect steelhead as indicated below:

6.3.3.1 Steelhead Redd Protection

Subject to the exception for Insufficient Months as determined pursuant to Section 6.4 (Flow Insufficiency), the City shall regulate spawning and incubation flows to protect steelhead redds and offspring as indicated below.

(1) Steelhead Spawning and Incubation Periods

(a) Steelhead Spawning Periods—The steelhead spawning period shall be March 15 through June 15 each year. This total spawning period shall be divided into three subperiods which correspond to the months, or portions thereof: March 15 - 31, April 1 - 30, and May 1 through June 15 which shall be treated as separate spawning groups for the purpose of determining succeeding steelhead incubation flows.

The spawning subperiod of March steelhead shall start at 0001 hours on March 15 and shall end at 2400 hours on March 31. The spawning subperiod of April steelhead shall start at 0001 hours on April 1 and shall end at 2400 hours on April 30. The spawning subperiod of May and June steelhead shall start at 0001 hours on May 1 and shall end at 2400 hours on June 15.

(b) Steelhead Incubation Periods—The incubation periods for each spawning group shall start at 0001 hours on the first day of the spawning subperiods and shall end at 2400 on June 30 for March steelhead, and July 31 for both April steelhead and May through June 15 steelhead. During the month of August minimum flows of 2,000 cfs will be maintained for fry protection purposes as described in Section 6.3.3.1.(3)(b). (2) Steelhead Planned Spawning Flow

During the steelhead spawning period, Planned Spawning Flows shall not exceed the flows indicated by the most current Spawning Control Curve, which is determined as shown in Appendix E (Shaping of Flows During Steelhead Spawning). Further, to the extent Ross Lake has sufficient storage volume to contain and shape the forecast runoff without causing spill, Planned Spawning Flows shall be less than the following amounts: 5,000 cfs for March steelhead, 5,000 cfs for April steelhead, and 4,000 for May through June 15 steelhead, unless the forecasted inflow and storage is great enough to provide incubation flows for higher Season Spawning Flows. Any Planned Spawning Flows greater than the flow ranges above shall not be implemented prior to discussion in the FCC. Spawning flows shall be shaped such that they result in reservoir elevations greater than or equal to the Spawning Control Curve and less than the Spill Control Curve as described in Appendix E. The City shall endeavor to provide uniform Season Spawning Flows over the entire spawning period as described in Appendix E.

The actual Season Spawning Flow for each subperiod shall be defined as the average of the highest ten (10) Daily Spawning Flows at the Newhalem gage during each spawning subperiod. Daily Spawning Flow shall be calculated as shown in Appendix A, Part 1 (Calculation of Spawning Flow).

(3) Steelhead Incubation Flow

The City shall provide instantaneous minimum incubation flow for each day of the incubation period of steelhead, as follows, unless higher minimum flows are required as specified under Section 6.3.1:

(a) Steelhead Incubation Flow During the Spawning Subperiods—Incubation flow during the first ten (10) days of each spawning subperiod shall be based on the Planned Spawning Flow. Thereafter, daily incubation flows shall be based on the average of the highest ten (10) Daily Spawning Flows that have occurred up to that day. Appropriate incubation flows for any given day shall be determined for the spawning flows that are calculated as described above and the Season Spawning Flows according to Appendix G (Steelhead Spawning/Incubation Flow Tables). Sample calculations are shown in Appendix F, Parts 1 and 2.

(b) Steelhead Incubation Flow Following the Spawning Subperiods—Incubation flow during days following each spawning subperiod shall be based on the Season Spawning Flow which shall be calculated as the average of the highest ten (10) Daily Spawning Flows during that subperiod. Appropriate incubation flows for any given day shall be determined by the Season Spawning Flows according to Appendix G. A sample calculation is shown in Appendix F, Part 3.

During the months of June and July, the City shall maintain daily incubation flows at Newhalem gage, at least as great as the monthly minimum fry protection flows set forth in Appendix I, that

result in Predicted Marblemount Flows no less than the flows listed in Appendix G which correspond to the appropriate Season Spawning Flows. A sample calculation is shown in Appendix F, Part 3. For the purposes of incubation, the City shall not be required to release flows (as measured at Newhalem gage) greater than 2,600 cfs. During the month of August, the City shall maintain instantaneous daily incubation flows at Newhalem gage of 2,000 cfs, except that when Natural Flow on the Inflow Day is less than 2,300 cfs, the minimum incubation flow may be reduced to 1,500 cfs until the Natural Flow exceeds 2,300 cfs.

6.3.3.2 Steelhead Fry Protection

During the Steelhead Fry Protection Period from 0001 hours on June 1 through 2400 hours on October 15, unless modified pursuant to Appendix K (Alternative Steelhead Fry Protection Period), the City shall implement the following restrictions on downramp conditions and minimum flow for the purpose of protecting steelhead fry.

(1) Downramp Amplitude During the Steelhead Fry Protection Period—Maximum 24 hour Downramp Amplitude shall be limited to 3,000 cfs, except that when Section 6.4 (Flow Insufficiency) flow reductions are in effect, the maximum 24 hour Downramp Amplitude for August shall be limited to 500 cfs. From the point that flow at Newhalem gage is 4,000 cfs or less, the Downramp Amplitude is further limited as shown in Table 1 below, regardless of whether the maximum 24 hour amplitude can be attained. A sample calculation is shown in Appendix H, Parts 1, 2, and 3.

(2) Downramping During the Steelhead Fry Protection Period—The City shall restrict its maximum downramping rate, as measured at Newhalem gage, to protect steelhead fry as follows:

(a) Newhalem Instantaneous Flow 4,000 cfs or Less—Downramping is allowed up to 500 cfs per hour.

(b) Newhalem Instantaneous Flow Above 4,000 cfs—Downramping is allowed up to 1,000 cfs per hour.

(3) Steelhead Fry Protection Flow—Subject to the exception for Insufficient Months as determined in Section 6.4 (Flow Insufficiency), the City shall maintain minimum flows at Newhalem gage which are the higher of flows specified in Appendix I (Fry Protection Flows at Newhalem Gage) or determined by Section 6.3.3.1 (Incubation Flows). During the portions of June and October excluded from the Steelhead Fry Protection Period pursuant to Appendix K (Alternative Steelhead Fry Protection Period), minimum flows shall be determined by Section 6.3.3.1 (Incubation Flow). Further, the minimum flow for August may be reduced to 1,500 cfs when Natural Flow at Newhalem gage on the Inflow Day is less than 2,300 cfs.

6.3.4 Steelhead and Chinook Yearling Protection Period

Downramping rates are limited to <3,000 cfs/hr from October 16 to January 31 each year

6.3.4–5 Measures Beyond The Required Operation Constraints

6.3.45.1 The Parties recognize that the operational requirements in this section for the protection of anadromous fish spawning, incubation, and rearing may not provide full and complete protection, particularly when uncontrollable flow events occur. However, it is the goal of the City and Intervenors to provide full and complete protection each year. Achieving this goal will require continuing cooperation among all Parties.

6.3.45.2 Certain actions beyond the Project operational requirements may be available to the City which will help achieve this goal. Such actions could include augmenting minimum flows or reducing daily average flows at the Gorge powerplant to reduce the effects of controlled and uncontrolled flow events which may be detrimental to anadromous fish spawning, incubation, and

Table 1. Downramp amplitude in cfs allowed during steelhead fry protection period.

Month	Maximum Daily 24 hour Amplitude (cfs)	Portion of Amplitude When Newhalem Gage < 4,000 cfs (cfs)
June 1 or Alternative Start Date to June 30	3,000	2,000
July	3,000	2,000
August	3,000*	2,000*
September	3,000	2,500
October 1 to 15 or Alternative End Date	3,000	2,500

* Limited to 500 cfs per day when Section 6.4 (Flow Insufficiency) provisions are in effect.

rearing. The specific actions to be taken shall be cooperatively developed through the FCC taking into account system flexibility, economic considerations, and potential impacts upon all anadromous species and life stages. Critical data to be considered shall include but not be limited to actual Newhalem to Marblemount Tributary Inflow and field monitoring of actual redd locations.

6.3.45.3 The City will initially develop proposed actions at the end of the spawning season for each species (or spawning group in the case of steelhead) or whenever uncontrollable flow events occur during the spawning, incubation, and rearing periods. The City will present the proposal to the FCC for review and discussion in an effort to reach consensus on a plan of action.

Modified FSA Appendix C Table C-3

Table C-3 Chum salmon incubation flows (revised Table C-3¹ from the FSA Flow Plan).

Chum Season Spawning Flow (cfs) ²	Minimum Instantaneous Incubation Flow (cfs)						
	Nov ^{3,4}	Dec ^{3,4}	Jan ⁴	Feb ⁴	Mar	Apr	May
3000	2100	1800	1000	1800	1800	2100	1500
3100	2100	1800	1500	1800	1800	2100	1500
3200	2200	1800	1500	1800	1800	2100	1500
3300	2200	1800	1500	1800	1800	2100	1500
3400	2200	1800	1800	1800	2100	2100	1500
3500	2200	1800	2200	1800	2100	2100	1500
3600	2200	1800	2200	1800	2100	2100	1500
3700	2200	1800	2200	1800	2200	2100	1500
3800	2200	1800	2200	1800	2200	2100	1500
3900	2200	1800	2200	1800	2200	2100	1500
4000	2200	1800	2200	1800	2200	2100	1500
4100	2200	1800	2200	1900	2300	2200	1500
4200	2200	1800	2300	1900	2300	2200	1500
4300	2200	1900	2400	1900	2300	2200	1500
4400	2200	1900	2400	1900	2300	2200	1500
4500	2200	2100	2400	2000	2300	2300	1600
4600	2200	2100	2600	2300	2600	2500	1600
4700	2200	2100	2800	2500	2800	2600	1700
4800	2200	2100	2900	2600	2800	2600	1800
4900	2400	2200	3000	2600	2900	2800	1900
5000	2600	2200	3000	2600	2900	2800	1900
5100	2600	2500	3000	2600	3000	2800	1900
5200	2600	2500	3000	2600	3000	2900	1900
5300	2600	2500	3000	2600	3100	3000	2100

Table C-3 Chum salmon incubation flows (revised Table C-3¹ from the FSA Flow Plan).

Chum Season Spawning Flow (cfs) ²	Minimum Instantaneous Incubation Flow (cfs)						
	Nov ^{3,4}	Dec ^{3,4}	Jan ⁴	Feb ⁴	Mar	Apr	May
5400	2800	2500	3200	2800	3300	3100	2100
5500	2900	2500	3200	2800	3300	3100	2200
5600	3000	2500	3200	2800	3300	3100	2200
5700	3000	2600	3200	3000	3500	3300	2300
5800	3000	2700	3400	3000	3500	3300	2400
5900	3300	2800	3400	3000	3500	3300	2500
6000	3400	3100	3400	3000	3500	3300	2700
6100	3500	3200	3400	3000	3700	3600	2900
6200	3500	3200	3500	3300	3900	3700	2900
6300	3800	3200	4100	3700	4300	4000	3000
6400	4000	3300	4100	3700	4300	4000	3300
6500	4200	3300	4100	3700	4300	4100	3500
6600	4200	3800	4100	3800	4400	4300	3600
6700	4300	3800	4200	3800	4400	4300	3600
6800	4600	3900	4200	4100	4700	4500	3700
6900	4600	4000	4700	4200	4800	4500	3700
7000	4600	4000	4700	4200	4800	4500	3800

¹ Table revised April, 2010. The FCC will monitor the effectiveness of these modifications over the first 5-years implementation. If needed, the FCC can make additional adjustments with the approval of SCL.

² Most likely spawning flows in bold.

³ Months during which spawning occurs are based on 50 percent tributary inflow exceedance probabilities (EP) for both spawning and incubation. Succeeding incubation flows are based on 50 percent EP during spawning and 90 percent EP during incubation.

⁴ Months during which incubation flow is based on the below gravel model.