Draft Report; Skagit County Water Supply IFIM and Fisheries Study

Gilligan Creek
Salmon Creek
Turner Creek
Mundt Creek

comments to CES 10/21/96 HB
see p IV-9

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SECTION I

INTRODUCTION

Overview and Authorization

The Public Utility District #1 of Skagit County (District) has estimated that water demand will exceed existing supply by 12.9 million gallons per day by the year 2014. Based upon long term planning efforts, the District is currently evaluating 9 different water supply options. These options are:

1) Water conservation
2) Purchasing additional water from the City of Anacortes
3) Additional supply from existing stream diversions
4) New supply from different surface sources
5) Divert / pump Skagit River water to the Water Treatment Plant / Judy Reservoir
6) Develop groundwater / artificial recharge resources
7) Raise Judy Reservoir to increase storage capacity
8) Dredge Judy Reservoir to increase storage capacity
9) Construct an additional impoundment reservoir in the Janicki Creek or Day Lake basin.

To evaluate Option # 3, acquiring additional water from the existing stream diversions into the Judy Reservoir, the District requested Cascades Environmental Services, Inc. (CES) to conduct an instream flow study. Instream flow studies using U.S. Fish and Wildlife Service (USFWS) Instream Flow Incremental Methodology (IFIM) will provide information to calculate minimum flow requirements of anadromous and resident salmonids in the streams which are presently supplying water to the Judy Reservoir system. Figure I-1 shows the location of the study streams, respective watersheds and Judy Reservoir.

This fisheries report contains results of the physical habitat surveys, synthesized hydrology, salmon spawning surveys, and IFIM studies completed on each stream. The fisheries and instream flow studies were conducted during the fall and winter field season of 1995-96.

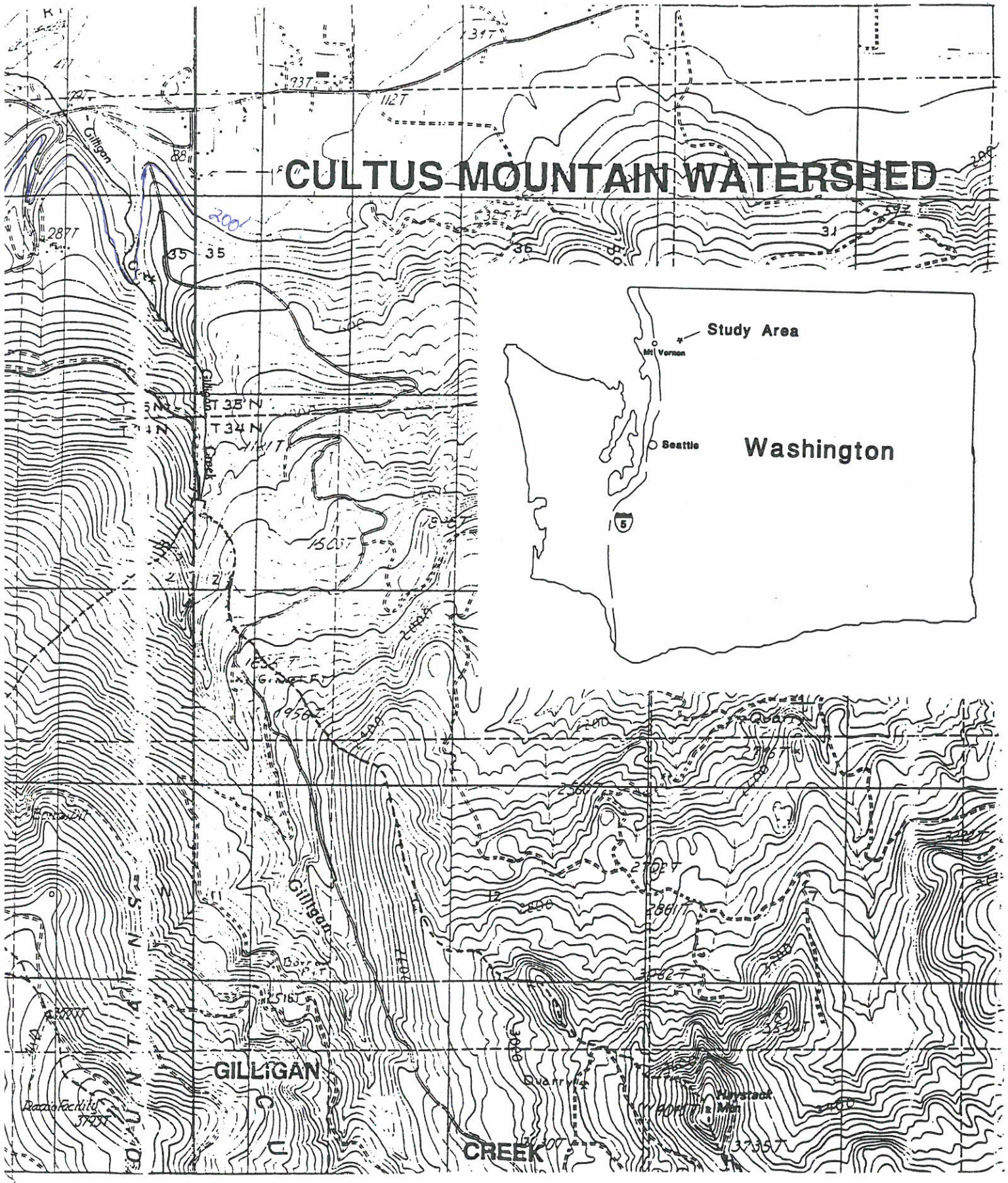

Figure I-1. Map of study streams and watersheds. Diversions, pipeline route and Judy Reservoir are shown.

Participants

This Draft IFIM Report is prepared for the Skagit Water Supply Instream Flow Review Panel, which is composed of the following individuals and their respective affiliations:

Table I-1. Skagit Water Supply Instream Flow Review Panel

Individual	**Affiliation**
Mr. Bob Powell	Public Utility District #1 of Skagit County (District)
Mr. Brad Spangler	Public Utility District #1 of Skagit County
Mr. Larry Wasserman	Skagit System Cooperative (SSC)
Mr. Art Stendal	Wash. Dept. of Fish and Wildlife (WDFW)
Dr. Hal Beecher	Wash. Dept. of Fish and Wildlife
Mr. Steve Hirschey	Wash. Dept. of Ecology (WDOE)
Mr. John Blum	Cascades Environmental Services, Inc. (CES)
Mr. Pete Rittmueller	Cascades Environmental Services, Inc.
Mr. Chris Fairbanks	Cascades Environmental Services, Inc.

Study Objectives

The objective of this IFIM study is to model the relationship between surface water discharge and physical habitat for salmonids in the diversion reaches of Gilligan, Salmon, Turner and Mundt creeks.

IFIM calibration discharge measurements of Salmon Creek were postponed because of an increase of sediment load which buried spawning gravel at the selected study sites. Because the sediment supply in Salmon Creek was not in equilibrium and the streambed was not stable, calibration discharge measurements were not taken.

Study Purpose

The purpose of this study is to provide scientific and technical data to state and federal agencies, the District and Skagit System Cooperative (SSC) for evaluating the effects of alternative flow regimes on salmonid fisheries resources in Gilligan, Salmon, Turner, and Mundt creeks.

Authority

This study is being conducted for and funded by the District.

Contractor

The District has contracted Cascades Environmental Services, Inc. (CES) of Bellingham, WA to conduct the IFIM study.

SECTION II

DESCRIPTION OF PROJECT AND STUDY AREAS

Introduction

The Skagit County water supply system obtains surface water from four streams: Gilligan, Salmon, Turner, and Mundt creeks. These creeks are located on the north and west slopes of the Cultus Mountains, east of Mt. Vernon, Washington (Figure I-1). The water originates as rainfall and snowmelt. The elevation of the watersheds ranges from about 600 to 1,000 feet above mean sea level (MSL) at the diversion structures to 4,100 feet MSL at the highest peak. A portion of each creek is diverted through underground pipes to the Judy Reservoir. The watershed areas above the diversion are listed in Table II-1.

Table II-1. Watershed areas of study streams above diversion structures.

STREAM	WATERSHED AREA (acres)
Gilligan Creek	3,409
Salmon Creek	249
Turner Creek	782
Mundt Creek	1,000

Physical habitat surveys were conducted for each of the study streams from the point of diversion to the stream's mouth. Habitat and stream descriptions were developed from analysis of topographic maps, ground reconnaissance, video record and a habitat frequency analysis. Brief descriptions of each study stream are provided below. Appendix A contains a full report of the physical habitat surveys.

To estimate the stream discharge at the diversion structure of each of the streams, a synthesized daily flow record was calculated with comparison to the gage record of East Fork Nookachamps Creek near Big Lake, USGS gage #12199800, December 1961 to August 1972. Appendix B contains the synthesized hydrology report. Mean monthly flows for each stream were calculated from the synthesized daily flows and are provided with the following physical description of the study sites.

Physical Descriptions of Study Sites

Following is a brief description of each study stream including physical features, watershed area, synthesized hydrology, fisheries resources, selected transects and target fish species. Complete physical descriptions of the study streams are included in Appendix A. A complete report of the synthesized hydrology is provided in Appendix B.

Gilligan Creek

Gilligan Creek is on the north slope of the Cultus Mountains and flows into the Skagit River upstream of River Mile (RM) 28 in the S.E. quarter of Section 27, Township 35 N, Range 5 E (Figure I-1). Gilligan Creek drains 3,409 acres above the diversion and 897 acres below the diversion. The Gilligan Creek diversion is located at approximatly 800 feet elevation MSL (EL), at RM 1.5. Immediately above the diversion is a moderate-sized waterfall which is a confirmed barrier to fish migration (WDF 1975). WDF (1975) also identified a fish migration barrier below the diversion at RM 1.0. The creek drops from the diversion to approximately 40 ft MSL at its confluence with the Skagit River. The overall slope of this creek is 9.4%. Table II-2 lists the physical characteristics of Gilligan Creek.

Table II-2. Physical Characteristics of Gilligan Creek.

Diversion Reach Length (ft)		8,085
Elevation (ft)		40 - 800
Slope (%)		9.4
Watershed Area: (acres)	Above diversion Below diversion	3,409 897
Substrate		boulders and cobble

Channel sinuosity is moderate; the stream is generally well confined. Below the South Skagit Highway at RM 0.15, however, the stream channel cuts through an alluvial fan and is poorly confined. Gravel bars occur between RM 0.00 - 0.89. Above RM 0.89 the stream channel is well confined by steep stream slopes.

Sediment supply is fairly uniform below the diversion with the exception of an unconsolidated bluff at RM 0.59. This bluff may contribute a substantial amount of sediment during peak flows.

About 150 ft above the South Skagit Highway, at RM 0.20, the stream channel of Gilligan Creek has been observed to run dry during low flows in July and August (SSC unpublished data). This section of Gilligan Creek is accessible to anadromous fish and the dry channel would be a barrier to their upstream migration.

Table II-3 lists the synthesized mean monthly flows for Gilligan Creek at the diversion structure. The District holds water rights to divert 8.89 cfs from Gilligan with a minimum bypass flow requirement of 0.75 cfs.

Table II-3. Synthesized mean monthly flow (cfs) for Gilligan Creek calculated for the watershed above the diversion structure using East Fork Nookachamps near Big Lake record 1961-1972.

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
29.87	44.20	45.50	50.20	45.78	37.75	47.06	62.26	34.50	14.48	8.26	17.13

Salmon Creek

Salmon Creek flows into Stevens Creek, a small tributary to the Skagit River downstream of RM 27, in the S.E. quarter of Section 28 Township 35N, Range 5E (Figure I-1). Salmon Creek drains 249 acres above the diversion and 234 acres below the diversion. The diversion is located at El 660, RM 1.53. Salmon Creek drops from the diversion to the South Skagit Highway (El 80, RM 0.7) at a gradient of 17%. Below the South Skagit Highway Salmon Creek enters the ditched channel of Stevens Creek and extends about 3,000 ft to the Skagit River at a gradient of less than 1%. Two unconfirmed anadromous barriers exist below Old Day Creek Road: 1) where Salmon Creek passes through a culvert under Old Day Creek Road (RM 1.3), and cascades down boulder riprap and 2) near RM 1.2 where the channel is confined in a bedrock chute and cascade. Table II-4 lists the physical characteristics of Salmon Creek.

Table II-4. Physical Characteristics of Salmon Creek.

Diversion Reach Length (ft)	8,100
Elevation (ft)	40 - 660
Slope (%)	7.6
Watershed Area: Above diversion (acres) Below diversion	249 234
Substrate	Bedrock, Gravel and Silt

Based on reconnaissance conducted during the physical habitat survey, sediment supply appeared to be uniform within the diversion reach. Therefore no segments were identified based on sediment supply. However, CES identified a significant sediment source during the transect selection process. A pond near Salmon Creek above Old Day Creek Road was being excavated. This condition was brought to the attention of the IFIM Review Panel on April 18, 1995 during the transect selection meeting. Observations made on October 11, 1995 found that sediment had completely covered the gravel at the study sites and raised the stream bed elavation. Because the stream bed was unstable and the sediment supply was not in equilibrium, the Salmon Creek IFIM study was postponed.

The District holds water rights to divert 1.8 cfs from Salmon Creek with no minimum bypass flow requirement. Table II-5 lists the synthesized mean monthly flows for Salmon Creek.

Table II-5. Synthesized mean monthly flow (cfs) for Salmon Creek calculated for the watershed above the diversion using East Fork Nookachamps near Big Lake gage record, 1961-1972.

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
2.18	3.23	3.32	3.67	3.35	2.76	3.44	4.55	2.52	1.06	0.60	1.25

Turner Creek

Turner Creek is on the west slope of the Cultus Mountains and is a tributary to East Fork Nookachamps Creek, which flows into the Skagit River. The diversion reach of Turner Creek flows through Sections 16, 17 and 20 of Township 34N, Range 5E (Figure I-1). Turner Creek drains 782 acres above the diversion and 808 acres below the diversion. A barrier to fish migration has been confirmed above the diversion structure at RM 3.3 (WDF 1975). Table II-6 lists the physical characteristics of Turner Creek.

Table II-6. Physical Characteristics of Turner Creek.

Diversion Reach (ft)		18,865
Elevation (ft)		35 - 820
Slope (%)		4.2
Watershed Area: (acres)	Above diversion Below diversion	782 808
Substrate		Cobble, Boulder, Gravel and Silt

Turner Creek flows through a natural channel to El 60 (RM 1.7) with an overall gradient of 10.8%. The creek then flows through a ditched channel for 9,650 ft to its confluence with East Fork Nookachamps at El 35, a gradient of less than 1%.

Channel sinuosity is low; the stream is uniformly straight particularly where the channel is ditched. The natural channel is well confined.

Sediment supply is uniform within the diversion reach. Therefore no segments were identified based on sediment supply. The ditched section of lower Turner Creek has a very low gradient and little riparian cover. During periods of summer low flows water temperature in Turner Creek are reported to be elevated and may potentially stress juvenile salmonids.

Table II-7 lists the synthesized mean monthly flows for Turner Creek at the diversion structure. The District holds water rights to divert 6.2 cfs from Turner Creek with a minimum bypass flow requirement of 0.6 cfs.

Table II-7. Synthesized mean monthly flow (cfs) for Turner Creek calculated for the watershed at the diversion using East Fork Nookachamps near Big Lake gage record, 1961-1972.											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
6.85	10.1	10.4	11.5	10.5	8.65	10.7	14.2	7.91	3.32	1.89	3.93

Mundt Creek

Mundt Creek is on the western slope of the Cultus Mountains and is a tributary to East Fork Nookachamps Creek. The diversion reach of Mundt Creek flows through Sections 7, 8 and 18 of Township 34N, Range 5E (Figure I-1). Mundt Creek drains 1,000 acres above the diversion and 1,648 acres below the diversion. A fish migration barrier has been identified below the diversion structure at RM 2.0 (WDF 1975). Table II-8 lists the physical characteristics of Mundt Creek.

Table II-8. Physical Characteristics of Mundt Creek.	
Diversion Reach (ft)	12,300
Elevation (ft)	35 - 1,000
Slope (%)	7.8
Watershed Area: Above diversion (acres) Below diversion	1,000 1,648
Substrate	Boulder, Cobble and Gravel

Channel sinuosity is moderate; the stream is fairly straight and well confined. Sediment supply is uniform within the diversion reach and no segments were identified based on sediment supply.

Table II-9 lists the synthesized mean monthly flows for Mundt Creek at the diversion structure. The District holds water rights to divert 8.0 cfs from Mundt Creek with no minimum bypass flow required.

Table II-9. Synthesized mean monthly flow (cfs) for Mundt Creek calculated for the watershed above the diversion using East Fork Nookachamps near Big Lake gage record, 1961-1972.											
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept
8.76	12.96	13.34	14.72	13.42	11.07	13.80	18.26	10.11	4.25	2.42	5.02

SECTION III

FISH POPULATIONS

Anadromous Fish

Anadromous fish have access to each of the study streams and have been observed in fish spawner surveys. WDFW and SSC have conducted surveys in these streams over several years and Mundt Creek has been an index stream since at least 1952. CES conducted spawner surveys in Turner and Mundt creeks in November and December 1995. Complete results of the CES spawner surveys are provided in Appendix C and a summary of these results are listed below.

Gilligan Creek

Fish surveys conducted by WDFW and SSC have found coho salmon (*Oncorhynchus kisutch*), chum salmon (*O. keta*) cutthroat trout (*O. clarki*) and rainbow trout (*O. mykiss*) in Gilligan Creek. CES biologists observed pink salmon spawning in Gilligan Creek after a freshet in the fall of 1995 as well as a single chinook salmon (*O. tschawytscha*) in a pool near Transect 3. Gilligan Creek is accessible to anadromous steelhead trout (*O. mykiss*) and the presence of rainbow trout suggests that steelhead may utilize Gilligan Creek. Fish migration in Gilligan Creek may be restricted by seasonal and intermittent low flows.

Salmon Creek

Salmon Creek is a tributary to Stevens Creek which flows into the Skagit River. Fish surveys conducted by WDFW and SSC have found coho salmon and cutthroat trout in Salmon and Stevens creeks. Although Salmon Creek is accessible to anadromous steelhead trout, no rainbow trout have been observed in the creek. Fish migration upstream may be impeded by seasonal and intermittent low flows.

Turner Creek

Turner Creek flows into East Fork Nookachamps Creek which flows into the Skagit River. Fish surveys conducted by WDFW and SSC have found coho and chum salmon in Turner Creek. Steelhead trout have not been observed during fish surveys; however, Turner Creek is accessible to steelhead trout. Fish migration upstream may be impeded by seasonal and intermittent low flows.

CES conducted spawner surveys in Turner Creek on November 9, 1995 and December 7, 1995.

Three chum salmon were observed in the latter survey. Two of the salmon were associated with a redd.

Mundt Creek

Mundt Creek is a tributary to East Fork Nookachamps Creek and is accessible to anadromous fish. Fish surveys conducted by WDFW and SSC have found coho and chum salmon in Mundt Creek. Mundt Creek is accessible to steelhead trout; however, steelhead trout have not been observed during fish surveys. A barrier to fish migration has been identified below the diversion at RM 2.0 (WDF 1975).

CES conducted spawner surveys in Mundt Creek on November 16 and December 7, 1995. Observations during the first survey included 58 coho salmon and 11 redds. During the second survey 8 redds, 55 chum salmon, and 3 coho salmon were observed.

SECTION IV

INSTREAM FLOW METHODOLOGY AND APPROACH

Overview of IFIM Methodology

The Instream Flow Incremental Method (IFIM) is designed to quantify potential physical habitat available for each life stage of a fish species at various levels of stream discharge. Major components of the IFIM methodology include: (1) study site and transect selection, (2) transect weighting, (3) field data collection, (4) hydraulic simulation to determine the spatial distribution of combinations of depths and velocities with respect to substrate and cover under a variety of discharges, and (5) habitat simulation, using habitat suitability criteria, to generate an index of change in habitat relative to change in discharge. The product of the habitat simulation is expressed as Weighted Usable Area (WUA) for a range of simulated stream discharges.

Habitat Descriptions

A number of methods were used for understanding and describing the physical stream character and fisheries habitat. These included foot surveys, physical habitat surveys and topographic maps. A complete physical descriptions of each study stream is provided in Appendix A. Habitats were characterized according to the following descriptions. The following habitat descriptions are general because habitat types are not discrete units in nature and can not be defined as such.

Pool: Pools generally are deeper and wider than other habitat types and flow is slower. Substrate ranges from cobbles to small gravel and sand. Transects have been selected in each study stream to represent pool habitat.

Substrate:	cobble to small gravel and sand
Channel Form:	wide and deep
Flow:	non-turbulent
Hydraulic Slope:	low
Hydraulic Control:	strong
Lateral water surface elevation (WSE):	even
Velocity:	slow

Glide: A glide is similar to a slow run except that generally velocities are slower and more laminar and the substrate is smaller. Glides can be deep or shallow, wide or narrow. Transects have been selected in each study stream to represent glide habitat.

Substrate:	cobble/boulder
Channel Form:	semi-uniform
Flow:	semi-laminar

Hydraulic Slope:	low
Hydraulic Control:	weak
Lateral WSE:	even
Velocity:	low to moderate

Run: Runs generally form in straight, trapezoidal channels, and velocities are generally dispersed evenly across the transect. Boulder runs provide a variety of microhabitats including feeding stations, pocket water, object cover, and small plunge pools. This habitat had a low occurrence in the study streams and is not represented in transect selection.

Substrate:	cobble to boulder with some gravel
Channel Form:	semi-irregular to irregular
Flow:	semi-turbulent to highly turbulent
Hydraulic Slope:	moderate
Hydraulic Control:	weak
Lateral WSE:	even to uneven
Velocity:	moderate to fast

Riffle: A riffle is generally characterized by an uneven lateral water surface elevation, shallow depths, a fairly uniform velocity distribution across the transect, and a gravel or rubble substrate. Each study stream has a large percentage of riffle habitat. Transects have been selected in each study stream to represent riffle habitat.

Substrate:	cobble/gravel
Channel Form:	uniform
Flow:	semi-turbulent to turbulent
Hydraulic Slope:	moderate
Hydraulic Control:	none
Lateral WSE:	even to uneven
Velocity:	moderate to fast

Boulder Garden: This habitat resembles a run with the addition of randomly placed large boulders which cause flow irregularities. This habitat was observed in Gilligan Creek but is not represented by the selected transects since it is a small proportion of the observations.

Chute: Characteristics of this habitat are fast and turbulent current, constricted and uneven flow distribution with highest velocities generally in the center of the transect. A chute offers little usable habitat for fish and is not represented in this study.

Substrate:	cobble/boulder/bedrock
Channel Form:	semi-uniform to irregular
Flow:	turbulent to highly turbulent
Hydraulic Slope:	moderate to steep
Hydraulic Control:	weak

Lateral WSE:	even to uneven
Velocity:	fast to very fast

Cascades: This habitat includes low, medium, and high gradient types. Low gradient cascades are usually formed by small boulders (2-4 ft in diameter) over a gradient of 4 - 8 percent. Medium gradient cascades are usually formed by medium size boulders (4-6 ft in diameter) over a gradient of 8 - 15 percent. High gradient cascades are formed by large boulders (6 ft and larger in diameter) or bedrock. Gradient exceeds 15 percent. Associated habitats are usually limited to shallow, small , and turbulent plunge pools. Although cascades offer habitat in the plunge pools, hydraulics are complex and difficult to model. Low gradient cascade habitat is represented in Gilligan, upper Turner and upper Mundt study sites.

Substrate:	boulder to bedrock
Channel Form:	very irregular
Flow:	highly turbulent
Hydraulic Slope:	moderate to steep
Hydraulic Control:	moderate
Lateral WSE:	very uneven
Velocity:	moderate to fast

Study Site and Transect Selection

Selected transects were approved by the Skagit Water Supply Instream Flow Review Panel on April 18, 1995.

Gilligan Creek

Seven transects were selected and approved to represent salmonid habitat for the diversion reach of Gilligan Creek. The transects are located along 2,500 ft of Gilligan Creek beginning about 750 feet above the South Skagit Highway culvert. Transect 1 is located downstream of all other transects with transect numbers increasing in an upstream direction. Figure IV-1 shows the locations of the selected transects. Following is a description of the selected transects.

T-1 Glide, 16 feet wide, cobble and gravel substrate.
T-2 Riffle, 16 feet wide, cobble and gravel substrate, with good spawning gravel.
T-3 Glide, pool tailout, 19 feet wide, boulder, cobble and gravel substrate.
T-4 Pool, 18 feet wide, boulder and cobble substrate.
T-5 Riffle, medium gradient, 22.5 feet wide, boulder and cobble substrate.
T-6 Cascade, low gradient, 18 feet wide, boulder, cobble, gravel substrate.
T-7 Pool, 10 feet wide, narrow fast velocity, medium depth, boulder and cobble substrate.

Transect Weighting

Weighting for each transect was accomplished in two steps. The first involved classification of the various habitat types present in the study reach. These classifications were derived from the physical stream survey.

CES completed physical habitat surveys of each study stream in the fall of 1994. These surveys made observations of habitat type, substrate, channel width, wetted width, channel depth and slope at 100 foot intervals. An analysis of habitat frequency in each study stream was used to select study sites and transects for the IFIM study. Because of the inherent limits to all hydraulic models, complex hydraulic features, such as chutes, were avoided.

Tables IV-1 through IV-8 list the frequency of habitat types for study reaches and transects with descriptions of habitat represented and weighting for Gilligan, Turner, and Mundt creeks, respectively. The data are adjusted to reflect habitat modeled in each study stream. Transect and study site weighting were approved by Dr. Hal Beecher, WDFW on July 24, 1996 (Appendix I).

No – transect + study site weighting were never approved by WDFW

Table IV-1. Frequency of habitat type observed in the Gilligan Creek study reach.

Length: 8,085 ft		Elevation: 40 - 600 ft	
Substrate: Boulder, cobble, gravel		Slope: 6.9 %	
HABITAT	**FREQUENCY**	**PERCENT [1]**	**PERCENT [2]**
Pool	13	18.6	19.1
Glide	5	7.1	7.4
Run	0		
Riffle	30	42.9	44.1
Bld Garden	1	1.4	
Chute	1	1.4	
Cascade	20	28.6	29.4
Total:	70	100.0	100.0

[1] All habitat types
[2] Boulder garden and chute removed for transect weight

Table IV-2. Transect weighting for Gilligan Creek.

TRANSECT	HABITAT	WEIGHTING (%)
T-1	Glide	3.7
T-2	Riffle	22.1
T-3	Glide	3.7
T-4	Pool	9.5
T-5	Riffle	22.1
T-6	Cascade	29.4
T-7	Pool	9.5
	TOTAL:	100.0

Table IV-3. Frequency of habitat type observed in the Lower Turner Creek study reach.

Length: 10,700 ft		Elevation: 35 - 80	
Substrate: Cobble, gravel and silt		Slope: 0.4%	
HABITAT	**FREQUENCY**	**PERCENT [1]**	**PERCENT [2]**
Pool	1	1.1	1.1
Glide	80	89.9	90.9
Run	1	1.1	
Riffle	7	7.9	8.0
Bld Garden	0		
Chute	0		
Cascade	0		
Total:	89	100.0	100.0

1 All habitat types
2 Run removed for transect weight

Table IV-4. Frequency of habitat type observed in the upper Turner Creek study reach.

Length: 8,165 ft		Elevation: 80 - 820	
Substrate: Boulder, cobble and gravel		Slope: 9.1%	
HABITAT	**FREQUENCY**	**PERCENT [1]**	**PERCENT [2]**
Pool	24	25.0	25.8
Glide	11	11.5	11.8
Run	0		
Riffle	50	52.1	53.8
Bld Garden	0		
Chute	3	3.1	
Cascade	8	8.3	8.6
Total:	96	100.0	100.0

1 All habitat types
2 Chute removed for transect weight

Table IV-5. Transect weighting for Turner Creek.

	Length (ft)	Percent
Study Site 1: Lower Turner	10,700	56.7
Study Site 2: Upper Turner	8,165	43.3

TRANSECT	HABITAT	REACH WEIGHTING (%)	TOTAL WEIGHTING (%)
Study Site 1: Lower Turner			
T-1	Glide	Not Applicable	Not Applicable
T-2	Glide	Not Applicable	Not Applicable
T-3	Glide	30.3	17.2
T-4	Glide	30.3	17.2
T-5	Pool	0.5	0.3
T-6	Riffle	2.8	1.6
T-7	Riffle	2.8	1.6
T-8	Glide Riffle	30.3 33.1 2.8	17.2 18.8 1.6
T-9	Pool	0.5	0.3
	TOTAL:	100.3	57.0
Study Site 2: Upper Turner			
T-1	Cascade	8.6	3.7
T-2	Riffle	26.9	11.6
T-3	Glide	11.8	5.1
T-4	Pool	25.8	11.2
T-5	Riffle	26.9	11.6
	TOTAL:	100.00	43.2

Table IV-6. Frequency of habitat type observed in the lower Mundt Creek study reach.

Length: 5,650 ft		Elevation: 35 - 280	
Substrate: Cobble and Gravel		Slope: 4.3 %	
HABITAT	**FREQUENCY**	**PERCENT [1]**	**PERCENT [2]**
Pool	12	26.1	26.7
Glide	11	23.9	24.4
Run	1	2.2	
Riffle	22	47.8	48.9
Bld Garden	0		
Chute	0		
Cascade	0		
Total:	46	100.0	100.0

1 All habitat types
2 Run removed for transect weight

Table IV-7. Frequency of habitat type observed in the upper Mundt Creek study reach.

Length: 6,650 ft		Elevation: 280 - 1,000 ft	
Substrate: Boulder and Cobble		Slope: 10.8 %	
HABITAT	**FREQUENCY**	**PERCENT [1]**	**PERCENT [2]**
Pool	26	34.2	34.7
Glide	1	1.3	1.3
Run	0		
Riffle	26	34.2	34.7
Bld Garden	0		
Chute	1	1.3	
Cascade	22	28.9	29.3
Total:	76	99.9	100.0

1 All habitat types
2 Chute removed for transect weight

Table IV-8. Transect weighting for Mundt Creek.

	Length (ft)	Percent
Study Site 1: Lower Mundt	5,650	45.9
Study Site 2: Upper Mundt	6,650	54.1

TRANSECT	HABITAT	REACH WEIGHTING (%)	TOTAL WEIGHTING (%)
Study Site #1: Lower Mundt Creek			
T-1	Riffle	16.3	7.5
T-2	Glide	12.2	5.6
T-3	Pool	13.4	6.1
T-4	Riffle	16.3	7.5
T-5	Glide	12.2	5.6
T-6	Pool	13.3	6.1
T-7	Riffle	16.3	7.5
	TOTAL:	100.0	45.9
Study Site #2 Upper Mundt Creek			
T-1	Glide	0.7	0.4
T-2	Riffle	17.4	9.4
T-3	Pool	17.4	9.4
T-4	Riffle Glide	17.3 17.9 0.6	9.4 9.7 0.3
T-5	Pool	17.3	9.4
T-6	Cascade	29.3	15.8
	TOTAL:	100.0	54.1

Field Methods

Field data were collected at three calibration flows. Generally all field measurements were taken using the standard procedures described in Trihey and Wegner (1981) and Bovee (1982). Transects were located throughout the diversion reach; for this reason, not all transects used the same benchmark and not all were physically adjacent. Water surface elevations (WSE) and above-water channel cross-sections were measured using a Topcon auto level and stadia rod, using standard survey techniques. Below water channel cross-sections were determined by subtracting measured depths from the WSE at the middle flow. Depths at high flow that were not present at the middle flow measurement were subtracted from the high flow WSE. Elevations outside the stream margin at the high flow measurement were surveyed.

Depth and velocity distributions at three calibration flows were measured using a digital, Swoffer brand, propeller-type velocity meter mounted on a standard top-set USGS wading rod. Velocities were measured at sixth tenths of the depth when depths were less than 2.5 feet and at two tenths and eight tenths of the depth where depths equaled or exceeded 2.5 feet or when the expected velocity profile was altered by an obstruction upstream. The rules for placement of verticals along the transect were closely followed. If there was uncertainty about whether a vertical was warranted, the vertical was usually placed at that point. In addition to stationing, notes were taken regarding the position of the top-set rod base plate relative to the substrate it was touching so that the meter could be placed in the exact position at succeeding calibration flows. These notes on substrate also revealed if bed shift had occurred since the previous calibration measurement. Temporary staff gage levels and the time of day were recorded at the beginning and end of each transect measurement to note changes in stage.

Substrate was measured visually and coded according to the revised Washington State Resource Agency Substrate Code (Table IV-9). Substrate within two feet upstream and downstream of the transect was evaluated in each cell. Substrate was classified using a three-digit code representing the most abundant particle size, the second-most abundant particle size, and the percentage of the most abundant particle size. For example, a code of 73.7 would mean that the most abundant substrate was cobble, that small gravel was the second-most abundant substrate, and that large cobble represented 70% of the cell area. Cover was recorded in a similar manner using the Washington State Resource Agency Cover Codes listed in Table IV-10.

An auto level and stadia rod were used to measure headpin elevations, WSE, hydraulic slopes, hydraulic controls, bed cross sections and the stage of zero flow. The surveyor tied these features to the transect benchmark to the nearest 0.01 feet. Benchmarks were tied together where two transects had the same hydraulic control. Transects were also tied together through surveying.

Table IV-9. IFIM substrate codes (WDFW 1994).

Code Number	Description	mm	Inches
0	Organic Detritus	b	b
1	Silt, Clay	2	<0.1
2	Sand	<2	<0.1
3	Small Gravel	2-12	0.1-0.5
4	Medium Gravel	12-38	0.5-1.5
5	Large Gravel	38-76	1.5-3.0
6	Small Cobble	76-152	3.0-6.0
7	Large Cobble	152-305	6.0-12.0
8	Boulder	>305	>12.0
9	Bedrock		

Table IV-10. IFIM cover codes (WDFW 1994).

Code Number	Description
0.0	No Cover
0.1	Undercut Bank
0.2	Overhanging Vegetation Touching Water
0.3	Root Wad (Greatest Width 1.5 feet)
0.4	Log Jam
0.5	Single Log
0.6	Submerged Aquatic Vegetation
0.7	Submerged Terrestrial Grass and Brush
0.8	Overhead Cover Not Touching Water
0.9	Fine Organic Substrate

Target Fish Species and Life Stages

Based on results of fish surveys conducted by WDFW and SSC the proposed target fish species and life stages for this IFIM study are listed in Table IV-11. The proposed target fish species were approved by the Skagit Water Supply IFIM Review Panel on April 18, 1995.

Table IV-11. Target species and life stages for Skagit County water supply IFIM study.

Gilligan Creek	Salmon Creek	Turner Creek	Mundt Creek
Coho salmon spawning rearing	Coho salmon spawning rearing	Coho salmon spawning rearing	Coho salmon spawning rearing
Pink salmon spawning	Pink salmon spawning	Pink salmon spawning	Pink salmon spawning
Steelhead trout spawning summer/winter rearing	Cutthroat trout spawning summer/winter rearing	Steelhead trout spawning summer/winter rearing	Steelhead trout spawning summer/winter rearing
Cutthroat trout spawning summer/winter rearing		Cutthroat trout spawning summer/winter rearing	Cutthroat trout spawning summer/winter rearing
		Chum salmon spawning	

SECTION V

PHABSIM ANALYSIS AND RESULTS

Application of PHABSIM to Cultus Mountain Tributaries

Following field data collection, the next phase of the instream flow study involves the use of the PHABSIM (Physical Habitat Simulation System) computer model (Milhous et al. 1984). Microcomputer PHABSIM software used by CES was written by Thomas R. Payne and Associates of Arcata, California. The Cultus Mountain Tributaries (CMT) IFIM hydraulic models were calibrated in consultation with Dr. Hal Beecher of WDFW. Calibration details for Gilligan Creek, Lower Mundt Creek, Upper Mundt Creek, Lower Turner Creek and Upper Turner Creek study sites are found in Appendices D through H, respectively.

Field Data Input

Field data were reduced by CES, using programs developed by CES, and then reviewed for typographical and transcription errors.

PHABSIM Programs

Analysis and integration of physical stream measurements and habitat preference criteria require the use of a group of computer programs developed by the US Fish and Wildlife Service, called the Physical Habitat Simulation System (PHABSIM). There are two main programs in the PHABSIM library: the hydraulic model (called IFG-4) and the habitat model (called HABTAT). The IFG-4 hydraulic simulation model predicts depth of flow and mean column velocities across the stream transect as a function of discharge. A log-log regression analysis is used to develop stage-discharge relationships at each transect and to predict velocity/discharge relationships at each habitat cell. Interpolation and extrapolation with the regression equations allows modeling of flows between and beyond the measured discharges. The resulting simulated hydraulic information is then input to the HABTAT program.

The HABTAT program integrates the simulated hydraulic information from IFG-4 with habitat suitability criteria and quantifies habitat availability over a range of flows for the specified target species and life stages. Habitat quantification is expressed as an index called Weighted Useable Area (WUA), and is given in square ft of habitat per 1,000 linear ft of stream.

Hydraulic Modeling Procedures

It was agreed through the scoping process that the standard "three velocity set" regression model be used on all transects except where special circumstances required the use of alternate modeling methods. All transects modeled successfully using the "3 velocity set" method, although the "one velocity set" model was used to extend the downward or upward extrapolation at some of the study sites, as described later in this section.

The CMT IFIM decks were compiled and calibrated using methods prescribed by the USFWS Instream Flow Group, Fort Collins, Colorado (Bovee 1982). All of the input decks were initially processed using the CKI4 program developed by the Instream Flow Group. This program looks for errors in data placement and produces hard copy of the pertinent information needed to run the model, including transect weighting factors, slopes, stage of zero flow and WSE.

One of the goals of the hydraulic simulation is to have the model accurately reflect measured velocities and depths at the calibration flows, while minimizing changes to the data. In this regard, only minor changes were made to the IFIM decks in order for the model to more accurately predict cell velocities at the simulated flows. Tables 1, 2 and 4 of the IFIM calibration appendices present the uncalibrated and calibrated input decks and tables specifying all changes for each study site. One type of data change was a minor velocity adjustment (0.01 - 0.10 ft/sec) in some cells where there was depth but no measurable velocity.

In all cases, the intent was to improve or enhance model predictions, while keeping the number and magnitude of changes to a minimum; the decks were revised only when specific changes improved model performance. At a few verticals, the velocity simulation was improved by changing a small recorded velocity to zero to adjust the cell velocity regressions. Other changes to the measured velocities during the calibration phase were kept within the parameters prescribed by WDFW. Comparison of actual and simulated velocities throughout the modeled range of flows are shown in each IFIM calibration report (Appendices D-H, Table 5).

Cells near the stream margins (edge cells) are often assigned high Manning's *n* values (i.e., the roughness coefficient) by the model. The high *n* values reduce the predicted velocity through these cells, giving unrealistic simulations. These *n* values were manually reduced to improve predicted velocities where needed.

The range of extrapolation for simulated depths and velocities depends on the hydraulics of the channel and the spread between calibration flows. Velocity Adjustment Factors (VAF) are a measure of how well the IFG-4 model simulates velocities. A VAF between 0.90 and 1.10 is considered good. A VAF between 0.85 and 0.90 or between 1.10 and 1.15 is considered to be fair. A VAF between .80 and .85 or 1.15 and 1.20 is marginal, while a VAF below 0.80 or above 1.20 is considered poor. A summary of VAFs and calibration details are presented in Tables 3 and 6 of the calibration appendices.

CES elected to use the "discontinuous" transect approach for the CMT IFIM studies. This method allows more flexibility in selecting transects to best represent all habitat types in the study reach. Using this approach requires that the model be "tricked" since the model assumes that there are no other habitat types between sequential transects. The following procedures were used to model the discontinuous transects. Each transect was given a weight of 1.0. Study site length was established at 1,000 ft. Actual weight for each transect was converted proportionally to the study site length and input as "distance to next transect". Because PHABSIM "looks" downstream for transect distance regardless of the weighting method, assigned transect distances must be shifted upstream one transect. The model "looks" upstream for transect weight and each

transect has received a full weight of 1.0; therefore, a "dummy" transect must be placed as the upper, or last transect. These dummy transects do not affect WUA since they are given a weight of 0.0.

Measured Flows for Cultus Mountain Tributaries

The goal of the modeling effort is to be able to model predicted habitat between 0.4 of the low flow calibration measurement and 2.5 times the high flow calibration measurement, using the "three-velocity set" IFG4 or "regression model" to predict velocities. Where this was not possible, alternative modeling methods (such as the "one velocity set" model mentioned above) were used.

Gilligan Creek Study Site

Three sets of calibration flow data were developed from the field measurements. CES determined the best estimate of each flow be 46 cfs for the high flow, 24 cfs for the middle flow, and 13 cfs for the low flow. Actual measured flows for each transect are shown in Table V-1. Estimates of best flow are made by selecting a transect which, using professional judgement, will give the most accurate discharge estimate.

Lower Mundt Creek Study Site

Three sets of calibration flow data were developed from the field measurements. The best estimate of each flow was determined to be 34 cfs for the high flow, 10 cfs for the middle flow, and 3 cfs at the low flow. Actual measured flows for each transect in Study Site 2 are shown in Table V-2.

Upper Mundt Creek Study Site

Three sets of calibration flow data were developed from the field measurements. The best estimate of each flow was determined to be 16 cfs for the high flow, 6 cfs for the middle flow, and 2 cfs at the low flow. Actual measured flows for each transect in Study Site 2 are shown in Table V-3.

Lower Turner Creek Study Site

Three sets of calibration flow data were developed from the field measurements. The best estimate of each flow was determined to be 18 cfs for the high flow, 9 cfs for the middle flow, and 5 cfs at the low flow. Actual measured flows for each transect in Study Site 2 are shown in Table V-4.

Upper Turner Creek Study Site

Three sets of calibration flow data were developed from the field measurements. The best estimate of each flow was determined to be 7 cfs for the high flow, 5 cfs for the middle flow, and 2 cfs at the low flow. Actual measured flows for each transect in Study Site 2 are shown in Table V-5.

Table V-1. Gilligan Creek study site measured flows.

	Low Flow	Middle Flow	High Flow
Transect	10/18/95	10/13/95	10/12/95
1	11	25	53
2	12	26	48
3	8	23	45
4	11	23	44
5	11	25	46
6	11	27	48
7	11	23	49

Table V-2. Lower Mundt Creek study site measured flows.

	Low Flow	Middle Flow	High Flow
Transect	10/23/95	10/18/95	10/11/95
1	5	13	39
2	4	13	39
3	4	13	35
4	4	13	32
5	3	10	34
6	2	11	34
7	4	12	29

Table V-3. Upper Mundt Creek study site measured flows.

	Low Flow	Middle Flow	High Flow
Transect	11/21/95	11/10/95	11/9/95
1	16	6	2
2	14	6	3
3	20	9	3
4	20	9	2
5	13	5	2
6	15	6	2

Table V-4. Lower Turner Creek study site measured flows.

	Low Flow	Middle Flow	High Flow
Transect	2/12/96	1/17/96	1/16/96
3	6	11	21
4	7	12	23
5	5	9	18
6	4	9	18
7	4	7	16
8	3	7	16
9	2	7	16

Table V-5. Upper Turner Creek study site measured flows.

	Low Flow	Middle Flow	High Flow
Transect	11/14/95	11/10/95	11/9/95
1	2	5	8
2	2	5	7
3	2	4	8
4	2	5	7
5	2	5	8

Model Performance

Only minor changes were made to the original input decks. Most revisions were to the high and middle flow calibration measurement velocities, where a 0.1 ft/sec velocity replaced a measured 0.0 ft/sec velocity.

Table 6 of each calibration report in Appendices D-H lists the summary of calibration details for each reach. Mean error (for both given and predicted discharges), ratio of measured vs. predicted discharges, and B coefficients were well within the acceptable limits for IFIM calibration.

In all study sites, a three-velocity set deck was used when VAF's and velocities were within acceptable and expected ranges. When VAF's were below 0.80 or above 1.20 or when velocities were unreasonable, a one-velocity set model was used in its place. VAF's for one velocity set models are not on the same scale as VAF's for three-velocity set models.

Models were approved by Dr. Hal Beecher, WDFW, for a certain range of flows. See Appendix I, Summary of Consultation.

Gilligan Creek Study Site

Five IFIM decks are required to simulate hydraulics at Gilligan Creek. These data decks are:

1. Deck for Transects 1-3; 5-7: 2 cfs - 6 cfs (3 velocity set deck)
2. Deck for Transect 4: 2 cfs - 6 cfs (1 velocity set deck)
3. Deck for all Transects: 7 cfs - 65 cfs (3 velocity set deck)
4. Deck for Transects 1-3; 5-7: 65 cfs - 90 cfs (3 velocity set deck)
5. Deck for Transect 4: 65 cfs - 90 cfs (1 velocity set deck)

Gilligan Creek models were approved by Dr Hal Beecher (WDFW) to be operated from 2 cfs to 90 cfs (Appendix I, Summary of Consultation).

Lower Mundt Creek Study Site

Three IFIM decks were required to simulate hydraulics at the Lower Mundt Creek Study Site. These data decks are:

1. Deck for Transects 1-5; 7: 3 cfs (3 velocity set deck)
2. Deck for Transect 6: 3 cfs (1 velocity set deck)
3. Deck for all Transects: 4 cfs - 70 cfs (3 velocity set deck)

Lower Mundt Creek models were approved by Dr Hal Beecher (WDFW) to be operated from 3 cfs to 70 cfs (Appendix I, Summary of Consultation).

Upper Mundt Creek Study Site

Five IFIM decks are required to simulate hydraulics at the Upper Mundt Creek Study Site. These data decks are:

1. Deck for Transects 1-6: 3 cfs - 19 cfs (3 velocity set deck)
2. Deck for Transect 6: 20 cfs - 29 cfs (1 velocity set deck)
3. Deck for all Transects 1-5: 20 cfs - 29 cfs (3 velocity set deck)
4. Deck for Transects 1-4: 30 cfs - 32 cfs (3 velocity set deck)
5. Deck for Transects 5 and 6: 30 cfs - 32 cfs (1 velocity set deck)

Upper Mundt Creek models were approved by Dr Hal Beecher (WDFW) to be operated from 3 cfs to 32 cfs (Appendix I, Summary of Consultation).

Lower Turner Creek Study Site

Three IFIM decks were required to simulate hydraulics at the Lower Turner Creek Study Site. These data decks are:

1. Deck for Transect 5: 2 cfs - 3 cfs (1 velocity set deck)
2. Deck for Transects 3-4; 6-9: 2 cfs - 3 cfs (3 velocity set deck)
3. Deck for all Transects: 4 cfs - 35 cfs (3 velocity set deck)

Lower Turner Creek models were approved by Dr Hal Beecher (WDFW) to be operated from 2 cfs to 35 cfs (Appendix I, Summary of Consultation).

Transects 1 and 2 were not modeled in this study. Stream flow at these study sites was influenced by a downstream blockage and the computer model would not accept discharge calibration measurements.

Upper Turner Creek Study Site

Three IFIM decks were required to simulate hydraulics at the Upper Turner Creek Study Site. These data decks are:

1. Deck for all Transects: 1 cfs - 12 cfs (3 velocity set deck)
2. Deck for Transect 1: 12 cfs - 18 cfs (1 velocity set deck)
3. Deck for Transects 2-5: 12 cfs - 18 cfs (3 velocity set deck)

Upper Turner Creek models were approved by Dr Hal Beecher (WDFW) to be operated from 1 cfs to 18 cfs (Appendix I, Summary of Consultation).

Habitat Modeling Procedures

After the hydraulic models were calibrated, transect weighting was added as shown in Tables IV-2, IV-5, and IV-8 for Gilligan, Turner and Mundt creeks, respectively. Final hydraulic model runs were made to produce input for the HABTAT habitat model.

Within the HABTAT program, output from the hydraulic modeling is combined with preference curves for depth, velocity, and substrate/cover for the target species life stages described above. The output from this model is expressed as Weighted Usable Area (WUA) v. Flow (Q), which is an index of available habitat per 1,000 linear feet of stream for each species and life stage modeled.

Weighted Usable Area

Gilligan Creek Study Site

Details of individual model outputs for Gilligan Creek are included in Appendix D. Table V-6 and Figures V-1 and V-2 show combined WUA for salmon, steelhead and trout rearing and spawning life stages at Gilligan Creek.

Lower Mundt Creek Study Site

Details of individual model outputs for the Lower Mundt Creek Study Site are included in Appendix E. Table V-7 and Figures V-3 and V-4 show combined WUA for salmon, steelhead and trout rearing and spawning life stages at the Lower Mundt Creek Study Site.

Upper Mundt Creek Study Site

Details of individual model outputs for the Upper Mundt Creek Study Site are included in Appendix F. Table V-8 and Figures V-5 and V-6 show combined WUA for salmon, steelhead and trout rearing and spawning life stages at the Upper Mundt Creek Study Site.

Lower Turner Creek Study Site

Details of individual model outputs for the Lower Turner Creek Study Site are included in Appendix G. Table V-9 and Figures V-7 and V-8 show combined WUA for salmon, steelhead and trout rearing and spawning life stages at the Lower Turner Creek Study Site.

Upper Turner Creek Study Site

Details of individual model outputs for the Upper Turner Creek Study Site are included in Appendix H. Table V-10 and Figures V-9 and V-10 show combined WUA for salmon, steelhead and trout rearing and spawning life stages at the Upper Turner Creek Study Site.

Table V-6. Gilligan Creek Study Site WUA.

Flow (cfs)	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
2	14,144	359	1,802	490	99	294	2,013	9,106	85	0
3	14,897	471	1,749	1,042	168	540	2,303	8,998	113	47
4	15,349	576	1,694	1,601	254	762	2,472	8,801	150	176
5	15,906	706	1,672	2,152	337	964	2,556	8,652	192	282
6	16,146	846	1,629	2,656	411	1,114	2,581	8,401	242	458
7	16,362	979	1,523	3,164	445	1,229	2,561	8,111	299	682
8	16,601	1,116	1,493	3,556	494	1,366	2,567	7,906	356	966
9	16,787	1,269	1,447	3,910	538	1,489	2,555	7,717	413	1,245
10	17,057	1,442	1,387	4,234	583	1,602	2,536	7,531	468	1,512
15	17,826	2,340	1,261	4,844	722	1,811	2,350	6,592	725	2,737
20	18,381	3,192	1,144	5,052	800	1,661	2,164	5,832	936	3,624
25	19,042	3,812	1,014	5,080	888	1,550	2,091	5,327	1,108	4,219
30	19,735	4,210	1,010	4,898	952	1,390	1,979	4,963	1,255	4,469
35	20,259	4,439	978	4,755	964	1,196	1,894	4,797	1,365	4,544
40	20,761	4,565	973	4,564	937	1,006	1,807	4,749	1,443	4,536
45	21,149	4,611	996	4,372	921	847	1,752	4,802	1,490	4,457
50	24,618	4,588	1,061	4,241	915	744	1,760	5,241	1,499	4,316
55	24,821	4,496	1,079	4,024	904	664	1,779	5,517	1,474	4,175
60	25,226	4,382	1,105	3,865	893	620	1,813	5,796	1,436	3,981
65	25,625	4,243	1,173	3,812	896	583	1,856	6,122	1,410	3,791
70	26,017	4,107	1,134	3,652	926	591	1,863	6,339	1,461	3,724
75	26,398	3,975	1,196	3,543	939	590	1,908	6,519	1,449	3,638
80	26,807	3,846	1,266	3,464	953	592	1,938	6,734	1,440	3,522
85	27,199	3,729	1,341	3,463	965	590	1,978	6,895	1,426	3,401
90	27,576	3,614	1,417	3,472	975	586	2,029	7,099	1,419	3,294
Max	27,576	4,611	1,802	5,080	975	1,811	2,581	9,106	1,499	4,544

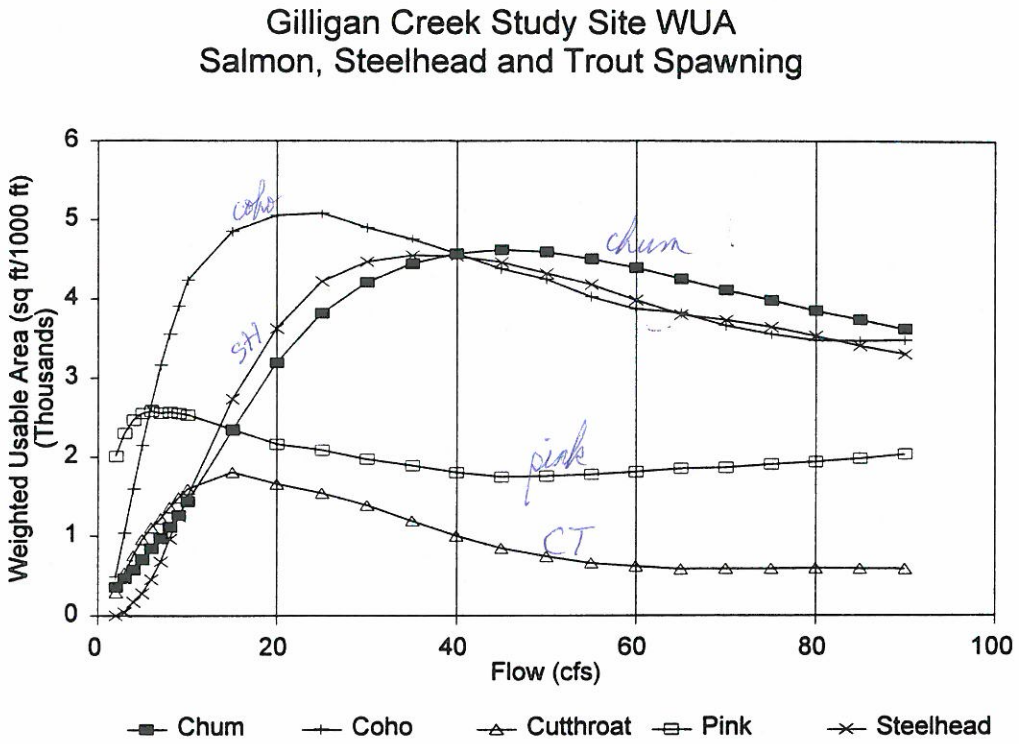

Figure V-1. Gilligan Creek combined Weighted Usable Area for spawning.

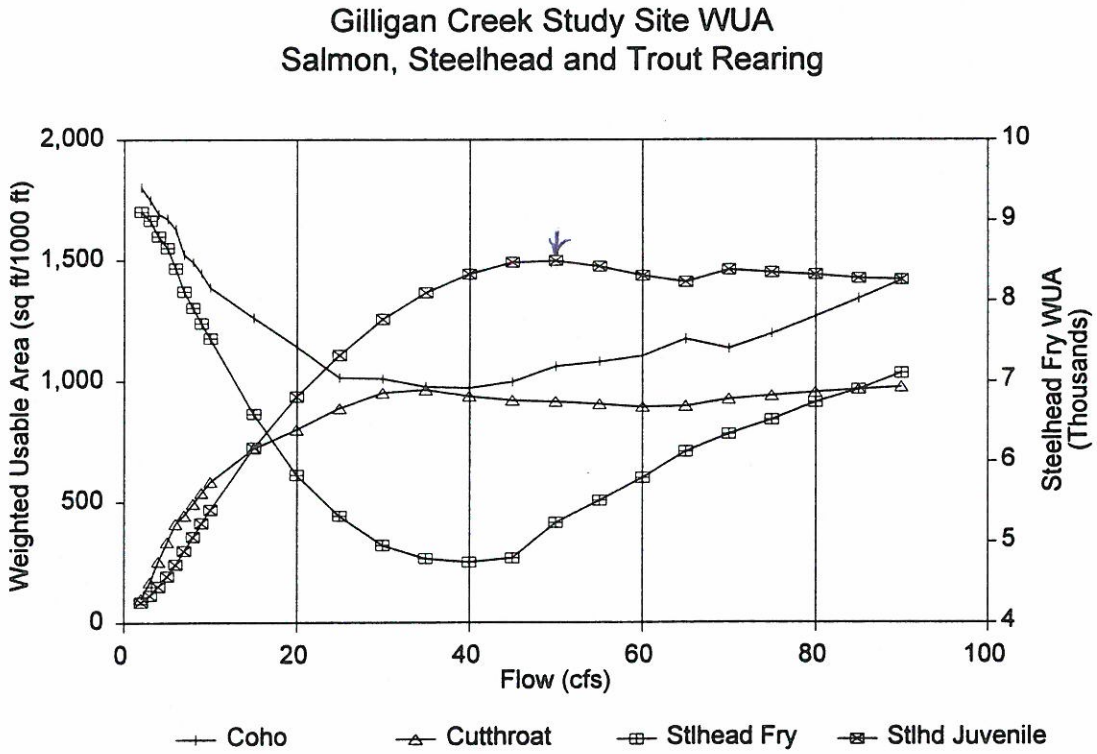

Figure V-2. Gilligan Creek combined Weighted Usable Area for rearing.

Table V-7. Lower Mundt Study Site WUA.

Flow (cfs)	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
3	12,515	998	3 694	1,156	87	474	2,707	5,813	58	4
4	13,050	1,184	527	1,737	141	777	4 2,842	4 5,862	78	79
5	13,320	1,342	487	2,299	198	1,000	2,831	5,757	98	232
6	13,468	1,501	469	2,786	244	1,162	2,748	5,607	120	432
7	13,996	1,660	452	3,231	275	1,263	2,630	5,431	145	685
8	14,205	1,818	438	3,695	298	8 1,297	2,495	5,250	170	966
9	14,534	1,990	427	4,102	313	1,282	2,365	5,090	198	1,270
10	14,721	2,156	405	4,449	10 320	1,250	2,229	4,936	226	1,568
15	15,487	2,938	299	5,542	291	1,153	1,646	4,222	347	3,171
20	16,377	3,569	244	20 5,553	262	921	1,251	3,709	420	5,162
25	17,167	4,152	187	4,912	248	631	1,037	3,305	464	6,070
30	18,297	4,542	166	4,092	244	525	951	3,135	30 473	30 6,228
35	18,911	35 4,720	158	3,605	233	485	887	3,064	462	6,019
40	19,488	4,662	147	3,304	215	442	843	2,925	430	5,559
45	19,835	4,485	145	2,971	199	405	818	2,794	401	5,028
50	20,187	4,270	151	2,732	187	367	803	2,702	382	4,521
55	20,520	4,039	158	2,550	177	359	811	2,614	372	4,127
60	20,854	3,824	167	2,434	169	355	819	2,569	369	3,797
65	21,265	3,624	178	2,307	163	352	828	2,563	371	3,543
70	21,665	3,436	191	2,237	159	348	837	2,580	373	3,364
Max	21,665	4,720	694	5,553	320	1,297	2,842	5,862	473	6,228

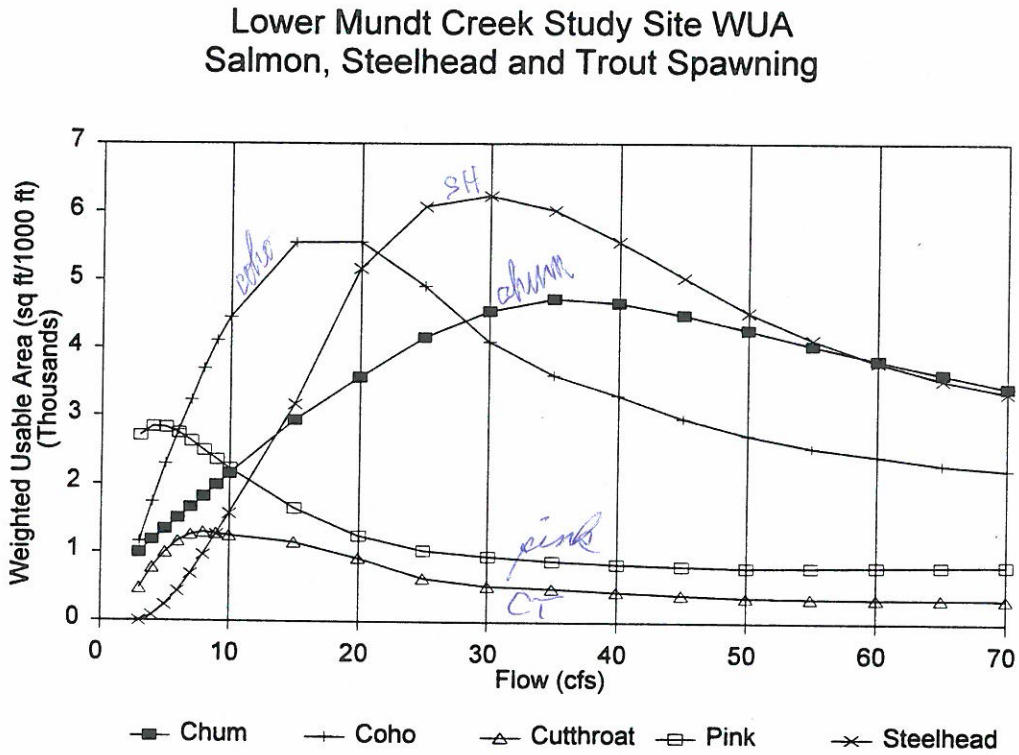

Figure V-3. Lower Mundt Creek combined Weighted Usable Area for spawning.

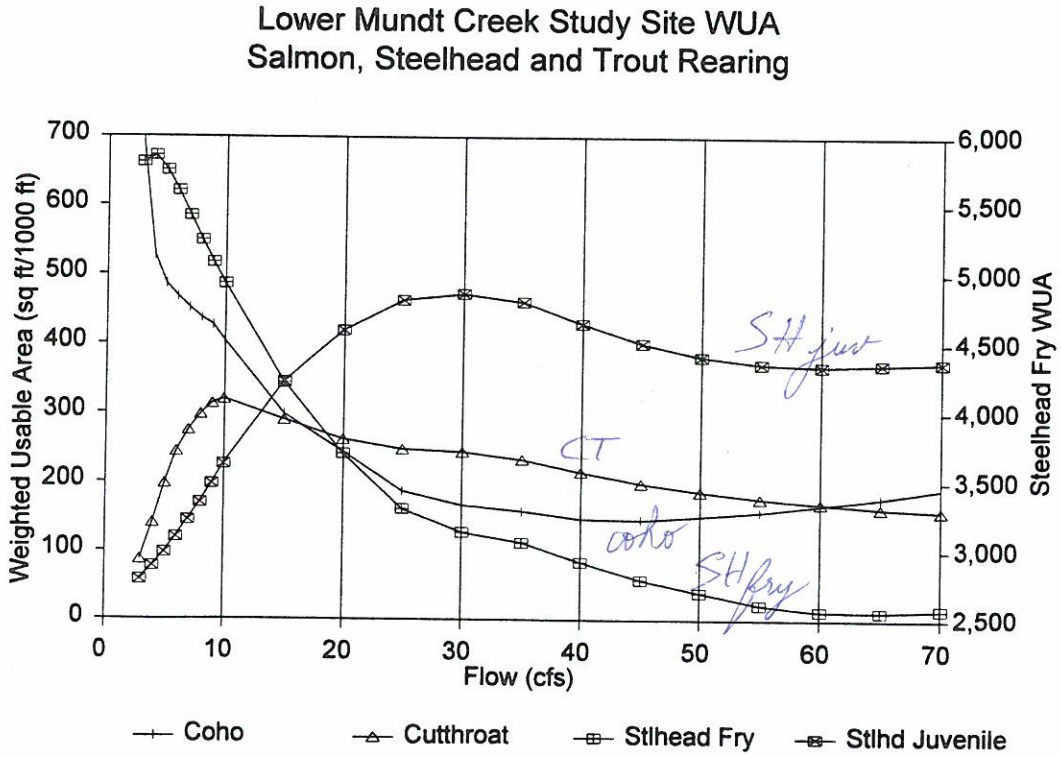

Figure V-4. Lower Mundt Creek combined Weighted Usable Area for rearing.

Table V-8. Upper Mundt Creek Study Site WUA.

Flow	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
1	6,304	261	1,016	99	56	23	615	2,685	66	0
2	6,894	337	868	287	118	107	730	2,467	113	5
3	7,478	400	798	461	183	219	778	2,332	158	14
4	7,831	454	723	603	242	278	813	2,301	209	92
5	8,129	503	666	735	288	314	816	2,255	258	180
6	8,256	552	612	845	324	318	803	2,178	302	267
7	8,628	597	562	924	350	310	786	2,138	340	333
8	8,854	631	513	981	369	308	774	2,107	370	397
9	9,005	658	492	1,028	392	300	774	2,092	395	454
10	9,157	682	485	1,069	417	280	772	2,085	414	507
11	9,313	698	497	1,073	446	267	771	2,055	428	550
12	9,455	712	508	1,091	477	255	770	2,039	438	581
13	10,144	724	538	1,105	506	250	773	2,098	448	597
14	10,382	730	581	1,130	533	248	781	2,200	456	614
15	10,632	735	626	1,160	557	247	791	2,311	464	627
16	10,721	737	663	1,173	579	246	802	2,431	470	639
17	10,913	740	698	1,173	592	248	813	2,530	478	648
18	11,000	743	731	1,181	604	250	825	2,624	487	660
19	11,163	748	759	1,201	613	252	835	2,669	498	675
20	11,311	757	760	1,202	637	258	844	2,713	529	695
21	11,454	761	782	1,205	647	265	854	2,720	541	708
22	11,592	763	805	1,210	656	273	864	2,730	552	722
23	11,716	766	829	1,221	664	280	875	2,740	563	739
24	11,830	774	852	1,230	674	289	888	2,755	574	747
25	11,940	784	871	1,249	683	297	900	2,767	584	754
26	12,398	794	892	1,268	693	303	912	2,818	593	761
27	12,490	807	913	1,285	706	308	923	2,870	604	765
28	12,581	822	934	1,300	721	311	933	2,917	614	767

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PHABSIM Analysis and Results

Table V-8. Upper Mundt Creek Study Site WUA.

Flow	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
29	12,659	837	956	1,316	735	314	944	2,954	627	771
30	12,720	855	976	1,338	751	319	954	2,983	642	785
31	12,793	869	994	1,354	767	321	966	3,004	654	792
32	12,841	32 884	1,014	32 1,368	32 780	32 322	32 977	32 3,016	32 665	32 801
Max	12,841	884	1,016	1,368	780	322	977	3,016	665	801

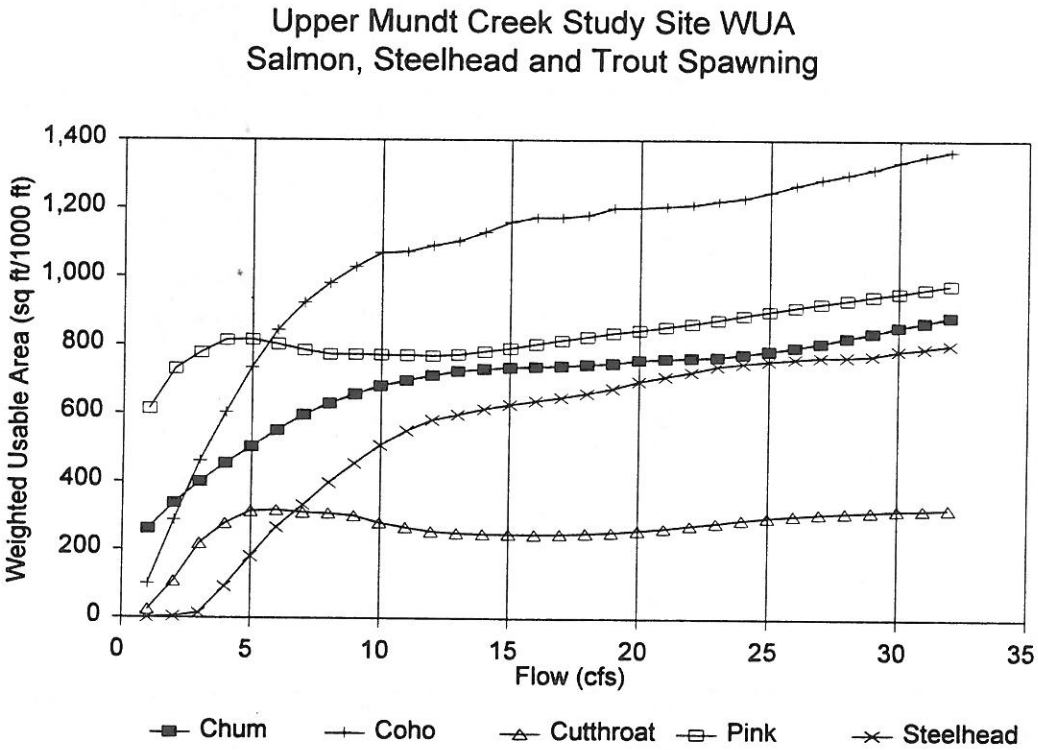

Figure V-5. Upper Mundt Creek combined Weighted Usable Area for spawning.

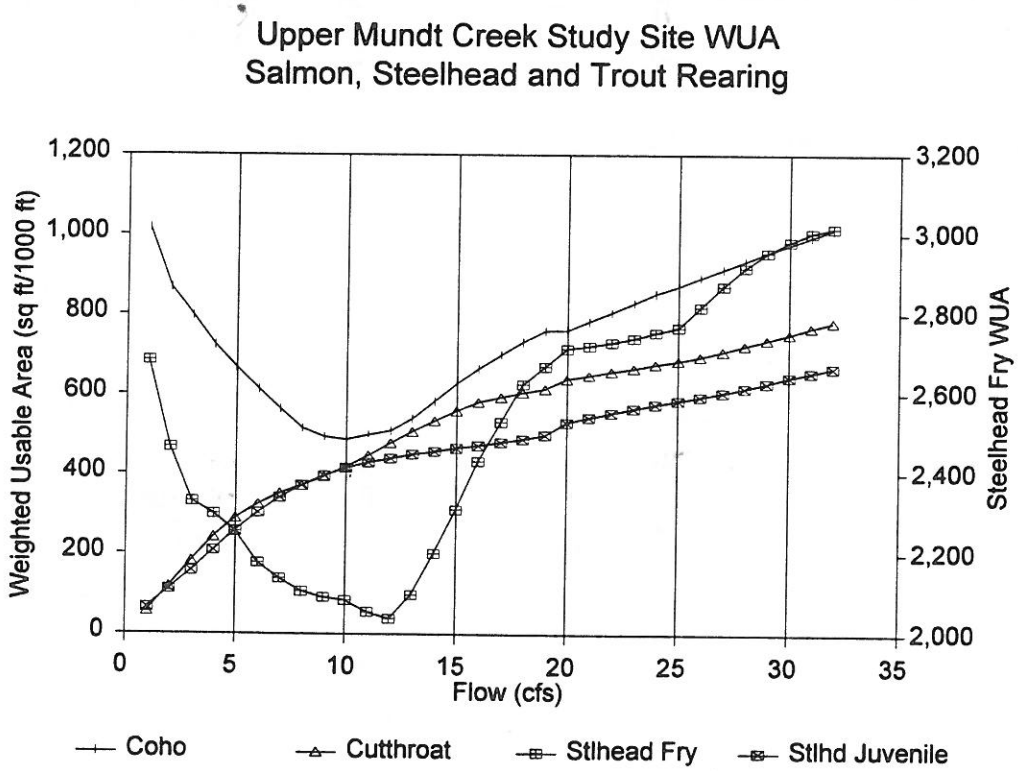

Figure V-6. Upper Mundt Creek combined Weighted Usable Area for rearing.

Table V-9. Lower Turner Study Site WUA.

Flow (cfs)	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
2	9,881	1,318	1,127	983	74	284	2,943	3,749	74	8
3	10,151	1,507	1,073	1,448	112	596	3,015	3,423	99	115
4	10,771	1,673	1,026	2,050	157	726	2,984	3,152	128	306
5	10,879	1,820	882	2,356	209	709	2,914	2,931	158	507
6	10,976	1,950	821	2,639	267	636	2,839	2,730	189	702
7	11,065	2,069	793	2,975	325	555	2,737	2,562	222	885
8	11,174	2,168	744	3,216	381	472	2,594	2,404	254	1,043
9	11,280	2,243	668	3,402	430	392	2,459	2,269	287	1,204
10	11,423	2,305	614	3,580	463	322	2,343	2,159	322	1,396
11	12,870	2,355	589	3,655	486	269	2,237	2,061	358	1,594
12	12,966	2,401	571	3,674	508	226	2,133	1,987	392	1,780
13	13,053	2,441	550	3,676	527	186	2,024	1,916	425	1,941
14	13,138	2,474	525	3,689	546	154	1,914	1,853	456	2,059
15	13,220	2,501	506	3,691	558	128	1,817	1,795	488	2,164
16	13,300	2,521	487	3,693	564	104	1,728	1,748	521	2,260
17	13,371	2,539	470	3,659	564	83	1,639	1,693	553	2,358
18	13,587	2,549	459	3,589	562	65	1,548	1,643	581	2,449
19	13,635	2,549	453	3,518	560	53	1,464	1,590	604	2,518
20	13,682	2,539	449	3,456	558	45	1,386	1,541	624	2,570
21	13,728	2,525	445	3,404	552	38	1,315	1,496	642	2,620
22	13,772	2,510	440	3,350	544	33	1,259	1,452	659	2,657
23	13,808	2,489	436	3,293	536	30	1,204	1,415	676	2,677
24	13,831	2,469	434	3,239	529	27	1,155	1,379	687	2,688
25	13,857	2,447	431	3,172	523	25	1,108	1,342	697	2,691
30	13,985	2,305	419	2,876	516	22	916	1,200	732	2,684
35	14,476	2,112	431	2,446	523	21	799	1,195	735	2,602
Max	14,476	2,549	1,127	3,693	564	726	3,015	3,749	735	2,691

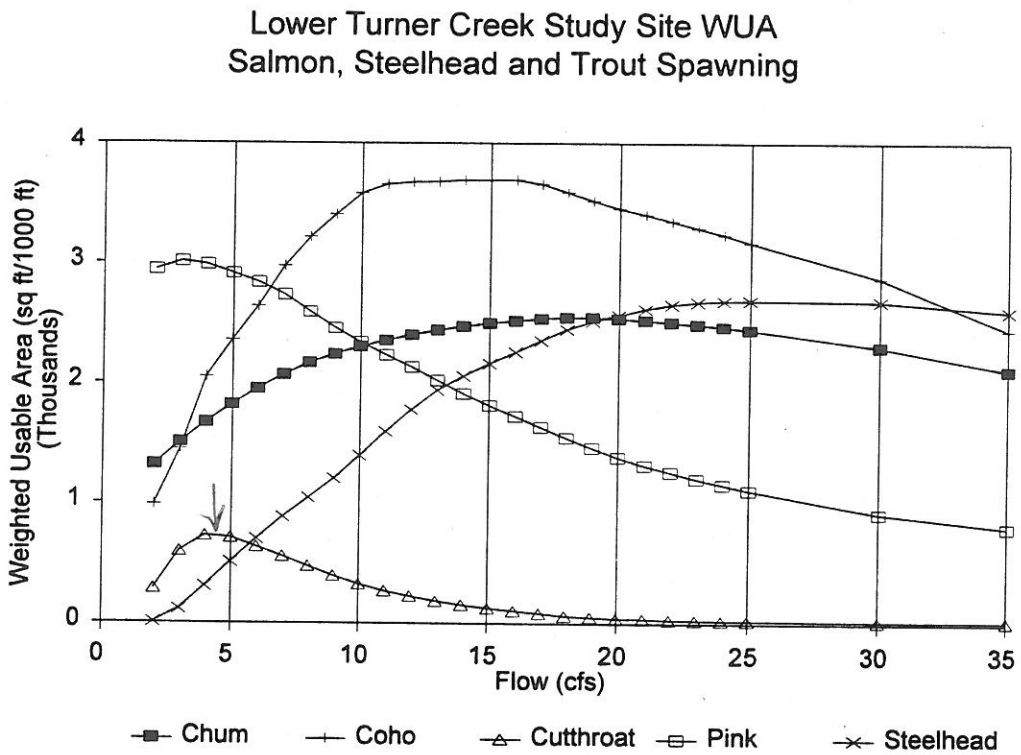

Figure V-7. Lower Turner Creek combined Weighted Usable Area for spawning.

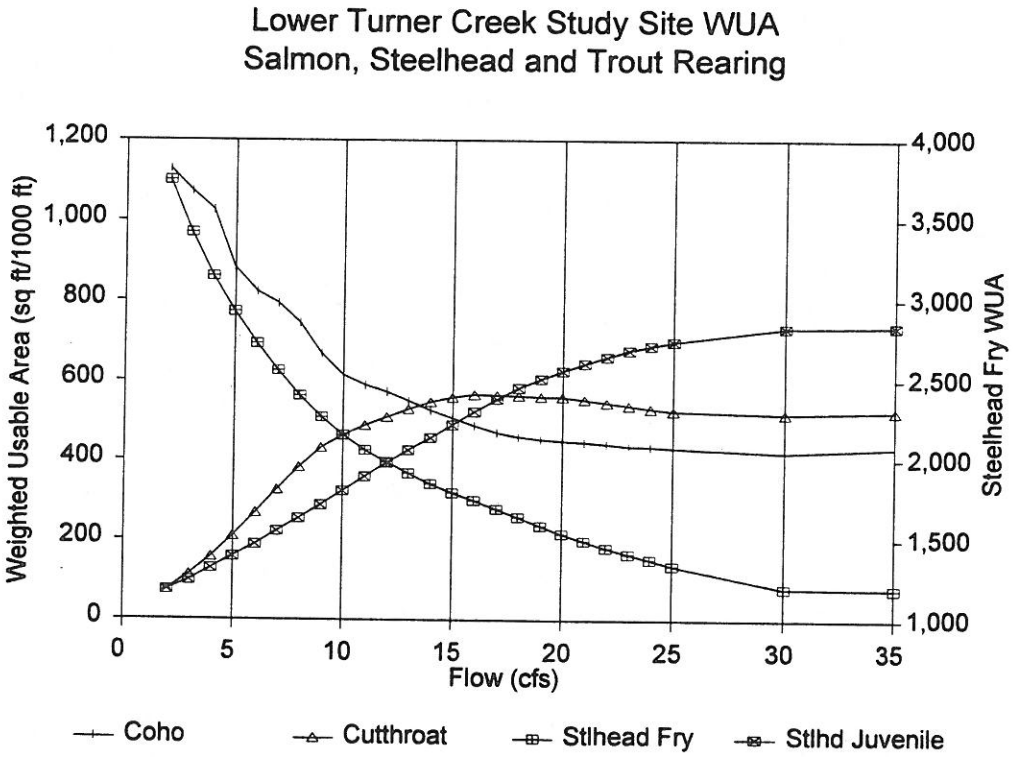

Figure V-8. Lower Turner Creek combined Weighted Usable Area for rearing.

Table V-10. Upper Turner Study Site WUA.

Flow (cfs)	Gross Habitat	Chum Spawning	Coho		Cutthroat		Pink Spawning	Steelhead		
			Rearing	Spawning	Rearing	Spawning		Fry	Juv	Spawning
1	5455	385	139	582	4	408	1 1092	2236	6	8
2	6651	628	2 141	1027	8	560	986	2 2362	13	231
3	7126	829	125	1468	8	550	885	2356	20	432
4	7575	961	106	1803	9	602	847	2252	27	775
5	7956	1095	97	2043	10	681	782	2107	34	1048
6	8181	1232	91	2172	12	724	716	1997	41	1273
7	8439	1349	87	2326	14	7 732	659	1919	47	1512
8	8522	1467	83	2446	15	704	605	1836	52	1716
9	8648	1588	82	2486	16	667	568	1759	59	1901
10	8884	1705	82	10 2500	17	623	536	1682	64	2081
11	9099	1808	84	2483	19	578	515	1613	69	2218
12	9290	1911	86	2472	21	542	510	1568	74	2337
13	9470	2010	89	2452	23	514	504	1529	78	2449
14	9633	2088	92	2434	25	499	511	1502	81	2530
15	9790	2147	95	2406	27	490	520	1486	83	2580
16	9907	2194	99	2367	29	479	531	1482	86	16 2583
17	10003	2233	103	2342	31	470	543	1482	88	2577
18	10102	18 2256	107	2343	18 33	459	555	1468	18 91	2565
Max		2256	141	2500	33	732	1092	2362	91	2583

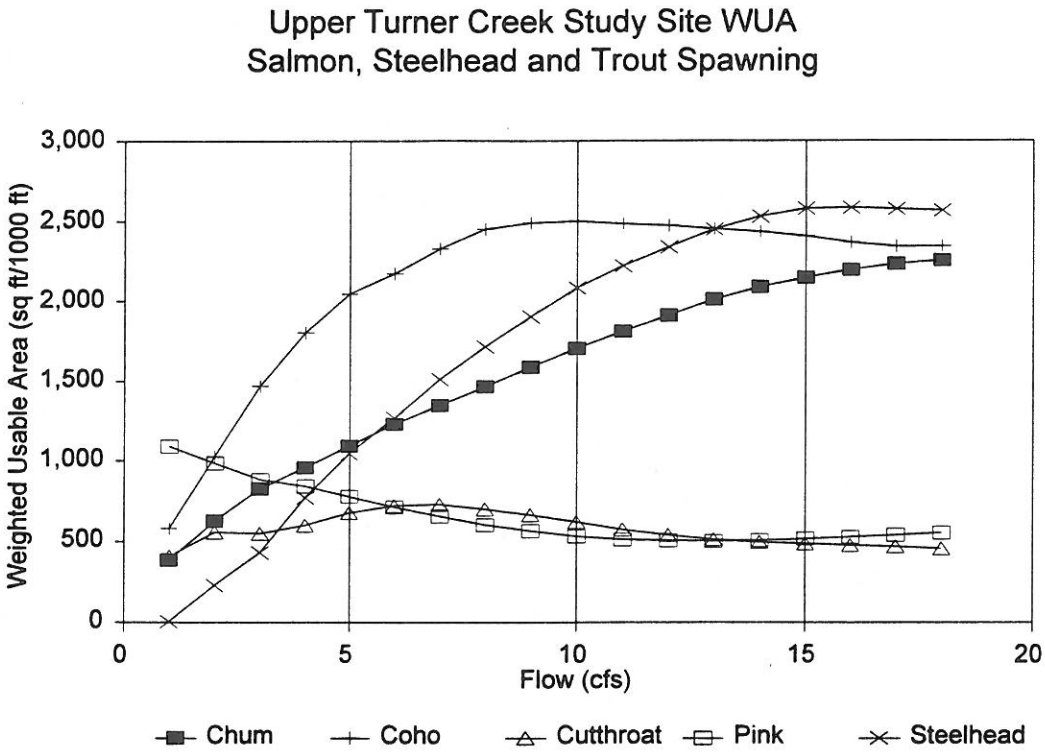

Figure V-9. Upper Turner Creek combined Weighted Usable Area for spawning.

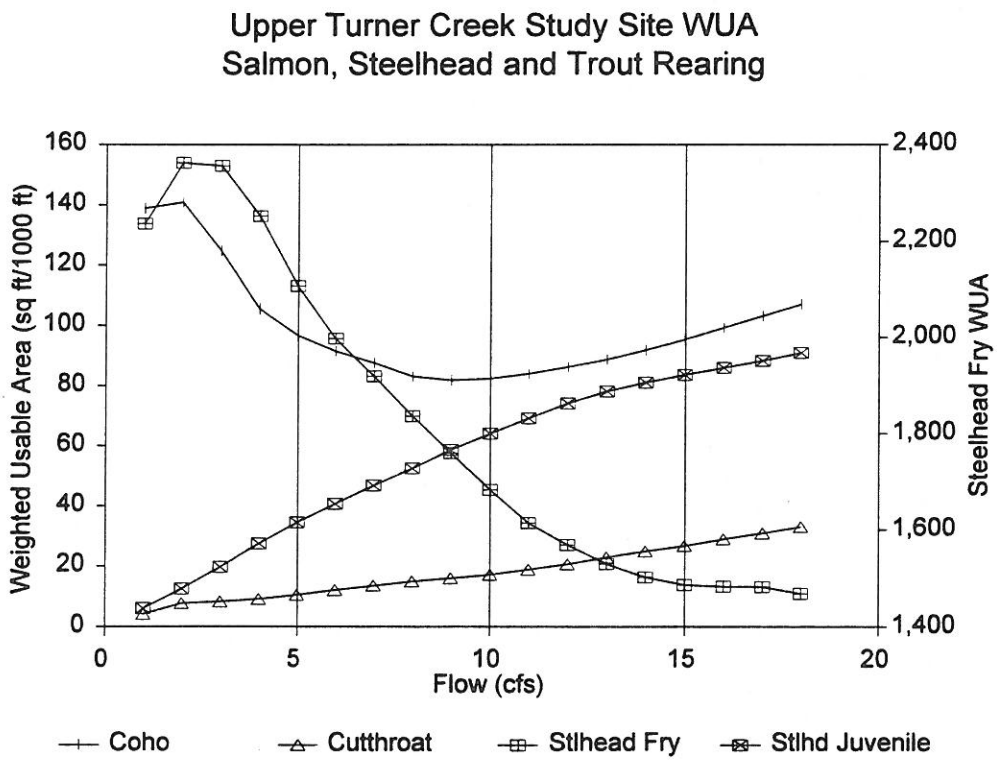

Figure V-10. Upper Turner Creek combined Weighted Usable Area for rearing.

SECTION VI

COMBINED CULTUS MOUNTAIN TRIBUTARY STUDY AREAS

Introduction of Inflows

When produced, the WUA for salmon, trout and steelhead rearing and spawning for each study reach is the first product of the instream flow analysis; however, these data only provide a static condition of each study site. It is useful to integrate hydrology so that WUA for CMT study sites can be combined to provide an effective tool for water resource managers. Total WUA for Gilligan, Mundt and Turner creeks can then be known for any species and life stages for any given discharge at their respective diversions.

The primary hydrologic information needed to integrate habitat between the study reaches is an estimate of inflow between the study reaches for a range of stream discharges. Inflow between the study sites was estimated based on watershed area and is listed in Tables VI-1 through VI-3 for Gilligan, Mundt and Turner creeks, respectively.

Table VI-4 and Figures VI-1 and VI-2 show final Gilligan Creek WUA for salmon, steelhead and trout rearing and spawning for flows at the diversion, incorporating inflow to the Gilligan Creek Study Site.

Table VI-5 and Figures VI-3 and VI-4 show final Mundt Creek WUA for salmon, steelhead and trout rearing and spawning for flows at the diversion, incorporating inflow to the Upper and Lower study sites and study site weighting (Table IV-8). Total WUA for Mundt Creek was calculated as follows:

Given a flow at the diversion and the corresponding flow at Upper Mundt Creek, WUA for that flow is taken from the Upper Mundt Creek Study Site WUA table. The value for the species and life stage is then multiplied by the upper study site weighting (54.1%). The WUA for the corresponding flow at the Lower Mundt Creek Study Site is then taken from the Lower Mundt Creek Study Site WUA table; the value for the species and life stage is then multiplied by the lower study site weighing (45.9%). The values for the corresponding WUA, for a given flow at the diversion, are then added together for a WUA for a given species and life stage at that diversion flow.

Table VI-6 and Figures VI-5 and VI-6 show final Turner Creek WUA for salmon, steelhead and trout rearing and spawning for flows at the diversion, incorporating inflow to the Upper and Lower study sites and study site weighting (Table IV-5). Total WUA for Turner Creek was calculated in an identical manner as Mundt Creek.

Table VI-1. Gilligan Creek inflow (cfs) from Gilligan Creek diversion to Gilligan Creek Study Site.

Gilligan Creek Flow (cfs)	
Diversion	IFIM Site
1	1.2
2	2.4
3	3.6
4	4.8
5	6.0
6	7.1
7	8.3
8	9.5
9	10.7
10	11.9
15	17.9
20	23.8
25	29.8
30	35.7
35	41.7
40	47.6
45	53.6
50	59.5
55	65.5
60	71.4
65	77.4
70	83.3
75	89.3
80	95.2

Table VI-2. Mundt Creek inflow (cfs) from Mundt Creek diversion to upper and lower Mundt study sites.

Mundt Creek Flow (cfs)		
Diversion	Upper M.	Lower M.
1	1	2.7
2	2	5.3
3	3	8.0
4	4	10.6
5	5	13.3
6	6	15.9
7	7	18.6
8	8	21.2
9	9	23.9
10	10	26.5
11	11	29.2
12	12	31.8
13	13	34.5
14	14	37.1
15	15	39.8
16	16	42.4
17	17	45.1
18	18	47.7
19	19	50.4
20	20	53.0
21	21	55.7
22	22	58.3
23	23	61.0
24	24	63.6
25	25	66.3
26	26	68.9
27	27	71.6
28	28	74.2
29	29	76.9
30	30	79.5
31	31	82.2
32	32	84.8

Table VI-3. Turner Creek inflow (cfs) from Turner Creek diversion to upper and lower Turner Creek study sites.

Turner Creek flow (cfs)		
Diversion	Upper	Lower
1	1	2.0
2	2	4.1
3	3	6.1
4	4	8.1
5	5	10.2
6	6	12.2
7	7	14.2
8	8	16.2
9	9	18.3
10	10	20.3
11	11	22.3
12	12	24.4
13	13	26.4
14	14	28.4
15	15	30.5
16	16	32.5
17	17	34.5
18	18	36.5

Table VI-4. Final Gilligan Creek WUA, incorporating inflow from diversion.

Flow (cfs)		Chum	Coho		Cutthroat		Pink	Steelhead		
Diversion	IFIM Site	Spawning	Rearing	Spawning	Rearing	Spawning	Spawning	Fry	Juv	Spawning
2	2.4	359	1,802	490	99	294	2,013	9,106	85	0
3	3.6	471	1,749	1,042	168	540	2,303	8,998	113	47
4	4.8	576	1,694	1,601	254	762	2,472	8,801	150	176
5	6.0	706	1,672	2,152	337	964	2,556	8,652	192	282
6	7.1	979	1,523	3,164	445	1,229	2,561	8,111	299	682
7	8.3	1,116	1,493	3,556	494	1,366	2,567	7,906	356	966
8	9.5	1,269	1,447	3,910	538	1,489	2,555	7,717	413	1,245
9	10.7	1,442	1,387	4,234	583	1,602	2,536	7,531	468	1,512
10	11.9	1,783	1,339	4,466	636	1,682	2,465	7,174	566	1,977
15	17.9	2,825	1,194	4,963	767	1,725	2,244	6,159	845	3,242
20	23.8	3,663	1,045	5,073	867	1,577	2,108	5,448	1,067	4,076
25	29.8	4,190	1,010	4,907	949	1,398	1,985	4,981	1,248	4,456
30	35.7	4,457	977	4,729	960	1,169	1,882	4,791	1,376	4,543
35	41.7	4,565	973	4,564	937	1,006	1,807	4,749	1,443	4,536
40	47.6	4,599	1,030	4,304	918	793	1,756	5,030	1,495	4,383
45	53.6	4,523	1,074	4,087	908	687	1,773	5,437	1,481	4,216
50	59.5	4,394	1,102	3,881	894	624	1,810	5,768	1,440	4,000
55	65.5	4,231	1,169	3,798	898	584	1,857	6,141	1,415	3,785
60	71.4	4,070	1,152	3,621	930	591	1,876	6,389	1,458	3,700
65	77.4	3,914	1,229	3,506	945	591	1,922	6,620	1,445	3,583
70	83.3	3,769	1,315	3,463	961	591	1,965	6,840	1,431	3,442
75	89.3	3,631	1,405	3,471	974	587	2,021	7,068	1,420	3,310
Max		4,599	1,802	5,073	974	1,725	2,567	9,106	1,495	4,543

Table VI-5. Final Mundt Creek WUA, incorporating inflow downstream from diversion.

Flow (cfs)			Chum	Coho		Cutthroat		Pink	Steelhead		
Diversion	Upper	Lower	Spawning	Rearing	Spawning	Rearing	Spawning	Spawning	Fry	Juv	Spawning
1	1	2.7	-	-	-	-	-	-	-	-	-
2	2	5.3	798	693	1210	155	517	1694	3977	106	109
3	3	8	978	639	1733	225	698	1628	3755	152	322
4	4	10.6	1278	571	2429	277	719	1431	3471	223	857
5	5	13.3	1452	520	2706	296	720	1323	3312	273	1207
6	6	15.9	1699	464	3002	306	682	1157	3074	329	1764
7	7	18.6	1825	428	3046	316	641	1085	2970	361	2120
8	8	21.2	2043	384	3009	319	557	969	2798	398	2684
9	9	23.9	2136	364	2949	329	515	941	2736	417	2836
10	10	26.5	2328	345	2720	339	427	882	2622	438	3082
11	11	29.2	2378	350	2636	354	408	872	2588	447	3122
12	12	31.8	2470	351	2469	370	379	853	2542	454	3173
13	13	34.5	2506	366	2395	384	369	844	2562	458	3147
14	14	37.1	2550	385	2208	392	348	821	2570	453	3006
15	15	39.8	2550	409	2209	404	346	824	2623	455	2990
16	16	42.4	2500	426	2078	408	328	815	2629	445	2780
17	17	45.1	2459	444	1999	411	320	816	2651	443	2659
18	18	47.7	2407	464	1943	415	311	818	2679	443	2539
19	19	50.4	2364	480	1904	417	305	820	2684	445	2440
20	20	53	2306	482	1854	428	306	827	2684	459	2342
21	21	55.7	2253	496	1815	431	308	834	2669	463	2257
22	22	58.3	2215	510	1797	434	311	841	2666	469	2204
23	23	61	2152	526	1767	437	314	850	2661	474	2120
24	24	63.6	2125	540	1752	441	319	858	2668	480	2085
25	25	66.3	2066	554	1726	444	322	868	2676	486	2014
26	26	68.9	2047	567	1728	449	325	876	2705	492	1994
27	27	71.6	2014	581	1722	455	326	883	2737	498	1958
28	28	74.2	2022	593	1730	463	328	889	2763	504	1959
29	29	76.9	2030	605	1739	471	330	895	2783	511	1961
30	30	79.5	2040	615	1751	479	332	901	2798	519	1969
31	31	82.2	2047	626	1759	488	333	907	2810	525	1972
32	32	84.8	2056	636	1767	495	334	913	2816	531	1977
Max			2550	693	3046	495	720	1694	3977	531	3173

Table VI-6. Final Turner Creek WUA, incorporating inflow downstream from diversion.

Turner Creek Flow (cfs)			Chum	Coho		Cutthroat		Pink	Steelhead		
Diversion	Upper	Lower	Spawning	Rearing	Spawning	Rearing	Spawning	Spawning	Fry	Juv	Spawning
1	1	2	914	699	809	44	338	2141	3094	45	8
2	2	4.1	1225	638	1618	94	654	2116	2802	79	280
3	3	6.1	1471	518	2149	158	595	1988	2560	117	594
4	4	8.1	1651	462	2617	224	523	1828	2329	158	938
5	5	10.2	1781	390	2915	267	478	1667	2136	198	1245
6	6	12.2	1899	361	3024	295	438	1509	1984	243	1577
7	7	14.2	1990	333	3099	317	401	1359	1875	283	1835
8	8	16.2	2067	310	3148	326	361	1230	1779	322	2038
9	9	18.3	2133	295	3100	325	324	1111	1685	358	2222
10	10	20.3	2175	290	3033	323	294	1006	1594	385	2367
11	11	22.3	2202	285	2964	315	268	927	1515	407	2470
12	12	24.4	2223	283	2893	308	250	866	1453	424	2536
13	13	26.4	2235	281	2813	305	236	817	1401	435	2585
14	14	28.4	2237	279	2738	305	229	775	1356	444	2619
15	15	30.5	2226	279	2650	304	224	738	1323	451	2635
16	16	32.5	2213	283	2557	307	220	722	1321	453	2621
17	17	34.5	2175	288	2425	309	216	695	1319	455	2596
18	18	36.5	2174	291	2402	310	211	694	1313	456	2586
Max			2237	699	3148	326	654	2141	3094	456	2635

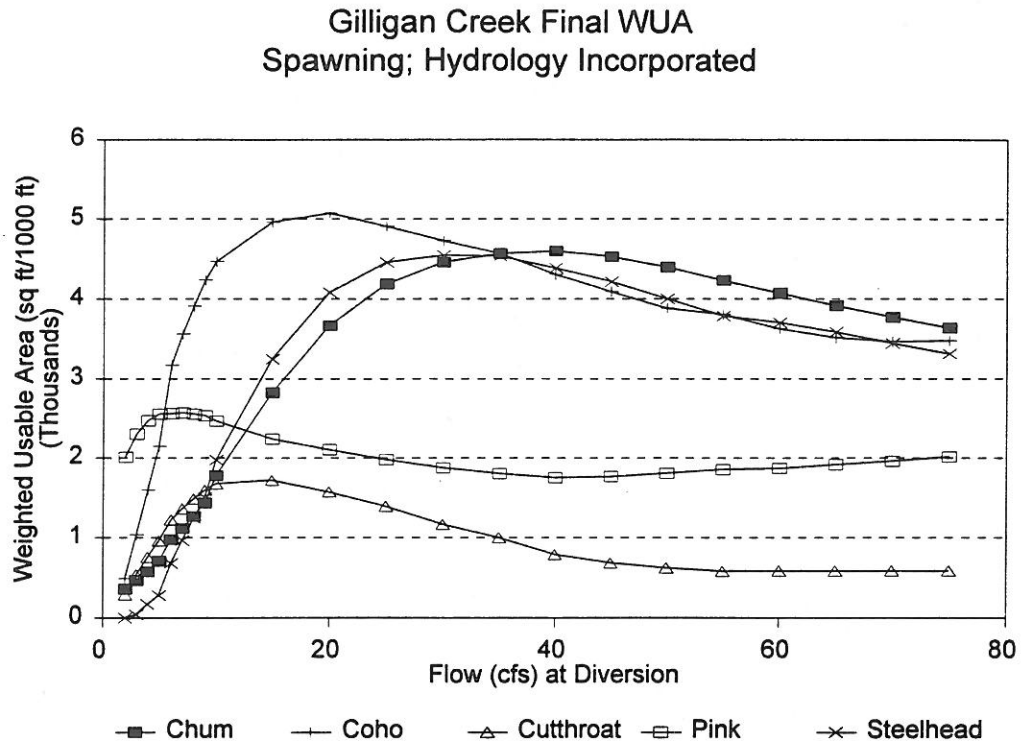

Figure VI-1. Gilligan Creek final Weighted Usable Area for spawning.

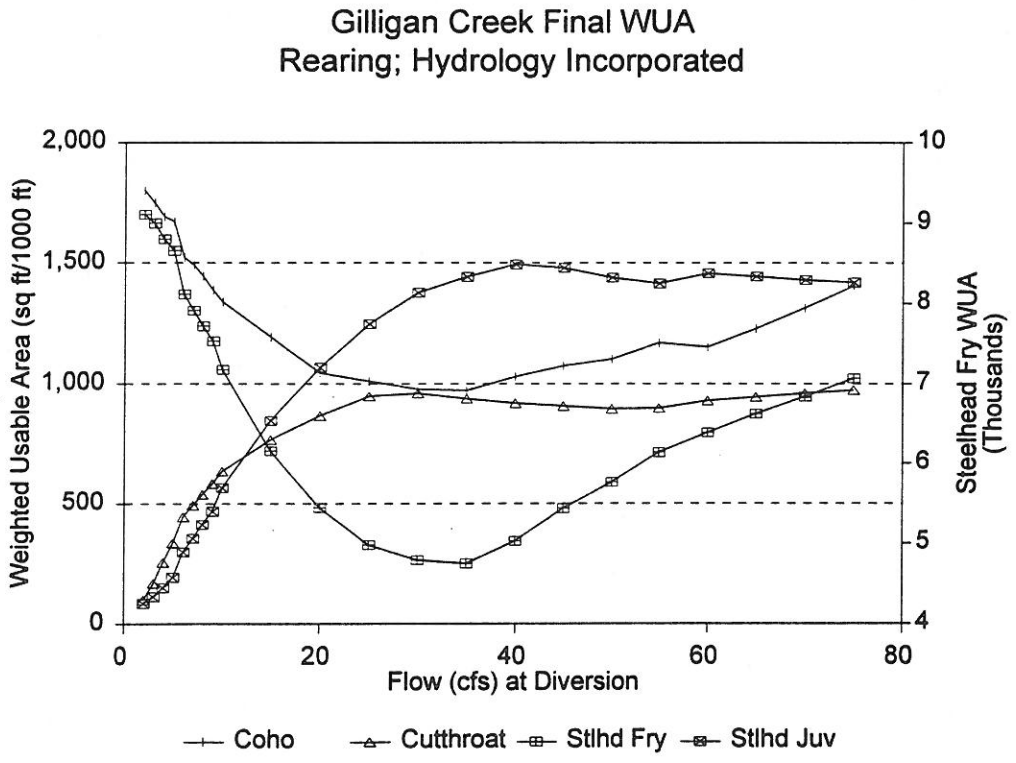

Figure VI-2. Gilligan Creek final Weighted Usable Area for rearing.

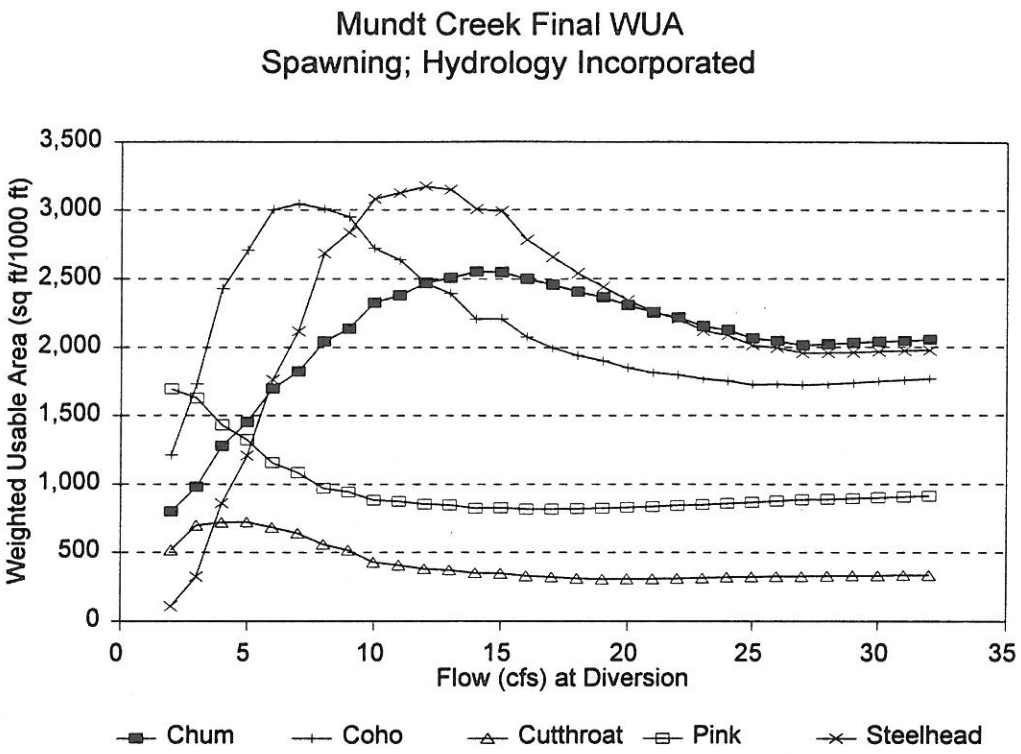

Figure VI-3. Mundt Creek final Weighted Usable Area for spawning.

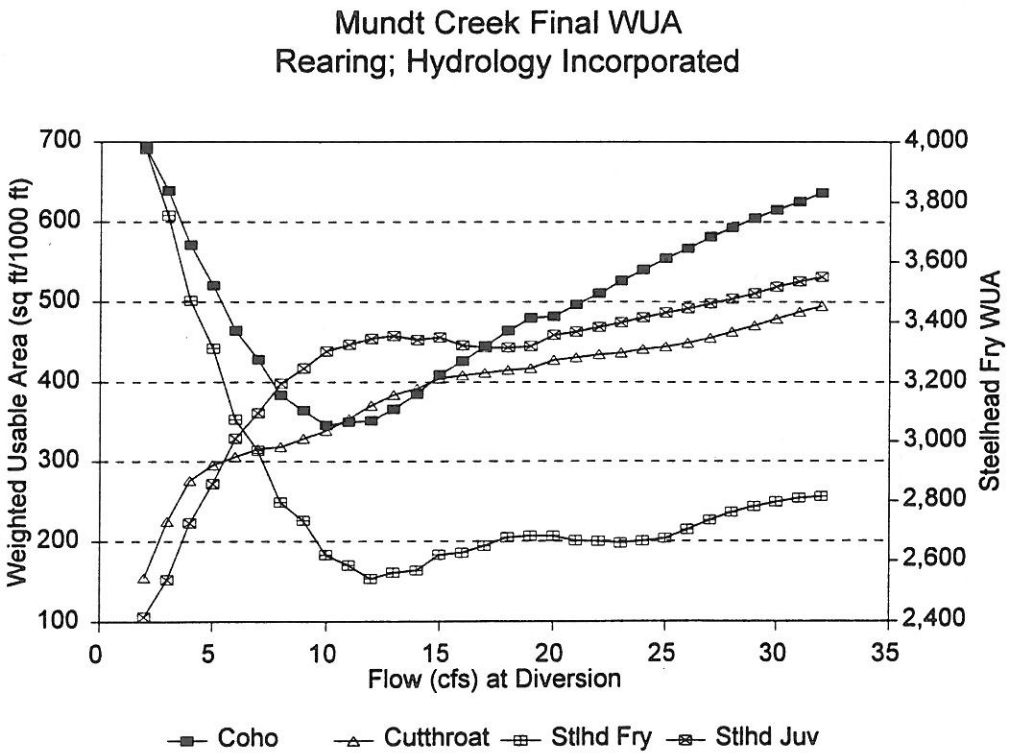

Figure VI-4. Mundt Creek final Weighted Usable Area for rearing.

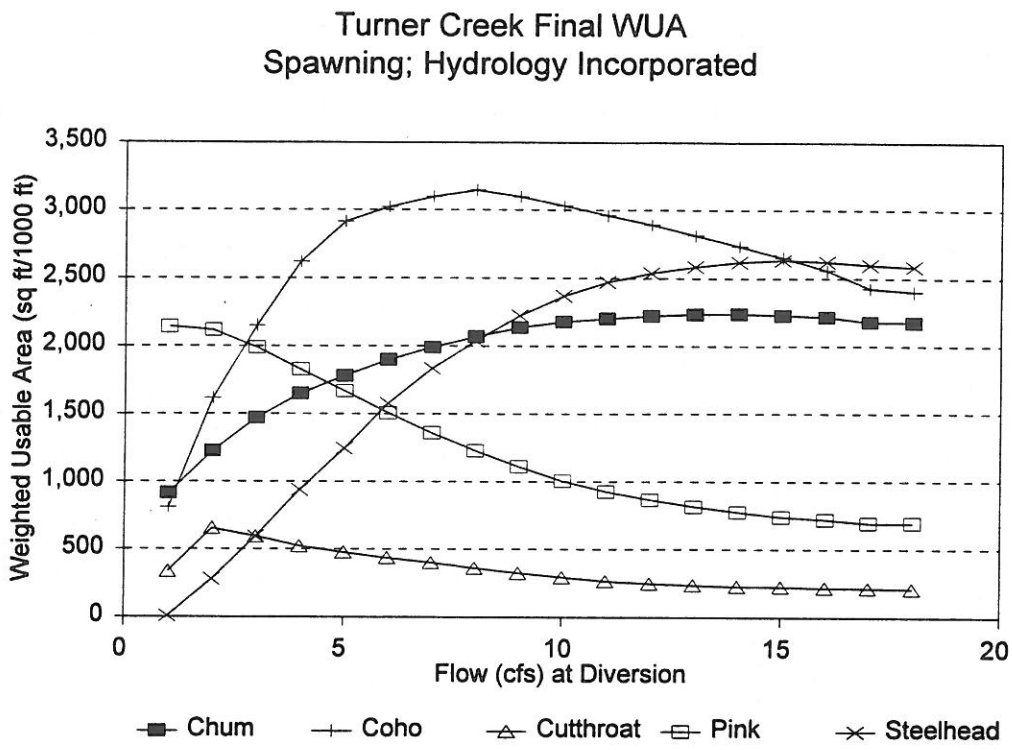

Figure VI-5. Turner Creek final Weighted Usable Area for spawning.

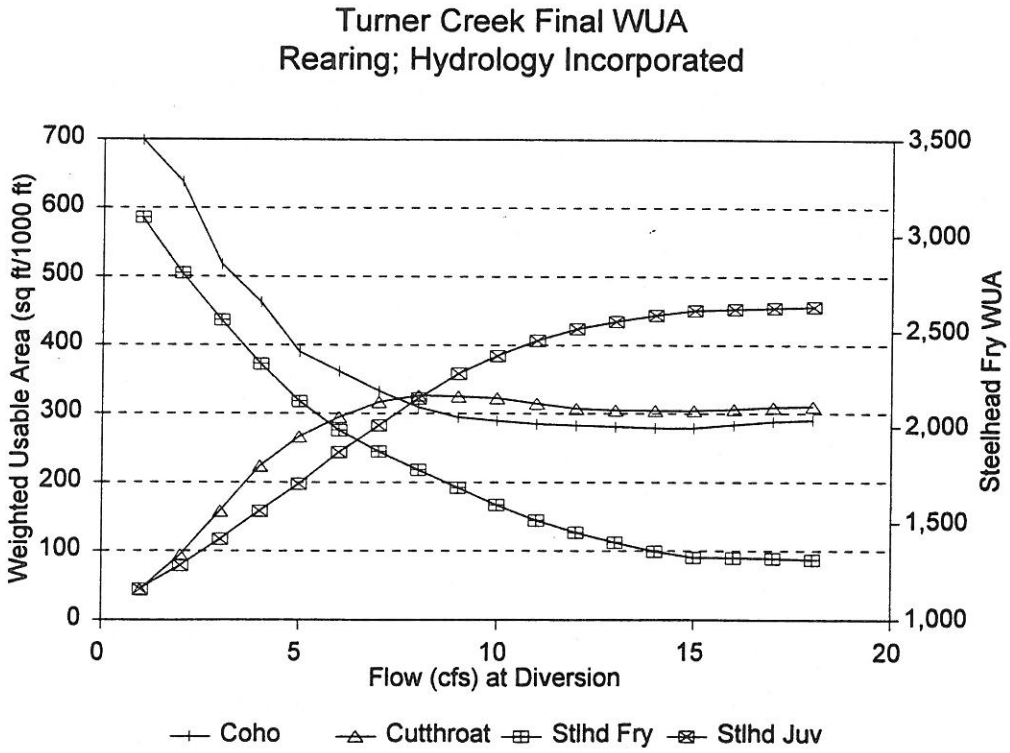

Figure VI-6. Turner Creek final Weighted Usable Area for rearing.

SECTION VII

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APPENDIX A

Physical Habitat Survey Report

Summary

Cascades Environmental Services, Inc. (CES) was contracted by the Skagit Public Utility District to investigate five streams in the Judy Reservoir system to determine if any may be suitable for expanded water supply. Associated with this task were physical habitat surveys to assess stream morphology and fish habitat availability in each stream. CES surveyed Gilligan, Salmon, Janicki, Turner, and Mundt Creeks. Gilligan, Turner, and Mundt Creeks are confirmed salmon streams. Salmon Creek is likely used by anadromous fish. Perched culverts at the mouth of Janicki Creek are a barrier to anadromous fish. Hydrologic records from 1954 to 1967 imply that Mundt Creek can provide more water than is presently diverted. No records were found for Gilligan Creek. However, the Gilligan Creek watershed above the diversion could likely provide more water than is presently diverted. CES recommends that a synthesized flow record be calculated for each of the streams to estimate the volume of water which may be available in each stream. If synthesized flows suggest additional water is available in any of the streams then IFIM studies of those streams are recommended. Since water rights for Mundt Creek do not require minimum flows, CES recommends an IFIM study to establish a minimum flow regime to provide adequate water for resident and anadromous fish in Mundt Creek.

Introduction

The Skagit Public Utility District #1 (District) in its long term planning, has determined that existing surface water demand will result in a 12.9 million gallon per day (mgd) deficit in water need by the year 2014. The District is currently evaluating 9 different water supply options. Among these options is the evaluation of acquiring additional supply from each existing stream diversion in the Judy Reservoir system.

Cascades Environmental Services, Inc. (CES) was contracted by the District to complete Task Order I which includes;

1. a reconnaissance of 5 streams diverted in the Judy Reservoir system to determine if any may be suitable for expanded water supply, and

2. a review of existing information on:

   a) use by resident and anadromous fish,
   b) hydrology and
   c) existing water rights.

Study Objectives

There are three objectives to the physical habitat surveys:

1. to characterize and quantify the morphology of the stream channel and associated habitat types between the diversion structures and the confluence of the creeks with the Skagit River or East Fork Nookachamps Creek;

2. determine the distribution and relative quantity and quality of spawning gravels available for resident and anadromous fish; and

3. determine, if possible, upstream barriers to anadromous salmon.

Study Area

This study made observations in five creeks which are presently diverted by the District in the Judy Reservoir system. These creeks originate as rain and snowmelt in the Cultus Mountains. Gilligan Creek and Salmon Creek are to the East of the Judy Reservoir. Janicki Creek is diverted around Judy Reservoir and is used as the outlet of the reservoir. Turner and Mundt creeks are to the South of Judy Reservoir (see Figure I-1).

Methods

A physical habitat survey documents the habitat within the stream bankfull channel. Each survey began at the diversion structure and extended down stream to the confluence of the stream with either the Skagit River or the East Fork Nookachamps Creek. Habitat above the diversion, or above confluent tributaries to the creeks were not included in this study. A team of two recorded measurements every 100 feet. Each station was video taped and photographs were taken of most stations. Measurements included habitat type, wetted channel width, bankfull channel width, depth, slope, substrate and spawning substrate and cover over the stream. These parameters are described below. Stream discharge was measured at the end of each survey.

Habitat type: Habitat was characterized according to a standard code shown in Table 1.

Channel width: Width was measured using a 6-foot graduated walking stick. Wetted width is the width of the channel which was filled with water. If the channel was split the width of the multiple channels were combined. Bankfull channel width is the distance between the vegetative zones on opposite stream banks of an active channel.

Depth: Depth was measured with a graduated walking stick at the center of the channel and halfway between the center and each bank. The average depth was calculated by adding the three depths and dividing by 4.

Slope: The longitudinal slope of each station transect was measured with a clinometer.

Substrate: Substrate was characterized using a standard code, as per WDFW (Table 2). The code uses three digits: the first digit represents the dominant substrate; the second digit represents the subdominant substrate; and the decimal represents the percentage of the dominant substrate. For example a substrate code of 53.6 describes a stream bed with 60% large gravel with small gravel as the subdominant substrate. Additional subdominant substrate types may be present but are not coded by this methodology.

Spawning substrate: Substrate appropriate for spawning was characterized in four general categories according to the proportion of the substrate available at each station. The categories are listed in Table 3. Resident trout use small to medium sized gravel (0.1 - 1.5 in.) for spawning and anadromous fish spawn in medium gravel to small cobble (0.5 - 6.0 in.).

Cover: Cover includes vegetation or debris within three ft of the water surface and offers fish resting areas, escape and protection from predators. Cover was classified by codes listed in Table 4.

Table 1. Habitat type coding and descriptions (Doughty 1991).

CODE	HABITAT	HABITAT DESCRIPTION
1	Pool	Slower velocity and deeper, non-turbulent flow with a strong hydraulic control. Modifier describes tailout: .0=bedrock/sand, .5=glide, .6=cobble/boulder run, .7=gravel/cobble riffle.
2	Lateral pool	Pool formed on the margin of the stream as a result of a structural element, substrate composition, or thalweg location. Generally at least half of the pool perimeter interfaces with adjacent habitat units. Modifier describes tailout: .0=bedrock/sand, .5=glide, .6=cobble/boulder run, .7=gravel/cobble riffle.
3	Plunge pool	Flow a head is vertical passing over an obstruction; fast, turbulent often with a bubble plume down the center. Modifier describes tailout: .0=bedrock/sand, .5=glide, .6=cobble/boulder run, .7=gravel/cobble riffle.
4	Trench pool	Long, generally deep slot in stable substrate; fast like a glide but with irregular substrate and depth that gives it elements of a pool. Modifier describes tailout: .0=bedrock/sand, .5=glide, .6=cobble/boulder run, .7=gravel/cobble riffle.
5	Glide	Smooth generally unbroken surface, generally laminar flow, moderate to shallow depth, often smaller substrates. Often doubles as a pool tailout.
6	Run	Like a glide except faster velocities and somewhat more turbulent, surface may be broken by protruding rocks. Modifier describes percent pool inclusions expressed as a decimal.
7	Riffle	Shallow with moderate velocities (less than run), lateral bottom profile is usually uniform, surface is broken but not turbulent like a run, gradient < 4%. Modifier describes percent pool inclusions expressed as a decimal.
8	Boulder garden	A run with a number of randomly placed large boulders causing flow irregularities, flow is not necessarily turbulent. Modifier describes percent pool inclusions expressed as a decimal.
9	Chute	Flow is confined in a narrow channel, velocity is fast to very fast.
10	Cascade	Turbulent flow with pronounced vertical drops causing a stepped gradient, substrate is often boulders and cobble. Modifiers describes relative height of steps; .1=low (1-2 ft), .2=moderate (2-4 ft), .3=high (>4ft).
11	Braided Channel	One or more divisions of the stream channel separated by islands of substrate not well vegetated. Modifier describes habitat within braid (eg. 11.7=braided channel riffle).
12	Split Channel	more than one permanent channel. Modifier describes habitat within channel.

Table 2. Substrate codes (WDFW 1993).		
Code Number	**Description**	**Inches**
0	Organic detritus	
1	Silt, Clay	< 0.1
2	Sand	< 0.1
3	Small gravel	0.1 - 0.5
4	Medium gravel	0.5 - 1.5
5	Large gravel	1.5 - 3.0
6	Small cobble	3.0 - 6.0
7	Large cobble	6.0 - 12.0
8	Boulder	> 12.0
9	Bedrock	

Table 3. Spawning substrate classifications (Doughty 1991).		
Code Number	**Percent substrate available for spawning**	**Value**
0	No substrate available	None
1	10 - 40	Marginal
2	40 - 70	Fair
3	70 - 100	Good
Spawning substrates range from medium gravel to small cobble for anadromous fish and small to medium gravel for resident trout.		

Table 4. Cover code classification (WDFW 1993)

Code number	Description
0.1	Undercut bank
0.2	Overhanging vegetation
0.3	Root wad (greatest width 1.5 feet)
0.4	Log jam
0.5	Single log parallel to bank
0.6	Submerged vegetation
0.7	Fine organic substrate
0.8	Grass and bushes

Results

Gilligan Creek

A physical habitat survey was conducted in Gilligan Creek on October 18, 1994 in the 8,085 ft stretch between the diversion to its confluence with the Skagit River. Flow at the time of the survey was 1.06 cubic feet per second (cfs) measured 100 ft below the diversion. Figure 2 shows the longitudinal profile of Gilligan Creek. The diversion structure is at the approximate elevation (El) of 800 ft. The creek then drops to near 40 ft at its confluence with the Skagit River. The overall slope of this creek is 9.4%. Gilligan Creek can be described in three reaches:

Reach 1. Reach 1 begins at the confluence with Skagit River (El 40) and extends 4,350 ft upstream to El 200 ft. Average bankfull width was 47.2 ft, average wetted width was 17.1 ft, and average depth was 0.4 ft. Stream gradient was 3.7%. Riffles dominate the habitat and consisted primarily of gravel and cobble substrate. Marginal to fair spawning habitat was abundant in this reach, which is accessible to anadromous fish.

Reach 2. Reach 2 extends 500 ft upstream to El 240. Average bankfull width was 51.8 ft, average wetted width was 18.5 ft and depth was 0.4 ft. Riffles dominate the habitat with boulders and large gravel substrate. This reach differs from Reach 1 because of the steeper gradient of 8%. This reach is accessible to anadromous fish; however, spawning substrate is less abundant than in Reach 1.

Reach 3. Reach 3 extends 3,235 ft upstream to the diversion structure at El 800. Average bankfull width was 42.9 ft, average wetted width was 18.9 ft, and average depth was 0.8 ft. Cascades, riffles and pools are the dominant habitat types in this reach with boulders and cobble substrate. This reach has a gradient of 17.3% and a number of unconfirmed anadromous barriers. Spawning substrate where present, is generally found in pools.

Table 5 lists slope, substrate, frequency of habitat types, average bankfull width, wetted width, depth and a ratio of spawning substrate classification for each reach of Gilligan Creek. Appendix A lists the physical habitat data recorded during the Gilligan Creek Survey.

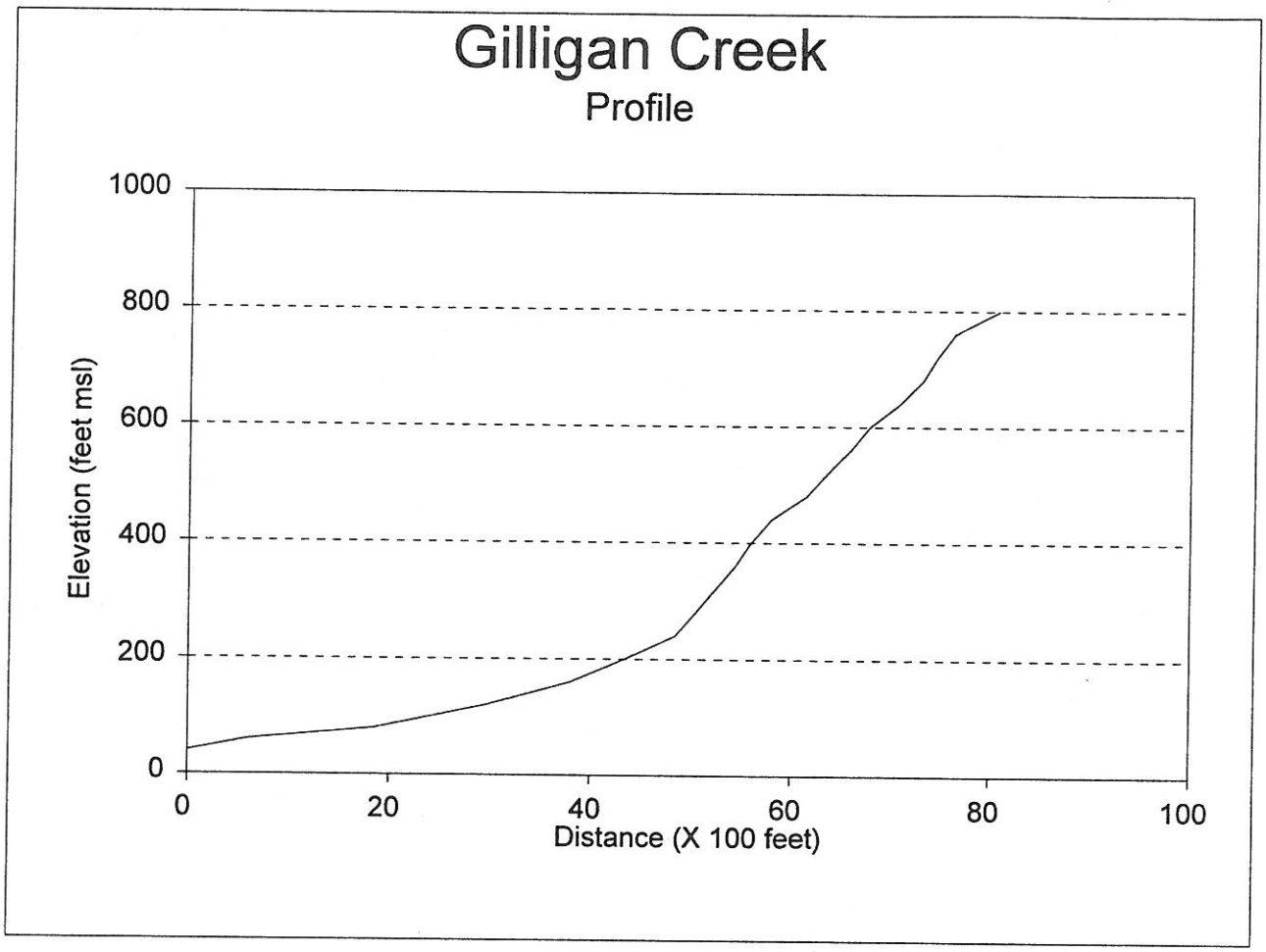


Figure 2. Longitudinal profile of Gilligan Creek from its confluence with the Skagit River to the diversion structure.

Table 5. Habitat frequency and substrate by reach in Gilligan Creek.

	Reach 1	**Reach 2**	**Reach 3**
Length (ft)	4,350	500	3,235
Elevation (ft)	40 - 200	200 - 240	240 - 600
Slope	3.7%	8%	17.3%
Substrate	med gravel:cobble	boulders:lg gravel	boulders:cobble
Habitat type: Pool	10%	14.3%	23.2%
Glide	20%	14.3%	-
Run	-	-	-
Riffle	70%	71.4%	25.6%
Bld garden	-	-	2.3%
Chute	-	-	2.3%
Cascade	-	-	46.5%
Average bankfull width (ft)	47.2	51.8	42.9
Average wetted width (ft)	17.1	18.5	18.9
Average depth (ft)	0.4	0.4	0.8
% Spawning substrate none:marg:fair:good	25:45:30:0	57:14:14:0	65:0:35:0

Salmon Creek

Salmon Creek was surveyed over three days. Discharges varied from 0.29 cfs to 2.72 cfs. Figure 3 shows the longitudinal profile of Salmon Creek. Salmon Creek can be segmented into four reaches:

Reach 1. Reach 1 is an artificial, ditched channel extending 4,700 ft from the Skagit River to a culvert under the South Skagit Highway (El 70). Average bankfull width was 19.5 ft, average wetted width was 17.7 ft and average depth was 1.1 ft. The gradient is less than 1% and much of the habitat in this reach was glides. A beaver dam which was observed in this reach, was not likely to impede fish passage. This reach is accessible to anadromous fish; however, very little spawning substrate was observed.

Reach 2. Reach 2. extends 1,700 ft upstream from El 80 to El 320. Average bankfull width was 12.5 ft, average wetted width was 17.7 ft. and average depth was 0.2 ft. This reach has a steeper gradient of 14.1% with riffles, pools, glides and some cascades with gravel and sand substrate. Good spawning habitat for anadromous and resident fish is available in this reach; however, anadromous fish may be restricted by shallow water and cascades.

Reach 3. Reach 3 extends 650 ft upstream to El 520 where the creek passes through a culvert under Old Day Creek Road. Average bankfull width is 9.5 ft, average wetted width was 4.3 ft, with an average depth of 0.2 ft. The gradient of this reach is steep, 30.8%. Habitat types are predominantly chutes and pools. Substrate has been eroded to bedrock in the chutes with gravel found primarily in pools. Spawning substrate was generally unavailable. An unconfirmed barrier to anadromous fish was identified midway through this reach at station 19. A second unconfirmed barrier is the cascade below Old Day Creek Road.

Reach 4. Reach 4 extends 1,050 ft upstream from Old Day Creek Road to the diversion at El 660. Average bankfull width was 11.7 ft, average wetted width was 5.8 ft, and average depth was 0.2 ft. The gradient is 13.3% and habitat consisted mostly of riffles. Bedrock and cobble substrate were observed in the chutes and riffles. Very little spawning habitat was available in this reach.

Table 6 lists slope, substrate, frequency of habitat types, average bankfull width, wetted width, depth and a ratio of spawning substrate classification for each reach of Salmon Creek. Appendix B lists the physical habitat data recorded during the survey of Salmon Creek.

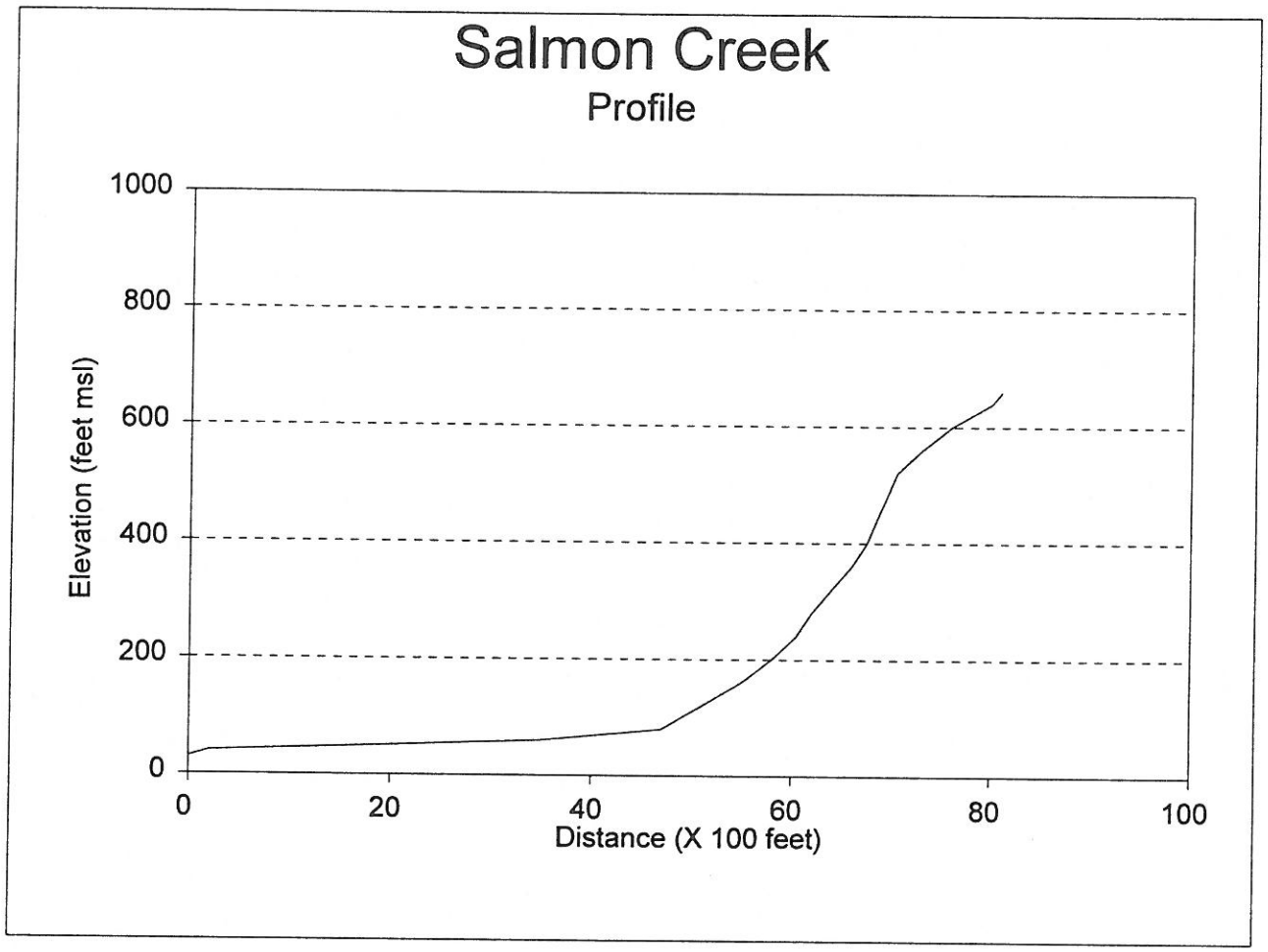


Figure 3. Longitudinal profile of Salmon Creek from its confluence with the Skagit River to the diversion structure.

Table 6. Habitat frequency and substrate by reach in Salmon Creek.

	Reach 1	Reach 2	Reach 3	Reach 4
Length (ft)	4700	1700	650	1050
Elevation (ft)	40 - 80	80 - 320	320 - 520	520 - 660
Slope	1.0%	14.1%	30.8%	13.3%
Substrate	Silt: detritus	Med gravel: sand	Bedrock: gravel	Bedrock: cobble
Habitat type: Pool	-	23.3%	53.8%	16.6%
Glide	100%	10%	-	-
Run	-	-	-	-
Riffle	-	63.3%	7.7%	50%
Bld garden	-	-	-	-
Chute	-	-	38.5%	16.6%
Cascade	-	3.3%	-	16.6%
Average bankfull width (ft)	19.5	12.5	9.5	11.7
Average wetted width (ft)	17.7	5.4	4.3	5.8
Average depth (ft)	1.1	0.2	0.2	0.2
% Spawning substrate none:marg:fair:good	90:10:0:0	27:27:23:23	85:8:0:8	91:9:0:0

Janicki Creek

CES conducted a physical habitat survey of Janicki Creek was on October 27, 1994. A discharge flow of 3.05 cfs was measured above Judy Reservoir. Janicki Creek has been diverted around Judy Reservoir and enters a natural channel below the reservoir. The length of the creek below the reservoir is about 3,675 ft extending from its confluence with the Skagit River at El 40 to the outlet structure of Judy Reservoir at El 440. Figure 4 shows the longitudinal profile of Janicki Creek. This section of Janicki Creek can be described as two reaches:

> **Reach 1.** Reach 1 extends 1,000 ft from the confluence with Skagit River to El 240. Average bankfull width was 21.1 ft, average wetted width was 14.1 ft, and average depth was 0.5 ft. The gradient of this reach is 20.0%. Riffles were the dominate habitat type observed in this reach with boulder and gravel substrate. There was very little spawning substrate available. A confirmed anadromous barrier is located at the mouth of Janicki Creek where the water falls approximately 10 ft from the culvert under South Skagit Highway onto boulders before entering the Skagit River (WDF 1975).
>
> **Reach 2.** Reach 2 extends 2, 775 ft upstream to the outlet structure of Judy Reservoir at El 440. Average bankfull width was 18.9 ft, average wetted width was 13.4 ft, and average depth was 0.4 ft. The gradient of this reach is 7.3% Riffles, cascades and pools were the dominant habitat types observed. Predominant substrate was gravel and cobbles. Marginal spawning habitat was available for resident trout.

Table 7 lists the length, slope, substrate, frequency of habitat types, average bankfull width, wetted width, depth and a ratio of spawning substrate classification observed in Janicki Creek. Appendix C lists the physical habitat data recorded during the survey of Janicki Creek.

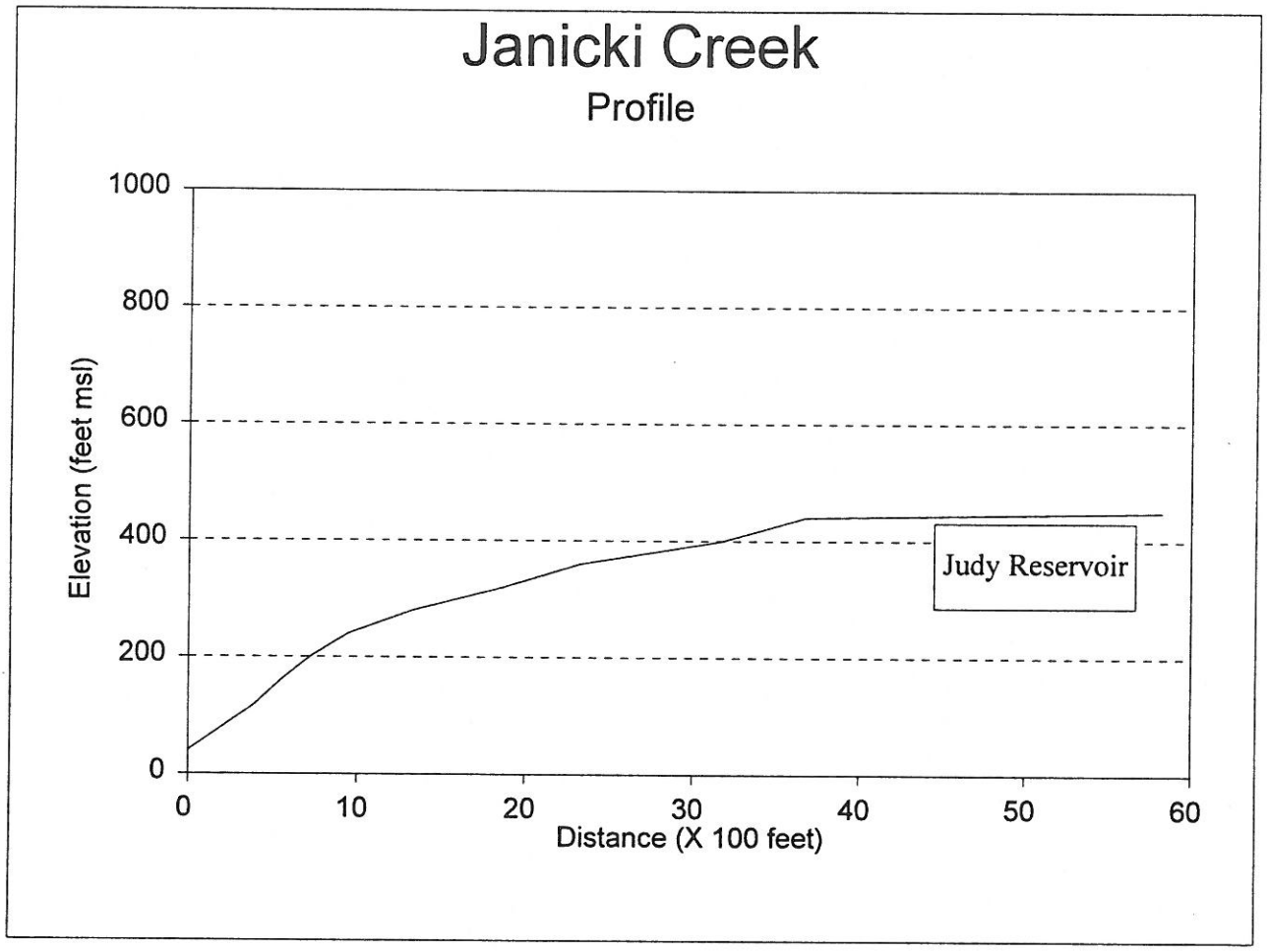


Figure 4. Longitudinal profile of Janicki Creek from its confluence with the Skagit River to the outlet structure of Judy Reservoir.

Table . Janicki Creek; Habitat frequency and substrate by reach.

	Reach 1	**Reach 2**
Length (ft)	950	2,775
Elevation (ft)	40 - 240	240 - 440
Slope	21.0%	7.3%
Substrate	Boulders: gravel	Gravel: cobbles
Habitat type: Pool	20%	19.2%
Glide	-	3.8%
Run	-	-
Riffle	50%	61.5%
Bld garden	-	-
Chute	20%	-
Cascade	10%	15.4%
Average bankfull width (ft)	21.1	18.9
Average wetted width (ft)	14.1	13.4
Average depth (ft)	0.5	0.4
% Spawning substrate none:marg:fair:good	90:10:0:0	73:23:4:0

Turner Creek

Turner Creek was surveyed over two days. CES surveyed the lower section on October 31, 1994 where the creek is ditched between fields. Discharge was 10.0 cfs as measured 200 ft above the culvert under a private drive east of Beaver Lake Road. The upper section of Turner Creek, between this culvert and the diversion structure was surveyed on November 2, 1994. The discharge during this survey was estimated to be about 11 cfs. Figure 5 shows the longitudinal profile of Turner Creek. Turner creek can be described as 4 reaches:

Reach 1. Reach 1 is an ditched channel beginning at the confluence with East Fork Nookachamps Creek at El 35 ft and extending 9,650 ft upstream to a man-made pond on the property owned by Mr. Ronald S. Walt at El 60 ft . Above and below this pond a number of weirs have been constructed to enhance fish habitat. Stream gradient is very low in this reach, 0.2%. Habitat in this reach is generally homogeneous. The habitat was characterized as a glide with very little available spawning habitat. Average bankfull width was 23.2 ft, average wetted width was 22.1 ft, and average depth was 2.9 ft. The substrate consisted of silt and detritus. Reed Canary grass and Blackberry bushes line the ditched channel. A fair amount of rain had preceded this survey and water from the East Fork Nookachamps Creek was backing up into Turner Creek, causing fields to become flooded.

Reach 2. Reach 2 extends from the pond 1,050 ft upstream to El 80 ft. The gradient of this reach is 3.8%. Average bankfull width was 17.9 ft, average wetted width was 8.4 ft, and average depth was 0.6 ft. Riffles are the dominate habitat type consisting of cobble and gravel substrate. This reach is accessible to anadromous fish and availability of spawning substrate was fair.

Reach 3. Reach 3 extends 5,715 ft upstream to El 640 where a service road for the electric transmission lines crosses the creek. Average bankfull width was 17.7 ft, average wetted width was 9.7 ft, and average depth was 0.3 ft. The gradient of this reach is 9.8%. Riffles were the dominant habitat type. Substrate was mostly boulders and cobbles. A number of log jams and cascades may impede migration of anadromous fish in this reach and availability of spawning substrate was marginal.

Reach 4. Reach 4 extends 2,450 ft upstream to the diversion structure ant El 820. The gradient of this reach is 7.3%. Average bankfull width was 16 ft, average wetted width was 7.2 ft, and average depth was 0.3 ft. Riffles were the dominant habitat type with cobble and gravel substrate. Spawning substrate in this reach was poor.

Table 8 lists the length, slope, substrate, frequency of habitat types, average bankfull width, wetted width, depth and a ratio of spawning substrate classification observed in Turner Creek. Appendix D lists the physical habitat data recorded during the survey of Turner Creek.

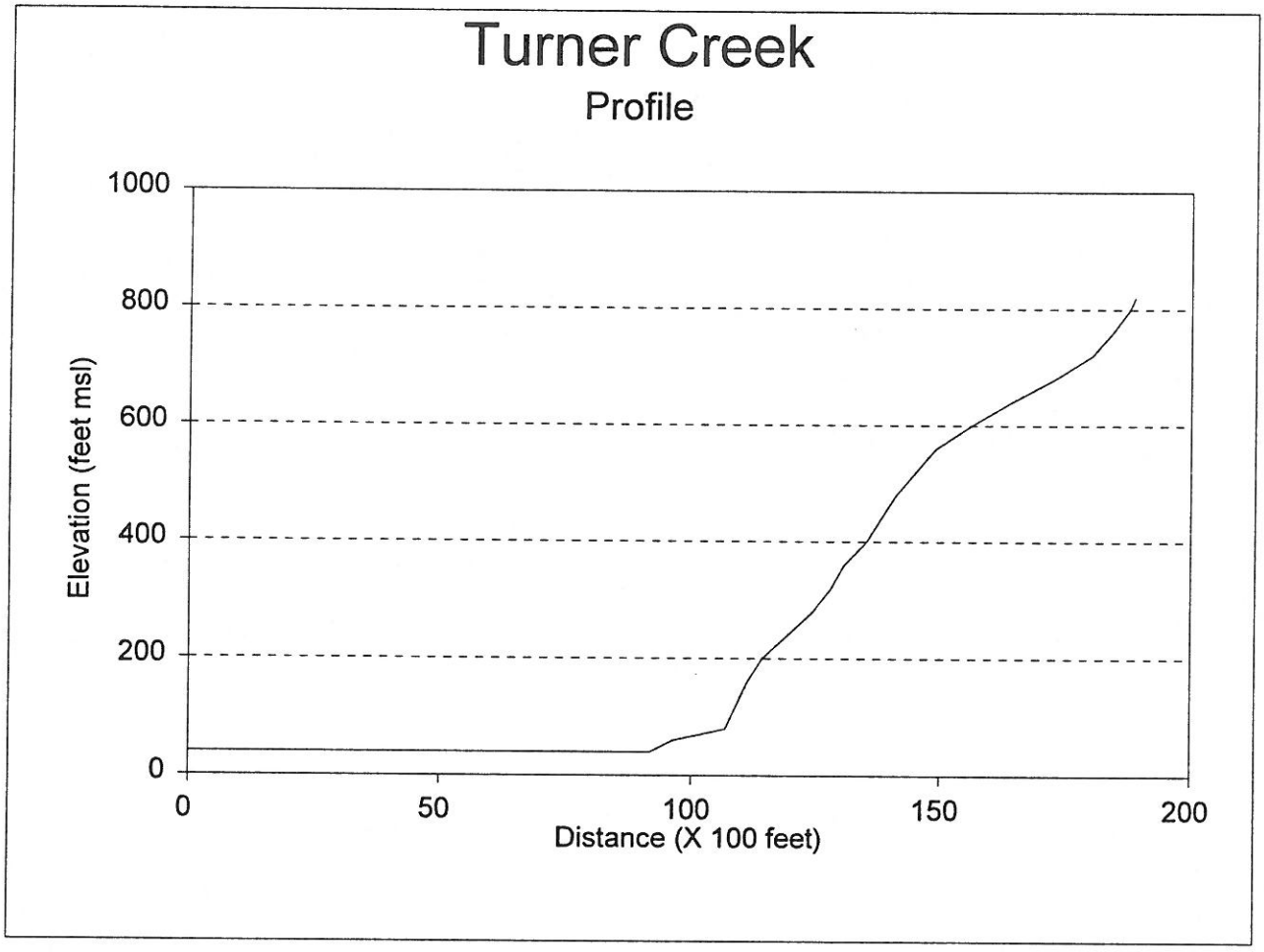


Figure 5. Longitudinal profile of Turner Creek from its confluence with the East Fork Nookachamps Creek to the diversion structure.

Table . Turner Creek; Habitat frequency and substrate by reach.

	Reach 1	**Reach 2**	**Reach 3**	**Reach 4**
Length (ft)	9,650	1,050	5,715	2,450
Elevation (ft)	35 - 60	60 - 80	80 - 640	640 - 820
Slope	0.2%	3.8%	9.8%	7.3%
Substrate	Silt:detritus	Cobble:gravel	Boulder:cobble	Cobble:gravel
Habitat type: Pool	1.2%	13.3%	26.2%	24.0%
Glide	94.0%	20.0%	8.2%	16.0%
Run	-	6.7%	-	-
Riffle	4.8%	60.0%	50.8%	52.0%
Bld garden	-	-	-	-
Chute	-	-	4.9%	-
Cascade	-	-	9.8%	8%
Average bankfull width (ft)	23.2	17.9	17.7	16.0
Average wetted width (ft)	22.1	8.4	9.7	7.2
Average depth (ft)	2.9	0.6	0.3	0.3
% Spawning substrate none:marg:fair:good	93:7:0:0	60:20:20:0	44:36:16:3	48:40:8:4

Mundt Creek

Mundt Creek was surveyed on November 4, 1994. The survey began at the diversion structure at El 1,000 and followed the creek downstream for 12,300 ft to its confluence with the East Fork Nookachamps Creek at El 50. Over all gradient is 7.8%. The discharge during this survey was 4.4 cfs, measured 50 ft below the Beaver Lake Road. Figure 6 shows the longitudinal profile of Mundt Creek. The surveyed section of Mundt Creek can be described as three reaches:

Reach 1. Reach 1 begins at the confluence of East Fork Nookachamps Creek, El 40, and extends 5,650 ft upstream to El 280 where an unconfirmed anadromous barrier was observed. The barrier is a complex of cascades, chutes and log jams. The gradient of this reach is 4.3%. Average bankfull width was 24.9 ft, average wetted width was 15.8 ft, and average depth was 0.3 ft. Riffles were the dominant habitat type with cobble and gravel substrate. This reach is accessible to anadromous fish and spawning substrate availability was marginal. Fish gut, bones and eggs of a size that would suggest the remains of an anadromous fish were observed in this reach. River otters (*Lutra canadensis*) were observed in this reach.

Reach 2. Reach 2 extends 4,150 ft upstream to El 520. The gradient of this reach is 5.8%. Average bankfull width was 23.6 ft, average wetted width was 13.2 ft, and average depth was 0.5 ft. Riffles and pools were the dominant habitat types with boulder and cobble substrate. Availability of spawning substrate was poor. It is unlikely that anadromous fish can use this reach because of cascades and logjams at the transition of this reach and reach 1.

Reach 3. Reach 3 extends 2,500 ft upstream to the diversion structure at El 1,000. The gradient in this reach is steep at 19.2%. Average bankfull width was 26.9 ft, average wetted width was 11.9 ft, and average depth was 0.5 ft. Cascades are the dominant habitat type with boulder and cobble substrate. Very little spawning habitat was available. It is unlikely that anadromous fish can pass the unconfirmed barrier between reach 1 and reach 2.

Table 10 lists the length, slope, substrate, frequency of habitat types, average bankfull width, wetted width, depth and a ratio of spawning substrate classification observed in Mundt Creek. Appendix E lists the physical habitat data recorded during the survey of Mundt Creek.

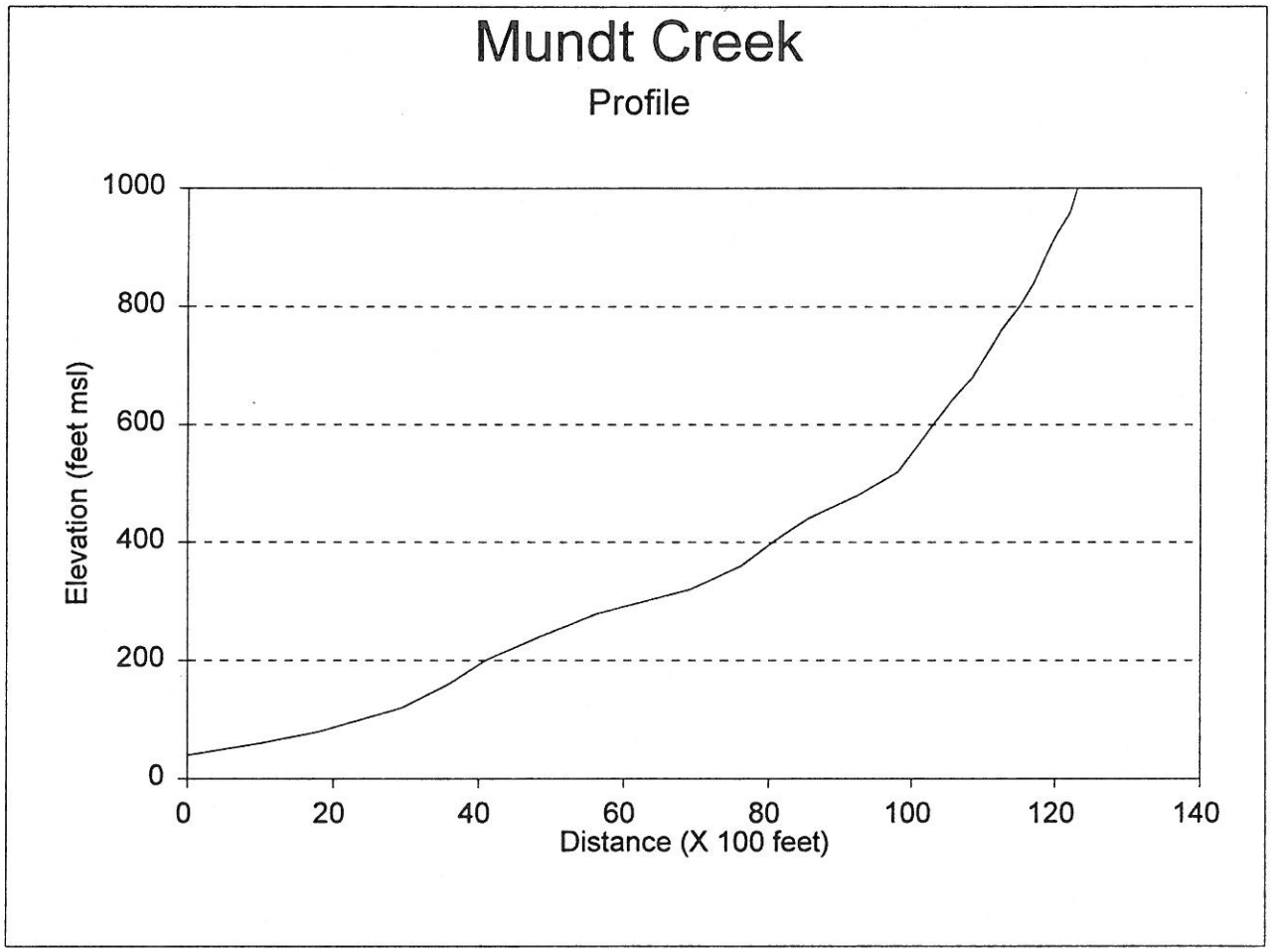


Figure 6. Longitudinal profile of Mundt Creek from its confluence with the East Fork Nookachamps Creek to the diversion structure.

Table 10. Habitat frequency and substrate by reach in Mundt Creek.

	Reach 1	**Reach 2**	**Reach 3**
Length (ft)	5,650	4,150	2,500
Elevation (ft)	35 - 280	280 - 520	520 - 1,000
Slope	4.3%	5.8%	19.2%
Substrate	Cobble:gravel	Boulder:cobble	Boulder:cobble
Habitat type: Pool	26.1%	35.7%	30.0%
Glide	23.9%	1.8%	15.0%
Run	2.2%	-	-
Riffle	47.8%	41.1%	-
Bld garden	-	-	-
Chute	-	1.8%	-
Cascade	-	19.6%	55%
Average bankfull width (ft)	24.9	23.6	26.9
Average wetted width (ft)	15.8	13.2	11.9
Average depth(ft)	0.3	0.5	0.5
% Spawning substrate none:marg:fair:good	61:30:7:2	54:36:7:4	80:15:5:0

Discussion

Gilligan Creek

The District holds water rights to divert 8.89 cfs from Gilligan Creek with a minimum bypass flow requirement of 0.75 cfs. The physical habitat survey was conducted during a discharge flow of 1.06 cfs, approximately 40% more than the minimum flow. The survey showed that Gilligan Creek has suitable habitat for spawning and rearing for resident and anadromous fish and is accessible and used by anadromous fish. The Catalog of Washington Streams and Salmon Utilization (WDF 1975) indicates that coho (*O. kisutch*), chum (*O. keta*) and pink (*O. gorbuscha*) salmon are found in Gilligan Creek. The District has an application pending for an increased diversion from Gilligan Creek for a maximum of 23.4 cfs to match the capacity of the collector pipeline.

Recommendations:

1) A synthesized mean monthly flow record should be calculated to estimate the volume of water which could be available for diversion and minimum flow.

2) If the synthesized flow record indicates that a larger volume of water may be available an instream flow study using instream flow methodology (IFIM) should be conducted. The IFIM study will calculate the amount of water available for diversion and a minimum flow requirement for spawning and rearing salmon and resident trout and will establish a flow regime for Gilligan Creek.

3) A stream gage and staff gage should be placed at the diversion. Data collected from the gages can be used to develop a rating curve to accurately estimate the bypass discharge.

Salmon Creek

The District holds water rights to divert 1.8 cfs from Salmon Creek and has an application pending to increase the diversion to 4.0 cfs with a minimum flow requirement of 0.056 cfs. The physical habitat survey was conducted during flows of 0.29 cfs, 1.19 cfs, and 2.72 cfs. On September 29, 1994 a low flow of 0.05 cfs was measured 20 ft above the diversion. A review of historical data from 1954 to 1967 found that discharge of Salmon Creek ranged from a low of 0.004 cfs in August 1963 to a high flow of 4.14 cfs in February 1965. The physical habitat survey shows that reach 1 of Salmon Creek has suitable habitat for rearing salmon and resident fish but spawning substrate is limited. Though Salmon Creek is not listed in the Catalog of Washington Stream and Salmon Utilization, Reach 1 is accessible to the Skagit River and is likely to be used by anadromous fish.

Recommendations:

1) A synthesized mean monthly flow record should be calculated to estimate the volume of water which could be available for diversion and minimum flow. A synthesized flow record would provide information to determine what further studies would be useful.

2) Since Salmon Creek does not offer a substantial volume of water an IFIM study is not recommended.

Janicki Creek

The District does not hold water rights to divert water from Janicki Creek for the Judy Reservoir system. Janicki Creek is diverted around Judy Reservoir and is returned to the natural channel below the reservoir. When Judy Reservoir is at normal operating pool level (NOPL) water is allowed to spill through an outlet structure into the natural channel of Janicki Creek. A confirmed barrier to anadromous fish is present at the mouth of Janicki Creek. The culverts under the South Skagit Highway are perched about ten feet above boulder rip rap; water flows out of the culverts and cascades down the boulders into the Skagit River. The physical habitat survey found habitat available for resident fish in the upper reach. The survey was conducted during a discharge flow of 3.05 cfs. A review of historical data from 1954 to 1967 found that the discharge of Janicki Creek ranged from a low of 0.01 cfs in August 1967 to a high flow of 16.84 cfs in February 1965. Though Janicki Creek appears to be an available source of water, concerns of water quality have be raised (Spangler 1994 pers. comm.). Apparently, during low flows, an unacceptable level of lead has been found in samples taken from Janicki Creek.

Recommendations:

1) A synthesized mean monthly flow record should be calculated to estimate the volume of water which could be available for diversion and minimum discharge.

2) If the synthesized flow record indicates that a substantial volume of water may be available from Janicki Creek an IFIM should be conducted. The IFIM study will calculate the amount of water available for diversion and a minimum flow requirement for spawning and rearing resident trout and will establish a flow regime for Janicki Creek.

3) A study to establish baseline levels and to locate sources of contamination could be designed and implemented.

Turner Creek

The District holds water rights to divert 6.2 cfs from Turner Creek with a minimum bypass flow of 0.6 cfs. The physical habitat survey was conducted during a discharge of 10.0 cfs and about 11 cfs. A low flow of 0.1 cfs was measured 50 ft above the diversion on September 29, 1994. A review of historical data from 1954 to 1967 found that discharge of Turner Creek ranged from a low of 0.02 cfs in September 1967 to a high flow of 18.96 cfs in February 1965. The Catalog of Washington Streams and Salmon Utilization (WDF 1975) indicates that coho (*O. kisutch*) and chum (*O. keta*) salmon are found in Turner Creek. Habitat for rearing fish was observed in all reaches of the creek and spawning substrate was observed in reaches 2 and 3.

Recommendations:

1) A synthesized mean monthly flow record should be calculated to estimate the volume of water which could be available for diversion and minimum discharge.

2) If the synthesized flow record indicates that a larger volume of water may be available an IFIM study should be conducted. The IFIM study will calculate the amount of water available for diversion and a minimum flow requirement for spawning and rearing salmon and resident trout and will establish a flow regime for Turner Creek.

Mundt Creek

The District holds water rights to divert 8 cfs from Mundt Creek with no minimum bypass discharge. A bypass in the existing diversion structure allows a discharge of 1.0 cfs for instream needs. The physical habitat survey was conducted during a discharge of 4.4 cfs and a low flow of 0.3 cfs was measured 40 ft above the diversion structure on September 29, 1994. A review of historical data from 1954 to 1967 found that discharge of Mundt Creek ranged from a low flow of 0.01 cfs in August 1963 to a high flow of 40.83 cfs in February 1965. Habitat observed in reaches 1 and 2 was suitable for rearing and spawning of anadromous and resident fish. The Catalog of Washington Stream and Salmon Utilization indicates that coho (*O. kisutch*) and chum salmon (*O. keta*) utilize Mundt Creek.

Recommendations:

1) A synthesized mean monthly flow record should be calculated to estimate the volume of water which could be available for diversion and minimum discharge.

2) An IFIM study should be conducted to establish minimum flow regimes for Mundt Creek to provide adequate water for spawning and rearing salmon and resident trout.

Conclusion

Three of the five streams surveyed in this study are utilized by anadromous fish. Gilligan, Turner and Mundt Creeks are confirmed salmon streams (WDF 1975). Janicki Creek has a confirmed anadromous barrier at the confluence with the Skagit River. Salmon Creek is likely to be used by anadromous fish though utilization has not been confirmed. All of the streams have habitat available for rearing and spawning anadromous fish and resident trout. To provide adequate stream flows for salmon and resident fish minimum flow regimes should be determined for each of the streams diverted for the Judy Reservoir System.

To investigate additional sources of water for the Judy Reservoir system CES recommends that a synthesized mean monthly flow be calculated for each of the streams. A synthesized flow will estimate the quantity of water that may be available in each of the streams and will indicate which streams could provide more water to the reservoir. If the synthesized flows suggest that any of the streams may supply substantial increased volumes of water to the reservoir then IFIM studies of those streams are recommended.

Since Mundt Creek has no minimum flow requirement CES recommends an IFIM study to establish a flow regime to provide adequate water for rearing and spawning resident and anadromous fish.

Literature Cited

Doughty, K. 1991. Habitat type and spawning substrate coding for IFIM and physical habitat surveys. Cascades Environmental Services, Inc. Bellingham, WA.

WDF. 1975. A catalog of Washington streams and salmon utilization. Washington State Department of Fisheries. Olympia, WA

WDFW. 1993. Instream flow guidelines; substrate and cover code classification. Washington State Department of Fish and Wildlife. Olympia, WA

Spangler, B. October 10, 1994. Telephone conversation Brad Spangler, Skagit PUD#1 regarding Janicki Creek.

APPENDIX B

Synthesized Hydrology Report

Synthesized Hydrology Report
Skagit Water Supply IFIM

Methods

Synthesized daily flows were calculated for Gilligan, Salmon, Turner and Mundt creeks using 11 years of record from the USGS Gage # 12199800 located on East Fork Nookachamps Creek near Big Lake. The watershed of East Fork Nookachamps Creek has similar weather conditions and elevations as the four study streams. This gage operated from December 1961 to August 1972 and was located at nearly the same elevation as the diversion of the other creeks. These data were used to compare the watershed area with stream discharge. The watershed areas of Gilligan, Turner and Mundt creeks are listed in Table 1. Watershed boundaries were determined above the diversion of each creek and the areas of the watersheds were compared to the area of East Fork Nookachamps Creek watershed above the gage. The ratios of watershed areas were used to adjust the East Fork Nookachamps daily flow record to calculate the synthesized daily flow for each creek.

Table 1. Comparison of watershed area for each stream at the point of diversion with East Fork Nookachamps Creek USGS Gage #12199800 near Big Lake.

	WATERSHED AREA (acres)	ADJUSTMENT RATIOS
East Fork Nookachamps:	2,278.40	
Gilligan Creek:	3,409.34	1.49637
Turner Creek:	781.62	0.34306
Mundt Creek:	999.69	0.43877

Flow Duration Curves

Flow duration curves for the annual flow and monthly flows were made from the East Fork Nookachamps stream gage data. Since the synthesized flow were calculated by applying the adjustment ratios of each creek to the East Fork Nookachamps data all duration curves would have the same shape. A table with the adjustment ratios is provided on each curve.

Monthly Discharge

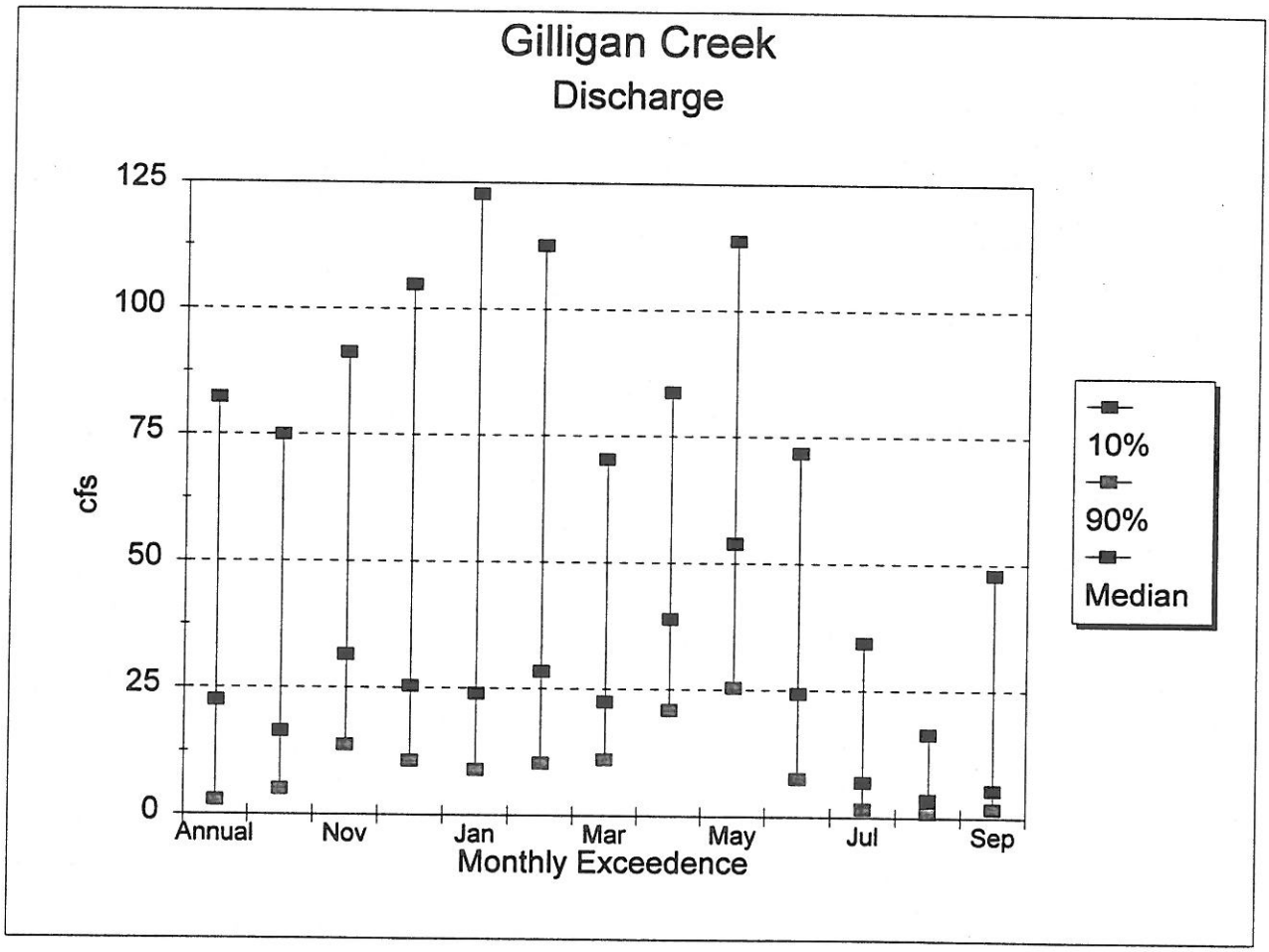
Monthly discharge charts of 10% and 90% exceedence flow with the median flow were made for Gilligan, Turner and Mundt creeks. The adjustment ratios from Table 1 were applied to the East Fork Nookachamps daily record to synthesize the discharge for each creek. The synthesized data was used for the discharge exceedence charts.

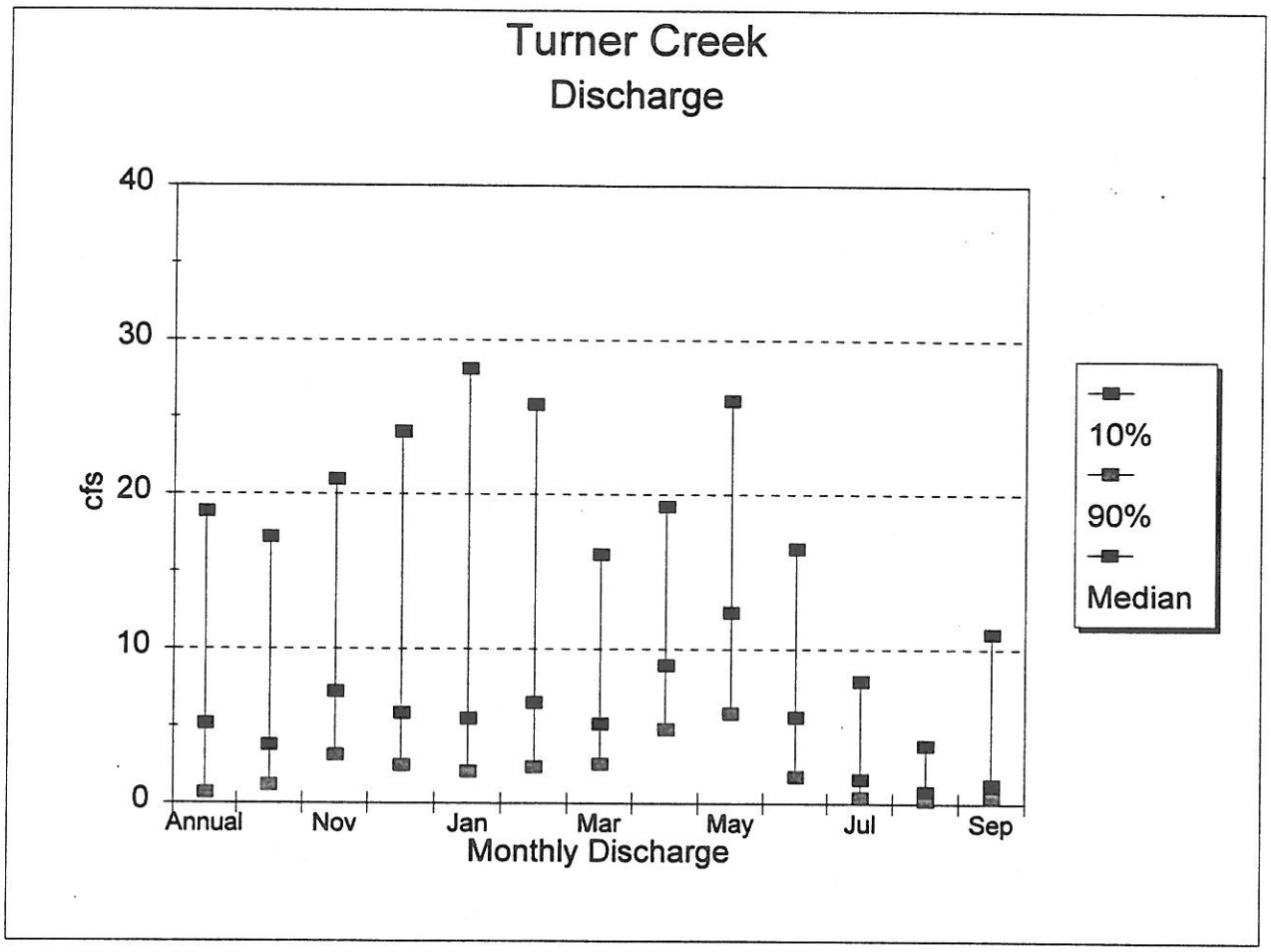
E. F. Nookachamps										
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ANNUAL	55	35	26	20	15	11	8	5	2	0
OCT	50	29	20	15	11	9	7	5	3	1
NOV	61	39	31	24	21	16	14	11	9	4
DEC	70	40	28	22	17	14	10	9	7	4
JAN	82	44	29	22	16	12	9	7	6	3
FEB	75	38	29	22	19	16	13	10	7	0
MAR	47	32	24	20	15	13	11	9	7	4
APR	56	43	34	29	26	23	20	17	14	10
MAY	76	60	47	40	36	32	27	22	17	6
JUN	48	36	28	24	16	13	10	7	5	1
JUL	23	13	8	6	5	4	3	2	1	1
AUG	11	6	4	3	2	2	1	1	1	0
SEP	32	15	9	5	4	3	2	2	1	0

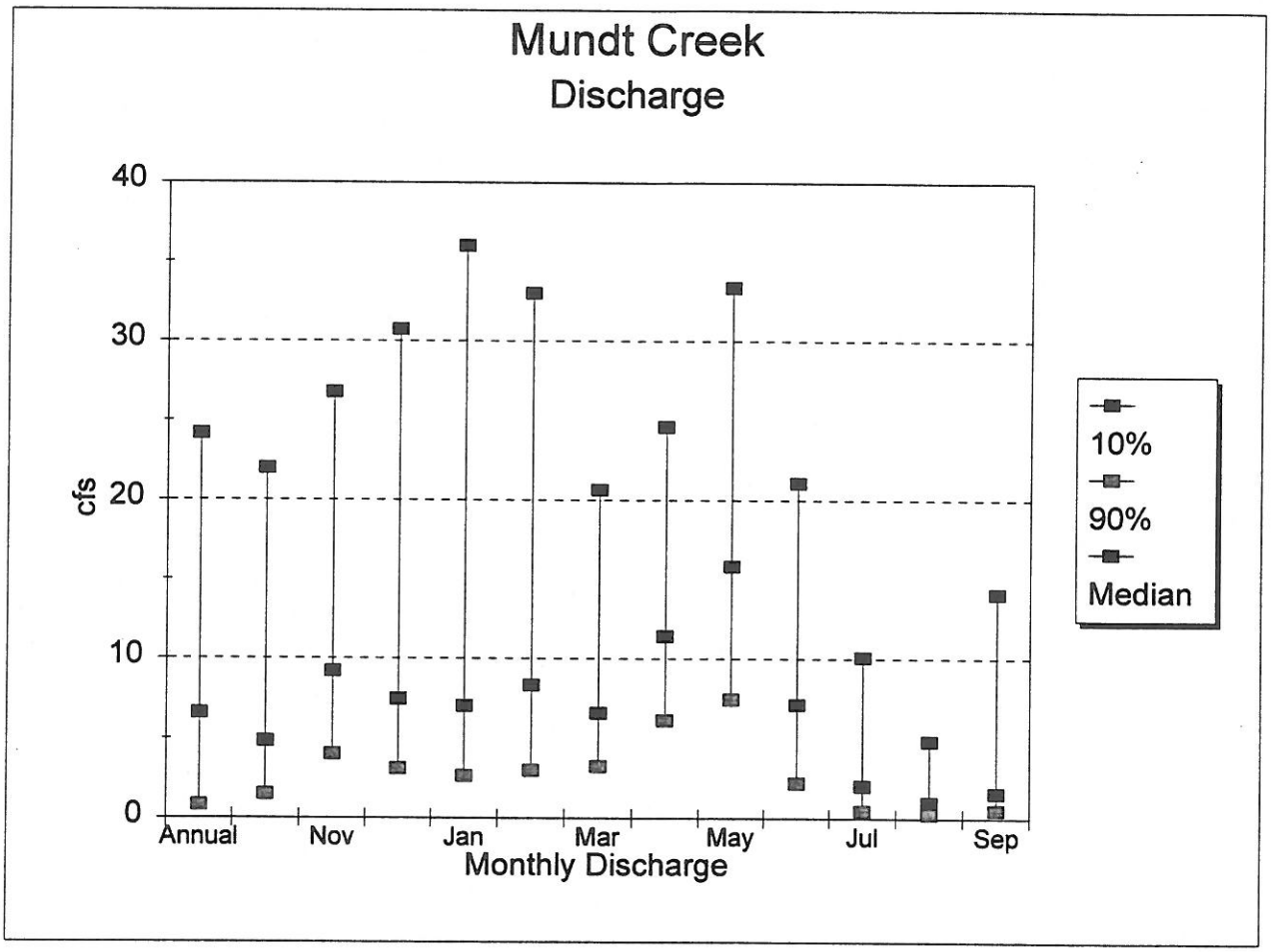
Gilligan Creek										
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ANNUAL	82	52	39	30	22	16	12	7	3	0
OCT	75	44	30	22	16	13	10	8	5	2
NOV	91	59	46	36	31	24	21	16	14	6
DEC	105	60	42	33	25	20	15	13	11	6
JAN	123	66	43	33	24	18	13	11	9	5
FEB	112	57	43	33	28	24	19	15	10	0
MAR	70	48	36	30	22	19	16	14	11	7
APR	84	64	51	43	39	34	30	25	21	14
MAY	114	90	70	60	54	48	40	33	25	8
JUN	72	54	42	36	24	19	15	11	7	2
JUL	34	19	12	9	7	6	4	3	2	1
AUG	16	9	5	4	3	3	2	1	1	0
SEP	48	22	13	8	5	4	3	2	2	1

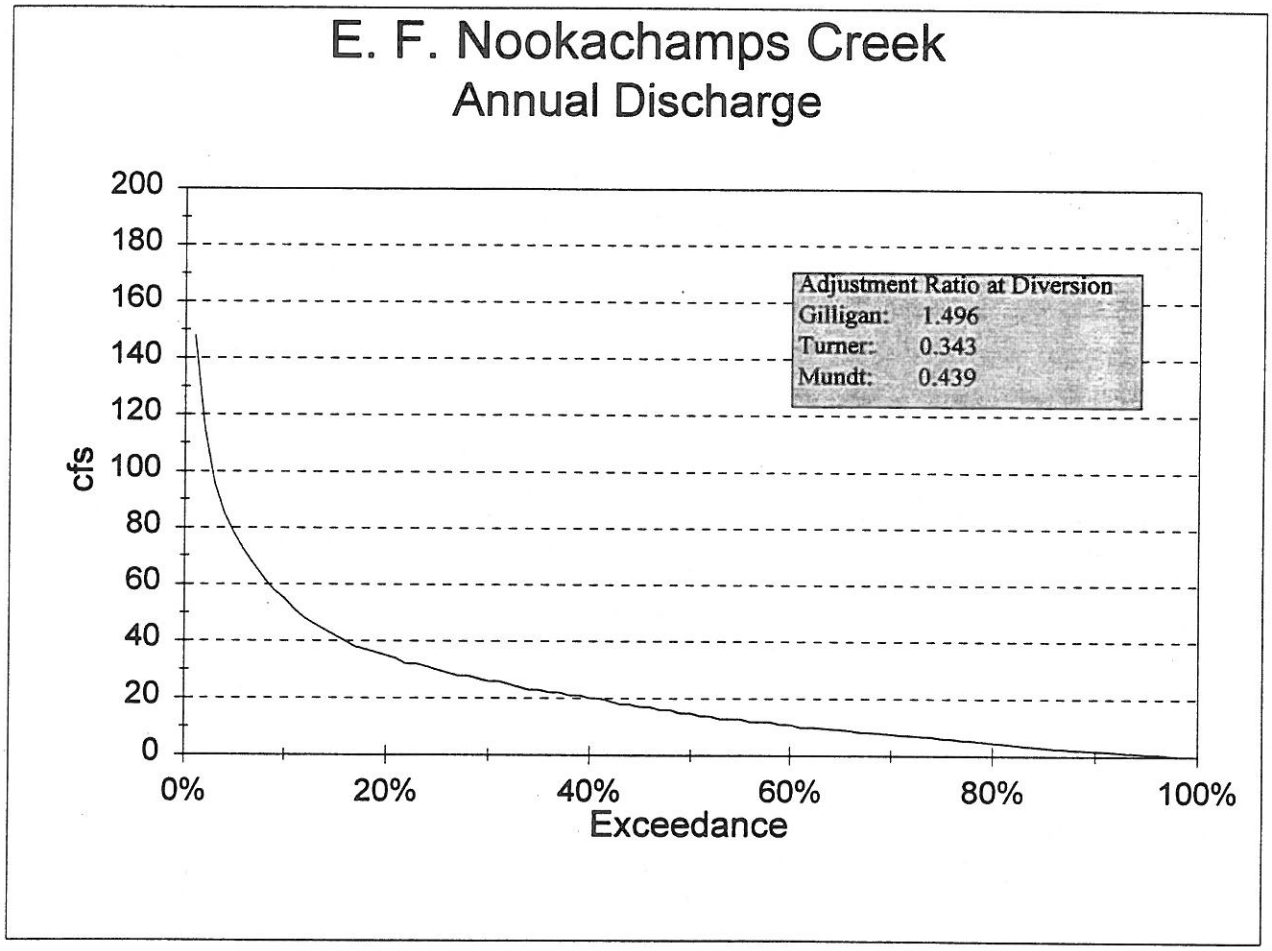
Turner Creek										
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ANNUAL	19	12	9	7	5	4	3	2	1	0
OCT	17	10	7	5	4	3	2	2	1	0
NOV	21	13	11	8	7	5	5	4	3	1
DEC	24	14	10	8	6	5	3	3	2	1
JAN	28	15	10	8	5	4	3	3	2	1
FEB	26	13	10	8	7	5	4	4	2	0
MAR	16	11	8	7	5	4	4	3	3	2
APR	19	15	12	10	9	8	7	6	5	3
MAY	26	21	16	14	12	11	9	8	6	2
JUN	16	12	10	8	6	4	3	3	2	0
JUL	8	4	3	2	2	1	1	1	0	0
AUG	4	2	1	1	1	1	0	0	0	0
SEP	11	5	3	2	1	1	1	1	0	0

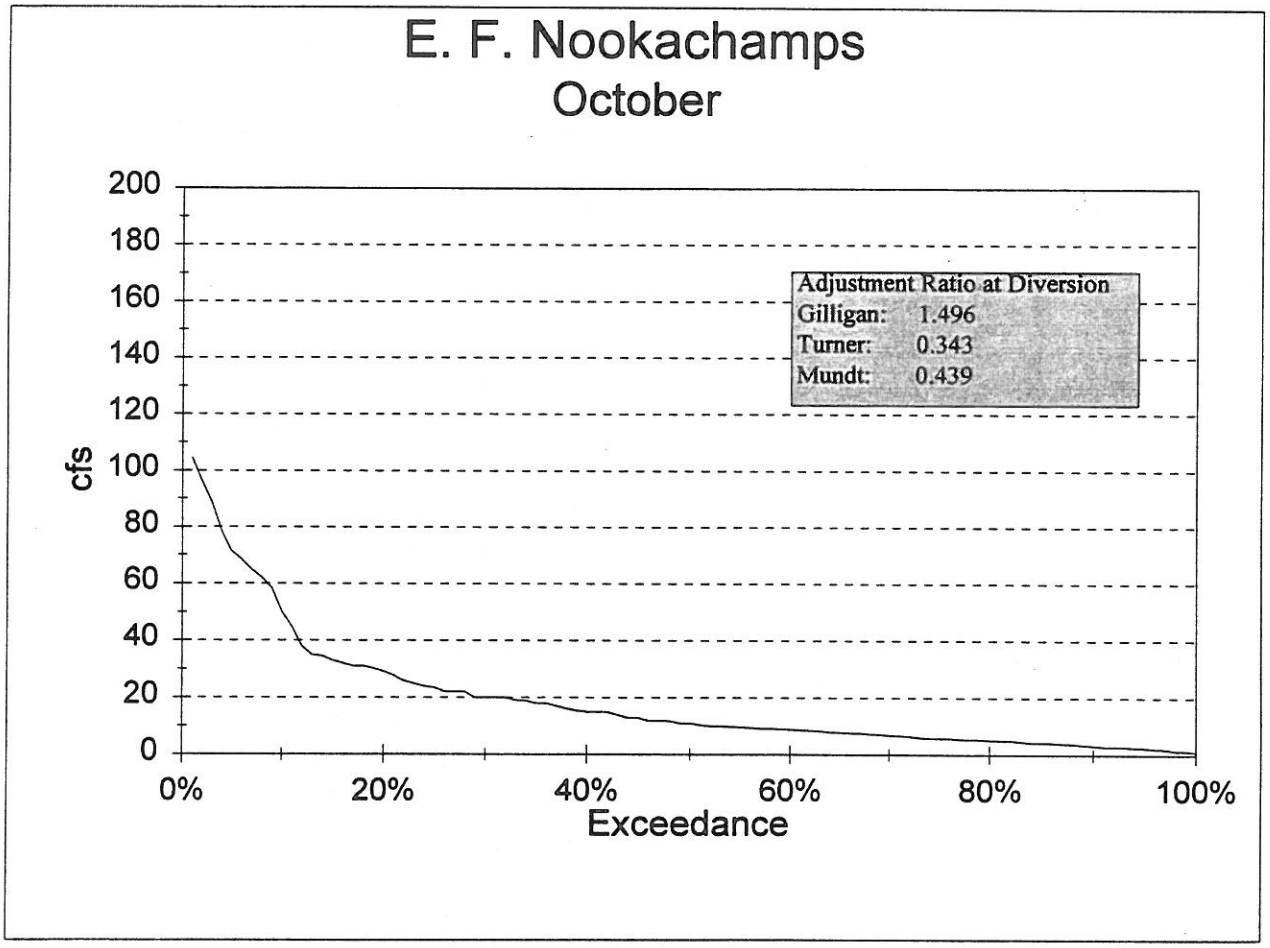
Mundt Creek										
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
ANNUAL	24	15	11	9	7	5	3	2	1	0
OCT	22	13	9	7	5	4	3	2	1	0
NOV	27	17	14	11	9	7	6	5	4	2
DEC	31	18	12	10	7	6	4	4	3	2
JAN	36	19	13	10	7	5	4	3	3	1
FEB	33	17	13	10	8	7	6	5	3	0
MAR	21	14	11	9	7	6	5	4	3	2
APR	25	19	15	13	11	10	9	7	6	4
MAY	33	26	21	18	16	14	12	10	7	2
JUN	21	16	12	11	7	6	4	3	2	1
JUL	10	6	4	3	2	2	1	1	0	0
AUG	5	3	2	1	1	1	1	0	0	0
SEP	14	7	4	2	2	1	1	1	1	0

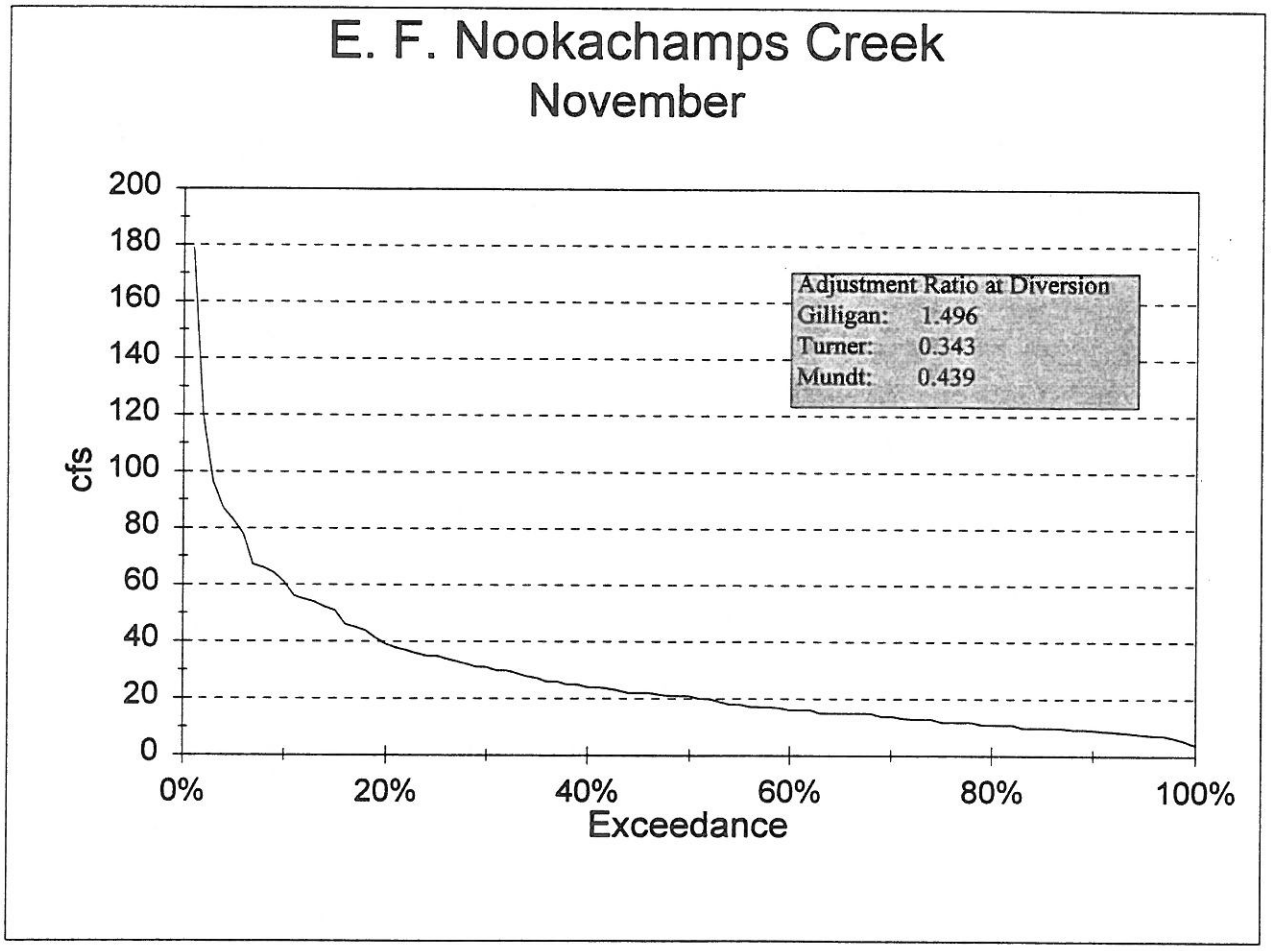

Gilligan Creek
Discharge
125
100
75
50
25
0
cfs
Annual
Nov
Jan
Mar
May
Jul
Sep
Monthly Exceedence
10%
90%
Median

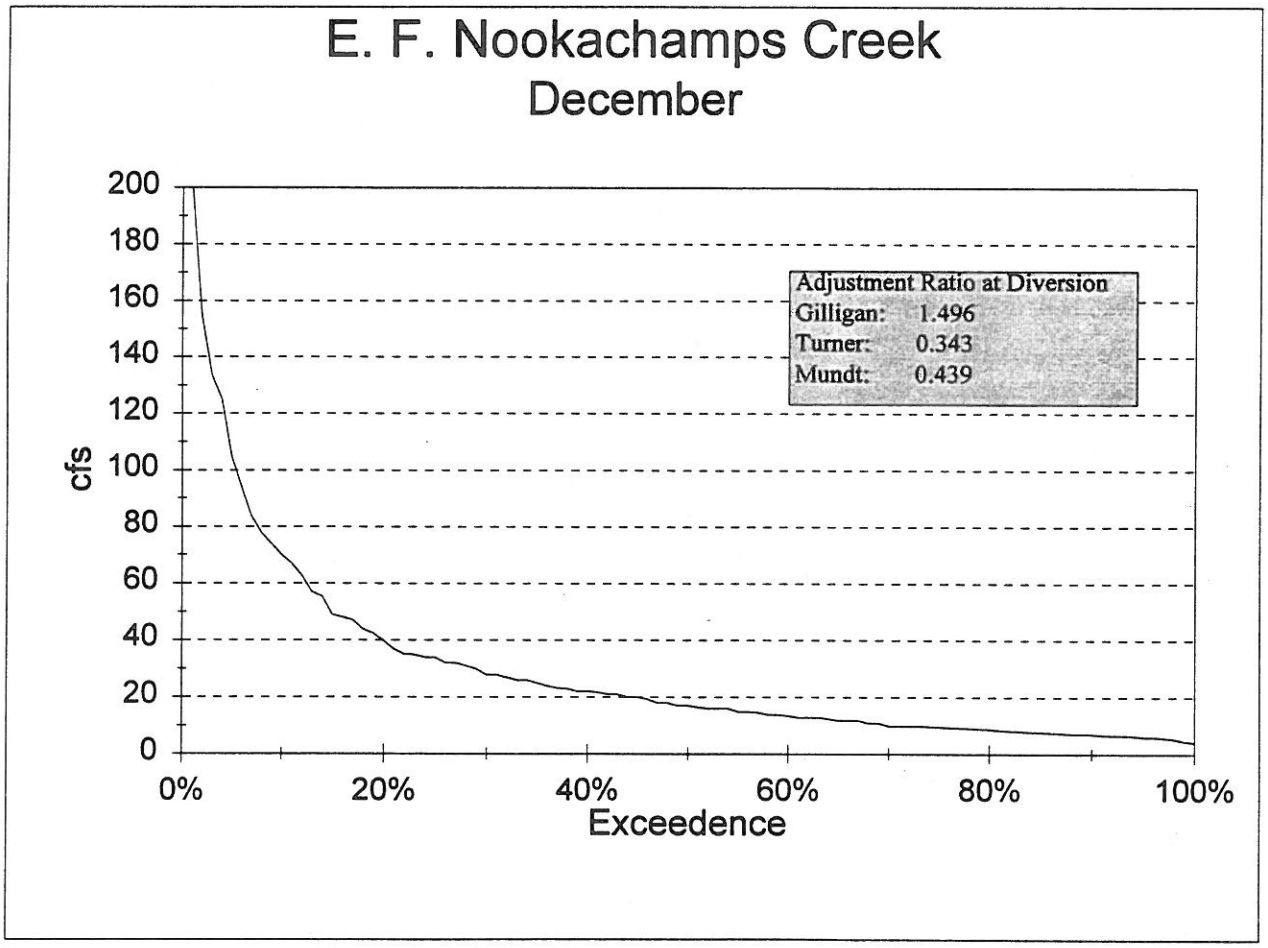

Turner Creek
Discharge
40
30
20
10
0
cfs
Annual
Nov
Jan
Mar
May
Jul
Sep
Monthly Discharge
10%
90%
Median

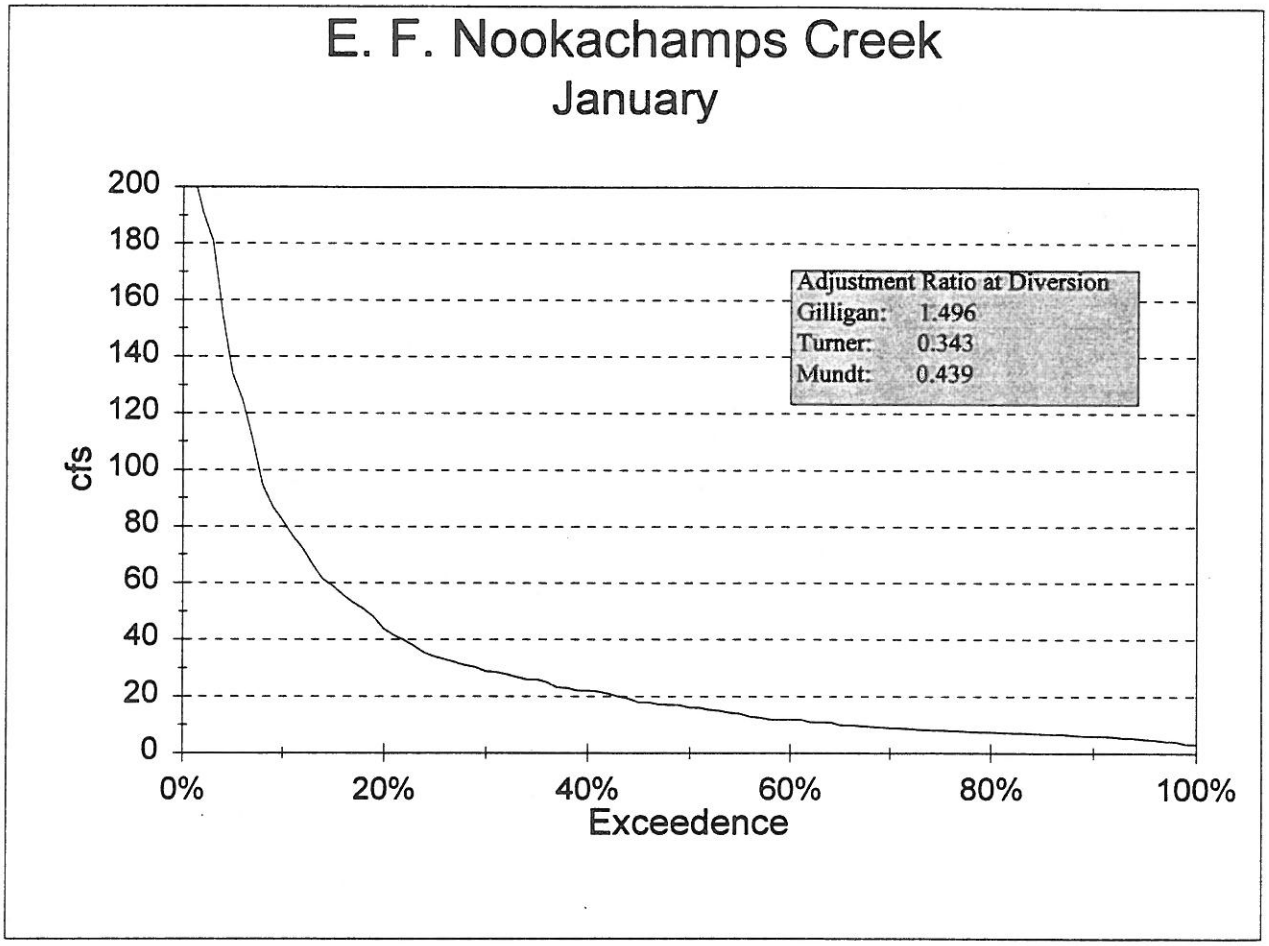

Mundt Creek
Discharge
40
30
20
10
0
cfs
Annual
Nov
Jan
Mar
May
Jul
Sep
Monthly Discharge
10%
90%
Median

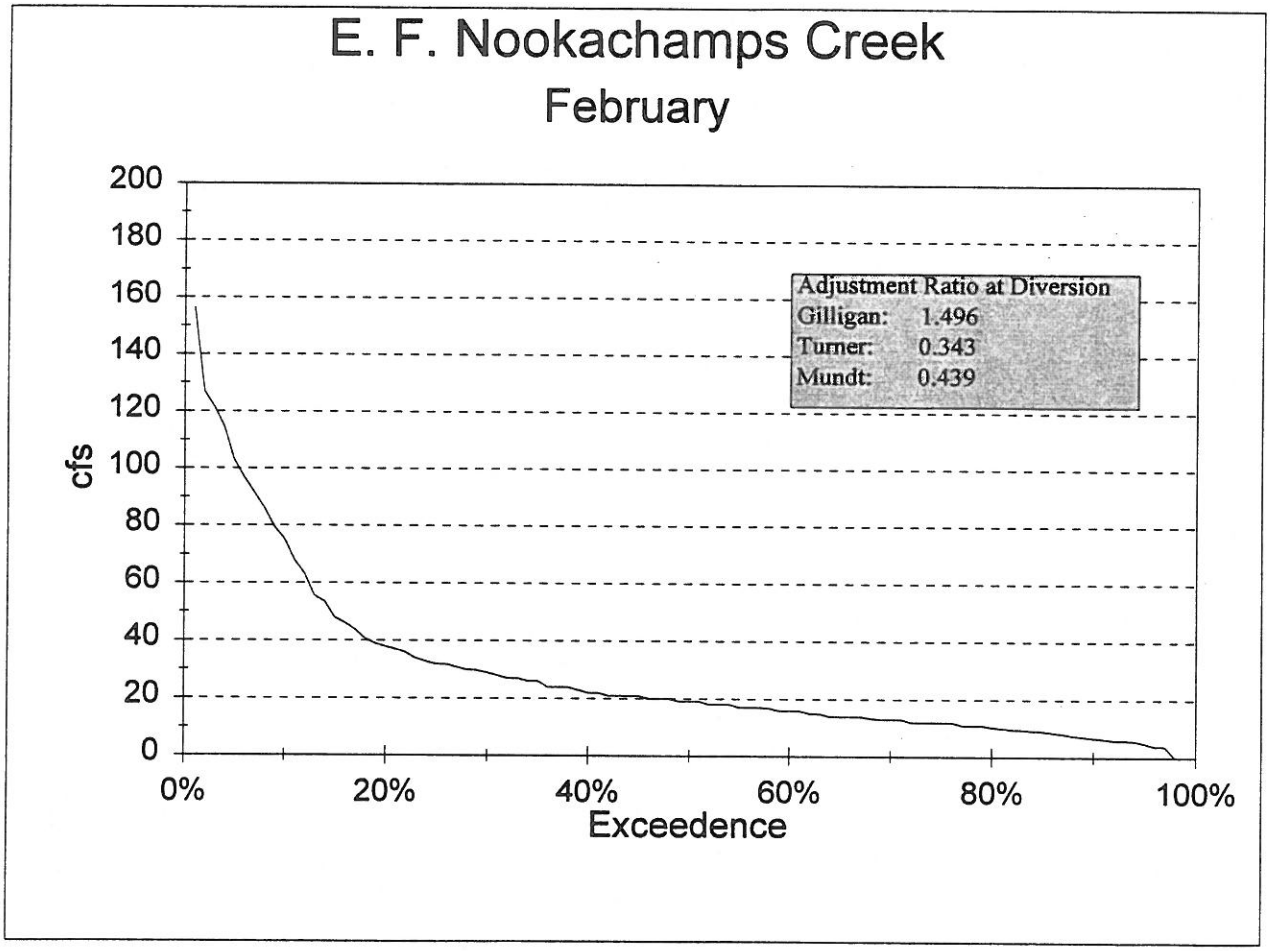

E. F. Nookachamps Creek
Annual Discharge
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedance

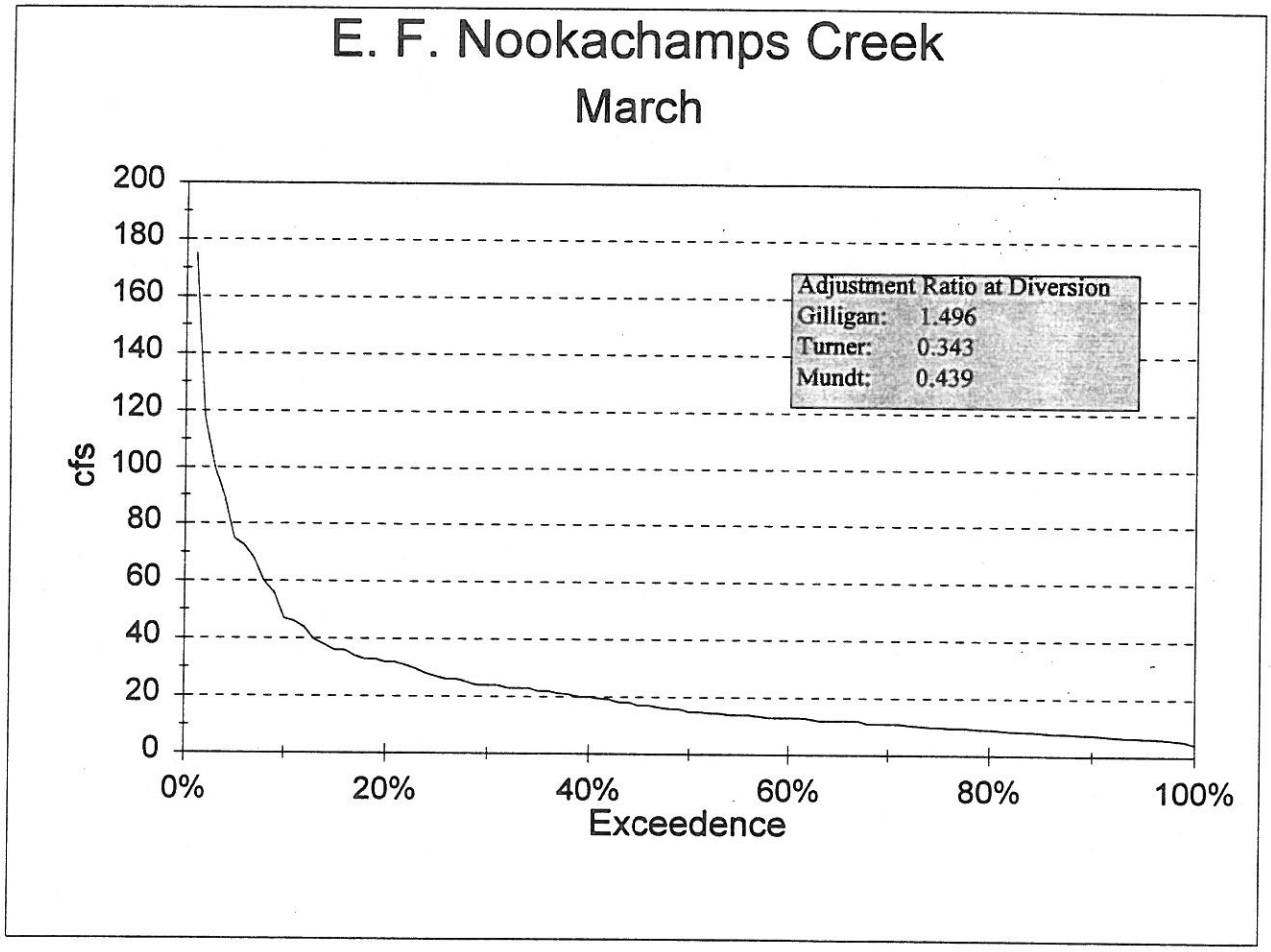

E. F. Nookachamps
October
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedance

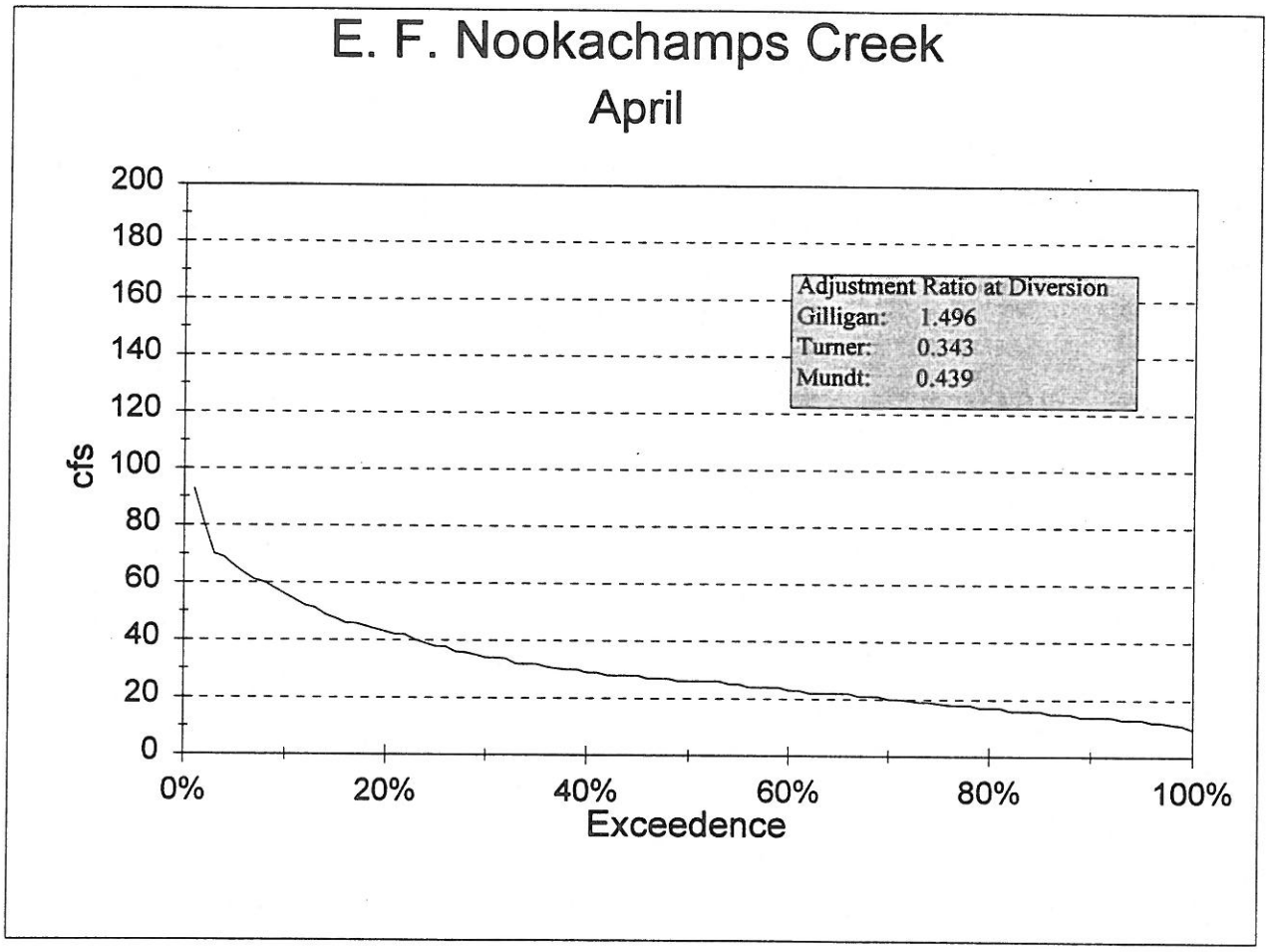

E. F. Nookachamps Creek
November
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedance

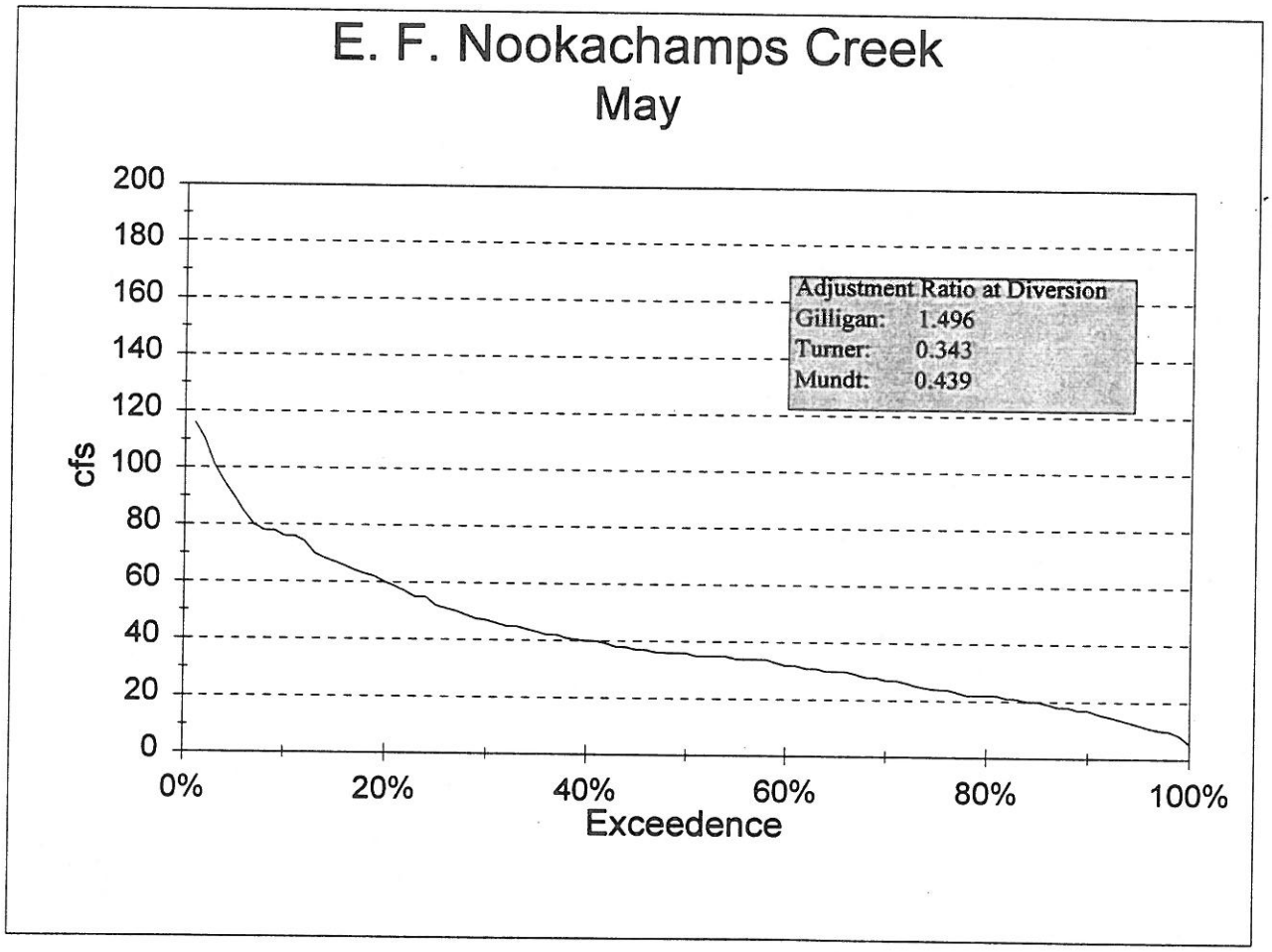

E. F. Nookachamps Creek
December
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence

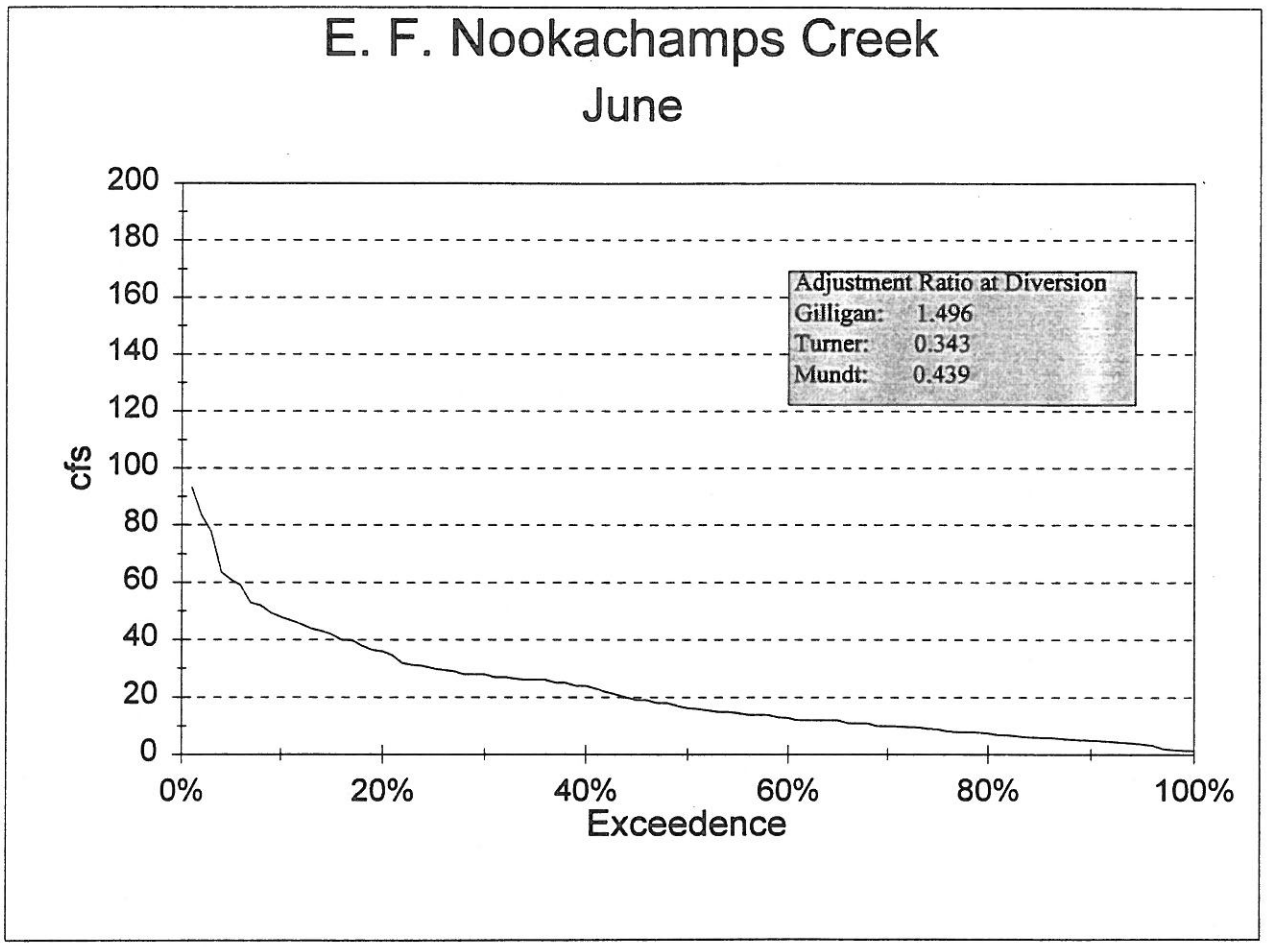

E. F. Nookachamps Creek
January
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence

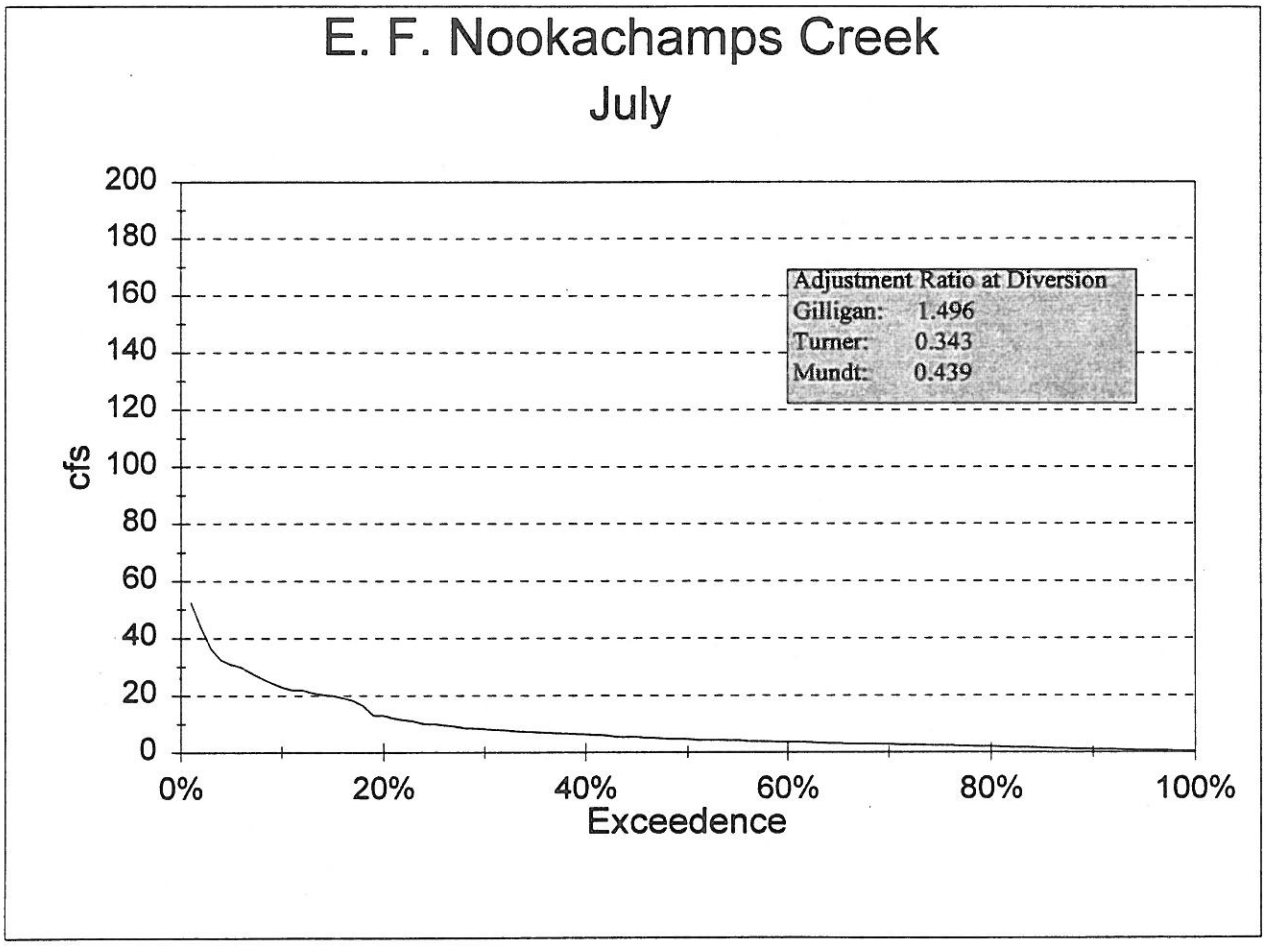

E. F. Nookachamps Creek
February
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence

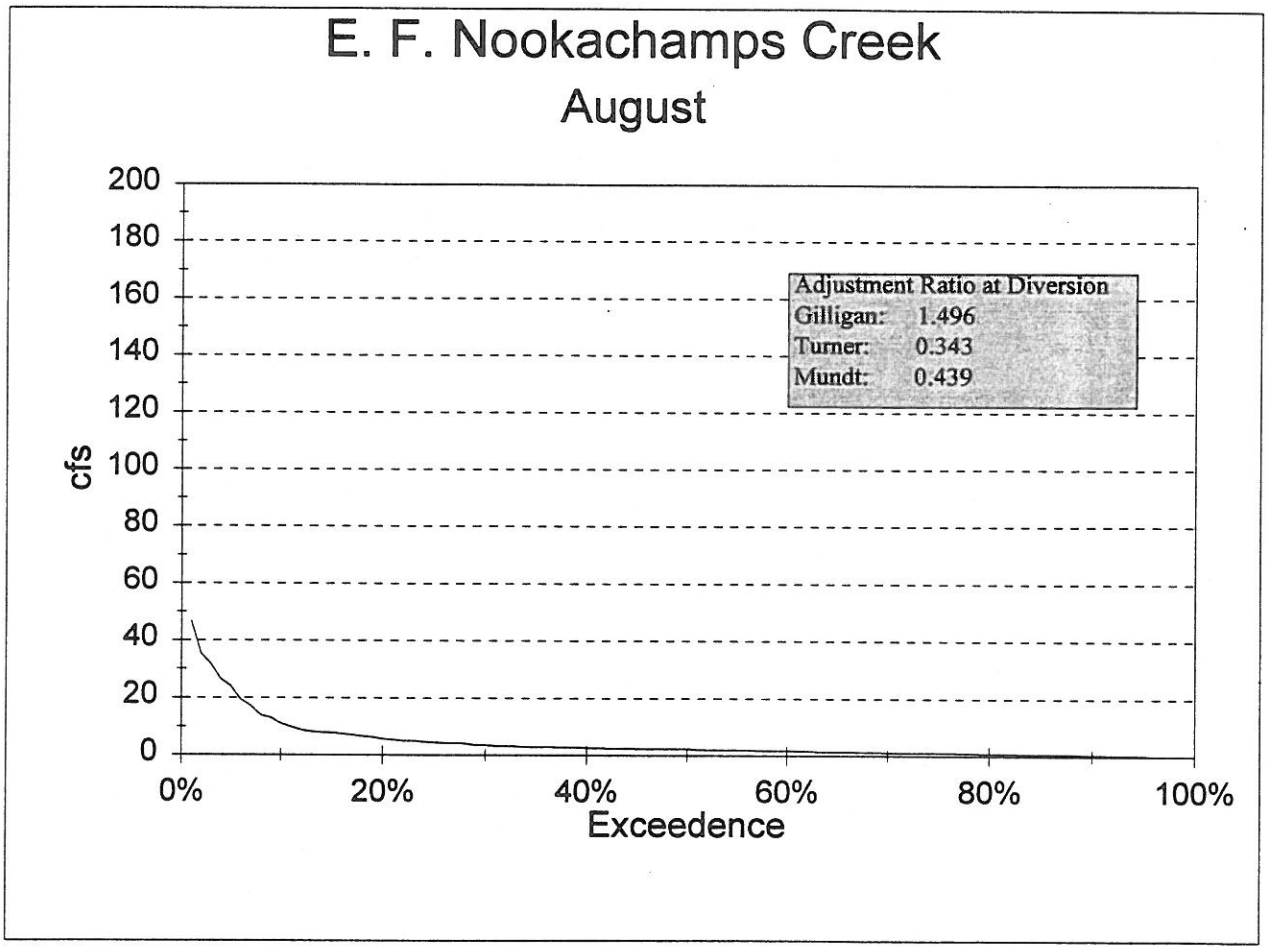

E. F. Nookachamps Creek
March
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence

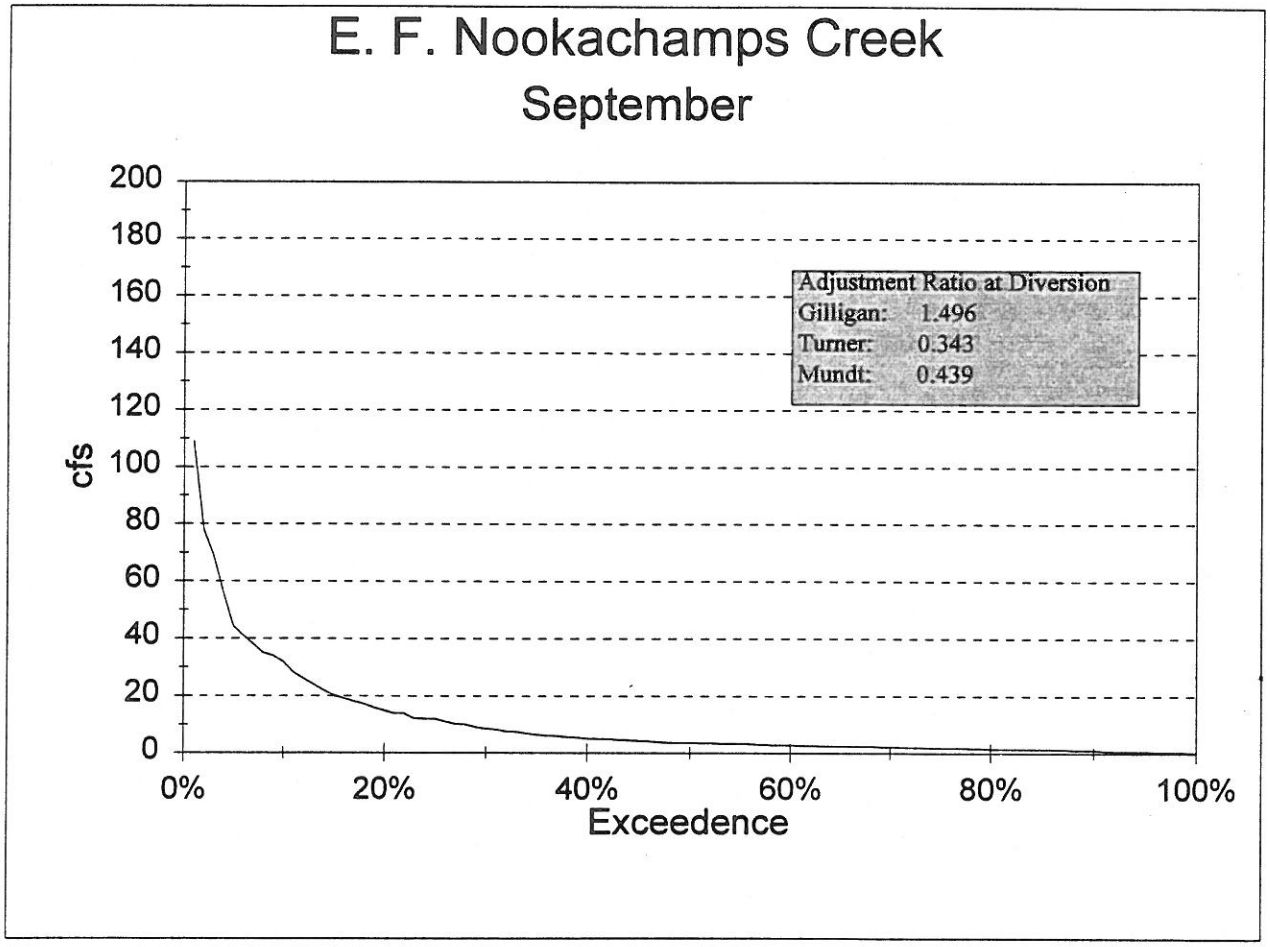

E. F. Nookachamps Creek
April
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence


E. F. Nookachamps Creek
May
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence


E. F. Nookachamps Creek
June
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence


E. F. Nookachamps Creek
July
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence


E. F. Nookachamps Creek
August
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence


E. F. Nookachamps Creek
September
Adjustment Ratio at Diversion
Gilligan: 1.496
Turner: 0.343
Mundt: 0.439
cfs
200
180
160
140
120
100
80
60
40
20
0
0%
20%
40%
60%
80%
100%
Exceedence

APPENDIX C

Spawning Salmon Depth and Velocity Report

Spawning Salmon Depth and Velocity
Skagit Water Supply IFIM Study

Introduction

As part of the Skagit Water Supply IFIM studies, the Washington Dept. of Fish and Wildlife (WDFW) requested that surveys be conducted to measure the water depth and velocity utilized by salmon that spawned in the streams. Cascades Environmental Services conducted surveys for spawning coho and chum salmon in both Mundt and Turner Creeks during November and December of 1995.

Methods & Results

With both species of salmon, depth and velocity were measured at active redds with fish present. Depth and velocity were measured at the front edge of each redd. Due to the limited number of fish observed and the dispersed nature of the redds no habitat availability data was collected.

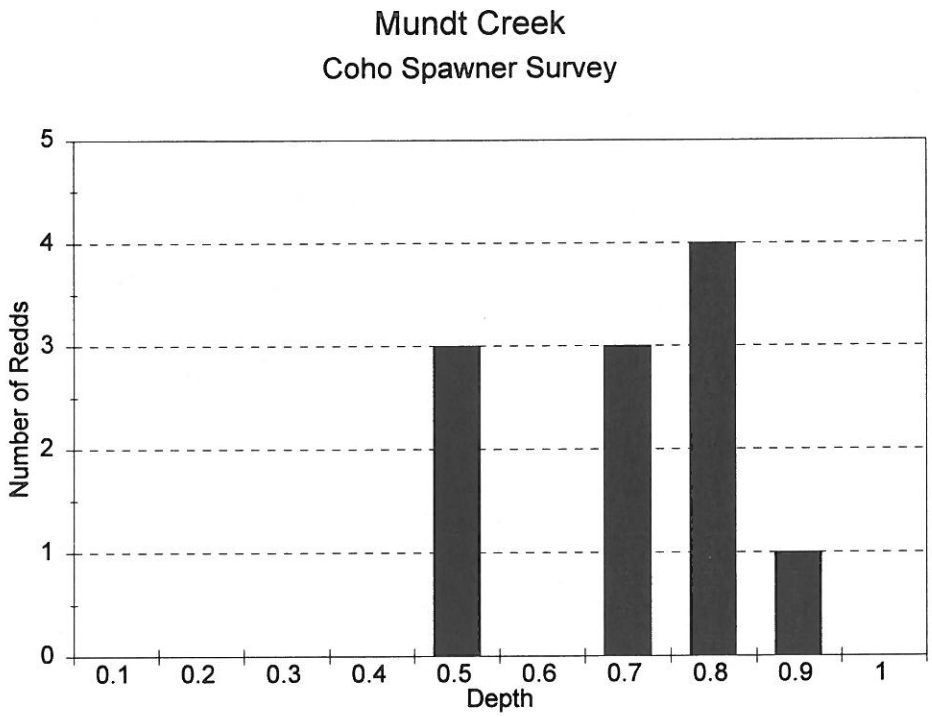
Spawner surveys were conducted on both Turner and Mundt Creeks on November 9 and 16, and December 7, 1995. One spawning salmon was observed on December 7 in Turner Creek. It is possible that a beaver dam down stream on Turner Creek blocked upstream salmon migration. Eleven active coho redds were observed in Mundt Creek on November 16, and eight chum salmon redds were observed on December 7. On both days that redds were observed in Mundt Creek, other live and dead salmon were also observed.

Depth and velocity for each redd is shown in Table 1. Coho used water depths between 0.5 and 0.9 feet while chum salmon redds were observed in depths ranging from 0.6 to 1.3 feet. Mean column water velocity ranged from 0.5 to 1.6 Feet per second (fps) over coho redds and 0.25 to 1.6 fps over chum redds. The distribution of depths and velocities for both coho and chum salmon are shown in Figures 1 and 2 respectively.

During the field calibration measurements for Gilligan Creek numerous pink salmon were observed spawning. Since the discharge had been changing dramatically for several days prior to observing the fish, depth and velocity measurements were not taken on these redds.

Table 1. Spawner Surveys in Turner and Mundt creeks

Date	Species	Redd #	Depth (ft)	Velocity (cfs)
Turner Creek				
11/9/95	No fish observed			
11/16/95	No fish observed			
12/7/95	Chum	1	2.0	0.38
	Total fish observed: 3 chum			
Mundt Creek				
11/9/95	No fish observed			
11/16/95	Coho	1	0.9	1.19
		2	0.8	1.46
		3	0.5	1.17
		4	0.8	1.49
		5	0.7	0.73
		6	0.8	1.12
		7	0.5	1.12
		8	0.7	1.13
		9	0.5	1.62
		10	0.7	0.64
		11	0.8	1.08
	Total fish observed: 58 coho			
12/7/95	Chum	1	1.2	0.75
		2	0.6	0.73
		3	0.8	1.60
		4	1.3	0.26
		5	1.3	1.22
		6	1.2	1.11
		7	0.6	1.16
		8	1.1	1.24
	Total fish observed: 55 chum, 3 coho			



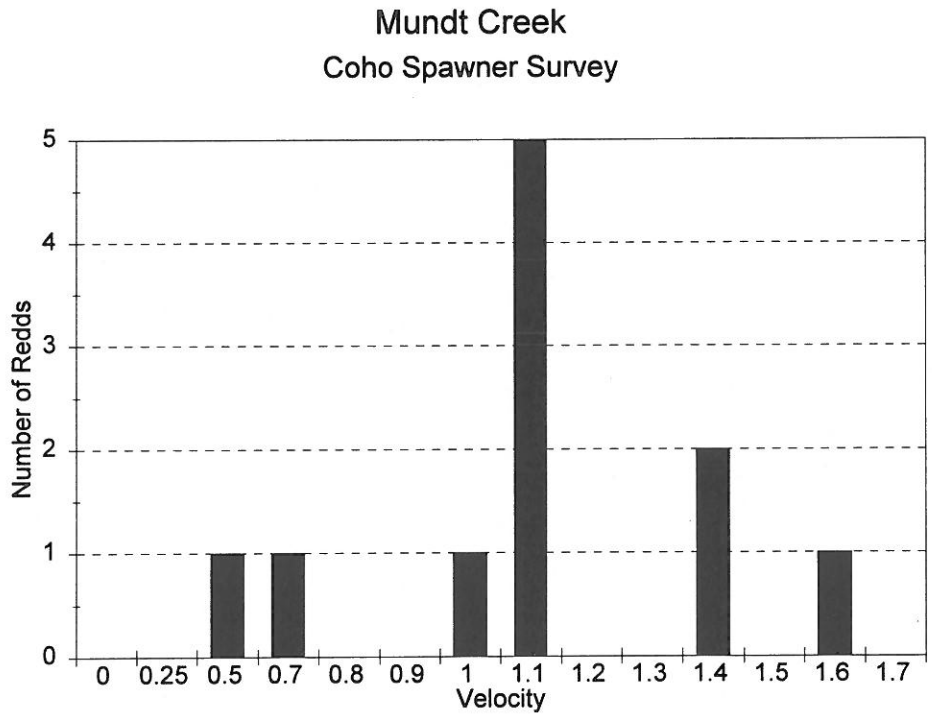
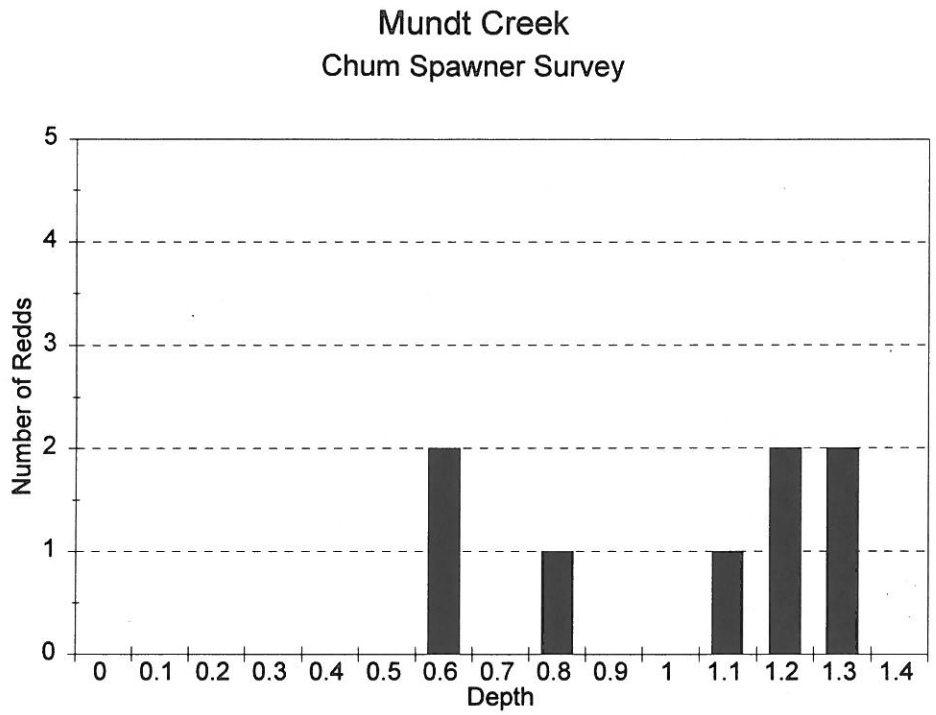


Figure 1. Utilization of Depth and Velocity by Spawning Coho Salmon. N=11



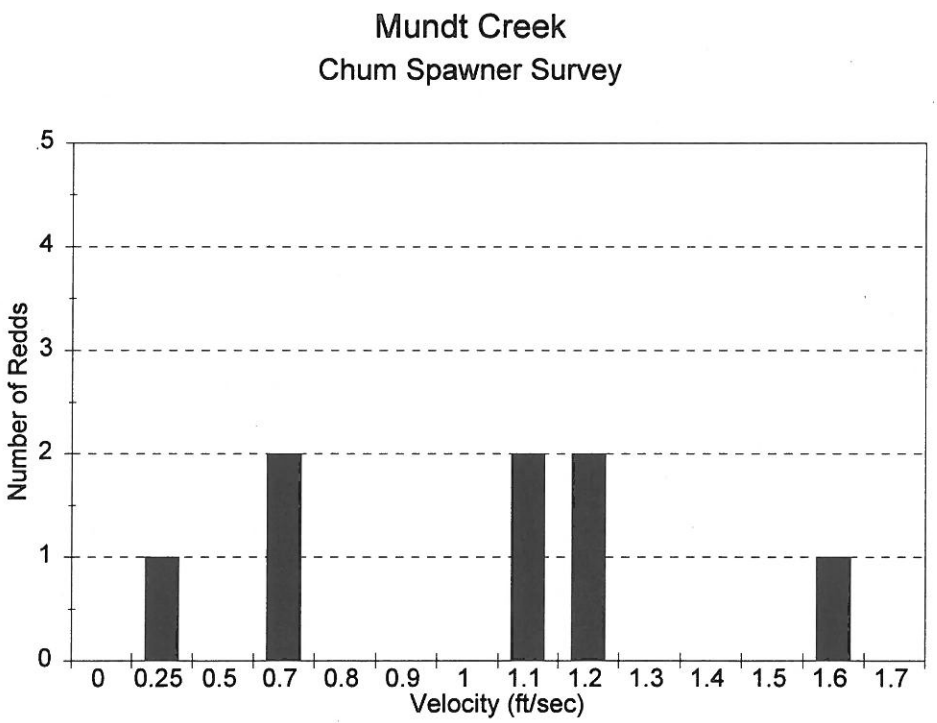


Figure 2. Utilization of Depth and Velocity by Spawning Chum Salmon. N=8

APPENDIX D

Gilligan Creek Final IFIM Calibration Report

Gilligan Creek Final IFIM Calibration Report

Prepared for

Dr. Hal Beecher

Prepared by

Cascades Environmental Services, Inc.

July 24, 1996

Table 1. Gilligan Creek original, uncalibrated data deck.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Gilligan Creek, Original Data Set
IOC       0100000201001
QARD   4.0
QARD  11.0
QARD  25.0
QARD  46.0
QARD 114.0
XSEC     1                    96.71      0.002
         1  0.0100.3  0.0100.0  0.6 99.4  7.2 98.8  8.5 98.9  9.0 98.5
         1 10.2 98.6 11.2 98.4 14.0 98.3 14.3 97.8 14.9 97.7 15.4 97.7
         1 16.0 97.6 16.5 97.6 17.0 97.5 17.5 97.1 18.0 97.0 18.5 97.0
         1 19.0 96.8 19.5 96.8 20.0 97.1 20.5 97.0 21.0 96.9 21.5 96.7
         1 22.0 96.8 22.5 96.8 23.0 96.8 23.5 96.7 24.0 96.7 24.5 96.8
         1 25.0 97.0 25.5 96.9 26.0 96.9 26.5 96.9 27.0 96.8 27.5 96.8
         1 28.0 96.8 28.5 96.8 29.0 96.6 29.5 96.6 30.0 96.5 30.5 96.6
         1 31.0 96.8 31.5 96.7 32.0 96.7 32.5 96.5 33.0 96.5 33.5 98.1
         1 34.2100.8
NS       1  0.0 20.8  0.0 20.8  0.0 20.8  0.0 85.7  0.0 85.7  0.0 85.7
NS       1  0.0 85.7  0.0 72.8  0.0 58.8  0.0 58.8  0.0 58.8  0.0 58.8
NS       1  0.0 58.8  0.0 58.8  0.0 58.8  0.0 58.7  0.0 58.7  0.0 58.7
NS       1  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7
NS       1  0.0 58.7  0.0 85.6  0.0 85.6  0.0 85.6  0.0 85.6  0.0 87.7
NS       1  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7
NS       1  0.0 87.7  0.0 87.7  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6
NS       1  0.0 56.6  0.0 56.6  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7
NS       1  0.0 53.7
CAL1     1    98.02       52.8
VEL1     1                                                 0.4  0.9  1.3
VEL1     1  0.9  1.1  1.1  2.1  2.4  3.5  3.5  3.1  3.6  4.0  3.3  3.0
VEL1     1  2.5  3.0  2.4  2.0  2.5  3.2  2.7  2.2  2.9  2.6  2.6  2.5
VEL1     1  1.9  1.5  1.4  1.4  1.7  1.6  1.4  1.1  1.0  0.7  0.3
VEL1     1
CAL2     1    97.77      24.97
VEL2     1                                                      0.0  0.0
VEL2     1  0.5  0.7  1.1  1.4  1.6  1.6  2.1  2.3  2.2  2.7  2.7  1.8
VEL2     1  2.1  2.2  1.8  1.8  2.1  2.1  2.3  1.6  2.0  2.1  2.0  1.9
VEL2     1  1.6  1.1  1.0  1.2  0.9  0.9  0.8  0.7  0.6  0.4  0.2
VEL2     1
CAL3     1    97.55       11.43
VEL3     1
VEL3     1                 0.9  0.8  1.2  1.1  0.4  1.6  1.3  1.0  1.7
VEL3     1  1.4  1.6  1.2  1.6  1.1  1.5  1.8  1.9  1.3  1.0  0.8  1.3
VEL3     1  1.4  1.5  1.0  1.2  0.9  0.5  0.6  0.4  0.4  0.1  0.0
VEL3     1
XSEC     2                    96.71      0.002
         2  0.0100.1  0.0 99.7  3.0 99.4  7.5 98.8 10.5 98.1 13.1 97.8
         2 13.5 97.6 13.8 97.7 14.0 99.1 14.3 99.0 14.4 97.5 15.0 97.4
         2 15.5 97.1 16.0 96.9 16.5 96.9 17.0 96.9 17.5 96.8 18.0 96.7
         2 18.5 96.7 19.0 96.7 19.5 96.7 20.0 96.8 20.5 96.7 21.0 96.8
         2 21.5 96.6 22.0 96.8 22.5 96.7 23.0 96.8 23.5 96.8 24.0 96.8
         2 24.5 96.9 25.0 97.2 25.5 97.2 26.0 97.2 26.5 97.3 27.0 97.4
         2 27.5 97.3 28.0 97.3 28.5 97.3 29.0 97.8 29.5 97.6 30.0 97.4
         2 30.5 97.5 31.0 97.5 33.8 98.8 36.0100.5 37.4101.6 37.5101.9
```

Table 1. Gilligan Creek original, uncalibrated data deck. - **continued**

```
NS      2  0.0 20.7  0.0 20.7  0.0 83.5  0.0 86.6  0.0 56.7  0.0 56.6
NS      2  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 54.7
NS      2  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7
NS      2  0.0 54.7  0.0 54.7  0.0 54.7  0.0 86.7  0.0 86.7  0.0 86.7
NS      2  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 56.6
NS      2  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6
NS      2  0.0 56.6  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS      2  0.0 65.7  0.0 65.7  0.0 60.7  0.0 60.7  0.0 60.7  0.0 60.7
CAL1    2     98.09      47.49
VEL1    2                          0.5  0.9  0.4  0.0  0.0  0.0  3.2
VEL1    2  3.9  4.4  4.3  4.7  4.2  3.7  3.6  3.8  3.7  3.5  3.3  3.2
VEL1    2  3.1  2.8  2.3  2.2  2.0  1.7  1.5  1.6  2.3  2.8  2.7  2.4
VEL1    2  1.6  0.8  0.7  1.0  0.5  0.1  0.0 -0.1
CAL2    2      97.8      26.21
VEL2    2                          0.0  0.6  0.0  0.0  0.0  1.6  2.1
VEL2    2  2.5  2.1  2.6  3.7  3.6  3.2  3.0  3.0  2.8  2.8  2.4  2.5
VEL2    2  2.4  1.7  1.4  1.4  1.5  1.6  2.1  1.7  1.8  1.4  0.7  0.4
VEL2    2  0.0  0.1  0.0  0.0  0.0  0.0  0.0  0.0
CAL3    2     97.58       12.15
VEL3    2                                                  0.4  1.1
VEL3    2  1.5  1.0  0.8  2.5  1.7  2.5  2.1  2.0  2.2  2.2  1.8  1.7
VEL3    2  1.6  1.5  1.4  1.3  1.0  1.0  0.7  0.5  0.1  0.0  0.0  0.0
VEL3    2  0.3  0.0  0.0  0.0  0.0  0.0  0.0  0.0
XSEC    3                   94.54      0.004
        3  0.0 98.7  0.0 98.4  1.0 96.8  3.5 97.0  3.6 95.4  4.0 95.3
        3  5.0 95.3  5.1 94.4  6.0 94.3  6.5 94.0  7.0 93.9  7.5 93.9
        3  8.0 93.7  8.5 93.6  9.0 93.6  9.5 93.6 10.0 93.9 10.3 93.9
        3 10.5 94.7 11.0 94.9 11.5 95.0 12.0 95.0 12.5 95.0 12.6 94.3
        3 13.1 95.2 13.5 95.2 14.2 95.1 14.7 95.2 15.2 94.7 16.0 94.8
        3 16.6 94.9 17.0 95.5 17.5 95.4 18.0 95.3 19.0 95.5 20.0 95.5
        3 21.0 95.6 22.0 95.6 23.0 95.7 24.0 95.7 25.0 96.0 25.5 96.2
        3 38.0 96.3 51.0 96.5 59.1 97.0 61.8 97.6 61.9 98.3
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS      3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 58.6
NS      3  0.0 58.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 74.7
NS      3  0.0 75.6  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7
CAL1    3     96.13      44.72
VEL1    3                 0.0  0.6  0.6  0.5  0.4  0.5  0.4  1.1  1.8
VEL1    3  2.5  2.7  2.6  3.0  2.3  1.7  3.2  2.4  2.8  2.2  1.9  2.0
VEL1    3  1.6  1.4  1.2  2.0  2.4  2.0  0.8  1.4  1.7  1.1  2.0  2.3
VEL1    3  1.9  0.8  1.0  0.6  0.0
CAL2    3     95.91      23.43
VEL2    3                       0.4  0.4  0.5  0.6  1.3  1.3  1.9  2.1
VEL2    3  2.3  1.9  1.2  1.2  1.0  1.0  0.8  0.8  0.6  0.7  0.6  0.5
VEL2    3  0.7  0.7  0.9  1.1  1.3  0.3  0.6  1.4  0.8  1.2  1.5  0.9
VEL2    3  0.7  0.4  0.0  0.0
CAL3    3     95.63        7.98
VEL3    3                       0.1  0.3  1.6  0.4  0.8  0.8  0.9  0.4
VEL3    3  0.9  0.8  0.6  0.6  0.4  0.4  0.4  0.4  0.4  0.5  0.5  0.5
VEL3    3  0.5  0.6  0.3  0.6  0.7  0.3  0.1  0.2  0.6  0.5  0.2  0.0
```

Table 1. Gilligan Creek original, uncalibrated data deck. - **continued**

```
VEL3     3  0.0   0.0
XSEC     4                    94.54      0.004
         4  0.0100.1  0.0100.0  7.0 99.1  9.8 98.3 10.0 97.1 12.4 97.0
         4 13.0 96.1 13.5 96.1 13.9 95.6 14.4 95.2 15.4 94.0 16.2 93.6
         4 17.0 93.4 17.6 93.5 18.2 93.3 18.8 93.4 19.4 93.4 20.0 94.0
         4 20.6 94.1 21.2 94.0 21.8 94.1 22.4 94.2 23.0 94.9 23.6 95.0
         4 24.2 94.8 24.8 94.7 25.4 94.8 26.0 94.8 26.6 95.0 27.2 95.1
         4 27.8 95.2 28.4 95.2 29.0 95.3 29.8 95.7 30.6 95.6 31.4 95.7
         4 32.2 95.7 33.0 95.9 34.5 96.2 49.7 97.1 71.7 97.8 71.9 98.4
NS       4  0.0   0.9  0.0   0.9  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 78.7  0.0 78.7  0.0 78.7
NS       4  0.0 78.7  0.0 78.7  0.0 36.8  0.0 36.8  0.0 36.8  0.0 36.8
NS       4  0.0 36.8  0.0 84.7  0.0 84.7  0.0 83.8  0.0 83.8  0.0 83.8
CAL1     4    96.17       43.5
VEL1     4                                 0.2  0.0  0.3  0.3  0.4  0.8
VEL1     4  1.6  2.1  1.8  2.5  2.6  2.2  2.6  2.0  1.7  1.2  0.1  0.2
VEL1     4  0.6  2.4  1.9  1.2  0.9  1.3  1.5  1.3  1.5  1.0  0.6  0.6
VEL1     4  0.2  0.4
CAL2     4    95.92       22.81
VEL2     4                                           -0.2 -0.1  0.2  1.1
VEL2     4  2.0  2.1  1.6  1.7  1.3  0.6  0.6  0.3  0.1  0.1  0.1  0.1
VEL2     4  0.3  0.9  0.7  0.6  0.8  1.1  1.3  1.3  1.0  0.9  0.6  0.3
VEL2     4  0.2                      0.0
CAL3     4    95.64       10.77
VEL3     4                                           0.0  0.2  1.0
VEL3     4  1.1  1.1  1.0  0.9  0.5  0.1  0.0  0.0  0.1  0.5  0.5  0.4
VEL3     4  0.1  0.1  0.7  1.0  1.1  1.0  0.9  0.6  0.0  0.0
VEL3     4                           0.0
XSEC     5                    93.44      0.009
         5  0.0100.1  0.0100.0  1.5 98.0  6.2 97.0  9.0 96.4 12.4 94.7
         5 13.3 94.5 13.6 94.3 14.6 93.8 15.4 94.2 16.4 93.4 17.2 93.4
         5 18.0 93.4 18.5 93.5 19.0 93.5 19.5 93.6 20.2 93.3 20.9 93.4
         5 21.6 93.4 22.3 93.8 23.0 93.3 23.7 93.4 24.4 93.2 25.1 93.5
         5 25.8 93.4 26.5 93.4 27.2 93.5 27.9 93.6 28.6 93.4 29.3 93.2
         5 30.0 93.5 30.7 93.5 31.4 93.4 32.1 93.3 32.8 93.4 33.5 93.4
         5 34.2 93.6 34.9 93.6 35.6 93.8 36.3 93.8 36.6 94.5 37.2 94.5
         5 37.5 94.2 38.1 94.3 38.5 94.7 42.0 94.9 45.0 95.2 46.5 95.4
         5 46.7 96.0
NS       5  0.0   8.8  0.0   8.8  0.0   8.8  0.0 86.9  0.0 86.9  0.0 86.9
NS       5  0.0 86.9  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.6  0.0 86.6
NS       5  0.0 86.6  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7
NS       5  0.0 57.7  0.0 57.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS       5  0.0 86.7  0.0 86.7  0.0 86.7  0.0 54.6  0.0 54.6  0.0 54.6
NS       5  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 57.8  0.0 57.8
NS       5  0.0 57.8  0.0 57.8  0.0 57.8  0.0 57.8  0.0 86.6  0.0 86.6
NS       5  0.0 86.6  0.0 86.6  0.0 86.6  0.0 63.6  0.0 63.6  0.0 63.6
NS       5  0.0 63.6
CAL1     5   94.475       45.5
VEL1     5                                      0.0  0.0  0.4  0.2  0.6
VEL1     5  1.1  1.0  1.0  1.1  1.8  2.9  2.9  4.0  2.9  3.1  2.5  1.3
VEL1     5  1.1  1.3  1.1  1.0  2.6  3.5  4.6  3.4  3.3  3.7  3.4  2.4
```

Table 1. Gilligan Creek original, uncalibrated data deck. - **continued**

```
VEL1     5  2.2  1.3  1.4  1.5  0.0  0.0  1.5  0.9
VEL1     5
CAL2     5    94.24      24.79
VEL2     5                                        0.1  0.1  0.4  0.4
VEL2     5  1.0  1.3  1.1  0.6  1.5  1.3  1.7  2.1  1.3  1.7  1.8  1.4
VEL2     5  1.0  1.3  1.4  0.3  1.9  2.0  2.8  3.4  3.2  3.0  2.8  1.8
VEL2     5  1.4  1.3  0.6  0.3  0.0  0.0  0.2
VEL2     5
CAL3     5    94.01       10.88
VEL3     5                                        0.0  0.0  0.6  0.8
VEL3     5  1.0  1.4  0.9  1.0  0.2  0.6  1.4  1.6  0.9  1.4  1.2  1.5
VEL3     5  1.0  0.7  0.7  0.3  0.6  1.2  1.5  2.3  1.1  2.1  2.0  1.6
VEL3     5  1.2  0.6  0.0  0.0
VEL3     5
XSEC     6                   93.55      0.035
         6  0.0100.9  0.0 99.9  2.0 99.5  4.7 94.6  5.5 94.6  6.5 94.4
         6  7.1 94.6  9.0 94.6  9.1 94.2  9.6 93.9 10.1 93.7 10.8 94.1
         6 11.5 93.6 12.2 94.0 12.8 93.9 13.4 93.4 14.0 93.4 14.6 93.6
         6 15.2 93.9 15.9 93.7 16.6 93.5 17.3 93.6 18.0 93.6 18.7 93.6
         6 19.4 93.6 20.1 93.7 20.8 93.6 21.5 93.6 22.2 93.5 22.9 94.0
         6 23.6 93.8 24.3 93.7 25.0 93.7 25.7 94.0 26.4 94.2 27.1 94.6
         6 27.8 94.3 28.3 94.6 36.2 94.6 36.4 94.4 36.9 94.5 37.2 94.6
         6 38.0 95.7 41.3 95.8 41.4 96.3
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 87.8  0.0 87.8  0.0 87.8
NS       6  0.0 87.8  0.0 87.8  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 86.8  0.0 86.8  0.0 86.8  0.0 86.8
NS       6  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8
NS       6  0.0 56.8  0.0 56.8  0.0 56.8  0.0 86.5  0.0 86.5  0.0 86.5
NS       6  0.0 86.5  0.0 86.5  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS       6  0.0 86.7  0.0 86.7  0.0 86.7
CAL1     6   94.645      48.23
VEL1     6                  0.0  0.1  1.2  0.0  0.0  0.2  0.7  1.6  4.0
VEL1     6  5.1  5.2  4.8  4.4  2.9  0.6  0.2  1.4  2.6  3.8  2.5  6.0
VEL1     6  4.7  3.7  1.6  0.5  2.8  3.0  4.1  4.0  3.0  2.4  1.1  0.4
VEL1     6  0.1  0.0  0.0  1.3  0.7  0.0
CAL2     6    94.42      26.66
VEL2     6                            0.1  0.0  0.0  1.2  0.8  0.7  3.0
VEL2     6  1.8  3.9  3.8  1.6  3.3  1.2  0.6  1.8  3.2  2.8  1.8  5.1
VEL2     6  3.8  1.4  0.6  0.3  2.0  1.9  3.4  2.2  2.6  1.9  1.1  0.0
VEL2     6  0.0
CAL3     6    94.25       11.01
VEL3     6                                 0.0  0.0  0.4  0.1  0.2  1.6
VEL3     6  1.8  2.0  3.6  2.2  1.3  0.2  0.4  1.9  3.2  0.3  0.3  2.9
VEL3     6  2.6  1.7  0.8  0.2  1.2  1.8  1.9  1.1  1.1  0.0
VEL3     6
XSEC     7                   94.56      0.028
         7  0.0 98.9  0.0 98.5  1.5 97.4  5.8 97.1  7.0 96.4  9.0 96.1
         7 11.5 96.4 11.8 95.9 12.1 95.8 12.4 96.0 12.5 96.6 13.5 96.4
         7 13.6 95.8 14.0 95.8 14.5 95.5 15.0 95.5 15.1 96.2 16.8 96.5
         7 16.9 94.7 17.5 94.8 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.5
         7 20.0 94.6 20.5 94.2 21.0 94.5 21.5 94.2 22.0 94.1 22.5 94.2
         7 23.0 94.2 23.5 94.4 24.0 94.3 24.5 94.7 25.1 94.5 25.5 94.7
         7 26.0 94.7 26.5 94.8 26.6 95.7 27.0 95.8 28.8 96.5 32.6 97.3
```

Table 1. Gilligan Creek original, uncalibrated data deck. - **continued**

```
          7 33.6 99.3 33.7 99.5
NS        7  0.0 88.9  0.0 88.9  0.0 65.6  0.0 26.6  0.0 26.6  0.0 87.8
NS        7  0.0 87.8  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS        7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 86.8  0.0 86.8  0.0 86.8
NS        7  0.0 86.8  0.0 86.8
CAL1      7   96.085      48.9
VEL1      7                                       0.0  1.2  0.0  0.0  0.0
VEL1      7  0.1  0.4  0.6  0.6  0.0  0.0  0.6  1.0  2.9  3.9  4.3  4.4
VEL1      7  4.7  4.3  4.1  2.9  2.5  2.2  2.4  2.5  2.6  3.2  2.8  2.3
VEL1      7  1.9  0.4  0.1  0.4
CAL2      7    95.76     22.91
VEL2      7
VEL2      7  0.0  0.0  0.0  0.3  0.0  0.0  0.4  1.0  1.1  1.7  2.5  4.0
VEL2      7  4.5  4.2  3.0  2.1  0.8  0.6  1.0  1.3  1.5  1.5  0.8  1.0
VEL2      7  0.5  0.2  0.0
CAL3      7    95.54       9.96
VEL3      7
VEL3      7                                  0.2  0.1  1.0  1.8  2.7  2.9
VEL3      7  2.3  2.1  1.2  0.7  0.3  0.5  0.6  0.7  0.5  0.1  0.3  0.2
VEL3      7  0.1
ENDJOB
```

Table 2a. Gilligan Creek revised, calibrated data deck.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Gilligan Creek, revised input deck All transects,
IOC       1100000201001
QARD   4.0
QARD  11.0
QARD  25.0
QARD  46.0
QARD 114.0
XSEC      1                   96.71     0.002
          1  0.0100.3  0.0100.0  0.6 99.4  7.2 98.8  8.5 98.9  9.0 98.5
          1 10.2 98.6 11.2 98.4 14.0 98.3 14.3 97.8 14.9 97.7 15.4 97.7
          1 16.0 97.6 16.5 97.6 17.0 97.6 17.5 97.1 18.0 97.0 18.5 97.0
          1 19.0 96.8 19.5 96.8 20.0 97.1 20.5 97.0 21.0 96.9 21.5 96.7
          1 22.0 96.8 22.5 96.8 23.0 96.8 23.5 96.7 24.0 96.7 24.5 96.8
          1 25.0 97.0 25.5 96.9 26.0 96.9 26.5 96.9 27.0 96.8 27.5 96.8
          1 28.0 96.8 28.5 96.8 29.0 96.6 29.5 96.6 30.0 96.5 30.5 96.6
          1 31.0 96.8 31.5 96.7 32.0 96.7 32.5 96.5 33.0 96.5 33.5 98.1
          1 34.2100.8
NS        1  0.0 20.8  0.0 20.8  0.0 20.8  0.0 85.7  0.0 85.7  0.0 85.7
NS        1  0.0 85.7  0.0 72.8  0.0 58.8  0.0 58.8  0.0 58.8  0.0 58.8
NS        1  0.0 58.8  0.0 58.8  0.0 58.8  0.0 58.7  0.0 58.7  0.0 58.7
NS        1  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7  0.0 58.7
NS        1  0.0 58.7  0.0 85.6  0.0 85.6  0.0 85.6  0.0 85.6  0.0 87.7
NS        1  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7  0.0 87.7
NS        1  0.0 87.7  0.0 87.7  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6
NS        1  0.0 56.6  0.0 56.6  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7
NS        1  0.0 53.7
CAL1      1    98.02      52.8
VEL1      1                                                 0.4  0.9  1.3
VEL1      1  0.9  1.1  1.1  2.1  2.4  3.5  3.5  3.1  3.6  4.0  3.3  3.0
VEL1      1  2.5  3.0  2.4  2.0  2.5  3.2  2.7  2.2  2.9  2.6  2.6  2.5
VEL1      1  1.9  1.5  1.4  1.4  1.7  1.6  1.4  1.1  1.0  0.7  0.3
VEL1      1
CAL2      1    97.77     24.97
VEL2      1                                                      0.0  0.0
VEL2      1  0.5  0.7  1.1  1.4  1.6  1.6  2.1  2.3  2.2  2.7  2.7  1.8
VEL2      1  2.1  2.2  1.8  1.8  2.1  2.1  2.3  1.6  2.0  2.1  2.0  1.9
VEL2      1  1.6  1.1  1.0  1.2  0.9  0.9  0.8  0.7  0.6  0.4  0.2
VEL2      1
CAL3      1    97.55      11.43
VEL3      1
VEL3      1                 0.9  0.8  1.2  1.1  0.4  1.6  1.3  1.0  1.7
VEL3      1  1.4  1.6  1.2  1.6  1.1  1.5  1.8  1.9  1.3  1.0  0.8  1.3
VEL3      1  1.4  1.5  1.0  1.2  0.9  0.5  0.6  0.4  0.4  0.1  0.0
VEL3      1
XSEC      2                   96.71     0.002
          2  0.0100.1  0.0 99.7  3.0 99.4  7.5 98.8 10.5 98.1 13.1 97.8
          2 13.5 97.6 13.8 97.7 14.0 99.1 14.3 99.0 14.4 97.5 15.0 97.4
          2 15.5 97.1 16.0 96.9 16.5 96.9 17.0 96.9 17.5 96.8 18.0 96.7
          2 18.5 96.7 19.0 96.7 19.5 96.7 20.0 96.8 20.5 96.7 21.0 96.8
          2 21.5 96.6 22.0 96.8 22.5 96.7 23.0 96.8 23.5 96.8 24.0 96.8
          2 24.5 96.9 25.0 97.2 25.5 97.2 26.0 97.2 26.5 97.3 27.0 97.4
          2 27.5 97.3 28.0 97.3 28.5 97.3 29.0 97.8 29.5 97.6 30.0 97.4
```

Table 2a. Gilligan Creek revised, calibrated data deck. - **Continued**

```
         2 30.5 97.5 31.0 97.5 33.8 98.8 36.0100.5 37.4101.6 37.5101.9
NS       2  0.0 20.7  0.0 20.7  0.0 83.5  0.0 86.6  0.0 56.7  0.0 56.6
NS       2  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 54.7
NS       2  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7
NS       2  0.0 54.7  0.0 54.7  0.0 54.7  0.0 86.7  0.0 86.7  0.0 86.7
NS       2  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 56.6
NS       2  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6  0.0 56.6
NS       2  0.0 56.6  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS       2  0.0 65.7  0.0 65.7  0.0 60.7  0.0 60.7  0.0 60.7  0.0 60.7
CAL1     2    98.09     47.49
VEL1     2                          0.5  0.9  0.4  0.0  0.0  0.0  3.2
VEL1     2  3.9  4.4  4.3  4.7  4.2  3.7  3.6  3.8  3.7  3.5  3.3  3.2
VEL1     2  3.1  2.8  2.3  2.2  2.0  1.7  1.5  1.6  2.3  2.8  2.7  2.4
VEL1     2  1.6  0.8  0.7  1.0  0.5  0.1  0.0 -0.1
CAL2     2     97.8     26.21
VEL2     2                          0.0  0.6  0.0  0.0  0.0  1.6  2.1
VEL2     2  2.5  2.1  2.6  3.7  3.6  3.2  3.0  3.0  2.8  2.8  2.4  2.5
VEL2     2  2.4  1.7  1.4  1.4  1.5  1.6  0.0  1.7  1.8  1.4  0.7  0.4
VEL2     2  0.0  0.1  0.2  0.0  0.0  0.0  0.0  0.0
CAL3     2    97.58      12.15
VEL3     2                                                  0.6  1.1
VEL3     2  1.5  1.0  0.8  2.5  1.7  2.5  2.1  2.0  2.2  2.2  1.8  1.7
VEL3     2  1.6  1.5  1.4  1.3  1.0  1.0  0.7  0.5  0.0  0.0  0.0  0.0
VEL3     2  0.3  0.0  0.0  0.0  0.0  0.0  0.0  0.0
XSEC     3                   94.54     0.004
         3  0.0 98.7  0.0 98.4  1.0 96.8  3.5 97.0  3.6 95.4  4.0 95.3
         3  5.0 95.3  5.1 94.4  6.0 94.3  6.5 94.0  7.0 93.9  7.5 93.9
         3  8.0 93.7  8.5 93.6  9.0 93.6  9.5 93.6 10.0 93.9 10.3 93.9
         3 10.5 94.7 11.0 94.9 11.5 95.0 12.0 95.0 12.5 95.0 12.6 94.3
         3 13.1 95.2 13.5 95.2 14.2 95.1 14.7 95.2 15.2 94.7 16.0 94.8
         3 16.6 94.9 17.0 95.5 17.5 95.4 18.0 95.3 19.0 95.5 20.0 95.5
         3 21.0 95.6 22.0 95.6 23.0 95.7 24.0 95.7 25.0 96.0 25.5 96.2
         3 38.0 96.3 51.0 96.5 59.1 97.0 61.8 97.6 61.9 98.3
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       3  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 58.6
NS       3  0.0 58.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 74.7
NS       3  0.0 75.6  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7
CAL1     3    96.13     44.72
VEL1     3                   0.0  0.6  0.6  0.5  0.4  0.5  0.4  1.1  1.8
VEL1     3  2.5  2.5  2.6  3.0  2.3  1.7  3.2  2.4  2.8  2.2  1.9  2.0
VEL1     3  1.6  1.4  1.2  2.0  2.4  2.0  .75  1.4  1.7 1.05  2.0  2.2
VEL1     3  1.9  0.8  1.0  0.6  0.1
CAL2     3    95.91     23.43
VEL2     3                       0.4  0.4  0.5  0.6  1.3  1.3  1.0  1.2
VEL2     3  2.1  1.7  1.2  1.2  1.0  1.0  0.8  0.8  0.8  0.7  0.6  0.7
VEL2     3  0.7  0.7  0.9  1.0  1.2  0.0  0.6  1.1  0.6  1.2  1.5  0.8
VEL2     3  0.7  0.4  0.0  0.0
CAL3     3    95.63       7.98
VEL3     3                       0.1  0.3  1.6  0.4  0.8  0.8  0.9  0.4
VEL3     3  0.7  0.7  0.6  0.6  0.4  0.4  0.4  0.4  0.2  0.5  0.5  0.3
```

Table 2a. Gilligan Creek revised, calibrated data deck. - **Continued**

```
VEL3     3  0.5  0.6  0.3  0.5  0.6  0.3  0.1  0.0  0.5  0.5  0.0  0.0
VEL3     3  0.0  0.0
XSEC     4                   94.54      0.004
         4  0.0100.1  0.0100.0  7.0 99.1  9.8 98.3 10.0 97.1 12.4 97.0
         4 13.0 96.1 13.5 96.1 13.9 95.7 14.4 95.2 15.4 94.0 16.2 93.6
         4 17.0 93.4 17.6 93.5 18.2 93.3 18.8 93.4 19.4 93.4 20.0 94.0
         4 20.6 94.1 21.2 94.0 21.8 94.1 22.4 94.2 23.0 94.9 23.6 95.0
         4 24.2 94.8 24.8 94.7 25.4 94.8 26.0 94.8 26.6 95.0 27.2 95.1
         4 27.8 95.2 28.4 95.2 29.0 95.3 29.8 95.7 30.6 95.6 31.4 95.7
         4 32.2 95.7 33.0 95.9 34.5 96.3 49.7 97.1 71.7 97.8 71.9 98.4
NS       4  0.0  0.9  0.0  0.9  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 78.7  0.0 78.7  0.0 78.7
NS       4  0.0 78.7  0.0 78.7  0.0 36.8  0.0 36.8  0.0 36.8  0.0 36.8
NS       4  0.0 36.8  0.0 84.7  0.0 84.7  0.0 83.8  0.0 83.8  0.0 83.8
CAL1     4    96.17       43.5
VEL1     4                                 0.2  0.0  0.3  0.3  0.4  0.8
VEL1     4  1.6  2.1  1.8  2.5  2.6  1.9  2.2  2.0  1.7  1.2  0.1  0.2
VEL1     4  0.6  2.0  1.9  1.2  0.9  1.3  1.5  1.3  1.5  1.0  0.6  0.6
VEL1     4  0.2  0.4
CAL2     4    95.92       22.81
VEL2     4                                           -0.2  0.1  0.2  1.1
VEL2     4  2.0  2.1  1.6  1.7  1.3  0.5  0.5  0.3  0.0  0.0  0.1  0.1
VEL2     4  0.3  0.8  0.7  1.1  0.8  1.1  1.3  1.3  1.0  0.9  0.6  0.3
VEL2     4  0.2                       0.0
CAL3     4    95.64       10.77
VEL3     4                                            -0.1  0.2  1.0
VEL3     4  1.1  1.1  1.0  0.9  0.5  0.1  0.1  0.1  0.1  0.5  0.5  0.4
VEL3     4  0.1  0.2  0.7  1.0  1.1  1.0  0.9  0.6  0.0  0.0
VEL3     4                            0.0
XSEC     5                   93.44      0.009
         5  0.0100.1  0.0100.0  1.5 98.0  6.2 97.0  9.0 96.4 12.4 94.7
         5 13.3 94.5 13.6 94.3 14.6 93.8 15.4 94.2 16.4 93.4 17.2 93.4
         5 18.0 93.4 18.5 93.5 19.0 93.5 19.5 93.6 20.2 93.3 20.9 93.4
         5 21.6 93.4 22.3 93.8 23.0 93.3 23.7 93.4 24.4 93.2 25.1 93.5
         5 25.8 93.4 26.5 93.4 27.2 93.5 27.9 93.6 28.6 93.4 29.3 93.2
         5 30.0 93.5 30.7 93.5 31.4 93.4 32.1 93.3 32.8 93.4 33.5 93.4
         5 34.2 93.6 34.9 93.6 35.6 93.8 36.3 93.8 36.6 94.5 37.2 94.5
         5 37.5 94.2 38.1 94.3 38.5 94.7 42.0 94.9 45.0 95.2 46.5 95.4
         5 46.7 96.0
NS       5  0.0  8.8  0.0  8.8  0.0  8.8  0.0 86.9  0.0 86.9  0.0 86.9
NS       5  0.0 86.9  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.6  0.0 86.6
NS       5  0.0 86.6  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7  0.0 57.7
NS       5  0.0 57.7  0.0 57.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS       5  0.0 86.7  0.0 86.7  0.0 86.7  0.0 54.6  0.0 54.6  0.0 54.6
NS       5  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 57.8  0.0 57.8
NS       5  0.0 57.8  0.0 57.8  0.0 57.8  0.0 57.8  0.0 86.6  0.0 86.6
NS       5  0.0 86.6  0.0 86.6  0.0 86.6  0.0 63.6  0.0 63.6  0.0 63.6
NS       5  0.0 63.6
CAL1     5   94.475       45.5
VEL1     5                                      0.0  0.0  0.4  0.2  0.6
VEL1     5  1.1  1.0  1.0  1.1  1.8  2.9  2.9  4.0  2.9  3.1  2.5  1.3
```

Table 2a. Gilligan Creek revised, calibrated data deck. - **Continued**

```
VEL1     5  1.1  1.3  1.1  1.0  2.6  3.5  4.6  3.4  3.3  3.7  3.4  2.4
VEL1     5  2.2  1.3  1.4  1.5  0.0  0.0  1.5  0.9
VEL1     5
CAL2     5    94.24      24.79
VEL2     5                                          0.1  0.1  0.4  0.4
VEL2     5  1.0  1.3  1.1  0.8  1.2  1.3  1.7  2.1  1.3  1.7  1.8  1.4
VEL2     5  1.0  1.3  1.4  0.3  1.9  2.0  2.8  3.4  3.2  3.0  2.8  1.8
VEL2     5  1.4  1.3  0.6  0.3  0.0  0.0  0.2
VEL2     5
CAL3     5    94.01       10.88
VEL3     5                                          0.0  0.0  0.6  0.8
VEL3     5  1.0  1.4  0.9  1.0  0.3  0.6  1.4  1.6  0.9  1.4  1.2  1.5
VEL3     5  1.0  0.7  0.7  0.2  0.6  1.2  1.5  2.3  1.1  2.1  2.0  1.6
VEL3     5  1.2  0.6  .15  0.0
VEL3     5
XSEC     6                   93.55      0.035
         6  0.0100.9  0.0 99.9  2.0 99.5  4.7 94.6  5.5 94.6  6.5 94.4
         6  7.1 94.6  9.0 94.6  9.1 94.2  9.6 93.9 10.1 93.7 10.8 94.1
         6 11.5 93.6 12.2 94.0 12.8 93.9 13.4 93.4 14.0 93.4 14.6 93.6
         6 15.2 93.9 15.9 93.7 16.6 93.5 17.3 93.6 18.0 93.6 18.7 93.6
         6 19.4 93.6 20.1 93.7 20.8 93.6 21.5 93.6 22.2 93.5 22.9 94.0
         6 23.6 93.8 24.3 93.7 25.0 93.7 25.7 94.0 26.4 94.2 27.1 94.6
         6 27.8 94.3 28.3 94.6 36.2 94.6 36.4 94.4 36.9 94.5 37.2 94.6
         6 38.0 95.7 41.3 95.8 41.4 96.3
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 87.8  0.0 87.8  0.0 87.8
NS       6  0.0 87.8  0.0 87.8  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 86.8  0.0 86.8  0.0 86.8  0.0 86.8
NS       6  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8  0.0 56.8
NS       6  0.0 56.8  0.0 56.8  0.0 56.8  0.0 86.5  0.0 86.5  .04 86.5
NS       6  0.0 86.5  0.0 86.5  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS       6  0.0 86.7  0.0 86.7  0.0 86.7
CAL1     6   94.645     48.23
VEL1     6                  0.0  0.1  1.2  0.0  0.0  0.2  0.7  1.6  4.0
VEL1     6  5.1  5.2  4.8  4.6  2.9  0.6  0.2  1.4  2.6  3.1  2.4  6.0
VEL1     6  4.7  3.7  1.6  0.5  2.8  3.0  4.1  4.0  3.0  2.4  1.1  0.6
VEL1     6  0.1  0.0  0.0  1.3  0.7  0.0
CAL2     6    94.42      26.66
VEL2     6                            0.0  0.0  0.0  0.0  0.6  0.7  3.0
VEL2     6  0.0  3.9  3.8  0.0  3.3  1.2  0.6  1.8  3.2  2.8  1.6  5.1
VEL2     6  3.8  0.0  0.0  0.3  2.0  1.9  3.4  2.2  2.6  0.0  1.1  0.0
VEL2     6  0.0
CAL3     6    94.25       11.01
VEL3     6                                 0.0  0.0  0.4  0.1  0.2  1.6
VEL3     6  1.8  2.0  3.6  2.4  1.3  0.2  0.4  1.9  3.2  0.4  0.4  2.9
VEL3     6  2.6  1.7  0.8  0.2  1.2  1.8  1.9  1.1  1.1  0.0
VEL3     6
XSEC     7                   94.56      0.028
         7  0.0 98.9  0.0 98.5  1.5 97.4  5.8 97.1  7.0 96.4  9.0 96.1
         7 11.5 96.4 11.8 95.9 12.1 95.8 12.4 96.0 12.5 96.6 13.5 96.4
         7 13.6 95.8 14.0 95.8 14.5 95.6 15.0 95.6 15.1 96.2 16.8 96.5
         7 16.9 94.7 17.5 94.8 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.5
         7 20.0 94.6 20.5 94.2 21.0 94.5 21.5 94.2 22.0 94.1 22.5 94.2
         7 23.0 94.2 23.5 94.4 24.0 94.3 24.5 94.7 25.1 94.5 25.5 94.7
```

Table 2a. Gilligan Creek revised, calibrated data deck. - **Continued**

```
          7 26.0 94.7 26.5 94.8 26.6 95.7 27.0 95.8 28.8 96.5 32.6 97.3
          7 33.6 99.3 33.7 99.5
NS        7  0.0 88.9  0.0 88.9  0.0 65.6  0.0 26.6  0.0 26.6  0.0 87.8
NS        7  0.0 87.8  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS        7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7  0.0 86.7
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        7  0.0 88.9  0.0 88.9  0.0 88.9  0.0 86.8  0.0 86.8  0.0 86.8
NS        7  0.0 86.8  0.0 86.8
CAL1      7   96.085      48.9
VEL1      7                                       0.0  1.2  0.0  0.0  0.0
VEL1      7  0.1  0.4  0.6  0.6  0.0  0.0  0.6  1.0  2.9  3.9  4.3  4.4
VEL1      7  4.7  4.3  4.1  2.9  2.5  2.2  2.4  2.5  2.6  2.8  2.8  2.3
VEL1      7  1.9  0.4  0.1  0.4
CAL2      7    95.76     22.91
VEL2      7
VEL2      7  0.0  0.0  0.2  0.3  0.0  0.0  0.4  0.0  1.1  1.7  2.5  4.0
VEL2      7  4.5  4.2  3.0  2.1  0.8  0.0  1.0  1.3  1.5  1.5  0.8  1.0
VEL2      7  0.5  0.2  0.0
CAL3      7    95.54       9.96
VEL3      7
VEL3      7                                  0.2  0.1  1.0  1.8  2.7  2.9
VEL3      7  2.3  2.1  1.2  0.7  0.3  0.5  0.6  0.7  0.5  0.2  0.3  0.2
VEL3      7  0.1
ENDJOB
```

Table 2b. Gilligan Creek revised and calibrated low flow data deck for Transect 4.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Gilligan Creek revised low flow deck (<7 cfs, Transect 4)
IOC       1100000200001
QARD   2.0
QARD   3.0
QARD   4.0
QARD   5.0
QARD   6.0
XSEC     4                    94.54      0.004
         4  0.0100.1  0.0100.0  7.0 99.1  9.8 98.3 10.0 97.1 12.4 97.0
         4 13.0 96.1 13.5 96.1 13.9 95.7 14.4 95.2 15.4 94.0 16.2 93.6
         4 17.0 93.4 17.6 93.5 18.2 93.3 18.8 93.4 19.4 93.4 20.0 94.0
         4 20.6 94.1 21.2 94.0 21.8 94.1 22.4 94.2 23.0 94.9 23.6 95.0
         4 24.2 94.8 24.8 94.7 25.4 94.8 26.0 94.8 26.6 95.0 27.2 95.1
         4 27.8 95.2 28.4 95.2 29.0 95.3 29.8 95.7 30.6 95.6 31.4 95.7
         4 32.2 95.7 33.0 95.9 34.5 96.2 49.7 97.1 71.7 97.8 71.9 98.4
NS       4  0.0  0.9  0.0  0.9  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 78.7  0.0 78.7  0.0 78.7
NS       4  0.0 78.7  0.0 78.7  0.0 36.8  0.0 36.8  0.0 36.8  0.0 36.8
NS       4  0.0 36.8  0.0 84.7  0.0 84.7  0.0 83.8  0.0 83.8  0.0 83.8
CAL1     4    96.17      43.5      43.5
VEL1     4
VEL1     4
VEL1     4
VEL1     4
CAL2     4    95.92      22.81      22.81
VEL2     4
VEL2     4
VEL2     4
VEL2     4
CAL3     4    95.64      10.77      10.77
VEL3     4                                          0.1  0.2  1.0
VEL3     4  1.1  1.1  1.0  0.9  0.5  0.1  0.1  0.1  0.1  0.5  0.5  0.4
VEL3     4  0.1  0.1  0.7  1.0  1.1  1.0  0.9  0.6  0.1  0.1
VEL3     4                            0.0
ENDJOB
```

Table 2c. Gilligan Creek revised, calibrated one flow data deck for Transects 2 and 4, flows > 46 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Gilligan Creek - high flows > 65 cfs, Transect 4
IOC       1100000200001
QARD  46.0
QARD  50.0
QARD  55.0
QARD  60.0
QARD  65.0
QARD  70.0
QARD  75.0
QARD  80.0
QARD  85.0
QARD  90.0
XSEC     4                    94.54      0.004
         4  0.0100.1  0.0100.0  7.0 99.1  9.8 98.3 10.0 97.1 12.4 97.0
         4 13.0 96.1 13.5 96.1 13.9 95.7 14.4 95.2 15.4 94.0 16.2 93.6
         4 17.0 93.4 17.6 93.5 18.2 93.3 18.8 93.4 19.4 93.4 20.0 94.0
         4 20.6 94.1 21.2 94.0 21.8 94.1 22.4 94.2 23.0 94.9 23.6 95.0
         4 24.2 94.8 24.8 94.7 25.4 94.8 26.0 94.8 26.6 95.0 27.2 95.1
         4 27.8 95.2 28.4 95.2 29.0 95.3 29.8 95.7 30.6 95.6 31.4 95.7
         4 32.2 95.7 33.0 95.9 34.5 96.3 49.7 97.1 71.7 97.8 71.9 98.4
NS       4  0.0  0.9  0.0  0.9  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 78.7  0.0 78.7  0.0 78.7
NS       4  0.0 78.7  0.0 78.7  0.0 36.8  0.0 36.8  0.0 36.8  0.0 36.8
NS       4  0.0 36.8  0.0 84.7  0.0 84.7  0.0 83.8  0.0 83.8  0.0 83.8
CAL1     4    96.17      43.5      43.5
VEL1     4                                0.2  0.1  0.3  0.3  0.4  0.8
VEL1     4  1.6  2.1  1.8  2.5  2.6  2.2  2.6  2.0  1.7  1.2  0.1  0.2
VEL1     4  0.6  2.4  1.9  1.2  0.9  1.3  1.5  1.3  1.5  1.0  0.6  0.6
VEL1     4  0.2  0.4
CAL2     4    95.92      22.81      22.81
VEL2     4
VEL2     4
VEL2     4
VEL2     4
CAL3     4    95.64      10.77      10.77
VEL3     4
VEL3     4
VEL3     4
VEL3     4
ENDJOB
```

Table 3. Gilligan Creek, original and revised VAF's.

	Trans 1		Trans 2		Trans 3		Trans 4				Trans 5		Trans 6		Trans 7	
Flow	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev-Lo	Rev	Rev-Hi	Orig	Rev	Orig	Rev	Orig	Rev
1	0.747	0.747	0.674	0.666	0.345	0.292	0.218	0.213	0.238		0.505	0.508	0.647	0.574	0.596	0.597
2	0.837	0.836	0.763	0.754	0.536	0.484	0.421	0.348	0.425		0.686	0.689	0.756	0.670	0.725	0.721
3	0.885	0.885	0.817	0.805	0.665	0.620	0.549	0.455	0.547		0.789	0.791	0.809	0.720	0.802	0.795
4	0.917	0.917	0.857	0.840	0.760	0.721	0.646	0.546	0.640		0.836	0.838	0.867	0.773	0.855	0.845
5	0.940	0.940	0.887	0.867	0.829	0.784	0.723	0.627	0.713		0.881	0.882	0.909	0.811	0.895	0.883
6	0.957	0.957	0.911	0.890	0.883	0.838	0.787	0.700	0.772		0.913	0.914	0.918	0.821	0.926	0.912
7	0.970	0.970	0.927	0.904	0.926	0.880	0.840	0.767	0.821		0.938	0.939	0.941	0.842	0.951	0.934
8	0.981	0.980	0.943	0.919	0.958	0.912	0.885	0.830	0.862		0.958	0.958	0.959	0.860	0.971	0.953
9	0.989	0.989	0.956	0.931	0.985	0.938	0.923	0.889	0.896		0.973	0.973	0.974	0.874	0.988	0.968
10	0.991	0.996	0.966	0.941	1.006	0.959	0.959	0.944	0.926		0.986	0.986	0.980	0.881	1.001	0.981
15	1.010	1.011	1.001	0.976	1.060	1.015	1.052		1.011		1.021	1.020	1.015	0.918	1.041	1.017
20	1.016	1.017	1.016	0.993	1.073	1.031	1.090		1.044		1.033	1.032	1.029	0.937	1.054	1.029
25	1.016	1.017	1.019	1.000	1.071	1.033	1.096		1.050		1.032	1.031	1.033	0.947	1.052	1.030
30	1.013	1.013	1.013	1.000	1.061	1.028	1.082		1.039		1.026	1.026	1.031	0.951	1.043	1.023
35	1.008	1.008	1.003	0.996	1.048	1.020	1.055		1.019		1.016	1.016	1.024	0.952	1.028	1.011
40	1.003	1.003	0.988	0.988	1.033	1.010	1.019		0.992		1.004	1.004	1.015	0.951	1.011	0.998
45	0.997	0.997	0.971	0.978	1.018	0.999	0.979		0.962	1.012	0.990	0.991	1.004	0.947	0.991	0.983
50	0.991	0.991	0.952	0.967	1.003	0.988	0.936		0.930	1.074	0.975	0.977	0.989	0.940	0.971	0.968
55	0.985	0.985	0.930	0.953	0.988	0.977	0.893		0.897	1.132	0.959	0.961	0.974	0.933	0.950	0.952
60	0.979	0.979	0.908	0.939	0.973	0.966	0.849		0.864	1.187	0.943	0.945	0.958	0.925	0.928	0.936
65	0.973	0.972	0.884	0.923	0.958	0.956	0.807		0.831	1.240	0.926	0.929	0.941	0.918	0.907	0.920
70	0.967	0.966	0.860	0.907	0.944	0.945	0.766		0.799	1.291	0.909	0.913	0.924	0.910	0.886	0.904
75	0.961	0.960	0.835	0.890	0.930	0.935	0.727		0.768	1.339	0.891	0.896	0.907	0.903	0.865	0.888
80	0.955	0.955	0.810	0.873	0.916	0.924	0.690		0.739	1.386	0.874	0.879	0.889	0.896	0.844	0.873
85	0.950	0.949	0.786	0.855	0.902	0.915	0.654		0.710	1.431	0.856	0.862	0.870	0.889	0.824	0.858
90	0.944	0.943	0.761	0.837	0.889	0.905	0.621		0.683	1.475	0.838	0.844	0.852	0.882	0.804	0.843
95	0.939	0.938	0.736	0.819	0.876	0.896	0.590		0.657	1.517	0.819	0.827	0.833	0.875	0.785	0.829
100	0.933	0.933	0.712	0.801	0.864	0.887	0.561		0.633	1.557	0.801	0.809	0.814	0.868	0.766	0.815
110	0.923	0.922	0.665	0.765	0.841	0.869	0.507		0.587	1.635	0.765	0.774	0.775	0.855	0.729	0.787
120	0.913	0.912	0.620	0.728	0.819	0.853	0.460		0.546	1.708	0.728	0.738	0.735	0.843	0.695	0.762
130	0.903	0.902	0.578	0.693	0.799	0.838	0.419		0.509	1.778	0.693	0.703	0.694	0.818	0.664	0.738
140	0.894	0.892	0.538	0.658	0.780	0.823	0.383		0.476	1.844	0.658	0.669	0.653	0.807	0.634	0.715
150	0.884	0.883	0.501	0.625	0.763	0.810	0.351		0.446	1.907	0.624	0.636	0.612	0.797	0.607	0.694

Table 4. Changes to Original Data Deck, Gilligan Creek

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
1	17.0							Elev 97.5 to 97.6
	33.5							Elev 96.4 to 98.1
2	14.4	0.4	0.6					
	24.5			2.1	1.9			
	25.5	0.1	0.0					
	28.5			0.0	0.2			
3	7.0			1.9	1.0			
	7.5			2.1	1.2			
	8.0	0.9	0.7	2.3	2.1			
	8.5	0.8	0.7	1.9	1.7	2.7	2.5	
	11.5	0.4	0.2	0.6	0.8			
	12.6	0.5	0.3	0.5	0.7			
	14.7	0.6	0.5	1.1	1.0			
	15.2	0.7	0.6	1.3	1.2			
	16.0			0.3	0.0			
	16.6					0.8	0.75	
	17.0	0.2	0.00	1.4	1.1			
	17.5	0.6	0.5	0.8	0.6			
	18.0					1.1	1.05	
	19.0	0.2	0.0					
	20.0			0.9	0.8	2.3	2.2	
	25.0					0.0	0.1	
4	13.9							Elev 95.6 to 95.7
	14.4	0.0	-0.1					
	20.0			0.6	0.5	2.2	1.9	
	20.6	0.0	0.1	0.6	0.5	2.6	2.2	
	21.8			0.1	0.0			
	22.4			0.1	0.0			
	24.8	0.1	0.2	0.9	0.8	2.4	2.0	
	26.0			0.6	1.1			
	13.5					0.0	0.1	Hi Flow Deck
	14.4	0.0	0.1					Low Flow Deck
	20.6	0.0	0.1					Low Flow Deck
	21.2	0.0	0.1					Low Flow Deck
	29.0	0.0	0.1					Low Flow Deck
	30.6	0.0	0.1					Low Flow Deck
5	19.5			0.6	0.8			
	20.2	0.2	0.3	1.5	1.2			
	27.9	0.3	0.2					
	35.6	0.0	0.15					
6	6.5			0.1	0.0			
	9.1			1.2	0.0			
	9.6			0.8	0.6			
	11.5			1.8	0.0			
	13.4	2.2	2.4	1.6	0.0	4.4	4.6	
	17.3	0.3	0.5			3.8	4.5	
	18.0	0.3	0.4	1.8	1.6	2.5	2.4	
	20.1			1.4	0.0			
	20.8			0.6	0.0			
	27.1					0.4	0.6	N .058 to 0.04
7	14.5			N/A	0.2			Elev 95.5 to 95.6; MF missing
	15.0							Elev 95.5 to 95.6
	17.5			1.0	0.0			
	22.5			0.6	0.0			
	24.5	0.1	0.2			3.2	2.8	

Table 5a. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 1.

Calibration details for Gilligan Creek

- Transect 1

	WSE (ft)		97.33		97.55				97.77				98.02				98.35	
	Disch (cfs)		4		11				25				46				114	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.3			0.0					0.0					0.0						
2	0.0	100.0			0.0					0.0					0.0						
3	0.6	99.4			0.0					0.0					0.0						
4	7.2	98.8			0.0					0.0					0.0						
5	8.5	98.9			0.0					0.0					0.0						
6	9.0	98.5			0.0					0.0					0.0						
7	10.2	98.6			0.0					0.0					0.0						
8	11.2	98.4			0.0					0.0					0.0					0.00	0.00
9	14.0	98.3			0.0					0.0					0.0	0.00		0.00		0.14	0.14
10	14.3	97.8			0.0					0.0	0.00		0.00		0.4	0.34		0.34		0.68	0.68
11	14.9	97.7			0.0					0.0	0.32	*	0.32	*	0.9	0.80		0.80		1.33	1.33
12	15.4	97.7			0.0					0.0	0.46	*	0.46	*	1.3	1.16		1.16		1.92	1.92
13	16.0	97.6			0.0					0.5	0.50		0.50		0.9	0.81		0.81		1.56	1.55
14	16.5	97.6			0.0	0.00				0.7	0.70		0.71		1.1	1.01		1.01		1.64	1.64
* 15	17.0	97.5	0.00	0.00	0.0	1.10	*	0.00		1.1	1.12		1.12		1.1	1.10		1.10		1.01	1.01
16	17.5	97.1	0.46	0.46	0.9	0.88		0.89		1.4	1.41		1.42		2.1	1.94		1.94		2.97	2.96
17	18.0	97.0	0.36	0.36	0.8	0.81		0.81		1.6	1.49		1.49		2.4	2.27		2.27		4.02	4.02
18	18.5	97.0	0.49	0.49	1.2	1.07		1.08		1.6	1.93	*	1.93	*	3.5	2.89		2.89		5.01	5.00
19	19.0	96.8	0.46	0.46	1.1	1.08		1.09		2.1	2.06		2.06		3.5	3.20		3.20		5.88	5.87
20	19.5	96.8	0.11	0.11	0.4	0.47		0.48		2.3	1.46	*	1.47	*	3.1	3.28		3.28		10.35	10.33
21	20.0	97.1	0.82	0.82	1.6	1.52		1.52		2.2	2.38		2.39		3.6	3.22		3.22		4.80	4.80
22	20.5	97.0	0.58	0.58	1.3	1.32		1.33		2.7	2.47		2.47		4.0	3.80		3.80		6.86	6.85
23	21.0	96.9	0.45	0.45	1.0	1.09		1.10		2.7	2.13	*	2.13	*	3.3	3.37		3.37		6.37	6.36
24	21.5	96.7	0.99	0.99	1.7	1.55		1.56		1.8	2.14		2.14		3.0	2.62		2.62		3.37	3.36
25	22.0	96.8	0.89	0.89	1.4	1.42		1.43		2.1	1.98		1.99		2.5	2.45		2.45		3.20	3.20
26	22.5	96.8	0.95	0.95	1.6	1.57		1.58		2.2	2.24		2.24		3.0	2.82		2.82		3.78	3.77
27	23.0	96.8	0.69	0.69	1.2	1.19		1.20		1.8	1.77		1.77		2.4	2.29		2.29		3.19	3.18
28	23.5	96.7	1.26	1.26	1.6	1.59		1.60		1.8	1.82		1.83		2.0	1.95		1.95		2.06	2.06
29	24.0	96.7	0.61	0.61	1.1	1.15		1.16		2.1	1.83		1.84		2.5	2.50		2.50		3.78	3.77
30	24.5	96.8	0.81	0.81	1.5	1.44		1.45		2.1	2.21		2.21		3.2	2.92		2.92		4.23	4.22
31	25.0	97.0	1.26	1.26	1.8	1.80		1.81		2.3	2.28		2.28		2.7	2.63		2.63		3.09	3.08
32	25.5	96.9	1.47	1.47	1.9	1.75		1.75		1.6	1.92		1.92		2.2	1.98		1.98		1.99	1.99
33	26.0	96.9	0.69	0.69	1.3	1.28		1.28		2.0	2.00		2.01		2.9	2.71		2.71		4.02	4.02
34	26.5	96.9	0.51	0.51	1.0	1.05		1.06		2.1	1.80		1.80		2.6	2.60		2.59		4.24	4.24
35	27.0	96.8	0.36	0.36	0.8	0.85		0.86		2.0	1.65		1.65		2.6	2.60		2.60		4.85	4.85
36	27.5	96.8	0.77	0.77	1.3	1.29		1.30		1.9	1.87		1.87		2.5	2.38		2.38		3.25	3.24
37	28.0	96.8	1.03	1.03	1.4	1.37		1.38		1.6	1.65		1.65		1.9	1.83		1.83		2.02	2.02
38	28.5	96.8	1.26	1.26	1.5	1.36		1.36		1.1	1.37	*	1.38	*	1.5	1.34		1.34		1.23	1.23
39	29.0	96.6	0.69	0.69	1.0	0.94		0.94		1.0	1.14		1.14		1.4	1.27		1.27		1.43	1.43
40	29.5	96.6	0.97	0.97	1.2	1.16		1.17		1.2	1.28		1.29		1.4	1.34		1.34		1.35	1.35
41	30.0	96.5	0.49	0.49	0.9	0.80		0.80		0.9	1.14	*	1.14	*	1.7	1.43		1.43		1.91	1.91
42	30.5	96.6	0.21	0.21	0.5	0.48		0.49		0.9	0.92		0.92		1.6	1.43		1.43		2.63	2.63
43	31.0	96.8	0.30	0.29	0.6	0.56		0.56		0.8	0.90		0.90		1.4	1.23		1.23		1.87	1.87
44	31.5	96.7	0.19	0.19	0.4	0.39		0.40		0.7	0.69		0.69		1.1	1.02		1.01		1.71	1.71
45	32.0	96.7	0.19	0.19	0.4	0.38		0.38		0.6	0.64		0.64		1.0	0.90		0.90		1.42	1.42
46	32.5	96.5	0.03	0.03	0.1	0.11		0.11		0.4	0.31		0.31		0.7	0.67		0.67		1.98	1.98
47	33.0	96.5	0.07	0.07	0.0	0.12		0.13		0.2	0.20		0.20		0.3	0.28		0.28		0.43	0.43
* 48	33.5	98.1	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.06	0.06
49	34.2	100.8			0.0					0.0					0.0					0.00	0.00
Total						1	*	0	*		7	*	7	*		0	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5b. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 2.

Calibration details for Gilligan Creek

Transect 2

	WSE (ft)		97.3		97.58				97.8				98.09				98.55		
	Disch (cfs)		4		11				25				46				114		
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	100.1			0.0					0.0					0.0						
	2	0.0	99.7			0.0					0.0					0.0						
	3	3.0	99.4			0.0					0.0					0.0						
	4	7.5	98.8			0.0					0.0					0.0					0.00	0.00
	5	10.5	98.1			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.43	0.50
	6	13.1	97.8			0.0					0.0	0.05		0.04		0.5	0.45		0.45		0.61	0.71
	7	13.5	97.6			0.0					0.6	0.60		0.60		0.9	0.85		0.85		1.02	1.14
	8	13.8	97.7			0.0					0.0	0.17		0.17		0.4	0.37		0.37		0.43	0.50
	9	14.0	99.1			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	10	14.3	99.0			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
*	11	14.4	97.5			0.4	0.32		0.48		1.6	1.56		1.60		0.0	4.70	*	3.67		17.48	10.09
	12	15.0	97.4	0.00	0.00	1.1	1.00		0.98		2.1	2.00		1.96		3.2	3.07		3.10		4.19	4.85
	13	15.5	97.1	0.58	0.57	1.5	1.35		1.32		2.5	2.51		2.46		3.9	3.66		3.69		4.62	5.36
	14	16.0	96.9	0.25	0.24	1.0	0.85		0.83		2.1	2.16		2.12		4.4	3.98		4.02		7.13	8.29
	15	16.5	96.9	0.18	0.18	0.8	0.74		0.72		2.6	2.14		2.10		4.3	4.35		4.37		8.99	10.34
	16	17.0	96.9	1.29	1.27	2.5	2.35		2.29		3.7	3.60		3.53		4.7	4.54		4.58		4.63	5.36
	17	17.5	96.8	0.74	0.73	1.7	1.67		1.63		3.6	3.03		2.97		4.2	4.34		4.36		5.34	6.14
	18	18.0	96.7	1.57	1.54	2.5	2.39		2.33		3.2	3.16		3.10		3.7	3.58		3.61		3.11	3.61
	19	18.5	96.7	1.17	1.15	2.1	2.00		1.95		3.0	2.90		2.84		3.6	3.51		3.53		3.36	3.89
	20	19.0	96.7	1.03	1.01	2.0	1.88		1.84		3.0	2.90		2.85		3.8	3.68		3.71		3.78	4.38
	21	19.5	96.7	1.22	1.19	2.2	2.03		1.98		2.8	2.90		2.85		3.7	3.47		3.51		3.28	3.81
	22	20.0	96.8	1.28	1.26	2.2	2.06		2.01		2.8	2.85		2.79		3.5	3.33		3.36		3.03	3.51
	23	20.5	96.7	0.93	0.91	1.8	1.65		1.61		2.4	2.48		2.44		3.3	3.09		3.12		3.09	3.59
	24	21.0	96.8	0.88	0.86	1.7	1.60		1.56		2.5	2.44		2.40		3.2	3.08		3.11		3.15	3.64
	25	21.5	96.6	0.81	0.79	1.6	1.50		1.46		2.4	2.34		2.30		3.1	2.99		3.01		3.11	3.60
	26	22.0	96.8	0.73	0.71	1.5	1.30		1.26		1.7	1.97		1.94		2.8	2.46		2.49		2.48	2.90
	27	22.5	96.7	0.74	0.72	1.4	1.21		1.17		1.4	1.69	*	1.66		2.3	1.99		2.02		1.84	2.15
	28	23.0	96.8	0.68	0.66	1.3	1.14		1.11		1.4	1.62		1.59		2.2	1.94		1.97		1.83	2.14
	29	23.5	96.8	0.49	0.48	1.0	0.93		0.91		1.5	1.48		1.45		2.0	1.92		1.93		2.03	2.36
	30	24.0	96.8	0.58	0.57	1.0	0.99		0.97		1.6	1.43		1.40		1.7	1.73		1.74		1.65	1.91
*	31	24.5	96.9	0.38	0.31	0.7	0.79		0.62		2.1	1.33	*	1.03	*	1.5	1.81	*	1.42		2.06	1.81
	32	25.0	97.2	0.19	0.19	0.5	0.53		0.52		1.7	1.14	*	1.12	*	1.6	1.85		1.85		2.73	3.10
*	33	25.5	97.2	0.01	0.77	0.1	0.11		1.26	*	1.8	0.78	*	1.80		2.3	3.09	*	2.20		17.37	2.36
	34	26.0	97.2	0.16	0.17	0.0	0.54	*	0.56	*	1.4	1.39		1.40		2.8	2.58		2.58		4.69	5.12
	35	26.5	97.3	0.01	0.01	0.0	0.11		0.12		0.7	0.68		0.70		2.7	2.38		2.36		11.13	11.48
	36	27.0	97.4	0.00	0.00	0.0	0.04		0.04		0.4	0.38		0.40		2.4	2.05		2.02		18.13	18.01
	37	27.5	97.3	0.06	0.06	0.3	0.26		0.25		0.0	0.73	*	0.71	*	1.6	1.47		1.46		2.99	3.42
	38	28.0	97.3	0.00	0.00	0.0	0.01		0.01		0.1	0.09		0.10		0.8	0.67		0.66		8.97	8.69
*	39	28.5	97.3	0.00	0.01	0.0	0.31	*	0.04		0.0	0.53	*	0.20		0.7	0.66		0.62		0.61	2.63
	40	29.0	97.8	0.00	0.00	0.0	0.00		0.00		0.0	0.09		0.09		1.0	0.90		0.91		1.22	1.41
	41	29.5	97.6			0.0	0.00		0.00		0.0	0.29	*	0.28	*	0.5	0.46		0.47		0.50	0.58
	42	30.0	97.4			0.0	0.03		0.03		0.0	0.07		0.07		0.1	0.09		0.09		0.09	0.11
	43	30.5	97.5			0.0	0.01		0.01		0.0	0.06		0.06		0.0	0.08		0.08		0.09	0.10
	44	31.0	97.5			0.0	-0.02		-0.02		0.0	-0.07		-0.06		-0.1	-0.09		-0.09		-0.09	-0.11
	45	33.8	98.8			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	46	36.0	100.5			0.0					0.0					0.0						
	47	37.4	101.6			0.0					0.0					0.0						
	48	37.5	101.9			0.0					0.0					0.0						
	Total						2	*	2	*		7	*	4	*		3	*	1	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5c. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 3.

Calibration details for Gilligan Creek

Transect 3

			WSE (ft)		95.48		95.63				95.91				96.13				96.49	
			Disch (cfs)		4		11				25				46				114	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	98.7			0.0					0.0					0.0						
	2	0.0	98.4			0.0					0.0					0.0						
	3	1.0	96.8			0.0					0.0					0.0						
	4	3.5	97.0	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	5	3.6	95.4	0.04	0.04	0.1	0.15		0.15		0.4	0.39		0.37		0.6	0.70		0.68		1.50	1.52
	6	4.0	95.3	0.17	0.16	0.3	0.34		0.32		0.4	0.48		0.47		0.6	0.58		0.57		0.68	0.71
	7	5.0	95.3	1.78	1.64	1.6	1.17	*	1.10	*	0.5	0.68		0.66		0.5	0.42		0.42		0.18	0.19
	8	5.1	94.4	0.33	0.32	0.4	0.46		0.44		0.6	0.49		0.47		0.4	0.48		0.46		0.40	0.41
	9	6.0	94.3	0.85	0.85	0.8	0.93		0.91		1.3	0.83	*	0.79	*	0.5	0.69		0.66		0.47	0.46
	10	6.5	94.0	0.96	0.96	0.8	0.93		0.91		1.3	0.75	*	0.72	*	0.4	0.58		0.56		0.36	0.35
*	11	7.0	93.9	0.71	0.60	0.9	1.14	*	0.91		1.9	1.37	*	1.05	*	1.1	1.44	*	1.09		1.38	1.05
*	12	7.5	93.9	0.19	0.17	0.4	0.66	*	0.54		2.1	1.49	*	1.18	*	1.8	2.50	*	1.95		4.80	3.73
*	13	8.0	93.7	0.48	0.33	0.9	1.21	*	0.95		2.3	2.11		1.86		2.5	2.91		2.84		4.19	4.86
*	14	8.5	93.6	0.38	0.31	0.8	1.06	*	0.89		1.9	1.99		1.73		2.7	2.92		2.63		4.58	4.45
	15	9.0	93.6	0.24	0.23	0.6	0.76		0.72		1.2	1.57	*	1.52	*	2.6	2.47		2.44		4.31	4.51
	16	9.5	93.6	0.23	0.21	0.6	0.76		0.72		1.2	1.67	*	1.62	*	3.0	2.76		2.73		5.15	5.42
	17	10.0	93.9	0.15	0.14	0.4	0.54		0.51		1.0	1.28	*	1.24	*	2.3	2.24		2.20		4.54	4.74
	18	10.3	93.9	0.17	0.16	0.4	0.54		0.51		1.0	1.12		1.08		1.7	1.78		1.74		3.12	3.22
	19	10.5	94.7	0.12	0.11	0.4	0.51		0.48		0.8	1.37	*	1.33	*	3.2	2.63		2.62		6.15	6.59
	20	11.0	94.9	0.14	0.13	0.4	0.51		0.48		0.8	1.21	*	1.17	*	2.4	2.11		2.10		4.30	4.56
*	21	11.5	95.0	0.12	0.05	0.4	0.47		0.30		0.6	1.17	*	1.08	*	2.8	2.11	*	2.63		4.53	8.99
	22	12.0	95.0	0.19	0.17	0.5	0.57		0.54		0.7	1.16	*	1.13	*	2.2	1.80		1.80		3.08	3.31
	23	12.5	95.0	0.20	0.18	0.5	0.55		0.51		0.6	1.03	*	1.00	*	1.9	1.51	*	1.52		2.38	2.57
*	24	12.6	94.3	0.18	0.09	0.5	0.52		0.38		0.5	0.99	*	0.97	*	2.0	1.46	*	1.81		2.33	4.17
	25	13.1	95.2	0.22	0.21	0.5	0.57		0.54		0.7	1.01	*	0.98	*	1.6	1.41		1.40		2.07	2.20
	26	13.5	95.2	0.30	0.28	0.6	0.65		0.61		0.7	0.99	*	0.95	*	1.4	1.24		1.23		1.54	1.63
	27	14.2	95.1	0.14	0.13	0.3	0.42		0.41		0.9	0.87		0.84		1.2	1.37		1.33		2.37	2.41
*	28	14.7	95.2	0.27	0.20	0.6	0.74		0.60		1.1	1.36	*	1.22		2.0	1.95		1.91		2.98	3.39
*	29	15.2	94.7	0.32	0.24	0.7	0.86		0.72		1.3	1.61	*	1.46		2.4	2.34		2.29		3.63	4.07
*	30	16.0	94.8	0.08	0.10	0.3	0.31		0.40		0.3	0.74	*	1.04	*	2.0	1.30	*	1.96		2.63	4.57
*	31	16.6	94.9	0.04	0.04	0.1	0.17		0.17		0.6	0.50		0.47		0.8	1.03	*	0.94		2.61	2.39
*	32	17.0	95.5	0.00	0.00	0.2	0.36		0.86	*	1.4	1.00	*	1.19		1.4	1.97	*	1.39		4.77	1.60
*	33	17.5	95.4	0.28	0.19	0.6	0.67		0.51		0.8	1.13	*	0.95		1.7	1.52		1.39		2.09	2.23
*	34	18.0	95.3	0.30	0.30	0.5	0.66		0.64		1.2	1.03		0.97		1.1	1.32	*	1.23		1.69	1.60
*	35	19.0	95.5	0.00	0.00	0.2	0.37		1.13	*	1.5	1.21		1.63		2.0	2.66	*	1.98		7.68	2.42
*	36	20.0	95.5			0.0	0.32	*	0.32	*	0.9	1.07		0.99		2.3	2.40		2.15		7.07	6.20
	37	21.0	95.6			0.0	0.23	*	0.28	*	0.7	0.84		0.87		1.9	1.99		1.86		6.35	5.27
	38	22.0	95.6			0.0	0.19		0.21	*	0.4	0.46		0.47		0.8	0.83		0.79		1.75	1.55
	39	23.0	95.7			0.0	0.06		0.06		0.0	0.72	*	0.69	*	1.0	1.02		1.00		1.25	1.29
	40	24.0	95.7			0.0	0.04		0.04		0.0	0.43	*	0.41	*	0.6	0.61		0.60		0.75	0.77
*	41	25.0	96.0			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.28	*	0.10		0.54	0.21
	42	25.5	96.2			0.0					0.0					0.0	0.00		0.00		0.38	0.15
	43	38.0	96.3			0.0					0.0					0.0					0.28	0.11
	44	51.0	96.5			0.0					0.0					0.0					0.00	0.00
	45	59.1	97.0			0.0					0.0					0.0						
	46	61.8	97.6			0.0					0.0					0.0						
	47	61.9	98.3			0.0					0.0					0.0						
	Total						7	*	6	*		22	*	18	*		11	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5d. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 4.

Calibration Details

- Transect 4

	WSE (ft)		95.37			95.64					95.92				96.17					96.69	
	Disch (cfs)		4			11					25				46					114	
Pt	Sta	Elev	Orig	Rev	Rev-1q	Meas	Orig	*	Rev	*	Rev-1q	*	Meas	Orig	*	Rev	*	Rev-1q	Orig	Rev	Rev-1q
1	0.0	100.1				0.0							0.0								
2	0.0	100.0				0.0							0.0								
3	7.0	99.1				0.0							0.0								
4	9.8	98.3				0.0							0.0								
5	10.0	97.1				0.0							0.0								
6	12.4	97.0				0.0							0.0			0.0	0.00	0.00	0.00	0.00	0.00
7	13.0	96.1				0.0							0.0			0.2	0.26	0.25	0.27	0.41	0.48	1.39
* 8	13.5	96.1				0.0	0.00						0.0	0.00		0.00	0.0	-0.09	-0.12	0.14	-0.15	-0.22	0.70
* 9	13.9	95.6	0.00	0.00	0.00	0.0	-0.70	*	0.00		0.00		-0.2	-0.13		-0.12	0.3	0.32	0.32	0.32	0.48	0.57	0.82
* 10	14.4	95.2	-0.71	-0.25	0.03	0.0	-0.50	*	-0.09		0.10		-0.1	-0.03		0.14	0.3	0.31	0.30	0.31	0.42	0.32	0.67
11	15.4	94.0	0.07	0.07	0.10	0.2	0.18		0.17		0.20		0.2	0.29		0.28	0.4	0.35	0.35	0.41	0.28	0.32	0.77
12	16.2	93.6	0.81	0.80	0.50	1.0	1.06		1.02		1.00		1.1	1.03		0.99	0.8	0.83	0.82	0.83	0.36	0.42	1.51
13	17.0	93.4	0.62	0.61	0.55	1.1	1.24		1.20		1.10		2.0	1.73		1.65	1.6	1.80	1.78	1.65	1.16	1.36	2.99
14	17.6	93.5	0.49	0.49	0.55	1.1	1.21		1.16		1.10		2.1	1.97		1.89	2.1	2.31	2.28	2.17	1.77	2.08	3.94
15	18.2	93.3	0.45	0.44	0.50	1.0	1.05		1.01		1.00		1.6	1.64		1.58	1.8	1.88	1.86	1.86	1.39	1.62	3.35
16	18.8	93.4	0.29	0.29	0.45	0.9	0.93		0.89		0.90		1.7	1.88		1.80	2.5	2.60	2.56	2.58	2.54	2.97	4.67
17	19.4	93.4	0.10	0.10	0.25	0.5	0.52		0.50		0.50		1.3	1.52		1.45	2.6	2.75	2.71	2.69	4.03	4.72	4.86
* 18	20.0	94.0	0.01	0.01	0.05	0.1	0.11		0.10		0.10		0.6	0.74		0.63	2.2	2.52	2.06	2.28	9.39	8.29	4.23
* 19	20.6	94.1	0.01	0.01	0.05	0.0	0.13		0.10		0.10		0.6	0.85	*	0.67	2.6	2.75	2.33	2.70	9.62	10.33	5.03
20	21.2	94.0	0.00	0.01	0.05	0.0	0.04		0.08		0.10		0.3	0.46		0.54	* 2.0	2.17	1.80	2.07	13.42	7.46	3.85
* 21	21.8	94.1	0.01	0.01	0.05	0.1	0.06		0.10		0.10		0.1	0.36	*	0.57	* 1.7	1.10	* 1.77	1.76	3.42	6.65	3.29
* 22	22.4	94.2	0.09	0.17	0.24	0.5	0.25	*	0.48		0.50		0.1	0.46	*	0.88	* 1.2	0.59	* 1.18	1.24	0.52	1.24	2.34
23	23.0	94.9	0.80	0.79	0.20	0.5	0.38		0.36		0.50		0.1	0.16		0.15	0.1	0.07	0.07	0.10	0.01	0.01	0.21
24	23.6	95.0	0.31	0.31	0.15	0.4	0.28		0.27		0.40		0.1	0.21		0.20	0.2	0.13	0.13	0.21	0.04	0.05	0.43
25	24.2	94.8	0.02	0.02	0.04	0.1	0.11		0.10		0.10		0.3	0.34		0.32	0.6	0.65	0.64	0.63	1.05	1.23	1.24
* 26	24.8	94.7	0.01	0.03	0.04	0.1	0.12		0.21		0.10		0.9	0.88		0.88	2.4	3.11	* 2.20	2.50	12.33	5.86	4.90
27	25.4	94.8	0.19	0.19	0.30	0.7	0.59		0.57		0.70		0.7	1.17	*	1.12	* 1.9	1.60	1.57	1.98	1.53	1.78	3.93
* 28	26.0	94.8	0.47	0.56	0.42	1.0	0.81		0.95		1.01		0.6	1.00	*	1.17	* 1.2	0.95	* 1.15	1.25	0.54	0.78	2.48
29	26.6	95.0	0.77	0.76	0.42	1.1	1.01		0.97		1.11		0.8	1.00		0.95	0.9	0.81	0.79	0.94	0.36	0.41	1.92
30	27.2	95.1	0.53	0.52	0.35	1.0	0.98		0.94		1.01		1.1	1.26		1.21	1.3	1.26	1.24	1.36	0.75	0.87	2.83
31	27.8	95.2	0.42	0.41	0.26	0.9	0.92		0.89		0.91		1.3	1.38		1.33	1.5	1.53	1.51	1.57	1.07	1.26	3.33
32	28.4	95.2	0.25	0.25	0.18	0.6	0.67		0.65		0.61		1.3	1.18		1.13	1.3	1.47	1.45	1.36	1.22	1.43	2.89
* 33	29.0	95.3	0.23	0.23	0.02	0.0	0.65	*	0.62	*	0.10		1.0	1.17		1.12	1.5	1.49	1.47	1.58	1.28	1.51	3.42
34	29.8	95.7	0.00	0.00	0.00	0.0	0.00		0.00		0.00		0.9	1.00		0.96	1.0	0.98	0.96	1.08	0.56	0.66	2.75
* 35	30.6	95.6				0.0	0.59	*	0.57	*	0.03		0.6	0.66		0.63	0.6	0.58	0.57	0.64	0.29	0.34	1.55
36	31.4	95.7				0.0	0.00		0.00		0.00		0.3	0.37		0.35	0.6	0.61	0.60	0.65	0.76	0.90	1.65
37	32.2	95.7				0.0							0.2	0.22		0.21	0.2	0.19	0.19	0.22	0.10	0.11	0.55
38	33.0	95.9				0.0							0.0	0.13		0.12	0.4	0.42	0.42	0.45	0.40	0.47	1.37
39	34.5	96.2				0.0							0.0	0.00		0.00	0.0	0.03	0.00	0.00	0.29	0.29	0.86
40	49.7	97.1				0.0							0.0				0.0	0.00			0.00	0.00	0.00
41	71.7	97.8				0.0							0.0				0.0						
42	71.9	98.4				0.0							0.0				0.0						
Total							5	*	2	*	0	*		5	*	5	*	4	* 0	* 0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5e. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 5.

Calibration details for Gilligan Creek

Transect 5

	WSE (ft)		93.82		94.01				94.24				94.47				94.96	
	Disch (cfs)		4		11				25				46				114	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.1			0.0					0.0					0.0						
2	0.0	100.0			0.0					0.0					0.0						
3	1.5	98.0			0.0					0.0					0.0						
4	6.2	97.0			0.0					0.0					0.0						
5	9.0	96.4			0.0					0.0					0.0					0.00	0.00
6	12.4	94.7			0.0					0.0					0.0					0.05	0.05
7	13.3	94.5			0.0					0.0					0.0	0.00		0.00		0.08	0.08
8	13.6	94.3	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.05		0.05		0.10	0.10
9	14.6	93.8	0.01	0.01	0.0	0.06		0.06		0.1	0.10		0.10		0.0	0.13		0.13		0.14	0.14
10	15.4	94.2	0.00	0.00	0.0	0.00		0.00		0.1	0.11		0.11		0.4	0.39		0.39		2.12	2.10
11	16.4	93.4	1.14	1.15	0.6	0.63		0.63		0.4	0.35		0.35		0.2	0.21		0.21		0.08	0.08
12	17.2	93.4	0.72	0.72	0.8	0.68		0.68		0.4	0.58		0.58		0.6	0.49		0.49		0.30	0.31
13	18.0	93.4	0.77	0.77	1.0	0.98		0.98		1.0	1.07		1.07		1.1	1.07		1.07		0.86	0.87
14	18.5	93.5	1.53	1.53	1.4	1.44		1.44		1.3	1.24		1.24		1.0	1.03		1.03		0.63	0.64
15	19.0	93.5	0.72	0.73	0.9	0.94		0.94		1.1	1.04		1.03		1.0	1.04		1.04		0.85	0.86
* 16	19.5	93.6	0.68	0.73	1.0	0.84		0.92		0.6	0.90	*	0.99	*	1.1	0.88	*	0.98		0.70	0.79
* 17	20.2	93.3	0.04	0.08	0.2	0.25		0.34		1.5	0.95	*	0.99	*	1.8	2.38	*	2.05		7.52	4.98
18	20.9	93.4	0.16	0.16	0.6	0.58		0.58		1.3	1.48		1.48		2.9	2.76		2.76		5.66	5.73
19	21.6	93.4	0.67	0.67	1.4	1.31		1.31		1.7	2.05	*	2.04		2.9	2.65		2.65		3.16	3.21
20	22.3	93.8	0.66	0.66	1.6	1.49		1.49		2.1	2.58	*	2.58	*	4.0	3.62		3.63		4.86	4.93
21	23.0	93.3	0.31	0.31	0.9	0.83		0.83		1.3	1.65	*	1.65	*	2.9	2.58		2.59		4.06	4.12
22	23.7	93.4	0.63	0.63	1.4	1.30		1.30		1.7	2.10	*	2.10	*	3.1	2.80		2.80		3.47	3.52
23	24.4	93.2	0.60	0.60	1.2	1.20		1.20		1.8	1.89		1.89		2.5	2.47		2.47		2.98	3.02
24	25.1	93.5	1.39	1.39	1.5	1.50		1.50		1.4	1.43		1.43		1.3	1.29		1.29		0.89	0.91
25	25.8	93.4	0.77	0.77	1.0	0.98		0.98		1.0	1.07		1.07		1.1	1.07		1.07		0.86	0.87
26	26.5	93.4	0.41	0.41	0.7	0.76		0.76		1.3	1.13		1.13		1.3	1.42		1.42		1.62	1.63
27	27.2	93.5	0.48	0.48	0.7	0.80		0.80		1.4	1.09	*	1.09	*	1.1	1.28		1.28		1.32	1.33
* 28	27.9	93.6	0.09	0.05	0.3	0.25		0.17		0.3	0.49		0.44		1.0	0.77	*	0.83		1.22	1.73
29	28.6	93.4	0.19	0.20	0.6	0.66		0.66		1.9	1.61		1.61		2.6	2.91		2.91		5.67	5.73
30	29.3	93.2	0.46	0.46	1.2	1.17		1.17		2.0	2.23		2.23		3.5	3.35		3.35		5.00	5.06
31	30.0	93.5	0.57	0.57	1.5	1.50		1.50		2.8	2.95		2.95		4.6	4.54		4.55		7.02	7.11
32	30.7	93.5	1.53	1.53	2.3	2.41		2.41		3.4	3.15		3.15		3.4	3.58		3.58		3.51	3.55
33	31.4	93.4	0.48	0.48	1.1	1.26		1.26		3.2	2.49	*	2.49	*	3.3	3.85		3.85		5.99	6.05
34	32.1	93.3	1.19	1.19	2.1	2.12		2.12		3.0	3.04		3.04		3.7	3.71		3.71		4.04	4.09
35	32.8	93.4	1.16	1.17	2.0	2.02		2.02		2.8	2.84		2.84		3.4	3.41		3.41		3.63	3.67
36	33.5	93.4	0.98	0.98	1.6	1.55		1.54		1.8	2.01		2.01		2.4	2.28		2.28		2.23	2.26
37	34.2	93.6	0.63	0.63	1.2	1.13		1.13		1.4	1.65		1.65		2.2	2.03		2.03		2.25	2.28
38	34.9	93.6	0.32	0.32	0.6	0.66		0.66		1.3	1.08		1.08		1.3	1.46		1.46		1.83	1.85
* 39	35.6	93.8	0.05	0.03	0.0	0.21	*	0.16		0.6	0.64		0.59		1.4	1.38		1.46		3.47	4.64
40	36.3	93.8	0.00	0.00	0.0	0.04		0.04		0.3	0.33		0.34		1.5	1.47		1.47		10.90	10.77
41	36.6	94.5	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.23	0.23
42	37.2	94.5			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.23	0.23
43	37.5	94.2			0.0					0.2	0.23		0.23		1.5	1.47		1.47		19.31	18.98
44	38.1	94.3			0.0					0.0	0.00		0.00		0.9	0.90		0.90		1.63	1.65
45	38.5	94.7			0.0					0.0					0.0	0.00		0.00		0.87	0.88
46	42.0	94.9			0.0					0.0					0.0					0.31	0.31
47	45.0	95.2			0.0					0.0					0.0					0.00	0.00
48	46.5	95.4			0.0					0.0					0.0						
49	46.7	96.0			0.0					0.0					0.0						
Total							1	*	0	*		8	*	7	*		3	*	0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5f. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 6.

Calibration details for Gilligan Creek

Transect 6

	WSE (ft)		94.06		94.25				94.42				94.64				94.95	
	Disch (cfs)		4		11				25				46				114	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.9			0.0					0.0					0.0						
2	0.0	99.9			0.0					0.0					0.0						
3	2.0	99.5			0.0					0.0					0.0	0.00		0.00		0.00	0.00
4	4.7	94.6			0.0					0.0					0.0	0.04		0.04		0.30	0.34
5	5.5	94.6			0.0					0.0	0.00		0.00		0.1	0.04		0.04		0.30	0.34
* 6	6.5	94.4			0.0					0.1	0.09		0.29		1.2	0.93	*	1.03		22.80	1.75
7	7.1	94.6			0.0					0.0	0.00		0.00		0.0	0.15		0.14		1.10	1.24
8	9.0	94.6			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.15		0.14		1.10	1.24
* 9	9.1	94.2	0.00	0.00	0.4	0.62	*	0.37		1.2	0.47	*	0.27	*	0.2	0.36		0.20		0.19	0.12
* 10	9.6	93.9	0.03	0.03	0.1	0.13		0.12		0.8	0.41	*	0.34	*	0.7	0.92	*	0.73		2.43	2.02
11	10.1	93.7	0.04	0.04	0.2	0.20		0.18		0.7	0.66		0.60		1.6	1.51		1.39		4.12	4.38
12	10.8	94.1	0.00	0.00	1.6	1.62		1.49		3.0	2.82		2.59		4.0	4.01		3.73		5.37	5.78
* 13	11.5	93.6	0.66	0.63	1.8	1.48		1.50		1.8	2.69	*	2.84	*	5.1	3.93	*	4.37		5.50	7.47
14	12.2	94.0	0.92	0.86	2.0	2.03		1.87		3.9	3.63		3.32		5.2	5.24		4.86		7.19	7.71
15	12.8	93.9	2.49	2.17	3.6	3.44		3.07		3.8	4.19		3.85		4.8	4.56		4.34		4.10	4.68
* 16	13.4	93.4	0.99	1.14	2.2	1.76	*	2.05		1.6	2.61	*	3.13	*	4.4	3.29	*	4.09		3.69	5.49
17	14.0	93.4	0.72	0.73	1.3	1.46		1.40		3.3	2.44	*	2.23	*	2.9	3.34		3.01		4.25	4.24
18	14.6	93.6	0.11	0.13	0.2	0.27		0.28		1.2	0.56	*	0.51	*	0.6	0.88	*	0.75		1.39	1.19
19	15.2	93.9	0.68	0.73	0.4	0.50		0.49		0.6	0.37	*	0.34	*	0.2	0.28		0.24		0.14	0.14
20	15.9	93.7	2.10	1.91	1.9	1.95		1.78		1.8	1.73		1.59		1.4	1.48		1.39		0.94	1.03
21	16.6	93.5	3.30	3.01	3.2	3.28		2.99		3.2	3.07		2.81		2.6	2.74		2.57		1.84	2.02
* 22	17.3	93.6	0.05	0.08	0.3	0.36		0.39		2.8	1.61	*	1.36	*	3.8	4.58	*	3.32		17.21	11.25
* 23	18.0	93.6	0.07	0.11	0.3	0.34		0.41		1.8	1.20	*	1.14	*	2.5	2.84		2.30		8.18	5.95
24	18.7	93.6	1.57	1.48	2.9	2.97		2.74		5.1	4.68		4.29		6.0	6.16		5.71		7.36	7.88
25	19.4	93.6	1.51	1.37	2.6	2.59		2.35		3.8	3.76		3.45		4.7	4.66		4.37		5.10	5.60
* 26	20.1	93.7	0.74	0.73	1.7	1.39		1.44		1.4	2.17	*	2.36	*	3.7	2.84	*	3.25		3.36	4.72
* 27	20.8	93.6	0.36	0.37	0.8	0.64		0.68		0.6	0.96	*	1.07	*	1.6	1.21	*	1.42		1.36	1.95
28	21.5	93.6	0.09	0.08	0.2	0.19		0.17		0.3	0.33		0.30		0.5	0.46		0.44		0.61	0.69
29	22.2	93.5	0.58	0.53	1.2	1.19		1.08		2.0	1.99		1.82		2.8	2.74		2.56		3.50	3.83
30	22.9	94.0	1.03	0.88	1.8	1.65		1.46		1.9	2.27		2.08		3.0	2.70		2.59		2.77	3.23
31	23.6	93.8	1.00	0.94	1.9	1.94		1.79		3.4	3.13		2.87		4.1	4.19		3.89		5.14	5.50
32	24.3	93.7	0.38	0.35	1.1	1.06		0.96		2.2	2.27		2.08		4.0	3.74		3.51		6.26	6.91
33	25.0	93.7	0.51	0.50	1.1	1.17		1.10		2.6	2.16		1.98	*	3.0	3.20		2.93		4.57	4.72
34	25.7	94.0	0.84	0.93	0.0	1.39	*	1.40	*	1.9	1.94		1.86		2.4	2.35		2.19		2.47	2.51
35	26.4	94.2	0.00	0.00	0.0	1.09	*	0.98	*	1.1	1.14		1.04		1.1	1.10		1.04		0.83	0.94
* 36	27.1	94.6			0.0	0.00		0.00		0.0	0.00		0.00		0.4	0.16	*	0.34		1.20	2.92
37	27.8	94.3			0.0					0.0	0.05		0.05		0.1	0.09		0.09		0.12	0.13
38	28.3	94.6			0.0					0.0	0.00		0.00		0.0	0.01		0.01		0.08	0.09
39	36.2	94.6			0.0					0.0	0.00		0.00		0.0	0.01		0.01		0.08	0.09
40	36.4	94.4			0.0					0.0	0.35	*	0.32	*	1.3	1.18		1.12		1.69	1.90
41	36.9	94.5			0.0					0.0	0.00		0.00		0.7	0.59		0.56		1.13	1.27
42	37.2	94.6			0.0					0.0					0.0	0.13		0.12		0.96	1.07
43	38.0	95.7			0.0					0.0					0.0	0.00		0.00		0.00	0.00
44	41.3	95.8			0.0					0.0					0.0						
45	41.4	96.3			0.0					0.0					0.0						
Total						4	*	2	*		12	*	13	*		9	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5g. Summary of calibration details for original and revised input decks, Gilligan Creek Transect 7.

Calibration details for Gilligan Creek

Transect 7

	WSE (ft)		95.31		95.54					95.76				96.08				96.47	
	Disch (cfs)		4		11					25				46				114	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	98.9																			
	2	0.0	98.5																			
	3	1.5	97.4																			
	4	5.8	97.1																		0.00	0.00
	5	7.0	96.4																		0.35	0.38
	6	9.0	96.1																		1.03	1.12
	7	11.5	96.4													0.0	0.00		0.00		0.35	0.38
	8	11.8	95.9								0.0	0.00		0.00		0.0	0.76	*	0.75	*	1.37	1.49
	9	12.1	95.8								0.0	0.16		0.16		1.2	1.07		1.07		1.53	1.66
	10	12.4	96.0								0.0	0.00		0.00		0.0	0.03		0.03		0.10	0.11
	11	12.5	96.6								0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	12	13.5	96.4								0.0	0.00		0.00		0.0	0.00		0.00		0.03	0.03
	13	13.6	95.8								0.0	0.01		0.01		0.1	0.09		0.09		0.13	0.14
	14	14.0	95.8			0.0	0.00				0.0	0.05		0.05		0.4	0.36		0.36		0.51	0.55
*	15	14.5	95.5			0.0	0.13				0.0	0.42	*	0.25		0.6	0.57		0.53		0.60	1.40
*	16	15.0	95.5			0.0	0.16				0.3	0.35		0.35		0.6	0.56		0.55		0.91	0.93
	17	15.1	96.2			0.0	0.00				0.0	0.00		0.00		0.0	0.00		0.00		0.07	0.07
	18	16.8	96.5	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	19	16.9	94.7	0.09	0.09	0.2	0.23		0.22		0.4	0.41		0.40		0.6	0.59		0.59		0.80	0.87
*	20	17.5	94.8	0.03	0.02	0.1	0.17		0.11		1.0	0.58	*	0.38	*	1.0	1.31	*	0.87		3.58	2.57
	21	18.0	94.3	0.40	0.39	1.0	0.93		0.90		1.1	1.67	*	1.64	*	2.9	2.35		2.35		3.11	3.45
	22	18.5	94.3	0.85	0.83	1.8	1.64		1.60		1.7	2.54	*	2.49	*	3.9	3.19		3.20		3.58	3.97
	23	19.0	94.3	1.60	1.56	2.7	2.53		2.47		2.5	3.34	*	3.27	*	4.3	3.74		3.74		3.52	3.88
	24	19.5	94.5	2.02	2.00	2.9	3.12		3.06		4.0	4.02		3.93		4.4	4.43		4.39		4.08	4.41
	25	20.0	94.6	1.43	1.44	2.3	2.68		2.64		4.5	4.04		3.95		4.7	5.00		4.93		5.46	5.85
	26	20.5	94.2	1.32	1.32	2.1	2.47		2.43		4.2	3.72		3.64		4.3	4.60		4.54		5.04	5.40
	27	21.0	94.5	0.55	0.55	1.2	1.43		1.41		3.0	2.82		2.75		4.1	4.24		4.19		6.21	6.67
	28	21.5	94.2	0.30	0.30	0.7	0.87		0.86		2.1	1.89		1.84		2.9	3.06		3.02		5.01	5.36
	29	22.0	94.1	0.07	0.07	0.3	0.33		0.32		0.8	1.03	*	1.01	*	2.5	2.18		2.17		5.29	5.78
*	30	22.5	94.2	0.15	0.18	0.5	0.46		0.53		0.6	1.02	*	1.19	*	2.2	1.68	*	2.00		2.82	3.69
	31	23.0	94.2	0.22	0.21	0.6	0.62		0.60		1.0	1.31	*	1.28	*	2.4	2.09		2.08		3.33	3.66
	32	23.5	94.4	0.28	0.28	0.7	0.76		0.74		1.3	1.51		1.48		2.5	2.31		2.30		3.47	3.77
	33	24.0	94.3	0.18	0.18	0.5	0.61		0.60		1.5	1.48		1.44		2.6	2.61		2.58		4.86	5.23
*	34	24.5	94.7	0.02	0.05	0.1	0.17		0.29		1.5	1.05	*	1.17	*	3.2	3.75		3.04		19.84	10.79
	35	25.1	94.5	0.07	0.07	0.3	0.33		0.32		0.8	1.08	*	1.06	*	2.8	2.38		2.37		6.17	6.76
	36	25.5	94.7	0.05	0.05	0.2	0.26		0.26		1.0	0.97		0.94		2.3	2.32		2.29		6.79	7.27
	37	26.0	94.7	0.02	0.02	0.1	0.12		0.12		0.5	0.59		0.58		1.9	1.72		1.70		6.68	7.25
	38	26.5	94.8	0.04	0.04	0.0	0.11		0.11		0.2	0.23		0.23		0.4	0.37		0.37		0.61	0.62
	39	26.6	95.7	0.00	0.00	0.0	0.00		0.00		0.0	0.05		0.05		0.1	0.09		0.09		0.11	0.12
	40	27.0	95.8								0.0	0.05		0.05		0.4	0.36		0.36		0.51	0.55
	41	28.8	96.5								0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	42	32.6	97.3																			
	43	33.6	99.3																			
	44	33.7	99.5																			
Total							0	*	0	*		10	*	9	*		3	*	1	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 6. Summary of Calibration Details, Gilligan Creek.

Transect	1	2	3	4	5	6	7
Discharge							
	11	12	8	11	11	11	11
Meas.	25	26	23	23	25	27	23
	53	48	45	44	46	48	49
	13	13	8	12	12	13	10
Calc.	24	26	21	22	25	24	22
	45	48	43	42	46	48	47
	11	12	11	11	11	11	11
Given	25	26	25	25	25	25	25
	46	46	46	46	46	46	46
Stage (given)							
	97.55	97.58	95.63	95.64	94.01	94.25	95.54
	97.77	97.80	95.91	95.92	94.24	94.42	95.76
	98.02	98.09	96.13	96.17	94.47	94.64	96.08
Plotting Stage (given)							
	0.844	0.870	1.090	1.100	0.570	0.700	0.980
	1.060	1.090	1.370	1.380	0.800	0.870	1.200
	1.310	1.380	1.590	1.630	1.030	1.090	1.520
Ratio of Measured vs Predicted Discharge (given)							
	1.006	0.966	0.991	1.002	0.997	0.945	0.963
	0.987	1.071	1.022	0.965	1.007	1.117	1.072
	1.007	0.967	0.987	1.021	0.996	0.945	0.969
Mean Error of Stage/Discharge Relationship for Calculated Q							
	0.17	2.85	3.56	3.88	1.13	0.25	1.58
Mean Error of Stage/Discharge Relationship for Given Q							
	0.87	4.53	1.46	2.42	0.46	7.31	4.58
Stage/Discharge Relationship (S vs Q) S=A*Q**B+SZF							
A=	0.348	0.365	0.675	0.523	0.181	0.292	0.490
B=	0.349	0.342	0.229	3.079	0.451	0.342	0.294
SZF=	96.71	96.71	94.54	94.54	93.44	93.55	94.56
B Coefficient log/log Relationship (calculated)							
	2.863	2.921	4.362	3.247	2.192	2.926	3.401

APPENDIX E

Upper Mundt Creek Final IFIM Calibration Report

Upper Mundt Creek Final IFIM Calibration Report

Prepared for

Dr. Hal Beecher

Prepared by

Cascades Environmental Services, Inc.

July 24, 1996

Table 1. Original, uncalibrated data deck, Upper Mundt Creek.

```
Table 1.  Original data deck for Upper Mundt Creek.

INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #  Upper Mundt Creek - Original, unrevised deck
IOC       1100000201001
QARD  1.0
QARD  2.0
QARD  3.0
QARD  4.0
QARD  5.0
QARD  6.0
QARD  7.0
QARD  8.0
QARD  9.0
QARD 10.0
QARD 11.0
QARD 12.0
QARD 13.0
QARD 14.0
QARD 15.0
QARD 16.0
QARD 17.0
QARD 18.0
QARD 19.0
QARD 20.0
QARD 22.0
QARD 24.0
QARD 26.0
QARD 28.0
QARD 30.0
QARD 32.0
QARD 34.0
QARD 36.0
QARD 38.0
QARD 39.0
XSEC     1                    92.57     0.003
         1  0.0 96.3  0.1 96.2  0.7 94.1  1.7 93.6  1.8 93.6  2.0 93.3
         1  2.5 93.3  3.0 93.2  3.5 93.2  4.0 93.2  4.5 93.2  5.0 93.1
         1  5.5 93.1  6.0 93.0  6.5 92.9  7.0 92.8  7.5 92.8  8.0 92.7
         1  8.5 92.8  9.0 92.5  9.5 92.4 10.0 92.5 10.5 92.2 11.0 92.2
         1 11.5 92.4 12.0 92.0 12.5 92.1 13.0 92.1 13.5 92.1 14.0 92.4
         1 14.5 92.6 15.0 92.7 15.5 92.8 16.0 93.0 16.5 93.0 17.0 93.2
         1 17.5 93.3 18.0 93.3 18.2 93.6 18.3 93.1 19.1 95.0 19.2 95.3
NS       1  0.0 80.8  0.0 80.8  0.0 80.8  0.0 80.7  0.0 80.7  0.0 22.9
NS       1  0.0 22.9  0.0 22.9  0.0 22.9  0.0 34.9  0.0 34.9  0.0 34.9
NS       1  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.8  0.0 34.8
NS       1  0.0 34.7  0.0 62.6  0.0 62.6  0.0 86.9  0.0 86.9  0.0 86.6
NS       1  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 25.6  0.0 82.6
NS       1  0.0 82.6  0.0 23.9  0.0 23.9  0.0 23.9  0.0 32.7  0.0 32.7
NS       1  0.0 32.8  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     1    93.61     15.31
VEL1     1                         -0.1  0.0  0.0  0.2  0.4  0.9  0.9
VEL1     1  1.1  1.3  1.6  1.5  1.0  1.4  2.1  1.3  1.0  1.2  1.5  2.1
VEL1     1  2.2  2.1  1.8  1.5  1.0  0.4  0.4  0.2  0.1  0.1 -0.2 -0.0
VEL1     1 -0.0  0.0
CAL2     1   93.375      6.02
```

Table 1. Original, uncalibrated data deck, Upper Mundt Creek. - **Continued**

```
VEL2     1                                0.0   0.0   0.1   0.1   0.1   0.3   0.5
VEL2     1  0.5   0.6   0.6   0.7   0.4   0.4   1.0   1.0   0.8   0.8   0.8   0.9
VEL2     1  1.1   0.9   0.8   0.8   0.5   0.4   0.3   0.2   0.1   0.1   0.1   0.0
VEL2     1  0.0   0.0
CAL3     1   93.065       2.43
VEL3     1
VEL3     1             0.3   0.5   0.6   0.6   0.6   0.6   0.4   0.3   0.3   0.4
VEL3     1  0.4   0.5   0.6   0.5   0.4   0.3   0.1   0.1   0.0
VEL3     1
XSEC     2                   92.57      0.003
         2  0.0  97.0   0.1  96.7   3.2  93.7   4.5  93.6   4.8100.5   5.5  93.6
         2  7.0  92.9   7.3  92.8   7.7  92.7   8.0  92.6   8.3  92.6   8.6  92.5
         2  8.9  92.6   9.2  92.6   9.5  92.6   9.8  92.6  10.1  92.6  10.4  92.2
         2 10.7  92.3  11.0  92.1  11.3  92.2  11.6  92.2  11.9  92.3  12.2  92.3
         2 12.5  92.4  12.8  92.4  13.1  92.1  13.4  92.2  13.7  92.2  14.0  92.4
         2 14.3  92.4  14.6  92.4  14.8100.5  14.9  93.7  15.7  94.1  16.7  93.8
         2 17.0  94.8  18.7  94.3  21.3  96.3  21.5  96.7
NS       2  0.0  99.9   0.0  99.9   0.0  92.8   0.0  94.6   0.0  94.6   0.0  22.9
NS       2  0.0  22.9   0.0  22.9   0.0  22.9   0.0  22.9   0.0  22.9   0.0  85.8
NS       2  0.0  85.8   0.0  85.8   0.0  85.8   0.0  85.8   0.0  85.8   0.0  48.6
NS       2  0.0  48.6   0.0  48.5   0.0  48.5   0.0  83.7   0.0  83.7   0.0  83.8
NS       2  0.0  83.8   0.0  83.8   0.0  88.9   0.0  88.9   0.0  88.9   0.0  88.9
NS       2  0.0  88.9   0.0  88.9   0.0  88.9   0.0  88.9   0.0  88.9   0.0  84.8
NS       2  0.0  84.8   0.0  99.9   0.0  99.9   0.0   0.0
CAL1     2    93.64      13.96
VEL1     2                                0.0   0.0   0.0   0.1   0.0   0.2   0.5
VEL1     2  0.8   1.0   1.7   1.9   1.9   1.8   1.9   1.7   1.2   0.8   0.5   0.7
VEL1     2  1.0   1.2   2.7   3.3   3.2   3.9   3.7   2.4
VEL1     2
CAL2     2   93.375       6.41
VEL2     2                                      0.0   0.0   0.1   0.1   0.1   0.1
VEL2     2  0.3   0.2   0.5   0.7   1.1   1.1   1.2   1.2   1.2   1.1   1.4   1.7
VEL2     2  1.2   1.2   1.1   1.4   1.4   1.1   0.4   0.2
VEL2     2
CAL3     2   93.075       2.66
VEL3     2                                      0.0   0.0   0.0   0.0   0.1   0.2
VEL3     2  0.3   0.3   0.6   0.7   0.7   0.6   0.7   0.6   0.5   0.5   0.4   0.3
VEL3     2  0.3   0.8   1.1   1.3   1.0   0.6   0.1
VEL3     2
XSEC     3                   92.57      0.003
         3  0.0  95.7   0.1  95.6   2.0  94.2   2.1100.5   2.2  93.2   2.6  92.6
         3  3.0  92.3   3.3  91.8   3.6  91.8   3.9  91.7   4.2  91.5   4.5  91.4
         3  4.8  91.8   5.1  91.9   5.4  92.0   5.7  92.0   6.0  91.7   6.3  91.7
         3  6.6  91.6   6.9  91.5   7.2  92.7   7.5  92.6   7.8  92.6   8.1  92.6
         3  8.4  92.8   8.7  92.8   9.0  92.8   9.3  92.8   9.7  93.0  10.0  93.1
         3 10.3  93.0  10.6  93.1  10.9  93.0  11.2  93.3  11.5  93.3  11.8  93.3
         3 12.1  93.4  12.4  93.5  12.7  93.6  13.0  93.6  13.3  93.7  13.5100.5
         3 13.6  93.7  17.0  94.0  18.3  94.4  18.5  95.7  20.6  97.3  25.2  97.7
         3 26.1100.3  26.1100.5
NS       3  0.0  99.9   0.0  99.9   0.0  99.9   0.0  99.9   0.0  99.9   0.0  43.7
NS       3  0.0  43.7   0.0  43.7   0.0  43.7   0.0  43.7   0.0  43.7   0.0  43.7
NS       3  0.0  43.7   0.0  43.7   0.0  43.7   0.0  43.7   0.0  58.8   0.0  58.8
NS       3  0.0  85.9   0.0  85.9   0.0  85.9   0.0  85.9   0.0  85.9   0.0  85.9
NS       3  0.0  85.9   0.0  85.9   0.0  85.9   0.0  85.9   0.0  85.9   0.0  83.9
NS       3  0.0  83.9   0.0  83.9   0.0  83.9   0.0  85.6   0.0  85.6   0.0  85.6
NS       3  0.0  85.6   0.0  85.6   0.0  43.8   0.0  43.8   0.0  43.8   0.0  43.8
NS       3  0.0  43.8   0.0  20.8   0.0  80.7   0.0  80.7   0.0  80.7   0.0  80.7
```

Table 1. Original, uncalibrated data deck, Upper Mundt Creek. - **Continued**

```
NS        3  0.0 80.7  0.0 80.7
CAL1      3    93.77      20.35
VEL1      3                       3.9  2.7  1.8  1.6  1.1  0.4  0.7  0.3
VEL1      3  1.0  0.9  0.9  0.8  0.8  0.7  0.4  0.7  2.5  4.0  4.1  4.5
VEL1      3  4.2  4.3  5.0  4.7  3.3  3.2  1.9  0.9  0.5  0.7 -1.0 -0.9
VEL1      3 -0.7 -0.5 -0.3 -0.3  0.0
VEL1      3
CAL2      3   93.385       8.57
VEL2      3                       1.1  0.5  0.7  1.0  0.3  0.4  0.3  0.4
VEL2      3  0.3  0.4  0.4  0.3  0.3  0.9  0.6  0.5  3.3  3.1  3.3  3.2
VEL2      3  3.0  2.9  2.7  1.8  0.6  0.7  0.3  0.1  0.1  0.0  0.0  0.0
VEL2      3  0.0
VEL2      3
CAL3      3   93.085        2.8
VEL3      3                                  0.7  0.6  0.3  0.1  0.1  0.3
VEL3      3  0.3  0.2  0.1  0.1  0.1  0.1  0.2  0.2  1.8  2.0  2.2  2.5
VEL3      3  2.3  2.2  2.0  1.9  0.0  0.0            0.0
VEL3      3
VEL3      3
XSEC      4                   97.95     0.009
          4  0.0100.7  0.1100.6  0.5100.4  1.0 99.4  2.1 99.2  2.7 98.7
          4  2.9 98.7  3.0 98.6  3.2 98.6  3.4 98.6  3.5 98.6  3.9 99.1
          4  4.0 98.7  5.0 99.1  6.0 99.8  7.0100.1  8.3100.4  8.4 99.1
          4  8.5 97.9  8.8 97.9  9.0 97.9  9.2 98.0  9.4 97.9  9.6 97.8
          4  9.8 97.8 10.0 98.0 10.2 98.0 10.4 98.0 10.6 97.8 10.8 97.8
          4 11.0 97.8 11.2 97.7 11.4 97.9 11.6 97.9 11.8 97.9 12.0 97.9
          4 12.3 98.2 12.5 98.2 12.8 98.1 13.1 98.0 13.4 98.1 13.7 98.1
          4 14.0 98.2 14.3 98.2 14.6 98.2 14.7 98.3 15.2 98.3 15.5 98.3
          4 16.0 98.4 16.4 98.5 16.8 99.0 16.9 99.3 17.6100.2 18.4100.6
          4 18.5100.8
NS        4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 72.8  0.0 72.8
NS        4  0.0 72.8  0.0 72.8  0.0 53.6  0.0 53.6  0.0 88.9  0.0 82.8
NS        4  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 82.8
NS        4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8
NS        4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 85.8  0.0 85.8  0.0 85.8
NS        4  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS        4  0.0 85.8  0.0 74.7  0.0 74.7  0.0 74.7  0.0 37.9  0.0 37.9
NS        4  0.0 37.9  0.0 37.9  0.0 75.8  0.0 75.8  0.0 45.6  0.0 45.6
NS        4  0.0 45.6  0.0 45.6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS        4  0.0  0.0
CAL1      4    98.95      13.91
VEL1      4                            0.5  0.6  0.7  0.9  0.7  0.2  0.0
VEL1      4  0.0  0.0  0.0  0.0  0.0  0.0  0.9  2.4  3.0  2.8  3.3  3.4
VEL1      4  3.4  1.9  1.4  1.6  1.5  1.7  2.1  2.0  3.5  3.6  3.1  2.8
VEL1      4  2.6  2.4  2.0  1.7  1.5  0.9  0.9  1.6  1.2  1.0  1.3  1.3
VEL1      4  1.0  0.3
CAL2      4    98.66        6.0
VEL2      4                                       0.0  0.0  0.0  0.0  0.0
VEL2      4  0.0  0.0  0.0  0.0  0.0  0.0  0.1  2.4  1.8  2.1  1.6  2.0
VEL2      4  2.3  1.3  0.9  0.5  0.4  0.5  0.6  1.0  1.7  2.4  2.2  2.0
VEL2      4  1.7  1.5  1.1  1.1  1.0  0.7  0.8  1.3  1.0  0.7  0.7  0.7
VEL2      4  0.9  0.3
CAL3      4    98.45        1.64
VEL3      4                                                            0.0
VEL3      4                            0.0  0.0  0.0  0.1  0.6  1.1  0.3
VEL3      4  0.4  0.3  0.5  0.6  0.4  0.7  0.9  0.9  0.3  0.2  0.2  0.6
VEL3      4  1.0  1.3  1.5  1.2  0.6  0.2  0.3  0.7  0.5  0.3
```

Table 1. Original, uncalibrated data deck, Upper Mundt Creek. - **Continued**

```
VEL3     4
XSEC     5                    97.89      0.005
         5  0.0101.3  0.1100.4  1.1 99.9  1.3 98.9  3.4 98.9  4.3 98.8
         5  5.0 98.7  5.1103.7  5.5 98.9  6.0 98.8  6.4 98.8  6.9 98.4
         5  7.3 98.4  7.7 98.6  8.0 98.5  8.3 98.3  8.7 98.4  9.0 98.4
         5  9.4 98.3  9.7 97.6 10.0 98.1 10.3 98.1 10.6 98.1 10.9 97.5
         5 11.2 97.5 11.5 97.5 11.8 97.6 12.1 97.6 12.4 97.6 12.7 97.7
         5 13.0 97.8 13.3 98.0 13.6 98.1 13.9 98.1 14.2 98.2 14.5 98.3
         5 14.8 98.7 15.0103.7 15.1 99.5 15.7100.3 15.8100.5
NS       5  0.0 88.9  0.0 88.9  0.0 46.8  0.0 46.8  0.0 74.9  0.0 42.6
NS       5  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8
NS       5  0.0 23.8  0.0 74.6  0.0 74.6  0.0 74.6  0.0 88.9  0.0 88.9
NS       5  0.0 88.9  0.0 88.9  0.0 88.9  0.0 83.9  0.0 83.9  0.0 83.9
NS       5  0.0 28.7  0.0 28.7  0.0 23.8  0.0 22.9  0.0 22.9  0.0 22.9
NS       5  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 99.9
NS       5  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     5    98.99     12.95
VEL1     5                                           0.0  0.6  0.9  0.4
VEL1     5  0.2  0.6  0.7  1.9  2.7  2.9  2.7  1.5  3.0  3.4  3.6  2.8
VEL1     5  2.7  2.1  2.1  1.8  1.5  1.3  1.1  0.9  0.9  0.8  0.7  0.6
VEL1     5  0.1
CAL2     5   98.715      5.13
VEL2     5                                                          0.1
VEL2     5  0.1  0.4  0.7  1.4  1.8  1.7  1.7  0.5  1.6  1.4  1.6  1.3
VEL2     5  1.5  1.1  1.2  0.9  0.8  0.8  0.8  0.7  0.5  0.5  0.4  0.1
VEL2     5
CAL3     5    98.49       2.36
VEL3     5                                             0.0  0.0  0.0
VEL3     5  0.2  0.2  0.3  0.6  0.9  1.2  1.4  1.1  0.8  0.6  0.2  0.1
VEL3     5  0.1  0.0  0.1  0.5  0.6  1.0  1.1  1.0  0.8  0.6  0.4  0.2
VEL3     5
XSEC     6                    97.91      0.003
         6  0.0101.2  0.1100.7  1.6 99.1  2.0 99.0  2.5 99.0  3.0 99.0
         6  3.5 99.0  4.0 98.9  4.5 98.7  4.8 98.6  5.2 98.4  5.5 98.2
         6  5.8 98.1  6.1 98.0  6.4 97.9  6.7 97.8  7.0 97.6  7.3 97.5
         6  7.6 97.5  7.9 97.4  8.2 97.4  8.4 97.4  8.6 97.3  8.8 97.2
         6  9.0 97.1  9.2 97.1  9.4 97.0  9.6 97.1  9.8 97.1 10.0 96.9
         6 10.2 97.1 10.4 97.3 10.6 97.4 10.8 97.6 11.0 97.7 11.2 98.0
         6 11.4 98.1 11.6 98.5 11.8 98.7 12.0103.7 12.1 99.5 14.7100.2
         6 15.0100.5
NS       6  0.0 88.9  0.0 88.9  0.0 82.7  0.0 82.7  0.0 82.7  0.0 82.7
NS       6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 63.7
NS       6  0.0 63.7  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 62.8  0.0 62.8  0.0 62.8  0.0 99.9
NS       6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       6  0.0  0.0
CAL1     6    99.06     14.98
VEL1     6                 0.0  0.0  0.1  0.1  0.2  0.1  0.2  0.2  0.2
VEL1     6  0.3  0.2  0.4  0.2  0.4  0.5  0.4  0.3  0.4  0.2  0.4  0.5
VEL1     6  0.9  1.9  2.7  3.7  3.3  4.5  6.1  3.0  2.3  2.7  1.9  1.9
VEL1     6  1.0  0.4  1.0
CAL2     6    98.76      5.57
VEL2     6                                         -0.7 -0.4  0.1  0.5
VEL2     6  0.6  0.4  0.4  0.6  0.4  0.4  0.3  0.6  1.0  1.1  0.9  0.5
VEL2     6  0.5  0.4  0.3  0.5  1.3  1.0  1.7  2.0  1.3  0.9  0.5  0.4
```

Table 1. Original, uncalibrated data deck, Upper Mundt Creek. - **Continued**

```
VEL2      6  0.5  0.2  0.0
CAL3      6    98.52       2.31
VEL3      6                                                                  0.0
VEL3      6 -0.6 -0.4 -0.5 -0.1  0.2  0.2  0.4  0.6  1.0  1.5  1.1  1.1
VEL3      6  1.1  0.6  0.5  0.2  0.2  0.2  0.1  0.1  0.3  0.1  0.2  0.1
VEL3      6 -0.3
ENDJOB
```

Table 2a. Revised Upper Mundt Creek data deck for flows to 10 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #  Upper Mundt Creek - low flow deck to 10 cfs
IOC       1000000201001
QARD  1.0
QARD  2.0
QARD  3.0
QARD  4.0
QARD  5.0
QARD  6.0
QARD  7.0
QARD  8.0
QARD  9.0
QARD 10.0
QARD 11.0
QARD 12.0
QARD 13.0
QARD 14.0
QARD 15.0
XSEC      1                    92.57      0.003
          1  0.0 96.3  0.1 96.2  0.7 94.1  1.7 93.6  1.8 93.6  2.0 93.3
          1  2.5 93.3  3.0 93.2  3.5 93.2  4.0 93.2  4.5 93.2  5.0 93.1
          1  5.5 93.1  6.0 93.1  6.5 92.9  7.0 92.8  7.5 92.8  8.0 92.7
          1  8.5 92.8  9.0 92.5  9.5 92.4 10.0 92.5 10.5 92.2 11.0 92.2
          1 11.5 92.4 12.0 92.0 12.5 92.1 13.0 92.1 13.5 92.1 14.0 92.4
          1 14.5 92.6 15.0 92.7 15.5 92.8 16.0 93.0 16.5 93.1 17.0 93.2
          1 17.5 93.3 18.0 93.3 18.2 93.6 18.3 93.1 19.1 95.0 19.2 95.3
NS        1  0.0 80.8  0.0 80.8  0.0 80.8  0.0 80.7  0.0 80.7  0.0 22.9
NS        1  0.0 22.9  0.0 22.9  0.0 22.9  0.0 34.9  0.0 34.9  0.0 34.9
NS        1  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.8  0.0 34.8
NS        1  0.0 34.7  0.0 62.6  0.0 62.6  0.0 86.9  0.0 86.9  0.0 86.6
NS        1  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 25.6  0.0 82.6
NS        1  0.0 82.6  0.0 23.9  0.0 23.9  0.0 23.9  0.0 32.7  0.0 32.7
NS        1  0.0 32.8  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1      1    93.61      15.31
VEL1      1                          -0.1  0.0  0.1  0.2  0.4  0.9  0.9
VEL1      1  1.1  1.3  1.6  1.5  1.0  1.4  2.1  1.3  1.0  1.2  1.5  2.1
VEL1      1  2.2  2.1  1.8  1.5  1.0  0.4  0.4  0.2  0.1  0.1 -0.2 -0.0
VEL1      1 -0.0  0.0
CAL2      1   93.325       6.02
VEL2      1                           0.0  0.0  0.1  0.1  0.1  0.3  0.5
VEL2      1  0.5  0.6  0.6  0.7  0.0  0.0  1.0  1.0  0.8  0.8  0.8  0.9
VEL2      1  1.1  0.9  0.8  0.8  0.5  0.4  0.3  0.2  0.1  0.1  0.1  0.0
VEL2      1  0.0  0.0
CAL3      1   93.065       2.43
VEL3      1
VEL3      1            0.3  0.5  0.6  0.6  0.6  0.6  0.4  0.3  0.3  0.4
VEL3      1  0.4  0.5  0.6  0.5  0.4  0.3  0.1  0.1  0.0
VEL3      1
XSEC      2                    92.57      0.003
          2  0.0 97.0  0.1 96.7  3.2 93.7  4.5 93.6  4.8 93.7  5.5 93.6
          2  7.0 92.9  7.3 92.8  7.7 92.7  8.0 92.6  8.3 92.6  8.6 92.5
          2  8.9 92.6  9.2 92.6  9.5 92.6  9.8 92.6 10.1 92.6 10.4 92.2
```

Table 2a. Revised Upper Mundt Creek data deck for flows to 10 cfs. - **Continued**

```
         2 10.7 92.3 11.0 92.1 11.3 92.2 11.6 92.2 11.9 92.3 12.2 92.3
         2 12.5 92.4 12.8 92.4 13.1 92.1 13.4 92.2 13.7 92.2 14.0 92.4
         2 14.3 92.4 14.6 93.1 14.8 93.8 14.9 93.8 15.7 94.1 16.7 93.8
         2 17.0 94.8 18.7 94.3 21.3 96.3 21.5 96.7
NS       2  0.0 99.9  0.0 99.9  0.0 92.8  0.0 94.6  0.0 94.6  0.0 22.9
NS       2  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 85.8
NS       2  0.0 85.8  .13 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 48.6
NS       2  0.0 48.6  0.0 48.5  0.0 48.5  0.0 83.7  0.0 83.7  0.0 83.8
NS       2  0.0 83.8  0.0 83.8  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       2  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 84.8
NS       2  0.0 84.8  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     2    93.64     13.96
VEL1     2                          0.0  0.0  0.0  0.1  0.0  0.2  0.5
VEL1     2  0.8  1.0  1.7  1.8  1.9  1.8  1.9  1.7  1.2  0.8  0.5  0.7
VEL1     2  1.0  1.2  2.7  3.3  3.2  3.9  3.2  2.4
VEL1     2
CAL2     2   93.375      6.41
VEL2     2                               0.0  0.0  0.0  0.1  0.1  0.1
VEL2     2  0.3  0.0  0.0  0.0  1.1  1.1  1.2  1.2  1.2  1.1  1.4  0.5
VEL2     2  0.6  1.2  1.1  1.4  1.4  1.1  0.4  0.0
VEL2     2
CAL3     2   93.075       2.66
VEL3     2                               0.0  0.0  0.1  0.0  0.1  0.2
VEL3     2  0.3  0.3  0.6  0.7  0.7  0.6  0.7  0.6  0.7  0.5  0.4  0.3
VEL3     2  0.3  0.8  1.1  1.3  1.0  0.6  0.2
VEL3     2
XSEC     3                   92.57     0.003
         3  0.0 95.7  0.1 95.6  2.0 94.2  2.1 93.8  2.2 93.2  2.6 92.6
         3  3.0 92.3  3.3 91.8  3.6 91.8  3.9 91.7  4.2 91.5  4.5 91.4
         3  4.8 91.8  5.1 91.9  5.4 92.0  5.7 92.0  6.0 91.7  6.3 91.7
         3  6.6 91.6  6.9 91.5  7.2 92.7  7.5 92.6  7.8 92.6  8.1 92.6
         3  8.4 92.8  8.7 92.8  9.0 92.8  9.3 92.8  9.7 93.0 10.0 93.1
         3 10.3 93.2 10.6 93.2 10.9 93.0 11.2 93.3 11.5 93.3 11.8 93.3
         3 12.1 93.4 12.4 93.5 12.7 93.6 13.0 93.6 13.3 93.7 13.5 93.8
         3 13.6 93.7 17.0 94.0 18.3 94.4 18.5 95.7 20.6 97.3 25.2 97.7
         3 26.1100.3 26.1100.5
NS       3  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 43.7
NS       3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7
NS       3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 58.8  0.0 58.8
NS       3  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9
NS       3  0.0 85.9  0.0 85.9  0.0 85.9 .014 85.9  0.0 85.9  0.0 83.9
NS       3  0.0 83.9  0.0 83.9  0.0 83.9  0.0 85.6  0.0 85.6  0.0 85.6
NS       3  0.0 85.6  0.0 85.6  0.0 43.8  0.0 43.8  0.0 43.8  0.0 43.8
NS       3  0.0 43.8  0.0 20.8  0.0 80.7  0.0 80.7  0.0 80.7  0.0 80.7
NS       3  0.0 80.7  0.0 80.7
CAL1     3    93.77     20.35
VEL1     3                       4.8  3.7  2.0  1.6  1.5  0.4  0.7  0.3
VEL1     3  1.3  1.0  1.0  0.9  0.9  0.7  0.4  0.7  2.5  4.0  4.1  4.5
VEL1     3  4.2  4.3  5.0  5.2  4.3  4.2  2.5  1.4  0.5  0.7 -1.0 -0.9
VEL1     3 -0.7 -0.5 -0.3 -0.3  0.0
VEL1     3
CAL2     3   93.385      8.57
```

Table 2a. Revised Upper Mundt Creek data deck for flows to 10 cfs. - **Continued**

```
VEL2     3                          1.4   0.7   0.0   1.0   0.4   0.4   0.3   0.4
VEL2     3  0.3   0.4   0.4   0.3   0.3   0.9   0.6   0.5   3.3   3.1   3.3   3.2
VEL2     3  3.0   2.9   2.7   2.9   1.0   1.1   0.5   0.2   0.1   0.0   0.0   0.0
VEL2     3  0.0
VEL2     3
CAL3     3   93.085         2.8
VEL3     3                                      0.8   0.6   0.2   0.1   0.1   0.3
VEL3     3 0.25   0.2   0.1   0.1   0.1   0.1   0.2   0.2   1.8   2.0   2.2   2.8
VEL3     3  2.6   2.5   2.3   2.5   0.0   0.0             0.0
VEL3     3
VEL3     3
XSEC     4                     97.95      0.009
         4  0.0100.7  0.1100.6  0.5100.4  1.0 99.4  2.1 99.2  2.7 98.7
         4  2.9 98.7  3.0 98.7  3.2 98.7  3.4 98.7  3.5 98.6  3.9 99.1
         4  4.0 98.7  5.0 99.1  6.0 99.8  7.0100.1  8.3100.4  8.4 99.1
         4  8.5 98.6  8.8 98.6  9.0 98.4  9.2 98.0  9.4 97.9  9.6 97.8
         4  9.8 97.8 10.0 98.0 10.2 98.0 10.4 98.0 10.6 97.8 10.8 97.8
         4 11.0 97.8 11.2 97.7 11.4 97.9 11.6 97.9 11.8 97.9 12.0 97.9
         4 12.3 98.2 12.5 98.2 12.8 98.1 13.1 98.0 13.4 98.1 13.7 98.1
         4 14.0 98.2 14.3 98.2 14.6 98.2 14.7 98.5 15.2 98.5 15.5 98.5
         4 16.0 98.6 16.4 98.5 16.8 99.0 16.9 99.3 17.6100.2 18.4100.6
         4 18.5100.8
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 72.8  0.0 72.8
NS       4  0.0 72.8  0.0 72.8  0.0 53.6  0.0 53.6  0.0 88.9  0.0 82.8
NS       4  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 74.7  0.0 74.7  0.0 74.7  0.0 37.9  0.0 37.9
NS       4  0.0 37.9  0.0 37.9  0.0 75.8  0.0 75.8  0.0 45.6  0.0 45.6
NS       4  0.0 45.6  0.0 45.6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       4  0.0  0.0
CAL1     4    98.95      13.91
VEL1     4                            0.5   0.6   0.7   0.9   0.7   0.2   0.0
VEL1     4  0.1   0.0   0.0   0.0   0.0   0.0   0.9   2.4   3.0   2.8   3.3   3.4
VEL1     4  3.4   1.9   1.4   1.6   1.5   1.7   2.1   2.0   3.5   3.6   3.1   2.8
VEL1     4  2.6   2.4   2.0   1.7   1.5   0.9   0.9   1.6   1.2   1.0   1.3   1.3
VEL1     4  1.0   0.3
CAL2     4    98.66       6.0
VEL2     4                                        0.0   0.0   0.0   0.0   0.0
VEL2     4  0.0   0.0   0.0   0.0   0.0   0.0   0.1   2.4   0.0   2.1   1.6   0.0
VEL2     4  0.0   1.3   0.9   0.5   0.4   1.2   1.5   1.0   1.7   0.0   0.0   2.0
VEL2     4  1.7   1.5   0.0   1.1   1.0   0.7   0.8   1.3   1.0   0.7   0.7   0.7
VEL2     4  0.9   0.3
CAL3     4    98.45       1.64
VEL3     4                                                                    0.0
VEL3     4                            0.0   0.0   0.0   0.2   0.6   1.1   0.4
VEL3     4  0.5   0.3   0.5   0.6   0.4   0.7   0.9   0.9   0.3   .35   .35   0.6
VEL3     4  1.0   1.3   1.5   1.2   0.6   0.2   0.3   0.7   0.5
VEL3     4
XSEC     5                     97.89      0.005
         5  0.0101.3  0.1100.4  1.1 99.9  1.3 99.3  3.4 99.3  4.3 99.1
```

Table 2a. Revised Upper Mundt Creek data deck for flows to 10 cfs. - **Continued**

```
         5  5.0 99.1  5.1 99.0  5.5 98.9  6.0 98.8  6.4 98.8  6.9 98.4
         5  7.3 98.4  7.7 98.6  8.0 98.4  8.3 98.3  8.7 98.4  9.0 98.4
         5  9.4 98.3  9.7 97.6 10.0 98.1 10.3 98.1 10.6 98.1 10.9 97.5
         5 11.2 97.5 11.5 97.5 11.8 97.6 12.1 97.6 12.4 97.6 12.7 97.7
         5 13.0 97.8 13.3 98.0 13.6 98.1 13.9 98.1 14.2 98.2 14.5 98.3
         5 14.8 98.7 15.0 99.0 15.1 99.5 15.7100.3 15.8100.5
NS       5  0.0 88.9  0.0 88.9  0.0 46.8  0.0 46.8  0.0 74.9  0.0 42.6
NS       5  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8
NS       5  0.0 23.8  0.0 74.6  0.0 74.6  0.0 74.6  0.0 88.9  0.0 88.9
NS       5  0.0 88.9  0.0 88.9  0.0 88.9  0.0 83.9  0.0 83.9  0.0 83.9
NS       5  0.0 28.7  0.0 28.7  0.0 23.8  0.0 22.9  0.0 22.9  0.0 22.9
NS       5  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 99.9
NS       5  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     5    98.99     12.95
VEL1     5                                           0.1  0.6  0.9  0.4
VEL1     5  0.2  0.6  0.7  1.9  2.7  2.9  2.7  1.5  3.0  3.4  3.6  2.8
VEL1     5  2.7  2.1  2.1  1.8  1.5  1.3  1.1  0.9  0.9  0.8  0.7  0.6
VEL1     5  0.1
CAL2     5   98.715      5.13
VEL2     5                                                          0.1
VEL2     5  0.1  0.4  0.7  1.4  1.8  1.7  1.7  1.2  1.6  1.4  1.6  1.3
VEL2     5  1.5  1.1  1.2  0.9  0.8  0.8  0.8  0.7  0.5  0.5  0.4  0.1
VEL2     5
CAL3     5    98.49      2.36
VEL3     5                                             0.0  0.0  0.0
VEL3     5  0.2  0.2  0.3  0.6  0.9  1.2  1.4  1.1  0.8  0.6  0.2  0.0
VEL3     5  0.0  0.0  0.0  0.5  0.6  1.0  1.1  1.0  0.8  0.6  0.4  0.2
VEL3     5
XSEC     6                   97.91     0.003
         6  0.0101.2  0.1100.7  1.6 99.1  2.0 99.0  2.5 99.0  3.0 99.0
         6  3.5 99.0  4.0 98.9  4.5 98.7  4.8 98.6  5.2 98.4  5.5 98.6
         6  5.8 98.1  6.1 98.0  6.4 97.9  6.7 97.8  7.0 97.6  7.3 97.5
         6  7.6 97.5  7.9 97.4  8.2 97.4  8.4 97.4  8.6 97.3  8.8 97.2
         6  9.0 97.1  9.2 97.1  9.4 97.0  9.6 97.1  9.8 97.1 10.0 96.9
         6 10.2 97.1 10.4 97.3 10.6 97.4 10.8 97.6 11.0 97.7 11.2 98.0
         6 11.4 98.1 11.6 98.5 11.8 98.8 12.0 99.1 12.1 99.5 14.7100.2
         6 15.0100.5
NS       6  0.0 88.9  0.0 88.9  0.0 82.7  0.0 82.7  0.0 82.7  0.0 82.7
NS       6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 63.7
NS       6  0.0 63.7  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS       6  0.0 88.9  0.0 88.9  0.0 62.8  0.0 62.8  0.0 62.8  0.0 99.9
NS       6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       6  0.0  0.0
CAL1     6    99.06     14.98
VEL1     6                 0.0  0.0  0.1  0.1  0.2  0.1  0.2  0.2  0.2
VEL1     6  0.3  0.2  0.4  0.2  0.4  0.5  0.4  0.3  0.4  0.2  0.4  0.5
VEL1     6  1.1  1.9  2.7  3.7  3.3  4.5  5.3  3.0  2.3  2.7  1.9  1.9
VEL1     6  1.0  0.4  1.0
CAL2     6    98.76      5.57
VEL2     6                                          -0.7 -0.4  0.1  0.5
```

Table 2a. Revised Upper Mundt Creek data deck for flows to 10 cfs. - **Continued**

```
VEL2     6  0.6  0.4  0.4  0.6  0.4  0.4  0.3  0.6  1.0  1.1  0.9  0.8
VEL2     6  1.2  0.0  0.0  0.5  1.3  1.0  1.9  2.0  1.3  0.9  0.5  0.4
VEL2     6  0.5  0.2  0.0
CAL3     6    98.52       2.31
VEL3     6                                                        0.0
VEL3     6  0.6  0.4  0.5  0.1  0.2  0.2  0.4  0.6  1.0  1.5  1.3  1.3
VEL3     6  1.4  0.8  0.6  0.2  0.2  0.2  0.3  0.0  0.3  0.1  0.2  0.1
VEL3     6 -0.3
ENDJOB
```

Table 2b. Revised, calibrated Upper Mundt Creek data deck for flows from 10 - 25 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #  Upper Mundt Creek for flows from 10 - 25 cfs
IOC       1100000201001
QARD 10.0
QARD 11.0
QARD 12.0
QARD 13.0
QARD 14.0
QARD 15.0
QARD 16.0
QARD 17.0
QARD 18.0
QARD 19.0
QARD 20.0
QARD 22.0
QARD 24.0
QARD 26.0
QARD 28.0
XSEC     1                    92.57     0.003
         1  0.0 96.3  0.1 96.2  0.7 94.1  1.7 93.6  1.8 93.6  2.0 93.3
         1  2.5 93.3  3.0 93.2  3.5 93.2  4.0 93.2  4.5 93.2  5.0 93.1
         1  5.5 93.1  6.0 93.1  6.5 92.9  7.0 92.8  7.5 92.8  8.0 92.7
         1  8.5 92.8  9.0 92.5  9.5 92.4 10.0 92.5 10.5 92.2 11.0 92.2
         1 11.5 92.4 12.0 92.0 12.5 92.1 13.0 92.1 13.5 92.1 14.0 92.4
         1 14.5 92.6 15.0 92.7 15.5 92.8 16.0 93.0 16.5 93.1 17.0 93.2
         1 17.5 93.3 18.0 93.3 18.2 93.6 18.3 93.1 19.1 95.0 19.2 95.3
NS       1  0.0 80.8  0.0 80.8  0.0 80.8  0.0 80.7  0.0 80.7  0.0 22.9
NS       1  0.0 22.9  0.0 22.9  0.0 22.9  0.0 34.9  0.0 34.9  0.0 34.9
NS       1  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.8  0.0 34.8
NS       1  0.0 34.7  0.0 62.6  0.0 62.6  0.0 86.9  0.0 86.9  0.0 86.6
NS       1  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 25.6  0.0 82.6
NS       1  0.0 82.6  0.0 23.9  0.0 23.9  0.0 23.9  0.0 32.7  0.0 32.7
NS       1  0.0 32.8  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     1    93.61      15.31
VEL1     1                         -0.1  0.0  0.1  0.2  0.4  0.9  0.9
VEL1     1  1.1  1.3  1.6  1.5  1.0  1.4  2.1  1.3  1.0  1.2  1.5  2.1
VEL1     1  2.2  2.1  1.8  1.5  1.0  0.4  0.4  0.2  0.1  0.1 -0.2 -0.0
VEL1     1 -0.0  0.0
CAL2     1   93.325       6.02
VEL2     1                          0.0  0.0  0.1  0.1  0.1  0.3  0.5
VEL2     1  0.5  0.6  0.6  0.7  0.0  0.0  1.0  1.0  0.8  0.8  0.8  0.9
VEL2     1  1.1  0.9  0.8  0.8  0.5  0.4  0.3  0.2  0.1  0.1  0.1  0.0
VEL2     1  0.0  0.0
CAL3     1   93.065       2.43
VEL3     1
VEL3     1            0.3  0.5  0.6  0.6  0.6  0.6  0.4  0.3  0.3  0.4
VEL3     1  0.4  0.5  0.6  0.5  0.4  0.3  0.1  0.1  0.0
VEL3     1
XSEC     2                    92.57     0.003
         2  0.0 97.0  0.1 96.7  3.2 93.7  4.5 93.6  4.8 93.7  5.5 93.6
         2  7.0 92.9  7.3 92.8  7.7 92.7  8.0 92.6  8.3 92.6  8.6 92.5
         2  8.9 92.6  9.2 92.6  9.5 92.6  9.8 92.6 10.1 92.6 10.4 92.2
```

Table 2b. Revised, calibrated Upper Mundt Creek data deck for flows from 10 - 25 cfs. - **Continued**

```
          2 10.7 92.3 11.0 92.1 11.3 92.2 11.6 92.2 11.9 92.3 12.2 92.3
          2 12.5 92.4 12.8 92.4 13.1 92.1 13.4 92.2 13.7 92.2 14.0 92.4
          2 14.3 92.4 14.6 93.1 14.8 93.8 14.9 93.8 15.7 94.1 16.7 93.8
          2 17.0 94.8 18.7 94.3 21.3 96.3 21.5 96.7
NS        2  0.0 99.9  0.0 99.9  0.0 92.8  0.0 94.6  0.0 94.6  0.0 22.9
NS        2  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 85.8
NS        2  0.0 85.8  .13 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 48.6
NS        2  0.0 48.6  0.0 48.5  0.0 48.5  0.0 83.7  0.0 83.7  0.0 83.8
NS        2  0.0 83.8  0.0 83.8  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        2  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 84.8
NS        2  0.0 84.8  0.0 99.9  0.0 99.9  0.0  0.0
CAL1      2    93.64     13.96
VEL1      2                          0.0  0.0  0.0  0.1  0.0  0.2  0.5
VEL1      2  0.8  1.0  1.7  1.8  1.9  1.8  1.9  1.7  1.2  0.8  0.5  0.7
VEL1      2  1.0  1.2  2.7  3.3  3.2  3.9  3.2  2.4
VEL1      2
CAL2      2   93.375      6.41
VEL2      2                               0.0  0.0  0.0  0.1  0.1  0.1
VEL2      2  0.3  0.0  0.0  0.0  1.1  1.1  1.2  1.2  1.2  1.1  1.4  0.5
VEL2      2  0.6  1.2  1.1  1.4  1.4  1.1  0.4  0.0
VEL2      2
CAL3      2   93.075       2.66
VEL3      2                               0.0  0.0  0.1  0.0  0.1  0.2
VEL3      2  0.3  0.3  0.6  0.7  0.7  0.6  0.7  0.6  0.7  0.5  0.4  0.3
VEL3      2  0.3  0.8  1.1  1.3  1.0  0.6  0.2
VEL3      2
XSEC      3                   92.57     0.003
          3  0.0 95.7  0.1 95.6  2.0 94.2  2.1 93.8  2.2 93.2  2.6 92.6
          3  3.0 92.3  3.3 91.8  3.6 91.8  3.9 91.7  4.2 91.5  4.5 91.4
          3  4.8 91.8  5.1 91.9  5.4 92.0  5.7 92.0  6.0 91.7  6.3 91.7
          3  6.6 91.6  6.9 91.5  7.2 92.7  7.5 92.6  7.8 92.6  8.1 92.6
          3  8.4 92.8  8.7 92.8  9.0 92.8  9.3 92.8  9.7 93.0 10.0 93.1
          3 10.3 93.2 10.6 93.2 10.9 93.0 11.2 93.3 11.5 93.3 11.8 93.3
          3 12.1 93.4 12.4 93.5 12.7 93.6 13.0 93.6 13.3 93.7 13.5 93.8
          3 13.6 93.7 17.0 94.0 18.3 94.4 18.5 95.7 20.6 97.3 25.2 97.7
          3 26.1100.3 26.1100.5
NS        3  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 43.7
NS        3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7
NS        3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 58.8  0.0 58.8
NS        3  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9
NS        3  0.0 85.9  0.0 85.9  0.0 85.9 .014 85.9  0.0 85.9  0.0 83.9
NS        3  0.0 83.9  0.0 83.9  0.0 83.9  0.0 85.6  0.0 85.6  0.0 85.6
NS        3  0.0 85.6  0.0 85.6  0.0 43.8  0.0 43.8  0.0 43.8  0.0 43.8
NS        3  0.0 43.8  0.0 20.8  0.0 80.7  0.0 80.7  0.0 80.7  0.0 80.7
NS        3  0.0 80.7  0.0 80.7
CAL1      3    93.77     20.35
VEL1      3                       4.8  3.7  2.0  1.6  1.5  0.4  0.7  0.3
VEL1      3  1.3  1.0  1.0  0.9  0.9  0.7  0.4  0.7  2.5  4.0  4.1  4.5
VEL1      3  4.2  4.3  5.0  5.2  4.3  4.2  2.5  1.4  0.5  0.7 -1.0 -0.9
VEL1      3 -0.7 -0.5 -0.3 -0.3  0.0
VEL1      3
CAL2      3   93.385      8.57
```

Table 2b. Revised, calibrated Upper Mundt Creek data deck for flows from 10 - 25 cfs. - **Continued**

```
VEL2     3                          1.4  0.7  0.0  1.0  0.4  0.4  0.3  0.4
VEL2     3  0.3  0.4  0.4  0.3  0.3  0.9  0.6  0.5  3.3  3.1  3.3  3.2
VEL2     3  3.0  2.9  2.7  2.9  1.0  1.1  0.5  0.2  0.1  0.0  0.0  0.0
VEL2     3  0.0
VEL2     3
CAL3     3   93.085        2.8
VEL3     3                                  0.8  0.6  0.2  0.1  0.1  0.3
VEL3     3 0.25  0.2  0.1  0.1  0.1  0.1  0.2  0.2  1.8  2.0  2.2  2.8
VEL3     3  2.6  2.5  2.3  2.5  0.0  0.0            0.0
VEL3     3
VEL3     3
XSEC     4                   97.95     0.009
         4  0.0100.7  0.1100.6  0.5100.4  1.0 99.4  2.1 99.2  2.7 98.7
         4  2.9 98.7  3.0 98.7  3.2 98.7  3.4 98.7  3.5 98.6  3.9 99.1
         4  4.0 98.7  5.0 99.1  6.0 99.8  7.0100.1  8.3100.4  8.4 99.1
         4  8.5 98.6  8.8 98.6  9.0 98.4  9.2 98.0  9.4 97.9  9.6 97.8
         4  9.8 97.8 10.0 98.0 10.2 98.0 10.4 98.0 10.6 97.8 10.8 97.8
         4 11.0 97.8 11.2 97.7 11.4 97.9 11.6 97.9 11.8 97.9 12.0 97.9
         4 12.3 98.2 12.5 98.2 12.8 98.1 13.1 98.0 13.4 98.1 13.7 98.1
         4 14.0 98.2 14.3 98.2 14.6 98.2 14.7 98.5 15.2 98.5 15.5 98.5
         4 16.0 98.6 16.4 98.5 16.8 99.0 16.9 99.3 17.6100.2 18.4100.6
         4 18.5100.8
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 72.8  0.0 72.8
NS       4  0.0 72.8  0.0 72.8  0.0 53.6  0.0 53.6  0.0 88.9  0.0 82.8
NS       4  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 74.7  0.0 74.7  0.0 74.7  0.0 37.9  0.0 37.9
NS       4  0.0 37.9  0.0 37.9  0.0 75.8  0.0 75.8  0.0 45.6  0.0 45.6
NS       4  0.0 45.6  0.0 45.6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       4  0.0  0.0
CAL1     4    98.95     13.91
VEL1     4                          0.5  0.6  0.7  0.9  0.7  0.2  0.0
VEL1     4  0.1  0.0  0.0  0.0  0.0  0.0  0.9  2.4  3.0  2.8  3.3  3.4
VEL1     4  3.4  1.9  1.4  1.6  1.5  1.7  2.1  2.0  3.5  3.6  3.1  2.8
VEL1     4  2.6  2.4  2.0  1.7  1.5  0.9  0.9  1.6  1.2  1.0  1.3  1.3
VEL1     4  1.0  0.3
CAL2     4    98.66      6.0
VEL2     4                                  0.0  0.0  0.0  0.0  0.0
VEL2     4  0.0  0.0  0.0  0.0  0.0  0.0  0.1  2.4  0.0  2.1  1.6  0.0
VEL2     4  0.0  1.3  0.9  0.5  0.4  1.2  1.5  1.0  1.7  0.0  0.0  2.0
VEL2     4  1.7  1.5  0.0  1.1  1.0  0.7  0.8  1.3  1.0  0.7  0.7  0.7
VEL2     4  0.9  0.3
CAL3     4    98.45      1.64
VEL3     4                                                       0.0
VEL3     4                          0.0  0.0  0.0  0.2  0.6  1.1  0.4
VEL3     4  0.5  0.3  0.5  0.6  0.4  0.7  0.9  0.9  0.3  .35  .35  0.6
VEL3     4  1.0  1.3  1.5  1.2  0.6  0.2  0.3  0.7  0.5
VEL3     4
XSEC     5                   97.89     0.005
         5  0.0101.3  0.1100.4  1.1 99.9  1.3 99.3  3.4 99.3  4.3 99.1
```

Table 2b. Revised, calibrated Upper Mundt Creek data deck for flows from 10 - 25 cfs. - **Continued**

```
          5  5.0 99.1  5.1 99.0  5.5 98.9  6.0 98.8  6.4 98.8  6.9 98.4
          5  7.3 98.4  7.7 98.6  8.0 98.4  8.3 98.3  8.7 98.4  9.0 98.4
          5  9.4 98.3  9.7 97.6 10.0 98.1 10.3 98.1 10.6 98.1 10.9 97.5
          5 11.2 97.5 11.5 97.5 11.8 97.6 12.1 97.6 12.4 97.6 12.7 97.7
          5 13.0 97.8 13.3 98.0 13.6 98.1 13.9 98.1 14.2 98.2 14.5 98.3
          5 14.8 98.7 15.0 99.0 15.1 99.5 15.7100.3 15.8100.5
NS        5  0.0 88.9  0.0 88.9  0.0 46.8  0.0 46.8  0.0 74.9  0.0 42.6
NS        5  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8  0.0 23.8
NS        5  0.0 23.8  0.0 74.6  0.0 74.6  0.0 74.6  0.0 88.9  0.0 88.9
NS        5  0.0 88.9  0.0 88.9  0.0 88.9  0.0 83.9  0.0 83.9  0.0 83.9
NS        5  0.0 28.7  0.0 28.7  0.0 23.8  0.0 22.9  0.0 22.9  0.0 22.9
NS        5  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 99.9
NS        5  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1      5    98.99     12.95
VEL1      5                                           0.1  0.6  0.7  0.4
VEL1      5  0.2  0.6  0.7  1.9  2.7  2.9  2.7  1.5  3.0  3.0  3.6  2.8
VEL1      5  2.7  2.1  2.1  1.8  1.5  1.3  1.1  0.9  0.9  0.8  0.7  0.6
VEL1      5  0.1
CAL2      5   98.715      5.13
VEL2      5                                                          0.1
VEL2      5  0.1  0.4  0.7  1.4  1.8  1.7  1.7  0.5  1.6  1.7  0.0  0.0
VEL2      5  0.0  1.1  0.0  0.9  0.8  0.8  0.8  0.7  0.5  0.5  0.4  0.1
VEL2      5
CAL3      5    98.49      2.36
VEL3      5                                            0.0  0.0  0.0
VEL3      5  0.2  0.2  0.3  0.6  0.9  1.2  1.4  1.1  0.8  0.7  0.0  0.0
VEL3      5  0.0  0.0  0.0  0.5  0.6  1.0  1.1  1.0  0.8  0.6  0.4  0.2
VEL3      5
XSEC      6                   97.91     0.003
          6  0.0101.2  0.1100.7  1.6 99.1  2.0 99.0  2.5 99.0  3.0 99.0
          6  3.5 99.0  4.0 98.9  4.5 98.7  4.8 98.6  5.2 98.4  5.5 98.6
          6  5.8 98.1  6.1 98.0  6.4 97.9  6.7 97.8  7.0 97.6  7.3 97.5
          6  7.6 97.5  7.9 97.4  8.2 97.4  8.4 97.4  8.6 97.3  8.8 97.2
          6  9.0 97.1  9.2 97.1  9.4 97.0  9.6 97.1  9.8 97.1 10.0 96.9
          6 10.2 97.1 10.4 97.3 10.6 97.4 10.8 97.6 11.0 97.7 11.2 98.0
          6 11.4 98.1 11.6 98.5 11.8 98.8 12.0 99.1 12.1 99.5 14.7100.2
          6 15.0100.5
NS        6  0.0 88.9  0.0 88.9  0.0 82.7  0.0 82.7  0.0 82.7  0.0 82.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 63.7
NS        6  0.0 63.7  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 88.9
NS        6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        6  0.0 88.9  0.0 88.9  0.0 62.8  0.0 62.8  0.0 62.8  0.0 99.9
NS        6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS        6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS        6  0.0  0.0
CAL1      6    99.06     14.98
VEL1      6                 0.0  0.0  0.1  0.1  0.2  0.1  0.2  0.2  0.2
VEL1      6  0.3  0.2  0.4  0.2  0.4  0.5  0.4  0.3  0.4  0.2  0.4  0.5
VEL1      6  1.1  1.9  2.7  3.7  3.3  4.5  5.3  3.0  2.3  2.7  1.9  1.9
VEL1      6  1.0  0.4  1.0
CAL2      6    98.76      5.57
VEL2      6                                       -0.7 -0.4  0.1  0.5
```

Table 2b. Revised, calibrated Upper Mundt Creek data deck for flows from 10 - 25 cfs. - **Continued**

```
VEL2      6  0.6  0.4  0.4  0.6  0.4  0.4  0.3  0.6  1.0  1.1  0.9  0.8
VEL2      6  1.2  0.0  0.0  0.5  1.3  1.0  1.9  2.0  1.3  0.9  0.5  0.4
VEL2      6  0.5  0.2  0.0
CAL3      6    98.52       2.31
VEL3      6                                                        0.0
VEL3      6  0.6  0.4  0.5  0.1  0.2  0.2  0.4  0.6  1.0  1.5  1.3  1.3
VEL3      6  1.4  0.8  0.6  0.2  0.2  0.2  0.3  0.0  0.3  0.1  0.2  0.1
VEL3      6 -0.3
ENDJOB
```

Table 2c. Revised calibrated Upper Mundt Creek for flows > 25 cfs, transects 1 - 4.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #  Upper Mundt Creek for high flows > 25 cfs, Transects 1-4
IOC       0100000201001
QARD 16.0
QARD 17.0
QARD 18.0
QARD 19.0
QARD 20.0
QARD 22.0
QARD 24.0
QARD 26.0
QARD 28.0
QARD 30.0
QARD 32.0
QARD 34.0
QARD 36.0
QARD 38.0
QARD 39.0
XSEC      1                    92.57     0.003
          1  0.0 96.3  0.1 96.2  0.7 94.1  1.7 93.6  1.8 93.6  2.0 93.3
          1  2.5 93.3  3.0 93.2  3.5 93.2  4.0 93.2  4.5 93.2  5.0 93.1
          1  5.5 93.1  6.0 93.1  6.5 92.9  7.0 92.8  7.5 92.8  8.0 92.7
          1  8.5 92.8  9.0 92.5  9.5 92.4 10.0 92.5 10.5 92.2 11.0 92.2
          1 11.5 92.4 12.0 92.0 12.5 92.1 13.0 92.1 13.5 92.1 14.0 92.4
          1 14.5 92.6 15.0 92.7 15.5 92.8 16.0 93.0 16.5 93.1 17.0 93.2
          1 17.5 93.3 18.0 93.3 18.2 93.6 18.3 93.1 19.1 95.0 19.2 95.3
NS        1  0.0 80.8  0.0 80.8  0.0 80.8  0.0 80.7  0.0 80.7  0.0 22.9
NS        1  0.0 22.9  0.0 22.9  0.0 22.9  0.0 34.9  0.0 34.9  0.0 34.9
NS        1  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.9  0.0 34.8  0.0 34.8
NS        1  0.0 34.7  0.0 62.6  0.0 62.6  0.0 86.9  0.0 86.9  0.0 86.6
NS        1  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 25.6  0.0 82.6
NS        1  0.0 82.6  0.0 23.9  0.0 23.9  0.0 23.9  0.0 32.7  0.0 32.7
NS        1  0.0 32.8  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1      1    93.61      15.31
VEL1      1                         -0.1  0.0  0.1  0.2  0.4  0.9  0.9
VEL1      1  1.1  1.3  1.6  1.5  1.0  1.4  2.1  1.3  1.0  1.2  1.5  2.1
VEL1      1  2.2  2.1  1.8  1.5  1.0  0.4  0.4  0.2  0.1  0.1 -0.2 -0.0
VEL1      1 -0.0  0.0
CAL2      1   93.325       6.02
VEL2      1                          0.0  0.0  0.1  0.1  0.1  0.3  0.5
VEL2      1  0.5  0.6  0.6  0.7  0.0  0.0  1.0  1.0  0.8  0.8  0.8  0.9
VEL2      1  1.1  0.9  0.8  0.8  0.5  0.4  0.3  0.2  0.1  0.1  0.1  0.0
VEL2      1  0.0  0.0
CAL3      1   93.065       2.43
VEL3      1
VEL3      1            0.3  0.5  0.6  0.6  0.6  0.6  0.4  0.3  0.3  0.4
VEL3      1  0.4  0.5  0.6  0.5  0.4  0.3  0.1  0.1  0.0
VEL3      1
XSEC      2                    92.57     0.003
          2  0.0 97.0  0.1 96.7  3.2 93.7  4.5 93.6  4.8 93.7  5.5 93.6
          2  7.0 92.9  7.3 92.8  7.7 92.7  8.0 92.6  8.3 92.6  8.6 92.5
          2  8.9 92.6  9.2 92.6  9.5 92.6  9.8 92.6 10.1 92.6 10.4 92.2
```

Table 2c. Revised calibrated Upper Mundt Creek for flows > 25 cfs, transects 1 - 4. - **Continued**

```
          2 10.7 92.3 11.0 92.1 11.3 92.2 11.6 92.2 11.9 92.3 12.2 92.3
          2 12.5 92.4 12.8 92.4 13.1 92.1 13.4 92.2 13.7 92.2 14.0 92.4
          2 14.3 92.4 14.6 93.1 14.8 93.8 14.9 93.8 15.7 94.1 16.7 93.8
          2 17.0 94.8 18.7 94.3 21.3 96.3 21.5 96.7
NS        2  0.0 99.9  0.0 99.9  0.0 92.8  0.0 94.6  0.0 94.6  0.0 22.9
NS        2  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 85.8
NS        2  0.0 85.8  .13 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 48.6
NS        2  0.0 48.6  0.0 48.5  0.0 48.5  0.0 83.7  0.0 83.7  0.0 83.8
NS        2  0.0 83.8  0.0 83.8  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        2  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 84.8
NS        2  0.0 84.8  0.0 99.9  0.0 99.9  0.0  0.0
CAL1      2    93.64     13.96
VEL1      2                          0.0  0.0  0.0  0.1  0.0  0.2  0.5
VEL1      2  0.8  1.0  1.7  1.8  1.9  1.8  1.9  1.7  1.2  0.8  0.5  0.7
VEL1      2  1.0  1.2  2.7  3.3  3.2  3.9  3.2  2.4
VEL1      2
CAL2      2   93.375      6.41
VEL2      2                               0.0  0.0  0.0  0.1  0.1  0.1
VEL2      2  0.3  0.0  0.0  0.0  1.1  1.1  1.2  1.2  1.2  1.1  1.4  0.5
VEL2      2  0.6  1.2  1.1  1.4  1.4  1.1  0.4  0.0
VEL2      2
CAL3      2   93.075       2.66
VEL3      2                               0.0  0.0  0.1  0.0  0.1  0.2
VEL3      2  0.3  0.3  0.6  0.7  0.7  0.6  0.7  0.6  0.7  0.5  0.4  0.3
VEL3      2  0.3  0.8  1.1  1.3  1.0  0.6  0.2
VEL3      2
XSEC      3                   92.57     0.003
          3  0.0 95.7  0.1 95.6  2.0 94.2  2.1 93.8  2.2 93.2  2.6 92.6
          3  3.0 92.3  3.3 91.8  3.6 91.8  3.9 91.7  4.2 91.5  4.5 91.4
          3  4.8 91.8  5.1 91.9  5.4 92.0  5.7 92.0  6.0 91.7  6.3 91.7
          3  6.6 91.6  6.9 91.5  7.2 92.7  7.5 92.6  7.8 92.6  8.1 92.6
          3  8.4 92.8  8.7 92.8  9.0 92.8  9.3 92.8  9.7 93.0 10.0 93.1
          3 10.3 93.2 10.6 93.2 10.9 93.0 11.2 93.3 11.5 93.3 11.8 93.3
          3 12.1 93.4 12.4 93.5 12.7 93.6 13.0 93.6 13.3 93.7 13.5 93.8
          3 13.6 93.7 17.0 94.0 18.3 94.4 18.5 95.7 20.6 97.3 25.2 97.7
          3 26.1100.3 26.1100.5
NS        3  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 43.7
NS        3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7
NS        3  0.0 43.7  0.0 43.7  0.0 43.7  0.0 43.7  0.0 58.8  0.0 58.8
NS        3  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9  0.0 85.9
NS        3  0.0 85.9  0.0 85.9  0.0 85.9 .014 85.9  0.0 85.9  0.0 83.9
NS        3  0.0 83.9  0.0 83.9  0.0 83.9  0.0 85.6  0.0 85.6  0.0 85.6
NS        3  0.0 85.6  0.0 85.6  0.0 43.8  0.0 43.8  0.0 43.8  0.0 43.8
NS        3  0.0 43.8  0.0 20.8  0.0 80.7  0.0 80.7  0.0 80.7  0.0 80.7
NS        3  0.0 80.7  0.0 80.7
CAL1      3    93.77     20.35
VEL1      3                     4.8  3.7  2.0  1.6  1.5  0.4  0.7  0.3
VEL1      3  1.3  1.0  1.0  0.9  0.9  0.7  0.4  0.7  2.5  4.0  4.1  4.5
VEL1      3  4.2  4.3  5.0  5.2  4.3  4.2  2.5  1.4  0.5  0.7 -1.0 -0.9
VEL1      3 -0.7 -0.5 -0.3 -0.3  0.0
VEL1      3
CAL2      3   93.385      8.57
```

Table 2c. Revised calibrated Upper Mundt Creek for flows > 25 cfs, transects 1 - 4. - **Continued**

```
VEL2     3                          1.4  0.7  0.0  1.0  0.4  0.4  0.3  0.4
VEL2     3  0.3  0.4  0.4  0.3  0.3  0.9  0.6  0.5  3.3  3.1  3.3  3.2
VEL2     3  3.0  2.9  2.7  2.9  1.0  1.1  0.5  0.2  0.1  0.0  0.0  0.0
VEL2     3  0.0
VEL2     3
CAL3     3   93.085        2.8
VEL3     3                                  0.8  0.6  0.2  0.1  0.1  0.3
VEL3     3 0.25  0.2  0.1  0.1  0.1  0.1  0.2  0.2  1.8  2.0  2.2  2.8
VEL3     3  2.6  2.5  2.3  2.5  0.0  0.0            0.0
VEL3     3
VEL3     3
XSEC     4                   97.95     0.009
         4  0.0100.7  0.1100.6  0.5100.4  1.0 99.4  2.1 99.2  2.7 98.7
         4  2.9 98.7  3.0 98.7  3.2 98.7  3.4 98.7  3.5 98.6  3.9 99.1
         4  4.0 98.7  5.0 99.1  6.0 99.8  7.0100.1  8.3100.4  8.4 99.1
         4  8.5 98.6  8.8 98.6  9.0 98.4  9.2 98.0  9.4 97.9  9.6 97.8
         4  9.8 97.8 10.0 98.0 10.2 98.0 10.4 98.0 10.6 97.8 10.8 97.8
         4 11.0 97.8 11.2 97.7 11.4 97.9 11.6 97.9 11.8 97.9 12.0 97.9
         4 12.3 98.2 12.5 98.2 12.8 98.1 13.1 98.0 13.4 98.1 13.7 98.1
         4 14.0 98.2 14.3 98.2 14.6 98.2 14.7 98.5 15.2 98.5 15.5 98.5
         4 16.0 98.6 16.4 98.5 16.8 99.0 16.9 99.3 17.6100.2 18.4100.6
         4 18.5100.8
NS       4  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 72.8  0.0 72.8
NS       4  0.0 72.8  0.0 72.8  0.0 53.6  0.0 53.6  0.0 88.9  0.0 82.8
NS       4  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8  0.0 82.8
NS       4  0.0 82.8  0.0 82.8  0.0 82.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8
NS       4  0.0 85.8  0.0 74.7  0.0 74.7  0.0 74.7  0.0 37.9  0.0 37.9
NS       4  0.0 37.9  0.0 37.9  0.0 75.8  0.0 75.8  0.0 45.6  0.0 45.6
NS       4  0.0 45.6  0.0 45.6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS       4  0.0  0.0
CAL1     4    98.95      13.91
VEL1     4                          0.5  0.6  0.7  0.9  0.7  0.2  0.0
VEL1     4  0.1  0.0  0.0  0.0  0.0  0.0  0.9  2.4  3.0  2.8  3.3  3.4
VEL1     4  3.4  1.9  1.4  1.6  1.5  1.7  2.1  2.0  3.5  3.6  3.1  2.8
VEL1     4  2.6  2.4  2.0  1.7  1.5  0.9  0.9  1.6  1.2  1.0  1.3  1.3
VEL1     4  1.0  0.3
CAL2     4    98.66       6.0
VEL2     4                                       0.0  0.0  0.0  0.0  0.0
VEL2     4  0.0  0.0  0.0  0.0  0.0  0.0  0.1  2.4  0.0  2.1  1.6  0.0
VEL2     4  0.0  1.3  0.9  0.5  0.4  1.2  1.5  1.0  1.7  0.0  0.0  2.0
VEL2     4  1.7  1.5  0.0  1.1  1.0  0.7  0.8  1.3  1.0  0.7  0.7  0.7
VEL2     4  0.9  0.3
CAL3     4    98.45       1.64
VEL3     4                                                          0.0
VEL3     4                          0.0  0.0  0.0  0.2  0.6  1.1  0.4
VEL3     4  0.5  0.3  0.5  0.6  0.4  0.7  0.9  0.9  0.3  .35  .35  0.6
VEL3     4  1.0  1.3  1.5  1.2  0.6  0.2  0.3  0.7  0.5
VEL3     4
ENDJOB
```

Table 2d. Revised, calibrated data deck for Upper Mundt Creek for flows > 25 cfs, transects 5 and 6.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #UPPER MUNDT CREEK - TRANSECTS 5, 6
IOC       0100000200001
QARD 16.0
QARD 17.0
QARD 18.0
QARD 19.0
QARD 20.0
QARD 22.0
QARD 24.0
QARD 26.0
QARD 28.0
QARD 30.0
QARD 32.0
QARD 34.0
QARD 36.0
QARD 38.0
QARD 39.0
XSEC     5                   97.89     0.005
         5  0.0101.3  0.1100.4  1.1 99.9  1.3 99.3  3.4 99.3  4.3 99.1
         5  5.0 99.1  5.1 99.0  5.5 98.9  6.0 98.8  6.4 98.8  6.9 98.4
         5  7.3 98.4  7.7 98.6  8.0 98.4  8.3 98.3  8.7 98.4  9.0 98.4
         5  9.4 98.3  9.7 97.6 10.0 98.1 10.3 98.1 10.6 98.1 10.9 97.5
         5 11.2 97.5 11.5 97.5 11.8 97.6 12.1 97.6 12.4 97.6 12.7 97.7
         5 13.0 97.8 13.3 98.0 13.6 98.1 13.9 98.1 14.2 98.2 14.5 98.3
         5 14.8 98.7 15.0 99.0 15.1 99.5 15.7100.3 15.8100.5
NS       5  0.0 88.9  0.0 88.9  0.0 46.8  0.0 46.8  0.0 74.9  0.0 42.6
NS       5  0.0 23.8  0.0 23.8  0.0 23.8  .08 23.8 .055 23.8  0.0 23.8
NS       5  0.0 23.8  0.0 74.6  0.0 74.6  0.0 74.6  0.0 88.9  0.0 88.9
NS       5  0.0 88.9  0.0 88.9  0.0 88.9  0.0 83.9  0.0 83.9  0.0 83.9
NS       5  0.0 28.7  0.0 28.7  0.0 23.8  0.0 22.9  0.0 22.9  0.0 22.9
NS       5  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 99.9
NS       5  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0  0.0
CAL1     5    98.99     12.95     12.95
VEL1     5                                          0.1  0.6  0.9  0.4
VEL1     5  0.2  0.6  0.7  1.9  2.7  2.9  2.7  1.5  3.0  3.4  3.6  2.8
VEL1     5  2.7  2.1  2.1  1.8  1.5  1.3  1.1  0.9  0.9  0.8  0.7  0.6
VEL1     5  0.1
CAL2     5   98.715      5.13      5.13
VEL2     5
VEL2     5
VEL2     5
VEL2     5
CAL3     5    98.49      2.36      2.36
VEL3     5
VEL3     5
VEL3     5
VEL3     5
XSEC     6                   97.91     0.003
         6  0.0101.2  0.1100.7  1.6 99.1  2.0 99.0  2.5 99.0  3.0 99.0
         6  3.5 99.0  4.0 98.9  4.5 98.7  4.8 98.6  5.2 98.4  5.5 98.6
```

Table 2d. Revised, calibrated data deck for Upper Mundt Creek for flows > 25 cfs, transects 5 and 6. - **Continued**

```
          6  5.8 98.1  6.1 98.0  6.4 97.9  6.7 97.8  7.0 97.6  7.3 97.5
          6  7.6 97.5  7.9 97.4  8.2 97.4  8.4 97.4  8.6 97.3  8.8 97.2
          6  9.0 97.1  9.2 97.1  9.4 97.0  9.6 97.1  9.8 97.1 10.0 96.9
          6 10.2 97.1 10.4 97.3 10.6 97.4 10.8 97.6 11.0 97.7 11.2 98.0
          6 11.4 98.1 11.6 98.5 11.8 98.8 12.0 99.1 12.1 99.5 14.7100.2
          6 15.0100.5
NS        6  0.0 88.9  0.0 88.9  0.0 82.7  0.0 82.7  0.0 82.7  0.0 82.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 63.7
NS        6  0.0 63.7  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 88.9
NS        6  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9  0.0 88.9
NS        6  0.0 88.9  0.0 88.9  0.0 62.8  0.0 62.8  0.0 62.8  0.0 99.9
NS        6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS        6  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9  0.0 99.9
NS        6  0.0  0.0
CAL1      6    99.06     14.98
VEL1      6                 0.0  0.0  0.1  0.1  0.2  0.1  0.2  0.2  0.2
VEL1      6  0.3  0.2  0.4  0.2  0.4  0.5  0.4  0.3  0.4  0.2  0.4  0.5
VEL1      6  1.1  1.9  2.7  3.7  3.3  4.5  6.1  3.0  2.3  2.7  1.9  1.9
VEL1      6  1.0  0.4  1.0
CAL2      6    98.76      5.57
VEL2      6                                          -0.7 -0.4  0.1  0.5
VEL2      6  0.6  0.4  0.4  0.6  0.4  0.4  0.3  0.6  1.0  1.1  0.9  0.5
VEL2      6  0.0  0.0  0.0  0.5  1.3  1.0  1.7  2.0  1.3  0.9  0.5  0.4
VEL2      6  0.5  0.2  0.0
CAL3      6    98.52       2.31
VEL3      6                                                         0.0
VEL3      6  0.6  0.4  0.5 -0.1  0.2  0.2  0.4  0.6  1.0  1.5  1.1  1.1
VEL3      6  1.4  0.8  0.5  0.2  0.2  0.2  1.7  2.0  0.3  0.1  0.2  0.1
VEL3      6 -0.3
ENDJOB
```

Table 3. Comparison of original and revised input decks, Upper Mundt Creek.

	Trans 1		Trans 2		Trans 3		Trans 4		Trans 5			Trans 6		
Flow (cfs	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev	Rev-1q	Orig	Rev	Rev-1q
1	0.918	0.884	0.812	0.794	0.826	0.793	0.772	0.874	0.757	0.582		0.360	0.377	
2	0.985	0.954	0.941	0.910	0.930	0.899	0.895	0.942	0.954	0.745		0.787	0.714	
3	1.008	0.979	1.002	0.958	0.984	0.957	0.952	0.967	1.029	0.831		1.065	0.923	
4	1.017	0.988	1.037	0.976	1.017	0.994	0.984	0.965	1.060	0.885		1.216	1.036	
5	1.019	0.989	1.057	0.985	1.032	1.008	1.002	0.962	1.069	0.925		1.277	1.099	
6	1.018	0.989	1.068	0.989	1.045	1.023	1.011	0.960	1.066	0.954		1.283	1.125	
7	1.015	0.987	1.073	0.990	1.053	1.031	1.015	0.958	1.054	0.976		1.259	1.128	
8	1.012	0.985	1.072	0.988	1.058	1.036	1.014	0.956	1.033	0.991		1.221	1.115	
9	1.008	0.982	1.069	0.985	1.060	1.039	1.011	0.953	1.010	1.002		1.175	1.094	
10	1.003	0.979	1.062	0.980	1.061	1.040	1.007	0.951	0.984	0.845		1.126	1.068	
11	0.999	0.976	1.054	0.975	1.059	1.039	1.001	0.948	0.956	0.876		1.077	1.039	
12	0.994	0.972	1.043	0.969	1.057	1.036	0.994	0.945	0.928	0.904		1.030	1.009	
13	0.990	0.969	1.030	0.963	1.053	1.033	0.986	0.942	0.901	0.930		0.984	0.979	
14	0.985	0.965	1.017	0.956	1.048	1.028	0.978	0.939	0.875	0.955		0.941	0.949	
15	0.980	0.962	1.002	0.949	1.042	1.023	0.970	0.936	0.850	0.978		0.900	0.919	
16	0.976	0.958	0.986	0.941	1.036	1.017	0.961	0.933	0.826	0.999	1.041	0.862	0.891	0.937
17	0.971	0.955	0.969	0.934	1.029	1.011	0.952	0.929	0.803	1.020	1.064	0.826	0.863	0.915
18	0.966	0.952	0.952	0.926	1.022	1.004	0.943	0.926	0.782	1.039	1.086	0.793	0.837	0.893
19	0.962	0.948	0.934	0.918	1.014	0.997	0.934	0.923	0.762	1.058	1.106	0.762	0.812	0.872
20	0.958	0.945	0.916	0.910	1.006	0.989	0.925	0.920	0.743	1.075	1.127	0.733	0.789	0.852
22	0.949	0.939	0.879	0.894	0.988	0.974	0.906	0.913	0.707	1.108	1.165	0.680	0.745	0.814
24	0.941	0.933	0.841	0.878	0.970	0.958	0.888	0.907	0.674	1.139	1.201	0.634	0.705	0.779
26	0.933	0.927	0.803	0.862	0.951	0.941	0.871	0.901	0.644	1.166	1.235	0.592	0.669	0.747
28	0.926	0.921	0.765	0.846	0.932	0.925	0.853	0.894	0.617	1.192	1.267	0.556	0.636	0.718
30	0.918	0.916	0.728	0.829	0.913	0.908	0.836	0.888	0.592	0.614	1.297	0.523	0.516	0.690
32	0.911	0.911	0.691	0.812	0.894	0.892	0.820	0.882	0.568	0.589	1.326	0.494	0.488	0.665
34	0.904	0.905	0.656	0.796	0.876	0.877	0.803	0.876	0.547	0.566	1.354	0.467	0.462	0.642
36	0.898	0.901	0.622	0.781	0.857	0.861	0.788	0.870	0.527	0.545	1.381	0.443	0.438	0.620
38	0.891	0.896	0.590	0.766	0.839	0.846	0.772	0.864	0.508	0.525	1.407	0.421	0.417	0.599
39	0.888	0.893	0.574	0.759	0.830	0.838	0.765	0.862	0.499	0.516	1.419	0.411	0.407	0.590

Table 4. Changes to Upper Mundt Creek.

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
1	3					0	0.1	
	6							Elev 93.0 to 93.1
	7.5			0.4	0.0			
	8			0.4	0.0			
	16.5							Elev 93.0 to 93.1
								Mid WSE 93.38 to 93.32
2	4.8							Elev 100.5 to 93.7
	9.2			0.2	0.0			N .166 to .13
	9.5			0.5	0.0			
	9.8			0.7	0.0	1.9	1.8	
	11.3	0.5	0.7					
	12.2			1.7	0.5			
	12.5			1.2	0.6			
	14.6							Elev 92.4 to 93.1
	14.8							Elev 100.5 to 93.8
3	2.1							Elev 100.5 to 93.8
	2.2			1.1	1.4	3.9	4.8	
	2.6			0.5	0.7	2.7	3.7	
	3.0	0.7	0.8	0.7	0.0	1.8	2.0	
	3.6	0.3	0.2	0.3	0.4	1.1	1.5	
	4.8	0.3	0.25			1.0	1.3	
	5.1					0.9	1.0	
	5.4					0.9	1.0	
	5.7					0.8	0.9	
	6.0					0.8	0.9	
	8.1	2.5	2.8					
	8.4	2.3	2.6					
	8.7	2.2	2.5					
	9.0	2.0	2.3					
	9.3	1.9	2.5	1.8	2.9	4.7	5.2	
	9.7			0.6	1.0	3.3	4.3	
	10.0			0.7	1.1	3.2	4.2	
	10.3			0.3	0.5	1.9	2.5	Elev 93.0 to 93.2
	10.6			0.1	0.2	0.9	1.4	Elev 93.1 to 93.2
	13.5							Elev 100.5 to 93.8
4	3.0							Elev 98.6 to 98.7
	3.2							Elev 98.6 to 98.7
	3.4							Elev 98.6 to 98.7
	4.0					0.0	0.1	
	8.5							Elev 97.9 to 98.6
	8.8							Elev 97.9 to 98.5
	9.0	0.1	0.2	1.8	0.0			
	9.6	0.3	0.4	2.0	0.0			
	9.8	0.4	0.5	2.3	0.0			
	10.8			0.5	1.2			
	11.0			0.6	1.5			
	11.6	0.2	0.35	2.4	0.0			
	11.8	0.2	0.35	2.2	0.0			
	12.8			1.1	0.0			
	14.7							Elev 98.3 to 98.5
	15.2							Elev 98.3 to 98.5
	15.5							Elev 98.3 to 98.5
	16.0							Elev 98.4 to 98.5

Table 4. Changes to Upper Mundt Creek.

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
5	1.3							Elev 98.9 TO 99.3
	3.4							Elev 98.9 TO 99.3
	4.3							Elev 98.8 to 99.2
	5.0							Elev 98.7 to 99.1
	5.1							Elev 103.7 to 99.0
	5.5					0.0	0.1	
	6.0							N .058 to .08 (1q only)
	6.4					0.9	0.7	3 flow deck
	6.4							N .038 to .055 (1q only)
	8.0							Elev 98.5 to 98.4
	9.7			0.5	1.2			
	10.3	0.6	0.7	1.4	1.7	3.4	3.0	
	10.6	0.2	0.0	1.6	0.0			On mid-flow deck 10 - 25 cfs
	10.9	0.1	0.0	1.6	0.0			On mid-flow deck 10 - 25 cfs
	11.2	0.1	0.0	1.6	0.0			On mid-flow deck 10 - 25 cfs
	11.8	0.1	0.0	1.2	0.0			On mid-flow deck 10 - 25 cfs
	15.0							Elev 103.7 to 99.0
6	5.5							Elev 98.2 to 98.6
	5.8	-0.6	0.6					
	6.1	-0.4	0.4					
	6.4	-0.5	0.5					
	9.0	1.1	1.4	0.5	0.0	0.9	1.1	
	9.2	0.6	0.8	0.4	0.0			
	9.4	0.5	0.6	0.3	0.0			
	10.2	0.1	0.3	1.7	1.9	6.1	5.3	
	11.8							Elev 98.7 to 98.8
	12.0							Elev 103.7 to 99.1

Table 5a. Summary of calibration details for original and revised input decks, Upper Mundt Transect 1.

Calibration Details
Upper Mundt Creek - Transect 1

		WSE (ft)	92.92		93.07					93.38					93.61					94.19	
		Disch (cfs)	1		2					6					16					39	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	96.3			0.0					0.0					0.0						
	2	0.1	96.2			0.0					0.0					0.0					0.00	0.00
	3	0.7	94.1			0.0					0.0			0.00		0.0	0.00		0.00		-0.04	-0.02
	4	1.7	93.6			0.0					0.0					0.0	-0.04		-0.03		-0.14	-0.13
	5	1.8	93.6			0.0					0.0	0.00				0.0	-0.04		-0.03		-0.14	-0.13
	6	2.0	93.3			0.0					0.0	-0.01				-0.1	-0.11		-0.10		-0.18	-0.17
	7	2.5	93.3			0.0					0.0	0.02		0.00		0.0	0.17		0.19		0.26	0.31
*	8	3.0	93.2			0.0					0.1	0.08		0.10		0.0	0.19		0.10		0.28	0.09
	9	3.5	93.2			0.0					0.1	0.10		0.10		0.2	0.21		0.20		0.38	0.34
	10	4.0	93.2			0.0					0.1	0.09		0.10		0.4	0.44		0.40		1.66	1.33
	11	4.5	93.2			0.0					0.3	0.29		0.30		0.9	0.96		0.89		2.72	2.28
	12	5.0	93.1			0.0					0.5	0.49		0.50		0.9	0.92		0.88		1.54	1.40
	13	5.5	93.1			0.0	0.00				0.5	0.49		0.50		1.1	1.15		1.08		2.35	2.08
*	14	6.0	93.0	0.00	0.00	0.0	0.21	*	0.00		0.6	0.59		0.60		1.3	1.35		1.28		2.73	2.42
	15	6.5	92.9	0.12	0.11	0.3	0.24		0.23		0.6	0.66		0.65		1.6	1.56		1.53		3.20	3.20
	16	7.0	92.8	0.25	0.24	0.5	0.41		0.40		0.7	0.82		0.79		1.5	1.40		1.38		2.17	2.20
*	17	7.5	92.8	0.35	0.41	0.6	0.46		0.54		0.4	0.63	*	0.76	*	1.0	0.78	*	0.97		0.91	1.15
*	18	8.0	92.7	0.29	0.35	0.6	0.42		0.52		0.4	0.70	*	0.89	*	1.4	1.05	*	1.36		1.42	1.91
	19	8.5	92.8	0.29	0.28	0.6	0.50		0.48		1.0	1.09		1.06		2.1	2.04		2.00		3.41	3.42
	20	9.0	92.5	0.39	0.38	0.6	0.57		0.55		1.0	0.93		0.91		1.3	1.36		1.32		1.80	1.78
	21	9.5	92.4	0.25	0.25	0.4	0.38		0.38		0.8	0.69		0.67		1.0	1.09		1.06		1.56	1.53
	22	10.0	92.5	0.15	0.15	0.3	0.28		0.28		0.8	0.67		0.65		1.2	1.35		1.30		2.43	2.36
	23	10.5	92.2	0.13	0.13	0.3	0.26		0.26		0.8	0.72		0.70		1.5	1.63		1.58		3.27	3.20
	24	11.0	92.2	0.16	0.16	0.4	0.33		0.32		0.9	0.92		0.89		2.1	2.14		2.09		4.36	4.33
	25	11.5	92.4	0.17	0.17	0.4	0.34		0.34		1.1	1.00		0.97		2.2	2.39		2.31		5.00	4.90
	26	12.0	92.0	0.22	0.21	0.5	0.41		0.39		0.9	0.99		0.96		2.1	2.04		2.00		3.73	3.74
	27	12.5	92.1	0.30	0.28	0.6	0.48		0.47		0.8	0.96		0.94		1.8	1.65		1.63		2.56	2.60
	28	13.0	92.1	0.26	0.25	0.5	0.43		0.41		0.8	0.85		0.83		1.5	1.47		1.44		2.28	2.29
	29	13.5	92.1	0.22	0.21	0.4	0.33		0.32		0.5	0.59		0.57		1.0	0.92		0.91		1.31	1.33
	30	14.0	92.4	0.25	0.24	0.3	0.30		0.29		0.4	0.37		0.36		0.4	0.41		0.40		0.43	0.43
	31	14.5	92.6	0.05	0.05	0.1	0.10		0.10		0.3	0.23		0.22		0.4	0.47		0.45		0.84	0.81
	32	15.0	92.7	0.07	0.07	0.1	0.10		0.10		0.2	0.16		0.16		0.2	0.22		0.22		0.29	0.28
	33	15.5	92.8	0.09	0.09	0.0	0.10		0.10		0.1	0.10		0.10		0.1	0.10		0.10		0.09	0.09
	34	16.0	93.0	0.00	0.00	0.0	0.10		0.10		0.1	0.10		0.10		0.1	0.10		0.10		0.09	0.09
*	35	16.5	93.0			0.0	0.49	*	0.00		0.1	0.12		0.09		-0.2	-0.22		-0.20		-0.47	-0.43
	36	17.0	93.2			0.0	0.00				0.0	0.05		0.06		0.0	0.12		0.15		0.17	0.23
	37	17.5	93.3			0.0					0.0	0.01		0.00		0.0	0.10		0.13		0.16	0.21
	38	18.0	93.3			0.0					0.0	0.01		0.00		0.0	0.10		0.13		0.16	0.21
	39	18.2	93.6			0.0					0.0	0.00		0.00		0.0	0.04		0.04		0.12	0.16
	40	18.3	93.1			0.0					0.0	0.07		0.09		0.0	0.13		0.17		0.18	0.25
	41	19.1	95.0			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	42	19.2	95.3			0.0					0.0					0.0						
	Total						2	*	0	*		2	*	2	*		2	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5b. Summary of calibration details for original and revised input decks, Upper Mundt Transect 2.

Calibration details for Upper Mundt Creek

Transect 2

	WSE (ft)		92.9		93.07				93.38				93.64				94.33	
	Disch (cfs)		1		2				6				16				39	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	97.0			0.0					0.0					0.0						
2	0.1	96.7			0.0					0.0					0.0	0.00		0.00		0.00	0.00
3	3.2	93.7			0.0					0.0					0.0	0.02		0.02		0.06	0.11
4	4.5	93.6			0.0					0.0					0.0	0.03		0.05		0.06	0.12
* 5	4.8	93.7			0.0					0.0					0.0	0.00		0.02		0.00	0.11
6	5.5	93.6			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.03		0.05		0.06	0.12
7	7.0	92.9	0.00	0.00	0.0	0.03		0.04		0.0	0.08		0.11		0.0	0.11		0.16		0.10	0.19
8	7.3	92.8	0.02	0.03	0.0	0.04		0.06		0.0	0.09		0.12		0.0	0.12		0.17		0.10	0.19
9	7.7	92.7	0.08	0.08	0.0	0.09		0.09		0.1	0.11		0.10		0.1	0.10		0.09		0.06	0.08
10	8.0	92.6	0.04	0.04	0.0	0.06		0.06		0.1	0.10		0.09		0.0	0.13		0.12		0.10	0.13
11	8.3	92.6	0.05	0.05	0.1	0.07		0.07		0.1	0.13		0.12		0.2	0.18		0.18		0.15	0.21
12	8.6	92.5	0.07	0.06	0.2	0.11		0.10		0.1	0.23		0.21		0.5	0.35		0.36		0.33	0.50
13	8.9	92.6	0.12	0.11	0.3	0.20		0.19		0.3	0.44		0.40		0.8	0.71		0.70		0.70	0.96
* 14	9.2	92.6	0.09	0.11	0.3	0.17		0.22		0.2	0.41	*	0.51	*	1.0	0.75	*	0.98		0.83	1.50
* 15	9.5	92.6	0.21	0.25	0.6	0.37	*	0.45		0.5	0.84	*	0.95	*	1.7	1.41		1.66		1.42	2.33
* 16	9.8	92.6	0.27	0.31	0.7	0.47	*	0.53		0.7	1.02	*	1.06	*	1.9	1.69		1.76		1.67	2.33
17	10.1	92.6	0.31	0.31	0.7	0.54		0.53		1.1	1.19		1.10		1.9	1.98		1.87		1.97	2.55
18	10.4	92.2	0.26	0.26	0.6	0.47		0.47		1.1	1.11		1.03		1.8	1.96		1.84		2.06	2.63
19	10.7	92.3	0.32	0.32	0.7	0.56		0.55		1.2	1.22		1.13		1.9	2.04		1.92		2.03	2.60
20	11.0	92.1	0.28	0.28	0.6	0.49		0.49		1.2	1.12		1.04		1.7	1.92		1.78		1.96	2.46
* 21	11.3	92.2	0.27	0.46	0.5	0.46		0.65		1.2	0.94	*	0.98		1.2	1.47	*	1.26		1.38	1.33
22	11.6	92.2	0.36	0.39	0.5	0.51		0.53		1.1	0.80	*	0.75	*	0.8	0.99		0.90		0.75	0.90
23	11.9	92.3	0.40	0.46	0.4	0.52		0.55		1.4	0.70	*	0.65	*	0.5	0.75	*	0.65		0.50	0.56
* 24	12.2	92.3	0.22	0.15	0.3	0.37		0.25		1.7	0.74	*	0.46	*	0.7	1.16	*	0.71		1.09	0.89
* 25	12.5	92.4	0.15	0.12	0.3	0.29		0.23		1.2	0.74	*	0.55	*	1.0	1.41	*	1.04		1.59	1.56
26	12.8	92.4	0.54	0.55	0.8	0.75		0.74		1.2	1.11		1.03		1.2	1.31		1.22		0.95	1.21
27	13.1	92.1	0.46	0.43	1.1	0.76	*	0.72	*	1.1	1.56	*	1.44	*	2.7	2.42		2.36		2.27	3.13
28	13.4	92.2	0.54	0.51	1.3	0.91	*	0.87	*	1.4	1.91	*	1.77	*	3.3	3.03		2.94		2.89	3.95
29	13.7	92.2	0.38	0.37	1.0	0.71	*	0.68	*	1.4	1.72	*	1.59		3.2	3.14		3.01		3.40	4.53
30	14.0	92.4	0.14	0.14	0.6	0.36	*	0.35	*	1.1	1.41	*	1.31		3.9	3.91		3.74		6.19	8.18
31	14.3	92.4	0.01	0.02	0.1	0.04		0.09		0.4	0.53		0.60		3.7	4.07		2.92	*	16.33	10.46
* 32	14.6	92.4	0.00	0.00	0.0	0.01		0.00		0.2	0.18		1.29	*	2.4	3.56	*	2.54		33.68	3.17
* 33	14.8	93.7	0.00		0.0	0.00				0.0	0.00		0.00		0.0	0.00		0.00		0.00	1.81
34	14.9	93.7			0.0					0.0					0.0	0.02		0.00		0.09	1.81
35	15.7	94.1			0.0					0.0					0.0	0.00				0.04	1.04
36	16.7	93.8			0.0					0.0					0.0					0.08	1.81
37	17.0	94.8			0.0					0.0					0.0					0.00	0.00
38	18.7	94.3			0.0					0.0					0.0					0.01	0.29
39	21.3	96.3			0.0					0.0					0.0					0.00	0.00
40	21.5	96.7			0.0					0.0					0.0						
Total						6	*	4	*		12	*	10	*		6	*	1	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5c. Summary of calibration details for original and revised input decks, Upper Mundt Transect 3.

Calibration details for Upper Mundt Creek

Transect 3

	WSE (ft)		92.9		93.08				93.39				93.77				94.14	
	Disch (cfs)		1		2				6				16				39	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	95.7			0.0					0.0					0.0						
2	0.1	95.6			0.0					0.0					0.0						
3	2.0	94.2			0.0					0.0					0.0						0.00
* 4	2.1	100.5			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	1.76
* 5	2.2	93.2	0.00	0.00	0.0	0.00		0.00		1.1	0.78	*	1.04		3.9	2.82	*	3.42		7.30	8.33
* 6	2.6	92.6	0.01	0.02	0.0	0.04		0.07		0.5	0.31		0.47		2.7	1.73	*	2.33		6.62	8.30
* 7	3.0	92.3	0.30	0.39	0.7	0.47	*	0.60		0.7	0.88		1.14	*	1.8	1.39	*	1.78		1.69	2.21
8	3.3	91.8	0.29	0.28	0.6	0.47		0.45		1.0	0.90		0.88		1.6	1.45		1.42		1.80	1.82
* 9	3.6	91.8	0.10	0.05	0.3	0.18		0.11		0.3	0.41		0.38		1.1	0.76	*	1.03		1.08	2.09
10	3.9	91.7	0.05	0.05	0.1	0.09		0.09		0.4	0.22		0.21		0.4	0.43		0.42		0.65	0.64
11	4.2	91.5	0.03	0.03	0.1	0.07		0.07		0.3	0.22		0.22		0.7	0.57		0.56		1.10	1.10
12	4.5	91.4	0.27	0.26	0.3	0.31		0.30		0.4	0.34		0.34		0.3	0.34		0.34		0.28	0.28
* 13	4.8	91.8	0.11	0.07	0.3	0.18		0.13		0.3	0.40		0.38		1.0	0.71	*	0.84		0.97	1.46
* 14	5.1	91.9	0.07	0.06	0.2	0.14		0.13		0.4	0.35		0.35		0.9	0.74		0.78		1.16	1.32
* 15	5.4	92.0	0.03	0.03	0.1	0.07		0.06		0.4	0.26		0.26		0.9	0.75		0.79		1.61	1.82
* 16	5.7	92.0	0.03	0.02	0.1	0.06		0.06		0.3	0.23		0.23		0.8	0.63		0.67		1.28	1.47
* 17	6.0	91.7	0.03	0.02	0.1	0.06		0.06		0.3	0.23		0.23		0.8	0.63		0.67		1.28	1.47
18	6.3	91.7	0.04	0.04	0.1	0.10		0.09		0.9	0.32	*	0.31	*	0.7	0.83		0.80		1.61	1.57
19	6.6	91.6	0.14	0.14	0.2	0.21		0.20		0.6	0.34	*	0.34	*	0.4	0.49		0.47		0.53	0.53
20	6.9	91.5	0.09	0.09	0.2	0.16		0.16		0.5	0.36		0.36		0.7	0.67		0.65		0.94	0.94
21	7.2	92.7	1.43	1.39	1.8	1.81		1.77		3.3	2.45	*	2.40	*	2.5	2.87		2.80		2.68	2.67
22	7.5	92.6	1.17	1.13	2.0	1.68		1.63		3.1	2.77		2.71		4.0	3.87		3.79		4.23	4.26
23	7.8	92.6	1.34	1.29	2.2	1.87		1.82		3.3	2.97		2.91		4.1	4.01		3.93		4.25	4.28
* 24	8.1	92.6	1.48	1.66	2.5	2.05		2.22		3.2	3.19		3.29		4.5	4.22		4.13		4.39	4.21
* 25	8.4	92.8	1.36	1.54	2.3	1.89		2.07		3.0	2.96		3.06		4.2	3.94		3.86		4.13	3.95
* 26	8.7	92.8	1.25	1.42	2.2	1.77		1.95		2.9	2.88		2.99		4.3	3.97		3.88		4.28	4.08
* 27	9.0	92.8	0.96	1.11	2.0	1.49	*	1.65		2.7	2.77		2.89		5.0	4.30		4.22		5.19	4.93
* 28	9.3	92.8	0.82	1.24	1.9	1.27	*	1.82		1.8	2.33	*	3.10	*	4.7	3.60	*	4.43		4.30	5.07
* 29	9.7	93.0	0.00	0.00	0.0	0.05		0.13		0.6	0.37	*	0.70		3.3	2.10	*	2.87		8.18	8.54
* 30	10.0	93.1			0.0	0.00		0.00		0.7	0.46	*	0.80		3.2	2.15	*	2.90		7.05	7.77
* 31	10.3	93.0			0.0	0.02		0.00		0.3	0.18		0.34		1.9	1.16	*	1.60		5.16	5.43
* 32	10.6	93.1			0.0	0.00		0.00		0.1	0.05		0.12		0.9	0.50	*	0.81		3.06	3.71
33	10.9	93.0			0.0	0.01		0.01		0.1	0.06		0.07		0.5	0.33		0.32		1.17	1.09
34	11.2	93.3			0.0	0.00		0.00		0.0	0.00		0.00		0.7	0.59		0.58		0.86	0.87
35	11.5	93.3			0.0					0.0					-1.0	-0.84		-0.83		-1.23	-1.24
36	11.8	93.3			0.0					0.0					-0.9	-0.76		-0.75		-1.10	-1.12
37	12.1	93.4			0.0					0.0					-0.7	-0.55		-0.54		-0.93	-0.94
38	12.4	93.5			0.0					0.0					-0.5	-0.34		-0.34		-0.74	-0.75
39	12.7	93.6			0.0					0.0					-0.3	-0.13		-0.13		-0.54	-0.55
40	13.0	93.6			0.0					0.0					-0.3	-0.13		-0.13		-0.54	-0.55
41	13.3	93.7			0.0					0.0					0.0	0.00		0.00		-0.47	-0.48
* 42	13.5	93.7			0.0					0.0					0.0					0.00	-0.40
43	13.6	93.7			0.0					0.0					0.0					-0.47	-0.48
44	17.0	94.0			0.0					0.0					0.0					-0.22	-0.22
45	18.3	94.4			0.0					0.0					0.0					0.00	0.00
46	18.5	95.7			0.0					0.0					0.0						
47	20.6	97.3			0.0					0.0					0.0						
48	25.2	97.7			0.0					0.0					0.0						
49	26.1	100.3			0.0					0.0					0.0						
50	26.1	100.5			0.0					0.0					0.0						
Total						3	*	0	*		7	*	5	*		10	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5d. Summary of calibration details for original and revised input decks, Upper Mundt Transect 4.

Calibration details for Mundt Creek

Transect 4

	WSE (ft)		98.37		98.45				98.66				98.95				99.31	
	Disch (cfs)		1		2				6				16				39	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.7			0.0					0.0					0.0						
2	0.1	100.6			0.0					0.0					0.0						
3	0.5	100.4			0.0					0.0					0.0						
4	1.0	99.4			0.0					0.0					0.0					0.00	0.00
5	2.1	99.2			0.0					0.0					0.0	0.00		0.00		0.23	0.25
6	2.7	98.7			0.0					0.0					0.5	0.51		0.49		0.70	0.79
7	2.9	98.7			0.0					0.0	0.00				0.6	0.61		0.59		0.84	0.94
* 8	3.0	98.6			0.0					0.0	0.29	*			0.7	0.70		0.69		0.87	1.10
* 9	3.2	98.6			0.0					0.0	0.38	*			0.9	0.90		0.89		1.12	1.42
* 10	3.4	98.6			0.0					0.0	0.29	*	0.00		0.7	0.70		0.69		0.87	1.10
11	3.5	98.6			0.0					0.0	0.08		0.08		0.2	0.20		0.19		0.25	0.28
12	3.9	99.1			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.03	0.08
* 13	4.0	98.7			0.0					0.0	0.00		0.00		0.0	0.05		0.10		0.07	0.16
14	5.0	99.1			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.03	0.20
15	6.0	99.8			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
16	7.0	100.1			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
17	8.3	100.4			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
18	8.4	99.1	0.00		0.0	0.00				0.0	0.00		0.00		0.0	0.00		0.00		0.03	0.20
* 19	8.5	97.9	0.00		0.0	0.01				0.1	0.10		0.16		0.9	1.22	*	0.82		9.59	3.39
* 20	8.8	97.9	1.83		0.0	2.13	*	0.00		2.4	2.42		2.30		2.4	2.31		2.24		1.85	2.07
* 21	9.0	97.9	0.04	0.00	0.1	0.15		0.20		1.8	1.05	*	0.82	*	3.0	5.04	*	2.74		17.42	7.82
22	9.2	98.0	0.34	0.44	0.6	0.67		0.76		2.1	1.72		1.62	*	2.8	3.39	*	3.05		5.24	5.15
23	9.4	97.9	0.61	0.67	1.1	1.00		1.04		1.6	1.95	*	1.87		3.3	3.04		3.01		3.78	4.41
* 24	9.6	97.8	0.14	0.18	0.3	0.37		0.39		2.0	1.53	*	1.21	*	3.4	4.56	*	3.12		10.26	7.03
* 25	9.8	97.8	0.21	0.25	0.4	0.49		0.49		2.3	1.72	*	1.34	*	3.4	4.52	*	3.13		9.04	6.41
26	10.0	98.0	0.16	0.21	0.3	0.35		0.40		1.3	1.04		0.98	*	1.9	2.38	*	2.12		4.18	4.04
27	10.2	98.0	0.30	0.35	0.5	0.48		0.52		0.9	0.93		0.88		1.4	1.42		1.36		1.74	1.91
28	10.4	98.0	0.30	0.30	0.6	0.47		0.46		0.5	0.84	*	0.81	*	1.6	1.20	*	1.28		1.39	1.84
29	10.6	97.8	0.19	0.19	0.4	0.32		0.32		0.4	0.68	*	0.66	*	1.5	1.14	*	1.21		1.52	2.00
* 30	10.8	97.8	0.35	0.51	0.7	0.53		0.73		0.5	0.90	*	1.15	*	1.7	1.22	*	1.66		1.35	2.19
* 31	11.0	97.8	0.45	0.66	0.9	0.67	*	0.93		0.6	1.11	*	1.44	*	2.1	1.48	*	2.04		1.60	2.65
32	11.2	97.7	0.52	0.56	0.9	0.77		0.79		1.0	1.29	*	1.24	*	2.0	1.74		1.76		1.90	2.29
33	11.4	97.9	0.14	0.18	0.3	0.36		0.40		1.7	1.46		1.38		3.5	4.37	*	3.91		9.87	9.60
* 34	11.6	97.9	0.09	0.15	0.2	0.28		0.35		2.4	1.50	*	1.17	*	3.6	5.63	*	3.30		15.63	8.04
* 35	11.8	97.9	0.10	0.16	0.2	0.28		0.35		2.2	1.37	*	1.08	*	3.1	4.81	*	2.85		12.54	6.52
36	12.0	97.9	0.34	0.43	0.6	0.66		0.74		2.0	1.69		1.59		2.8	3.33		3.02		5.13	5.10
37	12.3	98.2	0.60	0.70	1.0	0.96		1.02		1.7	1.77		1.68		2.6	2.62		2.51		3.10	3.42
38	12.5	98.2	0.82	0.90	1.3	1.14		1.19		1.5	1.76		1.68		2.4	2.20		2.17		2.24	2.61
* 39	12.8	98.1	0.96	1.20	1.5	1.19	*	1.42		1.1	1.52	*	1.68	*	2.0	1.62		1.86		1.42	1.94
40	13.1	98.0	0.79	0.86	1.2	1.01		1.04		1.1	1.35	*	1.29		1.7	1.49		1.49		1.35	1.62
41	13.4	98.1	0.37	0.43	0.6	0.57		0.61		1.0	1.04		0.99		1.5	1.51		1.45		1.76	1.94
42	13.7	98.1	0.12	0.15	0.2	0.22		0.25		0.7	0.56		0.53		0.9	1.10	*	0.99		1.67	1.64
43	14.0	98.2	0.19	0.24	0.3	0.32		0.36		0.8	0.66		0.62		0.9	1.06		0.96		1.36	1.36
44	14.3	98.2	0.45	0.54	0.7	0.69		0.75		1.3	1.21		1.15		1.6	1.71		1.60		1.94	2.05
45	14.6	98.2	0.32	0.39	0.5	0.50		0.55		1.0	0.91		0.86		1.2	1.31		1.22		1.52	1.59
* 46	14.7	98.3	0.25	0.00	0.0	0.39	*	0.00		0.7	0.71		0.73		1.0	1.02		0.93		1.18	1.09
* 47	15.2	98.3	0.15	0.00	0.0	0.28	*	0.00		0.7	0.71		0.78		1.3	1.38		1.20		2.10	1.70
* 48	15.5	98.3	0.15		0.0	0.28	*			0.7	0.71		0.78		1.3	1.38		1.20		2.10	1.70
* 49	16.0	98.4	0.00		0.0	0.70	*			0.9	0.91		0.89		1.0	0.98		0.93		0.87	0.92
50	16.4	98.5			0.0	0.00				0.3	0.30		0.29		0.3	0.29		0.28		0.23	0.26
51	16.8	99.0			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.36	0.40
52	16.9	99.3			0.0					0.0					0.0					0.04	0.05
53	17.6	100.2			0.0					0.0					0.0					0.00	0.00
54	18.4	100.6			0.0					0.0					0.0						
55	18.5	100.8			0.0					0.0					0.0						
Total							7	*	0	*		16	*	13	*		14	*	0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5e. Summary of calibration details for original and revised input decks, Upper Mundt Transect 5.

Calibration details for Upper Mundt Creek

Transect 5

		WSE (ft)	98.34		98.49				98.71				98.99					99.54		
		Disch (cfs)	1		2				6				16					39		
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Rev-1q	*	Orig	Rev	Rev-1q
	1	0.0	101.3			0.0					0.0					0.0									
	2	0.1	100.4			0.0					0.0					0.0									
	3	1.1	99.9			0.0					0.0					0.0	0.00						0.00	0.00	0.00
*	4	1.3	98.9			0.0					0.0					0.0	0.50	*					0.68	0.25	0.28
*	5	3.4	98.9			0.0					0.0					0.0	0.50	*					0.68	0.25	0.28
*	6	4.3	98.8			0.0					0.0	0.00				0.0	0.66	*					0.75	0.38	0.41
*	7	5.0	98.7			0.0					0.0	0.22	*			0.0	0.81	*	0.00		0.00		0.81	0.38	0.41
*	8	5.1	103.7			0.0					0.0	0.00				0.0	0.00		0.10		0.11		0.00	0.44	0.47
*	9	5.5	98.9			0.0					0.0	0.00				0.0	0.50	*	0.17		0.17		0.68	0.49	0.53
*	10	6.0	98.8			0.0					0.0	0.00				0.6	0.66		0.80		0.60		0.75	1.95	1.53
*	11	6.4	98.8			0.0	0.00		0.00		0.0	0.00		0.00		0.9	1.00		0.94		0.88		1.12	2.93	2.23
	12	6.9	98.4			0.0	0.02		0.02		0.1	0.12		0.12		0.4	0.51		0.48		0.46		1.40	1.91	0.88
	13	7.3	98.4			0.2	0.15		0.15		0.1	0.17		0.17		0.2	0.13		0.17		0.23		0.08	0.24	0.44
	14	7.7	98.6			0.2	0.00		0.00		0.4	0.42		0.41		0.6	0.61		0.70		0.73		0.65	1.58	1.54
*	15	8.0	98.5	0.00	0.00	0.3	0.00	*	0.30		0.7	0.59		0.58		0.7	0.76		0.85		0.81		0.72	1.62	1.55
	16	8.3	98.3	0.28	0.27	0.6	0.57		0.55		1.4	1.34		1.31		1.9	2.03		2.30	*	2.17		2.25	5.24	4.00
	17	8.7	98.4	0.00	0.00	0.9	0.82		0.79		1.8	1.87		1.82		2.7	2.74		3.17		3.13		2.95	7.10	5.97
	18	9.0	98.4	0.00	0.00	1.2	1.03		1.00		1.7	2.04		1.99		2.9	2.62		3.15		3.37		2.51	6.50	6.41
	19	9.4	98.3	0.74	0.71	1.4	1.21		1.17		1.7	2.06	*	2.02		2.7	2.33		2.84		3.09		1.98	5.23	5.69
*	20	9.7	97.6	0.54	0.69	1.1	0.76	*	0.99		0.5	1.02	*	1.36	*	1.5	0.93	*	1.28		1.64		0.65	2.14	2.67
	21	10.0	98.1	0.32	0.31	0.8	0.69		0.67		1.6	1.81		1.77		3.0	3.02		3.53		3.36		3.64	8.96	5.89
	22	10.3	98.1	0.19	0.19	0.6	0.49		0.47		1.4	1.69	*	1.65		3.4	3.55		3.68		3.81		5.33	9.88	6.67
*	23	10.6	98.1	0.04	0.04	0.2	0.18		0.18		1.6	1.34		1.31		3.6	5.57	*	3.87		4.04		15.45	6.50	7.07
*	24	10.9	97.5	0.02	0.02	0.1	0.10		0.09		1.3	0.94	*	0.92	*	2.8	5.06	*	2.93		3.05		17.76	4.51	4.91
*	25	11.2	97.5	0.02	0.02	0.1	0.10		0.10		1.5	0.97	*	0.95	*	2.7	5.13	*	2.82		2.94		17.74	4.35	4.74
	26	11.5	97.5	0.21	0.22	0.0	0.47	*	0.46	*	1.1	1.25		1.23		2.1	2.12		2.29		2.29		2.60	5.01	3.68
*	27	11.8	97.6	0.02	0.02	0.1	0.10		0.10		1.2	0.82	*	0.80	*	2.1	3.73	*	2.20		2.30		11.26	3.43	3.73
	28	12.1	97.6	0.20	0.19	0.5	0.42		0.41		0.9	1.08		1.05		1.8	1.75		2.07		1.97		2.06	5.19	3.20
	29	12.4	97.6	0.27	0.27	0.6	0.50		0.48		0.8	1.01	*	0.99		1.5	1.33		1.61		1.64		1.29	3.40	2.67
	30	12.7	97.7	0.60	0.58	1.0	0.83		0.80		0.8	1.10	*	1.07	*	1.3	0.98	*	1.24		1.43		0.68	1.92	2.34
	31	13.0	97.8	0.76	0.73	1.1	0.95		0.91		0.8	1.05	*	1.03	*	1.1	0.81	*	1.03		1.21		0.49	1.39	2.02
	32	13.3	98.0	0.73	0.70	1.0	0.87		0.84		0.7	0.91	*	0.89		0.9	0.66	*	0.83		1.00		0.37	1.06	1.72
	33	13.6	98.1	0.49	0.47	0.8	0.64		0.61		0.5	0.76	*	0.75	*	0.9	0.63	*	0.82		1.01		0.40	1.19	1.77
	34	13.9	98.1	0.36	0.34	0.6	0.50		0.48		0.5	0.67		0.66		0.8	0.61		0.77		0.90		0.43	1.21	1.57
	35	14.2	98.2	0.21	0.20	0.4	0.33		0.32		0.4	0.53		0.52		0.7	0.57		0.70		0.79		0.46	1.26	1.42
	36	14.5	98.3	0.06	0.06	0.2	0.12		0.11		0.1	0.26		0.25		0.6	0.37	*	0.53		0.69		0.39	1.36	1.26
	37	14.8	98.7	0.00	0.00	0.0	0.00		0.00		0.0	0.03		0.03		0.1	0.10		0.12		0.13		0.10	0.27	0.29
*	38	15.0	103.7			0.0					0.0	0.00		0.00		0.0	0.00		0.05		0.05		0.00	0.20	0.22
	39	15.1	99.5			0.0					0.0					0.0			0.00		0.00		0.01	0.04	0.04
	40	15.7	100.3			0.0					0.0					0.0							0.00	0.00	0.00
	41	15.8	100.5			0.0					0.0					0.0									
	Total						3	*	1	*		12	*	7	*		15	*	1	*	0	*			

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5f. Summary of calibration details for original and revised input decks, Upper Mundt Transect 6.

Calibration details for Upper Mundt Creek

Transect 6

	WSE (ft)		98.37		98.52				98.76				99.06					99.52		
	Disch (cfs)		1		2				6				16					39		
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Rev-1q	*	Orig	Rev	Rev-1q
1	0.0	101.2			0.0					0.0					0.0									
2	0.1	100.7			0.0					0.0					0.0							0.00	0.00	0.00
3	1.6	99.1			0.0					0.0					0.0	0.00		0.00		0.00		0.15	0.18	0.62
4	2.0	99.0			0.0					0.0					0.0	0.12		0.13		0.14		0.17	0.21	0.71
5	2.5	99.0			0.0					0.0					0.0	0.12		0.13		0.14		0.17	0.21	0.71
6	3.0	99.0			0.0					0.0					0.1	0.12		0.13		0.14		0.17	0.21	0.71
7	3.5	99.0			0.0					0.0					0.1	0.12		0.13		0.14		0.17	0.21	0.71
8	4.0	98.9			0.0					0.0	0.00		0.00		0.2	0.20		0.21		0.24		0.20	0.25	0.83
9	4.5	98.7			0.0					-0.7	-0.82		-0.65		0.1	0.13		0.10		0.11		0.36	0.36	0.29
10	4.8	98.6			0.0	0.00		0.00		-0.4	-0.45		-0.34		0.2	0.21		0.18		0.22		0.32	0.34	0.53
11	5.2	98.4	0.00		0.0	0.04		0.04		0.1	0.14		0.13		0.2	0.18		0.18		0.21		0.16	0.17	0.48
* 12	5.5	98.2	0.88	0.00	0.0	1.01	*	0.00		0.5	0.60		0.49		0.2	0.16		0.18		0.22		0.03	0.05	0.53
* 13	5.8	98.1	-0.26	0.36	-0.6	-0.31		0.51		0.6	0.15	*	0.53		0.3	0.49		0.28		0.32		0.41	0.11	0.65
* 14	6.1	98.0	-0.17	0.24	-0.4	-0.21		0.34		0.4	0.10	*	0.35		0.2	0.33		0.19		0.21		0.27	0.08	0.43
* 15	6.4	97.9	-0.26	0.20	-0.5	-0.31		0.34		0.4	0.15	*	0.48		0.4	0.50		0.34		0.42		0.41	0.18	0.84
* 16	6.7	97.8	-0.01	0.06	-0.1	0.06		0.13		0.6	0.31	*	0.26	*	0.2	0.33		0.26		0.21		0.21	0.18	0.41
17	7.0	97.6	0.06	0.07	0.2	0.17		0.16		0.4	0.41		0.36		0.4	0.40		0.40		0.42		0.26	0.30	0.80
18	7.3	97.5	0.05	0.06	0.2	0.16		0.15		0.4	0.45		0.39		0.5	0.48		0.49		0.52		0.35	0.41	0.99
19	7.6	97.5	0.13	0.13	0.4	0.28		0.25		0.3	0.47		0.41		0.4	0.32		0.33		0.42		0.15	0.19	0.80
20	7.9	97.4	0.33	0.36	0.6	0.56		0.51		0.6	0.60		0.53		0.3	0.28		0.28		0.31		0.10	0.11	0.59
21	8.2	97.4	0.64	0.69	1.0	0.99		0.91		1.0	0.93		0.81		0.4	0.38		0.39		0.42		0.12	0.14	0.79
22	8.4	97.4	1.68	1.83	1.5	1.73		1.60		1.1	0.85	*	0.75	*	0.2	0.20		0.20		0.21		0.04	0.04	0.39
23	8.6	97.3	0.69	0.89	1.1	1.03		1.09		0.9	0.92		0.85		0.4	0.36		0.36		0.42		0.11	0.12	0.78
* 24	8.8	97.2	0.48	0.73	1.1	0.79	*	0.98		0.5	0.82	*	0.89	*	0.5	0.37		0.43		0.52		0.12	0.15	0.97
* 25	9.0	97.1	0.33	0.58	1.1	0.69	*	1.00		0.5	1.01	*	1.37	*	0.9	0.62	*	0.96		0.94		0.27	0.49	1.73
* 26	9.2	97.1	0.09	0.20	0.6	0.31	*	0.52		0.4	1.01	*	1.37	*	1.9	1.27	*	1.70		1.98		1.07	1.44	3.66
* 27	9.4	97.0	0.05	0.11	0.5	0.22	*	0.37		0.3	0.98	*	1.39	*	2.7	1.65	*	2.43		2.81		1.79	2.79	5.17
28	9.6	97.1	0.02	0.02	0.2	0.11		0.10		0.5	0.98	*	0.86	*	3.7	3.07		3.18		3.85		5.92	7.26	7.13
29	9.8	97.1	0.03	0.03	0.2	0.15		0.15		1.3	1.29		1.13		3.3	3.73		3.64		3.43		6.69	7.35	6.36
30	10.0	96.9	0.02	0.02	0.2	0.13		0.12		1.0	1.32	*	1.16		4.5	4.53		4.52		4.68		9.48	10.85	8.56
* 31	10.2	97.1	0.01	0.04	0.1	0.08		0.22		1.7	1.41		1.72		6.1	8.04	*	5.78		6.35		26.70	12.08	11.75
32	10.4	97.3	0.01	0.43	0.1	0.10		1.03	*	2.0	1.16	*	2.40		3.0	4.50	*	2.68		3.13		10.56	2.07	5.86
33	10.6	97.4	0.05	0.06	0.3	0.24		0.23		1.3	1.29		1.13		2.3	2.50		2.46		2.40		3.11	3.47	4.53
34	10.8	97.6	0.01	0.01	0.1	0.08		0.07		0.9	0.86		0.75		2.7	3.20		3.09		2.82		7.23	7.80	5.42
35	11.0	97.7	0.02	0.03	0.2	0.13		0.12		0.5	0.77	*	0.68		1.9	1.70		1.73		1.99		2.37	2.83	3.86
36	11.2	98.0	0.01	0.01	0.1	0.06		0.06		0.4	0.58		0.51		1.9	1.82		1.83		2.00		3.52	4.10	4.05
37	11.4	98.1	-0.29	-0.29	-0.3	-0.26		-0.22		0.5	0.55		0.48		1.0	0.95		0.96		1.05		0.71	0.84	2.17
38	11.6	98.5	0.00	0.00	0.0	0.00		0.00		0.2	0.27		0.25		0.4	0.36		0.36		0.43		0.32	0.34	1.00
* 39	11.8	98.7			0.0					0.0	0.40	*	0.00		1.0	0.92		0.98		1.13		0.71	0.99	3.31
* 40	12.0	103.7			0.0					0.0	0.00				0.0	0.00		0.00		0.00		0.00	0.69	2.31
41	12.1	99.5			0.0					0.0					0.0							0.06	0.09	0.30
42	14.7	100.2			0.0					0.0					0.0							0.00	0.00	0.00
43	15.0	100.5			0.0					0.0					0.0									
Total						5	*	1	*		14	*	7	*		5	*	0	*	0	*			

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 6. Summary of Calibration Details, Upper Mundt Creek.						
Transect Number	1	2	3	4	5	6
DISCHARGE						
	2	3	3	2	2	2
Meas.	6	6	9	6	6	6
	15	14	20	14	15	15
	2	3	3	2	2	3
Calc.	6	6	9	4	6	5
	16	14	22	13	15	15
	2	2	2	2	2	2
Given	6	6	6	6	6	6
	16	16	16	16	16	16
Stage (given)						
	93.07	93.07	93.08	98.45	98.52	98.52
	93.32	93.38	93.39	98.66	98.76	98.76
	93.61	93.64	93.27	98.95	99.06	99.06
Plotting Stage (given)						
	0.500	0.500	0.510	0.500	0.610	0.610
	0.750	0.810	0.820	0.710	0.850	0.850
	1.040	1.070	0.700	1.000	1.150	1.150
Ratio of Measured vs Predicted Discharge (given)						
	1.041	1.038	0.987	0.931	1.032	1.032
	0.912	0.907	1.029	1.154	0.937	0.937
	1.054	1.063	0.985	0.930	1.035	1.035
Mean Error of Stage/Discharge Relationship for Calculated Q						
	8.22	9.67	2.15	10.81	4.43	12.6
Mean Error of Stage/Discharge Relationship for Given Q						
	6.23	6.62	1.87	9.46	4.39	4.39
Stage/Discharge Relationship (S vs Q) S=A*Q**B+SZF						
A=	0.365	0.327	0.302	0.440	0.462	0.425
B=	0.391	0.467	0.450	0.328	0.342	0.382
SZF=	92.57	92.57	92.57	97.95	97.91	97.91
B Coefficient log/log Relationship (calculated)						
	2.559	2.142	2.220	3.046	2.920	2.616

APPENDIX F

Lower Mundt Creek Final IFIM Calibration Report

Lower Mundt Creek Final IFIM Calibration Report

Prepared for

Dr. Hal Beecher

Prepared by

Cascades Environmental Services, Inc.

July 24, 1996

Table 1. Original, unrevised data deck, Lower Mundt Creek.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - uncalibrated data deck
IOC       1100000201001
QARD   1.0
QARD   3.0
QARD  10.0
QARD  34.0
QARD  80.0
XSEC     1                    95.59      0.007
         1  0.0 98.0  0.2 97.5  1.5 97.2  3.0 96.8  4.2 96.5  5.5 96.5
         1  6.0 96.4  6.5 96.4  7.0 96.3  7.5 96.2  8.0 96.1  8.5 96.0
         1  9.0 96.0  9.5 95.9 10.0 95.8 10.5 95.8 11.0 95.8 11.5 95.8
         1 12.0 95.8 12.5 95.8 13.0 95.7 13.5 95.7 14.0 95.8 14.5 95.7
         1 15.0 95.7 15.5 95.8 16.0 95.7 16.5 95.6 17.0 95.6 17.5 95.7
         1 18.0 95.7 18.5 95.7 19.0 95.7 19.5 95.6 20.0 95.6 20.5 95.7
         1 21.0 95.6 21.5 95.8 22.0 95.7 22.6 95.9 23.0 95.7 23.5 95.8
         1 24.0 95.8 24.5 95.8 25.0 96.0 25.5 96.2 26.0 96.1 26.5 96.2
         1 27.0 96.1 27.5 96.1 28.0 96.2 28.5 96.3 29.0 96.5 29.5 96.3
         1 30.0 96.3 30.5 96.3 31.0 96.3 31.5 96.5 31.9 96.3 33.7 98.4
         1 35.5100.4 35.7101.0
NS       1  0.0  2.9  0.0  2.9  0.0  2.9  0.0  2.9  0.0 24.6  0.0 24.6
NS       1  0.0 24.6  0.0 63.7  0.0 63.7  0.0 63.7  0.0 43.7  0.0 43.7
NS       1  0.0 43.7  0.0 43.7  0.0 46.8  0.0 46.8  0.0 35.7  0.0 35.7
NS       1  0.0 35.6  0.0 35.6  0.0 35.6  0.0 35.6  0.0 65.7  0.0 65.7
NS       1  0.0 65.7  0.0 65.7  0.0 65.8  0.0 65.8  0.0 65.8  0.0 65.9
NS       1  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9  0.0 66.9  0.0 66.9
NS       1  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 65.8
NS       1  0.0 65.8  0.0 65.8  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9
NS       1  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 57.8
NS       1  0.0 57.8  0.0 57.8  0.0 70.6  0.0 70.6  0.0  1.5  0.0  1.5
NS       1  0.0  1.5  0.0  1.5
CAL1     1    96.52       38.67
VEL1     1                          0.0  0.8  0.9  1.4  1.4  1.3  2.0
VEL1     1  1.9  2.0  2.0  2.1  2.9  2.9  2.6  2.7  3.1  2.3  2.3  2.7
VEL1     1  2.8  2.8  2.9  2.7  2.3  2.7  3.3  3.5  2.9  2.3  3.5  3.2
VEL1     1  3.2  3.3  3.2  3.3  3.0  2.8  2.7  3.0  3.3  3.0  2.4  3.1
VEL1     1  2.5  2.2  1.6  1.2  0.0  1.2  0.6  0.8  0.7  0.0
VEL1     1            0.0
CAL2     1    96.24       13.43
VEL2     1                                                 0.0  0.0  1.0
VEL2     1  1.4  1.1  2.0  2.0  2.0  2.2  2.2  2.3  2.2  2.3  1.7  2.4
VEL2     1  2.2  1.8  1.9  1.4  1.3  2.1  2.0  2.2  1.6  1.3  1.4  2.1
VEL2     1  1.3  2.0  1.8  1.7  1.3  1.2  1.0  0.9  1.1  0.0  0.6  0.0
VEL2     1  0.0  0.0
VEL2     1
CAL3     1    96.05        4.53
VEL3     1                                                           0.0
VEL3     1  0.0  0.0  0.8  1.1  1.4  1.4  1.8  1.8  1.9  1.4  1.4  1.8
VEL3     1  1.6  1.6  1.1  0.6  0.8  1.8  1.2  1.3  1.0  0.9  0.4  1.4
VEL3     1  0.9  1.0  0.8  0.7  0.7  0.6  0.4  0.3  0.0
VEL3     1                                                 0.0  0.0  0.0
VEL3     1  0.0  0.0
XSEC     2                    95.64      0.004
         2  0.0 97.9  0.2 97.3  0.5 97.2  1.3 97.1  2.0 97.0  3.9 96.6
         2  4.4 96.6  5.0 96.5  5.5 96.5  6.0 96.5  6.5 96.4  7.0 96.4
```

Table 1. Original, unrevised data deck, Lower Mundt Creek. - **Continued**

```
          2  7.5 96.4  8.0 96.3  8.5 96.3  9.0 96.2  9.5 96.3 10.0 96.2
          2 10.5 96.0 11.0 96.0 11.5 95.9 12.0 95.9 12.5 95.9 13.0 95.8
          2 13.5 95.8 14.0 95.8 14.5 95.8 15.0 95.8 15.5 95.7 16.0 95.6
          2 16.5 95.6 17.0 95.6 17.5 95.6 18.0 95.5 18.5 95.5 19.0 95.5
          2 19.5 95.4 20.0 95.4 20.5 95.4 21.0 95.7 21.5 95.9 22.0 95.7
          2 22.5 95.7 23.0 95.8 23.5 95.8 24.0 96.0 24.5 96.0 25.0 96.1
          2 25.5 96.1 26.0 96.2 26.5 96.3 27.0 96.3 27.5 96.4 28.0 96.5
          2 28.5 96.5 29.0 96.4 29.4 96.6 29.6 96.8 30.7 97.3 32.7 98.3
          2 34.7100.1 34.8100.6
NS        2  0.0  1.8  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9
NS        2  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 43.7
NS        2  0.0 43.7  0.0 43.7  0.0 36.6  0.0 36.6  0.0 43.6  0.0 43.6
NS        2  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 45.7  0.0 45.7
NS        2  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 64.6
NS        2  0.0 64.6  0.0 64.6  0.0 64.6  0.0 64.6  0.0 56.6  0.0 56.6
NS        2  0.0 56.6  0.0 56.6  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS        2  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS        2  0.0 78.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 75.7
NS        2  0.0 75.7  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8
NS        2  0.0  5.8  0.0  5.8
CAL1      2    96.57     38.89
VEL1      2                                  0.0  0.0  0.0  0.9  0.9
VEL1      2  1.3  1.7  1.7  1.8  1.9  2.1  2.3  2.3  2.5  2.6  2.7  2.7
VEL1      2  2.7  2.8  2.8  2.9  2.6  2.8  2.5  2.8  2.8  2.9  2.8  2.8
VEL1      2  2.9  2.9  2.8  3.2  3.1  3.1  2.6  2.6  2.7  2.7  2.7  2.5
VEL1      2  2.4  1.8  2.4  1.9  2.1  1.2  1.2  0.0
VEL1      2
CAL2      2     96.3     12.72
VEL2      2
VEL2      2       0.0  0.1  1.3  1.2  1.4  1.4  1.6  1.6  1.7  1.7  1.8
VEL2      2  1.8  1.8  1.9  1.9  1.7  1.7  1.8  1.6  1.5  1.5  1.4  1.4
VEL2      2  1.3  1.3  1.1  1.5  1.5  1.2  1.1  1.0  1.0  0.2  1.1  1.1
VEL2      2  0.5  0.0
VEL2      2
CAL3      2    96.09       4.02
VEL3      2
VEL3      2                             0.5  0.8  1.1  1.0  0.9  1.0
VEL3      2  1.0  1.0  1.0  1.0  1.1  0.9  1.0  0.8  0.8  0.9  0.9  0.7
VEL3      2  0.9  0.6  0.3  0.5  0.6  0.5  0.4  0.4  0.2  0.0
VEL3      2
VEL3      2
XSEC      3                  95.64     0.002
          3  0.0 97.9  0.2 97.3  1.0 97.2  2.0 96.9  3.8 96.6  4.3 96.6
          3  5.5 96.5  6.0 96.5  7.0 96.5  8.0 96.4  9.2 96.2 10.0 96.2
          3 11.0 96.2 12.0 95.9 12.5 95.8 13.0 95.6 13.5 95.5 14.3 95.2
          3 14.7 95.3 15.0 95.1 15.5 95.0 16.0 94.9 16.5 94.7 17.0 94.6
          3 17.5 94.4 17.8 94.5 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.2
          3 19.8 94.3 20.2 94.3 20.5 94.5 21.0 94.5 21.5 95.2 21.6 96.7
          3 21.9 96.9
NS        3  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9  0.0 22.9
NS        3  0.0 22.9  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6
NS        3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 65.7
NS        3  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 76.6
NS        3  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6
NS        3  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
```

Table 1. Original, unrevised data deck, Lower Mundt Creek. - **Continued**

```
NS      3  0.0 53.6
CAL1    3    96.61      35.04
VEL1    3                          0.0   0.0   0.3   0.5   1.0   0.9   1.2
VEL1    3  1.5   1.6   1.5   1.5   1.6   1.8   1.9   2.3   2.7   2.4   2.3   2.8
VEL1    3  2.9   3.1   3.1   2.8   2.5   1.9   1.1   0.3   0.3   0.2   0.1
VEL1    3
CAL2    3    96.32      12.52
VEL2    3                                                          0.1   0.0
VEL2    3  0.4   0.5   0.5   0.6   0.6   0.9   0.9   1.2   1.1   1.0   1.1   1.0
VEL2    3  1.0   0.9   1.0   1.2   1.4   1.3   0.7   0.2   0.3   0.4   0.3
VEL2    3
CAL3    3    96.11        3.52
VEL3    3
VEL3    3        0.0   0.0   0.0   0.2   0.2   0.3   0.5   0.4   0.5   0.6   0.5
VEL3    3  0.7   0.6   0.7   0.5   0.3   0.0   0.1  -0.1        -0.1  -0.0
VEL3    3
XSEC    4                    94.03      0.004
        4  0.0  96.8   0.1  96.3   0.9  95.7   4.3  95.0   4.4  95.0   5.0  95.0
        4  5.5  94.9   6.0  94.8   6.5  94.8   7.0  94.8   7.5  94.5   8.0  94.7
        4  8.5  94.3   9.0  94.2   9.5  94.3  10.0  94.2  10.5  94.3  11.0  94.3
        4 11.5  94.3  12.0  94.3  12.5  94.3  13.0  94.4  13.5  94.4  14.0  94.3
        4 14.5  93.9  15.0  94.2  15.5  94.3  16.0  94.2  16.5  94.2  17.0  94.2
        4 17.5  94.2  18.0  94.2  18.5  94.3  19.0  94.2  19.5  94.1  20.0  94.2
        4 20.5  94.3  21.0  94.2  21.5  94.3  22.0  94.4  22.5  94.4  23.0  95.0
        4 23.5  94.9  24.0  94.9  24.6  95.0  24.7  95.0  26.0  95.2  29.5  95.5
        4 30.0  97.0  31.2  97.6  31.3  98.1
NS      4  0.0   1.7   0.0   1.7   0.0   1.7   0.0   1.7   0.0  43.7   0.0  43.7
NS      4  0.0  54.5   0.0  54.5   0.0  54.5   0.0  85.8   0.0  85.8   0.0  64.6
NS      4  0.0  64.6   0.0  64.6   0.0  64.6   0.0  54.6   0.0  54.6   0.0  54.6
NS      4  0.0  54.6   0.0  54.6   0.0  54.6   0.0  54.6   0.0  54.7   0.0  54.7
NS      4  0.0  54.7   0.0  54.7   0.0  54.7   0.0  54.7   0.0  54.7   0.0  54.7
NS      4  0.0  34.6   0.0  34.6   0.0  34.6   0.0  34.6   0.0  64.6   0.0  64.6
NS      4  0.0  64.6   0.0  64.6   0.0  85.7   0.0  85.7   0.0  85.7   0.0  85.7
NS      4  0.0  85.7   0.0  85.7   0.0  85.7   0.0  85.7   0.0   1.8   0.0   1.8
NS      4  0.0   1.8   0.0   1.8   0.0   1.8
CAL1    4    95.05      31.74
VEL1    4                          0.0   1.1   1.6   1.9   2.1   2.3   2.9
VEL1    4  2.6   2.4   3.0   3.1   3.2   2.8   3.2   3.1   3.0   2.8   3.2   2.7
VEL1    4  3.1   3.4   4.0   3.8   2.8   3.2   3.0   2.4   1.5   1.6   1.7   2.3
VEL1    4  2.8   3.4   2.0   2.8   2.0   0.0   2.1   0.4
VEL1    4
CAL2    4    94.66      13.06
VEL2    4                                                          1.4
VEL2    4  2.2   2.1   2.1   2.3   2.2   2.2   2.4   2.4   2.4   2.4   3.0   2.4
VEL2    4  2.5   2.4   3.0   3.0   3.0   2.8   2.6   1.6   1.0   0.9   1.3   1.7
VEL2    4  2.9   2.2   0.5   0.4   0.2
VEL2    4
CAL3    4    94.48        4.21
VEL3    4
VEL3    4  0.7   0.8   1.2   1.5   1.3   1.2   1.4   1.5   1.5   0.9   1.4   1.1
VEL3    4  0.9   1.0   1.7   1.0   2.2   2.1   0.7   1.5   1.2   0.9   0.5   0.9
VEL3    4  1.9   0.8   0.1   0.0
VEL3    4
XSEC    5                    94.1       0.001
        5  0.0  97.2   0.1  96.4   4.3  96.2   6.8  95.6   7.8  95.4   8.8  95.3
```

Table 1. Original, unrevised data deck, Lower Mundt Creek. - **Continued**

```
          5  8.9102.2  9.5 95.0 10.0 94.9 10.5 94.8 11.0 94.4 11.5 94.4
          5 12.0 94.4 12.5 94.4 13.0 94.3 13.5 94.3 14.0 94.3 14.5 94.3
          5 15.0 94.3 15.5 94.3 16.0 94.2 16.5 94.3 17.0 94.1 17.5 94.1
          5 18.0 94.0 18.5 93.9 18.8 93.9 19.0 93.8 19.5 94.1 20.0 94.1
          5 20.5 94.3 21.0 94.0 21.5 93.9 22.0 94.1 22.5 94.1 23.0 94.2
          5 23.5 94.2 24.0 94.3 24.5 94.4 25.1 94.7 25.5 94.9 26.0 96.5
          5 27.0 97.1 27.2 97.6
NS        5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 34.7  0.0 34.7
NS        5  0.0 34.7  0.0 34.7  0.0 34.7  0.0 37.7  0.0 34.6  0.0 34.6
NS        5  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.5  0.0 34.5
NS        5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 43.6
NS        5  0.0 43.6  0.0 43.6  0.0 43.6  0.0 84.6  0.0 84.6  0.0 84.6
NS        5  0.0 84.6  0.0 84.6  0.0 74.6  0.0 74.6  0.0 74.6  0.0 74.6
NS        5  0.0 74.7  0.0 74.7  0.0  8.6  0.0  8.6  0.0  1.6  0.0  1.6
NS        5  0.0  1.6  0.0  1.6
CAL1      5     95.16      34.03
VEL1      5                                          0.7  0.9  1.3  1.5  2.0
VEL1      5  2.3  2.5  2.5  2.7  2.7  2.4  2.7  2.8  2.7  2.5  3.1  2.9
VEL1      5  3.1  3.4  3.1  3.3  3.3  3.5  3.0  3.0  2.6  2.1  1.1  1.1
VEL1      5  1.0  0.6  0.5  0.6  0.3
CAL2      5     94.79      10.00
VEL2      5                                                  0.0  0.7  0.8
VEL2      5  1.0  1.0  1.1  1.1  1.1  0.6  1.0  1.2  1.3  1.1  1.3  1.4
VEL2      5  1.3  1.4  1.5  1.6  1.6  1.7  1.7  1.9  1.4  1.2  1.0  0.9
VEL2      5  0.7  0.5  0.6  0.1
CAL3      5      94.6        3.45
VEL3      5                                                       0.4  0.3
VEL3      5  0.5  0.6  0.6  0.5  0.6  0.6  0.7  0.7  0.6  0.5  0.7  0.6
VEL3      5  0.7  0.6  0.7  0.7  1.0  1.0  0.9  0.9  0.7  0.6  0.6  0.4
VEL3      5  0.2  0.0  0.0  0.0
XSEC      6                    94.1      0.001
          6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
          6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
          6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
          6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
          6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
          6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
          6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS        6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS        6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.8
NS        6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS        6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
NS        6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1      6     95.17      34.11
VEL1      6                                                       0.1  0.3
VEL1      6  0.9  1.9  2.0  2.3  2.3  2.6  2.5  2.2  2.5  2.6  2.6  2.9
VEL1      6  2.8  3.1  3.1  3.2  3.3  3.3  3.6  2.9  2.7  2.0  1.7  1.2
VEL1      6 -0.4 -0.2 -0.2 -0.2
CAL2      6     94.82      10.53
VEL2      6                                                            0.0
VEL2      6  0.2  0.2  0.5  0.5  0.5  0.7  0.8  0.9  1.0  1.0  1.1  1.0
VEL2      6  1.0  1.2  1.4  1.3  1.6  1.5  1.6  1.4  1.4  1.3  1.2  0.6
VEL2      6 -0.2 -0.2 -0.1
```

Table 1. Original, unrevised data deck, Lower Mundt Creek. - **Continued**

```
CAL3      6    94.61        5.6
VEL3      6
VEL3      6  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.1  0.1  0.1  0.1  0.2
VEL3      6  0.4  0.5  0.5  0.5  0.6  0.6  0.6  0.4  0.5  0.5  0.2  0.0
VEL3      6
XSEC      7                    94.1      0.017
          7  0.0 97.1  0.1 96.0  2.0 95.6  3.5 95.8  4.3 95.2  5.1 95.2
          7  5.5 95.2  6.8 95.3  7.5 95.1  8.0 94.9  8.5 94.7  9.0 94.6
          7  9.5 94.5 10.0 94.5 10.4 94.5 10.8 94.6 11.2 94.4 11.5 94.3
          7 11.8 94.3 12.2 94.3 12.6 94.3 13.0 94.2 13.4 94.2 13.8 94.2
          7 14.2 94.2 14.8 94.0 15.2 94.2 15.4 94.3 15.8 94.1 16.2 94.1
          7 16.6 94.4 17.0 94.4 17.4 94.6 17.8 94.6 18.0 94.6 18.4102.2
          7 18.5 95.3 18.9 97.2 19.0 97.9
NS        7  0.0 22.9  0.0 22.9  0.0 85.7  0.0 85.7  0.0 83.6  0.0 34.7
NS        7  0.0 34.7  0.0 37.8  0.0 37.8  0.0 34.9  0.0 56.6  0.0 56.6
NS        7  0.0 56.6  0.0 56.6  0.0 65.6  0.0 65.6  0.0 65.6  0.0 65.7
NS        7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS        7  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.7
NS        7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        7  0.0 42.7  0.0 42.7  0.0 42.7
CAL1      7    95.28      28.68
VEL1      7                          0.0  0.0  0.0  0.5  0.7  1.9  2.6
VEL1      7  1.1  1.9  3.9  3.4  4.2  3.2  4.1  4.1  3.8  4.2  3.8  4.2
VEL1      7  3.8  2.3  3.5  3.0  3.2  3.0  4.1  2.1  1.2  0.6  0.4  0.0
VEL1      7
CAL2      7    94.89      12.28
VEL2      7                                             0.0  0.7  1.4
VEL2      7  1.7  1.6  1.5  1.7  2.8  2.7  2.6  4.2  3.5  3.3  3.1  3.1
VEL2      7  2.9  1.7  1.9  3.8  2.8  2.0  1.5  1.5  0.9  0.4  0.1
VEL2      7
CAL3      7    94.66        3.98
VEL3      7                                                       0.4
VEL3      7  1.0  1.4  1.5  0.0  1.6  2.3  1.7  1.8  0.7  0.1  1.7  0.8
VEL3      7  2.6  0.8  0.8  1.2  2.4  1.4  0.9  0.6  0.0  0.0  0.0
VEL3      7
ENDJOB
```

Table 2a. Calibrated data deck, Lower Mundt Creek.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - REVISED, CALIBRATED DATA DECK
IOC       0100000201001
QARD   1.0
QARD   4.0
QARD  11.0
QARD  25.0
QARD  46.0
QARD 114.0
XSEC     1                   95.59     0.007
         1  0.0 98.0  0.2 97.5  1.5 97.2  3.0 96.8  4.2 96.5  5.5 96.5
         1  6.0 96.4  6.5 96.4  7.0 96.3  7.5 96.2  8.0 96.1  8.5 96.0
         1  9.0 96.0  9.5 95.9 10.0 95.8 10.5 95.8 11.0 95.8 11.5 95.8
         1 12.0 95.8 12.5 95.8 13.0 95.7 13.5 95.7 14.0 95.8 14.5 95.7
         1 15.0 95.7 15.5 95.8 16.0 95.7 16.5 95.6 17.0 95.6 17.5 95.7
         1 18.0 95.7 18.5 95.7 19.0 95.7 19.5 95.6 20.0 95.6 20.5 95.7
         1 21.0 95.6 21.5 95.8 22.0 95.7 22.6 95.9 23.0 95.7 23.5 95.8
         1 24.0 95.8 24.5 95.8 25.0 96.0 25.5 96.2 26.0 96.1 26.5 96.2
         1 27.0 96.1 27.5 96.1 28.0 96.2 28.5 96.3 29.0 96.5 29.5 96.3
         1 30.0 96.3 30.5 96.3 31.0 96.3 31.5 96.5 31.9 96.6 33.7 98.4
         1 35.5100.4 35.7101.0
NS       1  0.0  2.9  0.0  2.9  0.0  2.9  0.0  2.9  0.0 24.6  0.0 24.6
NS       1  0.0 24.6  0.0 63.7  0.0 63.7  0.0 63.7  0.0 43.7  0.0 43.7
NS       1  0.0 43.7  0.0 43.7  0.0 46.8  0.0 46.8  0.0 35.7  0.0 35.7
NS       1  0.0 35.6  0.0 35.6  0.0 35.6  0.0 35.6  0.0 65.7  0.0 65.7
NS       1  0.0 65.7  0.0 65.7  0.0 65.8  0.0 65.8  0.0 65.8  0.0 65.9
NS       1  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9  0.0 66.9  0.0 66.9
NS       1  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 65.8
NS       1  0.0 65.8  0.0 65.8  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9
NS       1  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 57.8
NS       1  0.0 57.8  0.0 57.8  0.0 70.6  0.0 70.6  0.0  1.5  0.0  1.5
NS       1  0.0  1.5  0.0  1.5
CAL1     1    96.52      38.67
VEL1     1                         0.0  0.8  1.1  1.4  1.4  1.3  2.0
VEL1     1  1.9  2.0  2.0  2.1  2.9  2.9  2.6  2.7  3.1  2.3  2.3  2.7
VEL1     1  2.8  2.8  2.9  2.7  2.3  2.7  3.3  3.5  2.9  2.3  3.5  3.2
VEL1     1  3.2  3.3  3.2  3.3  3.0  2.8  2.7  3.0  3.3  3.0  2.4  3.1
VEL1     1  2.5  2.2  1.6  1.2  0.0  1.2  0.6  0.8  0.7  0.0
VEL1     1            0.0
CAL2     1    96.24      13.43
VEL2     1                                             0.0  0.0  1.0
VEL2     1  1.4  1.1  2.0  2.0  2.0  2.2  2.2  2.3  2.2  2.3  1.7  2.4
VEL2     1  2.2  1.8  1.9  1.4  1.3  2.1  2.0  2.2  1.6  1.3  1.4  2.1
VEL2     1  1.3  2.0  1.8  1.7  1.3  1.2  1.0  0.9  1.1  0.0  0.6  0.0
VEL2     1  0.0  0.0
VEL2     1
CAL3     1    96.05       4.53
VEL3     1                                                       0.0
VEL3     1  0.0  0.0  0.8  1.1  1.4  1.4  1.8  1.8  1.9  1.4  1.4  1.8
VEL3     1  1.6  1.6  1.1  0.6  0.8  1.8  1.2  1.3  1.0  0.9  0.4  1.4
VEL3     1  0.9  1.0  0.8  0.7  0.7  0.6  0.4  0.3  0.0
VEL3     1                                             0.0  0.0  0.0
VEL3     1  0.0  0.0
XSEC     2                   95.64     0.004
         2  0.0 97.9  0.2 97.3  0.5 97.2  1.3 97.1  2.0 97.0  3.9 96.6
```

Table 2a. Calibrated data deck, Lower Mundt Creek. - **Continued**

```
         2  4.4 96.6  5.0 96.5  5.5 96.5  6.0 96.5  6.5 96.4  7.0 96.4
         2  7.5 96.4  8.0 96.3  8.5 96.3  9.0 96.2  9.5 96.2 10.0 96.2
         2 10.5 96.0 11.0 96.0 11.5 95.9 12.0 95.9 12.5 95.9 13.0 95.8
         2 13.5 95.8 14.0 95.8 14.5 95.8 15.0 95.8 15.5 95.7 16.0 95.6
         2 16.5 95.6 17.0 95.6 17.5 95.6 18.0 95.5 18.5 95.5 19.0 95.5
         2 19.5 95.4 20.0 95.4 20.5 95.4 21.0 95.7 21.5 95.9 22.0 95.7
         2 22.5 95.7 23.0 95.8 23.5 95.8 24.0 96.0 24.5 96.1 25.0 96.1
         2 25.5 96.1 26.0 96.2 26.5 96.3 27.0 96.3 27.5 96.4 28.0 96.5
         2 28.5 96.5 29.0 96.4 29.4 96.6 29.6 96.8 30.7 97.3 32.7 98.3
         2 34.7100.1 34.8100.6
NS       2  0.0  1.8  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9
NS       2  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 43.7
NS       2  0.0 43.7  0.0 43.7 0.02 36.6  0.0 36.6 0.16 43.6  0.0 43.6
NS       2  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 45.7  0.0 45.7
NS       2  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 64.6
NS       2  0.0 64.6  0.0 64.6  0.0 64.6  0.0 64.6  0.0 56.6  0.0 56.6
NS       2  0.0 56.6  0.0 56.6  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 78.7  0.0 78.7 0.12 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 75.7
NS       2  0.0 75.7  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8
NS       2  0.0  5.8  0.0  5.8
CAL1     2    96.57     38.89
VEL1     2                                  0.1  0.1  0.1  0.9  0.9
VEL1     2  1.3  1.7  1.7  1.8  1.9  2.1  2.3  2.3  2.5  2.6  2.7  2.7
VEL1     2  2.7  2.8  2.8  2.9  2.6  2.8  2.5  2.8  2.8  2.9  2.8  2.8
VEL1     2  2.9  2.9  2.8  3.2  3.1  3.1  2.6  2.6  2.7  2.7  2.7  2.5
VEL1     2  2.4  1.8  2.4  1.9  2.1  1.2  1.2  0.1
VEL1     2
CAL2     2     96.3     12.72
VEL2     2
VEL2     2       0.0  0.1  1.3  1.2  1.4  1.4  1.6  1.6  1.7  1.7  1.8
VEL2     2  1.8  1.8  1.9  1.9  1.7  1.7  1.8  1.6  1.5  1.5  1.4  1.4
VEL2     2  1.3  1.3  1.1  1.5  1.5  1.2  1.1  1.0  1.0  0.4  1.1  1.1
VEL2     2  0.5  0.0
VEL2     2
CAL3     2    96.09       4.02
VEL3     2
VEL3     2                            0.5  0.8  1.1  1.0  0.9  1.0
VEL3     2  1.0  1.0  1.0  1.0  1.1  0.9  1.0  0.8  0.8  0.9  0.9  0.7
VEL3     2  0.9  0.6  0.3  0.5  0.6  0.5  0.4  0.4  0.2  0.0
VEL3     2
VEL3     2
XSEC     3                  95.64     0.002
         3  0.0 97.9  0.2 97.3  1.0 97.2  2.0 96.9  3.8 96.6  4.3 96.6
         3  5.5 96.5  6.0 96.5  7.0 96.5  8.0 96.4  9.2 96.2 10.0 96.2
         3 11.0 96.2 12.0 95.9 12.5 95.8 13.0 95.6 13.5 95.5 14.3 95.2
         3 14.7 95.3 15.0 95.1 15.5 95.0 16.0 94.9 16.5 94.7 17.0 94.6
         3 17.5 94.4 17.8 94.5 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.2
         3 19.8 94.3 20.2 94.3 20.5 94.5 21.0 94.5 21.5 95.2 21.6 96.7
         3 21.9 97.1
NS       3  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9  0.0 22.9
NS       3  0.0 22.9  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6
NS       3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 65.7
NS       3  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 76.6
NS       3  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6
```

Table 2a. Calibrated data deck, Lower Mundt Creek. - **Continued**

```
NS      3  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS      3  0.0 53.6
CAL1    3    96.61     35.04
VEL1    3                          0.0  0.1  0.3  0.5  1.0  0.9  1.2
VEL1    3  1.5  1.6  1.5  1.5  1.6  1.8  1.9  2.3  2.7  2.4  2.3  2.8
VEL1    3  2.9  3.1  3.1  2.8  2.5  1.9  1.0  0.3  0.3  0.4  0.3
VEL1    3
CAL2    3    96.32     12.52
VEL2    3                                                   0.1  0.0
VEL2    3  0.4  0.5  0.5  0.6  0.6  0.9  0.9  1.2  1.1  1.0  1.1  1.0
VEL2    3  1.2  0.9  1.0  1.2  1.4  1.3  0.7  0.2  0.3  0.2  0.1
VEL2    3
CAL3    3    96.11       3.52
VEL3    3
VEL3    3       0.0  0.0  0.0  0.2  0.2  0.3  0.5  0.4  0.5  0.6  0.5
VEL3    3  0.9  0.6  0.7  0.5  0.3  0.0  0.1  0.1  0.1  0.1  0.0
VEL3    3
XSEC    4                  94.03     0.004
        4  0.0 96.8  0.1 96.3  0.9 95.7  4.3 95.2  4.4 95.1  5.0 95.0
        4  5.5 94.9  6.0 94.8  6.5 94.8  7.0 94.8  7.5 94.5  8.0 94.7
        4  8.5 94.3  9.0 94.2  9.5 94.3 10.0 94.2 10.5 94.3 11.0 94.3
        4 11.5 94.3 12.0 94.3 12.5 94.3 13.0 94.4 13.5 94.4 14.0 94.3
        4 14.5 93.9 15.0 94.2 15.5 94.3 16.0 94.2 16.5 94.2 17.0 94.2
        4 17.5 94.2 18.0 94.2 18.5 94.3 19.0 94.2 19.5 94.1 20.0 94.2
        4 20.5 94.3 21.0 94.2 21.5 94.3 22.0 94.4 22.5 94.4 23.0 95.0
        4 23.5 94.9 24.0 94.9 24.6 95.0 24.7 95.0 26.0 95.2 29.5 95.5
        4 30.0 97.0 31.2 97.6 31.3 98.1
NS      4  0.0  1.7  0.0  1.7  0.0  1.7  0.0  1.7  0.0 43.7  0.0 43.7
NS      4  0.0 54.5  0.0 54.5  0.0 54.5  0.0 85.8  0.0 85.8  0.0 64.6
NS      4  0.0 64.6  0.0 64.6  0.0 64.6  0.0 54.6  0.0 54.6  0.0 54.6
NS      4  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.7  0.0 54.7
NS      4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7
NS      4  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 64.6  0.0 64.6
NS      4  0.0 64.6  0.0 64.60.192 85.70.192 85.7  0.0 85.7  0.0 85.7
NS      4  0.0 85.7  0.0 85.7  0.0 85.7  0.0 85.7  0.0  1.8  0.0  1.8
NS      4  0.0  1.8  0.0  1.8  0.0  1.8
CAL1    4    95.05     31.74
VEL1    4                          0.1  1.1  1.6  1.9  2.1  2.3  2.9
VEL1    4  2.6  2.4  3.0  3.1  3.2  2.8  3.2  3.1  3.0  2.8  3.2  2.7
VEL1    4  3.1  3.4  4.0  3.8  2.8  3.2  3.0  2.4  1.5  1.6  1.7  2.3
VEL1    4  2.8  3.4  2.0  2.8  2.0  0.1  2.1  0.4
VEL1    4
CAL2    4    94.66     13.06
VEL2    4                                                   1.4
VEL2    4  2.2  2.1  2.1  2.3  2.2  2.2  2.4  2.4  2.4  2.4  3.0  2.4
VEL2    4  2.5  2.4  3.0  3.0  3.0  2.8  0.0  1.6  1.0  0.9  1.3  1.7
VEL2    4  2.9  2.2  0.5  0.4  0.2
VEL2    4
CAL3    4    94.48       4.21
VEL3    4
VEL3    4  0.7  0.8  1.2  1.5  1.3  1.2  1.4  1.5  1.5  0.9  1.4  1.1
VEL3    4  0.9  1.0  1.7  1.0  2.2  2.1  0.7  1.5  1.2  0.9  0.5  0.9
VEL3    4  1.9  0.8  0.1  0.0
VEL3    4
XSEC    5                  94.1      0.001
```

Table 2a. Calibrated data deck, Lower Mundt Creek. - **Continued**

```
          5  0.0 97.2  0.1 96.4  4.3 96.2  6.8 95.6  7.8 95.4  8.8 95.3
          5  8.9 95.2  9.5 95.0 10.0 94.9 10.5 94.8 11.0 94.4 11.5 94.4
          5 12.0 94.4 12.5 94.4 13.0 94.3 13.5 94.3 14.0 94.3 14.5 94.3
          5 15.0 94.3 15.5 94.3 16.0 94.2 16.5 94.3 17.0 94.1 17.5 94.1
          5 18.0 94.0 18.5 93.9 18.8 93.9 19.0 93.8 19.5 94.1 20.0 94.1
          5 20.5 94.3 21.0 94.0 21.5 93.9 22.0 94.1 22.5 94.1 23.0 94.2
          5 23.5 94.2 24.0 94.3 24.5 94.4 25.1 94.7 25.5 94.9 26.0 96.5
          5 27.0 97.1 27.2 97.6
NS        5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 34.7  0.0 34.7
NS        5  0.0 34.7  0.0 34.7  0.0 34.7  0.0 37.7  0.0 34.6  0.0 34.6
NS        5  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.5  0.0 34.5
NS        5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 43.6
NS        5  0.0 43.6  0.0 43.6  0.0 43.6  0.0 84.6  0.0 84.6  0.0 84.6
NS        5  0.0 84.6  0.0 84.6  0.0 74.6  0.0 74.6  0.0 74.6  0.0 74.6
NS        5  0.0 74.7  0.0 74.7  0.0  8.6  0.0  8.6  0.0  1.6  0.0  1.6
NS        5  0.0  1.6  0.0  1.6
CAL1      5    95.16      34.03
VEL1      5                                          0.7  0.9  1.3  1.5  2.0
VEL1      5  2.3  2.5  2.5  2.7  2.7  2.4  2.7  2.8  2.7  2.5  3.1  2.9
VEL1      5  3.1  3.4  3.1  3.3  3.3  3.5  3.0  3.0  2.6  2.1  1.1  1.1
VEL1      5  1.0  0.6  0.5  0.6  0.3
CAL2      5    94.79      10.00
VEL2      5                                                  0.0  0.7  0.8
VEL2      5  1.0  1.0  1.1  1.1  1.1  0.0  1.0  1.2  1.3  1.1  1.3  1.4
VEL2      5  1.3  1.4  1.5  1.6  1.6  1.7  1.7  1.9  1.4  1.2  1.0  0.9
VEL2      5  0.7  0.5  0.6  0.1
CAL3      5     94.6        3.45
VEL3      5                                                       0.4  0.3
VEL3      5  0.5  0.6  0.6  0.5  0.6  0.6  0.7  0.7  0.6  0.5  0.7  0.6
VEL3      5  0.7  0.6  0.7  0.7  1.0  1.0  0.9  0.9  0.7  0.6  0.6  0.4
VEL3      5  0.2  0.0  0.0  0.0
XSEC      6                    94.1      0.001
          6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
          6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
          6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
          6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
          6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
          6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
          6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS        6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS        6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.8
NS        6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS        6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
NS        6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1      6    95.17      34.11
VEL1      6                                                       0.1  0.3
VEL1      6  0.9  1.5  2.0  2.3  2.3  2.6  2.5  2.2  2.1  2.2  2.2  2.5
VEL1      6  2.8  3.1  3.1  3.2  3.4  3.3  3.5  2.9  2.7  2.0  1.7  1.2
VEL1      6 -0.4 -0.2 -0.2 -0.2
CAL2      6    94.82      10.53
VEL2      6                                                            0.0
VEL2      6  0.2  0.4  0.5  0.5  0.5  0.7  0.8  0.5  0.6  0.6  0.6  1.0
VEL2      6  1.0  1.2  1.1  1.3  1.4  1.5  1.6  1.4  1.4  1.3  1.2  0.6
```

Table 2a. Calibrated data deck, Lower Mundt Creek. - **Continued**

```
VEL2      6 -0.2 -0.2 -0.1
CAL3      6    94.61       5.6
VEL3      6
VEL3      6  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.1  0.1  0.1  0.1  0.4
VEL3      6  0.4  0.5  0.8  0.5  0.9  0.6  0.9  0.4  0.9  0.9  0.5  0.0
VEL3      6
XSEC      7                    94.1      0.017
          7  0.0 97.1  0.1 96.0  2.0 95.6  3.5 95.8  4.3 95.5  5.1 95.2
          7  5.5 95.2  6.8 95.2  7.5 95.1  8.0 94.9  8.5 94.7  9.0 94.5
          7  9.5 94.5 10.0 94.5 10.4 94.5 10.8 94.6 11.2 94.4 11.5 94.3
          7 11.8 94.3 12.2 94.3 12.6 94.3 13.0 94.2 13.4 94.2 13.8 94.2
          7 14.2 94.2 14.8 94.0 15.2 94.2 15.4 94.3 15.8 94.1 16.2 94.1
          7 16.6 94.4 17.0 94.4 17.4 94.6 17.8 94.6 18.0 94.6 18.4102.2
          7 18.5 95.3 18.9 97.2 19.0 97.9
NS        7  0.0 22.9  0.0 22.9  0.0 85.7  0.0 85.7  0.0 83.6  0.0 34.7
NS        7  0.0 34.7  0.0 37.8  0.0 37.8  0.0 34.9  0.0 56.6  0.0 56.6
NS        7  0.0 56.6  0.0 56.6  0.0 65.6  0.0 65.6  0.0 65.6  0.0 65.7
NS        7  0.0 65.7  0.0 65.7  0.0 65.7 0.14 65.7  0.0 65.7  0.0 65.7
NS        7  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.7
NS        7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        7  0.0 42.7  0.0 42.7  0.0 42.7
CAL1      7    95.28      28.68
VEL1      7                          0.1  0.1  0.1  0.5  0.7  1.9  2.1
VEL1      7  1.1  1.9  3.9  3.4  4.2  3.2  4.1  3.8  3.5  3.8  3.8  3.7
VEL1      7  3.8  2.3  3.5  3.0  3.2  3.0  4.1  2.1  1.2  0.6  0.4  0.0
VEL1      7
CAL2      7    94.89      12.28
VEL2      7                                                0.0  0.7  1.4
VEL2      7  1.7  1.6  2.0  1.7  2.8  2.7  2.6  3.2  1.9  3.3  3.1  1.9
VEL2      7  2.9  1.7  1.9  2.0  2.8  2.0  1.5  1.5  0.9  0.4  0.1
VEL2      7
CAL3      7    94.66       3.98
VEL3      7                                                          0.5
VEL3      7  1.0  1.4  1.6  0.0  1.6  2.3  1.7  1.8  0.9  2.6  1.7  0.8
VEL3      7  2.6  0.8  0.8  1.3  2.4  1.4  1.1  0.6  0.0  0.0  0.0
VEL3      7
ENDJOB
```

Table 2b. Calibrated, one velocity deck, Transect 6, Lower Mundt Creek.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - one flow low, Transect 6
IOC       1100000200001
QARD   1.0
QARD   2.0
QARD   3.0
QARD   4.0
XSEC     6                    94.1     0.001
         6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
         6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
         6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
         6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
         6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
         6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
         6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS       6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS       6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7 0.10 45.8
NS       6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS       6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
NS       6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
NS       6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS       6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1     6    95.17      34.11       34.00
VEL1     6
VEL1     6
VEL1     6
VEL1     6
CAL2     6    94.82      10.53       10.0
VEL2     6
VEL2     6
VEL2     6
VEL2     6
CAL3     6    94.61        5.60       5.6
VEL3     6
VEL3     6  .01  .01  .01  .01  .01  .01  .01  0.1  0.1  0.1  0.1  0.2
VEL3     6  0.4  0.6  0.6  0.6  0.7  0.7  0.7  0.4  0.6  0.6  0.2  .01
VEL3     6
ENDJOB
```

Table 3. Original and revised Velocity Adjustment Factors (VAFs) for Lower Mundt Creek.

Flow	Trans 1		Trans 2		Trans 3		Trans 4		Trans 5		Trans 6			Trans 7	
	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev	Rev-1	Orig	Rev
1.0	0.971	0.970	0.901	0.904	0.375	0.663	2.543	2.473	0.949	0.939	0.425	0.482	0.163	0.955	0.990
2.0	0.943	0.943	0.944	0.947	0.605	0.774	1.284	1.255	0.959	0.949	0.672	0.685	0.363	1.017	1.015
3.0	0.955	0.955	0.967	0.971	0.715	0.836	1.117	1.095	0.968	0.957	0.803	0.798	0.571	1.028	1.008
4.0	0.962	0.962	0.985	0.990	0.782	0.878	1.052	1.033	0.974	0.964	0.883	0.871		1.020	0.993
5.0	0.973	0.973	0.996	1.002	0.829	0.908	1.024	1.008	0.980	0.970	0.935	0.920		1.023	0.991
10.0	1.008	1.008	1.026	1.025	0.941	0.980	1.003	0.992	0.996	0.986	1.038	1.026		1.030	0.996
15.0	1.012	1.012	1.029	1.027	0.987	1.006	1.006	0.999	1.002	0.992	1.049	1.043		1.022	1.001
20.0	1.009	1.009	1.024	1.023	1.009	1.015	1.006	1.002	1.005	0.995	1.033	1.034		1.005	1.003
25.0	1.004	1.004	1.015	1.014	1.021	1.016	1.001	0.999	1.006	0.997	1.006	1.014		0.984	1.004
30.0	0.998	0.998	1.003	1.004	1.025	1.012	0.992	0.993	1.007	0.998	0.975	0.990		0.959	1.002
35.0	0.992	0.993	0.988	0.992	1.025	1.006	0.980	0.978	1.008	0.998	0.943	0.964		0.932	1.000
40.0	0.986	0.986	0.973	0.980	1.023	0.999	0.966	0.963	1.008	0.998	0.911	0.939		0.904	0.998
45.0	0.979	0.980	0.958	0.969	1.019	0.992	0.952	0.949	1.009	0.998	0.880	0.915		0.876	0.995
50.0	0.973	0.974	0.943	0.958	1.014	0.984	0.936	0.935	1.009	0.998	0.850	0.891		0.849	0.992
55.0	0.967	0.968	0.929	0.947	1.008	0.976	0.920	0.921	1.009	0.998	0.822	0.868		0.823	0.989
60.0	0.962	0.963	0.914	0.937	1.002	0.967	0.904	0.907	1.009	0.998	0.794	0.847		0.798	0.987
65.0	0.958	0.959	0.900	0.927	0.995	0.959	0.888	0.893	1.009	0.998	0.768	0.826		0.774	0.984
70.0	0.953	0.954	0.886	0.917	0.988	0.951	0.871	0.879	1.009	0.997	0.744	0.807		0.751	0.981
75.0	0.949	0.950	0.872	0.907	0.981	0.943	0.854	0.865	1.009	0.997	0.720	0.788		0.729	0.978
80.0	0.945	0.946	0.858	0.897	0.973	0.935	0.837	0.851	1.009	0.996	0.698	0.771		0.708	0.976

Table 4. Changes to Original Data Deck, Lower Mundt Creek

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
1	6.5					0	0.1	
	31.9							Elev 96.3 to 96.6
2	5.0					0.0	0.1	
	5.5					0.0	0.1	
	6.0					0.0	0.1	
	8.5							N = .16
	9.5							Elev 96.3 to 96.2; N=.16
	24.0			0.2	0.4			N = .12
	24.5							Elev 96.0 to 96.1
	29.0					0.0	0.1	
3	5.5					0.0	0.1	
	19.8					1.1	1.0	
	20.2	-0.1	0.1					
	20.5	0.0	0.1					
	21.9							Elev 96.9 to 97.1
4	4.3							Elev 95.0 to 95.2
	4.4							Elev 95.0 tp 95.1
	5.0					0.0	0.1	
	17.5			1.5	0.0			
	21.5							N = 0.192
	22.0							N = 0.192
	23.0					0.0	0.1	Mean 22,23.5
5	8.9							Elev 102.2 to 95.2
6	14.5			0.2	0.4	1.9	1.5	
	17.5			0.9	0.5			
	18.0			1.0	0.6	2.5	2.1	
	18.5			1.0	0.6	2.6	2.2	
	19.5	0.2	0.4			2.9	2.5	
	20.8	0.5	0.8	1.4	1.6			
	21.4	0.6	0.9	1.6	1.4	3.3	3.4	
	22.0	0.6	0.9			3.6	3.5	
	23.1	0.5	0.9					
	23.5	0.2	0.5					
	20.5	0.5	0.6					Low flow deck only
	20.8	0.5	0.6					Low flow deck only
	21.1	0.5	0.6					Low flow deck only
	21.4	0.6	0.7					Low flow deck only
	21.7	0.6	0.7					Low flow deck only
	22.0	0.6	0.7					Low flow deck only
	22.8	0.5	0.6					Low flow deck only
	23.1	0.5	0.6					Low flow deck only
7	4.3							Elev 95.2 to 95.5
	5.1					0.0	0.1	
	5.5			0.0	0.1			
	6.8			0.0	0.1			
	9.0	0.4	0.5			2.6	2.1	Elev 94.6 to 94.5
	10.4	1.5	1.6	1.5	2.0			
	11.2					4.2	3.8	N = .14
	12.2			4.2	3.2	4.1	3.8	
	12.6	0.7	0.9	3.5	1.9	3.8	3.5	
	13.0	0.1	2.6			4.2	3.8	
	13.8			3.1	1.9	4.2	3.7	
	15.4	1.2	1.3	3.8	2.0			
	16.6	0.9	1.1					

Table 5a. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 1.

Calibration Details

Lower Mundt Creek - Transect 1

		WSE (ft)	95.87		96.05			96.24			96.52			96.77	
		Disch (cfs)	1		4.3			13.4			34			80	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	Rev	Meas	Orig	Rev	Meas	Orig	Rev	Orig	Rev
1	0.0	98.0			0.0			0.0			0.0				
2	0.2	97.5			0.0			0.0			0.0				
3	1.5	97.2			0.0			0.0			0.0				
4	3.0	96.8			0.0			0.0			0.0			0.00	0.00
5	4.2	96.5			0.0			0.0			0.0			1.29	1.29
6	5.5	96.5			0.0			0.0			0.0	0.00	0.00	1.29	1.29
7	6.0	96.4			0.0			0.0			0.8	0.60	0.60	1.60	1.60
* 8	6.5	96.4			0.0			0.0			0.9	0.67 *	0.82	1.80	2.20
9	7.0	96.3			0.0			0.0	0.00	0.00	1.4	1.21	1.21	2.19	2.19
10	7.5	96.2			0.0			0.0	0.38 *	0.23	1.4	1.27	1.27	1.94	1.94
11	8.0	96.1			0.0	0.00	0.00	0.0	0.64 *	0.57	1.3	1.20	1.20	1.67	1.68
12	8.5	96.0			0.0	0.48 *	0.48 *	1.0	1.03	0.96	2.0	1.82	1.82	2.96	2.96
13	9.0	96.0			0.0	0.99 *	0.99 *	1.4	1.43	1.38	1.9	1.81	1.81	2.19	2.19
14	9.5	95.9	0.00	0.00	0.0	0.58 *	0.58 *	1.1	1.13	1.06	2.0	1.84	1.84	2.78	2.78
15	10.0	95.8	0.48	0.48	0.8	0.88	0.88	2.0	1.50 *	1.43	2.0	2.18	2.18	2.98	2.98
16	10.5	95.8	0.75	0.75	1.1	1.15	1.15	2.0	1.69	1.63	2.1	2.19	2.19	2.69	2.69
17	11.0	95.8	0.81	0.81	1.4	1.32	1.32	2.0	2.04	1.96	2.9	2.75	2.75	3.49	3.50
18	11.5	95.8	0.84	0.84	1.4	1.37	1.37	2.2	2.10	2.03	2.9	2.83	2.83	3.60	3.60
19	12.0	95.8	1.36	1.35	1.8	1.73	1.73	2.2	2.20	2.16	2.6	2.54	2.54	2.80	2.80
20	12.5	95.8	1.33	1.33	1.8	1.74	1.74	2.3	2.26	2.22	2.7	2.65	2.65	2.96	2.97
21	13.0	95.7	1.26	1.26	1.9	1.75	1.75	2.2	2.38	2.32	3.1	2.89	2.89	3.35	3.35
22	13.5	95.7	1.05	1.04	1.4	1.45	1.45	2.3	1.98	1.93	2.3	2.40	2.40	2.78	2.78
23	14.0	95.8	0.94	0.94	1.4	1.31	1.31	1.7	1.79	1.74	2.3	2.18	2.18	2.52	2.53
24	14.5	95.7	1.35	1.35	1.8	1.77	1.77	2.4	2.30	2.25	2.7	2.69	2.69	3.00	3.01
25	15.0	95.7	1.06	1.06	1.6	1.54	1.54	2.2	2.17	2.11	2.8	2.72	2.72	3.23	3.24
26	15.5	95.8	0.99	0.99	1.6	1.44	1.44	1.8	2.03	1.97	2.8	2.55	2.55	3.03	3.04
27	16.0	95.7	0.55	0.55	1.1	1.06	1.06	1.9	1.85	1.76	2.9	2.77	2.77	3.87	3.88
28	16.5	95.6	0.21	0.21	0.6	0.58	0.58	1.4	1.34	1.24	2.7	2.52	2.52	4.36	4.37
29	17.0	95.6	0.36	0.36	0.8	0.74	0.74	1.3	1.36	1.29	2.3	2.11	2.11	3.06	3.06
30	17.5	95.7	1.29	1.29	1.8	1.69	1.69	2.1	2.20	2.15	2.7	2.57	2.58	2.88	2.88
31	18.0	95.7	0.57	0.57	1.2	1.13	1.13	2.0	2.02	1.92	3.3	3.08	3.08	4.39	4.40
32	18.5	95.7	0.63	0.63	1.3	1.24	1.24	2.2	2.19	2.08	3.5	3.30	3.30	4.66	4.67
33	19.0	95.7	0.45	0.45	1.0	0.92	0.92	1.6	1.69	1.60	2.9	2.64	2.64	3.84	3.85
34	19.5	95.6	0.43	0.43	0.9	0.82	0.82	1.3	1.41	1.34	2.3	2.08	2.09	2.89	2.89
35	20.0	95.6	0.09	0.09	0.4	0.39	0.39	1.4	1.28	1.14	3.5	3.21	3.21	7.24	7.25
36	20.5	95.7	0.76	0.76	1.4	1.32	1.32	2.1	2.14	2.05	3.2	3.01	3.01	3.98	3.99
37	21.0	95.6	0.32	0.32	0.9	0.77	0.77	1.3	1.58 *	1.48	3.2	2.69	2.69	4.26	4.26
38	21.5	95.8	0.43	0.43	1.0	0.97	0.97	2.0	1.91	1.79	3.3	3.14	3.14	4.81	4.81
39	22.0	95.7	0.30	0.30	0.8	0.78	0.78	1.8	1.69	1.57	3.2	3.03	3.03	5.01	5.01
40	22.6	95.9	0.00	0.00	0.7	0.67	0.67	1.7	1.60	1.48	3.3	3.09	3.09	5.45	5.45
41	23.0	95.7	0.23	0.23	0.7	0.63	0.63	1.3	1.42	1.32	3.0	2.63	2.63	4.47	4.47
42	23.5	95.8	0.19	0.19	0.6	0.54	0.54	1.2	1.28	1.19	2.8	2.46	2.47	4.34	4.34
43	24.0	95.8	0.10	0.10	0.4	0.36	0.36	1.0	1.04	0.95	2.7	2.35	2.35	4.79	4.80
44	24.5	95.8	0.06	0.06	0.3	0.27	0.27	0.9	0.95	0.84	3.0	2.54	2.54	6.05	6.06
45	25.0	96.0	0.00	0.00	0.0	0.35 *	0.35 *	1.1	1.14	1.02	3.3	2.84	2.84	6.34	6.35
46	25.5	96.2			0.0	0.00	0.00	0.0	0.81 *	0.49	3.0	2.71	2.71	4.16	4.16
47	26.0	96.1			0.0			0.6	0.63	0.55	2.4	1.99	1.99	5.56	5.56
48	26.5	96.2			0.0			0.0	0.83 *	0.51	3.1	2.80	2.81	4.29	4.30
49	27.0	96.1			0.0			0.0	1.24 *	1.10	2.5	2.32	2.32	3.22	3.22
50	27.5	96.1			0.0			0.0	1.09 *	0.97	2.2	2.04	2.04	2.83	2.84
51	28.0	96.2			0.0			0.0	0.43 *	0.26	1.6	1.45	1.45	2.22	2.22
52	28.5	96.3			0.0			0.0	0.00	0.00	1.2	1.04	1.04	1.88	1.88
53	29.0	96.5			0.0			0.0			0.0	0.00	0.00	1.29	1.29
54	29.5	96.3			0.0			0.0			1.2	1.04	1.04	1.88	1.88
55	30.0	96.3			0.0			0.0			0.6	0.52	0.52	0.94	0.94
56	30.5	96.3			0.0			0.0			0.8	0.69	0.69	1.25	1.25
57	31.0	96.3			0.0			0.0			0.7	0.60	0.60	1.09	1.10
58	31.5	96.5			0.0			0.0			0.0	0.00	0.00	0.75	0.75
* 59	31.9	96.3			0.0			0.0			0.0	0.60 *		1.09	0.55
60	33.7	98.4			0.0			0.0			0.0	0.00		0.00	0.00
61	35.5	100.4			0.0			0.0			0.0				
62	35.7	101.0			0.0			0.0			0.0				
Total						4 *	4 *		9 *	8 *		2 *	0 *		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5b. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 2.

Calibration Details

Lower Mundt Creek - Transect 2

		WSE (ft)	95.93		96.09				96.3				96.57				96.82	
		Disch (cfs)	1		3				10				34				80	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	97.9			0.0					0.0					0.0						
	2	0.2	97.3			0.0					0.0					0.0						
	3	0.5	97.2			0.0					0.0					0.0						
	4	1.3	97.1			0.0					0.0					0.0						
	5	2.0	97.0			0.0					0.0					0.0					0.00	0.00
	6	3.9	96.6			0.0					0.0					0.0					0.91	0.19
	7	4.4	96.6			0.0					0.0					0.0	0.00		0.00		0.91	0.19
*	8	5.0	96.5			0.0					0.0					0.0	0.31	*	0.06		1.17	0.25
*	9	5.5	96.5			0.0					0.0					0.0	0.31	*	0.06		1.17	0.25
*	10	6.0	96.5			0.0					0.0					0.0	0.31	*	0.06		1.17	0.25
	11	6.5	96.4			0.0					0.0					0.9	0.77		0.77		1.41	1.47
	12	7.0	96.4			0.0					0.0					0.9	0.77		0.77		1.41	1.47
	13	7.5	96.4			0.0					0.0					1.3	1.11		1.11		2.04	2.13
	14	8.0	96.3			0.0					0.0					1.7	1.54		1.54		2.26	2.36
*	15	8.5	96.3			0.0					0.1	0.00		0.00		1.7	1.20	*	1.21	*	9.03	9.61
	16	9.0	96.2			0.0					1.3	1.24		1.24		1.8	1.72		1.72		1.90	2.00
*	17	9.5	96.3			0.0					1.2	0.00	*	1.11		1.9	1.78		1.79		2.19	2.30
	18	10.0	96.2			0.0	0.00		0.00		1.4	1.32		1.31		2.1	1.98		1.99		2.34	2.45
	19	10.5	96.0			0.5	0.43		0.43		1.4	1.03	*	1.03	*	2.3	2.27		2.28		3.50	3.66
	20	11.0	96.0	0.00	0.00	0.8	0.71		0.71		1.6	1.32		1.32		2.3	2.26		2.27		2.91	3.05
	21	11.5	95.9	0.59	0.59	1.1	0.94		0.95		1.6	1.55		1.55		2.5	2.33		2.33		2.75	2.87
	22	12.0	95.9	0.51	0.51	1.0	0.87		0.87		1.7	1.53		1.53		2.6	2.47		2.48		3.07	3.21
	23	12.5	95.9	0.42	0.43	0.9	0.78		0.78		1.7	1.47		1.47		2.7	2.58		2.58		3.37	3.53
	24	13.0	95.8	0.50	0.50	1.0	0.87		0.88		1.8	1.57		1.57		2.7	2.60		2.60		3.27	3.42
	25	13.5	95.8	0.50	0.50	1.0	0.87		0.88		1.8	1.57		1.57		2.7	2.60		2.60		3.27	3.42
	26	14.0	95.8	0.49	0.49	1.0	0.87		0.87		1.8	1.58		1.58		2.8	2.67		2.68		3.41	3.56
	27	14.5	95.8	0.50	0.50	1.0	0.88		0.88		1.9	1.61		1.61		2.8	2.72		2.73		3.47	3.63
	28	15.0	95.8	0.48	0.49	1.0	0.87		0.87		1.9	1.63		1.63		2.9	2.79		2.80		3.61	3.78
	29	15.5	95.7	0.58	0.59	1.1	0.95		0.96		1.7	1.59		1.59		2.6	2.45		2.46		2.93	3.06
	30	16.0	95.6	0.41	0.41	0.9	0.77		0.77		1.7	1.49		1.48		2.8	2.65		2.66		3.52	3.68
	31	16.5	95.6	0.53	0.54	1.0	0.89		0.90		1.8	1.54		1.54		2.5	2.45		2.45		2.99	3.13
	32	17.0	95.6	0.34	0.34	0.8	0.67		0.67		1.6	1.38		1.38		2.8	2.63		2.64		3.65	3.82
	33	17.5	95.6	0.33	0.33	0.8	0.66		0.66		1.5	1.35		1.35		2.8	2.57		2.58		3.57	3.73
	34	18.0	95.5	0.39	0.39	0.9	0.73		0.73		1.5	1.44		1.44		2.9	2.61		2.62		3.51	3.67
	35	18.5	95.5	0.39	0.39	0.9	0.72		0.72		1.4	1.39		1.39		2.8	2.48		2.49		3.29	3.44
	36	19.0	95.5	0.27	0.27	0.7	0.56		0.57		1.4	1.25		1.25		2.8	2.55		2.56		3.72	3.89
	37	19.5	95.4	0.37	0.37	0.9	0.70		0.70		1.3	1.37		1.37		2.9	2.49		2.49		3.34	3.49
	38	20.0	95.4	0.20	0.20	0.6	0.47		0.47		1.3	1.15		1.15		2.9	2.60		2.60		4.07	4.25
	39	20.5	95.4	0.07	0.07	0.3	0.23		0.23		1.1	0.80	*	0.80	*	2.8	2.57		2.58		5.17	5.41
	40	21.0	95.7	0.15	0.15	0.5	0.40		0.40		1.5	1.14	*	1.14	*	3.2	3.00		3.01		5.23	5.47
	41	21.5	95.9	0.20	0.20	0.6	0.48		0.48		1.5	1.22		1.22		3.1	2.87		2.88		4.61	4.82
	42	22.0	95.7	0.14	0.15	0.5	0.38		0.38		1.2	1.05		1.05		3.1	2.71		2.72		4.67	4.88
	43	22.5	95.7	0.12	0.12	0.4	0.31		0.31		1.1	0.89		0.89		2.6	2.36		2.36		4.13	4.32
	44	23.0	95.8	0.11	0.11	0.4	0.30		0.30		1.0	0.86		0.86		2.6	2.28		2.29		4.00	4.18
	45	23.5	95.8	0.04	0.04	0.2	0.15		0.15		1.0	0.64	*	0.64	*	2.7	2.53		2.54		5.85	6.12
*	46	24.0	96.0	0.00	0.00	0.0	0.01		0.03		0.2	0.12		0.27		2.7	1.96	*	2.14		12.37	8.38
*	47	24.5	96.0			0.0	0.33	*	0.00		1.1	0.93		0.93		2.7	2.40		2.41		4.13	4.34
	48	25.0	96.1			0.0	0.00				1.1	0.95		0.94		2.5	2.24		2.25		3.64	3.82
	49	25.5	96.1			0.0					0.5	0.37		0.36		2.4	1.97		1.98		5.65	5.97
	50	26.0	96.2			0.0					0.0	0.45	*	0.45	*	1.8	1.67		1.68		2.18	2.28
	51	26.5	96.3			0.0					0.0	0.00		0.00		2.4	2.17		2.18		3.19	3.33
	52	27.0	96.3			0.0					0.0					1.9	1.72		1.72		2.52	2.64
	53	27.5	96.4			0.0					0.0					2.1	1.79		1.79		3.29	3.44
	54	28.0	96.5			0.0					0.0					1.2	0.75	*	0.76	*	2.84	2.97
	55	28.5	96.5			0.0					0.0					1.2	0.75	*	0.76	*	2.84	2.97
*	56	29.0	96.4			0.0					0.0					0.0	1.85	*	0.09		3.41	0.16
	57	29.4	96.6			0.0					0.0					0.0	0.00		0.00		2.20	0.11
	58	29.6	96.8			0.0					0.0					0.0					0.41	0.02
	59	30.7	97.3			0.0					0.0					0.0					0.00	0.00
	60	32.7	98.3			0.0					0.0					0.0						
	61	34.7	100.1			0.0					0.0					0.0						
	62	34.8	100.6			0.0					0.0					0.0						
Total								1	*	0	*		6	*	5	*		8	*	3	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5c. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 3.

Calibration Details

Lower Mundt Creek - Transect 3

		WSE (ft)	95.95		96.11				96.32				96.61				96.89	
		Disch (cfs)	1		3				10				34				80	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	Rev
	1	0.0	97.9			0.0					0.0					0.0		
	2	0.2	97.3			0.0					0.0					0.0		
	3	1.0	97.2			0.0					0.0					0.0		
	4	2.0	96.9			0.0					0.0					0.0	0.00	0.00
	5	3.8	96.6			0.0					0.0					0.0	0.55	0.18
	6	4.3	96.6			0.0					0.0					0.0	0.55	0.18
*	7	5.5	96.5			0.0					0.0					0.0	0.68	0.22
	8	6.0	96.5			0.0					0.0					0.3	0.68	0.65
	9	7.0	96.5			0.0					0.0					0.5	1.13	1.08
	10	8.0	96.4			0.0					0.0	0.00		0.00		1.0	1.71	1.64
	11	9.2	96.2			0.0					0.1	0.06		0.07		0.9	5.03	4.12
	12	10.0	96.2			0.0					0.0	0.40	*	0.42	*	1.2	1.65	1.58
	13	11.0	96.2	0.00	0.00	0.0	0.00		0.00		0.4	0.28		0.32		1.5	4.18	3.65
	14	12.0	95.9	0.01	0.02	0.0	0.07		0.10		0.5	0.37		0.41		1.6	3.93	3.47
	15	12.5	95.8	0.01	0.03	0.0	0.08		0.11		0.5	0.37		0.41		1.5	3.50	3.10
	16	13.0	95.6	0.02	0.05	0.0	0.12		0.16		0.6	0.46		0.51		1.5	3.03	2.72
	17	13.5	95.5	0.02	0.04	0.2	0.12		0.14		0.6	0.48		0.50		1.6	3.22	3.10
	18	14.3	95.2	0.02	0.04	0.2	0.13		0.16		0.9	0.56	*	0.59	*	1.8	4.32	4.11
	19	14.7	95.3	0.04	0.07	0.3	0.19		0.23		0.9	0.67	*	0.70		1.9	3.70	3.55
	20	15.0	95.1	0.08	0.15	0.5	0.32		0.38		1.2	0.95	*	0.99		2.3	3.92	3.77
	21	15.5	95.0	0.05	0.09	0.4	0.25		0.29		1.1	0.88		0.92		2.7	5.13	4.94
	22	16.0	94.9	0.08	0.13	0.5	0.30		0.35		1.0	0.91		0.94		2.4	3.84	3.71
	23	16.5	94.7	0.10	0.18	0.6	0.38	*	0.44		1.1	0.99		1.04		2.3	3.44	3.32
	24	17.0	94.6	0.07	0.12	0.5	0.29	*	0.34		1.0	0.95		0.98		2.8	4.58	4.44
*	25	17.5	94.4	0.11	0.28	0.7	0.40	*	0.62		1.0	1.09		1.33	*	2.9	3.98	3.64
	26	17.8	94.5	0.08	0.14	0.6	0.33	*	0.38	*	0.9	1.01		1.05		3.1	4.48	4.38
	27	18.0	94.3	0.10	0.18	0.7	0.39	*	0.46	*	1.0	1.11		1.16		3.1	4.30	4.20
	28	18.5	94.3	0.07	0.13	0.5	0.31		0.36		1.2	1.00		1.05		2.8	4.91	4.73
	29	19.0	94.3	0.04	0.07	0.3	0.21		0.24		1.4	0.84	*	0.87	*	2.5	6.02	5.71
	30	19.5	94.2	0.19	0.37	0.0	0.55	*	0.68	*	1.3	1.13		1.20		1.9	2.50	2.34
*	31	19.8	94.3	0.01	0.02	0.1	0.07		0.09		0.7	0.34	*	0.35	*	1.1	1.37	*	1.23	3.23	2.72
*	32	20.2	94.3	-0.11	0.04	-0.1	-0.07		0.08		0.2	0.10		0.17		0.3	0.33	0.31	0.46	0.43
*	33	20.5	94.5	0.11	0.04	0.0	0.21	*	0.09		0.3	0.28		0.19		0.3	0.31	0.35	0.29	0.50
	34	21.0	94.5	-0.07	0.03	-0.1	-0.02		0.07		0.4	0.14	*	0.18	*	0.2	0.33	0.39	0.43	0.60
	35	21.5	95.2	1.64	0.01	0.0	0.97	*	0.02		0.3	0.36		0.08	*	0.1	0.11	0.29	0.04	0.62
	36	21.6	96.7	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00	0.00	0.09	0.03
*	37	21.9	96.9			0.0					0.0					0.0			0.00	0.00
	Total						8	*	3	*		7	*	7	*		2	*	0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5d. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 4.

Calibration Details

Lower Mundt Creek - Transect 4

		WSE (ft)	94.27		94.48				94.66				95.05				95.47	
		Disch (cfs)	1		3				10				34				80	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	* Rev	* Meas	Orig	* Rev	* Meas	Orig	* Rev	* Orig	Rev
	1	0.0	96.8			0.0			0.0			0.0				
	2	0.1	96.3			0.0			0.0			0.0				
	3	0.9	95.7			0.0			0.0			0.0	0.00		0.00	0.00
*	4	4.3	95.0			0.0			0.0			0.0	0.48	*	1.99	0.27
*	5	4.4	95.0			0.0			0.0			0.0	0.48	* 0.00	1.99	0.33
*	6	5.0	95.0			0.0			0.0			0.0	0.48	* 0.09	1.99	0.39
	7	5.5	94.9			0.0			0.0			1.1	1.05	1.05	2.26	2.34
	8	6.0	94.8			0.0			0.0			1.6	1.55	1.55	2.60	2.69
	9	6.5	94.8			0.0			0.0			1.9	1.84	1.84	3.09	3.19
	10	7.0	94.8			0.0			0.0	0.00	0.00	2.1	2.03	2.03	3.42	3.53
	11	7.5	94.5			0.0			1.4	1.23	1.24	2.3	2.33	2.31	3.15	3.16
	12	8.0	94.7			0.0	0.00	0.00	0.0	0.00	0.00	2.9	2.82	2.81	4.13	4.27
	13	8.5	94.3	0.00	0.00	0.7	0.71	0.70	2.2	1.41	* 1.39	* 2.6	3.11	3.08	4.67	4.78
	14	9.0	94.2	1.02	1.00	0.8	0.82	0.81	2.1	1.44	* 1.42	* 2.4	2.78	2.77	3.81	3.91
	15	9.5	94.3	0.00	0.00	1.2	1.16	1.14	2.1	1.81	1.79	3.0	3.10	3.09	3.90	4.03
	16	10.0	94.2	2.28	2.23	1.5	1.49	1.46	2.3	2.07	2.04	3.1	3.15	3.14	3.66	3.78
	17	10.5	94.3	0.00	0.00	1.3	1.25	1.23	2.2	1.93	1.91	3.2	3.27	3.27	4.09	4.23
	18	11.0	94.3	0.00	0.00	1.2	1.21	1.19	2.2	1.81	1.78	2.8	2.97	2.96	3.64	3.76
	19	11.5	94.3	0.00	0.00	1.4	1.39	1.37	2.4	2.05	2.03	3.2	3.33	3.32	4.04	4.17
	20	12.0	94.3	0.00	0.00	1.5	1.51	1.48	2.4	2.09	2.07	3.1	3.20	3.19	3.72	3.84
	21	12.5	94.3	0.00	0.00	1.5	1.53	1.50	2.4	2.08	2.05	3.0	3.11	3.10	3.57	3.68
	22	13.0	94.4	0.00	0.00	0.9	0.92	0.91	2.4	1.64	* 1.62	* 2.8	3.25	3.23	4.52	4.64
	23	13.5	94.4	0.00	0.00	1.4	1.48	1.47	3.0	2.21	* 2.18	* 3.2	3.61	3.59	4.40	4.52
	24	14.0	94.3	0.00	0.00	1.1	1.14	1.13	2.4	1.77	* 1.75	* 2.7	3.03	3.01	3.80	3.91
	25	14.5	93.9	1.03	1.02	0.9	0.90	0.89	2.5	1.71	* 1.69	* 3.1	3.59	3.57	5.21	5.35
	26	15.0	94.2	1.11	1.09	1.0	0.96	0.94	2.4	1.80	* 1.78	* 3.4	3.74	3.72	5.38	5.55
	27	15.5	94.3	0.00	0.00	1.7	1.69	1.66	3.0	2.53	2.50	4.0	4.18	4.17	5.14	5.31
	28	16.0	94.2	1.07	1.06	1.0	0.99	0.97	3.0	1.99	* 1.97	* 3.8	4.45	4.42	6.74	6.92
	29	16.5	94.2	4.93	4.85	2.2	2.48	2.45	3.0	2.59	2.56	2.8	2.96	2.94	2.80	2.88
	30	17.0	94.2	4.00	3.92	2.1	2.22	2.18	2.8	2.56	2.53	3.2	3.25	3.24	3.32	3.43
*	31	17.5	94.2	0.72	0.60	0.7	0.71	0.59	2.6	1.54	* 1.27	* 3.0	3.72	* 3.04	5.95	4.98
	32	18.0	94.2	2.58	2.51	1.5	1.46	1.43	1.6	1.72	1.70	2.4	2.23	2.23	2.31	2.40
	33	18.5	94.3	0.00	0.00	1.2	1.18	1.15	1.0	1.20	1.18	1.5	1.33	1.33	1.24	1.29
	34	19.0	94.2	1.39	1.34	0.9	0.83	0.81	0.9	1.04	1.03	1.6	1.43	1.43	1.54	1.61
	35	19.5	94.1	0.57	0.56	0.5	0.49	0.48	1.3	0.92	* 0.91	* 1.7	1.92	1.91	2.78	2.85
	36	20.0	94.2	1.20	1.18	0.9	0.89	0.87	1.7	1.40	1.38	2.3	2.43	2.43	3.10	3.20
	37	20.5	94.3	0.00	0.00	1.9	2.11	2.08	2.9	2.41	2.38	2.8	3.01	2.99	3.03	3.12
	38	21.0	94.2	0.76	0.75	0.8	0.74	0.73	2.2	1.59	* 1.57	* 3.4	3.78	3.77	5.99	6.18
*	39	21.5	94.3	0.00	0.00	0.1	0.07	0.06	0.5	0.35	0.35	2.0	2.13	2.14	6.48	6.76
*	40	22.0	94.4			0.0	0.02	0.03	0.4	0.24	0.26	2.8	3.11	3.01	16.08	14.88
	41	22.5	94.4			0.0	0.01	0.01	0.2	0.11	0.12	2.0	2.27	2.19	16.35	14.82
*	42	23.0	95.0			0.0	0.00	0.00	0.0	0.00	0.00	0.0	0.06	0.09	0.25	0.39
	43	23.5	94.9			0.0			0.0			2.1	2.01	2.01	4.32	4.46
	44	24.0	94.9			0.0			0.0			0.4	0.38	0.38	0.82	0.85
	45	24.6	95.0			0.0			0.0			0.0	0.17	0.17	0.72	0.75
	46	24.7	95.0			0.0			0.0			0.0	0.17	0.17	0.72	0.75
	47	26.0	95.2			0.0			0.0			0.0	0.00	0.00	0.50	0.52
	48	29.5	95.5			0.0			0.0			0.0			0.00	0.00
	49	30.0	97.0			0.0			0.0			0.0				
	50	31.2	97.6			0.0			0.0			0.0				
	51	31.3	98.1			0.0			0.0			0.0				
	Total						0	* 0	*	11	* 11	*	4	* 0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5e. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 5.

Calibration Details

Lower Mundt Creek - Transect 5

	WSE (ft)		94.43		94.6				94.79				95.16				95.49	
	Disch (cfs)		1		3				10				34				80	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	97.2			0.0					0.0					0.0						
2	0.1	96.4			0.0					0.0					0.0						
3	4.3	96.2			0.0					0.0					0.0						
4	6.8	95.6			0.0					0.0					0.0					0.00	0.00
5	7.8	95.4			0.0					0.0					0.0					0.49	0.49
6	8.8	95.3			0.0					0.0					0.0					0.80	0.80
* 7	8.9	102.2			0.0					0.0					0.0	0.00		0.00		0.00	1.06
8	9.5	95.0			0.0					0.0					0.7	0.68		0.68		1.50	1.50
9	10.0	94.9			0.0					0.0	0.00		0.00		0.9	0.89		0.89		1.58	1.57
10	10.5	94.8	0.00	0.00	0.0	0.00		0.00		0.0	0.05		0.05		1.3	1.29		1.29		2.04	2.03
11	11.0	94.4	0.18	0.18	0.4	0.35		0.35		0.7	0.72		0.72		1.5	1.49		1.49		2.44	2.43
12	11.5	94.4	0.11	0.11	0.3	0.27		0.27		0.8	0.75		0.75		2.0	2.08		2.08		4.22	4.20
13	12.0	94.4	0.21	0.21	0.5	0.44		0.44		1.0	1.01		1.01		2.3	2.30		2.30		4.08	4.07
14	12.5	94.4	0.25	0.25	0.6	0.50		0.50		1.0	1.10		1.10		2.5	2.40		2.40		4.11	4.09
15	13.0	94.3	0.26	0.26	0.6	0.52		0.52		1.1	1.14		1.14		2.5	2.47		2.47		4.23	4.21
16	13.5	94.3	0.19	0.19	0.5	0.44		0.44		1.1	1.09		1.09		2.7	2.72		2.72		5.12	5.10
17	14.0	94.3	0.24	0.24	0.6	0.51		0.51		1.1	1.17		1.17		2.7	2.64		2.64		4.65	4.63
18	14.5	94.3	0.21	0.21	0.6	0.42		0.42		0.6	0.92	*	0.92	*	2.4	1.98		1.98		3.37	3.35
19	15.0	94.3	0.29	0.29	0.7	0.57		0.57		1.0	1.19		1.19		2.7	2.50		2.50		4.17	4.15
20	15.5	94.3	0.30	0.30	0.7	0.60		0.60		1.2	1.28		1.28		2.8	2.73		2.73		4.60	4.58
21	16.0	94.2	0.26	0.26	0.6	0.54		0.54		1.3	1.23		1.23		2.7	2.78		2.78		4.88	4.86
22	16.5	94.3	0.20	0.20	0.5	0.44		0.44		1.1	1.07		1.07		2.5	2.55		2.55		4.65	4.64
23	17.0	94.1	0.29	0.29	0.7	0.60		0.60		1.3	1.36		1.36		3.1	3.05		3.05		5.34	5.32
24	17.5	94.1	0.25	0.25	0.6	0.55		0.55		1.4	1.29		1.29		2.9	3.03		3.03		5.45	5.43
25	18.0	94.0	0.29	0.29	0.7	0.60		0.60		1.3	1.36		1.36		3.1	3.05		3.05		5.34	5.32
26	18.5	93.9	0.23	0.23	0.6	0.53		0.53		1.4	1.36		1.36		3.4	3.47		3.47		6.63	6.61
27	18.8	93.9	0.30	0.30	0.7	0.63		0.63		1.5	1.43		1.43		3.1	3.19		3.19		5.56	5.54
28	19.0	93.8	0.30	0.30	0.7	0.64		0.64		1.6	1.49		1.49		3.3	3.43		3.43		6.13	6.10
29	19.5	94.1	0.48	0.48	1.0	0.87		0.87		1.6	1.69		1.69		3.3	3.24		3.24		5.07	5.05
30	20.0	94.1	0.47	0.47	1.0	0.88		0.88		1.7	1.75		1.75		3.5	3.47		3.47		5.55	5.53
31	20.5	94.3	0.46	0.46	0.9	0.83		0.83		1.7	1.61		1.61		3.0	3.09		3.09		4.85	4.83
32	21.0	94.0	0.48	0.48	0.9	0.87		0.87		1.9	1.67		1.67		3.0	3.20		3.20		5.01	4.99
33	21.5	93.9	0.34	0.34	0.7	0.64		0.64		1.4	1.32		1.32		2.6	2.69		2.69		4.39	4.37
34	22.0	94.1	0.30	0.30	0.6	0.56		0.56		1.2	1.11		1.11		2.1	2.19		2.19		3.49	3.48
35	22.5	94.1	0.45	0.45	0.6	0.61		0.61		1.0	0.86		0.86		1.1	1.19		1.19		1.49	1.48
36	23.0	94.2	0.25	0.25	0.4	0.41		0.41		0.9	0.71		0.71		1.1	1.23		1.23		1.79	1.78
37	23.5	94.2	0.10	0.10	0.2	0.21		0.21		0.7	0.50		0.50		1.0	1.18		1.18		2.13	2.12
38	24.0	94.3	0.34	0.34	0.0	0.40	*	0.40	*	0.5	0.50		0.50		0.6	0.60		0.60		0.69	0.68
39	24.5	94.4	0.80	0.80	0.0	0.69	*	0.69	*	0.6	0.60		0.60		0.5	0.50		0.50		0.44	0.44
40	25.1	94.7	0.00	0.00	0.0	0.00		0.00		0.1	0.10		0.10		0.6	0.60		0.60		2.11	2.10
41	25.5	94.9			0.0					0.0	0.00		0.00		0.3	0.30		0.30		0.53	0.52
42	26.0	96.5			0.0					0.0					0.0	0.00		0.00		0.00	0.00
43	27.0	97.1			0.0					0.0					0.0						
44	27.2	97.6			0.0					0.0					0.0						
Total						2	*	2	*		1	*	1	*		0	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5f. Summary of calibration details for original and revised input decks, Lower Mundt Creek Transect 6.

Calibration Details

Lower Mundt Creek - Transect 6

	WSE (ft)		94.36			94.61					94.82				95.17				95.66		
	Disch (cfs)		1			3					10				34				80		
	Pt	Sta	Elev	Orig	Rev	Rev-1q	Meas	Orig	*	Rev	*	Rev-1q	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	99.0				0.0							0.0					0.0						
	2	0.1	98.9				0.0							0.0					0.0						
	3	0.5	96.5				0.0							0.0					0.0						
	4	4.0	96.4				0.0							0.0					0.0						
	5	8.3	95.7				0.0							0.0					0.0					0.00	0.00
	6	9.8	95.5				0.0							0.0					0.0					0.05	0.05
	7	10.2	95.6				0.0							0.0					0.0					0.02	0.03
	8	10.5	95.4				0.0							0.0					0.0					0.07	0.07
	9	12.2	95.3				0.0							0.0					0.0					0.08	0.09
	10	12.3	95.2				0.0							0.0					0.0	0.00		0.00		0.10	0.11
	11	13.0	94.9				0.0							0.0					0.1	0.10		0.10		0.14	0.15
	12	13.5	94.8				0.0	0.00		0.00		0.00		0.0	0.00		0.00		0.3	0.30		0.31		0.37	0.41
	13	14.0	94.5				0.0	0.01		0.02		0.00		0.2	0.12		0.15		0.9	1.06		0.96		3.83	2.90
*	14	14.5	94.4	0.00	0.00	0.00	0.0	0.00		0.05		0.00		0.2	0.09		0.31		1.9	2.48	*	1.59		19.85	4.06
	15	15.0	94.3	0.00	0.01	0.00	0.0	0.03		0.05		0.00		0.5	0.31		0.39		2.0	2.31		2.12		7.39	5.76
	16	15.5	94.2	0.00	0.00	0.00	0.0	0.02		0.04		0.00		0.5	0.29	*	0.38		2.3	2.71		2.46		10.05	7.56
	17	16.0	94.2	0.00	0.00	0.00	0.0	0.02		0.04		0.00		0.5	0.29	*	0.38		2.3	2.71		2.46		10.05	7.56
	18	16.5	94.2	0.00	0.01	0.00	0.0	0.05		0.08		0.00		0.7	0.44	*	0.55		2.6	2.97		2.75		8.78	6.97
	19	17.0	94.2	0.01	0.02	0.00	0.0	0.08		0.12		0.00		0.8	0.54	*	0.65		2.5	2.79		2.61		6.86	5.69
*	20	17.5	94.2	0.00	0.00	0.01	0.1	0.04		0.03		0.05		0.9	0.41	*	0.33	*	2.2	3.03	*	2.50		9.64	8.49
*	21	18.0	94.1	0.00	0.00	0.01	0.1	0.04		0.04		0.05		1.0	0.43	*	0.35	*	2.5	3.51	*	2.54		11.89	8.39
*	22	18.5	94.0	0.00	0.00	0.01	0.1	0.04		0.04		0.05		1.0	0.43	*	0.35	*	2.6	3.63	*	2.64		12.51	8.95
	23	19.0	93.9	0.00	0.00	0.01	0.1	0.04		0.04		0.05		1.1	0.45	*	0.35	*	2.6	3.76	*	2.64		13.01	8.95
*	24	19.5	93.8	0.01	0.04	0.03	0.2	0.08		0.19		0.10		1.0	0.61	*	0.81		2.9	3.40		2.63		8.80	4.95
	25	20.0	93.7	0.03	0.03	0.05	0.4	0.18	*	0.18	*	0.21		1.0	0.84		0.83		2.8	2.82		2.91		5.13	5.78
*	26	20.5	93.5	0.04	0.05	0.08	0.5	0.24	*	0.23	*	0.32		1.2	1.01		1.00		3.1	3.13		3.22		5.38	6.05
*	27	20.8	93.5	0.04	0.10	0.08	0.5	0.25	*	0.38		0.32		1.4	1.06	*	1.20		3.1	3.31		2.86		5.73	4.32
*	28	21.1	93.4	0.04	0.05	0.08	0.5	0.24	*	0.24	*	0.32		1.3	1.05		1.03		3.2	3.31		3.40		5.79	6.47
*	29	21.4	93.3	0.06	0.12	0.10	0.6	0.31	*	0.45		0.38	*	1.6	1.23	*	1.40		3.3	3.52		3.26		5.77	4.87
*	30	21.7	93.3	0.06	0.06	0.10	0.6	0.30	*	0.30	*	0.38	*	1.5	1.20		1.19		3.3	3.44		3.52		5.62	6.23
*	31	22.0	93.3	0.05	0.12	0.10	0.6	0.30	*	0.47		0.38	*	1.6	1.25	*	1.48		3.6	3.80		3.49		6.46	5.27
	32	22.5	93.2	0.03	0.04	0.06	0.4	0.20		0.20		0.22		1.4	0.95	*	0.94	*	2.9	3.29		3.33		6.16	6.69
*	33	22.8	93.4	0.05	0.16	0.08	0.5	0.26	*	0.50		0.32		1.4	1.03	*	1.34		2.7	2.95		2.66		4.79	3.55
*	34	23.1	93.4	0.07	0.21	0.08	0.5	0.29	*	0.56		0.32		1.3	0.95	*	1.23		2.0	2.22		1.99		3.14	2.30
*	35	23.5	93.4	0.02	0.09	0.03	0.2	0.11		0.31		0.11		1.2	0.58	*	0.88	*	1.7	2.31	*	1.89		4.73	2.66
	36	24.0	93.5	0.03	0.05	0.00	0.0	0.13		0.18		0.01		0.6	0.48		0.54		1.2	1.26		1.22		1.93	1.79
	37	24.5	93.6	0.19	0.15	0.00	0.0	0.14		0.07		0.00		-0.2	-0.13		-0.16		-0.4	-0.41		-0.40		-0.45	-0.45
	38	25.0	93.7	-0.08	-0.10	0.00	0.0	-0.16		-0.16		0.00		-0.2	-0.21		-0.21		-0.2	-0.19		-0.19		-0.14	-0.15
	39	25.5	93.9	0.09	0.08	0.00	0.0	0.07		0.04		0.00		-0.1	-0.06		-0.08		-0.2	-0.20		-0.20		-0.22	-0.23
	40	26.0	93.9	-0.04	-0.05	0.00	0.0	-0.10		-0.10		0.00		0.0	-0.16		-0.16		-0.2	-0.19		-0.20		-0.17	-0.19
	41	26.7	96.6	0.00	0.00	0.00	0.0	0.00		0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	42	26.8	97.2				0.0							0.0					0.0						
	Total							9	*	4	*	3	*		16	*	6	*		6	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 5g. Summary of calibration details for original and revised input decks, Upper Mundt Creek Transect 7.

Calibration Details

Lower Mundt Creek - Transect 7

	WSE (ft)		94.42		94.66				94.89				95.28				95.8	
	Disch (cfs)		1		3				10				34				80	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	97.1			0.0					0.0					0.0						
2	0.1	96.0			0.0					0.0					0.0					0.00	0.00
3	2.0	95.6			0.0					0.0					0.0					0.38	0.18
4	3.5	95.8			0.0					0.0					0.0	0.00				0.00	0.00
* 5	4.3	95.2			0.0					0.0					0.0	0.37	*	0.00		0.79	0.24
* 6	5.1	95.2			0.0					0.0					0.0	0.37	*	0.14		0.79	0.38
* 7	5.5	95.2			0.0					0.0					0.0	0.37	*	0.14		0.79	0.38
* 8	6.8	95.3			0.0					0.0					0.0	0.13		0.14		0.70	0.38
9	7.5	95.1			0.0					0.0					0.5	0.55		0.59		0.88	1.21
10	8.0	94.9			0.0					0.0	0.00		0.00		0.7	0.71		0.76		0.88	1.22
11	8.5	94.7			0.0			0.00		0.7	0.54		0.61		1.9	2.23		2.19		4.81	5.19
* 12	9.0	94.6			0.4	0.00	*	0.44		1.4	1.05	*	1.04	*	2.6	3.07		2.56		5.26	4.67
13	9.5	94.5			1.0	1.15		1.16		1.7	1.26	*	1.22	*	1.1	1.26		1.31		1.01	1.33
14	10.0	94.5			1.4	1.36		1.33		1.6	1.64		1.59		1.9	1.80		1.93		1.55	2.14
* 15	10.4	94.5			1.5	1.17	*	1.29		1.5	2.02	*	2.20	*	3.9	3.19		3.83		3.54	5.49
16	10.8	94.6	0.00	0.00	0.0	0.00		0.00		1.7	1.44		1.54		3.4	3.72		3.75		5.83	6.78
* 17	11.2	94.4	0.78	0.80	1.6	1.44		1.41		2.8	2.59		2.51		4.2	4.29		4.59		4.91	6.81
18	11.5	94.3	1.74	1.79	2.3	2.24		2.19		2.7	2.74		2.65		3.2	3.05		3.27		2.65	3.67
19	11.8	94.3	0.87	0.88	1.7	1.51		1.47		2.6	2.57		2.49		4.1	4.01		4.32		4.41	6.17
* 20	12.2	94.3	1.04	1.10	1.8	1.81		1.71		4.2	3.08	*	2.67	*	4.1	4.79		4.27		5.26	5.77
* 21	12.6	94.3	0.23	0.34	0.7	0.67		0.74		3.5	1.96	*	1.67	*	3.8	5.31	*	3.91		8.61	6.88
* 22	13.0	94.2	0.01	1.98	0.1	0.09		2.50	*	3.3	0.92	*	3.11		4.2	9.30	*	3.96		37.83	4.56
23	13.4	94.2	0.95	1.00	1.7	1.62		1.60		3.1	2.67		2.58		3.8	4.03		4.29		4.34	5.93
* 24	13.8	94.2	0.26	0.27	0.8	0.72		0.64		3.1	2.04	*	1.62	*	4.2	5.33	*	4.23		8.41	8.02
25	14.2	94.2	1.87	1.90	2.6	2.47		2.40		2.9	3.09		2.98		3.8	3.52		3.79		3.12	4.36
26	14.8	94.0	0.38	0.39	0.8	0.74		0.73		1.7	1.42		1.37		2.3	2.50		2.66		3.01	4.11
27	15.2	94.2	0.27	0.28	0.8	0.67		0.66		1.9	1.65		1.60		3.5	3.75		4.02		5.36	7.45
* 28	15.4	94.3	0.68	0.70	1.2	1.27		1.14		3.8	2.33	*	1.88	*	3.0	3.91	*	3.18		4.52	4.46
29	15.8	94.1	1.87	1.93	2.4	2.36		2.31		2.8	2.82		2.72		3.2	3.06		3.27		2.62	3.62
30	16.2	94.1	0.78	0.79	1.4	1.27		1.23		2.0	2.01		1.94		3.0	2.91		3.13		3.04	4.24
* 31	16.6	94.4	0.28	0.38	0.9	0.68	*	0.79		1.5	1.68		1.75		4.1	3.79		3.96		5.41	6.83
32	17.0	94.4	0.25	0.26	0.6	0.54		0.54		1.5	1.18	*	1.15	*	2.1	2.37		2.52		3.11	4.23
33	17.4	94.6	0.00	0.00	0.0	0.00		0.00		0.9	0.85		0.86		1.2	1.20		1.25		1.23	1.57
34	17.8	94.6			0.0					0.4	0.37		0.38		0.6	0.62		0.64		0.71	0.89
35	18.0	94.6			0.0					0.1	0.07		0.08		0.4	0.51		0.49		1.66	1.63
36	18.4	102.2			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
37	18.5	95.3			0.0					0.0					0.0	0.02		0.02		0.10	0.14
38	18.9	97.2			0.0					0.0					0.0	0.00		0.00		0.00	0.00
39	19.0	97.9			0.0					0.0					0.0						
Total						3	*	1	*		9	*	8	*		7	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec and 20%

Table 6. Summary of Calibration Details, Upper Mundt Creek.

Transect Number	1	2	3	4	5	6	7
DISCHARGE							
	5	4	4	4	3	2	4
Meas.	13	13	13	13	10	11	12
	39	39	35	32	34	34	29
	5	4	4	4	4	3	4
Calc.	14	12	12	12	10	11	12
	40	38	34	34	34	36	28
	3	3	3	3	3	3	3
Given	10	10	10	10	10	10	10
	34	34	34	34	34	34	34
Stage (given)							
	96.05	96.09	96.11	94.48	94.60	94.61	94.66
	96.24	96.30	96.32	94.66	94.79	94.82	94.89
	96.52	96.57	96.61	95.05	95.16	95.17	95.28
Plotting Stage (given)							
	0.46	0.45	0.47	0.45	0.50	0.51	0.56
	0.65	0.66	0.68	0.63	0.69	0.72	0.79
	0.93	0.93	0.97	1.02	1.06	1.07	1.18
Ratio of Measured vs Predicted Discharge (given)							
	0.989	1.014	0.969	0.889	0.969	1.077	0.926
	1.023	0.970	1.067	1.220	1.057	0.870	1.154
	0.989	1.016	0.967	0.921	0.977	1.087	0.936
Mean Error of Stage/Discharge Relationship for Calculated Q							
	0.47	1.81	0.87	10.29	2.90	0.26	4.09
Mean Error of Stage/Discharge Relationship for Given Q							
	1.49	2.03	4.30	12.99	3.65	9.47	9.38
Stage/Discharge Relationship (S vs Q) S=A*Q**B+SZF							
A=	0.255	0.292	0.3143	0.265	0.325	0.3869	0.318
B=	0.351	0.320	0.315	0.372	0.334	0.277	0.386
SZF=	95.59	95.64	95.64	94.03	94.10	94.10	94.10
B Coefficient log/log Relationship (calculated)							
	2.84	3.100	3.170	2.690	2.990	3.600	2.59

APPENDIX G

Upper Turner Creek Final IFIM Calibration Report

Upper Turner Creek Final IFIM Calibration Report

Prepared for

Dr. Hal Beecher

Prepared by

Cascades Environmental Services, Inc.

July 24, 1996

Table 1. Upper Turner Creek original uncalibrated data deck

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INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #UPPER TURNER CREEK - ORIGINAL DECK
IOC        1100000201001
QARD   1.0
QARD   2.0
QARD   3.0
QARD   4.0
QARD   5.0
QARD   6.0
QARD   7.0
QARD   8.0
QARD   9.0
QARD  10.0
QARD  11.0
QARD  12.0
QARD  13.0
QARD  14.0
QARD  15.0
QARD  16.0
QARD  17.0
QARD  18.0
XSEC      1                    96.85      0.034
          1  0.0 98.0  0.1 97.8  0.3 97.6  0.5 97.4  0.7 97.4  0.9 97.4
          1  1.1 97.4  1.3 97.2  1.5 97.1  1.7 97.1  1.9 97.1  2.1 97.2
          1  2.3 97.2  2.5 97.0  2.7 97.0  2.9 97.1  3.1 97.1  3.3 97.1
          1  3.5 97.2  3.7 96.9  3.9 96.9  4.0 96.9  4.2 97.2  4.4 97.2
          1  4.6 97.2  4.8 96.9  5.0 96.9  5.2 96.9  5.4 96.9  5.6 96.9
          1  5.8 96.9  6.0 96.9  6.2 96.9  6.4 97.1  6.6 97.1  6.8 97.1
          1  7.0 97.0  7.2 97.0  7.4 97.1  7.6 97.1  7.8 97.2  8.0 97.1
          1  8.2 97.1  8.4 97.0  8.6 97.0  8.8 97.1  9.0 97.1  9.2 97.2
          1  9.4 97.3  9.8 97.3 10.0 97.5 10.3 97.5 10.7 97.8 14.0 98.2
          1 14.1 98.8
NS        1  0.0  2.6  0.0  2.6  0.0  2.6  0.0  2.6  0.0 63.8  0.0 63.8
NS        1  0.0 63.8  0.0 63.8  0.0 63.8  0.0 54.7  0.0 54.7  0.0 54.7
NS        1  0.0 54.7  0.0 54.7  0.0 52.5  0.0 52.5  0.0 62.8  0.0 62.8
NS        1  0.0 62.8  0.0 62.8  0.0 62.8  0.0 35.7  0.0 35.7  0.0 65.8
NS        1  0.0 65.8  0.0 65.8  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS        1  0.0 53.6  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7
NS        1  0.0 64.7  0.0 64.7  0.0 75.7  0.0 75.7  0.0 75.7  0.0 75.7
NS        1  0.0 75.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7
NS        1  0.0 35.8  0.0 56.6  0.0 56.6  0.0 56.6  0.0  1.5  0.0  1.5
NS        1  0.0  1.5
CAL1      1    97.48       7.83
VEL1      1                 0.0  0.0  0.2  0.9  1.4  1.3  2.0  2.4  3.2
VEL1      1  1.7  0.5  0.1  0.4  0.4  0.4  1.1  2.5  2.7  1.9  1.9  1.8
VEL1      1  1.8  2.3  2.8  1.8  1.3  1.9  3.1  3.7  3.3  3.5  3.7  3.5
VEL1      1  3.2  3.4  3.8  3.6  3.2  3.4  3.6  3.5  2.1  1.3  0.4  0.6
VEL1      1  0.0  0.0  0.0
CAL2      1    97.38       4.6
VEL2      1                           0.0  0.0  0.8  1.6  1.9  2.5  2.2
VEL2      1  0.9  0.1  0.5  0.4  0.2  0.4  0.2  1.0  1.8  1.7  1.4  1.5
VEL2      1  1.5  1.9  1.7  1.4  0.8  0.8  1.3  2.5  3.5  4.6  4.6  2.8
```

Table 1. Upper Turner Creek original uncalibrated data deck - **Continued**

```
VEL2     1  3.1  3.5  3.6  3.2  2.8  2.4  2.6  2.2  0.7  0.3  0.1  0.0
VEL2     1  0.0  0.0
CAL3     1    97.25       1.85
VEL3     1                                       0.0  0.0  0.9  0.8  0.4
VEL3     1  0.3  0.0  0.0  0.0  0.0  0.0  0.0  0.4  1.4  1.4  1.2  0.0
VEL3     1  0.8  0.5  0.9  0.5  0.4  0.2  0.4  0.4  1.1  3.0  3.1  3.3
VEL3     1  2.8  2.9  2.6  2.2  2.1  1.8  1.6  2.2  1.5  0.8  0.3  0.0
VEL3     1  0.0
XSEC     2                   98.38      0.004
         2  0.0100.6  0.1 99.4  1.3 99.2  2.1 99.0  2.5 99.0  3.0 98.9
         2  3.5 98.9  4.0 98.7  4.5 98.7  4.8 98.7  5.1 98.7  5.6 98.7
         2  5.9 98.7  6.2 98.7  6.5 98.7  6.8 98.6  7.1 98.6  7.4 98.5
         2  7.7 98.5  8.0 98.4  8.3 98.4  8.6 98.5  8.9 98.4  9.2 98.3
         2  9.5 98.3  9.8 98.3 10.2 98.2 10.5 98.1 10.8 98.4 11.0 98.6
         2 11.1 98.8 11.9 99.0 12.6 99.3 12.7101.9
NS       2  0.0 21.8  0.0 21.8  0.0 21.8  0.0 21.8  0.0 25.7  0.0 65.6
NS       2  0.0 65.6  0.0 35.7  0.0 32.8  0.0 32.8  0.0 34.7  0.0 34.7
NS       2  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.7  0.0 34.7
NS       2  0.0 34.7  0.0 34.7  0.0 34.7  0.0 34.7  0.0 45.8  0.0 45.8
NS       2  0.0 45.8  0.0 45.8  0.0 43.6  0.0 43.6  0.0 43.6  0.0  2.5
NS       2  0.0  2.5  0.0  2.5  0.0  2.5  0.0  2.5
CAL1     2    99.04       7.33
VEL1     2                       0.0  0.6  1.2  1.2  1.0  1.2  1.4  1.5
VEL1     2  1.9  1.8  1.7  1.4  1.6  2.0  1.9  1.8  2.0  2.4  2.3  1.8
VEL1     2  2.1  2.1  1.5  1.5  2.0  1.7
CAL2     2    98.91       4.62
VEL2     2                            0.0  0.0  1.2  0.9  1.2  1.3  1.2
VEL2     2  1.5  2.0  1.6  1.7  1.9  2.0  1.7  1.7  1.4  1.7  2.5  1.4
VEL2     2  1.3  1.4  1.3  1.4  1.8  1.7
CAL3     2    98.75       2.06
VEL3     2                                 0.0  0.4  0.4  0.6  0.7  0.4
VEL3     2  0.5  0.4  1.1  1.3  1.6  1.6  1.3  1.3  1.3  1.3  1.5  1.4
VEL3     2  1.7  1.5  1.5  1.3  1.2  1.1
XSEC     3                   98.54      0.004
         3  0.0 99.9  0.1 99.5  0.8 99.3  1.4103.1  2.0 99.0  2.5 98.9
         3  3.0 98.9  3.3 98.8  3.6 98.8  3.9 98.7  4.2 98.6  4.5 98.6
         3  4.8 98.5  5.1 98.4  5.4 98.4  5.7 98.4  6.0 98.4  6.3 98.4
         3  6.6 98.4  6.9 98.4  7.2 98.4  7.5 98.4  7.8 98.4  8.1 98.5
         3  8.4 98.5  8.7 98.5  9.0 98.7  9.3 98.6  9.6 98.6  9.9 98.7
         3 10.2 98.7 10.5 98.7 10.8 98.8 11.1 98.9 11.4 98.9 11.7 99.0
         3 12.0 99.0 12.1 99.1 13.7 98.5 16.0 99.7 17.5 99.7 19.0100.1
         3 19.0101.2
NS       3  0.0 20.5  0.0 20.5  0.0 20.5  0.0 20.5  0.0 23.8  0.0 32.8
NS       3  0.0 32.8  0.0 32.8  0.0 32.8  0.0 53.7  0.0 53.8  0.0 52.7
NS       3  0.0 52.7  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 53.7
NS       3  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.6  0.0 53.6  0.0 53.6
NS       3  0.0 53.6  0.0 34.7  0.0 34.7  0.0 34.7  0.0 23.7  0.0 23.7
NS       3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9
NS       3  0.0 22.9  0.0 22.9  0.0 20.8  0.0  2.5  0.0  2.5  0.0  2.5
NS       3  0.0  2.5
CAL1     3   99.077       7.75
VEL1     3                       0.0  0.9  1.0  1.0  1.0  1.0  1.1  0.9
```

Table 1. Upper Turner Creek original uncalibrated data deck - **Continued**

```
VEL1     3  1.3  1.4  1.7  1.8  2.0  2.3  3.4  3.7  3.1  3.0  2.6  2.5
VEL1     3  2.0  1.4  1.3  1.1  0.9  0.6  0.6  0.5  0.3  0.3  0.1  0.1
VEL1     3  0.0
CAL2     3    98.97       4.43
VEL2     3                          0.0  0.8  0.7  0.8  0.9  0.8  0.7
VEL2     3  1.0  1.4  1.7  1.9  1.9  2.1  2.1  1.9  1.5  1.2  1.1  1.3
VEL2     3  1.1  0.9  1.0  1.0  0.9  1.0  1.0  0.9  0.7  0.8  0.0  0.0
VEL2     3
CAL3     3    98.85        2.12
VEL3     3                               0.0  0.0  0.5  0.5  0.5  0.5
VEL3     3  0.7  0.7  0.9  1.1  1.2  1.4  1.5  1.6  1.5  1.4  1.2  1.4
VEL3     3  1.3  1.1  1.1  1.0  0.7  0.0
VEL3     3
XSEC     4                   98.54      0.004
         4  0.0100.3  0.1 99.6  0.5 99.4  1.0 99.1  1.1 98.6  1.4 98.4
         4  1.7 98.4  2.0 98.4  2.3 98.4  2.6 98.2  2.9 98.1  3.2 98.2
         4  3.4 98.2  3.6 98.1  3.8 98.1  4.0 97.8  4.2 97.9  4.4 97.9
         4  4.6 97.9  4.8 98.0  5.0 98.0  5.2 98.0  5.4 98.2  5.6 98.2
         4  5.8 98.2  6.0 98.2  6.2 98.4  6.4 98.4  6.8 98.5  7.4 98.7
         4  7.8 98.8  8.2 98.9  8.6 98.9  9.0 99.0  9.3 99.0 10.4 99.5
         4 12.3 99.9 13.5 99.8 16.5 99.9 19.0100.1 19.2100.4
NS       4  0.0  2.7  0.0  2.7  0.0  2.7  0.0  2.7  0.0 22.9  0.0 22.9
NS       4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 56.7  0.0 56.7  0.0 56.7
NS       4  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7
NS       4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 43.7  0.0 43.7
NS       4  0.0 43.7  0.0 43.7  0.0 43.7  0.0 22.9  0.0 22.9  0.0 22.9
NS       4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 43.6
NS       4  0.0 45.7  0.0  3.8  0.0  2.5  0.0  2.5  0.0  2.5
CAL1     4   99.087       7.41
VEL1     4                     0.0  0.0  0.0  0.3  0.6  0.7  1.2  1.2
VEL1     4  1.4  1.5  1.6  2.0  2.6  3.8  4.2  3.5  2.4  1.7  1.3  1.2
VEL1     4  1.0  0.8  0.7  0.5  0.0  0.2 -0.4 -0.4 -0.5 -0.1
VEL1     4
CAL2     4    98.98       4.49
VEL2     4                     0.0  0.0  0.0  0.1  0.2  0.4  0.7  0.9
VEL2     4  1.2  1.6  2.1  1.8  2.1  1.9  2.1  1.6  1.3  1.1  0.8  0.7
VEL2     4  0.7  0.6  0.4  0.4  0.3  0.1  0.1  0.2  0.0
VEL2     4
CAL3     4    98.87        1.89
VEL3     4                     0.0  0.0  0.0  0.1  0.0  0.1  0.0  0.2
VEL3     4  0.4  0.4  0.9  1.0  1.1  1.0  1.4  1.3  1.3  1.0  0.7  0.7
VEL3     4  0.3  0.1  0.1  0.0  0.1
VEL3     4
XSEC     5                   97.51      0.011
         5  0.0 99.4  0.2 99.2  0.7 99.1  0.9 98.2  1.0 97.7  1.2 97.7
         5  1.4 97.6  1.6 97.6  1.8 97.6  2.0 97.5  2.2 97.4  2.4 97.5
         5  2.6 97.4  2.8 97.4  3.0 97.4  3.2 97.5  3.4 97.6  3.6 97.7
         5  3.8 97.6  4.0 97.6  4.2 97.6  4.4 97.7  4.6 97.7  4.8 97.7
         5  5.0 97.7  5.2 97.7  5.4 97.7  5.6 97.7  5.8 97.8  6.0 97.8
         5  6.2 97.9  6.4 97.8  6.6 97.8  6.8 97.9  7.0 97.9  7.2 98.0
         5  7.4 98.1  7.6 98.1  7.8 98.1  8.0 98.1  8.1 98.1  8.8 98.4
         5  9.5 98.6 10.8 98.9 10.9 99.2
```

Table 1. Upper Turner Creek original uncalibrated data deck - **Continued**

```
NS        5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 65.7  0.0 65.7
NS        5  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.6  0.0 65.6  0.0 65.6
NS        5  0.0 65.6  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS        5  0.0 65.7  0.0 65.7  0.0 63.7  0.0 63.7  0.0 54.7  0.0 54.7
NS        5  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.6  0.0 54.6  0.0 54.6
NS        5  0.0 54.6  0.0 54.6  0.0 45.6  0.0 45.6  0.0 45.6  0.0 45.6
NS        5  0.0 45.6  0.0 45.6  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7
NS        5  0.0 32.8  0.0  1.5  0.0  1.5
CAL1      5    98.16       7.71
VEL1      5                      1.6  1.9  1.6  1.5  1.3  1.0  1.3  1.8
VEL1      5  1.9  2.2  2.5  1.7  1.0  0.6  2.2  3.2  3.7  3.5  3.1  2.5
VEL1      5  1.4  1.7  2.6  2.9  3.3  2.9  3.4  3.5  3.3  3.0  2.7  2.4
VEL1      5  1.7  1.8  1.3  0.0
CAL2      5   98.062       4.88
VEL2      5                      0.9  1.6  1.7  1.5  1.4  1.3  1.5  1.4
VEL2      5  1.2  1.6  1.5  0.9  1.0  1.2  1.8  2.0  2.6  3.0  2.8  2.7
VEL2      5  2.0  1.6  2.1  2.6  2.8  2.9  2.7  3.1  2.5  2.3  1.9  2.0
VEL2      5
CAL3      5   97.875        2.07
VEL3      5                      0.4  1.3  1.4  1.7  2.0  2.2  1.9  0.9
VEL3      5  1.3  1.7  0.9  0.4  0.2  0.3  1.0  1.6  1.9  2.6  2.8  2.5
VEL3      5  1.6  1.2  1.2  1.5  1.9  0.8  1.3  0.6  0.4       0.0  0.0
VEL3      5
ENDJOB
```

Table 2a. Revised Upper Turner Creek IFIM Deck, 1 - 12 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #UPPER TURNER REVISED DECK 3/30/96
IOC        0100000201001
QARD  1.0
QARD  2.0
QARD  3.0
QARD  4.0
QARD  5.0
QARD  6.0
QARD  7.0
QARD  8.0
QARD  9.0
QARD 10.0
QARD 11.0
QARD 12.0
XSEC     1                    96.85     0.034
         1  0.0 98.0  0.1 97.8  0.3 97.6  0.5 97.4  0.7 97.4  0.9 97.4
         1  1.1 97.4  1.3 97.2  1.5 97.1  1.7 97.1  1.9 97.1  2.1 97.2
         1  2.3 97.2  2.5 97.0  2.7 97.0  2.9 97.1  3.1 97.1  3.3 97.1
         1  3.5 97.2  3.7 96.9  3.9 96.9  4.0 96.9  4.2 97.2  4.4 97.2
         1  4.6 97.2  4.8 96.9  5.0 96.9  5.2 96.9  5.4 96.9  5.6 96.9
         1  5.8 96.9  6.0 96.9  6.2 96.9  6.4 97.1  6.6 97.1  6.8 97.1
         1  7.0 97.0  7.2 97.0  7.4 97.1  7.6 97.1  7.8 97.2  8.0 97.1
         1  8.2 97.1  8.4 97.0  8.6 97.0  8.8 97.1  9.0 97.1  9.2 97.2
         1  9.4 97.3  9.8 97.3 10.0 97.5 10.3 97.5 10.7 97.8 14.0 98.2
         1 14.1 98.8
NS       1  0.0  2.6  0.0  2.6  0.0  2.6  0.0  2.6  0.0 63.8  0.0 63.8
NS       1  0.0 63.8  0.0 63.8  0.0 63.8  0.0 54.7  0.0 54.7  0.0 54.7
NS       1  0.0 54.7  0.0 54.7  0.0 52.5  0.0 52.5  0.0 62.8  0.0 62.8
NS       1  0.0 62.8  0.0 62.8  0.0 62.8  0.0 35.7  0.0 35.7  0.0 65.8
NS       1  0.0 65.8  0.0 65.8  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS       1  0.0 53.6  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7
NS       1  0.0 64.7  0.0 64.7  0.0 75.7  0.0 75.7  0.0 75.7  0.0 75.7
NS       1  0.0 75.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7
NS       1  0.0 35.8  0.0 56.6  0.0 56.6  0.0 56.6  0.0  1.5  0.0  1.5
NS       1  0.0  1.5
CAL1     1    97.48       7.83
VEL1     1                 0.0  0.0  0.2  0.9  1.4  1.3  2.0  2.4  3.2
VEL1     1  1.7  0.5  0.1  0.4  0.4  0.4  1.1  2.9  2.7  1.9  1.9  1.8
VEL1     1  1.8  2.3  2.8  1.8  1.3  1.9  3.1  3.7  3.3  3.5  3.7  3.5
VEL1     1  3.2  3.4  3.8  3.6  3.2  3.4  3.6  3.5  2.1  1.3  0.4  0.6
VEL1     1  0.1  0.0  0.0
CAL2     1    97.38       4.6
VEL2     1                           0.0  0.0  0.8  1.6  1.9  2.5  2.2
VEL2     1  0.9  0.1  0.5  0.4  0.2  0.4  0.2  1.0  1.7  1.7  1.4  1.5
VEL2     1  1.5  1.9  1.7  1.4  0.8  0.8  1.3  2.5  3.5  4.6  4.6  3.3
VEL2     1  3.1  3.5  3.6  3.2  2.8  2.4  2.6  2.2  0.0  0.0  0.1  0.0
VEL2     1  0.0  0.0
CAL3     1    97.25       1.85
VEL3     1                                     0.0  0.0  0.9  0.8  0.0
VEL3     1  0.3  0.0  0.1  0.1  0.0  0.1  0.0  0.6  1.5  1.4  1.2  0.0
VEL3     1  0.8  0.5  0.9  0.5  0.4  0.2  0.4  0.4  1.1  3.0  3.1  3.3
```

Table 2a. Revised Upper Turner Creek IFIM Deck, 1 - 12 cfs. - **Continued**

```
VEL3     1  2.8  2.9  2.6  2.2  2.1  1.8  1.6  2.2  1.5  0.8  0.3  0.0
VEL3     1  0.0
XSEC     2                   98.38     0.004
         2  0.0100.6  0.1 99.4  1.3 99.2  2.1 99.1  2.5 99.0  3.0 98.9
         2  3.5 98.9  4.0 98.7  4.5 98.7  4.8 98.7  5.1 98.7  5.6 98.7
         2  5.9 98.7  6.2 98.7  6.5 98.7  6.8 98.6  7.1 98.6  7.4 98.5
         2  7.7 98.5  8.0 98.4  8.3 98.4  8.6 98.5  8.9 98.4  9.2 98.3
         2  9.5 98.3  9.8 98.3 10.2 98.2 10.5 98.1 10.8 98.4 11.0 98.6
         2 11.1 99.1 11.9 99.2 12.6 99.3 12.7101.9
NS       2  0.0 21.8  0.0 21.8  0.0 21.8  0.0 21.8  0.0 25.7  0.0 65.6
NS       2  0.0 65.6  0.0 35.7  0.0 32.8  0.0 32.8  0.0 34.7  0.0 34.7
NS       2  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.7  0.0 34.7
NS       2  0.0 34.7  0.0 34.7  0.0 34.7  0.0 34.7  0.0 45.8  0.0 45.8
NS       2  0.0 45.8  0.0 45.8  0.0 43.6  0.0 43.6  0.0 43.6  0.0  2.5
NS       2  0.0  2.5  0.0  2.5  0.0  2.5  0.0  2.5
CAL1     2    99.04       7.33
VEL1     2                       0.1  0.6  1.2  1.2  1.0  1.2  1.4  1.5
VEL1     2  1.9  1.6  1.7  1.4  1.6  2.0  1.9  1.8  2.0  2.4  2.3  1.8
VEL1     2  2.1  2.1  1.5  1.5  2.0  1.7
CAL2     2    98.91       4.62
VEL2     2                            0.0  0.0  1.2  0.9  1.2  1.3  1.2
VEL2     2  1.5  2.0  1.4  1.7  1.9  2.0  1.7  1.7  1.4  1.7  2.5  1.4
VEL2     2  1.3  1.4  1.3  1.4  1.8  1.7
CAL3     2    98.75       2.06
VEL3     2                                 0.0  0.4  0.4  0.6  0.7  0.4
VEL3     2  0.5  0.4  1.1  1.3  1.6  1.6  1.3  1.3  1.3  1.3  1.5  1.4
VEL3     2  1.7  1.5  1.5  1.3  1.2  1.1
XSEC     3                   98.54     0.004
         3  0.0 99.9  0.1 99.5  0.8 99.3  1.4103.1  2.0 99.0  2.5 98.9
         3  3.0 98.9  3.3 98.9  3.6 98.8  3.9 98.7  4.2 98.6  4.5 98.6
         3  4.8 98.5  5.1 98.4  5.4 98.4  5.7 98.4  6.0 98.4  6.3 98.4
         3  6.6 98.4  6.9 98.4  7.2 98.4  7.5 98.4  7.8 98.4  8.1 98.5
         3  8.4 98.5  8.7 98.5  9.0 98.7  9.3 98.6  9.6 98.6  9.9 98.9
         3 10.2 98.9 10.5 98.9 10.8 98.9 11.1 98.9 11.4 98.9 11.7 99.0
         3 12.0 99.0 12.1 99.1 13.7 99.5 16.0 99.7 17.5 99.7 19.0100.1
         3 19.0101.2
NS       3  0.0 20.5  0.0 20.5  0.0 20.5  0.0 20.5  0.0 23.8  0.0 32.8
NS       3  0.0 32.8  0.0 32.8  0.0 32.8  0.0 53.7  0.0 53.8  0.0 52.7
NS       3  0.0 52.7  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 53.7
NS       3  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.6  0.0 53.6  0.0 53.6
NS       3  0.0 53.6  0.0 34.7  0.0 34.7  0.0 34.7  0.0 23.7  0.0 23.7
NS       3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9
NS       3  0.0 22.9  0.0 22.9  0.0 20.8  0.0  2.5  0.0  2.5  0.0  2.5
NS       3  0.0  2.5
CAL1     3   99.077       7.75
VEL1     3                       0.1  0.9  1.0  1.0  1.0  1.0  1.4  0.9
VEL1     3  1.3  1.4  1.7  1.8  2.0  2.3  3.8  4.7  3.3  3.2  2.9  3.0
VEL1     3  2.2  1.4  1.3  1.1  0.9  0.6  0.6  0.5  0.3  0.3  0.1  0.1
VEL1     3  0.1
CAL2     3    98.97       4.43
VEL2     3                            0.0  0.8  0.7  0.8  0.9  0.8  0.7
VEL2     3  1.0  1.4  1.7  1.9  1.9  2.1  2.1  2.5  1.8  0.0  1.5  0.0
```

Table 2a. Revised Upper Turner Creek IFIM Deck, 1 - 12 cfs. - **Continued**

```
VEL2     3  0.0  0.9  1.0  1.0  0.9  1.0  1.0  0.9  0.7  0.8  0.0  0.0
VEL2     3
CAL3     3    98.85       2.12
VEL3     3                                 0.0  0.0  0.5  0.5  0.5  0.5
VEL3     3  0.7  0.7  0.9  1.1  1.2  1.4  1.5  1.8  1.5  1.4  1.3  1.6
VEL3     3  1.5  1.1  1.1  1.0  0.7  0.0
VEL3     3
XSEC     4                   98.54      0.004
         4  0.0100.3  0.1 99.6  0.5 99.4  1.0 99.1  1.1 98.6  1.4 98.4
         4  1.7 98.4  2.0 98.4  2.3 98.4  2.6 98.2  2.9 98.1  3.2 98.2
         4  3.4 98.2  3.6 98.1  3.8 98.1  4.0 97.8  4.2 97.9  4.4 97.9
         4  4.6 97.9  4.8 98.0  5.0 98.0  5.2 98.0  5.4 98.2  5.6 98.2
         4  5.8 98.2  6.0 98.2  6.2 98.4  6.4 98.4  6.8 98.5  7.4 98.7
         4  7.8 98.9  8.2 98.9  8.6 98.9  9.0 99.0  9.3 99.0 10.4 99.5
         4 12.3 99.9 13.5 99.8 16.5 99.9 19.0100.1 19.2100.4
NS       4  0.0  2.7  0.0  2.7  0.0  2.7  0.0  2.7  0.0 22.9  0.0 22.9
NS       4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 56.7  0.0 56.7  0.0 56.7
NS       4  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7
NS       4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 43.7  0.0 43.7
NS       4  0.0 43.7  0.0 43.7  0.0 43.7  0.0 22.9  0.0 22.9  0.0 22.9
NS       4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 43.6
NS       4  0.0 45.7  0.0  3.8  0.0  2.5  0.0  2.5  0.0  2.5
CAL1     4   99.087      7.41
VEL1     4                      0.0  0.0  0.0  0.3  0.6  0.7  1.2  1.2
VEL1     4  1.4  1.5  1.6  2.0  2.6  3.8  4.2  3.5  2.4  1.7  1.3  1.2
VEL1     4  1.0  0.8  0.7  0.5  0.1  0.2 -0.4 -0.4 -0.5 -0.1
VEL1     4
CAL2     4    98.98       4.49
VEL2     4                      0.0  0.0  0.0  0.1  0.2  0.4  0.7  0.9
VEL2     4  1.2  1.6  2.1  1.8  2.1  1.9  2.1  1.6  1.3  1.1  0.7  0.7
VEL2     4  0.7  0.6  0.4  0.4  0.3  0.1  0.1  0.2  0.0
VEL2     4
CAL3     4    98.87       1.89
VEL3     4                      0.0  0.0  0.0  0.1  0.0  0.1  .16  0.2
VEL3     4  0.4  0.4  0.9  1.0  1.1  1.0  1.4  1.3  1.3  1.0  0.7  0.7
VEL3     4  0.3  0.1  0.1  0.1  0.1
VEL3     4
XSEC     5                   97.51      0.011
         5  0.0 99.4  0.2 99.2  0.7 99.1  0.9 98.2  1.0 97.7  1.2 97.7
         5  1.4 97.6  1.6 97.6  1.8 97.6  2.0 97.5  2.2 97.4  2.4 97.5
         5  2.6 97.4  2.8 97.4  3.0 97.4  3.2 97.5  3.4 97.6  3.6 97.7
         5  3.8 97.6  4.0 97.6  4.2 97.6  4.4 97.7  4.6 97.7  4.8 97.7
         5  5.0 97.7  5.2 97.7  5.4 97.7  5.6 97.7  5.8 97.8  6.0 97.8
         5  6.2 97.8  6.4 97.8  6.6 97.8  6.8 97.9  7.0 97.9  7.2 98.0
         5  7.4 98.1  7.6 98.1  7.8 98.1  8.0 98.1  8.1 98.2  8.8 98.4
         5  9.5 98.6 10.8 98.9 10.9 99.2
NS       5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 65.7  0.0 65.7
NS       5  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.6  0.0 65.6  0.0 65.6
NS       5  0.0 65.6  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS       5  0.0 65.7  0.0 65.7  0.0 63.7  0.0 63.7  0.0 54.7  0.0 54.7
NS       5  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.6  0.0 54.6  0.0 54.6
NS       5  0.0 54.6  0.0 54.6  0.0 45.6  0.0 45.6  0.0 45.6  0.0 45.6
```

Table 2a. Revised Upper Turner Creek IFIM Deck, 1 - 12 cfs. - **Continued**

```
NS        5 .011 45.6 .011 45.6  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7
NS        5  0.0 32.8  0.0  1.5  0.0  1.5
CAL1      5    98.16       7.71
VEL1      5                      1.6  1.9  1.6  1.5  1.3  1.0  1.3  1.8
VEL1      5  1.9  2.2  2.5  1.7  1.0  0.6  2.2  3.2  3.7  3.5  3.1  2.5
VEL1      5  1.4  1.7  2.6  2.9  3.3  2.9  3.4  3.3  3.3  3.0  2.7  2.4
VEL1      5  1.7  1.8  1.3  0.1
CAL2      5   98.062       4.88
VEL2      5                      0.9  1.6  1.7  1.5  1.4  1.3  1.5  1.4
VEL2      5  1.2  1.6  1.5  0.9  1.0  0.6  1.8  2.0  2.6  3.0  2.8  2.7
VEL2      5  2.0  1.6  2.1  2.6  2.8  2.9  2.7  2.7  2.5  2.1  1.9  2.0
VEL2      5
CAL3      5   97.875       2.07
VEL3      5                      0.4  1.3  1.4  1.7  2.0  2.2  1.9  0.9
VEL3      5  1.3  1.7  0.9  0.4  0.2  0.3  1.0  1.6  1.9  2.6  2.8  2.5
VEL3      5  1.6  1.2  1.2  1.5  1.9  0.8  1.3  0.7  0.0       0.0  0.0
VEL3      5
ENDJOB
```

Table 2b. Revised Upper Turner Creek IFIM deck, Transect 1, 12 - 18 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #
IOC        1100000200001
QARD  12.0
QARD  13.0
QARD  14.0
QARD  15.0
QARD  16.0
QARD  17.0
QARD  18.0
XSEC      1                    96.85      0.034
          1  0.0 98.0  0.1 97.8  0.3 97.6  0.5 97.4  0.7 97.4  0.9 97.4
          1  1.1 97.4  1.3 97.2  1.5 97.1  1.7 97.1  1.9 97.1  2.1 97.2
          1  2.3 97.2  2.5 97.0  2.7 97.0  2.9 97.1  3.1 97.1  3.3 97.1
          1  3.5 97.2  3.7 96.9  3.9 96.9  4.0 96.9  4.2 97.2  4.4 97.2
          1  4.6 97.2  4.8 96.9  5.0 96.9  5.2 96.9  5.4 96.9  5.6 96.9
          1  5.8 96.9  6.0 96.9  6.2 96.9  6.4 97.1  6.6 97.1  6.8 97.1
          1  7.0 97.0  7.2 97.0  7.4 97.1  7.6 97.1  7.8 97.2  8.0 97.1
          1  8.2 97.1  8.4 97.0  8.6 97.0  8.8 97.1  9.0 97.1  9.2 97.2
          1  9.4 97.3  9.8 97.3 10.0 97.5 10.3 97.5 10.7 97.8 14.0 98.2
          1 14.1 98.8
NS        1  0.0  2.6  0.0  2.6  0.0  2.6  0.0  2.6  0.0 63.8  0.0 63.8
NS        1  0.0 63.8 .075 63.8  0.0 63.8  0.0 54.7  0.0 54.7  0.0 54.7
NS        1  0.0 54.7  0.0 54.7  0.0 52.5  0.0 52.5  0.0 62.8  0.0 62.8
NS        1  0.0 62.8  0.0 62.8  0.0 62.8  0.0 35.7  0.0 35.7  0.0 65.8
NS        1  0.0 65.8  0.0 65.8  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS        1  0.0 53.6  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7  0.0 64.7
NS        1  0.0 64.7  0.0 64.7  0.0 75.7  0.0 75.7  0.0 75.7  0.0 75.7
NS        1  0.0 75.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.7
NS        1  0.0 35.8  0.0 56.6  0.0 56.6  0.0 56.6  0.0  1.5  0.0  1.5
NS        1  0.0  1.5
CAL1      1    97.48       7.83       7.83
VEL1      1                 0.0  0.0  0.2  0.9  1.2  1.5  2.0  2.4  3.2
VEL1      1  1.7  0.5  0.1  0.4  0.4  0.4  1.1  2.9  2.7  1.9  1.9  1.8
VEL1      1  1.8  2.3  2.8  1.8  1.3  1.9  3.1  3.7  3.3  3.5  3.7  3.5
VEL1      1  3.2  3.4  3.8  3.6  3.2  3.4  3.6  3.5  2.1  1.3  0.4  0.6
VEL1      1  0.1  0.0  0.0
CAL2      1    97.38        4.6        4.6
VEL2      1
VEL2      1
VEL2      1
VEL2      1
VEL2      1
CAL3      1    97.25        1.85       1.85
VEL3      1
VEL3      1
VEL3      1
VEL3      1
VEL3      1
ENDJOB
```

Table 2c. Revised Upper Turner Creek IFIM Deck, Transects 2 - 5, 12 - 18 cfs.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #UPPER TURNER REVISED DECK Transects 2-5, 12-18 cfs
IOC        0100000201001
QARD    1.0
QARD    2.0
QARD    3.0
QARD    4.0
QARD    5.0
QARD    6.0
QARD    7.0
QARD    8.0
QARD    9.0
QARD   10.0
QARD   11.0
QARD   12.0
XSEC      2                    98.38      0.004
          2  0.0100.6  0.1 99.4  1.3 99.2  2.1 99.1  2.5 99.0  3.0 98.9
          2  3.5 98.9  4.0 98.7  4.5 98.7  4.8 98.7  5.1 98.7  5.6 98.7
          2  5.9 98.7  6.2 98.7  6.5 98.7  6.8 98.6  7.1 98.6  7.4 98.5
          2  7.7 98.5  8.0 98.4  8.3 98.4  8.6 98.5  8.9 98.4  9.2 98.3
          2  9.5 98.3  9.8 98.3 10.2 98.2 10.5 98.1 10.8 98.4 11.0 98.6
          2 11.1 99.1 11.9 99.2 12.6 99.3 12.7101.9
NS        2  0.0 21.8  0.0 21.8  0.0 21.8  0.0 21.8  0.0 25.7  0.0 65.6
NS        2  0.0 65.6  0.0 35.7  0.0 32.8  0.0 32.8  0.0 34.7  0.0 34.7
NS        2  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.7  0.0 34.7
NS        2  0.0 34.7  0.0 34.7  0.0 34.7  0.0 34.7  0.0 45.8  0.0 45.8
NS        2  0.0 45.8  0.0 45.8  0.0 43.6  0.0 43.6  0.0 43.6  0.0  2.5
NS        2  0.0  2.5  0.0  2.5  0.0  2.5  0.0  2.5
CAL1      2    99.04       7.33
VEL1      2                       0.1  0.6  1.2  1.2  1.0  1.2  1.4  1.5
VEL1      2  1.9  1.6  1.7  1.4  1.6  2.0  1.9  1.8  2.0  2.4  2.3  1.8
VEL1      2  2.1  2.1  1.5  1.5  2.0  1.7
CAL2      2    98.91       4.62
VEL2      2                            0.0  0.0  1.2  0.9  1.2  1.3  1.2
VEL2      2  1.5  2.0  1.4  1.7  1.9  2.0  1.7  1.7  1.4  1.7  2.5  1.4
VEL2      2  1.3  1.4  1.3  1.4  1.8  1.7
CAL3      2    98.75       2.06
VEL3      2                                 0.0  0.4  0.4  0.6  0.7  0.4
VEL3      2  0.5  0.4  1.1  1.3  1.6  1.6  1.3  1.3  1.3  1.3  1.5  1.4
VEL3      2  1.7  1.5  1.5  1.3  1.2  1.1
XSEC      3                    98.54      0.004
          3  0.0 99.9  0.1 99.5  0.8 99.3  1.4103.1  2.0 99.0  2.5 98.9
          3  3.0 98.9  3.3 98.9  3.6 98.8  3.9 98.7  4.2 98.6  4.5 98.6
          3  4.8 98.5  5.1 98.4  5.4 98.4  5.7 98.4  6.0 98.4  6.3 98.4
          3  6.6 98.4  6.9 98.4  7.2 98.4  7.5 98.4  7.8 98.4  8.1 98.5
          3  8.4 98.5  8.7 98.5  9.0 98.7  9.3 98.6  9.6 98.6  9.9 98.9
          3 10.2 98.9 10.5 98.9 10.8 98.9 11.1 98.9 11.4 98.9 11.7 99.0
          3 12.0 99.0 12.1 99.1 13.7 99.5 16.0 99.7 17.5 99.7 19.0100.1
          3 19.0101.2
NS        3  0.0 20.5  0.0 20.5  0.0 20.5  0.0 20.5  0.0 23.8  0.0 32.8
NS        3  0.0 32.8  0.0 32.8  0.0 32.8  0.0 53.7  0.0 53.8  0.0 52.7
NS        3  0.0 52.7  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 53.7
```

Table 2c. Revised Upper Turner Creek IFIM Deck, Transects 2 - 5, 12 - 18 cfs. - **Continued**

```
NS      3  0.0 53.7  0.0 53.7  0.0 53.7  0.0 53.6  0.0 53.6  0.0 53.6
NS      3  0.0 53.6  0.0 34.7  0.0 34.7  0.0 34.7  0.0 23.7  0.0 23.7
NS      3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9
NS      3  0.0 22.9  0.0 22.9  0.0 20.8  0.0  2.5  0.0  2.5  0.0  2.5
NS      3  0.0  2.5
CAL1    3   99.077       7.75
VEL1    3                       0.1  0.9  1.0  1.0  1.0  1.0  1.4  0.9
VEL1    3  1.3  1.4  1.7  1.8  2.0  2.3  3.8  4.7  3.3  3.2  2.9  3.0
VEL1    3  2.2  1.4  1.3  1.1  0.9  0.6  0.6  0.5  0.3  0.3  0.1  0.1
VEL1    3  0.1
CAL2    3    98.97       4.43
VEL2    3                            0.0  0.8  0.7  0.8  0.9  0.8  0.7
VEL2    3  1.0  1.4  1.7  1.9  1.9  2.1  2.1  2.5  1.8  0.0  1.5  0.0
VEL2    3  0.0  0.9  1.0  1.0  0.9  1.0  1.0  0.9  0.7  0.8  0.0  0.0
VEL2    3
CAL3    3    98.85        2.12
VEL3    3                                 0.0  0.0  0.5  0.5  0.5  0.5
VEL3    3  0.7  0.7  0.9  1.1  1.2  1.4  1.5  1.8  1.5  1.4  1.3  1.6
VEL3    3  1.5  1.1  1.1  1.0  0.7  0.0
VEL3    3
XSEC    4                   98.54      0.004
        4  0.0100.3  0.1 99.6  0.5 99.4  1.0 99.1  1.1 98.6  1.4 98.4
        4  1.7 98.4  2.0 98.4  2.3 98.4  2.6 98.2  2.9 98.1  3.2 98.2
        4  3.4 98.2  3.6 98.1  3.8 98.1  4.0 97.8  4.2 97.9  4.4 97.9
        4  4.6 97.9  4.8 98.0  5.0 98.0  5.2 98.0  5.4 98.2  5.6 98.2
        4  5.8 98.2  6.0 98.2  6.2 98.4  6.4 98.4  6.8 98.5  7.4 98.7
        4  7.8 98.9  8.2 98.9  8.6 98.9  9.0 99.0  9.3 99.0 10.4 99.5
        4 12.3 99.9 13.5 99.8 16.5 99.9 19.0100.1 19.2100.4
NS      4  0.0  2.7  0.0  2.7  0.0  2.7  0.0  2.7  0.0 22.9  0.0 22.9
NS      4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 56.7  0.0 56.7  0.0 56.7
NS      4  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7  0.0 56.7
NS      4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 43.7  0.0 43.7
NS      4  0.0 43.7  0.0 43.7  0.0 43.7  0.0 22.9  0.0 22.9  0.0 22.9
NS      4  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 43.6
NS      4  0.0 45.7  0.0  3.8  0.0  2.5  0.0  2.5  0.0  2.5
CAL1    4   99.087       7.41
VEL1    4                       0.0  0.0  0.0  0.3  0.6  0.7  1.2  1.2
VEL1    4  1.4  1.5  1.6  2.0  2.6  3.8  4.2  3.5  2.4  1.7  1.3  1.2
VEL1    4  1.0  0.8  0.7  0.5  0.1  0.2 -0.4 -0.4 -0.5 -0.1
VEL1    4
CAL2    4    98.98       4.49
VEL2    4                       0.0  0.0  0.0  0.1  0.2  0.4  0.7  0.9
VEL2    4  1.2  1.6  2.1  1.8  2.1  1.9  2.1  1.6  1.3  1.1  0.7  0.7
VEL2    4  0.7  0.6  0.4  0.4  0.3  0.1  0.1  0.2  0.0
VEL2    4
CAL3    4    98.87        1.89
VEL3    4                       0.0  0.0  0.0  0.1  0.0  0.1  .16  0.2
VEL3    4  0.4  0.4  0.9  1.0  1.1  1.0  1.4  1.3  1.3  1.0  0.7  0.7
VEL3    4  0.3  0.1  0.1  0.1  0.1
VEL3    4
XSEC    5                   97.51      0.011
        5  0.0 99.4  0.2 99.2  0.7 99.1  0.9 98.2  1.0 97.7  1.2 97.7
```

Table 2c. Revised Upper Turner Creek IFIM Deck, Transects 2 - 5, 12 - 18 cfs. - **Continued**

```
          5  1.4 97.6  1.6 97.6  1.8 97.6  2.0 97.5  2.2 97.4  2.4 97.5
          5  2.6 97.4  2.8 97.4  3.0 97.4  3.2 97.5  3.4 97.6  3.6 97.7
          5  3.8 97.6  4.0 97.6  4.2 97.6  4.4 97.7  4.6 97.7  4.8 97.7
          5  5.0 97.7  5.2 97.7  5.4 97.7  5.6 97.7  5.8 97.8  6.0 97.8
          5  6.2 97.8  6.4 97.8  6.6 97.8  6.8 97.9  7.0 97.9  7.2 98.0
          5  7.4 98.1  7.6 98.1  7.8 98.1  8.0 98.1  8.1 98.2  8.8 98.4
          5  9.5 98.6 10.8 98.9 10.9 99.2
NS        5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 65.7  0.0 65.7
NS        5  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.6  0.0 65.6  0.0 65.6
NS        5  0.0 65.6  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS        5  0.0 65.7  0.0 65.7  0.0 63.7  0.0 63.7  0.0 54.7  0.0 54.7
NS        5  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.6  0.0 54.6  0.0 54.6
NS        5  0.0 54.6  0.0 54.6  0.0 45.6  0.0 45.6  0.0 45.6  0.0 45.6
NS        5 .011 45.6 .011 45.6  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7
NS        5  0.0 32.8  0.0  1.5  0.0  1.5
CAL1      5    98.16       7.71
VEL1      5                      1.6  1.9  1.6  1.5  1.3  1.0  1.3  1.8
VEL1      5  1.9  2.2  2.5  1.7  1.0  0.6  2.2  3.2  3.7  3.5  3.1  2.5
VEL1      5  1.4  1.7  2.6  2.9  3.3  2.9  3.4  3.3  3.3  3.0  2.7  2.4
VEL1      5  1.7  1.8  1.3  0.1
CAL2      5   98.062       4.88
VEL2      5                      0.9  1.6  1.7  1.5  1.4  1.3  1.5  1.4
VEL2      5  1.2  1.6  1.5  0.9  1.0  0.6  1.8  2.0  2.6  3.0  2.8  2.7
VEL2      5  2.0  1.6  2.1  2.6  2.8  2.9  2.7  2.7  2.5  2.1  1.9  2.0
VEL2      5
CAL3      5   97.875       2.07
VEL3      5                      0.4  1.3  1.4  1.7  2.0  2.2  1.9  0.9
VEL3      5  1.3  1.7  0.9  0.4  0.2  0.3  1.0  1.6  1.9  2.6  2.8  2.5
VEL3      5  1.6  1.2  1.2  1.5  1.9  0.8  1.3  0.7  0.0       0.0  0.0
VEL3      5
ENDJOB
```

Table 3. Original and revised VAF's for Upper Turner Creek IFIM site.

	Trans 1			Trans 2		Trans 3		Trans 4		Trans 5	
Flow (cfs)	Orig	Rev	Rev-1q	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev
1	0.234	1.003		0.919	0.920	0.826	0.881	0.872	0.916	0.846	0.859
2	0.785	0.947		1.009	1.009	0.897	0.933	0.947	0.996	0.998	0.990
3	0.941	0.966		1.025	1.026	0.940	0.947	0.974	1.012	1.035	1.025
4	0.987	0.981		1.025	1.028	0.963	0.941	0.988	1.017	1.041	1.030
5	1.004	0.990		1.013	1.019	0.979	0.940	0.993	1.015	1.032	1.024
6	1.007	0.992		0.994	1.004	0.988	0.939	0.991	1.007	1.017	1.014
7	1.004	0.990	0.979	0.969	0.987	0.993	0.938	0.986	0.997	0.991	0.994
8	0.995	0.984	1.007	0.944	0.970	0.997	0.937	0.978	0.984	0.962	0.971
9	0.983	0.975	1.034	0.920	0.953	0.998	0.935	0.968	0.970	0.931	0.949
10	0.968	0.964	1.060	0.898	0.935	0.998	0.934	0.957	0.955	0.902	0.928
11	0.951	0.950	1.085	0.876	0.919	0.998	0.932	0.945	0.940	0.875	0.908
12	0.932	0.935	1.109	0.856	0.902	0.998	0.931	0.932	0.924	0.849	0.890
13	0.911	0.918	1.132	0.837	0.886	0.997	0.929	0.919	0.909	0.825	0.873
14	0.889	0.900	1.155	0.819	0.870	0.997	0.927	0.906	0.894	0.803	0.857
15	0.866	0.881	1.176	0.802	0.854	0.996	0.925	0.894	0.879	0.781	0.842
16	0.842	0.861	1.197	0.786	0.839	0.995	0.923	0.881	0.864	0.760	0.828
17	0.817	0.840	1.218	0.770	0.824	0.994	0.922	0.868	0.849	0.740	0.815
18	0.792	0.818	1.238	0.756	0.810	0.993	0.920	0.855	0.835	0.721	0.803

Table 4. Changes to Original Data Deck, Upper Turner Creek

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
1	2.1	0.4	0.0					
	2.7	0.0	0.1					
	2.9	0.0	0.1					
	3.3	0.0	0.1					
	3.7	0.4	0.6			2.5	2.9	
	3.9	1.4	1.5	1.8	1.7			
	6.8			2.8	3.3			
	8.4			0.7	0.0			
	8.6			0.3	0.0			
	9.4					0.0	0.1	
2	2.1							Elev 99.0 to 99.1
	2.5					0.0	0.1	
	6.2			2.0	1.8	1.8	2.0	
	11.1							Elev 98.8 to 99.1
	11.9							Elev 99.0 to 99.2
3	2.0					0.0	0.1	
	3.3							Elev 98.8 to 98.9
	4.2					1.1	1.4	
	6.6					3.4	3.8	
	7.2			1.5	1.8	3.1	3.3	
	7.5			1.2	0.0	3.0	3.2	
	7.8	1.2	1.3	1.1	1.50	2.6	2.9	
	9.9							Elev 98.7 to 98.9
	10.2							Elev 98.7 to 98.9
	10.5							Elev 98.7 to 98.9
	10.8							Elev 98.8 to 98.9
4	2.9	0.0	0.18					
	5.3			0.8	0.7			
	6.4	0.0	0.1					
	6.8					0.0	0.1	
	7.8							Elev 98.8 to 98.9
5	3.6			1.2	0.6			
	6.2							Elev 97.8 to 97.9
	6.4	0.6	0.7	3.1	2.7	3.5	3.3	
	6.6	0.4	0.5			3.3	3.1	
	7.4							N .014 to .011
	7.6							N .013 to .011
	8.0					0.0	0.1	
	8.1							Elev 98.1 to 98.2

Table 5a. Summary of calibration details for original and revised input decks, Upper Turner Creek Transect 1.

Calibration details for Upper Turner Creek

Transect 1

		WSE (ft)	97.18		97.25				97.38				97.48				97.67		
		Disch (cfs)	1		2				5				7				18		
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	* Rev	* Meas	Orig	* Rev	* Meas	Orig	* Rev	* Meas	Orig	Rev	Rev-1
	1	0.0	98.0			0.0			0.0			0.0						
	2	0.1	97.8			0.0			0.0			0.0				0.00	0.00	0.00
	3	0.3	97.6			0.0			0.0			0.0	0.00	0.00		0.14	0.14	0.18
	4	0.5	97.4			0.0			0.0			0.0	0.16	0.16		0.35	0.37	0.53
	5	0.7	97.4			0.0			0.0			0.0	0.16	0.16		0.35	0.37	0.53
	6	0.9	97.4			0.0			0.0			0.2	0.16	0.16		0.35	0.37	0.53
	7	1.1	97.4			0.0	0.00	0.00	0.0	0.00	0.00	0.9	0.72	0.71		1.60	1.65	2.36
	8	1.3	97.2	0.00	0.00	0.0	0.23	* 0.29	* 0.8	0.85	0.85	1.4	1.26	1.24		2.97	2.94	2.62
	9	1.5	97.1	0.73	3.05	0.0	1.82	* 2.16	* 1.6	1.57	1.54	1.3	1.36	1.34		0.71	0.75	2.35
	10	1.7	97.1	0.15	0.66	0.9	0.78	0.94	1.9	1.71	1.69	2.0	2.08	2.05		2.87	2.95	3.13
	11	1.9	97.1	0.12	0.54	0.8	0.74	0.89	2.5	2.01	1.98	2.4	2.66	2.62		4.57	4.70	3.75
	12	2.1	97.2	0.00	0.00	0.4	0.39	1.10	* 2.2	1.94	2.29	3.2	3.21	2.94		10.40	4.93	5.37
	13	2.3	97.2	0.00	0.00	0.3	0.26	0.31	0.9	1.00	0.98	1.7	1.49	1.47		3.66	3.78	2.85
	14	2.5	97.0	0.00	0.00	0.0	0.00	0.01	0.1	0.12	0.12	0.5	0.37	0.36		6.75	6.18	0.75
*	15	2.7	97.0	20.88	0.13	0.0	6.96	* 0.14	0.5	0.42	0.18	* 0.1	0.14	0.19		0.00	0.19	0.15
*	16	2.9	97.1	0.09	0.06	0.0	0.31	* 0.12	0.4	0.40	0.31	0.4	0.40	0.44		0.32	0.96	0.63
	17	3.1	97.1	0.01	0.02	0.0	0.05	0.06	0.2	0.22	0.22	0.4	0.35	0.34		1.07	1.05	0.63
*	18	3.3	97.1	0.09	0.06	0.0	0.31	* 0.12	0.4	0.40	0.31	0.4	0.40	0.44		0.32	0.96	0.63
	19	3.5	97.2	0.00	0.00	0.0	0.01	0.01	0.2	0.24	0.25	1.1	0.79	* 0.77	*	17.57	15.97	1.85
*	20	3.7	96.9	0.04	0.29	0.4	0.33	0.55	1.0	1.30	* 1.48	* 2.5	1.97	* 2.08		4.97	4.53	4.20
*	21	3.9	96.9	0.24	1.13	1.4	1.10	* 1.38	1.8	2.08	2.04	2.7	2.41	2.31		2.85	2.72	3.91
	22	4.0	96.9	0.29	1.23	1.4	1.12	1.35	1.7	1.74	1.71	1.9	1.86	1.84		1.79	1.85	2.75
	23	4.2	97.2	0.00	0.00	1.2	0.94	* 1.13	1.4	1.57	1.55	1.9	1.74	1.72		1.82	1.88	3.19
	24	4.4	97.2	0.00	0.00	0.0	0.85	* 1.04	* 1.5	1.54	1.52	1.8	1.74	1.72		1.97	2.00	3.02
	25	4.6	97.2	0.00	0.00	0.8	0.67	0.81	1.5	1.46	1.44	1.8	1.78	1.75		2.42	2.50	3.02
	26	4.8	96.9	0.06	0.28	0.5	0.46	0.56	1.9	1.64	1.62	2.3	2.39	2.35		5.38	5.53	3.33
	27	5.0	96.9	0.13	0.55	0.9	0.74	0.89	1.7	1.92	1.89	2.8	2.49	2.45		4.07	4.22	4.06
	28	5.2	96.9	0.07	0.30	0.5	0.44	0.53	1.4	1.31	1.30	1.8	1.79	1.76		3.36	3.47	2.61
	29	5.4	96.9	0.06	0.24	0.4	0.33	0.40	0.8	0.89	0.88	1.3	1.16	1.15		1.97	2.04	1.88
	30	5.6	96.9	0.02	0.08	0.2	0.18	0.21	0.8	0.93	0.92	1.9	1.58	1.56		5.39	5.58	2.75
	31	5.8	96.9	0.04	0.17	0.4	0.34	0.41	1.3	1.58	* 1.56	3.1	2.53	2.50		7.48	7.76	4.49
	32	6.0	96.9	0.04	0.17	0.4	0.39	0.47	2.5	2.17	2.14	3.7	3.72	3.67		13.34	13.72	5.36
	33	6.2	96.9	0.17	0.74	1.1	1.02	1.23	3.5	2.79	* 2.75	* 3.3	3.68	3.62		6.35	6.52	4.78
	34	6.4	97.1	0.68	2.95	3.0	2.56	3.10	4.6	3.78	3.72	3.5	3.98	3.92		3.63	3.74	5.47
	35	6.6	97.1	0.70	3.00	3.1	2.62	3.17	4.6	3.90	3.84	3.7	4.12	4.05		3.79	3.90	5.79
*	36	6.8	97.1	0.73	3.21	3.3	2.48	* 3.11	2.8	3.21	3.36	3.5	3.22	3.40		2.57	2.90	5.47
	37	7.0	97.0	0.62	2.66	2.8	2.22	* 2.68	3.1	3.10	3.06	3.2	3.20	3.16		2.76	2.85	4.78
	38	7.2	97.0	0.64	2.75	2.9	2.34	2.83	3.5	3.35	3.31	3.4	3.49	3.45		3.10	3.20	5.08
	39	7.4	97.1	0.52	2.25	2.6	2.12	2.57	3.6	3.50	3.45	3.8	3.84	3.78		3.92	4.05	5.94
	40	7.6	97.1	0.42	1.81	2.2	1.80	2.17	3.2	3.17	3.13	3.6	3.57	3.52		3.92	4.05	5.63
	41	7.8	97.2	0.00	0.00	2.1	1.70	2.05	2.8	2.84	2.80	3.2	3.14	3.09		3.27	3.38	5.37
	42	8.0	97.1	0.32	1.35	1.8	1.43	* 1.72	2.4	2.69	2.65	3.4	3.10	3.06		3.64	3.77	5.32
	43	8.2	97.1	0.26	1.13	1.6	1.30	1.57	2.6	2.78	2.74	3.6	3.35	3.31		4.48	4.63	5.63
	44	8.4	97.0	0.41	1.74	2.2	1.66	* 1.99	2.2	2.73	* 2.70	* 3.5	3.00	2.96		3.08	3.20	5.23
*	45	8.6	97.0	0.27	1.30	1.5	0.96	* 1.45	0.7	1.33	* 1.88	* 2.1	1.37	* 2.03		1.18	2.09	3.14
*	46	8.8	97.1	0.13	0.65	0.8	0.48	* 0.78	0.3	0.70	* 1.11	* 1.3	0.74	* 1.24		0.67	1.41	2.03
	47	9.0	97.1	0.05	0.22	0.3	0.18	0.21	0.1	0.23	0.23	0.4	0.23	0.23		0.18	0.19	0.63
	48	9.2	97.2	0.00	0.00	0.0	0.17	0.20	0.0	0.47	* 0.47	* 0.6	0.57	0.56		0.67	0.69	1.01
*	49	9.4	97.3			0.0	0.00	0.00	0.0	0.29	* 0.06	0.0	0.41	* 0.09		0.57	0.13	0.19
	50	9.8	97.3			0.0			0.0	0.29	* 0.06	0.0	0.41	* 0.09		0.57	0.13	0.19
	51	10.0	97.5			0.0			0.0	0.00	0.00	0.0	0.00	0.00		0.34	0.08	0.11
	52	10.3	97.5			0.0			0.0			0.0				0.34	0.08	0.11
	53	10.7	97.8			0.0			0.0			0.0				0.00	0.00	0.00
	54	14.0	98.2			0.0			0.0			0.0						
	55	14.1	98.8			0.0			0.0			0.0						
	Total						14	* 4	*	9	* 7	*	6	* 1	*			

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5b. Summary of calibration details for original and revised input decks, Upper Turner Creek Transect 2.

Calibration details for Upper Turner Creek

Transect 2

		WSE (ft)	98.65		98.75				98.91				99.04				99.37	
		Disch (cfs)	1		2				5				7				18	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	* Rev *	Meas	Orig	* Rev *	Meas	Orig	* Rev *	Orig	Rev
	1	0.0	100.6			0.0			0.0			0.0				
	2	0.1	99.4			0.0			0.0			0.0			0.00	0.00
	3	1.3	99.2			0.0			0.0			0.0	0.00		0.52	0.21
*	4	2.1	99.0			0.0			0.0			0.0	0.18	0.00	0.87	0.29
*	5	2.5	99.0			0.0			0.0	0.00	0.00	0.0	0.18	0.07	0.87	0.36
	6	3.0	98.9			0.0			0.0	0.23 *	0.23 *	0.6	0.54	0.55	1.02	1.09
	7	3.5	98.9			0.0	0.00	0.00	0.0	0.46 *	0.46 *	1.2	1.07	1.09	2.04	2.19
	8	4.0	98.7			0.4	0.44	0.44	1.2	1.01	1.01	1.2	1.31	1.33	2.40	2.56
	9	4.5	98.7			0.4	0.42	0.42	0.9	0.83	0.84	1.0	1.02	1.04	1.61	1.73
	10	4.8	98.7			0.6	0.64	0.64	1.2	1.08	1.08	1.2	1.25	1.27	1.67	1.79
	11	5.1	98.7			0.7	0.73	0.73	1.3	1.23	1.23	1.4	1.42	1.44	1.88	2.02
	12	5.6	98.7			0.4	0.42	0.42	1.2	1.12	1.12	1.5	1.53	1.56	3.27	3.50
	13	5.9	98.7			0.5	0.52	0.52	1.5	1.41	1.41	1.9	1.93	1.97	4.16	4.46
*	14	6.2	98.7			0.4	0.46	0.47	2.0	1.46 *	1.39 *	1.8	2.13	1.99	5.41	4.91
	15	6.5	98.7	0.00	0.00	1.1	1.13	1.09	1.6	1.56	1.50	1.7	1.68	1.63	1.83	1.84
	16	6.8	98.6	1.19	1.20	1.3	1.39	1.39	1.7	1.50	1.51	1.4	1.47	1.50	1.24	1.33
	17	7.1	98.6	1.52	1.52	1.6	1.69	1.69	1.9	1.72	1.73	1.6	1.66	1.69	1.31	1.41
	18	7.4	98.5	1.31	1.32	1.6	1.64	1.64	2.0	1.95	1.96	2.0	1.98	2.02	1.84	1.97
	19	7.7	98.5	0.97	0.97	1.3	1.31	1.31	1.7	1.73	1.74	1.9	1.84	1.87	1.90	2.04
	20	8.0	98.4	1.00	1.01	1.3	1.32	1.32	1.7	1.69	1.70	1.8	1.77	1.80	1.76	1.89
	21	8.3	98.4	0.90	0.90	1.3	1.23	1.23	1.4	1.66	1.67	2.0	1.77	1.80	1.86	1.99
	22	8.6	98.5	0.82	0.83	1.3	1.25	1.25	1.7	1.94	1.95	2.4	2.17	2.21	2.64	2.83
	23	8.9	98.4	1.13	1.13	1.5	1.59	1.59	2.5	2.23	2.24	2.3	2.41	2.45	2.64	2.83
	24	9.2	98.3	1.08	1.08	1.4	1.35	1.35	1.4	1.60	1.61	1.8	1.62	1.65	1.50	1.61
	25	9.5	98.3	1.29	1.29	1.7	1.54	1.54	1.3	1.73 *	1.74 *	2.1	1.73	1.76	1.51	1.62
	26	9.8	98.3	1.08	1.08	1.5	1.40	1.39	1.4	1.74 *	1.75 *	2.1	1.80	1.83	1.75	1.88
	27	10.2	98.2	1.34	1.34	1.5	1.46	1.46	1.3	1.44	1.45	1.5	1.38	1.40	1.06	1.13
	28	10.5	98.1	1.10	1.10	1.3	1.30	1.30	1.4	1.45	1.46	1.5	1.44	1.46	1.24	1.33
	29	10.8	98.4	0.84	0.84	1.2	1.22	1.22	1.8	1.79	1.80	2.0	1.96	2.00	2.26	2.42
	30	11.0	98.6	0.81	0.81	1.1	1.14	1.14	1.7	1.60	1.61	1.7	1.72	1.76	1.89	2.02
*	31	11.1	98.8	0.00	0.00	0.0	0.00	0.00	0.0	1.02 *	0.00	0.0	1.39 *	0.00	2.02	1.31
*	32	11.9	99.0			0.0			0.0	0.00		0.0	0.31 *		1.51	0.96
	33	12.6	99.3			0.0			0.0			0.0	0.00		0.49	0.53
	34	12.7	101.9			0.0			0.0			0.0			0.00	0.00
	Total						0 *	0 *		6 *	5 *		2 *	0 *		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5c. Summary of calibration details for original and revised input decks, Upper Turner Creek Transect 3.

Calibration details for Upper Turner Creek

Transect 3

		WSE (ft)	98.77		98.85				98.97				99.08				99.31	
		Disch (cfs)	1		2				5				7				18	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	99.9			0.0					0.0					0.0						
	2	0.1	99.5			0.0					0.0					0.0					0.00	0.00
	3	0.8	99.3			0.0					0.0					0.0					0.16	0.03
	4	1.4	103.1			0.0					0.0					0.0	0.00		0.00		0.00	0.00
*	5	2.0	99.0			0.0					0.0	0.00		0.00		0.0	0.42	*	0.08		1.31	0.24
	6	2.5	98.9			0.0					0.0	0.55	*	0.53	*	0.9	0.83		0.78		1.58	1.46
	7	3.0	98.9			0.0	0.00				0.8	0.83		0.81		1.0	0.95		0.89		1.32	1.12
*	8	3.3	98.8			0.0	0.41	*	0.00		0.7	0.75		0.75		1.0	0.92		0.86		1.57	1.25
	9	3.6	98.8	0.00	0.00	0.5	0.45		0.48		0.8	0.79		0.76		1.0	0.96		0.89		1.59	1.39
	10	3.9	98.7	0.29	0.34	0.5	0.46		0.50		0.9	0.83		0.78		1.0	1.00		0.92		1.66	1.41
	11	4.2	98.6	0.26	0.24	0.5	0.44		0.44		0.8	0.83		0.89		1.1	1.03		1.15		1.83	2.30
	12	4.5	98.6	0.29	0.33	0.5	0.44		0.46		0.7	0.72		0.69		0.9	0.85		0.80		1.31	1.16
	13	4.8	98.5	0.41	0.45	0.7	0.61		0.65		1.0	1.03		0.99		1.3	1.23		1.15		1.93	1.71
	14	5.1	98.4	0.43	0.51	0.7	0.67		0.74		1.4	1.20		1.14		1.4	1.46		1.32		2.41	2.01
	15	5.4	98.4	0.56	0.66	0.9	0.86		0.94		1.7	1.47		1.40		1.7	1.76		1.61		2.80	2.35
	16	5.7	98.4	0.74	0.87	1.1	1.05		1.15		1.9	1.63		1.55		1.8	1.88		1.72		2.70	2.29
	17	6.0	98.4	0.78	0.89	1.2	1.11		1.20		1.9	1.74		1.66		2.0	2.02		1.86		2.93	2.53
	18	6.3	98.4	0.90	1.02	1.4	1.28		1.37		2.1	1.98		1.89		2.3	2.29		2.12		3.28	2.87
*	19	6.6	98.4	0.74	0.74	1.5	1.25		1.28		2.1	2.42		2.44		3.4	3.03		3.08		5.46	5.84
	20	6.9	98.4	0.74	0.87	1.6	1.26	*	1.52		1.9	2.46	*	2.96	*	3.7	3.10		3.77		5.66	7.33
*	21	7.2	98.4	0.72	0.77	1.5	1.14	*	1.24		1.5	2.07	*	2.17	*	3.1	2.52		2.66		4.25	4.63
*	22	7.5	98.4	0.62	0.74	1.4	1.01	*	1.20		1.2	1.86	*	2.14	*	3.0	2.29	*	2.64		3.96	4.65
*	23	7.8	98.4	0.54	0.64	1.2	0.88	*	1.05		1.1	1.64	*	1.87	*	2.6	2.03	*	2.31		3.53	4.07
	24	8.1	98.5	0.73	0.95	1.4	1.08	*	1.40		1.3	1.76	*	2.18	*	2.5	2.07		2.55		3.13	3.91
	25	8.4	98.5	0.74	1.04	1.3	1.00	*	1.35		1.1	1.47	*	1.77	*	2.0	1.67		1.94		2.27	2.50
	26	8.7	98.5	0.71	0.72	1.1	0.88	*	0.89		0.9	1.13	*	1.09		1.4	1.22		1.17		1.44	1.41
	27	9.0	98.7	0.78	0.80	1.1	0.92		0.94		1.0	1.13		1.09		1.3	1.19		1.14		1.34	1.28
	28	9.3	98.6	0.77	0.82	1.0	0.88		0.91		1.0	1.02		0.98		1.1	1.06		1.01		1.14	1.06
	29	9.6	98.6	0.52	0.57	0.7	0.64		0.68		0.9	0.84		0.80		0.9	0.91		0.85		1.09	0.97
*	30	9.9	98.7	2.63	0.00	0.0	1.64	*	0.00		1.0	0.85		0.78	*	0.6	0.66		0.64		0.31	0.35
*	31	10.2	98.7	2.63		0.0	1.64	*			1.0	0.85		0.78	*	0.6	0.66		0.64		0.31	0.35
*	32	10.5	98.7	2.81		0.0	1.61	*			0.9	0.75		0.69	*	0.5	0.56		0.54		0.23	0.28
*	33	10.8	98.8	0.00		0.0	1.70	*			0.7	0.55		0.49		0.3	0.35		0.35		0.10	0.13
	34	11.1	98.9	0.00		0.0	0.00				0.8	0.60		0.53	*	0.3	0.36		0.36		0.08	0.12
	35	11.4	98.9	0.00		0.0	0.00				0.0	0.06		0.06		0.1	0.09		0.09		0.18	0.16
	36	11.7	99.0	0.00		0.0	0.00				0.0	0.00		0.00		0.1	0.08		0.08		0.25	0.24
	37	12.0	99.0	0.00		0.0	0.00				0.0	0.00				0.0	0.08		0.08		0.25	0.24
	38	12.1	99.1	0.00		0.0	0.00				0.0	0.00				0.0	0.00		0.00		0.20	0.18
	39	13.7	98.5	0.19		0.0	0.24	*			0.0	0.34	*			0.0	0.37	*			0.48	0.00
	40	16.0	99.7	0.00		0.0	0.00				0.0	0.00				0.0	0.00				0.00	
	41	17.5	99.7			0.0					0.0					0.0						
	42	19.0	100.1			0.0					0.0					0.0						
	43	19.0	101.2			0.0					0.0					0.0						
	Total							13	*	0	*		9	*	11	*		4	*	0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5d. Summary of calibration details for original and revised input decks, Upper Turner Creek Transect 4.

Calibration details for Upper Turner Creek

Transect 4

		WSE (ft)	98.8		98.87				98.98				99.09				99.29	
		Disch (cfs)	1		2				5				7				18	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	100.3			0.0					0.0					0.0						
	2	0.1	99.6			0.0					0.0					0.0						
	3	0.5	99.4			0.0					0.0					0.0					0.00	0.00
	4	1.0	99.1	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.05	0.05
	5	1.1	98.6	0.05	0.05	0.0	0.07		0.07		0.0	0.09		0.09		0.0	0.10		0.10		0.11	0.11
	6	1.4	98.4	0.08	0.08	0.0	0.09		0.10		0.0	0.12		0.12		0.0	0.12		0.13		0.13	0.13
	7	1.7	98.4	0.08	0.08	0.0	0.09		0.10		0.0	0.12		0.12		0.0	0.12		0.13		0.13	0.13
	8	2.0	98.4	0.05	0.05	0.1	0.08		0.09		0.1	0.17		0.17		0.3	0.22		0.22		0.37	0.37
	9	2.3	98.4	0.01	0.01	0.0	0.04		0.04		0.2	0.26		0.27		0.6	0.51		0.51		3.04	2.75
	10	2.6	98.2	0.04	0.04	0.1	0.11		0.11		0.4	0.42		0.43		0.7	0.68		0.68		2.29	2.23
*	11	2.9	98.1	0.14	0.06	0.0	0.30	*	0.18		0.7	0.79		0.73		1.2	1.10		1.19		2.46	4.08
	12	3.2	98.2	0.08	0.09	0.2	0.22		0.24		0.9	0.81		0.83		1.2	1.27		1.28		3.95	3.82
	13	3.4	98.2	0.21	0.22	0.4	0.43		0.46		1.2	1.08		1.10		1.4	1.48		1.49		3.14	3.05
	14	3.6	98.1	0.21	0.22	0.4	0.46		0.49		1.6	1.24	*	1.26	*	1.5	1.74		1.75		3.96	3.83
	15	3.8	98.1	0.66	0.70	0.9	0.99		1.05		2.1	1.60	*	1.63	*	1.6	1.86		1.88		2.52	2.44
	16	4.0	97.8	0.65	0.68	1.0	1.01		1.07		1.8	1.72		1.75		2.0	2.03		2.05		2.89	2.81
	17	4.2	97.9	0.65	0.69	1.1	1.11		1.17		2.1	2.09		2.14		2.6	2.57		2.60		4.09	3.99
	18	4.4	97.9	0.45	0.47	1.0	0.95		0.99		1.9	2.39	*	2.44	*	3.8	3.28		3.31		7.02	6.88
	19	4.6	97.9	0.69	0.72	1.4	1.28		1.35		2.1	2.74	*	2.80	*	4.2	3.53		3.58		6.38	6.26
	20	4.8	98.0	0.66	0.69	1.3	1.15		1.20		1.6	2.25	*	2.30	*	3.5	2.81		2.85		4.65	4.58
	21	5.0	98.0	0.79	0.82	1.3	1.14		1.19		1.3	1.74	*	1.78	*	2.4	1.98		2.01		2.53	2.49
	22	5.2	98.0	0.65	0.68	1.0	0.91		0.95		1.1	1.33		1.36	*	1.7	1.49		1.51		1.83	1.79
	23	5.4	98.2	0.44	0.44	0.7	0.63		0.64		0.8	0.98		0.96		1.3	1.13		1.14		1.47	1.35
	24	5.6	98.2	0.44	0.46	0.7	0.62		0.65		0.7	0.90		0.92	*	1.2	1.01		1.03		1.23	1.21
	25	5.8	98.2	0.15	0.16	0.3	0.30		0.32		0.7	0.72		0.74		1.0	0.97		0.98		1.95	1.90
	26	6.0	98.2	0.04	0.04	0.1	0.12		0.12		0.6	0.52		0.53		0.8	0.87		0.88		3.34	3.23
	27	6.2	98.4	0.04	0.04	0.1	0.11		0.11		0.4	0.42		0.43		0.7	0.68		0.68		2.29	2.23
*	28	6.4	98.4	0.19	0.05	0.0	0.27	*	0.12		0.4	0.42		0.36		0.5	0.48		0.54		0.61	1.41
*	29	6.8	98.5	0.04	0.12	0.1	0.10		0.13		0.3	0.35		0.15		0.0	0.55	*	0.15		1.67	0.14
	30	7.4	98.7	0.01	0.01	0.0	0.03		0.04		0.1	0.12		0.12		0.2	0.18		0.18		0.53	0.49
*	31	7.8	98.8	0.00	0.00	0.0	0.78	*	0.00		0.1	-0.02		-0.03		-0.4	-0.33		-0.33		-1.03	-0.98
	32	8.2	98.9			0.0	0.00				0.2	0.05		0.05		-0.4	-0.32		-0.32		-1.17	-1.11
	33	8.6	98.9			0.0					0.0	-0.34	*	-0.35	*	-0.5	-0.46		-0.47		-0.70	-0.68
	34	9.0	99.0			0.0					0.0	-0.02		-0.02		-0.1	-0.08		-0.09		-0.19	-0.19
	35	9.3	99.0			0.0					0.0	-0.02		-0.02		0.0	-0.08		-0.09		-0.19	-0.19
	36	10.4	99.5			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.00
	37	12.3	99.9			0.0					0.0					0.0						
	38	13.5	99.8			0.0					0.0					0.0						
	39	16.5	99.9			0.0					0.0					0.0						
	40	19.0	100.1			0.0					0.0					0.0						
	41	19.2	100.4			0.0					0.0					0.0						
	Total						3	*	0	*		7	*	9	*		1	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5e. Summary of calibration details for original and revised input decks, Upper Turner Creek Transect 5.

Calibration details for Upper Turner Creek

Transect 5

		WSE (ft)	97.78		97.88				98.06				98.16				98.48	
		Disch (cfs)	1		2				5				7				18	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	99.4			0.0					0.0					0.0						
	2	0.2	99.2			0.0					0.0					0.0						
	3	0.7	99.1			0.0					0.0					0.0					0.00	0.00
	4	0.9	98.2	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.39	0.43
	5	1.0	97.7	0.16	0.16	0.4	0.38		0.37		0.9	1.01		1.00		1.6	1.38		1.38		2.68	2.98
	6	1.2	97.7	0.89	0.90	1.3	1.27		1.26		1.6	1.71		1.69		1.9	1.80		1.81		1.71	1.91
	7	1.4	97.6	1.11	1.13	1.4	1.42		1.41		1.7	1.64		1.63		1.6	1.64		1.65		1.34	1.49
	8	1.6	97.6	1.54	1.56	1.7	1.69		1.67		1.5	1.59		1.58		1.5	1.47		1.48		0.97	1.08
	9	1.8	97.6	2.13	2.17	2.0	1.99		1.97		1.4	1.50		1.49		1.3	1.29		1.29		0.68	0.76
	10	2.0	97.5	2.88	2.92	2.2	2.24		2.22		1.3	1.33		1.32		1.0	1.04		1.05		0.43	0.48
	11	2.2	97.4	1.99	2.02	1.9	1.92		1.90		1.5	1.53		1.52		1.3	1.33		1.33		0.74	0.82
	12	2.4	97.5	0.52	0.53	0.9	0.88		0.87		1.4	1.47		1.46		1.8	1.69		1.69		2.02	2.25
	13	2.6	97.4	0.87	0.88	1.3	1.20		1.19		1.2	1.54	*	1.53	*	1.9	1.60		1.60		1.45	1.62
	14	2.8	97.4	1.22	1.24	1.7	1.61		1.59		1.6	1.92		1.91		2.2	1.94		1.95		1.64	1.83
	15	3.0	97.4	0.43	0.43	0.9	0.85		0.84		1.5	1.74		1.73		2.5	2.16		2.16		3.19	3.55
	16	3.2	97.5	0.15	0.15	0.4	0.37		0.37		0.9	1.04		1.03		1.7	1.43		1.44		2.89	3.22
	17	3.4	97.6	0.07	0.07	0.2	0.21		0.21		1.0	0.74	*	0.74	*	1.0	1.11		1.11		2.83	3.12
	18	3.6	97.7	0.19	0.18	0.3	0.35		0.31		1.2	0.69	*	0.53	*	0.6	0.84	*	0.63		1.17	0.86
	19	3.8	97.6	0.55	0.56	1.0	0.99		0.98		1.8	1.80		1.79		2.2	2.12		2.13		2.76	3.06
	20	4.0	97.6	0.90	0.92	1.6	1.50		1.48		2.0	2.42	*	2.40		3.2	2.74		2.75		3.16	3.53
	21	4.2	97.6	1.10	1.11	1.9	1.82		1.80		2.6	2.94		2.91		3.7	3.32		3.33		3.83	4.26
	22	4.4	97.7	1.86	1.88	2.6	2.55		2.53		3.0	3.22		3.19		3.5	3.32		3.33		2.97	3.31
	23	4.6	97.7	2.23	2.26	2.8	2.75		2.73		2.8	3.02		3.00		3.1	2.97		2.98		2.30	2.56
	24	4.8	97.7	2.13	2.16	2.5	2.53		2.51		2.7	2.65		2.63		2.5	2.56		2.57		1.89	2.10
	25	5.0	97.7	1.49	1.52	1.6	1.71		1.70		2.0	1.69		1.68		1.4	1.60		1.60		1.11	1.23
	26	5.2	97.7	0.84	0.85	1.2	1.20		1.19		1.6	1.60		1.59		1.7	1.69		1.69		1.59	1.77
	27	5.4	97.7	0.66	0.67	1.2	1.19		1.18		2.1	2.12		2.11		2.6	2.49		2.50		3.19	3.55
	28	5.6	97.7	0.89	0.90	1.5	1.51		1.50		2.6	2.52		2.50		2.9	2.88		2.89		3.44	3.81
	29	5.8	97.8	0.00	0.00	1.9	1.88		1.86		2.8	2.87		2.85		3.3	3.18		3.19		3.46	3.84
	30	6.0	97.8			0.8	0.84		0.84		2.9	2.30	*	2.28	*	2.9	3.16		3.16		6.24	6.90
*	31	6.2	97.9			1.3	0.00	*	1.28		2.7	2.66		2.63		3.4	3.28		3.29		4.85	5.39
*	32	6.4	97.8			0.6	0.63		0.71		3.1	2.41	*	2.29	*	3.5	3.75		3.37		10.51	8.74
*	33	6.6	97.8			0.4	0.41		1.39	*	2.5	2.00		2.58		3.3	3.40		3.10		12.14	4.56
	34	6.8	97.9			0.0	0.00		0.00		2.3	2.38		2.17		3.0	2.82		2.78		3.73	4.84
	35	7.0	97.9			0.0					1.9	1.97		1.97		2.7	2.50		2.50		4.00	4.31
	36	7.2	98.0			0.0					2.0	2.07		2.06		2.4	2.30		2.30		2.51	2.75
*	37	7.4	98.1			0.0					0.0	0.00		0.00		1.7	1.35	*	1.72		4.19	5.92
*	38	7.6	98.1			0.0					0.0					1.8	1.43	*	1.72		4.44	5.92
	39	7.8	98.1			0.0					0.0					1.3	1.04		1.04		3.21	3.57
*	40	8.0	98.1			0.0					0.0					0.0	1.04	*	0.08		3.21	0.27
*	41	8.1	98.1			0.0					0.0					0.0	1.04	*	0.00		3.21	0.22
	42	8.8	98.4			0.0					0.0					0.0	0.00				1.10	0.09
	43	9.5	98.6			0.0					0.0					0.0					0.00	0.00
	44	10.8	98.9			0.0					0.0					0.0						
	45	10.9	99.2			0.0					0.0					0.0						
	Total						1	*	1	*		6	*	5	*		5	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 6. Summary of Calibration Details, Upper Turner Creek.

Transect Number:	1	2	3	4	5
DISCHARGE					
Meas.	2.58	2.57	2.48	2.57	2.58
Calc.	2.58	2.47	2.48	2.57	2.57
Given	2.57	2.57	2.57	2.57	2.57
Stage (given)	97.25	98.75	98.85	98.87	97.80
	97.38	98.91	98.97	98.98	98.06
	97.48	99.04	99.08	99.09	98.16
Plotting Stage (given)	0.400	0.370	0.310	0.330	0.290
	0.530	0.530	0.430	0.440	0.550
	0.630	0.660	0.540	0.550	0.650
Ratio of Measured vs Predicted Discharge (given)	0.993	0.995	1.009	0.975	1.015
	1.011	1.013	0.977	1.060	0.948
	0.996	0.992	1.014	0.968	1.039
Mean Error of Stage/Discharge Relationship for Calculated Q	2.83	1.41	10.25	1.44	2.21
Mean Error of Stage/Discharge Relationship for Given Q	0.74	0.85	1.54	3.84	3.57
Stage/Discharge Relationship (S vs Q) S=A*Q**B+SZF					
A=	0.347	0.241	0.206	0.241	2.171
B=	0.206	0.528	0.496	0.406	0.269
SZF=	96.85	98.38	98.54	98.54	97.51
B Coefficient log/log Relationship (calculated)	3.495	1.893	2.016	2.461	2.171

APPENDIX H

Lower Turner Creek Final IFIM Calibration Report

Lower Turner Creek Final IFIM Calibration Report

Prepared for

Dr. Hal Beecher

Prepared by

Cascades Environmental Services, Inc.

July 24, 1996

Table 1. Original, unrevised data deck for Lower Turner Creek study site.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - uncalibrated data deck
IOC        1100000201001
QARD   1.0
QARD   3.0
QARD  10.0
QARD  34.0
QARD  80.0
XSEC     1                    95.59      0.007
         1  0.0 98.0  0.2 97.5  1.5 97.2  3.0 96.8  4.2 96.5  5.5 96.5
         1  6.0 96.4  6.5 96.4  7.0 96.3  7.5 96.2  8.0 96.1  8.5 96.0
         1  9.0 96.0  9.5 95.9 10.0 95.8 10.5 95.8 11.0 95.8 11.5 95.8
         1 12.0 95.8 12.5 95.8 13.0 95.7 13.5 95.7 14.0 95.8 14.5 95.7
         1 15.0 95.7 15.5 95.8 16.0 95.7 16.5 95.6 17.0 95.6 17.5 95.7
         1 18.0 95.7 18.5 95.7 19.0 95.7 19.5 95.6 20.0 95.6 20.5 95.7
         1 21.0 95.6 21.5 95.8 22.0 95.7 22.6 95.9 23.0 95.7 23.5 95.8
         1 24.0 95.8 24.5 95.8 25.0 96.0 25.5 96.2 26.0 96.1 26.5 96.2
         1 27.0 96.1 27.5 96.1 28.0 96.2 28.5 96.3 29.0 96.5 29.5 96.3
         1 30.0 96.3 30.5 96.3 31.0 96.3 31.5 96.5 31.9 96.3 33.7 98.4
         1 35.5100.4 35.7101.0
NS       1  0.0  2.9  0.0  2.9  0.0  2.9  0.0  2.9  0.0 24.6  0.0 24.6
NS       1  0.0 24.6  0.0 63.7  0.0 63.7  0.0 63.7  0.0 43.7  0.0 43.7
NS       1  0.0 43.7  0.0 43.7  0.0 46.8  0.0 46.8  0.0 35.7  0.0 35.7
NS       1  0.0 35.6  0.0 35.6  0.0 35.6  0.0 35.6  0.0 65.7  0.0 65.7
NS       1  0.0 65.7  0.0 65.7  0.0 65.8  0.0 65.8  0.0 65.8  0.0 65.9
NS       1  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9  0.0 66.9  0.0 66.9
NS       1  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 65.8
NS       1  0.0 65.8  0.0 65.8  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9
NS       1  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 57.8
NS       1  0.0 57.8  0.0 57.8  0.0 70.6  0.0 70.6  0.0  1.5  0.0  1.5
NS       1  0.0  1.5  0.0  1.5
CAL1     1    96.52       38.67
VEL1     1                          0.0  0.8  0.9  1.4  1.4  1.3  2.0
VEL1     1  1.9  2.0  2.0  2.1  2.9  2.9  2.6  2.7  3.1  2.3  2.3  2.7
VEL1     1  2.8  2.8  2.9  2.7  2.3  2.7  3.3  3.5  2.9  2.3  3.5  3.2
VEL1     1  3.2  3.3  3.2  3.3  3.0  2.8  2.7  3.0  3.3  3.0  2.4  3.1
VEL1     1  2.5  2.2  1.6  1.2  0.0  1.2  0.6  0.8  0.7  0.0
VEL1     1            0.0
CAL2     1    96.24       13.43
VEL2     1                                                0.0  0.0  1.0
VEL2     1  1.4  1.1  2.0  2.0  2.0  2.2  2.2  2.3  2.2  2.3  1.7  2.4
VEL2     1  2.2  1.8  1.9  1.4  1.3  2.1  2.0  2.2  1.6  1.3  1.4  2.1
VEL2     1  1.3  2.0  1.8  1.7  1.3  1.2  1.0  0.9  1.1  0.0  0.6  0.0
VEL2     1  0.0  0.0
VEL2     1
CAL3     1    96.05        4.53
VEL3     1                                                          0.0
VEL3     1  0.0  0.0  0.8  1.1  1.4  1.4  1.8  1.8  1.9  1.4  1.4  1.8
VEL3     1  1.6  1.6  1.1  0.6  0.8  1.8  1.2  1.3  1.0  0.9  0.4  1.4
VEL3     1  0.9  1.0  0.8  0.7  0.7  0.6  0.4  0.3  0.0
VEL3     1                                                0.0  0.0  0.0
VEL3     1  0.0  0.0
```

Table 1. Original, unrevised data deck for Lower Turner Creek study site. - **Continued**

```
XSEC     2                    95.64      0.004
         2  0.0 97.9  0.2 97.3  0.5 97.2  1.3 97.1  2.0 97.0  3.9 96.6
         2  4.4 96.6  5.0 96.5  5.5 96.5  6.0 96.5  6.5 96.4  7.0 96.4
         2  7.5 96.4  8.0 96.3  8.5 96.3  9.0 96.2  9.5 96.3 10.0 96.2
         2 10.5 96.0 11.0 96.0 11.5 95.9 12.0 95.9 12.5 95.9 13.0 95.8
         2 13.5 95.8 14.0 95.8 14.5 95.8 15.0 95.8 15.5 95.7 16.0 95.6
         2 16.5 95.6 17.0 95.6 17.5 95.6 18.0 95.5 18.5 95.5 19.0 95.5
         2 19.5 95.4 20.0 95.4 20.5 95.4 21.0 95.7 21.5 95.9 22.0 95.7
         2 22.5 95.7 23.0 95.8 23.5 95.8 24.0 96.0 24.5 96.0 25.0 96.1
         2 25.5 96.1 26.0 96.2 26.5 96.3 27.0 96.3 27.5 96.4 28.0 96.5
         2 28.5 96.5 29.0 96.4 29.4 96.6 29.6 96.8 30.7 97.3 32.7 98.3
         2 34.7100.1 34.8100.6
NS       2  0.0  1.8  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9
NS       2  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 43.7
NS       2  0.0 43.7  0.0 43.7  0.0 36.6  0.0 36.6  0.0 43.6  0.0 43.6
NS       2  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 45.7  0.0 45.7
NS       2  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 64.6
NS       2  0.0 64.6  0.0 64.6  0.0 64.6  0.0 64.6  0.0 56.6  0.0 56.6
NS       2  0.0 56.6  0.0 56.6  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 75.7
NS       2  0.0 75.7  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8
NS       2  0.0  5.8  0.0  5.8
CAL1     2    96.57     38.89
VEL1     2                                      0.0  0.0  0.0  0.9  0.9
VEL1     2  1.3  1.7  1.7  1.8  1.9  2.1  2.3  2.3  2.5  2.6  2.7  2.7
VEL1     2  2.7  2.8  2.8  2.9  2.6  2.8  2.5  2.8  2.8  2.9  2.8  2.8
VEL1     2  2.9  2.9  2.8  3.2  3.1  3.1  2.6  2.6  2.7  2.7  2.7  2.5
VEL1     2  2.4  1.8  2.4  1.9  2.1  1.2  1.2  0.0
VEL1     2
CAL2     2     96.3     12.72
VEL2     2
VEL2     2       0.0  0.1  1.3  1.2  1.4  1.4  1.6  1.6  1.7  1.7  1.8
VEL2     2  1.8  1.8  1.9  1.9  1.7  1.7  1.8  1.6  1.5  1.5  1.4  1.4
VEL2     2  1.3  1.3  1.1  1.5  1.5  1.2  1.1  1.0  1.0  0.2  1.1  1.1
VEL2     2  0.5  0.0
VEL2     2
CAL3     2    96.09       4.02
VEL3     2
VEL3     2                                 0.5  0.8  1.1  1.0  0.9  1.0
VEL3     2  1.0  1.0  1.0  1.0  1.1  0.9  1.0  0.8  0.8  0.9  0.9  0.7
VEL3     2  0.9  0.6  0.3  0.5  0.6  0.5  0.4  0.4  0.2  0.0
VEL3     2
VEL3     2
XSEC     3                    95.64      0.002
         3  0.0 97.9  0.2 97.3  1.0 97.2  2.0 96.9  3.8 96.6  4.3 96.6
         3  5.5 96.5  6.0 96.5  7.0 96.5  8.0 96.4  9.2 96.2 10.0 96.2
         3 11.0 96.2 12.0 95.9 12.5 95.8 13.0 95.6 13.5 95.5 14.3 95.2
         3 14.7 95.3 15.0 95.1 15.5 95.0 16.0 94.9 16.5 94.7 17.0 94.6
         3 17.5 94.4 17.8 94.5 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.2
         3 19.8 94.3 20.2 94.3 20.5 94.5 21.0 94.5 21.5 95.2 21.6 96.7
         3 21.9 96.9
```

Table 1. Original, unrevised data deck for Lower Turner Creek study site. - **Continued**

```
NS      3  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9  0.0 22.9
NS      3  0.0 22.9  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6
NS      3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 65.7
NS      3  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 76.6
NS      3  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6
NS      3  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS      3  0.0 53.6
CAL1    3    96.61      35.04
VEL1    3                          0.0  0.0  0.3  0.5  1.0  0.9  1.2
VEL1    3  1.5  1.6  1.5  1.5  1.6  1.8  1.9  2.3  2.7  2.4  2.3  2.8
VEL1    3  2.9  3.1  3.1  2.8  2.5  1.9  1.1  0.3  0.3  0.2  0.1
VEL1    3
CAL2    3    96.32      12.52
VEL2    3                                                    0.1  0.0
VEL2    3  0.4  0.5  0.5  0.6  0.6  0.9  0.9  1.2  1.1  1.0  1.1  1.0
VEL2    3  1.0  0.9  1.0  1.2  1.4  1.3  0.7  0.2  0.3  0.4  0.3
VEL2    3
CAL3    3    96.11        3.52
VEL3    3
VEL3    3       0.0  0.0  0.0  0.2  0.2  0.3  0.5  0.4  0.5  0.6  0.5
VEL3    3  0.7  0.6  0.7  0.5  0.3  0.0  0.1 -0.1       -0.1 -0.0
VEL3    3
XSEC    4                  94.03      0.004
        4  0.0 96.8  0.1 96.3  0.9 95.7  4.3 95.0  4.4 95.0  5.0 95.0
        4  5.5 94.9  6.0 94.8  6.5 94.8  7.0 94.8  7.5 94.5  8.0 94.7
        4  8.5 94.3  9.0 94.2  9.5 94.3 10.0 94.2 10.5 94.3 11.0 94.3
        4 11.5 94.3 12.0 94.3 12.5 94.3 13.0 94.4 13.5 94.4 14.0 94.3
        4 14.5 93.9 15.0 94.2 15.5 94.3 16.0 94.2 16.5 94.2 17.0 94.2
        4 17.5 94.2 18.0 94.2 18.5 94.3 19.0 94.2 19.5 94.1 20.0 94.2
        4 20.5 94.3 21.0 94.2 21.5 94.3 22.0 94.4 22.5 94.4 23.0 95.0
        4 23.5 94.9 24.0 94.9 24.6 95.0 24.7 95.0 26.0 95.2 29.5 95.5
        4 30.0 97.0 31.2 97.6 31.3 98.1
NS      4  0.0  1.7  0.0  1.7  0.0  1.7  0.0  1.7  0.0 43.7  0.0 43.7
NS      4  0.0 54.5  0.0 54.5  0.0 54.5  0.0 85.8  0.0 85.8  0.0 64.6
NS      4  0.0 64.6  0.0 64.6  0.0 64.6  0.0 54.6  0.0 54.6  0.0 54.6
NS      4  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.7  0.0 54.7
NS      4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7
NS      4  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 64.6  0.0 64.6
NS      4  0.0 64.6  0.0 64.6  0.0 85.7  0.0 85.7  0.0 85.7  0.0 85.7
NS      4  0.0 85.7  0.0 85.7  0.0 85.7  0.0 85.7  0.0  1.8  0.0  1.8
NS      4  0.0  1.8  0.0  1.8  0.0  1.8
CAL1    4    95.05      31.74
VEL1    4                          0.0  1.1  1.6  1.9  2.1  2.3  2.9
VEL1    4  2.6  2.4  3.0  3.1  3.2  2.8  3.2  3.1  3.0  2.8  3.2  2.7
VEL1    4  3.1  3.4  4.0  3.8  2.8  3.2  3.0  2.4  1.5  1.6  1.7  2.3
VEL1    4  2.8  3.4  2.0  2.8  2.0  0.0  2.1  0.4
VEL1    4
CAL2    4    94.66      13.06
VEL2    4                                                    1.4
VEL2    4  2.2  2.1  2.1  2.3  2.2  2.2  2.4  2.4  2.4  2.4  3.0  2.4
VEL2    4  2.5  2.4  3.0  3.0  3.0  2.8  2.6  1.6  1.0  0.9  1.3  1.7
VEL2    4  2.9  2.2  0.5  0.4  0.2
```

Table 1. Original, unrevised data deck for Lower Turner Creek study site. - **Continued**

```
VEL2     4
CAL3     4    94.48       4.21
VEL3     4
VEL3     4  0.7  0.8  1.2  1.5  1.3  1.2  1.4  1.5  1.5  0.9  1.4  1.1
VEL3     4  0.9  1.0  1.7  1.0  2.2  2.1  0.7  1.5  1.2  0.9  0.5  0.9
VEL3     4  1.9  0.8  0.1  0.0
VEL3     4
XSEC     5                    94.1     0.001
         5  0.0 97.2  0.1 96.4  4.3 96.2  6.8 95.6  7.8 95.4  8.8 95.3
         5  8.9102.2  9.5 95.0 10.0 94.9 10.5 94.8 11.0 94.4 11.5 94.4
         5 12.0 94.4 12.5 94.4 13.0 94.3 13.5 94.3 14.0 94.3 14.5 94.3
         5 15.0 94.3 15.5 94.3 16.0 94.2 16.5 94.3 17.0 94.1 17.5 94.1
         5 18.0 94.0 18.5 93.9 18.8 93.9 19.0 93.8 19.5 94.1 20.0 94.1
         5 20.5 94.3 21.0 94.0 21.5 93.9 22.0 94.1 22.5 94.1 23.0 94.2
         5 23.5 94.2 24.0 94.3 24.5 94.4 25.1 94.7 25.5 94.9 26.0 96.5
         5 27.0 97.1 27.2 97.6
NS       5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 34.7  0.0 34.7
NS       5  0.0 34.7  0.0 34.7  0.0 34.7  0.0 37.7  0.0 34.6  0.0 34.6
NS       5  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.5  0.0 34.5
NS       5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 43.6
NS       5  0.0 43.6  0.0 43.6  0.0 43.6  0.0 84.6  0.0 84.6  0.0 84.6
NS       5  0.0 84.6  0.0 84.6  0.0 74.6  0.0 74.6  0.0 74.6  0.0 74.6
NS       5  0.0 74.7  0.0 74.7  0.0  8.6  0.0  8.6  0.0  1.6  0.0  1.6
NS       5  0.0  1.6  0.0  1.6
CAL1     5    95.16      34.03
VEL1     5                                          0.7  0.9  1.3  1.5  2.0
VEL1     5  2.3  2.5  2.5  2.7  2.7  2.4  2.7  2.8  2.7  2.5  3.1  2.9
VEL1     5  3.1  3.4  3.1  3.3  3.3  3.5  3.0  3.0  2.6  2.1  1.1  1.1
VEL1     5  1.0  0.6  0.5  0.6  0.3
CAL2     5    94.79      10.00
VEL2     5                                                  0.0  0.7  0.8
VEL2     5  1.0  1.0  1.1  1.1  1.1  0.6  1.0  1.2  1.3  1.1  1.3  1.4
VEL2     5  1.3  1.4  1.5  1.6  1.6  1.7  1.7  1.9  1.4  1.2  1.0  0.9
VEL2     5  0.7  0.5  0.6  0.1
CAL3     5     94.6       3.45
VEL3     5                                                       0.4  0.3
VEL3     5  0.5  0.6  0.6  0.5  0.6  0.6  0.7  0.7  0.6  0.5  0.7  0.6
VEL3     5  0.7  0.6  0.7  0.7  1.0  1.0  0.9  0.9  0.7  0.6  0.6  0.4
VEL3     5  0.2  0.0  0.0  0.0
XSEC     6                    94.1     0.001
         6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
         6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
         6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
         6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
         6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
         6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
         6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS       6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS       6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.8
NS       6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS       6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
NS       6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
```

Table 1. Original, unrevised data deck for Lower Turner Creek study site. - **Continued**

```
NS        6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1      6     95.17      34.11
VEL1      6                                                     0.1  0.3
VEL1      6  0.9  1.9  2.0  2.3  2.3  2.6  2.5  2.2  2.5  2.6  2.6  2.9
VEL1      6  2.8  3.1  3.1  3.2  3.3  3.3  3.6  2.9  2.7  2.0  1.7  1.2
VEL1      6 -0.4 -0.2 -0.2 -0.2
CAL2      6     94.82      10.53
VEL2      6                                                          0.0
VEL2      6  0.2  0.2  0.5  0.5  0.5  0.7  0.8  0.9  1.0  1.0  1.1  1.0
VEL2      6  1.0  1.2  1.4  1.3  1.6  1.5  1.6  1.4  1.4  1.3  1.2  0.6
VEL2      6 -0.2 -0.2 -0.1
CAL3      6     94.61        5.6
VEL3      6
VEL3      6  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.1  0.1  0.1  0.1  0.2
VEL3      6  0.4  0.5  0.5  0.5  0.6  0.6  0.6  0.4  0.5  0.5  0.2  0.0
VEL3      6
XSEC      7                    94.1      0.017
          7  0.0 97.1  0.1 96.0  2.0 95.6  3.5 95.8  4.3 95.2  5.1 95.2
          7  5.5 95.2  6.8 95.3  7.5 95.1  8.0 94.9  8.5 94.7  9.0 94.6
          7  9.5 94.5 10.0 94.5 10.4 94.5 10.8 94.6 11.2 94.4 11.5 94.3
          7 11.8 94.3 12.2 94.3 12.6 94.3 13.0 94.2 13.4 94.2 13.8 94.2
          7 14.2 94.2 14.8 94.0 15.2 94.2 15.4 94.3 15.8 94.1 16.2 94.1
          7 16.6 94.4 17.0 94.4 17.4 94.6 17.8 94.6 18.0 94.6 18.4102.2
          7 18.5 95.3 18.9 97.2 19.0 97.9
NS        7  0.0 22.9  0.0 22.9  0.0 85.7  0.0 85.7  0.0 83.6  0.0 34.7
NS        7  0.0 34.7  0.0 37.8  0.0 37.8  0.0 34.9  0.0 56.6  0.0 56.6
NS        7  0.0 56.6  0.0 56.6  0.0 65.6  0.0 65.6  0.0 65.6  0.0 65.7
NS        7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7
NS        7  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.7
NS        7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        7  0.0 42.7  0.0 42.7  0.0 42.7
CAL1      7    95.28      28.68
VEL1      7                          0.0  0.0  0.0  0.5  0.7  1.9  2.6
VEL1      7  1.1  1.9  3.9  3.4  4.2  3.2  4.1  4.1  3.8  4.2  3.8  4.2
VEL1      7  3.8  2.3  3.5  3.0  3.2  3.0  4.1  2.1  1.2  0.6  0.4  0.0
VEL1      7
CAL2      7    94.89      12.28
VEL2      7                                             0.0  0.7  1.4
VEL2      7  1.7  1.6  1.5  1.7  2.8  2.7  2.6  4.2  3.5  3.3  3.1  3.1
VEL2      7  2.9  1.7  1.9  3.8  2.8  2.0  1.5  1.5  0.9  0.4  0.1
VEL2      7
CAL3      7    94.66        3.98
VEL3      7                                                          0.4
VEL3      7  1.0  1.4  1.5  0.0  1.6  2.3  1.7  1.8  0.7  0.1  1.7  0.8
VEL3      7  2.6  0.8  0.8  1.2  2.4  1.4  0.9  0.6  0.0  0.0  0.0
VEL3      7
ENDJOB
```

Table 2a. Revised, calibrated data deck, Lower Turner Creek

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - REVISED, CALIBRATED DATA DECK
IOC        0100000201001
QARD    1.0
QARD    4.0
QARD   11.0
QARD   25.0
QARD   46.0
QARD  114.0
XSEC      1                    95.59      0.007
          1  0.0 98.0  0.2 97.5  1.5 97.2  3.0 96.8  4.2 96.5  5.5 96.5
          1  6.0 96.4  6.5 96.4  7.0 96.3  7.5 96.2  8.0 96.1  8.5 96.0
          1  9.0 96.0  9.5 95.9 10.0 95.8 10.5 95.8 11.0 95.8 11.5 95.8
          1 12.0 95.8 12.5 95.8 13.0 95.7 13.5 95.7 14.0 95.8 14.5 95.7
          1 15.0 95.7 15.5 95.8 16.0 95.7 16.5 95.6 17.0 95.6 17.5 95.7
          1 18.0 95.7 18.5 95.7 19.0 95.7 19.5 95.6 20.0 95.6 20.5 95.7
          1 21.0 95.6 21.5 95.8 22.0 95.7 22.6 95.9 23.0 95.7 23.5 95.8
          1 24.0 95.8 24.5 95.8 25.0 96.0 25.5 96.2 26.0 96.1 26.5 96.2
          1 27.0 96.1 27.5 96.1 28.0 96.2 28.5 96.3 29.0 96.5 29.5 96.3
          1 30.0 96.3 30.5 96.3 31.0 96.3 31.5 96.5 31.9 96.6 33.7 98.4
          1 35.5100.4 35.7101.0
NS        1  0.0  2.9  0.0  2.9  0.0  2.9  0.0  2.9  0.0 24.6  0.0 24.6
NS        1  0.0 24.6  0.0 63.7  0.0 63.7  0.0 63.7  0.0 43.7  0.0 43.7
NS        1  0.0 43.7  0.0 43.7  0.0 46.8  0.0 46.8  0.0 35.7  0.0 35.7
NS        1  0.0 35.6  0.0 35.6  0.0 35.6  0.0 35.6  0.0 65.7  0.0 65.7
NS        1  0.0 65.7  0.0 65.7  0.0 65.8  0.0 65.8  0.0 65.8  0.0 65.9
NS        1  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9  0.0 66.9  0.0 66.9
NS        1  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 66.9  0.0 65.8
NS        1  0.0 65.8  0.0 65.8  0.0 65.9  0.0 65.9  0.0 65.9  0.0 65.9
NS        1  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 76.5  0.0 57.8
NS        1  0.0 57.8  0.0 57.8  0.0 70.6  0.0 70.6  0.0  1.5  0.0  1.5
NS        1  0.0  1.5  0.0  1.5
CAL1      1    96.52       38.67
VEL1      1                          0.0  0.8  1.1  1.4  1.4  1.3  2.0
VEL1      1  1.9  2.0  2.0  2.1  2.9  2.9  2.6  2.7  3.1  2.3  2.3  2.7
VEL1      1  2.8  2.8  2.9  2.7  2.3  2.7  3.3  3.5  2.9  2.3  3.5  3.2
VEL1      1  3.2  3.3  3.2  3.3  3.0  2.8  2.7  3.0  3.3  3.0  2.4  3.1
VEL1      1  2.5  2.2  1.6  1.2  0.0  1.2  0.6  0.8  0.7  0.0
VEL1      1            0.0
CAL2      1    96.24       13.43
VEL2      1                                                 0.0  0.0  1.0
VEL2      1  1.4  1.1  2.0  2.0  2.0  2.2  2.2  2.3  2.2  2.3  1.7  2.4
VEL2      1  2.2  1.8  1.9  1.4  1.3  2.1  2.0  2.2  1.6  1.3  1.4  2.1
VEL2      1  1.3  2.0  1.8  1.7  1.3  1.2  1.0  0.9  1.1  0.0  0.6  0.0
VEL2      1  0.0  0.0
VEL2      1
CAL3      1    96.05        4.53
VEL3      1                                                           0.0
VEL3      1  0.0  0.0  0.8  1.1  1.4  1.4  1.8  1.8  1.9  1.4  1.4  1.8
VEL3      1  1.6  1.6  1.1  0.6  0.8  1.8  1.2  1.3  1.0  0.9  0.4  1.4
VEL3      1  0.9  1.0  0.8  0.7  0.7  0.6  0.4  0.3  0.0
VEL3      1                                                 0.0  0.0  0.0
```

Table 2a. Revised, calibrated data deck, Lower Turner Creek - **Continued**

```
VEL3     1  0.0  0.0
XSEC     2                   95.64     0.004
         2  0.0 97.9  0.2 97.3  0.5 97.2  1.3 97.1  2.0 97.0  3.9 96.6
         2  4.4 96.6  5.0 96.5  5.5 96.5  6.0 96.5  6.5 96.4  7.0 96.4
         2  7.5 96.4  8.0 96.3  8.5 96.3  9.0 96.2  9.5 96.2 10.0 96.2
         2 10.5 96.0 11.0 96.0 11.5 95.9 12.0 95.9 12.5 95.9 13.0 95.8
         2 13.5 95.8 14.0 95.8 14.5 95.8 15.0 95.8 15.5 95.7 16.0 95.6
         2 16.5 95.6 17.0 95.6 17.5 95.6 18.0 95.5 18.5 95.5 19.0 95.5
         2 19.5 95.4 20.0 95.4 20.5 95.4 21.0 95.7 21.5 95.9 22.0 95.7
         2 22.5 95.7 23.0 95.8 23.5 95.8 24.0 96.0 24.5 96.1 25.0 96.1
         2 25.5 96.1 26.0 96.2 26.5 96.3 27.0 96.3 27.5 96.4 28.0 96.5
         2 28.5 96.5 29.0 96.4 29.4 96.6 29.6 96.8 30.7 97.3 32.7 98.3
         2 34.7100.1 34.8100.6
NS       2  0.0  1.8  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9
NS       2  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 25.8  0.0 43.7
NS       2  0.0 43.7  0.0 43.7 0.02 36.6  0.0 36.6 0.16 43.6  0.0 43.6
NS       2  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 45.7  0.0 45.7
NS       2  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 64.6
NS       2  0.0 64.6  0.0 64.6  0.0 64.6  0.0 64.6  0.0 56.6  0.0 56.6
NS       2  0.0 56.6  0.0 56.6  0.0 78.7  0.0 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 78.7  0.0 78.7 0.12 78.7  0.0 78.7  0.0 78.7
NS       2  0.0 78.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 67.7  0.0 75.7
NS       2  0.0 75.7  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8  0.0  5.8
NS       2  0.0  5.8  0.0  5.8
CAL1     2    96.57      38.89
VEL1     2                                       0.1  0.1  0.1  0.9  0.9
VEL1     2  1.3  1.7  1.7  1.8  1.9  2.1  2.3  2.3  2.5  2.6  2.7  2.7
VEL1     2  2.7  2.8  2.8  2.9  2.6  2.8  2.5  2.8  2.8  2.9  2.8  2.8
VEL1     2  2.9  2.9  2.8  3.2  3.1  3.1  2.6  2.6  2.7  2.7  2.7  2.5
VEL1     2  2.4  1.8  2.4  1.9  2.1  1.2  1.2  0.1
VEL1     2
CAL2     2     96.3      12.72
VEL2     2
VEL2     2       0.0  0.1  1.3  1.2  1.4  1.4  1.6  1.6  1.7  1.7  1.8
VEL2     2  1.8  1.8  1.9  1.9  1.7  1.7  1.8  1.6  1.5  1.5  1.4  1.4
VEL2     2  1.3  1.3  1.1  1.5  1.5  1.2  1.1  1.0  1.0  0.4  1.1  1.1
VEL2     2  0.5  0.0
VEL2     2
CAL3     2    96.09       4.02
VEL3     2
VEL3     2                                  0.5  0.8  1.1  1.0  0.9  1.0
VEL3     2  1.0  1.0  1.0  1.0  1.1  0.9  1.0  0.8  0.8  0.9  0.9  0.7
VEL3     2  0.9  0.6  0.3  0.5  0.6  0.5  0.4  0.4  0.2  0.0
VEL3     2
VEL3     2
XSEC     3                   95.64     0.002
         3  0.0 97.9  0.2 97.3  1.0 97.2  2.0 96.9  3.8 96.6  4.3 96.6
         3  5.5 96.5  6.0 96.5  7.0 96.5  8.0 96.4  9.2 96.2 10.0 96.2
         3 11.0 96.2 12.0 95.9 12.5 95.8 13.0 95.6 13.5 95.5 14.3 95.2
         3 14.7 95.3 15.0 95.1 15.5 95.0 16.0 94.9 16.5 94.7 17.0 94.6
         3 17.5 94.4 17.8 94.5 18.0 94.3 18.5 94.3 19.0 94.3 19.5 94.2
         3 19.8 94.3 20.2 94.3 20.5 94.5 21.0 94.5 21.5 95.2 21.6 96.7
```

Table 2a. Revised, calibrated data deck, Lower Turner Creek - **Continued**

```
          3 21.9 97.1
NS        3  0.0  1.8  0.0  1.8  0.0  1.8  0.0 22.9  0.0 22.9  0.0 22.9
NS        3  0.0 22.9  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6  0.0 43.6
NS        3  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 22.9  0.0 65.7
NS        3  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 65.7  0.0 76.6
NS        3  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6  0.0 76.6
NS        3  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6  0.0 53.6
NS        3  0.0 53.6
CAL1      3    96.61     35.04
VEL1      3                          0.0  0.1  0.3  0.5  1.0  0.9  1.2
VEL1      3  1.5  1.6  1.5  1.5  1.6  1.8  1.9  2.3  2.7  2.4  2.3  2.8
VEL1      3  2.9  3.1  3.1  2.8  2.5  1.9  1.0  0.3  0.3  0.4  0.3
VEL1      3
CAL2      3    96.32     12.52
VEL2      3                                                   0.1  0.0
VEL2      3  0.4  0.5  0.5  0.6  0.6  0.9  0.9  1.2  1.1  1.0  1.1  1.0
VEL2      3  1.2  0.9  1.0  1.2  1.4  1.3  0.7  0.2  0.3  0.2  0.1
VEL2      3
CAL3      3    96.11       3.52
VEL3      3
VEL3      3       0.0  0.0  0.0  0.2  0.2  0.3  0.5  0.4  0.5  0.6  0.5
VEL3      3  0.9  0.6  0.7  0.5  0.3  0.0  0.1  0.1  0.1  0.1  0.0
VEL3      3
XSEC      4                 94.03     0.004
          4  0.0 96.8  0.1 96.3  0.9 95.7  4.3 95.2  4.4 95.1  5.0 95.0
          4  5.5 94.9  6.0 94.8  6.5 94.8  7.0 94.8  7.5 94.5  8.0 94.7
          4  8.5 94.3  9.0 94.2  9.5 94.3 10.0 94.2 10.5 94.3 11.0 94.3
          4 11.5 94.3 12.0 94.3 12.5 94.3 13.0 94.4 13.5 94.4 14.0 94.3
          4 14.5 93.9 15.0 94.2 15.5 94.3 16.0 94.2 16.5 94.2 17.0 94.2
          4 17.5 94.2 18.0 94.2 18.5 94.3 19.0 94.2 19.5 94.1 20.0 94.2
          4 20.5 94.3 21.0 94.2 21.5 94.3 22.0 94.4 22.5 94.4 23.0 95.0
          4 23.5 94.9 24.0 94.9 24.6 95.0 24.7 95.0 26.0 95.2 29.5 95.5
          4 30.0 97.0 31.2 97.6 31.3 98.1
NS        4  0.0  1.7  0.0  1.7  0.0  1.7  0.0  1.7  0.0 43.7  0.0 43.7
NS        4  0.0 54.5  0.0 54.5  0.0 54.5  0.0 85.8  0.0 85.8  0.0 64.6
NS        4  0.0 64.6  0.0 64.6  0.0 64.6  0.0 54.6  0.0 54.6  0.0 54.6
NS        4  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.6  0.0 54.7  0.0 54.7
NS        4  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7
NS        4  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 64.6  0.0 64.6
NS        4  0.0 64.6  0.0 64.60.192 85.70.192 85.7  0.0 85.7  0.0 85.7
NS        4  0.0 85.7  0.0 85.7  0.0 85.7  0.0 85.7  0.0  1.8  0.0  1.8
NS        4  0.0  1.8  0.0  1.8  0.0  1.8
CAL1      4    95.05     31.74
VEL1      4                          0.1  1.1  1.6  1.9  2.1  2.3  2.9
VEL1      4  2.6  2.4  3.0  3.1  3.2  2.8  3.2  3.1  3.0  2.8  3.2  2.7
VEL1      4  3.1  3.4  4.0  3.8  2.8  3.2  3.0  2.4  1.5  1.6  1.7  2.3
VEL1      4  2.8  3.4  2.0  2.8  2.0  0.1  2.1  0.4
VEL1      4
CAL2      4    94.66     13.06
VEL2      4                                                   1.4
VEL2      4  2.2  2.1  2.1  2.3  2.2  2.2  2.4  2.4  2.4  2.4  3.0  2.4
VEL2      4  2.5  2.4  3.0  3.0  3.0  2.8  0.0  1.6  1.0  0.9  1.3  1.7
```

Table 2a. Revised, calibrated data deck, Lower Turner Creek - **Continued**

```
VEL2     4  2.9  2.2  0.5  0.4  0.2
VEL2     4
CAL3     4    94.48       4.21
VEL3     4
VEL3     4  0.7  0.8  1.2  1.5  1.3  1.2  1.4  1.5  1.5  0.9  1.4  1.1
VEL3     4  0.9  1.0  1.7  1.0  2.2  2.1  0.7  1.5  1.2  0.9  0.5  0.9
VEL3     4  1.9  0.8  0.1  0.0
VEL3     4
XSEC     5                    94.1      0.001
         5  0.0 97.2  0.1 96.4  4.3 96.2  6.8 95.6  7.8 95.4  8.8 95.3
         5  8.9 95.2  9.5 95.0 10.0 94.9 10.5 94.8 11.0 94.4 11.5 94.4
         5 12.0 94.4 12.5 94.4 13.0 94.3 13.5 94.3 14.0 94.3 14.5 94.3
         5 15.0 94.3 15.5 94.3 16.0 94.2 16.5 94.3 17.0 94.1 17.5 94.1
         5 18.0 94.0 18.5 93.9 18.8 93.9 19.0 93.8 19.5 94.1 20.0 94.1
         5 20.5 94.3 21.0 94.0 21.5 93.9 22.0 94.1 22.5 94.1 23.0 94.2
         5 23.5 94.2 24.0 94.3 24.5 94.4 25.1 94.7 25.5 94.9 26.0 96.5
         5 27.0 97.1 27.2 97.6
NS       5  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 34.7  0.0 34.7
NS       5  0.0 34.7  0.0 34.7  0.0 34.7  0.0 37.7  0.0 34.6  0.0 34.6
NS       5  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.6  0.0 34.5  0.0 34.5
NS       5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 34.5  0.0 43.6
NS       5  0.0 43.6  0.0 43.6  0.0 43.6  0.0 84.6  0.0 84.6  0.0 84.6
NS       5  0.0 84.6  0.0 84.6  0.0 74.6  0.0 74.6  0.0 74.6  0.0 74.6
NS       5  0.0 74.7  0.0 74.7  0.0  8.6  0.0  8.6  0.0  1.6  0.0  1.6
NS       5  0.0  1.6  0.0  1.6
CAL1     5    95.16      34.03
VEL1     5                                        0.7  0.9  1.3  1.5  2.0
VEL1     5  2.3  2.5  2.5  2.7  2.7  2.4  2.7  2.8  2.7  2.5  3.1  2.9
VEL1     5  3.1  3.4  3.1  3.3  3.3  3.5  3.0  3.0  2.6  2.1  1.1  1.1
VEL1     5  1.0  0.6  0.5  0.6  0.3
CAL2     5    94.79      10.00
VEL2     5                                             0.0  0.7  0.8
VEL2     5  1.0  1.0  1.1  1.1  1.1  0.0  1.0  1.2  1.3  1.1  1.3  1.4
VEL2     5  1.3  1.4  1.5  1.6  1.6  1.7  1.7  1.9  1.4  1.2  1.0  0.9
VEL2     5  0.7  0.5  0.6  0.1
CAL3     5     94.6       3.45
VEL3     5                                                  0.4  0.3
VEL3     5  0.5  0.6  0.6  0.5  0.6  0.6  0.7  0.7  0.6  0.5  0.7  0.6
VEL3     5  0.7  0.6  0.7  0.7  1.0  1.0  0.9  0.9  0.7  0.6  0.6  0.4
VEL3     5  0.2  0.0  0.0  0.0
XSEC     6                    94.1      0.001
         6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
         6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
         6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
         6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
         6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
         6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
         6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS       6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS       6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.8
NS       6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS       6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
```

Table 2a. Revised, calibrated data deck, Lower Turner Creek - **Continued**

```
NS      6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
NS      6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS      6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1    6    95.17      34.11
VEL1    6                                                    0.1  0.3
VEL1    6  0.9  1.5  2.0  2.3  2.3  2.6  2.5  2.2  2.1  2.2  2.2  2.5
VEL1    6  2.8  3.1  3.1  3.2  3.4  3.3  3.5  2.9  2.7  2.0  1.7  1.2
VEL1    6 -0.4 -0.2 -0.2 -0.2
CAL2    6    94.82      10.53
VEL2    6                                                         0.0
VEL2    6  0.2  0.4  0.5  0.5  0.5  0.7  0.8  0.5  0.6  0.6  0.6  1.0
VEL2    6  1.0  1.2  1.1  1.3  1.4  1.5  1.6  1.4  1.4  1.3  1.2  0.6
VEL2    6 -0.2 -0.2 -0.1
CAL3    6    94.61        5.6
VEL3    6
VEL3    6  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.1  0.1  0.1  0.1  0.4
VEL3    6  0.4  0.5  0.8  0.5  0.9  0.6  0.9  0.4  0.9  0.9  0.5  0.0
VEL3    6
XSEC    7                    94.1      0.017
        7  0.0 97.1  0.1 96.0  2.0 95.6  3.5 95.8  4.3 95.5  5.1 95.2
        7  5.5 95.2  6.8 95.2  7.5 95.1  8.0 94.9  8.5 94.7  9.0 94.5
        7  9.5 94.5 10.0 94.5 10.4 94.5 10.8 94.6 11.2 94.4 11.5 94.3
        7 11.8 94.3 12.2 94.3 12.6 94.3 13.0 94.2 13.4 94.2 13.8 94.2
        7 14.2 94.2 14.8 94.0 15.2 94.2 15.4 94.3 15.8 94.1 16.2 94.1
        7 16.6 94.4 17.0 94.4 17.4 94.6 17.8 94.6 18.0 94.6 18.4102.2
        7 18.5 95.3 18.9 97.2 19.0 97.9
NS      7  0.0 22.9  0.0 22.9  0.0 85.7  0.0 85.7  0.0 83.6  0.0 34.7
NS      7  0.0 34.7  0.0 37.8  0.0 37.8  0.0 34.9  0.0 56.6  0.0 56.6
NS      7  0.0 56.6  0.0 56.6  0.0 65.6  0.0 65.6  0.0 65.6  0.0 65.7
NS      7  0.0 65.7  0.0 65.7  0.0 65.7 0.14 65.7  0.0 65.7  0.0 65.7
NS      7  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.8  0.0 54.7
NS      7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 42.7  0.0 42.7  0.0 42.7
NS      7  0.0 42.7  0.0 42.7  0.0 42.7
CAL1    7    95.28      28.68
VEL1    7                          0.1  0.1  0.1  0.5  0.7  1.9  2.1
VEL1    7  1.1  1.9  3.9  3.4  4.2  3.2  4.1  3.8  3.5  3.8  3.8  3.7
VEL1    7  3.8  2.3  3.5  3.0  3.2  3.0  4.1  2.1  1.2  0.6  0.4  0.0
VEL1    7
CAL2    7    94.89      12.28
VEL2    7                                             0.0  0.7  1.4
VEL2    7  1.7  1.6  2.0  1.7  2.8  2.7  2.6  3.2  1.9  3.3  3.1  1.9
VEL2    7  2.9  1.7  1.9  2.0  2.8  2.0  1.5  1.5  0.9  0.4  0.1
VEL2    7
CAL3    7    94.66        3.98
VEL3    7                                                         0.5
VEL3    7  1.0  1.4  1.6  0.0  1.6  2.3  1.7  1.8  0.9  2.6  1.7  0.8
VEL3    7  2.6  0.8  0.8  1.3  2.4  1.4  1.1  0.6  0.0  0.0  0.0
VEL3    7
ENDJOB
```

Table 2b. Revised, calibrated deck for Turner Creek, low flows, Transect 5.

```
INPUT DECK PREPARED BY: Cascades Environmental Services, Inc.
STUDY SITE #Lower Mundt Creek - one flow low, Transect 6
IOC        1100000200001
QARD    1.0
QARD    2.0
QARD    3.0
QARD    4.0
XSEC      6                     94.1      0.001
          6  0.0 99.0  0.1 98.9  0.5 96.5  4.0 96.4  8.3 95.7  9.8 95.5
          6 10.2 95.6 10.5 95.4 12.2 95.3 12.3 95.2 13.0 94.9 13.5 94.8
          6 14.0 94.5 14.5 94.4 15.0 94.3 15.5 94.2 16.0 94.2 16.5 94.2
          6 17.0 94.2 17.5 94.2 18.0 94.1 18.5 94.0 19.0 93.9 19.5 93.8
          6 20.0 93.7 20.5 93.5 20.8 93.5 21.1 93.4 21.4 93.3 21.7 93.3
          6 22.0 93.3 22.5 93.2 22.8 93.4 23.1 93.4 23.5 93.4 24.0 93.5
          6 24.5 93.6 25.0 93.7 25.5 93.9 26.0 93.9 26.7 96.6 26.8 97.2
NS        6  0.0  0.9  0.0  0.9  0.0  0.9  0.0  0.9  0.0 24.8  0.0 82.7
NS        6  0.0 82.7  0.0 45.7  0.0 45.7  0.0 45.7  0.0 45.7 0.10 45.8
NS        6  0.0 45.8  0.0 52.6  0.0 52.6  0.0 52.6  0.0 52.6  0.0 42.7
NS        6  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7  0.0 42.7
NS        6  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 54.7  0.0 85.8
NS        6  0.0 85.8  0.0 85.8  0.0 85.8  0.0 85.8  0.0 75.7  0.0 75.7
NS        6  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 43.5  0.0 25.5
CAL1      6    95.17      34.11       34.00
VEL1      6
VEL1      6
VEL1      6
VEL1      6
CAL2      6    94.82      10.53       10.0
VEL2      6
VEL2      6
VEL2      6
VEL2      6
CAL3      6    94.61        5.60       5.6
VEL3      6
VEL3      6  .01  .01  .01  .01  .01  .01  .01  0.1  0.1  0.1  0.1  0.2
VEL3      6  0.4  0.6  0.6  0.6  0.7  0.7  0.7  0.4  0.6  0.6  0.2  .01
VEL3      6
ENDJOB
```

Table 3. Original and revised Velocity Adjustment Factors (VAFs), Lower Turner Study Site.

	Trans 3		Trans 4		Trans 5			Trans 6		Trans 7		Trans 8		Trans 9	
Flow (cfs)	Orig	Rev	Orig	Rev	Orig	Rev	Rev-1q	Orig	Rev	Orig	Rev	Orig	Rev	Orig	Rev
1.0	0.700	0.700	0.316	0.316	0.118	0.137	0.636	0.380	0.766	1.195	1.206	0.827	0.863	0.903	0.903
2.0	0.831	0.831	0.538	0.538	0.525	0.520	0.755	0.721	0.886	1.042	1.045	0.947	0.958	0.967	0.966
3.0	0.900	0.900	0.665	0.665	0.826	0.795	0.842	0.863	0.942	1.022	1.021	1.001	0.998	0.993	0.992
4.0	0.942	0.942	0.746	0.746	0.962	0.929	0.914	0.932	0.973	1.012	1.010	1.029	1.017	1.007	1.006
5.0	0.970	0.970	0.803	0.803	1.020	0.994	0.975	0.969	0.991	1.007	1.005	1.044	1.026	1.014	1.013
6.0	0.989	0.989	0.844	0.844	1.046	1.026		0.990	1.002	1.004	1.002	1.050	1.029	1.017	1.016
7.0	1.003	1.003	0.876	0.876	1.055	1.041		1.003	1.008	1.002	1.000	1.050	1.028	1.019	1.018
8.0	1.009	1.009	0.901	0.901	1.057	1.046		1.010	1.011	1.001	0.999	1.047	1.025	1.019	1.018
9.0	1.015	1.015	0.921	0.921	1.054	1.046		1.014	1.012	1.000	0.998	1.041	1.021	1.017	1.017
10.0	1.018	1.018	0.938	0.938	1.047	1.042		1.015	1.011	0.999	0.998	1.034	1.015	1.016	1.015
11.0	1.020	1.020	0.951	0.951	1.039	1.036		1.014	1.008	0.998	0.998	1.025	1.009	1.013	1.013
12.0	1.020	1.020	0.961	0.961	1.030	1.029		1.012	1.005	0.998	0.998	1.015	1.002	1.010	1.010
13.0	1.019	1.019	0.969	0.969	1.020	1.021		1.008	1.002	0.997	0.998	1.004	0.995	1.007	1.007
14.0	1.017	1.017	0.975	0.975	1.010	1.012		1.004	0.997	0.997	0.998	0.992	0.987	1.003	1.004
15.0	1.015	1.015	0.980	0.980	0.999	1.002		1.000	0.993	0.996	0.998	0.981	0.980	0.999	1.000
20.0	0.997	0.997	0.993	0.993	0.942	0.952		0.971	0.966	0.993	0.999	0.919	0.942	0.978	0.981
25.0	0.975	0.975	0.994	0.994	0.887	0.903		0.937	0.936	0.990	0.999	0.859	0.907	0.954	0.960
30.0	0.951	0.951	0.989	0.989	0.833	0.856		0.904	0.907	0.987	0.999	0.802	0.874	0.930	0.939
35.0	0.927	0.927	0.981	0.981	0.785	0.813		0.871	0.878	0.983	0.999	0.749	0.843	0.905	0.917
40.0	0.903	0.903	0.972	0.972	0.741	0.774		0.839	0.851	0.980	0.999	0.701	0.816	0.880	0.896
41.0	0.898	0.898	0.970	0.970	0.732	0.767		0.833	0.845	0.979	0.999	0.692	0.810	0.875	0.892
42.0	0.893	0.893	0.968	0.968	0.724	0.760		0.827	0.840	0.979	0.999	0.683	0.805	0.870	0.888
43.0	0.889	0.889	0.966	0.966	0.716	0.753		0.821	0.835	0.978	0.999	0.674	0.800	0.865	0.884
44.0	0.884	0.884	0.964	0.964	0.708	0.746		0.815	0.830	0.977	0.999	0.665	0.795	0.860	0.880
45.0	0.880	0.880	0.961	0.961	0.701	0.739		0.809	0.825	0.977	0.999	0.657	0.790	0.855	0.876

Table 4. Changes to Original Data Deck, Gilligan Creek

		Low Flow		Middle Flow		High Flow		
Trans	Sta	Orig	Rev	Orig	Rev	Orig	Rev	Other
1	17.0							Elev 97.5 to 97.6
	33.5							Elev 96.4 to 98.1
2	14.4	0.4	0.6					
	24.5			2.1	1.9			
	25.5	0.1	0.0					
	28.5			0.0	0.2			
3	7.0			1.9	1.0			
	7.5			2.1	1.2			
	8.0	0.9	0.7	2.3	2.1			
	8.5	0.8	0.7	1.9	1.7	2.7	2.5	
	11.5	0.4	0.2	0.6	0.8			
	12.6	0.5	0.3	0.5	0.7			
	14.7	0.6	0.5	1.1	1.0			
	15.2	0.7	0.6	1.3	1.2			
	16.0			0.3	0.0			
	16.6					0.8	0.75	
	17.0	0.2	0.00	1.4	1.1			
	17.5	0.6	0.5	0.8	0.6			
	18.0					1.1	1.05	
	19.0	0.2	0.0					
	20.0			0.9	0.8	2.3	2.2	
	25.0					0.0	0.1	
4	13.9							Elev 95.6 to 95.7
	14.4	0.0	-0.1					
	20.0			0.6	0.5	2.2	1.9	
	20.6	0.0	0.1	0.6	0.5	2.6	2.2	
	21.8			0.1	0.0			
	22.4			0.1	0.0			
	24.8	0.1	0.2	0.9	0.8	2.4	2.0	
	26.0			0.6	1.1			
	13.5					0.0	0.1	Hi Flow Deck
	14.4	0.0	0.1					Low Flow Deck
	20.6	0.0	0.1					Low Flow Deck
	21.2	0.0	0.1					Low Flow Deck
	29.0	0.0	0.1					Low Flow Deck
	30.6	0.0	0.1					Low Flow Deck
5	19.5			0.6	0.8			
	20.2	0.2	0.3	1.5	1.2			
	27.9	0.3	0.2					
	35.6	0.0	0.15					
6	6.5			0.1	0.0			
	9.1			1.2	0.0			
	9.6			0.8	0.6			
	11.5			1.8	0.0			
	13.4	2.2	2.4	1.6	0.0	4.4	4.6	
	17.3	0.3	0.5			3.8	4.5	
	18.0	0.3	0.4	1.8	1.6	2.5	2.4	
	20.1			1.4	0.0			
	20.8			0.6	0.0			
	27.1					0.4	0.6	N .058 to 0.04
7	14.5			N/A	0.2			Elev 95.5 to 95.6; MF missing
	15.0							Elev 95.5 to 95.6
	17.5			1.0	0.0			
	22.5			0.6	0.0			
	24.5	0.1	0.2			3.2	2.8	

Table 5a. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 3.

Calibration details for Lower Turner Creek

Transect 3

	WSE (ft)		97.76		97.97				98.09				98.35				98.7	
	Disch (cfs)		2		5				9				18				45	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.9			0.0					0.0					0.0						
2	0.1	100.5			0.0					0.0					0.0					0.00	0.00
* 3	2.0	98.3			0.0					0.0					0.0	0.00				0.38	0.39
* 4	3.2	98.1			0.0	0.00				0.0	0.00				0.0	0.26	*			0.50	0.62
* 5	3.7	97.9	0.00		0.0	0.04				0.0	0.23	*			0.0	0.42	*			0.60	0.62
* 6	4.0	97.6	0.19		0.0	0.36	*			0.0	0.48	*			0.0	0.63	*	0.00		0.75	0.80
* 7	4.5	97.4	0.32		0.0	0.50	*			0.0	0.62	*	0.00		0.8	0.75		0.64		0.83	1.27
* 8	5.0	97.9	0.00	0.00	0.0	0.26	*	0.00		0.6	0.50		0.51		1.2	1.00		1.02		2.12	2.26
9	5.5	97.6	0.12	0.13	0.5	0.35		0.37		0.7	0.66		0.67		1.6	1.28	*	1.30		2.64	2.75
10	6.0	97.4	0.21	0.23	0.7	0.56		0.58		1.2	0.97		1.00		2.0	1.75		1.78		3.26	3.41
11	6.4	97.3	0.23	0.25	0.7	0.55		0.57		1.0	0.89		0.91		1.7	1.47		1.50		2.45	2.55
12	6.8	97.3	0.10	0.10	0.4	0.31		0.32		0.8	0.61		0.62		1.5	1.28		1.30		2.91	3.04
* 13	7.2	97.1	0.04	0.13	0.2	0.18		0.38		0.9	0.43	*	0.71		1.2	1.15		1.40		3.56	3.03
* 14	7.6	96.9	0.14	0.27	0.4	0.34		0.56		0.8	0.58	*	0.84		1.1	1.02		1.27		1.82	1.96
* 15	8.0	96.9	0.43	0.48	1.0	0.77	*	0.83		1.0	1.07		1.13		1.7	1.45		1.52		1.88	2.00
16	8.4	96.7	0.30	0.32	0.9	0.71		0.73		1.3	1.15		1.18		2.2	1.90		1.94		3.19	3.32
17	8.8	96.7	0.34	0.36	1.0	0.81		0.84		1.6	1.33		1.36		2.5	2.22		2.26		3.75	3.92
18	9.2	96.7	0.57	0.61	1.3	1.08		1.13		1.7	1.54		1.58		2.4	2.17		2.22		2.94	3.07
19	9.6	96.7	0.56	0.59	1.3	1.06		1.10		1.6	1.51		1.55		2.4	2.14		2.18		2.90	3.03
20	10.0	96.8	0.50	0.53	1.2	1.00		1.04		1.7	1.48		1.52		2.4	2.18		2.22		3.12	3.26
21	10.4	96.9	0.50	0.54	1.2	0.96	*	1.00		1.4	1.37		1.40		2.2	1.93		1.97		2.62	2.73
22	10.8	96.9	0.40	0.43	1.0	0.81		0.84		1.3	1.20		1.23		2.0	1.77		1.80		2.55	2.66
23	11.2	97.0	0.25	0.26	0.7	0.57		0.59		1.1	0.92		0.94		1.7	1.51		1.54		2.50	2.61
24	11.6	96.8	0.32	0.34	0.7	0.60		0.63		1.0	0.86		0.88		1.3	1.21		1.23		1.63	1.71
25	12.0	96.8	0.36	0.39	0.6	0.54		0.56		0.7	0.65		0.67		0.8	0.76		0.78		0.81	0.84
26	12.4	96.6	0.12	0.13	0.3	0.25		0.25		0.4	0.36		0.37		0.6	0.54		0.55		0.77	0.80
27	12.8	96.6	0.13	0.14	0.4	0.20		0.21		0.1	0.25		0.26		0.5	0.31		0.31		0.34	0.35
28	13.2	96.7	0.03	0.03	0.1	0.09		0.09		0.3	0.18		0.18		0.4	0.38		0.39		0.88	0.93
29	13.6	96.6	0.01	0.01	0.1	0.07		0.08		0.4	0.22		0.23		0.9	0.74		0.76		3.20	3.37
* 30	14.0	96.6	0.01	0.05	0.1	0.08		0.17		0.5	0.24	*	0.37		0.9	0.80		0.84		3.37	2.21
* 31	14.4	96.6	0.01	0.05	0.1	0.08		0.17		0.5	0.24	*	0.37		0.9	0.80		0.84		3.37	2.21
32	14.8	96.6	0.04	0.05	0.0	0.16		0.16		0.4	0.33		0.33		0.9	0.73		0.74		1.80	1.93
* 33	15.1	96.7	0.07	0.08	0.3	0.20		0.23		0.4	0.39		0.43		1.0	0.78	*	0.85		1.67	1.83
* 34	15.4	105.4	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.00	0.10
35	15.5	98.7			0.0					0.0					0.0					0.01	0.01
36	17.1	98.9			0.0					0.0					0.0					0.00	0.00
37	19.1	99.8			0.0					0.0					0.0						
Total						5	*	0	*		7	*	0	*		5	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5b. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 4.

Calibration details for Lower Turner Creek

Transect 4

	WSE (ft)		97.75		98.01				98.12				98.4				98.71	
	Disch (cfs)		2		7				12				22				45	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.0													0.0	0					
2	0.1	99.4													0.0	0					
3	0.5	99.0													0.0	0					
4	1.0	98.8													0.0	0			*	0	0.00
5	1.1	98.4											0.00		0.0	0		0.00		0.04	0.04
6	1.5	98.1						0.00		0.0	0.01		0.01		0.0	0.03		0.03		0.05	0.05
7	2.5	97.8			0.00	0.02		0.02		0.0	0.03		0.03		0.0	0.05		0.05		0.07	0.07
8	3.0	97.8			0.00	0.02		0.02		0.0	0.03		0.03		0.0	0.05		0.05		0.07	0.07
9	3.5	97.8	0.00	0.00	0.00	0.02		0.02		0.0	0.03		0.03		0.0	0.05		0.05		0.07	0.07
10	4.0	97.7	0.00	0.00	0.00	0.03		0.03		0.0	0.04		0.04		0.0	0.05		0.05		0.07	0.07
11	4.5	97.6	0.01	0.01	0.00	0.03		0.03		0.0	0.04		0.04		0.0	0.06		0.06		0.08	0.08
12	5.0	97.4	0.02	0.02	0.00	0.04		0.04		0.0	0.06		0.06		0.0	0.07		0.07		0.08	0.08
13	5.5	97.2	0.02	0.02	0.00	0.05		0.05		0.0	0.06		0.06		0.0	0.08		0.08		0.09	0.09
* 14	6.0	96.7	0.04	0.04	0.00	0.07		0.07		0.0	0.09		0.09		0.1	0.10		0.10		0.11	0.11
* 15	6.4	96.6	0.05	0.05	0.10	0.09		0.09		0.1	0.10		0.10		0.1	0.10		0.10		0.10	0.10
16	6.8	96.3	0.03	0.03	0.20	0.14		0.14		0.2	0.25		0.25		0.5	0.44		0.44		0.80	0.80
17	7.1	96.2	0.08	0.08	0.40	0.28		0.28		0.3	0.41		0.41		0.7	0.59		0.59		0.85	0.85
18	7.4	96.1	0.14	0.14	0.60	0.44		0.44		0.5	0.63		0.63		1.0	0.88		0.88		1.22	1.22
19	7.7	96.1	0.12	0.12	0.60	0.50		0.50		0.9	0.84		0.84		1.4	1.40		1.40		2.37	2.37
20	8.0	96.0	0.12	0.12	0.60	0.50		0.50		0.9	0.84		0.84		1.4	1.40		1.40		2.37	2.37
21	8.3	96.0	0.11	0.11	0.60	0.51		0.51		1.0	0.89		0.89		1.5	1.53		1.53		2.70	2.70
22	8.6	95.9	0.14	0.14	0.70	0.60		0.60		1.1	0.99		0.99		1.6	1.62		1.62		2.71	2.71
23	9.0	96.0	0.14	0.14	0.70	0.60		0.60		1.1	0.99		0.99		1.6	1.62		1.62		2.71	2.71
24	9.4	96.0	0.11	0.11	0.60	0.51		0.51		1.0	0.89		0.89		1.5	1.53		1.53		2.70	2.70
25	9.8	96.0	0.10	0.10	0.60	0.51		0.51		1.0	0.91		0.91		1.6	1.62		1.62		2.99	2.99
26	10.2	96.1	0.14	0.14	0.70	0.58		0.58		1.0	0.96		0.96		1.6	1.58		1.58		2.64	2.64
27	10.6	96.0	0.10	0.10	0.60	0.49		0.49		0.9	0.86		0.86		1.5	1.48		1.48		2.63	2.63
28	11.0	96.0	0.13	0.13	0.70	0.54		0.54		0.8	0.87		0.87		1.5	1.40		1.40		2.27	2.27
29	11.4	95.9	0.17	0.17	0.70	0.54		0.54		0.7	0.78		0.78		1.2	1.11		1.11		1.55	1.55
30	11.8	95.7	0.14	0.14	0.70	0.50	*	0.50		0.6	0.76		0.76		1.3	1.14		1.14		1.69	1.69
31	12.2	95.8	0.06	0.06	0.40	0.34		0.34		0.7	0.63		0.63		1.2	1.21		1.21		2.42	2.42
32	12.6	95.6	0.02	0.02	0.20	0.19		0.19		0.7	0.48	*	0.48	*	1.1	1.25		1.25		3.66	3.66
33	13.0	95.7	0.08	0.08	0.00	0.38	*	0.38	*	0.7	0.67		0.67		1.2	1.19		1.19		2.17	2.17
34	13.4	95.7	0.01	0.01	0.00	0.11		0.11		0.3	0.28		0.28		0.8	0.79		0.79		2.44	2.44
35	13.8	95.8	0.54	0.54	0.00	0.38	*	0.38	*	0.3	0.29		0.29		0.2	0.20		0.20		0.12	0.12
* 36	14.2	95.8	0.04	0.04	0.00	0.08		0.08		0.0	0.09		0.09		0.1	0.10		0.10		0.11	0.11
37	14.6	98.1	0.00	0.00	0.00	0.00		0.00		0.0	0.03		0.03		0.1	0.10		0.10		0.17	0.17
38	15.0	98.1			0.00	0.00				0.0	0.15		0.15		0.6	0.58		0.58		1.01	1.01
39	16.0	98.1			0.00	0.00				0.0	0.05		0.05		0.2	0.19		0.19		0.34	0.34
40	17.0	98.1			0.00	0.00				0.0	0.05		0.05		0.0	0.19		0.19		0.34	0.34
41	18.0	98.1			0.00	0.00				0.0	0.05		0.05		0.0	0.19		0.19		0.34	0.34
42	19.0	98.1			0.00	0.00				0.0	0.05		0.05		0.0	0.19		0.19		0.34	0.34
43	19.8	98.4			0.0					0.0	0.00		0.00		0.0	0.00		0.00		0.23	0.23
44	19.9	98.6			0.0					0.0					0.0					0.14	0.14
45	20.3	98.7			0.0					0.0					0.0					0.09	0.09
46	20.9	98.9			0.0					0.0					0.0					0	0.00
47	21.0	99.2			0.0					0.0					0.0						
Total							3	*	2	*		1	*	1	*		0	*	0	*	

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5c. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 5.

Calibration details for Lower Turner Creek

Transect 5

	WSE (ft)		96.12			96.32						96.51				96.75				97.21		
	Disch (cfs)		2			5						9				18				45		
Pt	Sta	Elev	Orig	Rev	Rev-1q	Meas	Orig	*	Rev	*	Rev-1q	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	99.5				0.0							0.0					0.0						
2	0.1	98.8				0.0							0.0					0.0						
3	0.9	98.4				0.0							0.0					0.0						
4	1.7	97.4				0.0							0.0					0.0					0.00	0.00
5	2.8	96.8				0.0							0.0					0.0					0.41	0.15
6	5.0	96.9				0.0							0.0					0.0	0.00		0.00		0.34	0.12
* 7	6.2	96.6				0.0							0.0					0.0	0.30	*	0.10		0.54	0.19
* 8	6.3	96.7				0.0							0.0					0.0	0.15		0.10		0.48	0.35
* 9	6.7	96.5	0.00	0.00	0.00	0.0	0.00		0.00		0.00		0.0	0.00		0.00		0.0	0.41	*	0.10		0.60	0.15
10	7.0	96.0	0.60	1.10	0.19	0.5	0.60		0.65		0.49		0.5	0.40		0.32		0.2	0.22		0.12		0.08	0.03
11	7.3	95.9	0.12	0.12	0.14	0.3	0.29		0.28		0.29		0.3	0.34		0.34		0.4	0.37		0.37		0.33	0.35
* 12	7.6	95.9	0.01	0.03	0.14	0.1	0.14		0.23		0.28		0.8	0.49	*	0.61		1.6	1.94	*	1.67		9.89	5.31
13	7.9	95.9	0.22	0.22	0.43	0.9	0.82		0.80		0.88		1.0	1.29	*	1.28	*	2.2	1.93		1.94		2.70	2.82
14	8.2	95.8	0.43	0.42	0.76	1.4	1.52		1.48		1.37		2.5	2.32		2.30		3.3	3.36		3.39		4.46	4.73
15	8.5	95.8	0.79	0.78	1.30	2.4	2.27		2.21		2.35		2.5	3.01	*	2.99		4.1	3.71		3.73		3.99	4.19
16	8.8	95.7	0.40	0.39	0.75	1.3	1.48		1.43		1.27		2.7	2.32		2.30		3.3	3.47		3.52		4.84	5.16
17	9.1	95.7	0.28	0.28	0.63	1.1	1.09		1.06		1.08		1.6	1.76		1.75		2.9	2.73		2.75		3.98	4.19
18	9.4	95.7	0.20	0.19	0.52	0.9	0.98		0.95		0.88		2.0	1.85		1.83		3.4	3.45		3.49		6.43	6.83
19	9.7	95.6	0.35	0.35	0.78	1.3	1.32		1.29		1.27		2.0	2.09		2.08		3.3	3.17		3.20		4.49	4.74
20	10.0	95.6	0.67	0.66	1.15	1.9	1.85		1.80		1.86		2.1	2.40		2.38		3.1	2.88		2.89		2.98	3.13
21	10.3	95.7	0.69	0.68	1.04	1.8	2.08		2.01		1.76		3.4	2.84		2.82		3.4	3.63		3.67		4.09	4.36
22	10.6	95.6	0.40	0.40	0.90	1.5	1.42		1.39		1.47		1.8	2.15		2.13		3.4	3.09		3.10		4.06	4.26
23	10.9	95.6	0.31	0.31	0.72	1.2	1.21		1.17		1.17		1.8	1.93		1.91		3.1	2.95		2.98		4.24	4.47
24	11.2	95.6	0.34	0.33	0.78	1.3	1.35		1.31		1.27		2.2	2.22		2.20		3.6	3.52		3.55		5.28	5.59
25	11.5	95.5	0.74	0.74	1.25	2.0	1.85		1.81		1.96		1.8	2.25	*	2.23	*	2.8	2.50		2.51		2.33	2.44
26	11.8	95.5	0.43	0.42	0.81	1.3	1.29		1.26		1.27		1.6	1.77		1.75		2.4	2.26		2.28		2.55	2.69
27	12.1	95.5	0.03	0.03	0.19	0.3	0.34		0.33		0.29		1.2	1.03		1.02		3.2	3.35		3.39		13.04	13.91
28	12.4	95.5	0.04	0.04	0.19	0.3	0.38		0.36		0.29		1.5	1.05	*	1.04	*	2.7	3.09		3.14		10.52	11.32
29	12.7	95.5	0.07	0.06	0.19	0.3	0.36		0.34		0.29		0.9	0.71		0.70		1.3	1.42		1.44		2.88	3.08
30	13.0	95.7	0.07	0.07	0.12	0.2	0.23		0.23		0.20		0.4	0.33		0.32		0.4	0.43		0.44		0.50	0.54
* 31*	13.3	95.8	0.72	1.12	0.59	1.1	0.72	*	1.05		1.08		0.2	0.48	*	0.69	*	0.4	0.27		0.37		0.10	0.14
32	13.6	95.8	10.45	9.15	0.81	1.5	1.57		1.50		1.47		0.3	0.31		0.33		0.0	0.04		0.05		0.00	0.00
* 33	13.9	95.9	0.94	2.21	0.77	1.6	0.75	*	1.57		1.57		0.1	0.44	*	0.87	*	0.4	0.20		0.38		0.06	0.11
* 34	14.2	95.9	0.02	0.02	0.14	0.1	0.08		0.08		0.28		0.1	0.15		0.15		0.3	0.25		0.25		0.40	0.42
35	14.5	95.9	0.10	0.10	0.10	0.2	0.20		0.20		0.20		0.0	0.21	*	0.21	*	0.2	0.19		0.19		0.14	0.15
36	14.6	96.5	0.00	0.00	0.00	0.0	0.00		0.00		0.00		0.0	0.00		0.00		0.2	0.20		0.20		0.28	0.30
37	14.9	96.6				0.0							0.0					0.0	0.14		0.14		0.26	0.27
38	15.1	96.7				0.0							0.0					0.0	0.07		0.07		0.23	0.24
39	15.2	96.7				0.0							0.0					0.0	0.07		0.07		0.23	0.24
40	16.2	98.1				0.0							0.0					0.0	0.00		0.00		0.00	0.00
41	17.5	99.1				0.0							0.0					0.0						
42	17.6	99.7				0.0							0.0					0.0						
Total							2	*	0	*	0	*		8	*	6	*		3	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5d. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 6.

Calibration details for Lower Turner Creek

Transect 6

		WSE (ft)	96.86		96.61				96.82				97.17				99.47	
		Disch (cfs)	2		5				9				18				45	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	* Rev	*	Meas	Orig	* Rev	*	Meas	Orig	* Rev	*	Orig	Rev
	1	0.0	99.7			0.0				0.0				0.0				0.00	
	2	0.1	99.1			0.0				0.0				0.0				0.12	
	3	1.0	98.7			0.0				0.0				0.0	0.00			0.19	
	4	1.9	98.0			0.0	0.00			0.0	0.00			0.0	0.16		0.00	0.29	0.00
	5	2.8	97.0			0.0	0.22	*		0.0	0.36	*		0.0	0.45	*	0.03	0.41	0.07
	6	3.6	97.2	0.00		0.0	0.09		0.00	0.0	0.28	*	0.00	0.0	0.40	*	0.00	0.39	0.06
	7	3.7	96.6	0.23	0.00	0.0	0.41	*	0.02	0.0	0.49	*	0.04	0.0	0.54	*	0.07	0.46	0.09
*	8	4.0	96.2	0.36	0.04	0.0	0.06		0.06	0.4	0.02	*	0.08	** 0.1	0.00		0.10	0.00	0.11
	9	4.3	96.1	0.44	0.77	0.6	0.28	*	0.57	0.5	0.20	*	0.44	0.3	0.12		0.31	0.05	0.17
*	10	4.6	96.2	1.12	0.96	1.0	1.01		1.08	1.5	0.89	*	1.10	** 0.9	0.69	*	1.07	0.39	0.90
	11	4.9	96.2	1.62	1.41	1.5	1.55		1.58	1.8	1.40	*	1.61	1.5	1.13	*	1.56	0.67	1.32
	12	5.2	96.1	2.03	1.62	2.0	2.03		1.91	1.8	1.89		2.02	2.2	1.57	*	2.04	0.97	1.82
	13	5.5	96.1	2.53	1.46	2.0	3.02	*	2.09	2.4	3.15	*	2.49	3.0	3.01		2.89	2.23	3.11
	14	5.8	96.0	2.45	1.23	1.8	3.17	*	1.91	2.3	3.48	*	2.40	3.1	3.52		2.97	2.82	3.48
	15	6.1	96.0	2.48	1.10	1.7	3.43	*	1.83	2.3	3.92	*	2.42	3.3	4.17	*	3.16	3.58	3.97
	16	6.4	96.0	2.30	0.96	1.5	3.30	*	1.66	2.2	3.87	*	2.24	3.1	4.24	*	3.01	3.77	3.93
	17	6.7	96.0	2.04	0.99	1.4	2.71	*	1.56	2.1	3.02	*	2.00	2.5	3.11	*	2.52	2.55	3.01
	18	7.0	96.0	2.07	1.04	1.4	2.69	*	1.61	2.3	2.96	*	2.03	2.4	3.01	*	2.51	2.42	2.94
	19	7.3	96.0	1.81	0.60	0.9	2.96	*	1.19	** 2.3	3.78	*	1.75	** 2.3	4.58	*	2.60	4.65	3.87
*	20	7.6	96.0	2.23	1.11	1.2	3.59	*	1.81	** 2.5	4.53	*	2.36	3.0	5.41	*	3.03	5.40	3.74
*	21	7.9	96.0	2.07	0.49	1.0	3.63	*	1.11	2.4	4.84	*	1.78	** 2.9	6.16	*	2.94	6.69	5.02
	22	8.2	96.0	2.25	0.70	1.2	3.81	*	1.44	2.3	4.97	*	2.17	3.3	6.16	*	3.33	6.46	5.17
	23	8.5	96.0	2.34	0.68	1.2	4.09	*	1.46	** 2.4	5.45	*	2.25	3.5	6.94	*	3.54	7.52	5.70
*	24	8.8	96.0	2.06	0.82	0.9	3.99	*	1.55	** 2.4	5.67	*	2.21	3.1	7.77	*	3.17	9.31	4.52
	25	9.1	96.0	2.04	0.72	1.2	3.21	*	1.38	2.0	3.98	*	1.98	2.9	4.67	*	2.86	4.54	4.10
*	26	9.4	96.2	1.26	1.07	1.1	1.09		1.06	2.0	0.93	*	1.00	** 0.9	0.69	*	0.88	0.37	0.66
	27	9.7	96.3	1.82	0.46	0.9	3.43	*	1.06	0.0	4.78	*	1.73	** 3.0	6.42	*	2.89	7.48	5.03
*	28	10.0	96.3	1.31	0.25	0.6	3.07	*	0.74	0.9	4.91	*	1.40	** 3.0	7.78	*	2.82	11.25	6.26
*	29	10.3	96.2	0.76	0.17	0.4	1.96	*	0.56	0.3	3.35	*	1.16	** 2.5	5.74	*	2.59	9.21	6.60
	30	10.6	96.2	0.34	0.01	0.0	1.96	*	0.10	0.3	5.57	*	0.32	1.3	17.40	*	1.22	61.82	6.34
	31	10.9	96.3	0.33	0.04	0.0	1.04	*	0.14	0.3	2.02	*	0.32	0.8	4.03	*	0.76	7.89	2.17
	32	11.2	96.3	0.11	0.02	0.0	0.24	*	0.06	0.1	0.37	*	0.10	0.2	0.56	*	0.19	0.78	0.38
	33	11.5	96.2	0.11	0.05	0.0	0.14		0.08	0.1	0.15		0.10	0.0	0.16		0.13	0.13	0.15
	34	11.8	96.1	0.12	0.06	0.0	0.15		0.09	0.0	0.16		0.11	0.0	0.16		0.14	0.13	0.16
	35	11.9	97.2	0.00	0.00	0.0	0.02		0.00	0.0	0.07		0.00	0.0	0.10		0.00	0.10	0.08
	36	12.0	98.0			0.0	0.00			0.0	0.00			0.0	0.04			0.07	0.00
	37	12.9	98.8			0.0				0.0				0.0	0.00			0.04	
	38	13.0	99.4			0.0				0.0				0.0				0.01	
	Total						22	*	4 *		27	*	8 *		24	*	0 *		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5e. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 7.

Calibration details for Lower Turner Creek

Transect 7

		WSE (ft)	96.96		97.05					97.13					97.37					97.76	
		Disch (cfs)	2		5					9					18					45	
	Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
	1	0.0	98.9			0.0					0.0					0.0						
	2	0.1	98.4			0.0					0.0					0.0						
	3	1.6	98.1			0.0					0.0					0.0						
	4	2.1	97.9			0.0					0.0					0.0					0.00	0.00
	5	2.2	97.4			0.0					0.0					0.0	0.00		0.00		0.39	0.39
	6	2.4	97.3			0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.15		0.15		0.45	0.46
	7	2.5	97.0	0.00	0.00	0.0	0.15		0.15		0.0	0.27	*	0.27	**	0.4	0.41		0.41		0.63	0.65
	8	3.0	96.9	0.53	0.53	0.5	0.66		0.66		1.0	0.77	*	0.77	**	0.8	0.94		0.94		1.20	1.22
	9	3.5	96.8	1.02	1.02	1.4	1.56		1.56		1.7	2.08	*	2.08	**	2.9	2.92		2.94		4.54	4.65
	10	4.0	97.0	0.00	0.00	0.8	0.84		0.84		0.8	1.22	*	1.21	**	2.0	1.89		1.90		3.35	3.44
	11	4.5	97.0	0.00	0.00	1.2	1.01		1.00		0.7	1.12	*	1.12	**	1.5	1.27		1.28		1.48	1.53
	12	5.0	96.9	1.21	1.21	1.3	1.24		1.23		1.1	1.27		1.27		1.4	1.32		1.33		1.38	1.41
*	13	5.5	96.8	0.29	0.87	0.4	0.69	*	1.19	**	1.5	1.22		1.49		1.8	2.38	*	1.95		5.70	2.78
	14	6.0	96.9	1.71	1.71	1.8	2.01		2.00		2.3	2.26		2.26		2.5	2.61		2.62		3.13	3.20
	15	6.5	96.9	1.07	1.07	1.5	1.80		1.80		2.2	2.56		2.56		3.7	3.89		3.91		6.69	6.85
	16	7.0	96.9	1.38	1.39	1.5	1.77		1.77		2.2	2.10		2.10		2.4	2.59		2.59		3.36	3.44
	17	7.5	96.7	1.42	1.42	1.8	2.17	*	2.16	**	2.7	2.89		2.88		3.8	4.06		4.07		6.30	6.44
	18	8.0	96.7	1.47	1.48	1.7	2.22	*	2.22	**	3.2	2.94		2.93		3.6	4.09		4.11		6.28	6.41
	19	8.5	96.7	2.35	2.35	2.4	2.54		2.54		2.7	2.72		2.71		2.9	2.95		2.96		3.25	3.32
	20	9.0	96.7	1.37	1.38	1.6	2.12	*	2.11	**	3.1	2.83		2.83		3.5	4.00		4.02		6.27	6.40
	21	9.5	96.8	1.86	1.86	2.2	2.47		2.47		2.8	3.02		3.01		3.7	3.82		3.84		5.17	5.29
	22	10.0	96.9	1.79	1.79	1.9	2.04		2.04		2.2	2.26		2.25		2.5	2.55		2.56		2.96	3.03
	23	10.5	96.8	1.10	1.10	1.3	1.57	*	1.57	**	2.0	2.01		2.01		2.5	2.70		2.71		3.94	4.03
	24	11.0	96.8	1.96	1.97	2.1	2.17		2.17		2.2	2.35		2.35		2.6	2.59		2.60		2.91	2.98
	25	11.5	96.7	1.72	1.72	1.8	1.97		1.97		2.2	2.19		2.19		2.4	2.48		2.49		2.90	2.97
	26	12.0	96.8	1.74	1.74	1.8	2.04		2.03		2.4	2.29		2.29		2.5	2.64		2.65		3.16	3.23
	27	12.5	96.8	1.74	1.74	2.0	2.00		1.99		1.9	2.22		2.21		2.6	2.51		2.52		2.93	3.00
	28	13.0	96.8	1.51	1.51	1.9	1.99		1.99		2.0	2.42	*	2.41		3.1	3.04		3.06		4.08	4.19
	29	13.5	96.8	1.54	1.54	1.9	1.95		1.94		1.9	2.30	*	2.30	**	2.9	2.82		2.83		3.63	3.72
	30	14.0	96.9	0.80	0.80	0.9	1.20	*	1.20	**	1.8	1.58		1.58		1.9	2.20		2.20		3.35	3.42
	31	14.5	96.8	0.12	0.12	0.1	0.21		0.21		0.7	0.31	*	0.31	**	0.3	0.48		0.48		0.86	0.87
	32	15.0	96.8	0.10	0.10	0.0	0.10		0.10		0.1	0.10		0.10		0.1	0.10		0.10		0.10	0.10
	33	15.5	96.9	0.03	0.03	0.0	0.07		0.07		0.0	0.09		0.09		0.0	0.13		0.13		0.19	0.19
	34	15.6	97.4	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.00		0.00		0.10	0.11
	35	16.9	98.0			0.0					0.0					0.0					0.00	0.00
	36	17.5	98.8			0.0					0.0					0.0						
	37	20.9	99.7			0.0					0.0					0.0						
	38	20.9	100.1			0.0					0.0					0.0						
	Total						6	*	6	*		8	*	7	*		1	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5f. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 8.

Calibration details for Lower Turner Creek

Transect 8

	WSE (ft)		97.41		97.47				97.65				97.87				98.33	
	Disch (cfs)		2		3				7.1				15.5				45	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	100.3			0.0																
2	0.1	99.8			0.0																
3	1.6	99.3			0.0										0.0	0.00				0.00	0.00
4	2.1	97.9			0.0										0.0	-0.02				-0.07	0.09
5	2.6	97.9			0.0										0.0	-0.02		0.00		-0.07	0.09
6	3.0	97.8			0.0					0.0	0.00				0.0	-0.05		0.03		-0.08	0.10
7	3.5	97.7			0.0	0.00				0.0	-0.01		0.00		0.0	-0.07		0.06		-0.09	0.11
8	4.0	97.5			0.0	-0.03				0.0	-0.07		0.06		0.0	-0.10		0.10		-0.11	0.14
* 9	4.5	97.5	0.00	0.00	0.0	-0.03		0.00		0.0	-0.07		0.06		-0.1	-0.10		0.10		-0.11	0.14
* 10	5.0	97.4	-0.09	0.10	0.0	-0.10		0.10		-0.1	-0.10		0.10		-0.1	-0.09		0.10		-0.07	0.08
11	5.5	97.2	0.08	0.08	0.1	0.13		0.10		0.0	0.16		0.14		0.0	0.18		0.18		0.17	0.21
12	6.0	97.0	0.28	0.29	0.3	0.31		0.30		0.3	0.31		0.31		0.3	0.28		0.29		0.20	0.24
* 13	6.5	97.3	0.14	0.14	0.2	0.54	*	0.25		1.4	1.21		0.83	*	1.9	2.89	*	2.23		7.23	7.51
14	7.0	97.1	0.12	0.12	0.2	0.39		0.20		0.6	0.81	*	0.60		1.5	1.73		1.49		3.73	4.48
15	7.4	97.2	0.46	0.46	0.6	0.91	*	0.62		1.2	1.32		1.12		1.7	1.86		1.75		2.33	2.81
16	7.7	96.9	0.86	0.88	1.2	1.21		1.02		0.9	1.42	*	1.31	*	1.9	1.55	*	1.53		1.38	1.64
17	8.0	96.9	0.34	0.35	0.5	0.84	*	0.51		1.2	1.41		1.13		2.1	2.36		2.14		3.68	4.44
18	8.3	96.8	0.20	0.20	0.3	0.54	*	0.31		0.8	0.96		0.75		1.5	1.72		1.54		2.96	3.57
19	8.6	96.8	0.35	0.35	0.5	0.71	*	0.48		0.8	1.05	*	0.88		1.5	1.51		1.41		1.94	2.33
* 20	8.9	96.8	0.13	0.69	0.2	0.59	*	0.92	**	1.7	1.48		1.63		2.5	3.98	*	2.53		11.60	4.00
* 21	9.2	97.2	0.04	0.17	0.1	0.34	*	0.30		0.9	1.22	*	0.93		3.3	4.88	*	2.43	*	24.32	7.83
* 22	9.5	97.2	0.07	0.12	0.2	0.29		0.22		0.2	0.67	*	0.78	*	2.2	1.65	*	2.26		4.30	8.31
* 23	9.8	96.9	0.15	0.21	0.3	0.33		0.30		0.2	0.51	*	0.61	*	1.1	0.79	*	1.08		1.12	2.04
24	10.1	96.8	0.18	0.18	0.3	0.42		0.26		0.4	0.68	*	0.55		1.2	1.10		1.00		1.65	1.97
25	10.4	96.9	0.30	0.30	0.5	0.78	*	0.46		0.9	1.37	*	1.08		2.4	2.41		2.15		4.01	4.80
26	10.7	96.9	0.82	0.83	1.1	1.50	*	1.08		1.7	2.06	*	1.79		2.7	2.73		2.60		3.14	3.78
27	11.0	96.9	0.97	0.98	1.2	1.57	*	1.21		1.8	2.01		1.80		2.4	2.45		2.38		2.52	3.03
28	11.3	96.9	0.69	0.70	0.9	1.35	*	0.94		1.8	1.96		1.66		2.5	2.74		2.58		3.39	4.09
29	11.6	96.7	0.70	0.71	0.9	1.35	*	0.94		1.8	1.92		1.64		2.4	2.64		2.50		3.20	3.86
30	11.9	96.7	0.68	0.69	0.9	1.33	*	0.92		1.7	1.92		1.63		2.5	2.69		2.53		3.32	4.00
31	12.2	96.7	0.86	0.87	1.1	1.47	*	1.10		1.7	1.95		1.71		2.4	2.46		2.37		2.65	3.19
32	12.5	96.8	0.61	0.61	0.8	1.24	*	0.84		1.7	1.84		1.55		2.4	2.67		2.50		3.45	4.16
33	12.8	96.7	0.48	0.48	0.6	1.01	*	0.67		1.6	1.53		1.28		1.9	2.28		2.12		3.05	3.69
34	13.1	96.7	0.43	0.43	0.6	0.82	*	0.58		0.9	1.16	*	0.99		1.6	1.59		1.50		1.91	2.29
35	13.4	96.7	0.45	0.46	0.6	0.80		0.59		0.9	1.09		0.95		1.4	1.41		1.35		1.58	1.89
36	13.7	96.6	0.45	0.46	0.6	0.76		0.58		0.8	1.01	*	0.89		1.3	1.26		1.22		1.35	1.62
37	14.0	96.6	0.55	0.56	0.7	0.78		0.65		0.7	0.91	*	0.84		1.1	0.99		0.99		0.89	1.06
38	14.1	97.9	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.06		0.00		0.29	0.35
39	14.2	98.6			0.0					0.0					0.0	0.00		0.00		0.00	0.00
40	14.7	99.7			0.0					0.0					0.0						
41	15.0	99.9			0.0					0.0					0.0						
Total						17	*	1	*		12	*	4	*		6	*	1	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 5g. Summary of calibration details for original and revised input decks, Lower Turner Creek Transect 9.

Calibration details for Lower Turner Creek

Transect 9

	WSE (ft)		97.41		97.48				97.66				97.88				98.31	
	Disch (cfs)		2		3.1				7.3				16.2				45	
Pt	Sta	Elev	Orig	Rev	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Meas	Orig	*	Rev	*	Orig	Rev
1	0.0	99.4			0.0					0.0					0.0						
2	0.1	99.2			0.0					0.0					0.0	0.00				0.00	0.00
3	0.4	97.9	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.03		0.00		0.18	0.18
4	0.9	97.1	0.14	0.14	0.2	0.29		0.20		0.4	0.46		0.39		0.7	0.76		0.71		1.32	1.35
5	1.2	97.1	0.13	0.13	0.2	0.33		0.21		0.5	0.56		0.46		0.9	1.03		0.94		2.06	2.11
6	1.5	97.1	0.21	0.21	0.3	0.47		0.31		0.7	0.75		0.63		1.1	1.26		1.17		2.26	2.31
7	1.8	97.1	0.28	0.28	0.4	0.59		0.40		0.8	0.92		0.79		1.4	1.52		1.41		2.63	2.69
8	2.1	97.1	0.35	0.35	0.5	0.73	*	0.51		1.0	1.14		0.98		1.7	1.85		1.73		3.16	3.24
9	2.4	96.9	0.32	0.32	0.5	0.70		0.47		0.8	1.11	*	0.94		1.9	1.86		1.73		3.33	3.41
10	2.7	96.9	0.23	0.23	0.4	0.63	*	0.37		0.8	1.16	*	0.94		2.3	2.32		2.10		5.21	5.34
11	3.0	96.9	0.31	0.31	0.5	0.79	*	0.49		1.1	1.41	*	1.15		2.5	2.67		2.43		5.61	5.75
12	3.3	96.9	0.38	0.38	0.6	0.94	*	0.59		1.3	1.63	*	1.34		2.8	3.00		2.75		6.08	6.23
13	3.6	96.8	0.46	0.46	0.7	1.08	*	0.70		1.5	1.82	*	1.51		3.0	3.24		2.98		6.28	6.43
14	3.9	96.8	0.55	0.55	0.8	1.19	*	0.80		1.6	1.91		1.62		3.0	3.22		2.98		5.79	5.93
15	4.2	96.8	0.39	0.39	0.6	1.02	*	0.62		1.6	1.83		1.49		3.1	3.55		3.23		7.69	7.87
16	4.5	96.9	0.55	0.55	0.8	1.21	*	0.81		1.7	1.95		1.65		3.0	3.29		3.06		5.95	6.09
17	4.8	96.9	0.75	0.75	1.0	1.39	*	1.01		1.8	2.01		1.76		2.8	3.00		2.84		4.61	4.72
18	5.1	96.9	0.79	0.79	1.0	1.36	*	1.03		1.8	1.87		1.67		2.4	2.63		2.51		3.73	3.82
19	5.4	96.9	0.68	0.68	0.9	1.32	*	0.94		1.9	1.97		1.71		2.7	3.05		2.87		4.91	5.02
20	5.7	96.9	0.71	0.71	0.9	1.33	*	0.96		2.0	1.94		1.70		2.5	2.92		2.75		4.52	4.62
21	6.0	96.9	0.63	0.63	0.8	1.24	*	0.88		2.0	1.86		1.61		2.4	2.90	*	2.72		4.71	4.82
22	6.3	96.9	0.62	0.62	0.8	1.22	*	0.86		1.9	1.83		1.58		2.4	2.84		2.67		4.60	4.71
23	6.6	97.0	0.54	0.54	0.7	1.11	*	0.76		1.8	1.71		1.47		2.3	2.77	*	2.59		4.73	4.84
24	6.9	97.0	0.45	0.45	0.6	0.94	*	0.65		1.5	1.46		1.25		2.0	2.38		2.22		4.08	4.18
25	7.2	97.0	0.45	0.45	0.6	0.87	*	0.62		1.2	1.29		1.12		1.8	1.99		1.87		3.19	3.27
26	7.5	97.0	0.30	0.30	0.4	0.67	*	0.45		1.2	1.10		0.92	**	1.5	1.89	*	1.74		3.48	3.56
27	7.8	97.1	0.21	0.21	0.3	0.49		0.32		0.8	0.81		0.68		1.2	1.43		1.32		2.70	2.77
28	8.1	97.1	0.06	0.06	0.1	0.25		0.11		0.7	0.61		0.40	**	1.1	1.65	*	1.25		5.63	4.94
29	8.4	97.0	0.05	0.05	0.1	0.19		0.10		0.3	0.45		0.33		1.1	1.18		1.03		3.83	3.92
* 30	8.7	97.0	0.01	0.01	0.0	0.07		0.02		0.2	0.28		0.17		1.1	1.54	*	1.08		12.92	10.22
31	9.1	97.9	0.00	0.00	0.0	0.00		0.00		0.0	0.00		0.00		0.0	0.02		0.00		0.12	0.13
32	9.2	98.0			0.0					0.0					0.0	0.00		0		0.10	0.10
33	9.8	99.2			0.0					0.0					0.0					0.00	0.00
34	9.9	99.5			0.0					0.0					0.0						
Total						18	*	0	*		5	*	2	*		5	*	0	*		

Note: an * means the modeled velocity exceeds the measured velocity by 0.2 ft/sec or 20%

Table 6. Summary of Calibration Details, Lower Turner Creek.

Transect Number	3	4	5	6	7	8	9
DISCHARGE							
	6	7	5	4	4	3	2
Meas.	11	12	9	9	7	7	7
	21	23	18	18	16	16	16
	7	7	4	4	4	3	2
Calc.	11	12	9	9	8	7	7
	22	23	19	18	16	15	16
	5	7	5	5	5	5	5
Given	9	12	9	9	9	9	9
	18	22	18	18	18	18	18
Stage (given)							
	97.97	98.01	96.32	96.61	97.05	97.47	97.48
	98.09	98.12	96.61	96.82	97.13	97.65	97.66
	98.35	98.40	96.70	97.17	97.37	97.87	97.88
Plotting Stage (given)							
	0.510	0.550	0.740	0.460	0.300	0.400	0.410
	0.630	0.660	1.030	0.670	0.380	0.580	0.590
	0.890	0.940	1.120	1.020	0.620	0.800	0.810
Ratio of Measured vs Predicted Discharge (given)							
	0.959	0.980	1.023	0.963	0.900	0.900	1.008
	1.070	1.021	0.956	1.073	1.160	1.160	0.983
	0.975	0.993	1.023	0.967	0.952	0.952	1.009
Mean Error of Stage/Discharge Relationship for Calculated Q							
	3.12	4.90	<1	3.80	6	<1	3.95
Mean Error of Stage/Discharge Relationship for Given Q							
	4.48	1.40	3.04	4.70	9.8	<1	1.2
Stage/Discharge Relationship (S vs Q) S=A*Q**B+SZF							
A=	0.198	0.210	0.462	0.213	0.132	0.250	0.294
B=	0.485	0.477	0.316	0.534	0.544	0.430	0.366
SZF=	97.46	97.46	95.58	96.15	96.75	97.07	97.07
B Coefficient log/log Relationship (calculated)							
	2.063	2.090	3.150	1.800	1.800	2.320	2.730

APPENDIX I

Summary of Consultation

PROJECT: UR Cultus Mountain
STREAM: Upper Turner Creek.
FERC #: _____

DOCUMENTATION OF CONSULATION WITH WDW ON INSTREAM FLOW STUDIES - ALL BLANKS MUST BE SIGNED BY WDW PERSONNEL FOR COMPLETION OF CONSULTATION.

SCOPING

Study site(s) approved _____ date __/__/__
Transects approved _____ date __/__/__
Target measurement flows approved HCB date 7/24/96

HYDRAULIC MODEL

Measured flows approved HCB date 7/24/96
Hydraulic model approved for the following ranges:
T1 3 flow 1cfs-12cfs T1 1 flow 12-18cfs
T2-T5 3 flow 1cfs-18cfs

HCB date 7/24/96

HABITAT PREFERENCE CURVES

Preference curve ~~s~~study design approved (inc. species, lifestages) HCB date 7/24/96

Preference curve study completed HCB date 7/24/96

Preference curves approved (copy to be attached)

_____ date __/__/__

INSTREAM FLOWS - LIST BY TIME PERIOD:

MONTH/DATE	to	MONTH/DATE	MINIMUM FLOW (cfs)
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____

Approved by Department of Wildlife

_____
date __/__/__
Instream Flow Biologist

_____ date __/__/__
Regional Habitat Biologist

PROJECT: Cultus
STREAM: Lower Turner Creek
FERC #: _____

DOCUMENTATION OF CONSULATION WITH WDW ON INSTREAM FLOW STUDIES - ALL BLANKS MUST BE SIGNED BY WDW PERSONNEL FOR COMPLETION OF CONSULTATION.

SCOPING

Study site(s) approved _____ date __/__/__
Transects approved _____ date __/__/__
Target measurement flows approved HOB date 7/24/96

HYDRAULIC MODEL

Measured flows approved HOB date 7/24/96
Hydraulic model approved for the following ranges:
T5 3flow 4-35cfs; T5 1flow 2-3cfs
T3-4,6-9 2-35cfs

HOB date 7/24/96

HABITAT PREFERENCE CURVES

Prefernce curve sstsudy design approved (inc. species, lifestages) HOB date 7/24/96

Preference curve study completed HOB date 7/24/96

Preference curves approved (copy to be attached)

_____ date __/__/__

INSTREAM FLOWS - LIST BY TIME PERIOD:

MONTH/DATE	to	MONTH/DATE	MINIMUM FLOW (cfs)
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____
___/___	to	___/___	_____

Approved by Department of Wildlife

_____
date __/__/__
Instream Flow Biologist

_____ date __/__/__
Regional Habitat Biologist

PROJECT: Cultus MTN

STREAM: LOWER MUNDT CREEK

FERC#: _____

DOCUMENTATION OF CONSULTATION WITH WDFW ON INSTREAM FLOW STUDIES - ALL BLANKS MUST BE SIGNED BY WDFW PERSONNEL FOR COMPLETION OF CONSULTATION

SCOPING

Study site(s)

approved _____ date __/__/__

Transects

approved _____ date __/__/__

Target measurement flows

approved HOB date 7/24/96

HYDRAULIC MODEL

Measured flows

approved HOB date 7/24/96

Hydraulic model approved for the following ranges:

T1-5, T7 3-70cfs 3flow

T6 4-70cfs 3flow 3flow 3cfs

HOB date 7/24/96

HABITAT PREFERENCE CURVES

Preference curve study design approved (incl. species, lifestages) HOB date 7/24/96

Preference curve study completed HOB date 7/24/96

Preference curves approved (copy to be attached) _____ date __/__/__

INSTREAM FLOWS - LIST BY TIME PERIOD:

MONTH/DATE	to	MONTH/DATE	MINIMUM FLOW (cfs)
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____

FLUSHING FLOW REQUIREMENT - >48 HRS/3 YRS

_____ cfs

Approved by Department of Fish and Wildlife

_____ date __/__/__

Instream Flow Biologist

_____ date __/__/__

Regional Habitat Biologist

PROJECT: Cultus Mtn

STREAM: Upper Mundt Cr.

FERC#: _____

DOCUMENTATION OF CONSULTATION WITH WDFW ON INSTREAM FLOW STUDIES - ALL BLANKS MUST BE SIGNED BY WDFW PERSONNel FOR COMPLETION OF CONSULTATION

SCOPING

Study site(s)

approved _____ date __/__/__

Transects

approved _____ date __/__/__

Target measurement flows

approved HCB date 7/24/96

HYDRAULIC MODEL

Measured flows

approved HCB date 7/24/96

Hydraulic model approved for the following ranges:

T1-4 3flow 3-32cfs
T5 3flow 3-28cfs 1flow 30-32cfs T6 1flow 20-32cfs
T6 3flow 3-19cfs HCB date 7/24/96

HABITAT PREFERENCE CURVES

Preference curve study design approved (incl. species, lifestages) HCB date 7/24/96

Preference curve study completed HCB date 7/24/96

Preference curves approved (copy to be attached) _____ date __/__/__

INSTREAM FLOWS - LIST BY TIME PERIOD:

MONTH/DATE	to	MONTH/DATE	MINIMUM FLOW (cfs)
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____

FLUSHING FLOW REQUIREMENT - >48 HRS/3 YRS

_____ cfs

Approved by Department of Fish and Wildlife

_____ date __/__/__
Instream Flow Biologist

_____ date __/__/__
Regional Habitat Biologist

PROJECT: CULTUS MOUNTAIN

STREAM: GILLIGAN CR

FERC#: –

DOCUMENTATION OF CONSULTATION WITH WDFW ON INSTREAM FLOW STUDIES - ALL BLANKS MUST BE SIGNED BY WDFW PERSONNEL FOR COMPLETION OF CONSULTATION

SCOPING

Study site(s)

approved _____ date __/__/__

Transects

approved _____ date __/__/__

Target measurement flows

approved HAB date 7/24/96

HYDRAULIC MODEL

Measured flows

approved HAB date 7/24/96

Hydraulic model approved for the following ranges:

T1-3, 5-7 3 flow. 5-90 cfs
T4 3 flow 7-65 cfs T4 1 flow 2-6 cfs

T4. 1 flow 65-90 cfs per HAB 8/2/96

HAB date 7/24/96

HABITAT PREFERENCE CURVES

Preference curve study design approved (incl. species, lifestages) HAB date 7/24/96

Preference curve study completed HAB date 7/24/96

Preference curves approved (copy to be attached) _____ date __/__/__

INSTREAM FLOWS - LIST BY TIME PERIOD:

MONTH/DATE	to	MONTH/DATE	MINIMUM FLOW (cfs)
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____
____/____	to	____/____	_____

FLUSHING FLOW REQUIREMENT - >48 HRS/3 YRS

_____ cfs

Approved by Department of Fish and Wildlife

_____ date __/__/__
Instream Flow Biologist

_____ date __/__/__
Regional Habitat Biologist

Cascades
Environmental
Services, Inc.

Fisheries and Natural
Resource Consultants

Mr. Brad Spangler
Public Utility District #1 of Skagit County
1415 Freeway Drive
Mount Vernon, WA 98273-2492

Dear Brad,

Enclosed is a summary of consultation for the meeting of the Review Panel for Skagit Water Supply Instream Flow Supply on April 18, 1995. The summary of consultation is a narrative of the discussions which took place at this meeting and a description of the transects in each stream which were approved for the instream flow study.

Comments on the summary of consultation will be accepted until May 19, 1995. Please send written comments or telephone Chris Fairbanks at Cascades Environmental Services, Inc. (CES) If no comments are received by this date it will be assumed that this summary of consultation is acceptable to all parties.

If you have any questions please call.

Sincerely,

Chris Fairbanks

cc: Brad Spangler, Skagit PUD #1
Bob Powell, Skagit PUD #1
Larry Wasserman, Skagit System Cooperative
Art Stendal, WA Dept. of Fish and Wildlife
Hal Beecher, WA Dept. of Fish and Wildlife
Jeff Marti, WA Dept. of Ecology
Steve Hershey, WA Dept of Ecology
Pete Rittmueller, Cascades Environmental Services, Inc.
John Blum, Cascades Environmental Services, Inc.

1111 North Forest Street • Bellingham, Washington 98225-5119 • (360) 671-1150 • FAX (360) 671-1152

SUMMARY OF CONSULTATION
SKAGIT WATER SUPPLY IFIM TRANSECT SELECTION

The Skagit Water Supply Instream Flow Review Panel met in the Public Utility District #1 of Skagit County (District) office in Mt. Vernon on April 18, 1995 at 8:30. In attendance were the following individuals:

Attendance of the Instream Flow Review Panel for Skagit Water Supply IFIM Study.		
NAME	AFFILIATION	TELEPHONE
Bob Powell	Public Utility District #1 of Skagit County	(360) 424-7104
Brad Spangler	Public Utility District #1 of Skagit County	(360) 424-7104
Larry Wasserman	Skagit System Cooperative (SSC)	(360) 466-7250
Art Stendal	WA Dept. of Fish & Wildlife (WDFW)	(360) 424-1260
Pete Rittmueller	Cascades Environmental Services, Inc. (CES)	(360) 671-1150
John Blum	CES	(360) 671-1150
Chris Fairbanks	CES	(360) 671-1150

Washington Department of Ecology

Washington Department of Ecology (DOE) was not in attendance. Jeff Marti, DOE, in a telephone conversation with Chris Fairbanks, CES, explained that DOE would defer to the judgement of Art Stendal, WDFW and Larry Wasserman, SSC, on transect selection for the Skagit Water Supply IFIM Study.

A discussion followed which emphasized the importance of keeping DOE informed and involved with the process of this study. It was requested that DOE attend future discussions. Chris Fairbanks agreed to notify both Jeff Marti and Steve Hershey, DOE, of future discussions.

Fish Preference Curves and Electroshocking

Anadromous and resident fish preference curves will be based upon published information, in particular the WDFW 1994 Instream Flow Study Guidelines. Preference curves for both anadromous and resident fish will be modeled in each study stream for all study sites. If anadromous barriers between the study reaches on any of the streams, then resident fish only will be modeled above the barrier.

CES will use data from fish surveys conducted by SSC and WDFW for presence of fish species in the study streams. CES will not conduct electroshocking fish surveys.

Bull Trout

It was agreed by the Review Panel that Bull Trout (*Salvelinus confluentis*) will not be an issue in any of the study streams of this IFIM study.

Pink Salmon

Pete Rittmueller, CES, recommended that pink salmon (*Oncorhynchus gorbuscha*) spawning should be added to the list of target species and life stage in each of the study streams. The Review Panel discussed that if pink salmon were observed in the streams during the study then it should be included as a target species. It was decided that pink salmon should be added to the list of target species in each of the study streams, because the presence of the IFIM crew may not coincide with the presence of pink salmon in the stream.

Barrier Confirmation

A discussion of confirmation of possible barriers between the mouth and diversion in each stream was presented by Pete Rittmueller, CES. Larry Wasserman stated that confirmation of barriers was not important to SSC but, in future discussions of barriers Eric Beamer of SSC should be consulted. Art Stendal was hesitant to confirm possible barriers. Bob Powell stated that barrier confirmation was not important to the District at this time. The conclusion of this discussion was that the IFIM study will be conducted without confirmation of possible barriers between the mouth and diversion structure on each stream. If the results of this study indicate that it would be advantageous that the possible barriers were confirmed, then discussion of this issue would be readdressed.

Temperature

Larry Wasserman opened a discussion of temperature problems in lower Turner Creek. The channel of lower Turner Creek is a low gradient ditch with little riparian cover. During the summer with decreased flow, stream velocities may decline and water temperatures may raise to levels which stress rearing salmonids. Brad Spangler agreed to investigate maintaining temperature data loggers in Turner Creek to collect water temperatures over a period of time.

East Fork Nookachamps Creek

Larry Wasserman questioned whether the District would be allowed to divert water from Mundt and Turner creeks during periods of low flows in the East Fork Nookachamps. If flows in Mundt and Turner creeks exceeded minimum flow requirements but discharge in the East Fork Nookachamps was below flows required for fish, then the additional water would benefit the East Fork Nookachamps. If the District diverted the excess water from Mundt and Turner creeks the East Fork Nookachamps would not benefit from additional water. The discussion concluded that investigating flows in East Fork Nookachamps Creek is outside of the scope of this study and that this question should be discussed in a different forum after this IFIM study has been completed.

Transect Selection

Transects, tentatively selected by CES in each study stream, were presented to the Review Panel by Pete Rittmueller. A field visit to Turner and Mundt creeks to view selected transects and to select transects in lower Turner Creek followed this review. Following are descriptions of the transects which have been approved in each of the study streams. Transect 1 of each study site is downstream of the other transects. Transect numbers increase going upstream.

Gilligan Creek

Seven transects were chosen to represent salmonid habitat in Gilligan Creek.

T-1 **Glide**, 16 feet wide, cobble and gravel substrate.

T-2 **Riffle**, 16 feet wide, cobble and gravel substrate, good spawning gravel.

T-3 **Glide**, pool tailout, 19 feet wide, boulder, cobble and gravel substrate.

T-4 **Pool**, deep pool, 18 feet wide, boulder and cobble substrate.

T-5 **Riffle**, medium gradient, 22.5 feet wide, boulder and cobble substrate.

T-6 **Cascade**, low gradient, 18 feet wide, boulder, cobble, gravel substrate.

T-7 **Pool,** 10 feet wide, narrow fast velocity, medium depth, boulder and cobble substrate.

Salmon Creek

Six transects were selected to represent salmonid habitat in Salmon Creek.

T-1 **Riffle**, 6 ft wide riffle, gravel substrate, (spawning gravel).

T-2 **Glide,** deeper glide, 6 ft wide, gravel substrate.

T-3 **Riffle**, 5 ft wide, cobble substrate.

T-4 **Pool**, 6 ft wide, 0.5 ft deep, cobble, gravel and sand substrate.

T-5 **Glide**, pool tailout, 5 ft wide, cobble and sand substrate.

T-6 **Pool**, 4 ft wide, cobble, gravel and sand substrate.

Turner Creek

Study site #1: During the site visit by the Review Panel six transects were chosen to represent salmonid habitat found in lower Turner Creek. Six transects are in addition to three transects chosen above the culvert where Turner Creek has a more natural riparian zone and channel.

T-1 **Glide,** deeper glide about 100 ft below confluence with "Beaver Creek", mud substrate, 10 ft wide.

T-2 **Glide,** shallower glide about 60 ft below confluence with "Beaver Creek", mud substrate, 9 ft wide.

T-3 **Glide tailout,** below settling pond, 11 ft wide, gravel substrate

T-4 **Glide,** deeper glide, below settling pond, 17 ft wide, mud and gravel substrate.

T-5 **Pool,** above settling pond, 6.5 ft wide, large to small gravel and sand substrate.

T-6 **Riffle,** above settling pond, 6.5 ft wide, large to small gravel and sand substrate.

T-7 **Riffle,** above culvert on private drive, 10.5 ft wide, cobble and gravel substrate.

T-8 **Glide/riffle,** above T-7, 8.5 ft wide, small and large gravel substrate.

T-9 **Pool,** a short distance above T-8, 8 ft wide, small gravel, with some boulders.

Study site #2: Five transects were chosen to represent salmonid habitat in upper Turner Creek in Study Site # 2. Transects T-1 through T-5 are just below the Upper Jeep road.

T-1 **Cascade**, 9 feet wide, boulder and gravel substrate.

T-2 **Riffle**, 8.5 feet wide, cobble and gravel substrate.

T-3 **Glide**, on a pool tailout, 7.5 feet wide, cobble and small gravel substrate.

T-4 **Pool**, 6.5 feet wide, cobble and small gravel substrate, rootwad cover on the left bank.

T-5 **Riffle**, 6.5 feet wide, cobble and gravel substrate, single log parallel to the bank.

Mundt Creek

Study Site #1: Seven transects were chosen to represent salmonid habitat in lower Mundt Creek. Transects T-1 through T-3 are approximately 500 feet below lower quarry bridge. Transects T-4 through T-7 are approximately 800 feet upstream of the quarry bridge. Description of the transects follow.

T-1 **Riffle**, shallow and wide, large gravel and small cobble, boulder substrate.

T-2 **Glide,** 19 feet wide, mixed spawnable substrate, shallow to moderate depth.

T-3 **Pool**, 1.5 to 2.0 feet deep, fine substrate, rootwad cover on the right bank.

T-4 **Riffle**, 17.5 feet wide, mixed spawnable substrate.

T-5 **Glide**, 16.5 feet wide, Small to large gravel, shallow tailout of pool T-F.

T-6 **Pool**, 1.5 feet deep, small to large gravel, rootwad cover on the right bank.

T-7 **Riffle**, 12.5 feet wide, steep fast and narrow, cobble substrate.

Study Site #2: Six transects were chosen to represent salmonid fish habitat in upper Mundt Creek. Transects T-1 through T-3 are approximately 1,000 ft below the jeep road under the power line corridor. Transects T-4 through T-6 are upstream and approximately 250 feet below the upper bridge. Description of the transects follows.

T-1 **Glide**, on a pool tailout, 11.5 feet wide, good spawning gravel for substrate.

T-2 **Riffle**, on a pool tailout, 9 feet wide, boulders to medium gravel substrate.

T-3 **Pool**, 9.5 feet wide, gravel substrate.

T-4 **Glide**, 8.5 feet wide, boulder and cobble substrate.

T-5 **Pool**, 9.5 feet wide, boulder and large gravel substrate.

T-6 **Cascade**, 6.5 feet wide, boulder and mixed gravel substrate.