Memorandum

DATE: July 16, 2007

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TO: Linda Zurkirchen

FROM: Sarah Lawrie

CC: Shane Uren, Mike Stewart

SUBJECT: Modelling Results for the Requested Descending Flows and High Flows in Trudel Creek

This memo summarizes the results from running the Trudel Creek Hec-Ras flow model at a specified set of flows. The model was run using flows ranging from 36 to 0.5 m^3/s descending in 2 m^3/s intervals. A flow of 0.1 m^3/s was also attempted; however, the model became unstable and results are not defined for that flow. The model was also run using flows of 100, 200, 250, 350, and 500 m^3/s, as requested.

The results from the most recent field investigations were used to verify the Trudel Creek Hec-Ras model. The results of that verification are summarized briefly below.

Verification of Model Results

To assess the performance of the Trudel Creek Hec-Ras model, the model predictions for water surface elevations were compared to recent field observations. Field measurements were collected during the annual low flow period at Trudel Creek. Typically, the lowest flows occur within the system in the early spring before the onset of freshet. Measurements were taken after the ice had cleared from the main channel of Trudel Creek, but before the ice had completely melted from the lakes within the system. This was the lowest practical measurable flow. The average flow measured during the May 2007 field investigations was 145.895 m^3/s. This value was used in the Trudel Creek Hec-Ras flow model. The predicted water surface elevations at various cross-sections along the creek were then compared to the observed water surface elevations at these same locations (Figure 1). The model predictions of water levels are all within 1% of the measured water levels.

Model Results for Various Flows

For more details regarding how the Trudel Creek Hec-Ras model was developed, see the Taltson Expansion Project Trudel Creek Minimum Flow Assessment – Phase III (Rescan 2007). For the purpose of this memo, each specified flow was run as a pseudo-unsteady flow analysis with constant flows to allow the modelled water levels to reach a steady-state value. Only spillage over the South Valley Spillway is considered (*i.e.* no lateral inflows are considered).

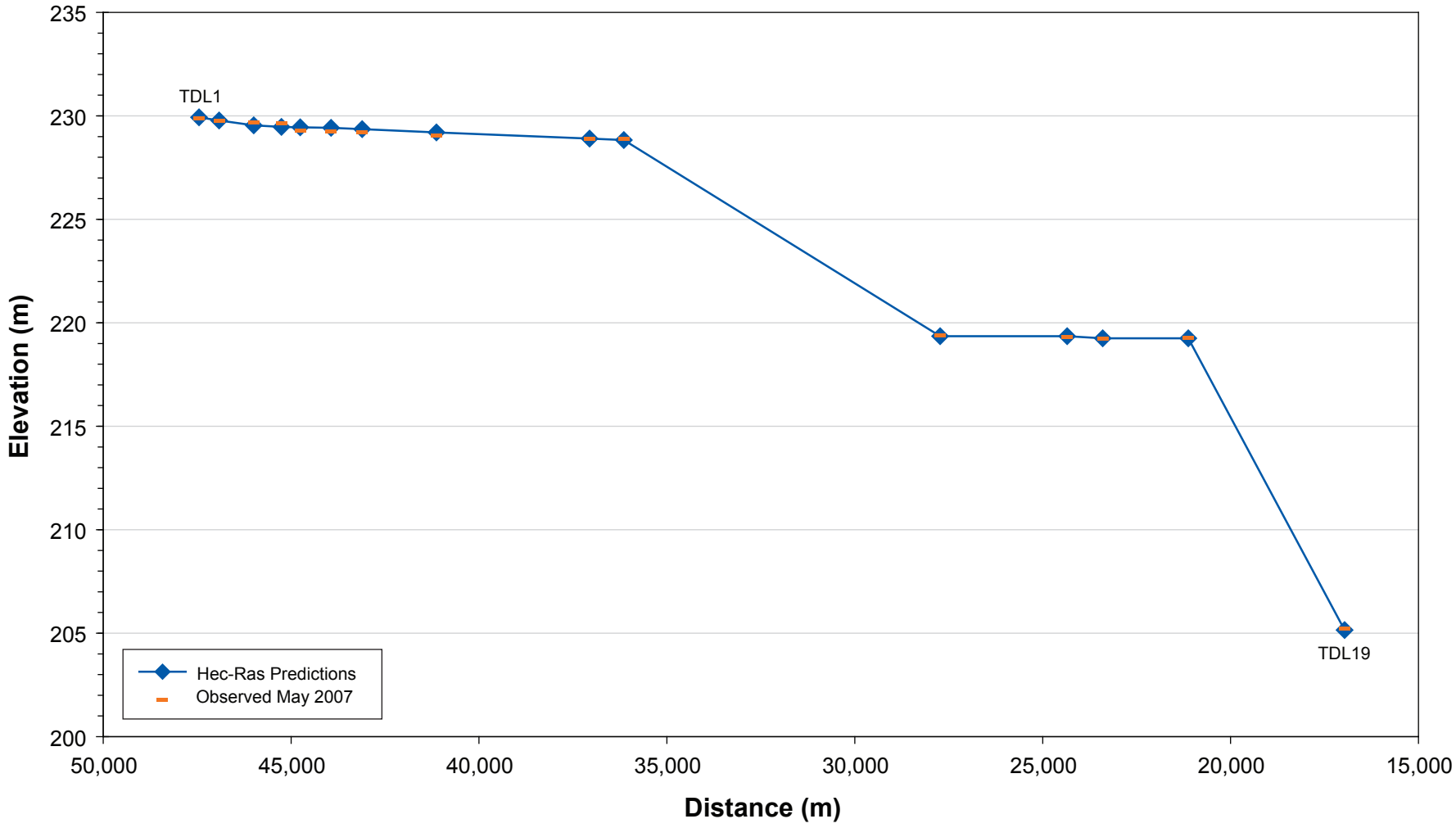

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FIGURE 1

Comparing Modelled Water Levels with Observed Levels at Low Flow (146 m^3/s)

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Figure 2 shows the location of the modelled cross-sections. The water levels in the cross-sections for various flows are shown in Figures 3 to 8. Not all water levels are shown as the figures become very difficult to read. All data for water surface elevations, maximum depths and velocities for all cross-sections at all modelled flows are presented in Table 1 at the end of this memo.

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Trudel Creek Survey Locations and Cross-Sections Used in HEC-RAS Modelling

FIGURE 2

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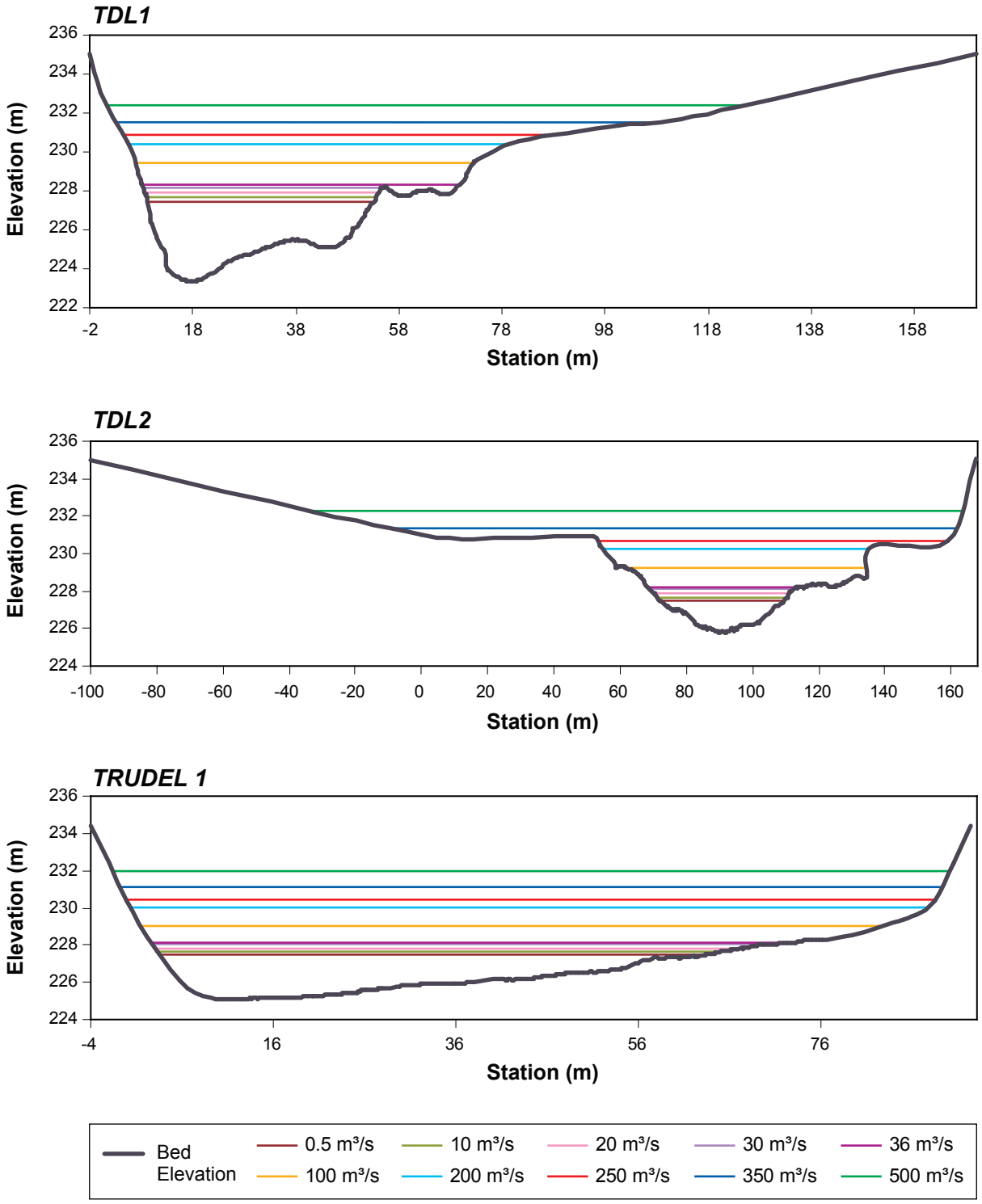

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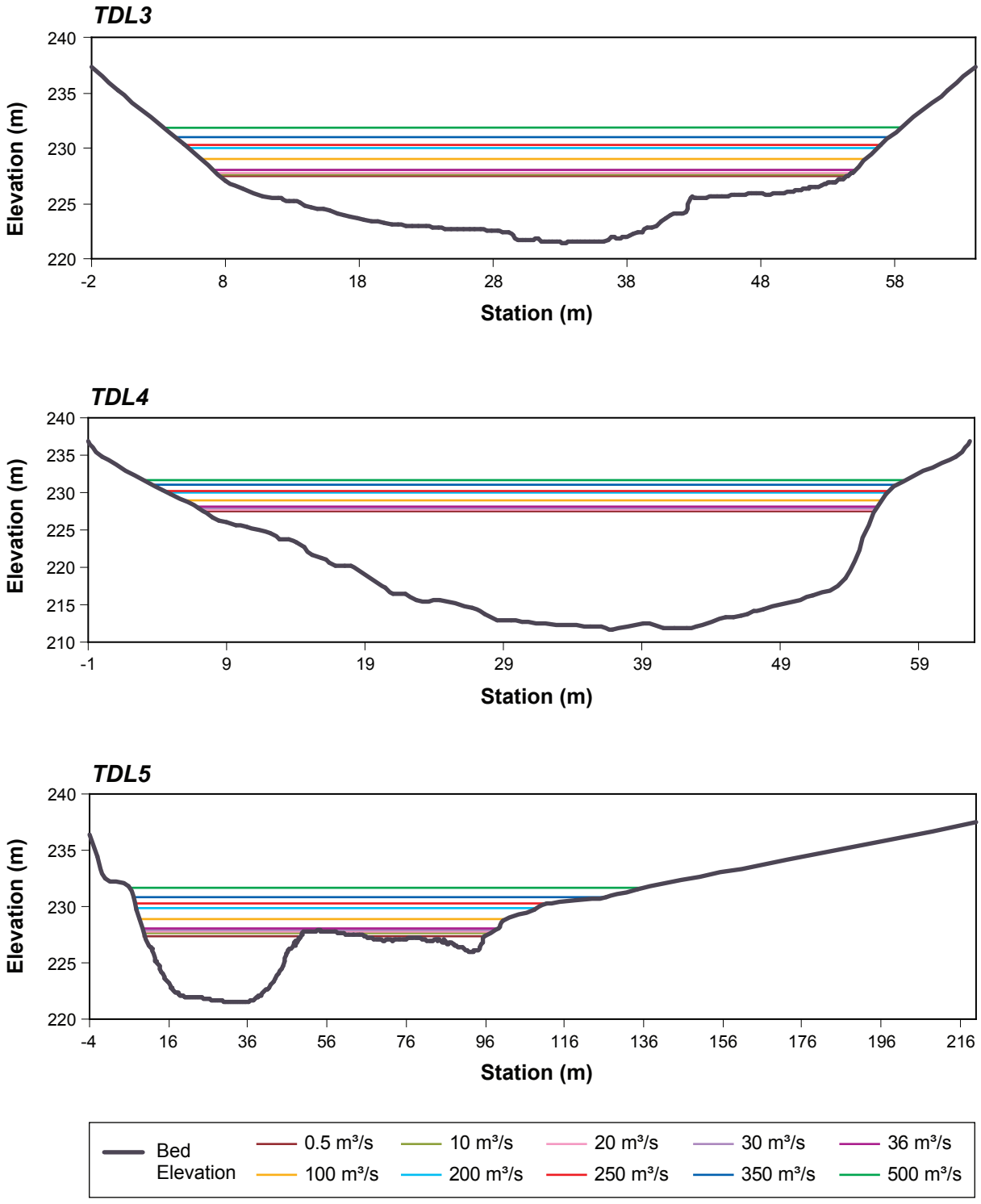
Water Level Elevations for Various Flows: TDL1, TDL2, TRUDEL 1

FIGURE 3

Rescan™



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Water Level Elevations for Various Flows: TDL3, TDL4, TDL5

FIGURE 4

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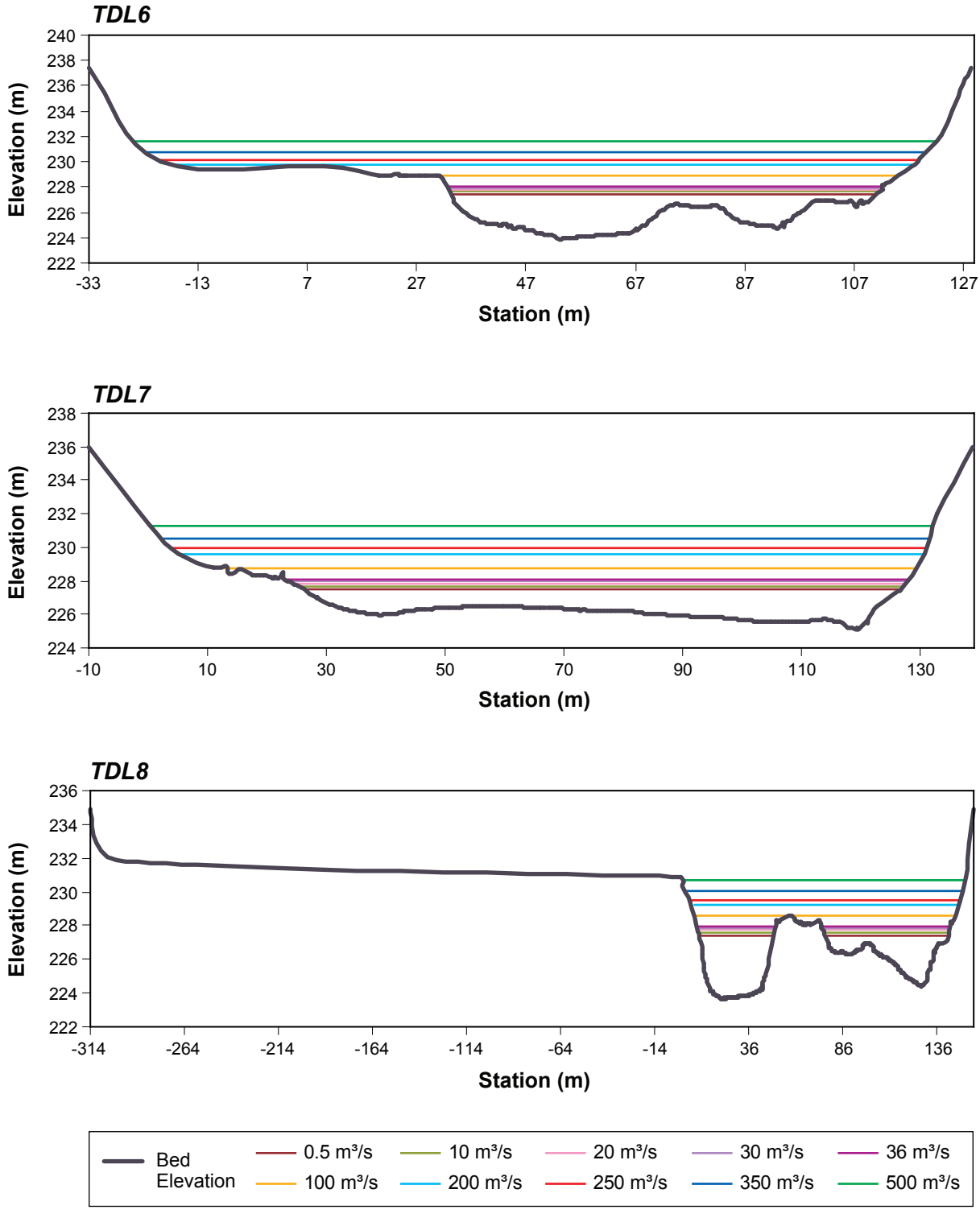

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Water Level Elevations for Various Flows: TDL6, TDL7, TDL8

FIGURE 5

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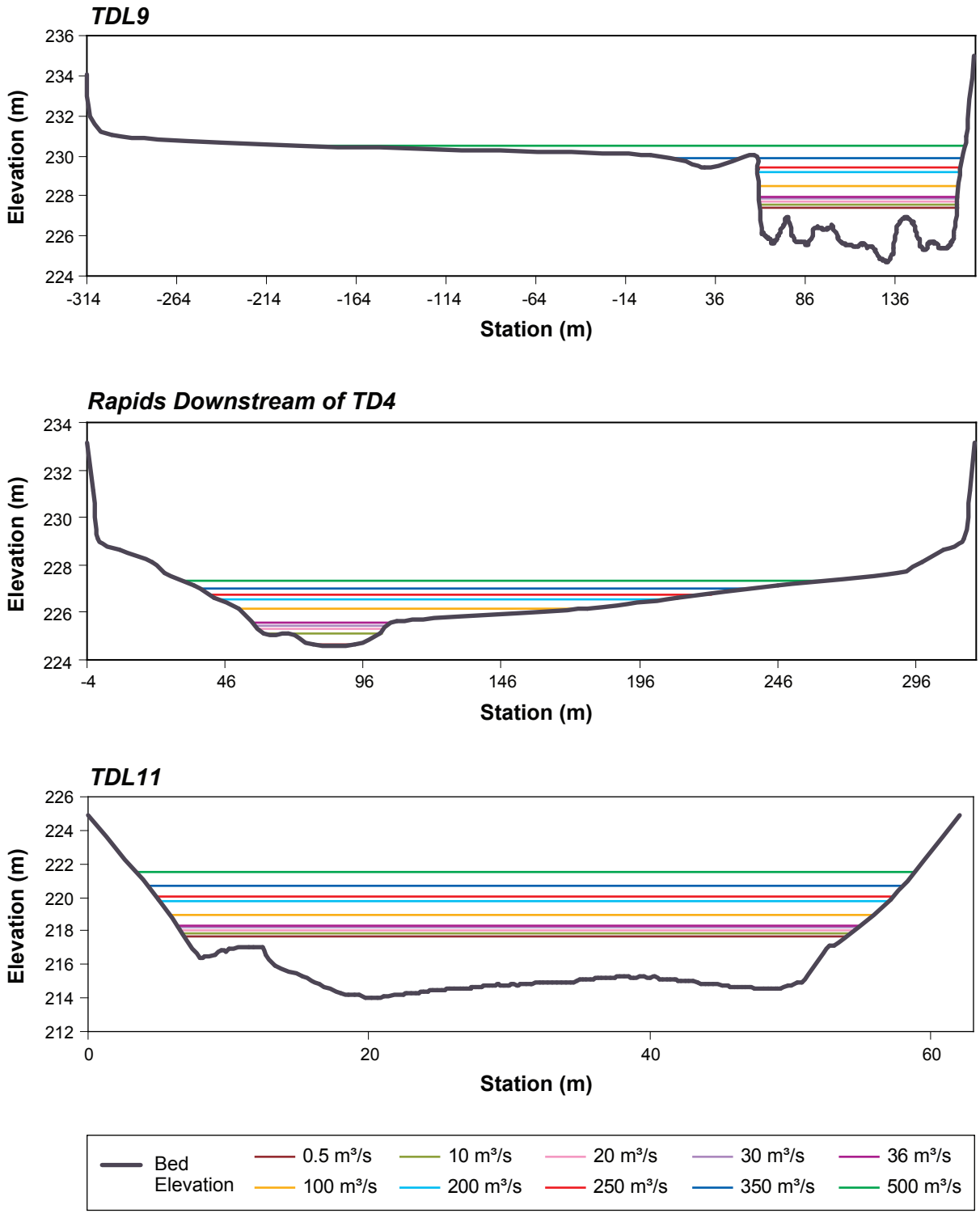

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Water Level Elevations for Various Flows: TDL9, Rapids Downstream of TD4, TKL11

FIGURE 6

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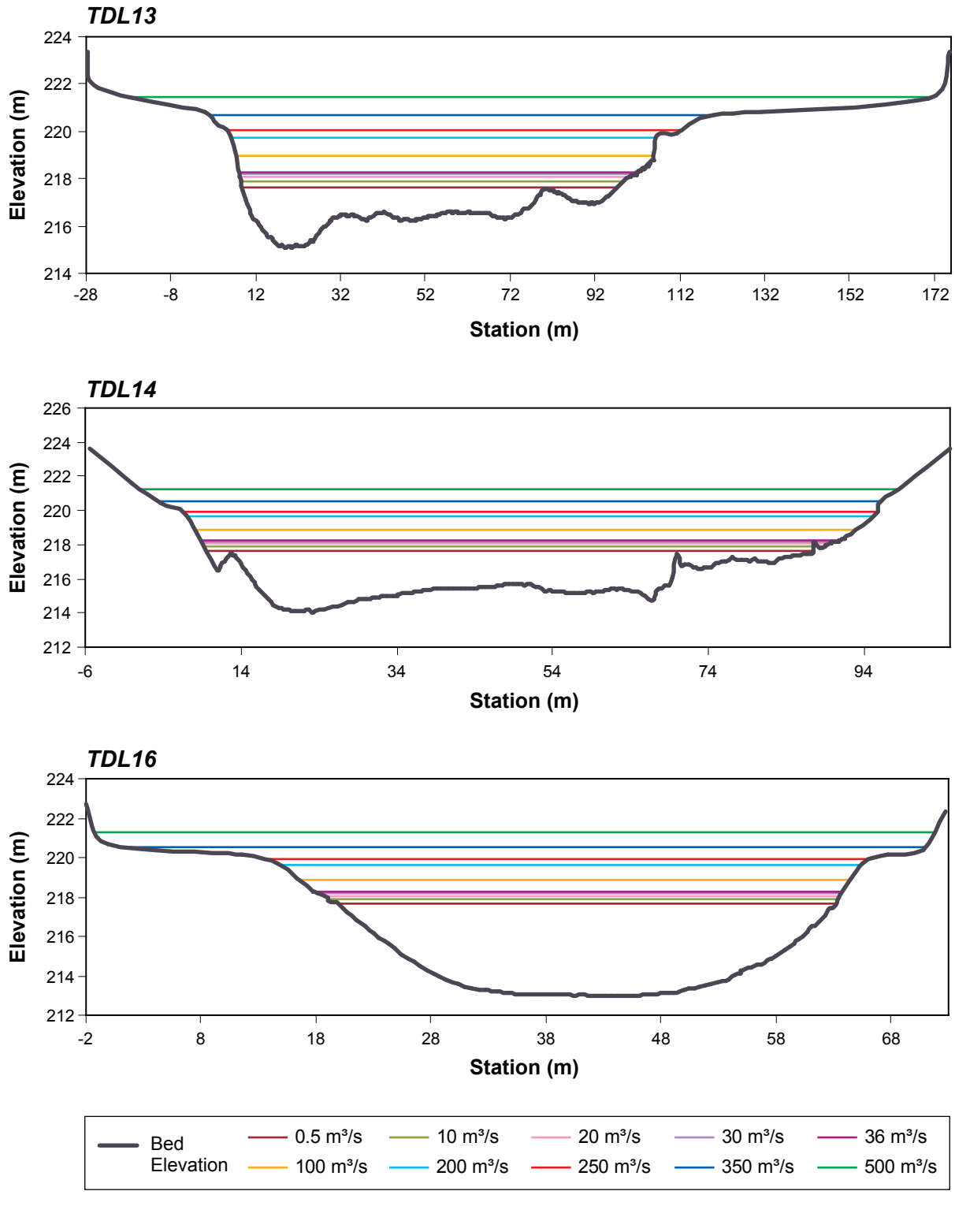

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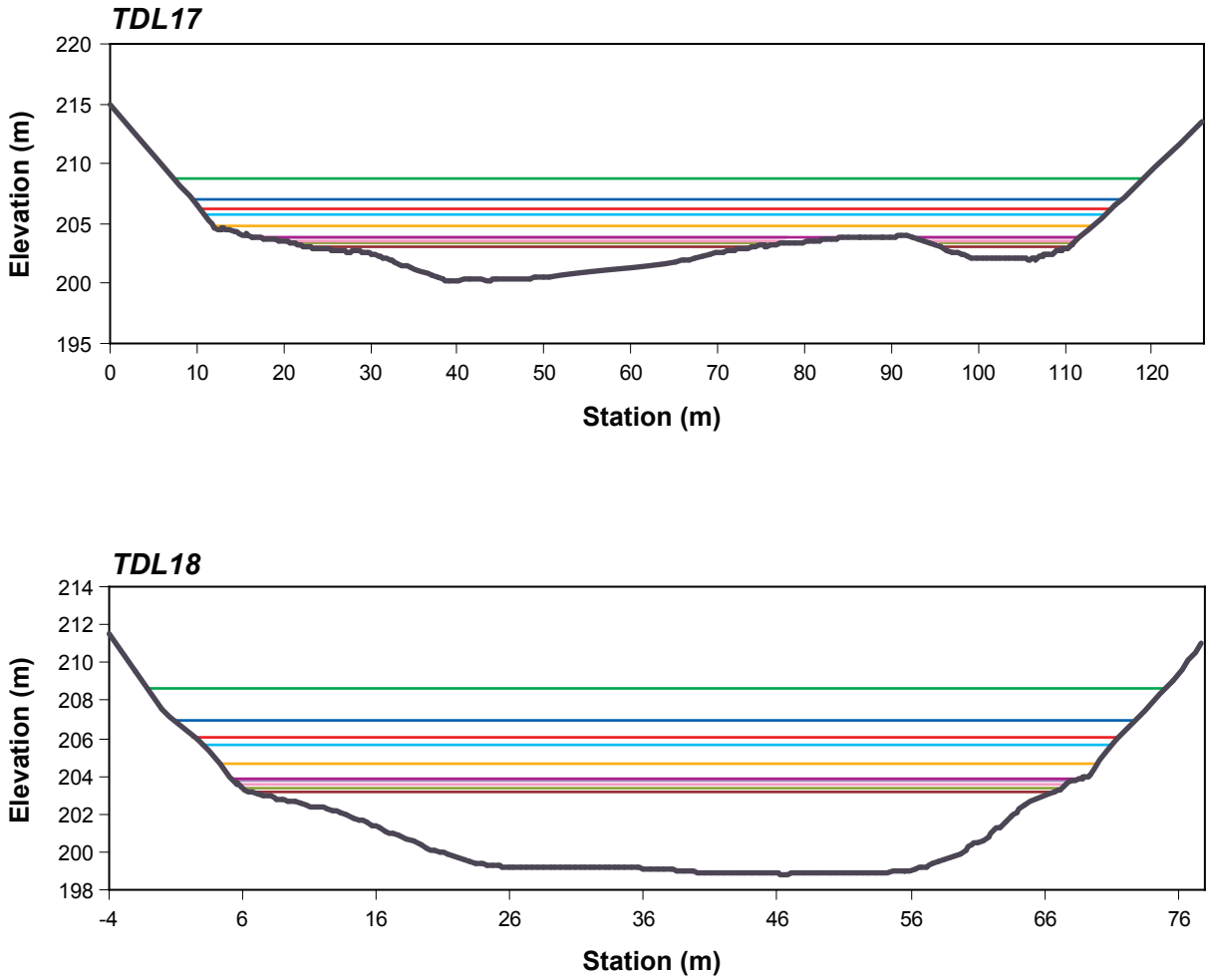
Water Level Elevations for Various Flows: TDL13, TDL14, TDL16

FIGURE 7

Rescan™



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Water Level Elevations for Various Flows: TDL17, TDL18

FIGURE 8

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Table 1
Model Output for All Cross-Sections along Trudel Creek

Reach	River Cross-Section Location	Model Q (m^3/s)	Minimum Channel Bed Elevation (m)	Water Surface Elevation (m)	Maximum Channel Depth (m)	Average Channel Velocity (m/s)	Top Channel Width (m)	Wetted Perimeter (m)
Spillway to TDL9	TDL1	0.5	223.33	227.44	4.11	0.01	43.76	46.04
Spillway to TDL9	TDL1	2	223.33	227.46	4.13	0.01	43.83	46.12
Spillway to TDL9	TDL1	4	223.33	227.49	4.16	0.02	43.92	46.24
Spillway to TDL9	TDL1	6	223.33	227.55	4.22	0.04	44.05	46.42
Spillway to TDL9	TDL1	8	223.33	227.6	4.27	0.05	44.18	46.59
Spillway to TDL9	TDL1	10	223.33	227.66	4.33	0.07	44.3	46.76
Spillway to TDL9	TDL1	12	223.33	227.71	4.38	0.08	44.48	46.97
Spillway to TDL9	TDL1	14	223.33	227.77	4.44	0.1	45.69	48.21
Spillway to TDL9	TDL1	16	223.33	227.82	4.49	0.11	48.87	51.42
Spillway to TDL9	TDL1	18	223.33	227.87	4.54	0.13	50.71	53.32
Spillway to TDL9	TDL1	20	223.33	227.92	4.59	0.14	52.41	55.08
Spillway to TDL9	TDL1	22	223.33	227.97	4.64	0.15	53.85	56.58
Spillway to TDL9	TDL1	24	223.33	228.03	4.70	0.16	56.38	59.16
Spillway to TDL9	TDL1	26	223.33	228.08	4.75	0.17	58.52	61.35
Spillway to TDL9	TDL1	28	223.33	228.13	4.80	0.18	59.05	61.96
Spillway to TDL9	TDL1	30	223.33	228.17	4.84	0.19	59.85	62.81
Spillway to TDL9	TDL1	32	223.33	228.22	4.89	0.2	61.03	64.01
Spillway to TDL9	TDL1	34	223.33	228.27	4.94	0.21	61.3	64.29
Spillway to TDL9	TDL1	36	223.33	228.32	4.99	0.22	61.55	64.57
Spillway to TDL9	TDL1	100	223.33	229.4	6.07	0.45	65.56	69.19
Spillway to TDL9	TDL1	200	223.33	230.44	7.11	0.67	74.67	78.78
Spillway to TDL9	TDL1	250	223.33	230.85	7.52	0.76	83.56	87.78
Spillway to TDL9	TDL1	350	223.33	231.54	8.21	0.92	104.11	108.5
Spillway to TDL9	TDL1	500	223.33	232.4	9.07	1.11	123.27	127.87
Spillway to TDL9	TDL2	0.5	225.79	227.44	1.65	0.02	36.9	37.3
Spillway to TDL9	TDL2	2	225.79	227.45	1.66	0.03	37.13	37.54
Spillway to TDL9	TDL2	4	225.79	227.49	1.70	0.06	37.55	37.97
Spillway to TDL9	TDL2	6	225.79	227.54	1.75	0.11	38.05	38.48
Spillway to TDL9	TDL2	8	225.79	227.59	1.80	0.15	38.59	39.02
Spillway to TDL9	TDL2	10	225.79	227.64	1.85	0.19	39.24	39.69
Spillway to TDL9	TDL2	12	225.79	227.69	1.90	0.23	39.7	40.16
Spillway to TDL9	TDL2	14	225.79	227.74	1.95	0.26	39.92	40.4
Spillway to TDL9	TDL2	16	225.79	227.79	2.00	0.29	40.12	40.63
Spillway to TDL9	TDL2	18	225.79	227.83	2.04	0.32	40.34	40.87
Spillway to TDL9	TDL2	20	225.79	227.88	2.09	0.34	40.83	41.44
Spillway to TDL9	TDL2	22	225.79	227.93	2.14	0.37	41.22	41.86
Spillway to TDL9	TDL2	24	225.79	227.97	2.18	0.39	41.84	42.48
Spillway to TDL9	TDL2	26	225.79	228.02	2.23	0.41	42.54	43.19
Spillway to TDL9	TDL2	28	225.79	228.06	2.27	0.43	43.11	43.77
Spillway to TDL9	TDL2	30	225.79	228.1	2.31	0.45	43.82	44.48
Spillway to TDL9	TDL2	32	225.79	228.15	2.36	0.47	44.5	45.17
Spillway to TDL9	TDL2	34	225.79	228.19	2.40	0.49	45.61	46.36
Spillway to TDL9	TDL2	36	225.79	228.23	2.44	0.5	48.82	49.6
Spillway to TDL9	TDL2	100	225.79	229.26	3.47	0.74	73.49	75.05
Spillway to TDL9	TDL2	200	225.79	230.29	4.50	0.93	81.41	83.53
Spillway to TDL9	TDL2	250	225.79	230.69	4.90	1.01	105.98	108.21
Spillway to TDL9	TDL2	350	225.79	231.38	5.59	1.12	169.88	172.31
Spillway to TDL9	TDL2	500	225.79	232.25	6.46	1.24	193.62	196.28
Spillway to TDL9	TRUDEL1	0.5	225.06	227.43	2.37	0.01	59.05	59.92
Spillway to TDL9	TRUDEL1	2	225.06	227.45	2.39	0.01	59.5	60.38
Spillway to TDL9	TRUDEL1	4	225.06	227.49	2.43	0.03	59.88	60.76
Spillway to TDL9	TRUDEL1	6	225.06	227.53	2.47	0.05	60.23	61.14
Spillway to TDL9	TRUDEL1	8	225.06	227.58	2.52	0.07	60.94	61.86
Spillway to TDL9	TRUDEL1	10	225.06	227.62	2.56	0.09	61.24	62.17
Spillway to TDL9	TRUDEL1	12	225.06	227.66	2.60	0.11	61.48	62.43
Spillway to TDL9	TRUDEL1	14	225.06	227.7	2.64	0.12	62.28	63.24
Spillway to TDL9	TRUDEL1	16	225.06	227.73	2.67	0.14	62.95	63.94
Spillway to TDL9	TRUDEL1	18	225.06	227.77	2.71	0.16	63.75	64.76
Spillway to TDL9	TRUDEL1	20	225.06	227.81	2.75	0.17	64.08	65.11
Spillway to TDL9	TRUDEL1	22	225.06	227.85	2.79	0.19	64.72	65.8
Spillway to TDL9	TRUDEL1	24	225.06	227.88	2.82	0.2	64.96	66.06
Spillway to TDL9	TRUDEL1	26	225.06	227.92	2.86	0.21	65.36	66.47
Spillway to TDL9	TRUDEL1	28	225.06	227.96	2.90	0.23	65.83	66.95
Spillway to TDL9	TRUDEL1	30	225.06	227.99	2.93	0.24	66.23	67.37
Spillway to TDL9	TRUDEL1	32	225.06	228.02	2.96	0.25	67.15	68.3
Spillway to TDL9	TRUDEL1	34	225.06	228.06	3.00	0.26	68.52	69.69
Spillway to TDL9	TRUDEL1	36	225.06	228.09	3.03	0.27	69	70.19
Spillway to TDL9	TRUDEL1	100	225.06	229.03	3.97	0.51	80.87	82.47
Spillway to TDL9	TRUDEL1	200	225.06	230.05	4.99	0.71	87.02	89.12
Spillway to TDL9	TRUDEL1	250	225.06	230.44	5.38	0.79	88.44	90.77
Spillway to TDL9	TRUDEL1	350	225.06	231.13	6.07	0.92	89.82	92.72
Spillway to TDL9	TRUDEL1	500	225.06	232	6.94	1.1	91.56	95.18
Spillway to TDL9	TDL3	0.5	221.38	227.43	6.05	0	46.77	50.45
Spillway to TDL9	TDL3	2	221.38	227.45	6.07	0.01	46.81	50.5
Spillway to TDL9	TDL3	4	221.38	227.49	6.11	0.01	46.87	50.6
Spillway to TDL9	TDL3	6	221.38	227.53	6.15	0.03	46.98	50.74
Spillway to TDL9	TDL3	8	221.38	227.57	6.19	0.04	47.08	50.87
Spillway to TDL9	TDL3	10	221.38	227.61	6.23	0.05	47.18	51
Spillway to TDL9	TDL3	12	221.38	227.65	6.27	0.06	47.26	51.11
Spillway to TDL9	TDL3	14	221.38	227.69	6.31	0.07	47.35	51.23

(continued)

Table 1
Model Output for All Cross-Sections along Trudel Creek (continued)

Reach	River Cross-Section Location	Model Q (m^3/s)	Minimum Channel Bed Elevation (m)	Water Surface Elevation (m)	Maximum Channel Depth (m)	Average Channel Velocity (m/s)	Top Channel Width (m)	Wetted Perimeter (m)
Spillway to TDL9	TDL3	16	221.38	227.73	6.35	0.08	47.42	51.33
Spillway to TDL9	TDL3	18	221.38	227.76	6.38	0.09	47.49	51.43
Spillway to TDL9	TDL3	20	221.38	227.8	6.42	0.1	47.56	51.53
Spillway to TDL9	TDL3	22	221.38	227.84	6.46	0.11	47.64	51.64
Spillway to TDL9	TDL3	24	221.38	227.87	6.49	0.12	47.71	51.74
Spillway to TDL9	TDL3	26	221.38	227.91	6.53	0.13	47.78	51.84
Spillway to TDL9	TDL3	28	221.38	227.94	6.56	0.14	47.84	51.93
Spillway to TDL9	TDL3	30	221.38	227.97	6.59	0.15	47.9	52.02
Spillway to TDL9	TDL3	32	221.38	228.01	6.63	0.16	47.95	52.1
Spillway to TDL9	TDL3	34	221.38	228.04	6.66	0.17	48.01	52.19
Spillway to TDL9	TDL3	36	221.38	228.07	6.69	0.18	48.07	52.28
Spillway to TDL9	TDL3	100	221.38	228.97	7.59	0.43	49.65	54.68
Spillway to TDL9	TDL3	200	221.38	229.95	8.57	0.7	51.38	57.28
Spillway to TDL9	TDL3	250	221.38	230.33	8.95	0.82	52.06	58.3
Spillway to TDL9	TDL3	350	221.38	230.99	9.61	1.04	53.37	60.16
Spillway to TDL9	TDL3	500	221.38	231.81	10.43	1.31	55.02	62.5
Spillway to TDL9	TDL4	0.5	211.57	227.43	15.86	0	48.63	63.73
Spillway to TDL9	TDL4	2	211.57	227.45	15.88	0	48.65	63.77
Spillway to TDL9	TDL4	4	211.57	227.49	15.92	0	48.68	63.84
Spillway to TDL9	TDL4	6	211.57	227.53	15.96	0.01	48.73	63.95
Spillway to TDL9	TDL4	8	211.57	227.57	16.00	0.01	48.77	64.04
Spillway to TDL9	TDL4	10	211.57	227.61	16.04	0.02	48.81	64.14
Spillway to TDL9	TDL4	12	211.57	227.65	16.08	0.02	48.85	64.23
Spillway to TDL9	TDL4	14	211.57	227.69	16.12	0.02	48.89	64.31
Spillway to TDL9	TDL4	16	211.57	227.73	16.16	0.03	48.93	64.4
Spillway to TDL9	TDL4	18	211.57	227.76	16.19	0.03	48.97	64.48
Spillway to TDL9	TDL4	20	211.57	227.8	16.23	0.03	49.01	64.56
Spillway to TDL9	TDL4	22	211.57	227.83	16.26	0.04	49.04	64.65
Spillway to TDL9	TDL4	24	211.57	227.87	16.30	0.04	49.08	64.73
Spillway to TDL9	TDL4	26	211.57	227.9	16.33	0.04	49.12	64.8
Spillway to TDL9	TDL4	28	211.57	227.94	16.37	0.05	49.15	64.88
Spillway to TDL9	TDL4	30	211.57	227.97	16.40	0.05	49.19	64.96
Spillway to TDL9	TDL4	32	211.57	228	16.43	0.06	49.24	65.05
Spillway to TDL9	TDL4	34	211.57	228.04	16.47	0.06	49.28	65.13
Spillway to TDL9	TDL4	36	211.57	228.07	16.50	0.06	49.32	65.21
Spillway to TDL9	TDL4	100	211.57	228.96	17.39	0.17	50.51	67.43
Spillway to TDL9	TDL4	200	211.57	229.92	18.35	0.31	51.85	69.86
Spillway to TDL9	TDL4	250	211.57	230.3	18.73	0.37	52.6	70.92
Spillway to TDL9	TDL4	350	211.57	230.94	19.37	0.5	53.89	72.75
Spillway to TDL9	TDL4	500	211.57	231.75	20.18	0.67	55.52	75.04
Spillway to TDL9	TDL5	0.5	221.47	227.43	5.96	0	71.16	76.8
Spillway to TDL9	TDL5	2	221.47	227.45	5.98	0.01	71.45	77.1
Spillway to TDL9	TDL5	4	221.47	227.49	6.02	0.01	73.24	78.92
Spillway to TDL9	TDL5	6	221.47	227.53	6.06	0.02	74.68	80.41
Spillway to TDL9	TDL5	8	221.47	227.57	6.10	0.03	76.03	81.81
Spillway to TDL9	TDL5	10	221.47	227.61	6.14	0.04	76.66	82.47
Spillway to TDL9	TDL5	12	221.47	227.65	6.18	0.05	77.32	83.17
Spillway to TDL9	TDL5	14	221.47	227.69	6.22	0.06	79.03	84.91
Spillway to TDL9	TDL5	16	221.47	227.73	6.26	0.07	79.63	85.54
Spillway to TDL9	TDL5	18	221.47	227.76	6.29	0.08	82.15	88.11
Spillway to TDL9	TDL5	20	221.47	227.8	6.33	0.08	85.61	91.61
Spillway to TDL9	TDL5	22	221.47	227.83	6.36	0.09	88.07	94.1
Spillway to TDL9	TDL5	24	221.47	227.87	6.40	0.1	88.74	94.79
Spillway to TDL9	TDL5	26	221.47	227.9	6.43	0.11	88.94	95.01
Spillway to TDL9	TDL5	28	221.47	227.93	6.46	0.11	89.15	95.24
Spillway to TDL9	TDL5	30	221.47	227.97	6.50	0.12	89.35	95.45
Spillway to TDL9	TDL5	32	221.47	228	6.53	0.13	89.54	95.67
Spillway to TDL9	TDL5	34	221.47	228.03	6.56	0.14	89.74	95.88
Spillway to TDL9	TDL5	36	221.47	228.06	6.59	0.14	89.93	96.09
Spillway to TDL9	TDL5	100	221.47	228.94	7.47	0.31	93.24	100.02
Spillway to TDL9	TDL5	200	221.47	229.89	8.42	0.48	101.43	108.69
Spillway to TDL9	TDL5	250	221.47	230.25	8.78	0.56	104.61	112.05
Spillway to TDL9	TDL5	350	221.47	230.89	9.42	0.68	120.12	127.84
Spillway to TDL9	TDL5	500	221.47	231.68	10.21	0.84	129.99	138.08
Spillway to TDL9	TDL6	0.5	223.88	227.43	3.55	0	77.93	81.01
Spillway to TDL9	TDL6	2	223.88	227.45	3.57	0.01	78.01	81.09
Spillway to TDL9	TDL6	4	223.88	227.49	3.61	0.01	78.13	81.24
Spillway to TDL9	TDL6	6	223.88	227.53	3.65	0.03	78.32	81.44
Spillway to TDL9	TDL6	8	223.88	227.57	3.69	0.04	78.48	81.63
Spillway to TDL9	TDL6	10	223.88	227.61	3.73	0.05	78.64	81.81
Spillway to TDL9	TDL6	12	223.88	227.65	3.77	0.06	78.79	81.98
Spillway to TDL9	TDL6	14	223.88	227.69	3.81	0.07	78.94	82.15
Spillway to TDL9	TDL6	16	223.88	227.72	3.84	0.08	79.08	82.31
Spillway to TDL9	TDL6	18	223.88	227.76	3.88	0.09	79.22	82.47
Spillway to TDL9	TDL6	20	223.88	227.79	3.91	0.1	79.37	82.64
Spillway to TDL9	TDL6	22	223.88	227.83	3.95	0.11	79.44	82.74
Spillway to TDL9	TDL6	24	223.88	227.86	3.98	0.12	79.49	82.83
Spillway to TDL9	TDL6	26	223.88	227.9	4.02	0.13	79.53	82.92
Spillway to TDL9	TDL6	28	223.88	227.93	4.05	0.14	79.58	83
Spillway to TDL9	TDL6	30	223.88	227.96	4.08	0.15	79.63	83.08
Spillway to TDL9	TDL6	32	223.88	227.99	4.11	0.15	79.67	83.16
Spillway to TDL9	TDL6	34	223.88	228.02	4.14	0.16	79.71	83.24

(continued)

Table 1
Model Output for All Cross-Sections along Trudel Creek (continued)

Reach	River Cross-Section Location	Model Q (m^3/s)	Minimum Channel Bed Elevation (m)	Water Surface Elevation (m)	Maximum Channel Depth (m)	Average Channel Velocity (m/s)	Top Channel Width (m)	Wetted Perimeter (m)
Spillway to TDL9	TDL6	36	223.88	228.05	4.17	0.17	79.76	83.32
Spillway to TDL9	TDL6	100	223.88	228.9	5.02	0.37	87.77	91.81
Spillway to TDL9	TDL6	200	223.88	229.82	5.94	0.55	122.59	126.85
Spillway to TDL9	TDL6	250	223.88	230.17	6.29	0.62	139.07	143.45
Spillway to TDL9	TDL6	350	223.88	230.79	6.91	0.74	141.53	146.2
Spillway to TDL9	TDL6	500	223.88	231.57	7.69	0.88	144.58	149.63
Spillway to TDL9	TDL7	0.5	225.1	227.43	2.33	0	100.03	101.28
Spillway to TDL9	TDL7	2	225.1	227.45	2.35	0.01	100.28	101.55
Spillway to TDL9	TDL7	4	225.1	227.48	2.38	0.02	100.45	101.74
Spillway to TDL9	TDL7	6	225.1	227.53	2.43	0.03	100.71	102.01
Spillway to TDL9	TDL7	8	225.1	227.57	2.47	0.04	100.93	102.25
Spillway to TDL9	TDL7	10	225.1	227.61	2.51	0.06	101.15	102.48
Spillway to TDL9	TDL7	12	225.1	227.64	2.54	0.07	101.39	102.74
Spillway to TDL9	TDL7	14	225.1	227.68	2.58	0.08	101.64	103
Spillway to TDL9	TDL7	16	225.1	227.71	2.61	0.09	101.9	103.27
Spillway to TDL9	TDL7	18	225.1	227.75	2.65	0.1	102.17	103.56
Spillway to TDL9	TDL7	20	225.1	227.78	2.68	0.11	102.44	103.83
Spillway to TDL9	TDL7	22	225.1	227.81	2.71	0.12	102.7	104.11
Spillway to TDL9	TDL7	24	225.1	227.84	2.74	0.13	103.2	104.61
Spillway to TDL9	TDL7	26	225.1	227.87	2.77	0.14	103.35	104.77
Spillway to TDL9	TDL7	28	225.1	227.9	2.80	0.15	103.5	104.93
Spillway to TDL9	TDL7	30	225.1	227.93	2.83	0.16	103.64	105.09
Spillway to TDL9	TDL7	32	225.1	227.96	2.86	0.16	104.13	105.59
Spillway to TDL9	TDL7	34	225.1	227.99	2.89	0.17	104.3	105.77
Spillway to TDL9	TDL7	36	225.1	228.02	2.92	0.18	104.47	105.95
Spillway to TDL9	TDL7	100	225.1	228.79	3.69	0.36	115.89	118.19
Spillway to TDL9	TDL7	200	225.1	229.62	4.52	0.53	125.53	128.12
Spillway to TDL9	TDL7	250	225.1	229.95	4.85	0.6	126.8	129.59
Spillway to TDL9	TDL7	350	225.1	230.53	5.43	0.71	129	132.16
Spillway to TDL9	TDL7	500	225.1	231.27	6.17	0.85	131.8	135.41
Spillway to TDL9	TDL8	0.5	223.61	227.43	3.82	0	104.91	108.59
Spillway to TDL9	TDL8	2	223.61	227.45	3.84	0.01	105.14	108.84
Spillway to TDL9	TDL8	4	223.61	227.48	3.87	0.01	105.52	109.24
Spillway to TDL9	TDL8	6	223.61	227.53	3.92	0.02	106.07	109.82
Spillway to TDL9	TDL8	8	223.61	227.57	3.96	0.03	106.54	110.32
Spillway to TDL9	TDL8	10	223.61	227.6	3.99	0.04	106.98	110.78
Spillway to TDL9	TDL8	12	223.61	227.63	4.02	0.04	107.39	111.22
Spillway to TDL9	TDL8	14	223.61	227.66	4.05	0.05	107.73	111.58
Spillway to TDL9	TDL8	16	223.61	227.69	4.08	0.06	108	111.89
Spillway to TDL9	TDL8	18	223.61	227.72	4.11	0.07	108.27	112.18
Spillway to TDL9	TDL8	20	223.61	227.75	4.14	0.08	108.52	112.46
Spillway to TDL9	TDL8	22	223.61	227.78	4.17	0.08	108.78	112.74
Spillway to TDL9	TDL8	24	223.61	227.8	4.19	0.09	109.02	113
Spillway to TDL9	TDL8	26	223.61	227.83	4.22	0.1	109.25	113.25
Spillway to TDL9	TDL8	28	223.61	227.86	4.25	0.1	109.46	113.49
Spillway to TDL9	TDL8	30	223.61	227.88	4.27	0.11	109.68	113.73
Spillway to TDL9	TDL8	32	223.61	227.9	4.29	0.12	109.88	113.96
Spillway to TDL9	TDL8	34	223.61	227.93	4.32	0.12	110.09	114.18
Spillway to TDL9	TDL8	36	223.61	227.95	4.34	0.13	110.29	114.4
Spillway to TDL9	TDL8	100	223.61	228.56	4.95	0.29	137.85	142.76
Spillway to TDL9	TDL8	200	223.61	229.24	5.63	0.46	142.73	147.89
Spillway to TDL9	TDL8	250	223.61	229.53	5.92	0.52	144.41	149.67
Spillway to TDL9	TDL8	350	223.61	230.04	6.43	0.63	147.65	153.08
Spillway to TDL9	TDL8	500	223.61	230.69	7.08	0.77	150.97	156.67
Spillway to TDL9	TDL9	0.5	224.71	227.43	2.72	0	109.99	113.3
Spillway to TDL9	TDL9	2	224.71	227.45	2.74	0.01	110.03	113.36
Spillway to TDL9	TDL9	4	224.71	227.48	2.77	0.01	110.09	113.44
Spillway to TDL9	TDL9	6	224.71	227.53	2.82	0.02	110.17	113.56
Spillway to TDL9	TDL9	8	224.71	227.56	2.85	0.03	110.24	113.67
Spillway to TDL9	TDL9	10	224.71	227.6	2.89	0.04	110.31	113.77
Spillway to TDL9	TDL9	12	224.71	227.63	2.92	0.05	110.38	113.86
Spillway to TDL9	TDL9	14	224.71	227.66	2.95	0.06	110.44	113.94
Spillway to TDL9	TDL9	16	224.71	227.69	2.98	0.07	110.49	114.02
Spillway to TDL9	TDL9	18	224.71	227.72	3.01	0.08	110.55	114.1
Spillway to TDL9	TDL9	20	224.71	227.75	3.04	0.09	110.6	114.18
Spillway to TDL9	TDL9	22	224.71	227.77	3.06	0.1	110.66	114.26
Spillway to TDL9	TDL9	24	224.71	227.8	3.09	0.1	110.71	114.33
Spillway to TDL9	TDL9	26	224.71	227.82	3.11	0.11	110.76	114.4
Spillway to TDL9	TDL9	28	224.71	227.85	3.14	0.12	110.81	114.47
Spillway to TDL9	TDL9	30	224.71	227.87	3.16	0.13	110.85	114.53
Spillway to TDL9	TDL9	32	224.71	227.9	3.19	0.14	110.9	114.6
Spillway to TDL9	TDL9	34	224.71	227.92	3.21	0.14	110.94	114.66
Spillway to TDL9	TDL9	36	224.71	227.94	3.23	0.15	110.99	114.73
Spillway to TDL9	TDL9	100	224.71	228.52	3.81	0.34	112.13	116.35
Spillway to TDL9	TDL9	200	224.71	229.15	4.44	0.55	113.38	118.14
Spillway to TDL9	TDL9	250	224.71	229.42	4.71	0.63	117.45	122.41
Spillway to TDL9	TDL9	350	224.71	229.9	5.19	0.78	162.15	167.33
Spillway to TDL9	TDL9	500	224.71	230.53	5.82	0.94	322.2	327.57
TD4 to TDL11	Rapids d/s TD4	100	224.63	226.18	1.55	1.15	130.48	130.59
TD4 to TDL11	Rapids d/s TD4	200	224.63	226.58	1.95	1.38	163.42	163.54
TD4 to TDL11	Rapids d/s TD4	250	224.63	226.74	2.11	1.45	177.55	177.68
TD4 to TDL11	Rapids d/s TD4	350	224.63	227	2.37	1.57	200.52	200.66

(continued)

Table 1
Model Output for All Cross-Sections along Trudel Creek (continued)

Reach	River Cross-Section Location	Model Q (m^3/s)	Minimum Channel Bed Elevation (m)	Water Surface Elevation (m)	Maximum Channel Depth (m)	Average Channel Velocity (m/s)	Top Channel Width (m)	Wetted Perimeter (m)
TD4 to TDL11	Rapids d/s TD4	500	224.63	227.33	2.70	1.71	232.56	232.71
TD4 to TDL11	Rapids ds TD4	0.5	224.63	224.68	0.05	0.78	16.88	16.88
TD4 to TDL11	Rapids ds TD4	2	224.63	224.73	0.10	0.7	18.74	18.75
TD4 to TDL11	Rapids ds TD4	4	224.63	224.83	0.20	0.63	22.35	22.37
TD4 to TDL11	Rapids ds TD4	6	224.63	224.96	0.33	0.63	26.94	26.96
TD4 to TDL11	Rapids ds TD4	8	224.63	225.03	0.40	0.73	29.28	29.3
TD4 to TDL11	Rapids ds TD4	10	224.63	225.09	0.46	0.78	31.64	31.67
TD4 to TDL11	Rapids ds TD4	12	224.63	225.16	0.53	0.79	42.59	42.62
TD4 to TDL11	Rapids ds TD4	14	224.63	225.22	0.59	0.77	43.96	44
TD4 to TDL11	Rapids ds TD4	16	224.63	225.26	0.63	0.81	44.75	44.79
TD4 to TDL11	Rapids ds TD4	18	224.63	225.29	0.66	0.86	45.37	45.41
TD4 to TDL11	Rapids ds TD4	20	224.63	225.32	0.69	0.9	45.99	46.04
TD4 to TDL11	Rapids ds TD4	22	224.63	225.35	0.72	0.94	46.62	46.67
TD4 to TDL11	Rapids ds TD4	24	224.63	225.38	0.75	0.97	47.25	47.3
TD4 to TDL11	Rapids ds TD4	26	224.63	225.41	0.78	0.99	47.87	47.92
TD4 to TDL11	Rapids ds TD4	28	224.63	225.44	0.81	1.02	48.48	48.54
TD4 to TDL11	Rapids ds TD4	30	224.63	225.47	0.84	1.03	49.14	49.2
TD4 to TDL11	Rapids ds TD4	32	224.63	225.5	0.87	1.05	49.79	49.85
TD4 to TDL11	Rapids ds TD4	34	224.63	225.53	0.90	1.06	50.43	50.49
TD4 to TDL11	Rapids ds TD4	36	224.63	225.56	0.93	1.07	51.08	51.15
TD4 to TDL11	TDL11	0.5	213.98	217.64	3.66	0.01	46.9	49.92
TD4 to TDL11	TDL11	2	213.98	217.66	3.68	0.01	46.94	49.97
TD4 to TDL11	TDL11	4	213.98	217.69	3.71	0.02	47.02	50.08
TD4 to TDL11	TDL11	6	213.98	217.75	3.77	0.04	47.15	50.26
TD4 to TDL11	TDL11	8	213.98	217.81	3.83	0.05	47.28	50.43
TD4 to TDL11	TDL11	10	213.98	217.86	3.88	0.07	47.42	50.61
TD4 to TDL11	TDL11	12	213.98	217.92	3.94	0.08	47.55	50.79
TD4 to TDL11	TDL11	14	213.98	217.96	3.98	0.09	47.63	50.9
TD4 to TDL11	TDL11	16	213.98	217.99	4.01	0.11	47.7	50.99
TD4 to TDL11	TDL11	18	213.98	218.02	4.04	0.12	47.77	51.08
TD4 to TDL11	TDL11	20	213.98	218.05	4.07	0.14	47.84	51.18
TD4 to TDL11	TDL11	22	213.98	218.08	4.10	0.15	47.91	51.27
TD4 to TDL11	TDL11	24	213.98	218.11	4.13	0.16	47.97	51.36
TD4 to TDL11	TDL11	26	213.98	218.14	4.16	0.17	48.04	51.45
TD4 to TDL11	TDL11	28	213.98	218.17	4.19	0.19	48.11	51.54
TD4 to TDL11	TDL11	30	213.98	218.2	4.22	0.2	48.18	51.63
TD4 to TDL11	TDL11	32	213.98	218.23	4.25	0.21	48.25	51.72
TD4 to TDL11	TDL11	34	213.98	218.26	4.28	0.22	48.32	51.81
TD4 to TDL11	TDL11	36	213.98	218.28	4.30	0.23	48.38	51.9
TD4 to TDL11	TDL11	100	213.98	218.97	4.99	0.55	49.95	54
TD4 to TDL11	TDL11	200	213.98	219.75	5.77	0.91	51.75	56.4
TD4 to TDL11	TDL11	250	213.98	220.08	6.10	1.05	52.45	57.37
TD4 to TDL11	TDL11	350	213.98	220.68	6.70	1.3	53.65	59.06
TD4 to TDL11	TDL11	500	213.98	221.48	7.50	1.61	55.26	61.34
TDL13 to TDL15	TDL13	0.5	215.09	217.64	2.55	0.01	88.67	89.79
TDL13 to TDL15	TDL13	2	215.09	217.66	2.57	0.01	88.79	89.91
TDL13 to TDL15	TDL13	4	215.09	217.69	2.60	0.02	88.99	90.13
TDL13 to TDL15	TDL13	6	215.09	217.75	2.66	0.04	89.33	90.5
TDL13 to TDL15	TDL13	8	215.09	217.81	2.72	0.05	89.71	90.91
TDL13 to TDL15	TDL13	10	215.09	217.86	2.77	0.07	90.09	91.32
TDL13 to TDL15	TDL13	12	215.09	217.92	2.83	0.08	90.49	91.75
TDL13 to TDL15	TDL13	14	215.09	217.96	2.87	0.09	90.82	92.09
TDL13 to TDL15	TDL13	16	215.09	217.99	2.90	0.1	91.07	92.35
TDL13 to TDL15	TDL13	18	215.09	218.02	2.93	0.12	91.33	92.62
TDL13 to TDL15	TDL13	20	215.09	218.05	2.96	0.13	91.65	92.95
TDL13 to TDL15	TDL13	22	215.09	218.08	2.99	0.14	91.95	93.26
TDL13 to TDL15	TDL13	24	215.09	218.11	3.02	0.15	92.55	93.87
TDL13 to TDL15	TDL13	26	215.09	218.14	3.05	0.16	93.27	94.61
TDL13 to TDL15	TDL13	28	215.09	218.17	3.08	0.17	93.5	94.86
TDL13 to TDL15	TDL13	30	215.09	218.2	3.11	0.18	93.81	95.21
TDL13 to TDL15	TDL13	32	215.09	218.23	3.14	0.19	94.02	95.46
TDL13 to TDL15	TDL13	34	215.09	218.26	3.17	0.2	94.21	95.66
TDL13 to TDL15	TDL13	36	215.09	218.28	3.19	0.21	94.43	95.89
TDL13 to TDL15	TDL13	100	215.09	218.97	3.88	0.43	99.1	101.18
TDL13 to TDL15	TDL13	200	215.09	219.75	4.66	0.65	100.84	103.53
TDL13 to TDL15	TDL13	250	215.09	220.08	4.99	0.73	108.86	111.64
TDL13 to TDL15	TDL13	350	215.09	220.68	5.59	0.87	120.41	123.26
TDL13 to TDL15	TDL13	500	215.09	221.48	6.39	1.02	187.55	190.46
TDL13 to TDL15	TDL14	0.5	214.06	217.64	3.58	0	77.83	82.02
TDL13 to TDL15	TDL14	2	214.06	217.66	3.60	0.01	77.86	82.06
TDL13 to TDL15	TDL14	4	214.06	217.69	3.63	0.02	77.9	82.15
TDL13 to TDL15	TDL14	6	214.06	217.75	3.69	0.03	77.97	82.3
TDL13 to TDL15	TDL14	8	214.06	217.8	3.74	0.04	78.08	82.49
TDL13 to TDL15	TDL14	10	214.06	217.86	3.80	0.05	78.65	83.15
TDL13 to TDL15	TDL14	12	214.06	217.92	3.86	0.06	79.04	83.64
TDL13 to TDL15	TDL14	14	214.06	217.95	3.89	0.07	79.28	83.95
TDL13 to TDL15	TDL14	16	214.06	217.98	3.92	0.08	79.47	84.19
TDL13 to TDL15	TDL14	18	214.06	218.01	3.95	0.09	79.67	84.43
TDL13 to TDL15	TDL14	20	214.06	218.04	3.98	0.1	79.95	84.76
TDL13 to TDL15	TDL14	22	214.06	218.07	4.01	0.11	80.35	85.22
TDL13 to TDL15	TDL14	24	214.06	218.1	4.04	0.12	80.44	85.38
TDL13 to TDL15	TDL14	26	214.06	218.12	4.06	0.13	80.53	85.55

(continued)

Table 1
Model Output for All Cross-Sections along Trudel Creek (completed)

Reach	River Cross-Section Location	Model Q (m^3/s)	Minimum Channel Bed Elevation (m)	Water Surface Elevation (m)	Maximum Channel Depth (m)	Average Channel Velocity (m/s)	Top Channel Width (m)	Wetted Perimeter (m)
TDL13 to TDL15	TDL14	28	214.06	218.15	4.09	0.14	80.62	85.71
TDL13 to TDL15	TDL14	30	214.06	218.18	4.12	0.15	80.7	85.87
TDL13 to TDL15	TDL14	32	214.06	218.21	4.15	0.15	81.83	87.04
TDL13 to TDL15	TDL14	34	214.06	218.24	4.18	0.16	81.86	87.12
TDL13 to TDL15	TDL14	36	214.06	218.26	4.20	0.17	81.93	87.22
TDL13 to TDL15	TDL14	100	214.06	218.9	4.84	0.39	85.07	90.75
TDL13 to TDL15	TDL14	200	214.06	219.62	5.56	0.63	87.72	93.8
TDL13 to TDL15	TDL14	250	214.06	219.93	5.87	0.72	89.22	95.47
TDL13 to TDL15	TDL14	350	214.06	220.5	6.44	0.89	92.53	99.09
TDL13 to TDL15	TDL14	500	214.06	221.27	7.21	1.08	97.38	104.2
DS Gertrude Lk	TDL16	0.5	212.99	217.64	4.65	0	43.19	45.1
DS Gertrude Lk	TDL16	2	212.99	217.66	4.67	0.01	43.26	45.18
DS Gertrude Lk	TDL16	4	212.99	217.69	4.70	0.02	43.4	45.35
DS Gertrude Lk	TDL16	6	212.99	217.75	4.76	0.03	43.67	45.65
DS Gertrude Lk	TDL16	8	212.99	217.8	4.81	0.04	44.11	46.13
DS Gertrude Lk	TDL16	10	212.99	217.86	4.87	0.05	44.34	46.41
DS Gertrude Lk	TDL16	12	212.99	217.92	4.93	0.06	44.4	46.55
DS Gertrude Lk	TDL16	14	212.99	217.95	4.96	0.08	44.43	46.63
DS Gertrude Lk	TDL16	16	212.99	217.98	4.99	0.09	44.46	46.7
DS Gertrude Lk	TDL16	18	212.99	218.01	5.02	0.1	44.58	46.83
DS Gertrude Lk	TDL16	20	212.99	218.04	5.05	0.11	44.69	46.97
DS Gertrude Lk	TDL16	22	212.99	218.07	5.08	0.12	44.82	47.1
DS Gertrude Lk	TDL16	24	212.99	218.1	5.11	0.13	44.93	47.24
DS Gertrude Lk	TDL16	26	212.99	218.12	5.13	0.14	45.05	47.37
DS Gertrude Lk	TDL16	28	212.99	218.15	5.16	0.15	45.18	47.51
DS Gertrude Lk	TDL16	30	212.99	218.18	5.19	0.16	45.38	47.72
DS Gertrude Lk	TDL16	32	212.99	218.21	5.22	0.17	45.57	47.93
DS Gertrude Lk	TDL16	34	212.99	218.24	5.25	0.18	45.79	48.16
DS Gertrude Lk	TDL16	36	212.99	218.26	5.27	0.19	45.93	48.31
DS Gertrude Lk	TDL16	100	212.99	218.9	5.91	0.48	48.08	50.85
DS Gertrude Lk	TDL16	200	212.99	219.62	6.63	0.82	50.45	53.64
DS Gertrude Lk	TDL16	250	212.99	219.93	6.94	0.97	53.41	56.7
DS Gertrude Lk	TDL16	350	212.99	220.5	7.51	1.22	66.76	70.15
DS Gertrude Lk	TDL16	500	212.99	221.27	8.28	1.52	72.27	76.23
DS Gertrude Lk	TDL17	0.5	200.19	203.14	2.95	0.01	68.18	69.21
DS Gertrude Lk	TDL17	2	200.19	203.14	2.95	0.01	68.26	69.3
DS Gertrude Lk	TDL17	4	200.19	203.17	2.98	0.02	69.2	70.29
DS Gertrude Lk	TDL17	6	200.19	203.22	3.03	0.04	70.56	71.7
DS Gertrude Lk	TDL17	8	200.19	203.28	3.09	0.06	71.5	72.67
DS Gertrude Lk	TDL17	10	200.19	203.33	3.14	0.08	72.81	74.01
DS Gertrude Lk	TDL17	12	200.19	203.38	3.19	0.09	73.57	74.8
DS Gertrude Lk	TDL17	14	200.19	203.43	3.24	0.11	75.59	76.86
DS Gertrude Lk	TDL17	16	200.19	203.48	3.29	0.12	76.83	78.12
DS Gertrude Lk	TDL17	18	200.19	203.53	3.34	0.13	78.27	79.6
DS Gertrude Lk	TDL17	20	200.19	203.58	3.39	0.14	79.86	81.22
DS Gertrude Lk	TDL17	22	200.19	203.63	3.44	0.15	80.79	82.18
DS Gertrude Lk	TDL17	24	200.19	203.67	3.48	0.16	81.65	83.07
DS Gertrude Lk	TDL17	26	200.19	203.72	3.53	0.17	83.04	84.48
DS Gertrude Lk	TDL17	28	200.19	203.76	3.57	0.18	84.48	85.94
DS Gertrude Lk	TDL17	30	200.19	203.8	3.61	0.19	86.18	87.66
DS Gertrude Lk	TDL17	32	200.19	203.84	3.65	0.2	87.66	89.16
DS Gertrude Lk	TDL17	34	200.19	203.89	3.70	0.21	89.53	91.08
DS Gertrude Lk	TDL17	36	200.19	203.92	3.73	0.22	93.6	95.23
DS Gertrude Lk	TDL17	100	200.19	204.76	4.57	0.41	101.13	103.37
DS Gertrude Lk	TDL17	200	200.19	205.72	5.53	0.59	103.64	106.54
DS Gertrude Lk	TDL17	250	200.19	206.16	5.97	0.65	104.77	107.98
DS Gertrude Lk	TDL17	350	200.19	207.08	6.89	0.72	107.16	111
DS Gertrude Lk	TDL17	500	200.19	208.71	8.52	0.76	111.43	116.37
DS Gertrude Lk	TDL18	0.5	198.84	203.14	4.30	0.01	59.89	61.42
DS Gertrude Lk	TDL18	2	198.84	203.14	4.30	0.01	59.9	61.43
DS Gertrude Lk	TDL18	4	198.84	203.17	4.33	0.01	60.12	61.66
DS Gertrude Lk	TDL18	6	198.84	203.22	4.38	0.02	60.46	62.01
DS Gertrude Lk	TDL18	8	198.84	203.27	4.43	0.03	60.79	62.36
DS Gertrude Lk	TDL18	10	198.84	203.32	4.48	0.04	61.06	62.65
DS Gertrude Lk	TDL18	12	198.84	203.37	4.53	0.05	61.23	62.84
DS Gertrude Lk	TDL18	14	198.84	203.42	4.58	0.06	61.4	63.05
DS Gertrude Lk	TDL18	16	198.84	203.47	4.63	0.07	61.58	63.24
DS Gertrude Lk	TDL18	18	198.84	203.52	4.68	0.08	61.75	63.46
DS Gertrude Lk	TDL18	20	198.84	203.58	4.74	0.09	62.02	63.82
DS Gertrude Lk	TDL18	22	198.84	203.62	4.78	0.09	62.27	64.15
DS Gertrude Lk	TDL18	24	198.84	203.66	4.82	0.1	62.51	64.47
DS Gertrude Lk	TDL18	26	198.84	203.7	4.86	0.11	62.73	64.75
DS Gertrude Lk	TDL18	28	198.84	203.74	4.90	0.12	62.91	64.95
DS Gertrude Lk	TDL18	30	198.84	203.79	4.95	0.13	63.09	65.15
DS Gertrude Lk	TDL18	32	198.84	203.83	4.99	0.13	63.27	65.36
DS Gertrude Lk	TDL18	34	198.84	203.87	5.03	0.14	63.48	65.59
DS Gertrude Lk	TDL18	36	198.84	203.9	5.06	0.15	63.73	65.84
DS Gertrude Lk	TDL18	100	198.84	204.7	5.86	0.35	65.98	68.67
DS Gertrude Lk	TDL18	200	198.84	205.64	6.80	0.57	68.07	71.48
DS Gertrude Lk	TDL18	250	198.84	206.07	7.23	0.66	69.09	72.82
DS Gertrude Lk	TDL18	350	198.84	206.98	8.14	0.79	71.88	76.15
DS Gertrude Lk	TDL18	500	198.84	208.61	9.77	0.9	76.15	81.55

***Note: model crashed at 0.1 m^3/s**