A Department of Ecology Report

Groundwater Contributions to Siebert Creek (Clallam County) During the Summer of 2003

Abstract

Siebert Creek drains a small watershed in Clallam County on the northern coast of the Olympic Peninsula. During the summer of 2003, the flow in Siebert Creek was primarily groundwater discharge. The changes in streamflow that occurred between its headwaters and its mouth reflect this groundwater interaction.

To investigate groundwater/surface water interactions, I divided Siebert Creek into seven reaches, five on the mainstem with the east and west forks each comprising an additional reach. I established a streamflow-measurement station at the start of each reach and measured streamflow several times between May and October, 2003. An increase in streamflow indicated groundwater was discharging to the stream, while a decrease in streamflow indicated groundwater recharge.

Six of the seven reaches were "gaining" reaches with a positive groundwater discharge. Reach 2 (RM 1.3 to 2.5) was a "losing" reach with streamflow decreasing as water was lost to groundwater (groundwater recharge). With the exception of Reach 2, streamflow increased from upstream to downstream as groundwater entered the stream. Total groundwater discharge from May through September averaged 4.2 cfs (8.3 acre-ft./day). On an area-inch basis, total groundwater contributions to streamflow were relatively consistent from the headwaters through Reach 3 varying between 0.83 and 1.43 inches. Reach 2 lost 1.14 inches of streamflow to groundwater, and Reach 1 (RM 0.6 to 1.3) gained 6.72 inches of groundwater. On an acre-ft./channel mile basis, total groundwater contributions to streamflow were similar from the headwaters through Reach 4 varying between 57 and 90 acre-ft./mile. A large increase in groundwater contribution per mile of channel occurred in Reach 3 where streamflow gained 149 acre-ft./mile. This changed to a streamflow loss (-51 acre-ft./mile) in Reach 2. The greatest groundwater contribution to streamflow occurred in Reach 1 where streamflow increased by 408 acre-ft./mile of channel.

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Introduction

Siebert Creek drains a small watershed on the northern coast of the Olympic Peninsula about seven miles east of Port Angeles. This relatively undeveloped watershed flows directly into the Strait of Juan de Fuca (Figure 1). While timber management is the major activity in the upper basin, some farming occurs in the middle to lower basin. Residential development is increasing, but construction near the stream is limited by the steep, incised nature of the channel, especially in the upper basin. The stream is home to salmon, as well as winter steelhead and cutthroat trout.

During summer, when little rainfall occurs, streamflow is maintained by groundwater. The groundwater is probably enhanced by irrigation and leakage from unlined canals and this probably affects streamflow within the lower three miles of the basin.

Purpose

This study investigates the contribution of groundwater to the summer streamflow in Siebert Creek. Little rainfall occurs during the summer months and streamflow is primarily groundwater. Siebert Creek has few tributaries, and all were dry during the summer of 2003. However, there were many springs and seeps apparent throughout the entrenched channel. The specific tasks of this study were to:

1. Quantify the contribution of groundwater to streamflow along the stream channel, and
2. Determine regions of groundwater discharge or recharge.

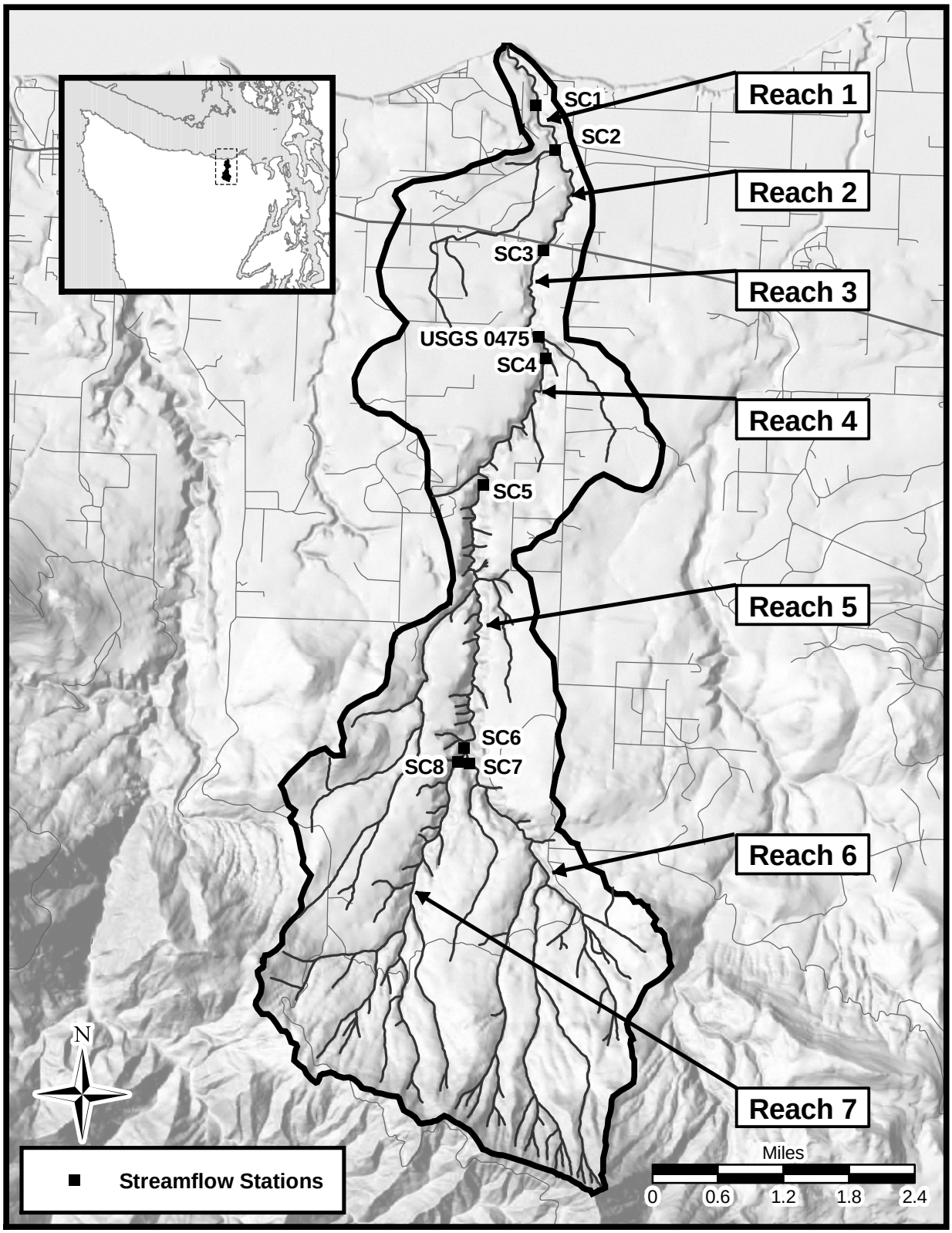

Figure 1. Siebert Creek Watershed

Study Area

Siebert Creek originates on 5,400 feet Blue Mountain and enters the Strait of Juan de Fuca at sea level. The stream has a length of 12.4 miles and a watershed area of about 19.5 square miles. At about river mile (RM) 8.1 the stream branches into two forks. The average stream gradient is 1.5 percent near the mouth, about 2.0 percent up to the confluence of the east and west forks, and 3 percent at the confluence. The forks have a steeper 6 percent gradient for the first few miles and become even steeper as the headwaters are approached.

The northeastern quadrant of the watershed is served by the Agnew irrigation ditch. The Agnew ditch diverts water from Dungeness River, beginning with 8 to 12 cubic-feet/second (cfs) in April and ending with 9 to 10 cfs in September, averaging about 15 cfs over the summer (Foster Wheeler, 2003). The ditch crosses the lower basin and terminates near the mouth of Siebert Creek. Most wastewater is sent directly into the strait, however about 0.5 cfs is dumped into Siebert Creek about one-half mile from the mouth (0.1 miles below the study area).

The Siebert Creek basin has a maritime climate with cool, dry summers and mild, wet winters. Only about 25 percent of the annual precipitation falls from April through September. Nearby Port Angeles, with an average precipitation of about 26 inches, averages less than 6 inches of rain during spring and summer, with summer rainfall (June – September) averaging only 3.3 inches. During a normal year, summer evapotranspiration is greater than precipitation. If it were not for contributions from groundwater, streamflow would cease.

The United States Geological Survey (USGS) gaged Siebert Creek (12-047500) at river mile 3.4 from 1952 through 1969. The average May through September flow during this period was 6.2 cfs.

Surficial Geology

The influence that groundwater has on streamflow depends on the flow characteristics of the surficial geology. The Siebert Creek watershed is mantled with direct or indirect products of glaciations consisting of till, advance and recessional outwash, and deposits of gravels, sands, silts, and clay. Significant quantities of groundwater are restricted to this glacial drift, and the bedrock is considered the base of the groundwater system. The bedrock consists of inter-bedded marine sediments and volcanics of early Tertiary age. Sedimentary rocks include sandstone, siltstone, mudstone and conglomerates. Volcanic rocks are submarine basalt flows and breccias (Jones, 1996).

The last major continental ice sheet, the Fraser Glaciation, occurred about 17,000 years ago. The ice sheet advanced outward from British Columbia through the Strait of Georgia and the Strait of Juan de Fuca overriding what is now the Siebert Creek watershed. At the peak of glaciation the ice cap reached 3,500 feet in elevation and only the higher foothills and peaks of the Olympic Mountains rose above the ice. As the glacier advanced, extensive erosion scoured the basin and new drift materials were deposited as the ice moved through. Outwash materials collected in low areas ahead of the advancing glacier, only to be overridden and compacted by the ice. The

ice reached its maximum advance about 15,000 years ago. As the climate warmed, the ice retreated rapidly and was gone from the basin by about 14,000 years ago. The retreat left behind recessional outwash deposits over much of the basin and glaciomarine drift where marine waters replaced the retreating ice. Groundwater is most abundant in the advance outwash and the recessional deposits.

As the ice retreated, Siebert Creek started reshaping its watershed, cutting through the deposits to form the channel we see today. Above the confluence of Emery Creek (RM 3.5), at about 300 feet in elevation, outcrops of marine sediments and volcanics (bedrock) begin to appear in the channel. Noble (1960) mapped the area between Emery Creek and Highway 101 as undifferentiated glacial drift. He mapped the area below Highway 101 as sands, silts, and gravels from reworking of glacial outwash by post-glacial streams. These deposits are reasonably porous and open to high groundwater storage and movement.

These sediments were probably deposited during a period of stream aggradation. Since that time, a relative lowering of sea level has caused a more or less continuous period of downcutting by Siebert Creek. The stream now lies in a deep canyon cut into its old surface. Jones (1996) indicates that the glacial drift may be as much as 200 feet thick over the lower basin; however, the water table may be 100 or more feet below the surface on the highlands away from the channel.

Methods

I estimated groundwater discharge or recharge by measuring changes in streamflow that occurred along the stream channel throughout the summer. Ignoring the minimal summer precipitation, I assumed that changes in streamflow were a direct reflection of groundwater interaction. If the stream increased in volume, then groundwater was assumed to be discharging to the stream. A decrease in streamflow indicated groundwater recharge. To estimate these interactions, I divided Siebert Creek into seven reaches, five on the mainstem with the east and west forks each comprising an additional reach. I established a streamflow-measurement station at the start of each reach. The beginning of any upstream reach was, of course, the end of the prior reach. An eighth station was established at the confluence of the two forks with streamflow the sum of the flow in the two forks. The station locations in river miles from mouth, along with the watershed area above each station and the approximate elevation of the station, are presented in Table 1. Station SC2 was established at the continuous streamflow gage operated by Ecology since 2002 (Gage 18L060). Table 2 presents the length of reach between stations and the approximate watershed area directly contributing to each reach.

Table 1. Stream gaging locations, including the historic USGS site.

Station ID	Location	River Mile (RM)	Basin Area (sq. mi) [1]	Elevation (ft.)
SC1	Above Agnew Ditch return	0.6	19.3	50
SC2	Old Olympic Highway	1.3	18.5	100
SC3	Above Highway 101	2.5	17.5	200
SC4	Near Transfer Station	3.6	14.8	310
SC5	Near mid-basin	5.2	13.2	510
SC6	Sum East and West Forks	8.1	8.7	940
SC7	Mouth East Fork	8.1	5.1	940
SC8	Mouth West Fork	8.1	3.6	940
12-0475	USGS below Emery Cr.	3.4	15.5	280

1. Basin area from station to headwaters

Table 2. The channel length and contributing area for each reach.

Reach	Reach Length (mi)	Reach Area (acres)
1	0.7	510
2	1.2	640
3	1.1	1730
4	1.6	1020
5	2.9	2880
6	4.3	3260
7	3.6	2300

1. Approximate basin area contributing to reach

During 2003, I measured streamflow at each of the stations three or four times between May and October. Measurement of streamflow followed established Ecology methods (Hopkins, 2002).

In my judgment, the accuracy of the measurements is within 10-percent with the exception of the east and west forks. The minimal streamflow among large cobbles made it difficult to measure discharge in the forks, and the accuracy is probably only within twenty-percent. However, the relative precision among measurements is better. To insure consistency, the same equipment and techniques were used throughout the study. Discharge was measured using a Swoffer brand velocity meter and calculated using the mid-section method. Discharge measured at SC2 compared favorably with that measured independently by the operators of Gage 18L060.

The dates of measurement and the stream discharge at each station are presented in Table 3. The discharge notes and calculations are included as Appendix A. I estimated a continuous streamflow record at each station by regressing the measured discharge with the stage at SC2 (Ecology 18L060) on the same date and time. The regression equations were used to calculate a continuous discharge record at each station from the continuous stage record at SC2. The regressions are presented in Appendix B and the resulting daily streamflow at each station is presented in Appendix C.

Table 3. Streamflow (cfs) measured at each study site, including the date.

Date	SC1	SC2	SC3	SC4	SC5	SC7	SC8
6/24/03				3.05		1.55	0.80
6/25/03	4.24	3.53	3.62		2.55		
7/28/03	3.03	2.28	2.55		2.10		
7/29/03				2.36			
8/20/03		2.00					
9/2/03	2.40	1.87	2.01		1.55		
9/3/03				1.75		0.58	0.49
10/13/03	5.09	3.94	4.05	3.50			
10/14/03					2.68	0.93	0.67

Using the estimated daily streamflow, I calculated groundwater interactions by subtracting the discharge entering a reach from that leaving the reach. A positive result indicated that groundwater was discharging to the stream within that reach. A negative result indicated the stream was losing water and recharging the groundwater.

Results

The summer of 2003 was unusually dry. The 1.1 inches of rainfall at Port Angeles was only 1/3 of normal. Air temperature was also warmer than average, 60.2 degrees F as compared to the average 58.5 degrees. Rainfall was much less than the evapotranspirational needs of the basin. The warmer and drier summer resulted in below average stream flow. The average streamflow at SC1 from May through mid October was 4.2 cfs with a total runoff of about 1.3 inches
(1,300 acre-ft.).

Based on historic patterns (Williams et al. 1985), streamflow during the 2003 summer should occur (on average) about once every 100 years. Although this comparison is questionable, streamflow during the summer of 2003 was low, less than one-half the normal (Table 4). The lowest seven-day discharge was 1.9 cfs, occurring in early September. Based on the USGS low flow non-exceedance probabilities (7Q10) this low flow should occur, on average, about once every 50 years.

Table 4. Comparison of the USGS 1952 – 1969 mean-monthly streamflow (cfs) at RM 3.4 with the 2003 streamflow at station SC4 (RM 3.6).

	May	**Jun**	**Jul**	**Aug**	**Sept**	**Avg.**
Mean 1952-1969	10.9	7.9	5.2	3.5	3.5	6.2
2003 average	4.8	3.3	2.5	2.1	2.2	3.0

The lack of rainfall emphasizes the role of groundwater in maintaining streamflow. Table 5. presents the estimated ground water contribution along each reach, that is, the gains or losses to streamflow. Groundwater inflow is estimated in both cfs and acre-ft. for the months May through September. Table 6. presents a summary of the total groundwater contribution over this time period in units of acre-ft., acre-ft. per channel mile, and area inches. The total groundwater contribution was about 1,300 acre-ft., equivalent to about 1.3 inches, which, by definition, equals the total runoff of Siebert Creek during this period. Six of the seven reaches were "gaining" reaches with a positive groundwater discharge (inflow to stream). Reach 2 was a "losing" reach with streamflow decreasing as water was lost to groundwater (groundwater recharge).

Table 5. Gains in streamflow within each study reach attributed to groundwater.

Reach		May		Jun		Jul		Aug		Sep		Average	
		(cfs)	(ac-ft.)	(cfs)	(ac-ft.)	(cfs)	(ac-ft.)	(cfs)	(ac-ft.)	(cfs)	(ac-ft.)	(cfs)	(ac-ft.)
1	SC1to SC2	1.5	92	1.0	60	0.8	49	0.7	43	0.7	42	0.9	57
2	SC2 to SC3	-0.1	-6	-0.2	-12	-0.2	-12	-0.3	-18	-0.2	-12	-0.2	-12
3	SC3 to SC4	1.0	61	0.7	42	0.4	25	0.3	18	0.3	18	0.5	33
4	SC4 to SC5	0.4	25	0.3	18	0.3	18	0.3	18	0.2	12	0.3	18
5	SC5 to SC6	0.7	43	0.6	36	0.6	37	0.7	43	0.7	42	0.7	40
6	East Fork	2.5	154	1.5	89	0.9	55	0.7	43	0.8	48	1.3	78
7	West Fork	1.2	74	0.8	48	0.6	37	0.5	31	0.6	36	0.7	45

Table 6. Total May through September groundwater contribution to streamflow within each reach.

Reach		Total Groundwater Contribution		
		(ac-ft.)	(ac-ft./mi)	(in)
1	SC1to SC2	286	408	6.72
2	SC2 to SC3	-61	-51	-1.14
3	SC3 to SC4	164	149	1.14
4	SC4 to SC5	91	57	1.07
5	SC5 to SC6	200	69	0.83
6	East Fork	389	90	1.43
7	West Fork	225	62	1.17

Because the reaches vary in length and in contributing area, the most useful indicators of groundwater inflow are acre-ft. per channel mile which accounts for the differing reach lengths and area-inches which accounts for differences in contributing area. Reach 1, from Old Olympic Highway (RM 1.3) to near the mouth (RM 0.7), has, by far, the greatest groundwater contribution. Although the shortest of the seven reaches at 0.7 miles, Reach 1 gained 408 acre-ft. per channel mile, over 2.5 times greater than the next highest gaining reach (Reach 3). Reach 1 also has a relatively small contributing area but had an increase in stream flow equal to 6.72 area-inches. This is almost five times greater than the east fork, the reach with the next highest area-inch contribution.

Ground water contributions from the upper 8.8 channel miles (Reaches 4 through 7) ranged from 57 to 90 acre-feet/mile. A large increase in groundwater contribution occurred in Reach 3 between the Recycle/Transfer Station (RM 3.6) and Highway 101 (RM 2.5). Ground water contributed an estimated 149 acre-feet/mile along this reach.

Reach 2, between Highway 101 (RM 2.5) and Old Olympic Highway (RM 1.3), was a losing reach, losing a total of 61 acre-ft. to ground water (-51 acre-feet/mile).

Summary

Groundwater is an important component of streamflow during the summer months. From May through September, groundwater discharge averaged 4.2 cfs (8.3 acre-ft./day). With the exception of Reach 2 (RM 1.3 to 2.5), the losing reach, streamflow increased from upstream to downstream as groundwater entered the stream.

Based on contributing area, total groundwater contributions to streamflow were relatively consistent from the headwaters through Reach 3 (from RM 2.5 to 12.4) varying between 0.83 and 1.43 inches. Reach 2 lost 1.14 inches of streamflow to groundwater (groundwater recharge), and Reach 1 (RM 0.6 to 1.3) gained 6.72 inches of groundwater (groundwater discharge).

On an acre-ft./channel mile basis, total groundwater contributions to streamflow were relatively consistent from the headwaters through Reach 4 (from RM 3.6 to 12.4) varying between 57 and 90 acre-ft./mile. A large increase in groundwater contribution per mile of channel occurred in Reach 3 where streamflow gained 149 acre-ft./mile. This changed to a streamflow loss (-51 acre-ft./mile) in Reach 2. The greatest groundwater contribution to streamflow occurred in Reach 1 where streamflow increased by 408 acre-ft./mile of channel.

It is possible that outcropping bedrock causes the groundwater to surface along Reach 3 and that increasing depths of re-worked glacial deposits along Reach 2 allow the water to recharge back into the groundwater. I will also speculate that the streamflow lost to groundwater in Reach 2 simply moves down-gradient and re-enters the stream in Reach 1. It is also probable, though not documented, that the high contribution of groundwater to streamflow in Reach 1 is partially due to irrigation and losses from Agnew ditch.

If a more detailed description of groundwater/surface water interactions is desired, I suggest three steps:

1. Divide Reaches 1 and 2 into sub-segments and identify major gaining and losing sections.
2. Divide the Agnew Irrigation ditch into segments and determine where major water losses occur.
3. Investigate the surficial geology of segments where large groundwater/surface water interactions occur.

References

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Appendix A

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Stream Discharge Calculation

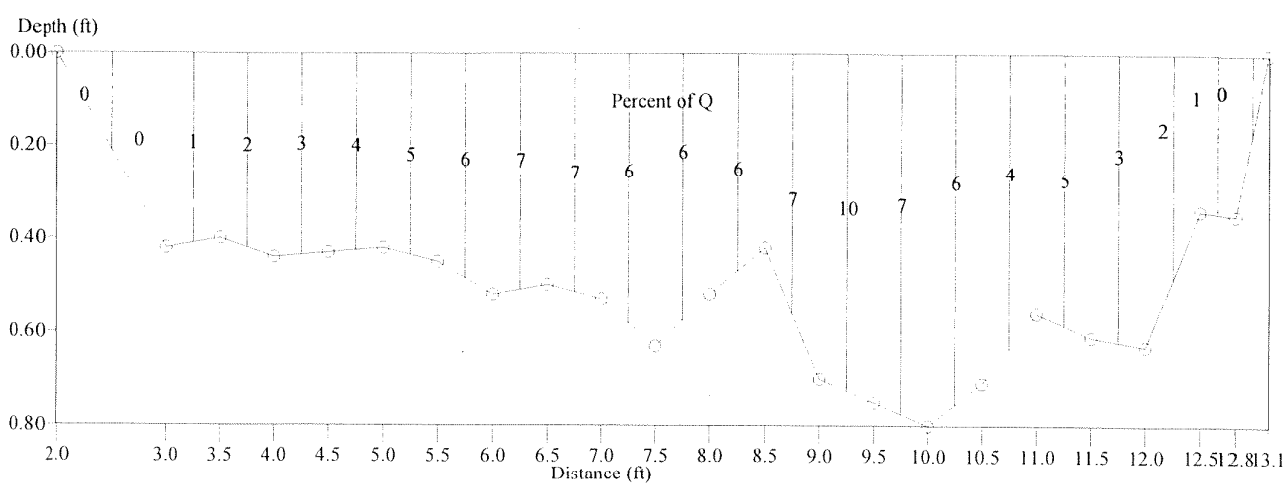
Site ID = SC-1
Site Name = Siebert Creek above Agnew Ditch
Stage: ft. Date: 6/25/03 Time: 0730 pst

Comment:
staff at recorder was 0.81, logger was 0.85 at 0900

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	2.00	0.00	0.05	0.00	0.00	0.00
2	3.00	0.42	0.26	0.06	0.00	0.02
3	3.50	0.40	0.20	0.17	0.00	0.03
4	4.00	0.44	0.22	0.42	0.00	0.09
5	4.50	0.43	0.22	0.59	0.00	0.13
6	5.00	0.42	0.21	0.76	0.00	0.16
7	5.50	0.45	0.23	0.95	0.00	0.22
8	6.00	0.52	0.25	0.97	0.00	0.25
9	6.50	0.50	0.25	1.25	0.00	0.32
10	7.00	0.53	0.27	1.14	0.00	0.31
11	7.50	0.63	0.30	0.87	0.00	0.26
12	8.00	0.52	0.26	1.04	0.00	0.27
13	8.50	0.42	0.23	1.09	0.00	0.25
14	9.00	0.70	0.34	0.91	0.00	0.31
15	9.50	0.75	0.38	1.09	0.00	0.41
16	10.00	0.80	0.39	0.81	0.00	0.32
17	10.50	0.71	0.35	0.74	0.00	0.26
18	11.00	0.56	0.29	0.63	0.00	0.18
19	11.50	0.61	0.30	0.71	0.00	0.22
20	12.00	0.63	0.30	0.45	0.00	0.13
21	12.50	0.34	0.15	0.55	0.00	0.08
22	12.80	0.35	0.09	0.30	0.00	0.03
23	13.10	0.00	0.01	0.00	0.00	0.00

Total Area = 5.57 sq. ft.
Average Velocity = 0.76 ft./sec.

Total Discharge = 4.24 cfs



Stream Discharge Calculation

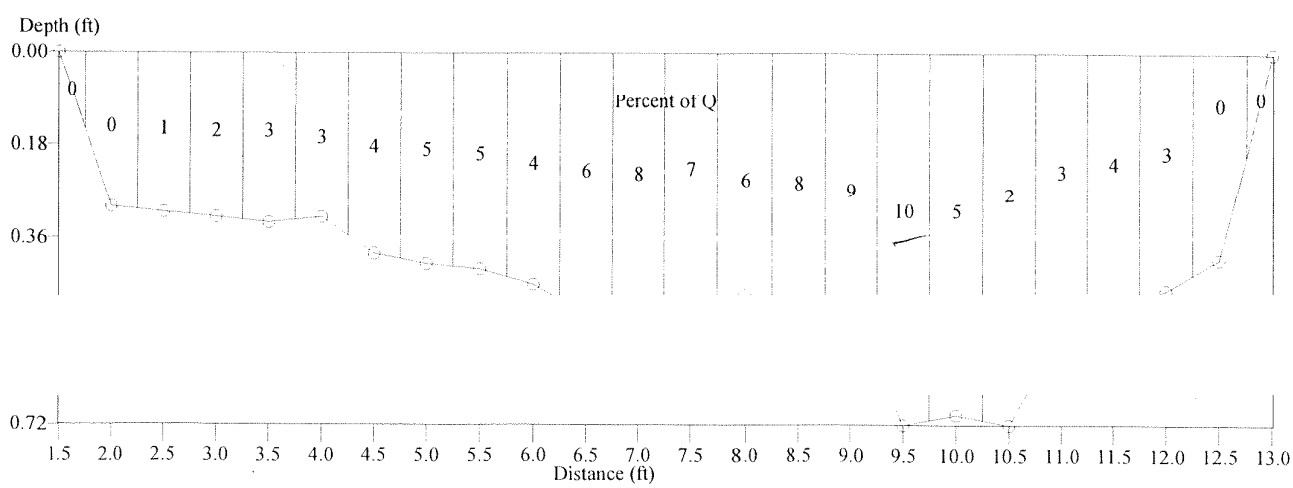
Site ID = SC-1
Site Name = Siebert Creek above Agnew Ditch
Stage: 0.75 ft. Date: 7/28/03 Time: 1330

Comment:
1230 pst,

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	1.50	0.00	0.02	0.00	0.00	0.00
2	2.00	0.30	0.13	0.05	0.00	0.01
3	2.50	0.31	0.16	0.23	0.00	0.04
4	3.00	0.32	0.16	0.29	0.00	0.05
5	3.50	0.33	0.16	0.62	0.00	0.10
6	4.00	0.32	0.16	0.56	0.00	0.09
7	4.50	0.39	0.19	0.67	0.00	0.13
8	5.00	0.41	0.20	0.80	0.00	0.16
9	5.50	0.42	0.21	0.73	0.00	0.15
10	6.00	0.45	0.23	0.50	0.00	0.11
11	6.50	0.51	0.25	0.76	0.00	0.19
12	7.00	0.52	0.26	0.89	0.00	0.23
13	7.50	0.54	0.26	0.80	0.00	0.21
14	8.00	0.47	0.25	0.77	0.00	0.19
15	8.50	0.65	0.30	0.83	0.00	0.25
16	9.00	0.50	0.27	0.97	0.00	0.26
17	9.50	0.72	0.34	0.87	0.00	0.30
18	10.00	0.70	0.35	0.45	0.00	0.16
19	10.50	0.72	0.35	0.18	0.00	0.06
20	11.00	0.54	0.28	0.37	0.00	0.10
21	11.50	0.50	0.25	0.49	0.00	0.12
22	12.00	0.46	0.23	0.39	0.00	0.09
23	12.50	0.40	0.18	0.04	0.00	0.01
24	13.00	0.00	0.03	0.00	0.00	0.00

Total Area = 5.24 sq. ft.
Average Velocity = 0.58 ft./sec.

Total Discharge = 3.03 cfs



Stream Discharge Calculation

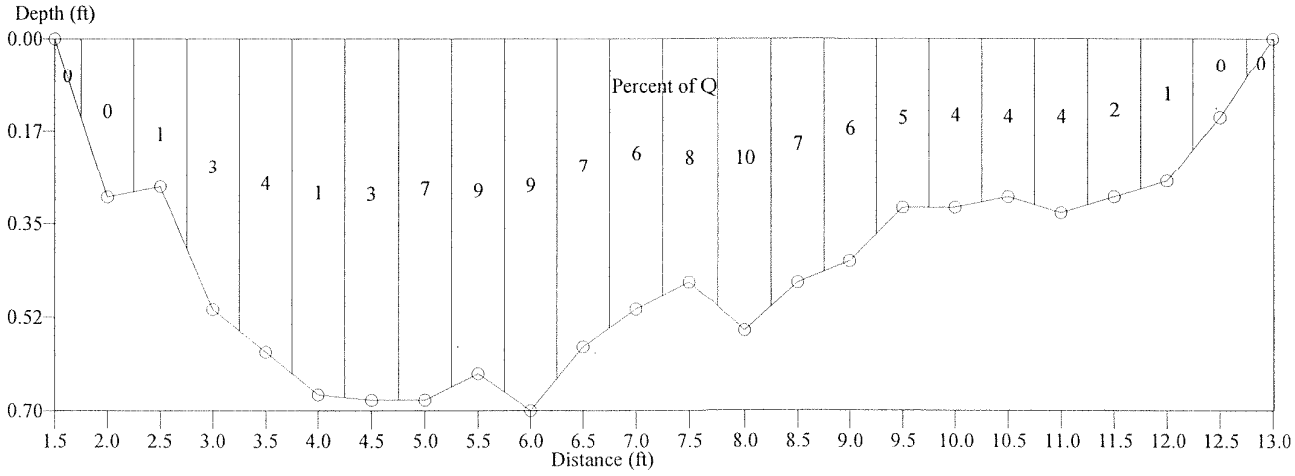
Site ID = SC-1
Site Name = Siebert Creek above Agnew Ditch
Stage: 0.73 ft. Date: 9/2/03 Time: 1215 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	1.50	0.00	0.02	0.00	0.00	0.00
2	2.00	0.30	0.13	0.01	0.00	0.00
3	2.50	0.28	0.16	0.14	0.00	0.02
4	3.00	0.51	0.25	0.31	0.00	0.08
5	3.50	0.59	0.29	0.34	0.00	0.10
6	4.00	0.67	0.33	0.10	0.00	0.03
7	4.50	0.68	0.34	0.20	0.00	0.07
8	5.00	0.68	0.34	0.52	0.00	0.18
9	5.50	0.63	0.32	0.69	0.00	0.22
10	6.00	0.70	0.34	0.62	0.00	0.21
11	6.50	0.58	0.29	0.60	0.00	0.18
12	7.00	0.51	0.26	0.58	0.00	0.15
13	7.50	0.46	0.24	0.77	0.00	0.18
14	8.00	0.55	0.26	0.93	0.00	0.25
15	8.50	0.46	0.23	0.69	0.00	0.16
16	9.00	0.42	0.21	0.64	0.00	0.13
17	9.50	0.32	0.17	0.67	0.00	0.11
18	10.00	0.32	0.16	0.59	0.00	0.09
19	10.50	0.30	0.15	0.58	0.00	0.09
20	11.00	0.33	0.16	0.54	0.00	0.09
21	11.50	0.30	0.15	0.28	0.00	0.04
22	12.00	0.27	0.13	0.13	0.00	0.02
23	12.50	0.15	0.07	0.05	0.00	0.00
24	13.00	0.00	0.01	0.00	0.00	0.00

Total Area = 5.01 sq. ft.
Average Velocity = 0.48 ft./sec.

Total Discharge = 2.40 cfs



Stream Discharge Calculation

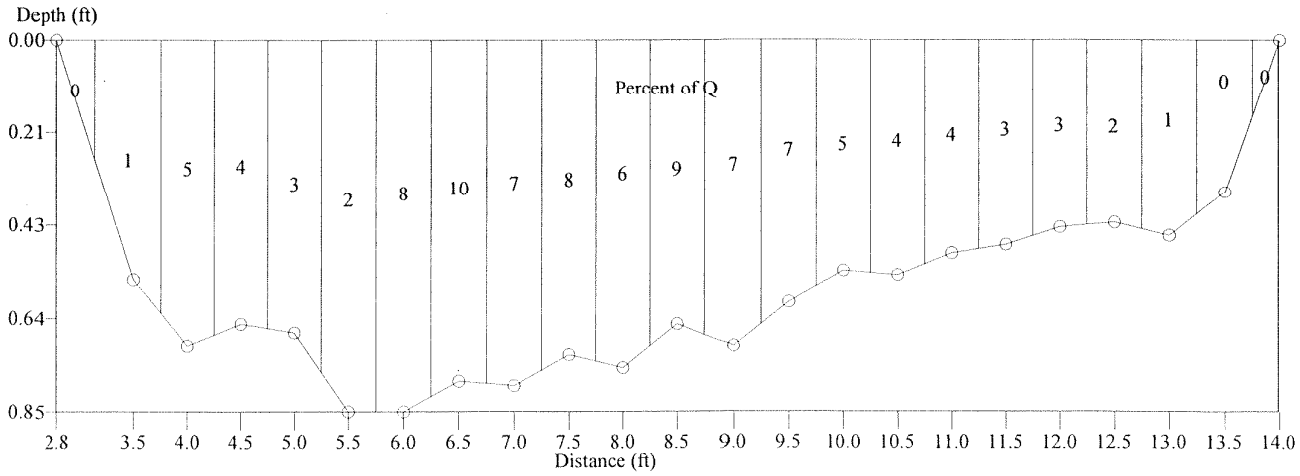
Site ID = SC1
Site Name = Siebert Creek above Ditch
Stage: 0.85 ft. Date: 10/13/03 Time: 1400

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	2.80	0.00	0.05	0.00	0.00	0.00
2	3.50	0.55	0.29	0.17	0.15	0.05
3	4.00	0.70	0.34	0.80	0.00	0.27
4	4.50	0.65	0.33	0.64	0.65	0.21
5	5.00	0.67	0.34	0.45	0.00	0.16
6	5.50	0.85	0.41	0.28	0.23	0.11
7	6.00	0.85	0.42	0.92	0.00	0.39
8	6.50	0.78	0.40	1.29	1.23	0.50
9	7.00	0.79	0.39	0.91	0.86	0.35
10	7.50	0.72	0.37	1.02	1.09	0.39
11	8.00	0.75	0.37	0.87	0.89	0.32
12	8.50	0.65	0.33	1.29	1.30	0.43
13	9.00	0.70	0.34	1.11	1.08	0.37
14	9.50	0.60	0.30	1.14	0.00	0.34
15	10.00	0.53	0.27	0.98	1.00	0.27
16	10.50	0.54	0.27	0.78	0.00	0.21
17	11.00	0.49	0.25	0.93	0.90	0.23
18	11.50	0.47	0.23	0.78	0.74	0.18
19	12.00	0.43	0.22	0.80	0.76	0.17
20	12.50	0.42	0.21	0.37	0.42	0.08
21	13.00	0.45	0.22	0.31	0.00	0.07
22	13.50	0.35	0.16	0.10	0.00	0.02
23	14.00	0.00	0.02	0.00	0.00	0.00

Total Area = 6.53 sq. ft.
Average Velocity = 0.78 ft./sec.

Total Discharge = 5.09 cfs



Stream Discharge Calculation

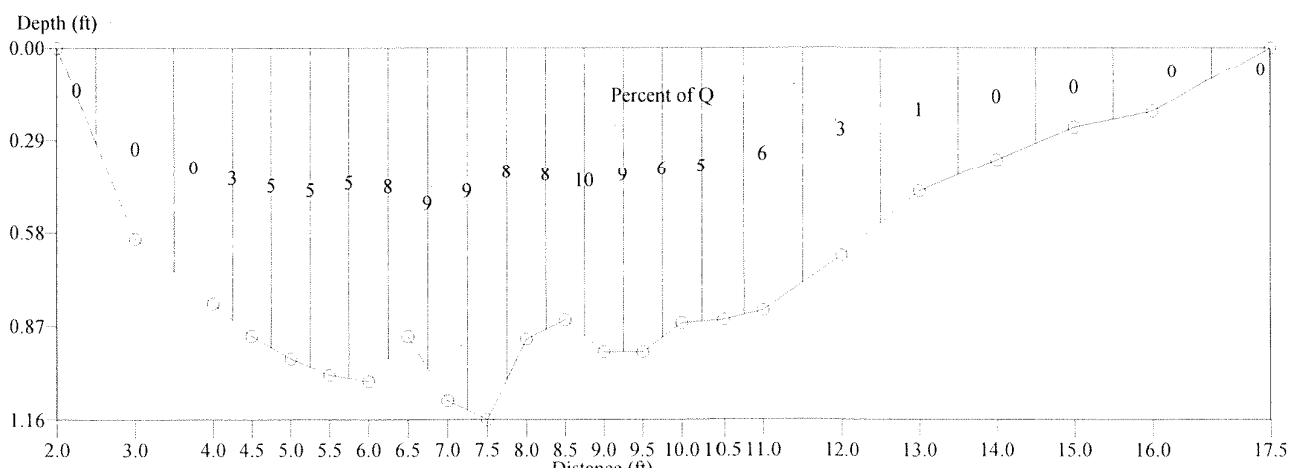
Site ID = 18L060 SC-2
Site Name = Siebert Creek at gage
Stage: ft. Date: 6/25/03 Time: 0900 pst

Comment:
staff at recorder was 0.81; logger was 0.85 at 0900

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	2.00	0.00	0.08	0.00	0.00	0.00
2	3.00	0.60	0.55	0.00	0.00	0.00
3	4.00	0.80	0.58	0.01	0.00	0.01
4	4.50	0.90	0.45	0.23	0.00	0.10
5	5.00	0.97	0.48	0.36	0.00	0.17
6	5.50	1.02	0.51	0.37	0.00	0.19
7	6.00	1.04	0.51	0.37	0.00	0.19
8	6.50	0.90	0.47	0.61	0.00	0.29
9	7.00	1.10	0.54	0.56	0.00	0.30
10	7.50	1.16	0.56	0.55	0.00	0.31
11	8.00	0.91	0.47	0.61	0.00	0.28
12	8.50	0.85	0.44	0.62	0.00	0.27
13	9.00	0.95	0.47	0.77	0.00	0.36
14	9.50	0.95	0.47	0.65	0.00	0.31
15	10.00	0.86	0.44	0.46	0.00	0.20
16	10.50	0.85	0.42	0.40	0.00	0.17
17	11.00	0.82	0.60	0.36	0.00	0.21
18	12.00	0.65	0.65	0.16	0.00	0.10
19	13.00	0.45	0.46	0.09	0.00	0.04
20	14.00	0.35	0.35	0.05	0.00	0.02
21	15.00	0.25	0.26	0.01	0.00	0.00
22	16.00	0.20	0.22	0.00	0.00	0.00
23	17.50	0.00	0.04	0.00	0.00	0.00

Total Area = 10.00 sq. ft.
Average Velocity = 0.35 ft./sec.

Total Discharge = 3.53 cfs



Stream Discharge Calculation

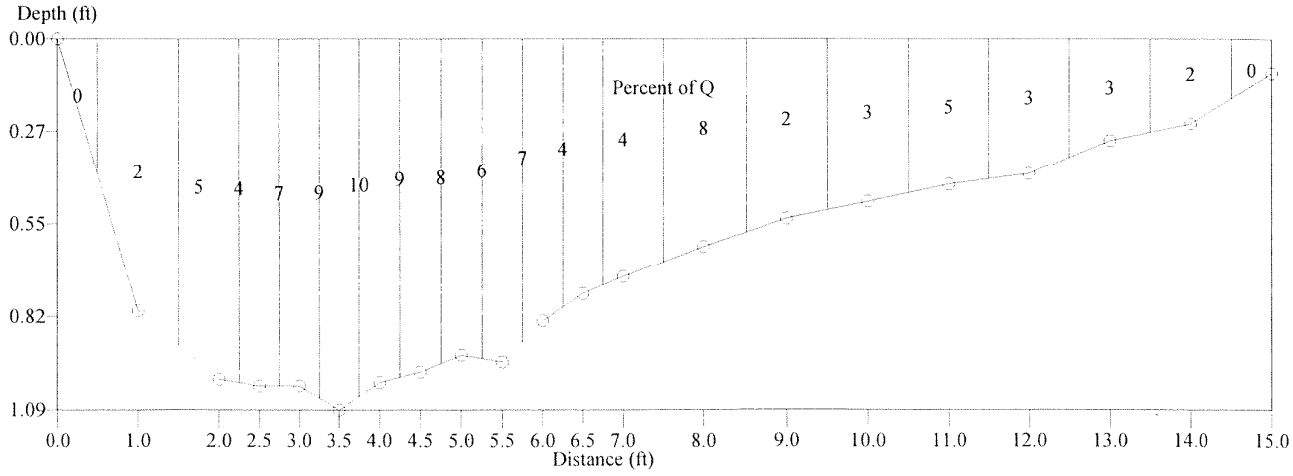
Site ID = SC-2
Site Name = Siebert Creek at Old Olympic Highway
Stage: 0.75 ft. Date: 7/28/03 Time: 1445

Comment:
1345 PST staff was 0.75, logger was 0.74

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	0.00	0.00	0.10	0.00	0.00	0.00
2	1.00	0.80	0.73	0.05	0.00	0.04
3	2.00	1.00	0.73	0.15	0.00	0.11
4	2.50	1.02	0.51	0.20	0.00	0.10
5	3.00	1.02	0.51	0.29	0.00	0.15
6	3.50	1.09	0.54	0.38	0.00	0.20
7	4.00	1.01	0.51	0.43	0.00	0.22
8	4.50	0.98	0.49	0.42	0.00	0.21
9	5.00	0.93	0.47	0.39	0.00	0.18
10	5.50	0.95	0.47	0.30	0.00	0.14
11	6.00	0.83	0.42	0.39	0.00	0.16
12	6.50	0.75	0.38	0.27	0.00	0.10
13	7.00	0.70	0.52	0.19	0.00	0.10
14	8.00	0.61	0.61	0.28	0.00	0.17
15	9.00	0.53	0.53	0.09	0.00	0.05
16	10.00	0.48	0.48	0.16	0.00	0.08
17	11.00	0.43	0.43	0.25	0.00	0.11
18	12.00	0.40	0.39	0.18	0.00	0.07
19	13.00	0.30	0.31	0.20	0.00	0.06
20	14.00	0.25	0.24	0.15	0.00	0.04
21	15.00	0.10	0.07	0.00	0.00	0.00

Total Area = 9.41 sq. ft.
Average Velocity = 0.24 ft./sec.

Total Discharge = 2.28 cfs



Stream Discharge Calculation

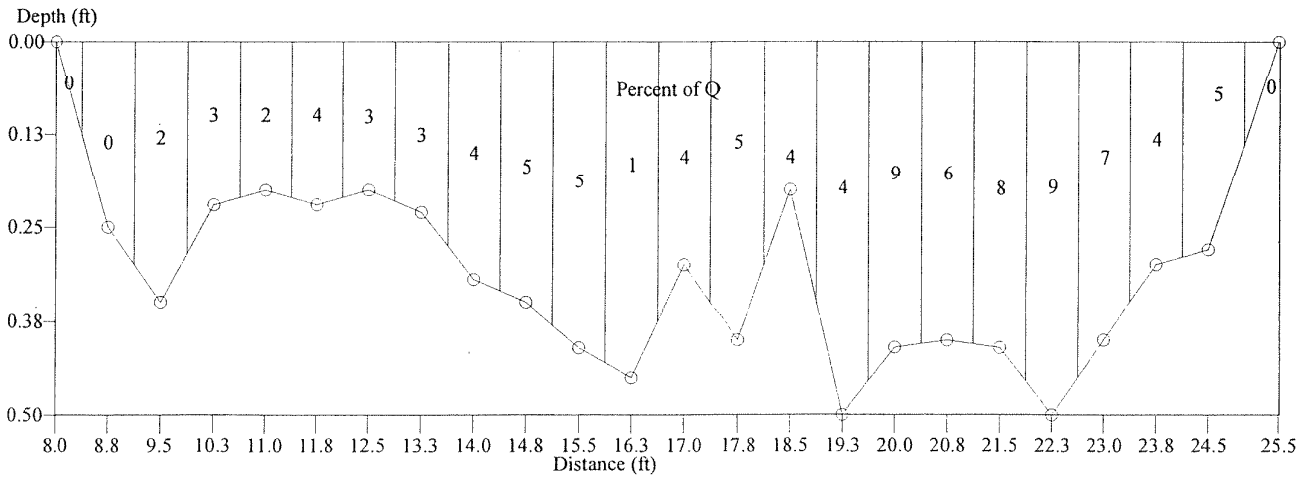
Site ID = 18L060 SC-2
Site Name = Seibert Creek
Stage: 0.74 ft. Date: 8/20/03 Time: 1545pst

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	8.00	0.00	0.02	0.00	0.00	0.00
2	8.75	0.25	0.17	0.04	0.04	0.01
3	9.50	0.35	0.24	0.14	0.14	0.03
4	10.25	0.22	0.18	0.30	0.30	0.05
5	11.00	0.20	0.15	0.29	0.28	0.04
6	11.75	0.22	0.16	0.46	0.47	0.07
7	12.50	0.20	0.15	0.35	0.36	0.05
8	13.25	0.23	0.18	0.39	0.35	0.07
9	14.00	0.32	0.23	0.36	0.37	0.09
10	14.75	0.35	0.27	0.36	0.38	0.10
11	15.50	0.41	0.31	0.30	0.31	0.09
12	16.25	0.45	0.32	0.08	0.08	0.03
13	17.00	0.30	0.25	0.35	0.34	0.09
14	17.75	0.40	0.27	0.39	0.41	0.11
15	18.50	0.20	0.20	0.45	0.00	0.09
16	19.25	0.50	0.34	0.25	0.24	0.08
17	20.00	0.41	0.31	0.58	0.60	0.19
18	20.75	0.40	0.30	0.42	0.00	0.13
19	21.50	0.41	0.31	0.53	0.50	0.16
20	22.25	0.50	0.36	0.55	0.51	0.19
21	23.00	0.40	0.30	0.48	0.49	0.15
22	23.75	0.30	0.23	0.36	0.36	0.08
23	24.50	0.28	0.21	0.51	0.51	0.11
24	25.50	0.00	0.04	0.00	0.00	0.00

Total Area = 5.51 sq. ft.
Average Velocity = 0.36 ft./sec.

Total Discharge = 2.00 cfs



Stream Discharge Calculation

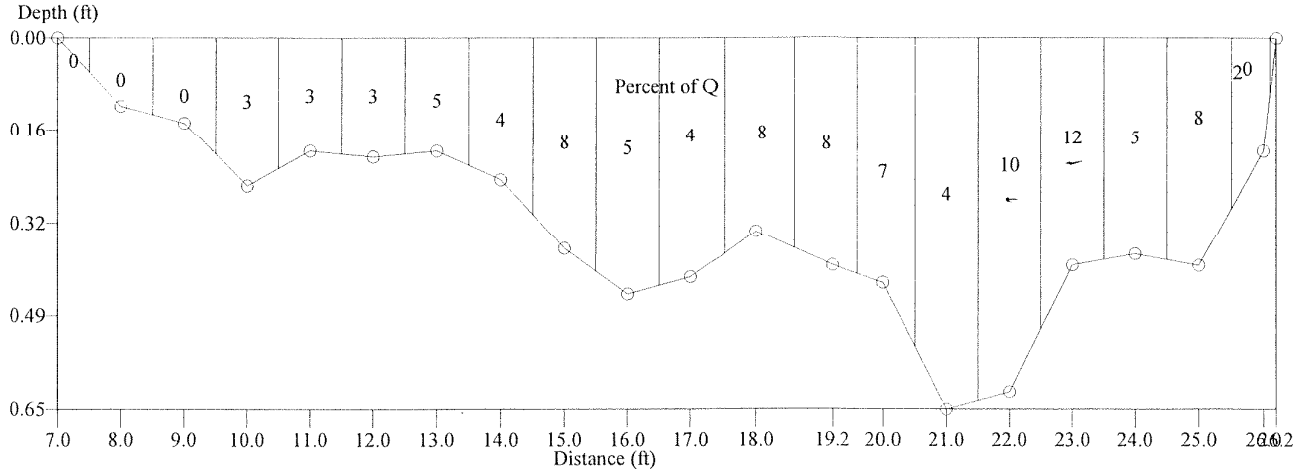
Site ID = SC-2
Site Name = Siebert Creek at Old Pacific Hiway
Stage: 0.73 ft. Date: 9/2/03 Time: 1330 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	7.00	0.00	0.01	0.00	0.00	0.00
2	8.00	0.12	0.11	0.00	0.00	0.00
3	9.00	0.15	0.16	0.02	0.00	0.00
4	10.00	0.26	0.24	0.24	0.00	0.06
5	11.00	0.20	0.21	0.30	0.00	0.06
6	12.00	0.21	0.21	0.24	0.00	0.05
7	13.00	0.20	0.21	0.43	0.00	0.09
8	14.00	0.25	0.26	0.27	0.00	0.07
9	15.00	0.37	0.37	0.41	0.00	0.15
10	16.00	0.45	0.44	0.23	0.00	0.10
11	17.00	0.42	0.41	0.19	0.00	0.08
12	18.00	0.34	0.39	0.38	0.00	0.15
13	19.20	0.40	0.39	0.37	0.00	0.15
14	20.00	0.43	0.41	0.31	0.00	0.13
15	21.00	0.65	0.62	0.13	0.00	0.08
16	22.00	0.62	0.60	0.31	0.00	0.18
17	23.00	0.40	0.43	0.55	0.00	0.23
18	24.00	0.38	0.38	0.26	0.00	0.10
19	25.00	0.40	0.37	0.41	0.00	0.15
20	26.00	0.20	0.14	0.27	0.00	0.04
21	26.20	0.00	0.01	0.00	0.00	0.00

Total Area = 6.36 sq. ft.
Average Velocity = 0.29 ft./sec.

Total Discharge = 1.87 cfs



Stream Discharge Calculation

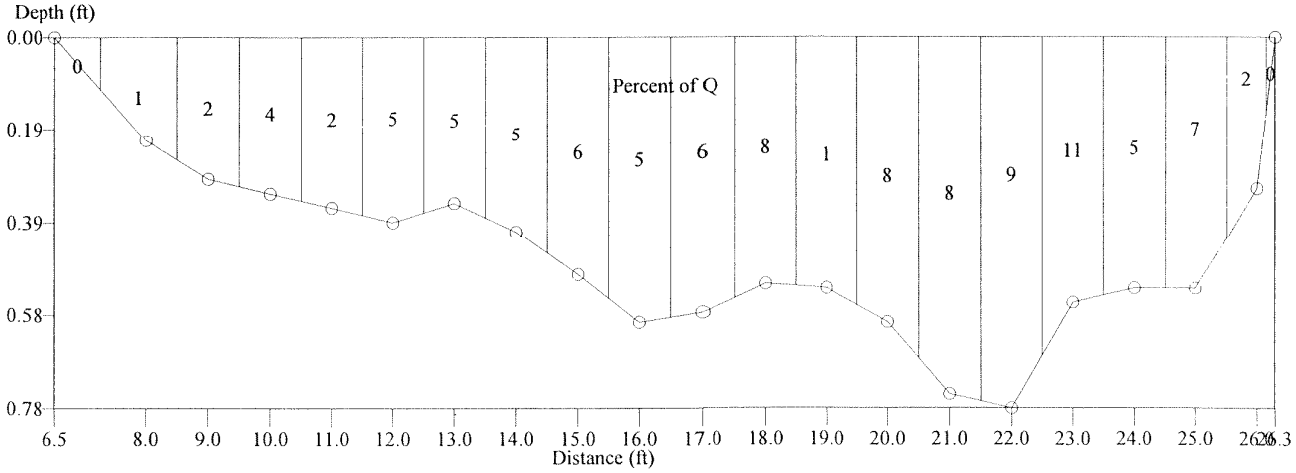
Site ID = SC2
Site Name = Siebert Creek at Old Highway
Stage: 0.85 ft. Date: 10/13/03 Time: 1500

Comment:
Logger was reading 0.85 ft., same as staff

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	6.50	0.00	0.04	0.00	0.00	0.00
2	8.00	0.22	0.24	0.08	0.09	0.02
3	9.00	0.30	0.29	0.29	0.31	0.09
4	10.00	0.33	0.33	0.45	0.41	0.14
5	11.00	0.36	0.36	0.24	0.25	0.09
6	12.00	0.39	0.38	0.52	0.49	0.19
7	13.00	0.35	0.36	0.55	0.53	0.20
8	14.00	0.41	0.41	0.48	0.44	0.19
9	15.00	0.50	0.50	0.45	0.48	0.23
10	16.00	0.60	0.59	0.37	0.33	0.20
11	17.00	0.58	0.57	0.41	0.42	0.24
12	18.00	0.52	0.53	0.58	0.61	0.31
13	19.00	0.53	0.54	0.09	0.10	0.05
14	20.00	0.60	0.61	0.50	0.52	0.31
15	21.00	0.75	0.74	0.41	0.46	0.32
16	22.00	0.78	0.75	0.52	0.47	0.37
17	23.00	0.56	0.58	0.73	0.69	0.41
18	24.00	0.53	0.53	0.38	0.38	0.20
19	25.00	0.53	0.50	0.57	0.55	0.28
20	26.00	0.32	0.22	0.36	0.33	0.08
21	26.30	0.00	0.01	0.00	0.00	0.00

Total Area = 9.10 sq. ft.
Average Velocity = 0.43 ft./sec.

Total Discharge = 3.94 cfs



Stream Discharge Calculation

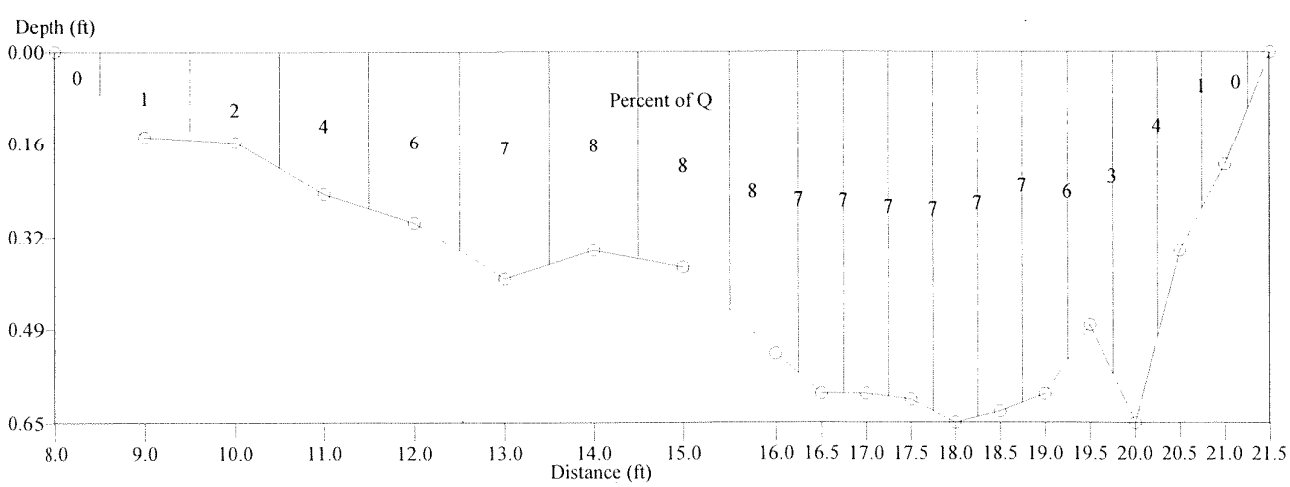
Site ID = SC-3
Site Name = Siebert Creek above Highway 101
Stage: ft. Date: 6/25/03 Time: 1000 pst

Comment:
staff at recorder was 0.81, logger was 0.85 at 0900 pst

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	8.00	0.00	0.02	0.00	0.00	0.00
2	9.00	0.15	0.13	0.29	0.00	0.04
3	10.00	0.16	0.17	0.47	0.00	0.08
4	11.00	0.25	0.25	0.63	0.00	0.15
5	12.00	0.30	0.31	0.70	0.00	0.21
6	13.00	0.40	0.38	0.70	0.00	0.27
7	14.00	0.35	0.36	0.78	0.00	0.28
8	15.00	0.38	0.39	0.72	0.00	0.28
9	16.00	0.53	0.38	0.80	0.00	0.31
10	16.50	0.60	0.30	0.82	0.00	0.24
11	17.00	0.60	0.30	0.84	0.00	0.25
12	17.50	0.61	0.31	0.85	0.00	0.26
13	18.00	0.65	0.32	0.82	0.00	0.26
14	18.50	0.63	0.31	0.82	0.00	0.26
15	19.00	0.60	0.29	0.80	0.00	0.24
16	19.50	0.48	0.26	0.79	0.00	0.20
17	20.00	0.65	0.30	0.35	0.00	0.10
18	20.50	0.35	0.18	0.76	0.00	0.14
19	21.00	0.20	0.10	0.33	0.00	0.03
20	21.50	0.00	0.01	0.00	0.00	0.00

Total Area = 5.07 sq. ft.
Average Velocity = 0.71 ft./sec.

Total Discharge = 3.62 cfs



Stream Discharge Calculation

Site ID = SC-3
Site Name = Siebert Creek above Highway 101
Stage: 0.75 ft. Date: 7/28/03 Time: 1545

Comment:
1445 PST staff was 0.75, logger was 0.74

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	4.50	0.00	0.01	0.00	0.00	0.00
2	5.00	0.10	0.07	0.02	0.00	0.00
3	6.00	0.10	0.08	0.26	0.00	0.02
4	6.50	0.13	0.06	0.39	0.00	0.03
5	7.00	0.15	0.08	0.42	0.00	0.03
6	7.50	0.20	0.10	0.23	0.00	0.02
7	8.00	0.32	0.15	0.53	0.00	0.08
8	8.50	0.30	0.15	0.44	0.00	0.07
9	9.00	0.32	0.16	0.63	0.00	0.10
10	9.50	0.26	0.13	0.70	0.00	0.09
11	10.00	0.27	0.14	0.60	0.00	0.08
12	10.50	0.28	0.14	0.72	0.00	0.10
13	11.00	0.34	0.17	0.66	0.00	0.11
14	11.50	0.36	0.18	0.73	0.00	0.13
15	12.00	0.40	0.20	0.74	0.00	0.15
16	12.50	0.49	0.24	0.72	0.00	0.17
17	13.00	0.50	0.25	0.75	0.00	0.19
18	13.50	0.50	0.25	0.74	0.00	0.19
19	14.00	0.51	0.26	0.74	0.00	0.19
20	14.50	0.62	0.30	0.77	0.00	0.23
21	15.00	0.53	0.27	0.77	0.00	0.21
22	15.50	0.50	0.25	0.63	0.00	0.16
23	16.00	0.45	0.23	0.48	0.00	0.11
24	16.50	0.45	0.20	0.34	0.00	0.07
25	17.00	0.10	0.10	0.20	0.00	0.02
26	18.50	0.00	0.02	0.00	0.00	0.00

Total Area = 4.19 sq. ft.
Average Velocity = 0.61 ft./sec.

Total Discharge = 2.55 cfs

Stream Discharge Calculation

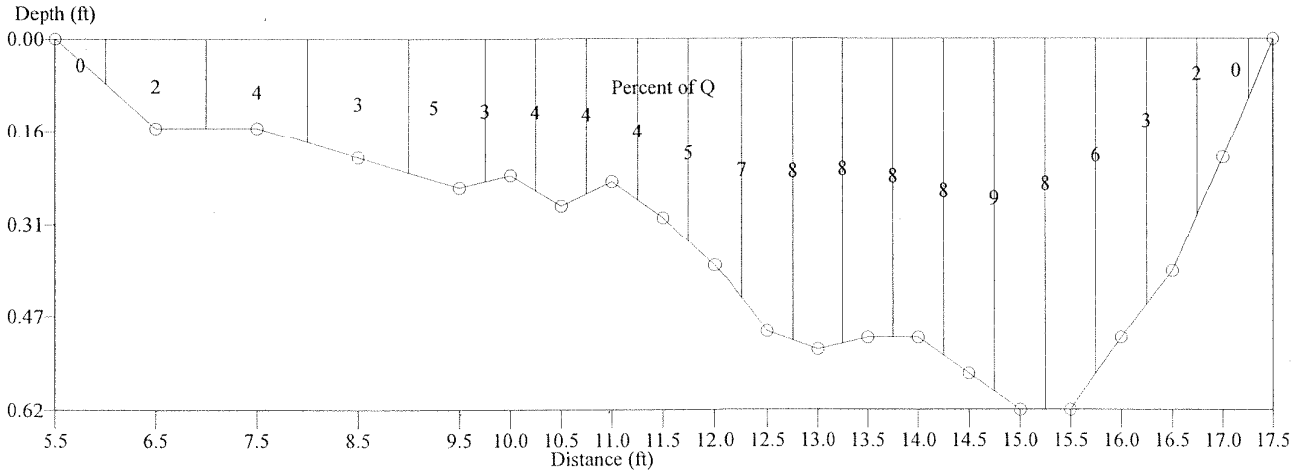
Site ID = SC-3
Site Name = Siebert Creek above Hiway 101
Stage: 0.73 ft. Date: 9/2/03 Time: 1415 PST

Comment:
about 200 yards upstream of Hiway

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	5.50	0.00	0.02	0.00	0.00	0.00
2	6.50	0.15	0.13	0.25	0.00	0.03
3	7.50	0.15	0.16	0.46	0.00	0.07
4	8.50	0.20	0.20	0.28	0.00	0.06
5	9.50	0.25	0.18	0.56	0.00	0.10
6	10.00	0.23	0.12	0.52	0.00	0.06
7	10.50	0.28	0.13	0.57	0.00	0.08
8	11.00	0.24	0.13	0.60	0.00	0.08
9	11.50	0.30	0.15	0.55	0.00	0.08
10	12.00	0.38	0.19	0.52	0.00	0.10
11	12.50	0.49	0.24	0.58	0.00	0.14
12	13.00	0.52	0.26	0.61	0.00	0.16
13	13.50	0.50	0.25	0.62	0.00	0.16
14	14.00	0.50	0.25	0.64	0.00	0.16
15	14.50	0.56	0.28	0.57	0.00	0.16
16	15.00	0.62	0.31	0.61	0.00	0.19
17	15.50	0.62	0.30	0.55	0.00	0.17
18	16.00	0.50	0.25	0.50	0.00	0.13
19	16.50	0.39	0.19	0.28	0.00	0.05
20	17.00	0.20	0.10	0.43	0.00	0.04
21	17.50	0.00	0.01	0.00	0.00	0.00

Total Area = 3.85 sq. ft.
Average Velocity = 0.52 ft./sec.

Total Discharge = 2.01 cfs



Stream Discharge Calculation

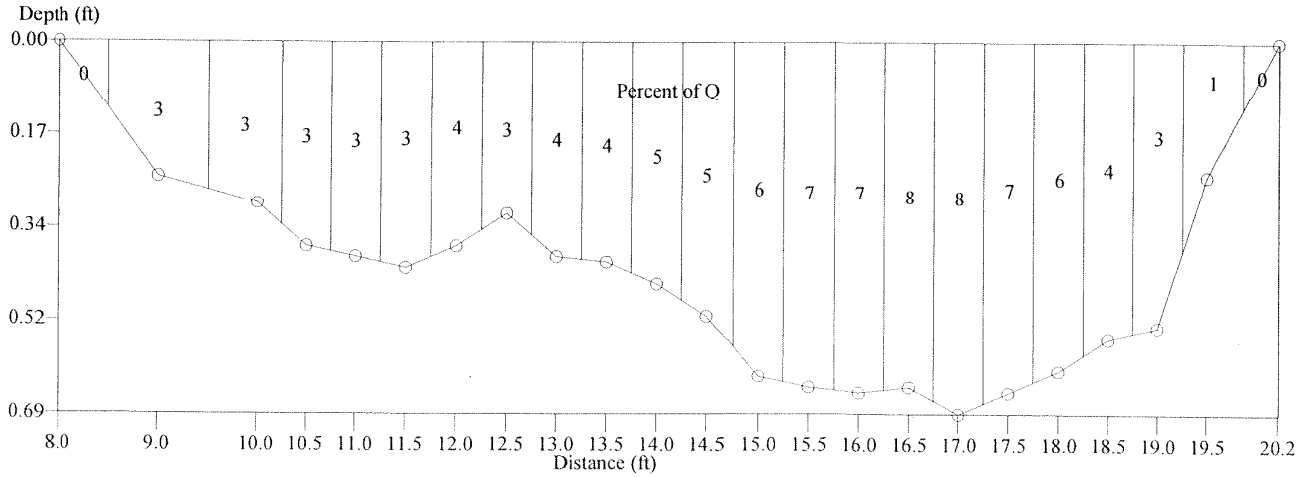
Site ID = SC3
Site Name = Siebert Creek above 101
Stage: 0.85 ft. Date: 10/13/03 Time: 1530

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	8.00	0.00	0.03	0.00	0.00	0.00
2	9.00	0.25	0.22	0.45	0.46	0.10
3	10.00	0.30	0.22	0.62	0.61	0.14
4	10.50	0.38	0.19	0.64	0.63	0.12
5	11.00	0.40	0.20	0.67	0.63	0.13
6	11.50	0.42	0.21	0.67	0.69	0.14
7	12.00	0.38	0.19	0.82	0.83	0.16
8	12.50	0.32	0.17	0.76	0.78	0.13
9	13.00	0.40	0.20	0.82	0.84	0.16
10	13.50	0.41	0.21	0.88	0.86	0.18
11	14.00	0.45	0.23	0.90	0.00	0.20
12	14.50	0.51	0.26	0.83	0.00	0.21
13	15.00	0.62	0.30	0.83	0.86	0.26
14	15.50	0.64	0.32	0.94	0.00	0.30
15	16.00	0.65	0.32	0.95	0.87	0.29
16	16.50	0.64	0.32	0.95	0.00	0.31
17	17.00	0.69	0.34	0.91	0.00	0.31
18	17.50	0.65	0.32	0.87	0.86	0.28
19	18.00	0.61	0.30	0.83	0.80	0.25
20	18.50	0.55	0.28	0.63	0.66	0.18
21	19.00	0.53	0.25	0.56	0.55	0.14
22	19.50	0.25	0.15	0.39	0.00	0.06
23	20.20	0.00	0.02	0.00	0.00	0.00

Total Area = 5.25 sq. ft.
Average Velocity = 0.77 ft./sec.

Total Discharge = 4.05 cfs



Stream Discharge Calculation

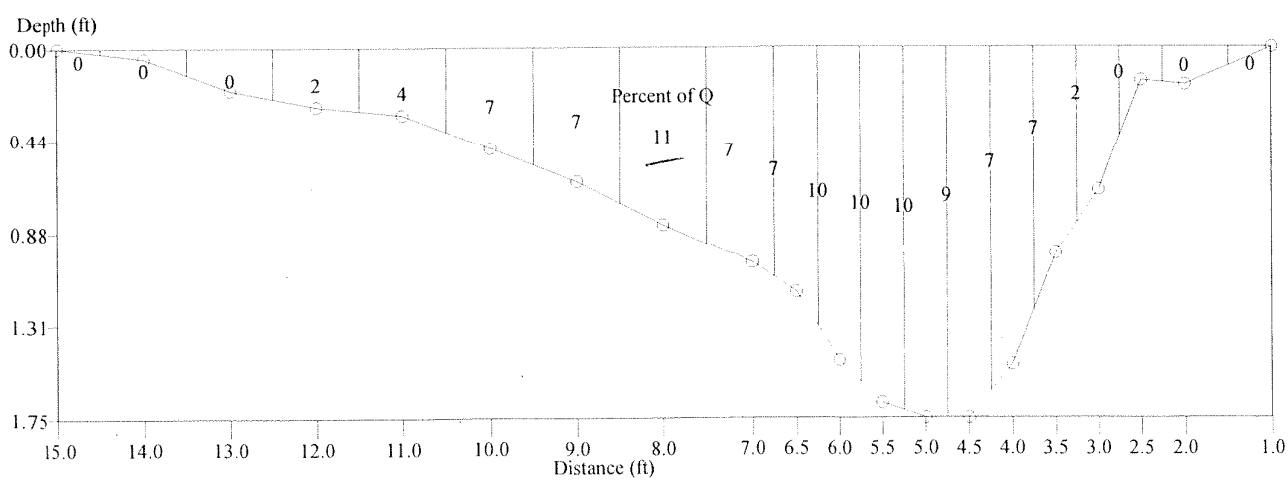
Site ID = sc-4
Site Name = Siebert Creek at Transfer Station
Stage: ft. Date: 6/24/03 Time: 1600 pst

Comment:
staff at recorder was 0.82, logger was 0.86 at 0745 pst

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	15.00	0.00	0.01	0.00	0.00	0.00
2	14.00	0.05	0.06	0.03	0.00	0.00
3	13.00	0.20	0.19	0.05	0.00	0.01
4	12.00	0.28	0.28	0.20	0.00	0.06
5	11.00	0.32	0.34	0.40	0.00	0.13
6	10.00	0.48	0.48	0.45	0.00	0.22
7	9.00	0.64	0.64	0.32	0.00	0.21
8	8.00	0.84	0.84	0.39	0.00	0.33
9	7.00	1.02	0.75	0.27	0.00	0.20
10	6.50	1.16	0.59	0.38	0.00	0.22
11	6.00	1.48	0.73	0.43	0.00	0.31
12	5.50	1.68	0.83	0.35	0.00	0.29
13	5.00	1.75	0.87	0.15	0.56	0.31
14	4.50	1.75	0.86	0.12	0.49	0.26
15	4.00	1.50	0.73	0.30	0.00	0.22
16	3.50	0.98	0.50	0.40	0.00	0.20
17	3.00	0.68	0.33	0.20	0.00	0.07
18	2.50	0.16	0.11	0.09	0.00	0.01
19	2.00	0.18	0.11	0.03	0.00	0.00
20	1.00	0.00	0.02	0.00	0.00	0.00

Total Area = 9.28 sq. ft.
Average Velocity = 0.33 ft./sec.

Total Discharge = 3.05 cfs



Stream Discharge Calculation

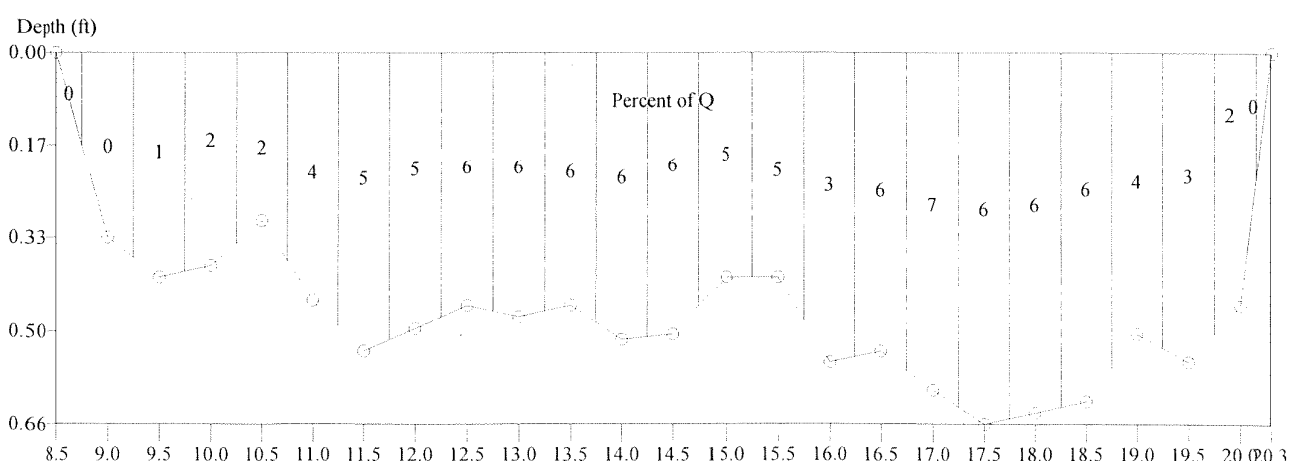
Site ID = SC-4
Site Name = Siebert Creek near Transfer Station
Stage: 0.74 + ft. Date: 7/29/03 Time: 1030

Comment:
0930 PST staff was 0.74 +

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	8.50	0.00	0.02	0.00	0.00	0.00
2	9.00	0.33	0.15	0.05	0.00	0.01
3	9.50	0.40	0.19	0.17	0.00	0.03
4	10.00	0.38	0.19	0.25	0.00	0.05
5	10.50	0.30	0.16	0.34	0.00	0.06
6	11.00	0.44	0.22	0.42	0.00	0.09
7	11.50	0.53	0.26	0.46	0.00	0.12
8	12.00	0.49	0.25	0.46	0.00	0.11
9	12.50	0.45	0.23	0.57	0.00	0.13
10	13.00	0.47	0.23	0.56	0.00	0.13
11	13.50	0.45	0.23	0.57	0.00	0.13
12	14.00	0.51	0.25	0.54	0.00	0.14
13	14.50	0.50	0.24	0.57	0.00	0.14
14	15.00	0.40	0.21	0.59	0.00	0.12
15	15.50	0.40	0.21	0.57	0.00	0.12
16	16.00	0.55	0.26	0.31	0.00	0.08
17	16.50	0.53	0.27	0.50	0.00	0.14
18	17.00	0.60	0.30	0.54	0.00	0.16
19	17.50	0.66	0.33	0.46	0.00	0.15
20	18.00	0.64	0.32	0.41	0.00	0.13
21	18.50	0.62	0.30	0.43	0.00	0.13
22	19.00	0.50	0.26	0.32	0.00	0.08
23	19.50	0.55	0.27	0.29	0.00	0.08
24	20.00	0.45	0.17	0.23	0.00	0.04
25	20.30	0.00	0.02	0.00	0.00	0.00

Total Area = 5.53 sq. ft.
Average Velocity = 0.43 ft./sec.

Total Discharge = 2.36 cfs



Stream Discharge Calculation

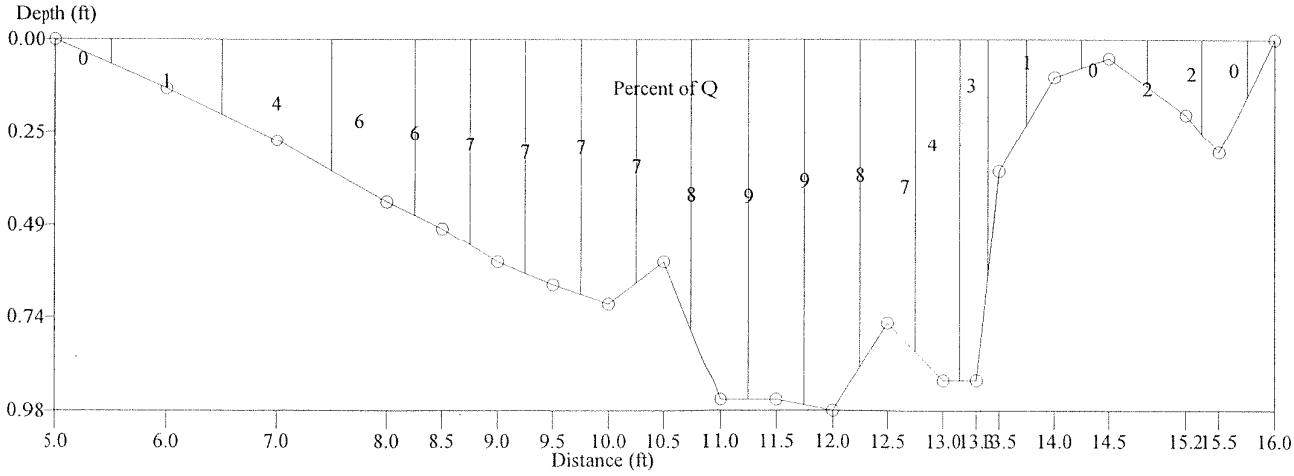
Site ID = SC-4
Site Name = Siebert Creek at Transfer Station
Stage: 0.73 ft. Date: 9/3/03 Time: 1100 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	5.00	0.00	0.02	0.00	0.00	0.00
2	6.00	0.13	0.13	0.17	0.00	0.02
3	7.00	0.27	0.27	0.27	0.00	0.07
4	8.00	0.43	0.31	0.34	0.00	0.10
5	8.50	0.50	0.25	0.40	0.00	0.10
6	9.00	0.59	0.29	0.40	0.00	0.12
7	9.50	0.65	0.32	0.39	0.00	0.13
8	10.00	0.70	0.34	0.37	0.00	0.13
9	10.50	0.59	0.32	0.38	0.00	0.12
10	11.00	0.95	0.45	0.31	0.00	0.14
11	11.50	0.95	0.48	0.34	0.00	0.16
12	12.00	0.98	0.47	0.35	0.00	0.17
13	12.50	0.75	0.40	0.34	0.00	0.14
14	13.00	0.90	0.35	0.35	0.00	0.12
15	13.30	0.90	0.21	0.37	0.00	0.08
16	13.50	0.35	0.12	0.49	0.00	0.06
17	14.00	0.10	0.06	0.40	0.00	0.03
18	14.50	0.05	0.05	0.05	0.00	0.00
19	15.20	0.20	0.09	0.40	0.00	0.04
20	15.50	0.30	0.10	0.32	0.00	0.03
21	16.00	0.00	0.02	0.00	0.00	0.00

Total Area = 5.06 sq. ft.
Average Velocity = 0.35 ft./sec.

Total Discharge = 1.75 cfs



Stream Discharge Calculation

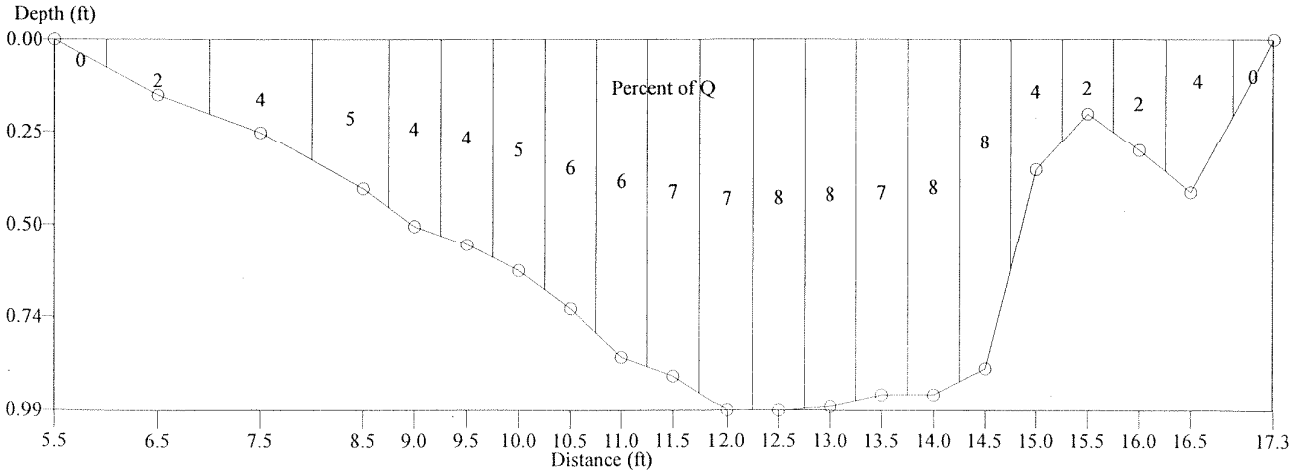
Site ID = SC4
Site Name = Siebert Creek at Transfer Station
Stage: 0.85 ft. Date: 10/13/03 Time: 1700

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	5.50	0.00	0.02	0.00	0.00	0.00
2	6.50	0.15	0.14	0.38	0.00	0.05
3	7.50	0.25	0.26	0.49	0.48	0.12
4	8.50	0.40	0.29	0.55	0.00	0.16
5	9.00	0.50	0.25	0.53	0.00	0.13
6	9.50	0.55	0.28	0.45	0.58	0.14
7	10.00	0.62	0.31	0.62	0.59	0.19
8	10.50	0.72	0.36	0.58	0.57	0.21
9	11.00	0.85	0.42	0.49	0.54	0.22
10	11.50	0.90	0.45	0.56	0.00	0.25
11	12.00	0.99	0.49	0.47	0.52	0.24
12	12.50	0.99	0.49	0.59	0.00	0.29
13	13.00	0.98	0.49	0.55	0.56	0.27
14	13.50	0.95	0.48	0.47	0.52	0.24
15	14.00	0.95	0.47	0.59	0.00	0.28
16	14.50	0.88	0.41	0.64	0.00	0.26
17	15.00	0.35	0.20	0.69	0.72	0.14
18	15.50	0.20	0.12	0.71	0.68	0.08
19	16.00	0.30	0.15	0.55	0.00	0.08
20	16.50	0.41	0.22	0.66	0.61	0.14
21	17.30	0.00	0.04	0.00	0.00	0.00

Total Area = 6.33 sq. ft.
Average Velocity = 0.55 ft./sec.

Total Discharge = 3.50 cfs



Stream Discharge Calculation

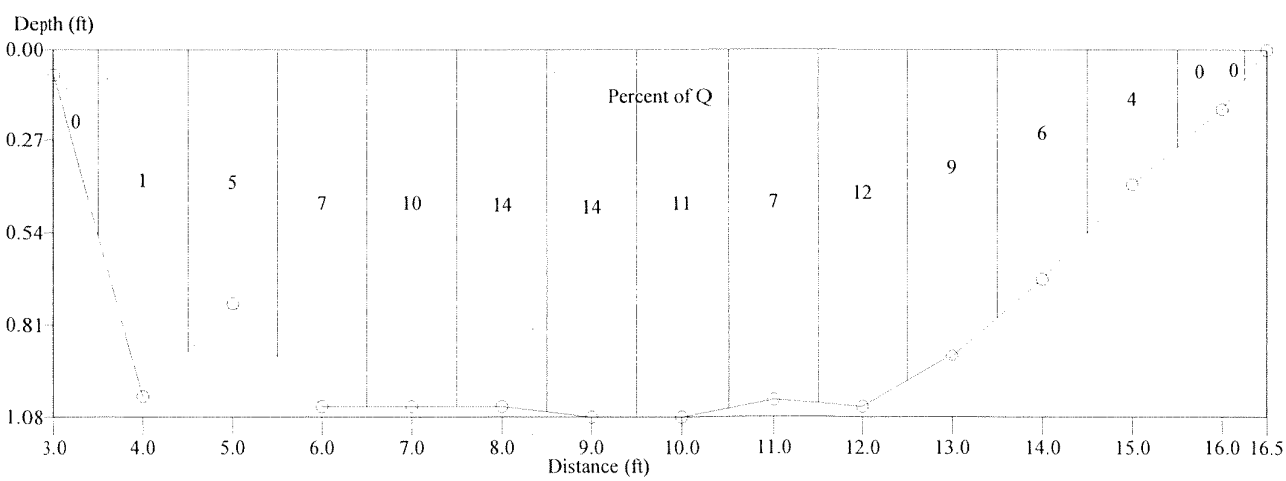
Site ID = sc-5
Site Name = Siebert Creek below Mary's
Stage: ft. Date: 6/25/03 Time: 1100 pst

Comment:
staff at recorder was 0.81, logger was 0.85 at 0900 pst

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	3.00	0.08	0.16	0.00	0.00	0.00
2	4.00	1.02	0.87	0.04	0.00	0.03
3	5.00	0.75	0.82	0.14	0.00	0.11
4	6.00	1.05	1.01	0.18	0.00	0.18
5	7.00	1.05	1.05	0.24	0.00	0.25
6	8.00	1.05	1.05	0.34	0.00	0.36
7	9.00	1.08	1.08	0.33	0.00	0.36
8	10.00	1.08	1.07	0.26	0.00	0.28
9	11.00	1.03	1.04	0.17	0.00	0.18
10	12.00	1.05	1.03	0.29	0.00	0.30
11	13.00	0.90	0.89	0.27	0.00	0.24
12	14.00	0.68	0.67	0.22	0.00	0.15
13	15.00	0.40	0.41	0.25	0.00	0.10
14	16.00	0.18	0.15	0.03	0.00	0.00
15	16.50	0.00	0.01	0.00	0.00	0.00

Total Area = 11.31 sq. ft.
Average Velocity = 0.23 ft./sec.

Total Discharge = 2.55 cfs



Stream Discharge Calculation

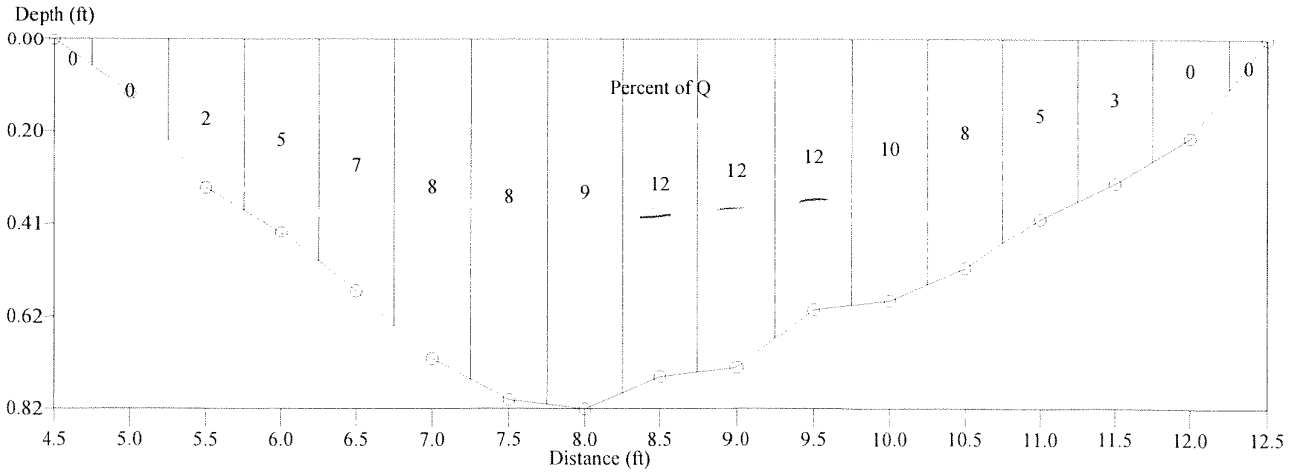
Site ID = SC-5
Site Name = Siebert Creek below Mary's
Stage: 0.74 + ft. Date: 7/29/03 Time: 0900

Comment:
0800 PST staff was 0.74 +

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	4.50	0.00	0.01	0.00	0.00	0.00
2	5.00	0.12	0.07	0.04	0.00	0.00
3	5.50	0.33	0.16	0.32	0.00	0.05
4	6.00	0.43	0.22	0.45	0.00	0.10
5	6.50	0.56	0.28	0.49	0.00	0.14
6	7.00	0.71	0.35	0.47	0.00	0.17
7	7.50	0.80	0.40	0.44	0.00	0.17
8	8.00	0.82	0.40	0.45	0.00	0.18
9	8.50	0.75	0.38	0.64	0.00	0.24
10	9.00	0.73	0.36	0.72	0.00	0.26
11	9.50	0.60	0.31	0.79	0.00	0.24
12	10.00	0.58	0.29	0.70	0.00	0.20
13	10.50	0.51	0.25	0.69	0.00	0.17
14	11.00	0.40	0.20	0.53	0.00	0.11
15	11.50	0.32	0.16	0.38	0.00	0.06
16	12.00	0.22	0.10	0.02	0.00	0.00
17	12.50	0.00	0.01	0.00	0.00	0.00

Total Area = 3.94 sq. ft.
Average Velocity = 0.53 ft./sec.

Total Discharge = 2.10 cfs



Stream Discharge Calculation

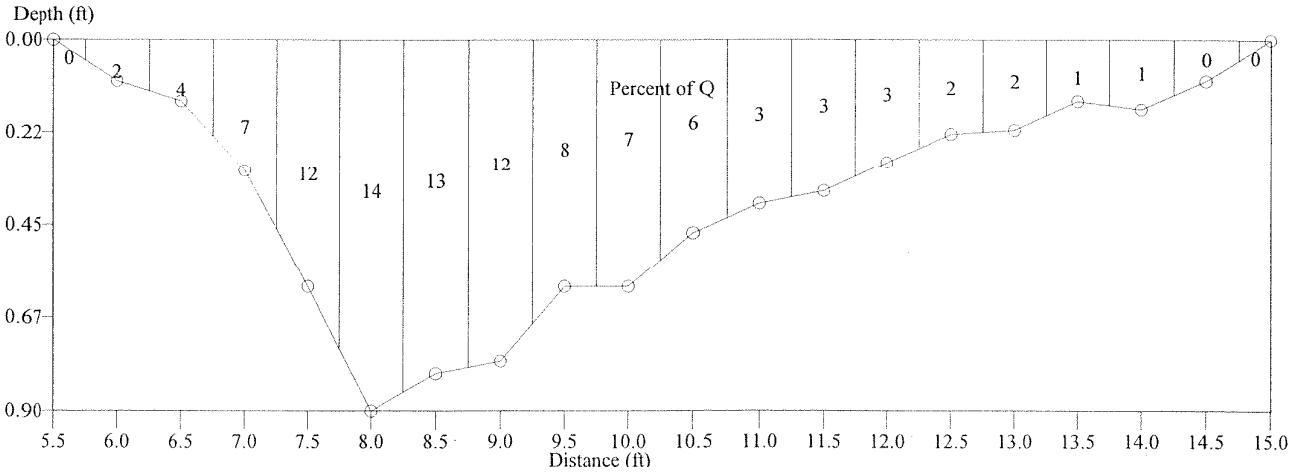
Site ID = SC-5
Site Name = Siebert Creek below Mary's
Stage: 0.73 ft. Date: 9/2/03 Time: 1530 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	5.50	0.00	0.01	0.00	0.00	0.00
2	6.00	0.10	0.05	0.55	0.00	0.03
3	6.50	0.15	0.08	0.71	0.00	0.06
4	7.00	0.32	0.17	0.67	0.00	0.11
5	7.50	0.60	0.30	0.62	0.00	0.19
6	8.00	0.90	0.43	0.52	0.00	0.22
7	8.50	0.81	0.41	0.49	0.00	0.20
8	9.00	0.78	0.38	0.49	0.00	0.19
9	9.50	0.60	0.31	0.41	0.00	0.13
10	10.00	0.60	0.29	0.38	0.00	0.11
11	10.50	0.47	0.24	0.39	0.00	0.09
12	11.00	0.40	0.20	0.21	0.00	0.04
13	11.50	0.37	0.18	0.25	0.00	0.05
14	12.00	0.30	0.15	0.29	0.00	0.04
15	12.50	0.23	0.12	0.26	0.00	0.03
16	13.00	0.22	0.11	0.25	0.00	0.03
17	13.50	0.15	0.08	0.23	0.00	0.02
18	14.00	0.17	0.08	0.19	0.00	0.02
19	14.50	0.10	0.05	0.05	0.00	0.00
20	15.00	0.00	0.01	0.00	0.00	0.00

Total Area = 3.64 sq. ft.
Average Velocity = 0.43 ft./sec.

Total Discharge = 1.55 cfs



Stream Discharge Calculation

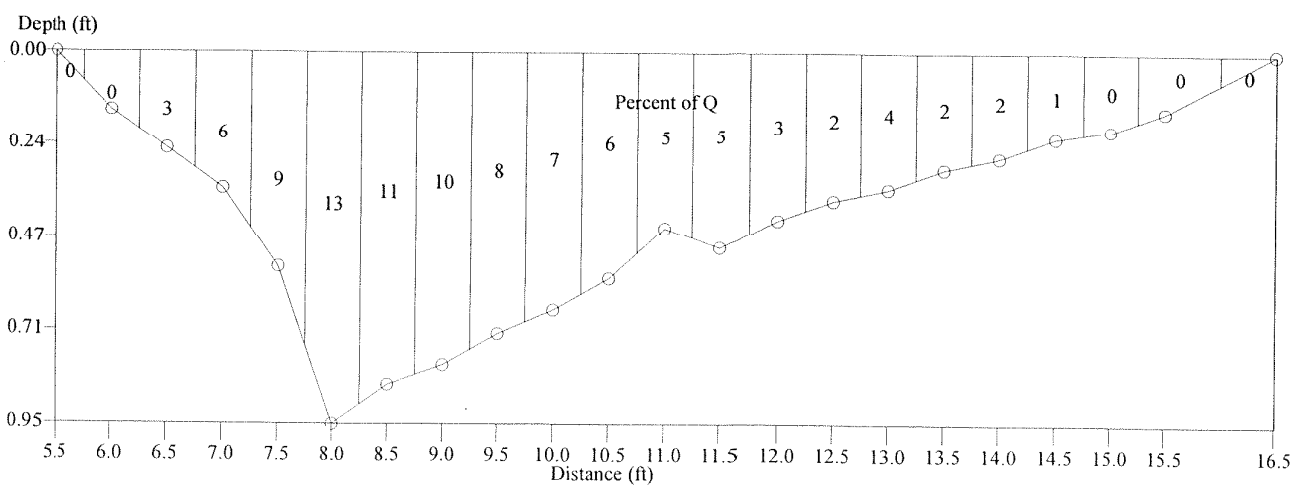
Site ID = SC5
Site Name = Siebert Creek below Mary's
Stage: 0.80 ft. Date: 10/14/03 Time: 0800

Comment:
Stream had dropped 0.05 feet overnight since 10/13/03

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	5.50	0.00	0.01	0.00	0.00	0.00
2	6.00	0.15	0.07	0.05	0.00	0.00
3	6.50	0.25	0.13	0.73	0.76	0.09
4	7.00	0.35	0.18	0.82	0.83	0.15
5	7.50	0.55	0.29	0.89	0.88	0.25
6	8.00	0.95	0.44	0.81	0.00	0.36
7	8.50	0.85	0.43	0.68	0.72	0.30
8	9.00	0.80	0.40	0.65	0.66	0.26
9	9.50	0.72	0.36	0.65	0.61	0.23
10	10.00	0.66	0.33	0.58	0.00	0.19
11	10.50	0.58	0.29	0.57	0.00	0.16
12	11.00	0.45	0.24	0.58	0.59	0.14
13	11.50	0.50	0.24	0.49	0.54	0.12
14	12.00	0.43	0.22	0.36	0.37	0.08
15	12.50	0.38	0.19	0.34	0.33	0.06
16	13.00	0.35	0.17	0.56	0.57	0.10
17	13.50	0.30	0.15	0.44	0.00	0.07
18	14.00	0.27	0.13	0.39	0.00	0.05
19	14.50	0.22	0.11	0.34	0.37	0.04
20	15.00	0.20	0.10	0.12	0.00	0.01
21	15.50	0.15	0.10	0.07	0.00	0.01
22	16.50	0.00	0.02	0.00	0.00	0.00

Total Area = 4.59 sq. ft.
Average Velocity = 0.58 ft./sec.

Total Discharge = 2.68 cfs



Stream Discharge Calculation

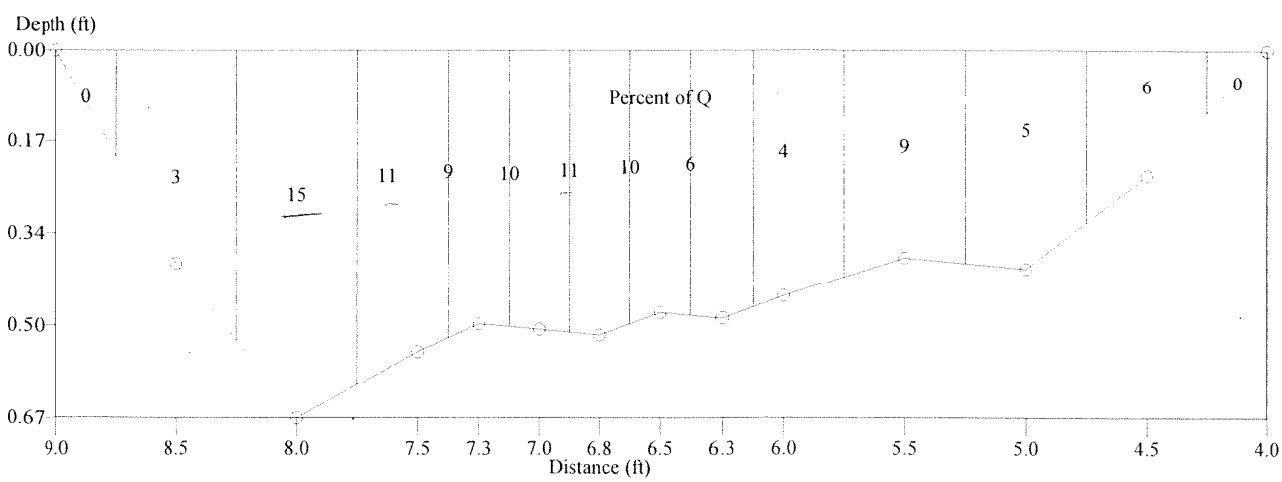
Site ID = SC-7
Site Name – East Fork Siebert Creek
Stage: ft. Date: 6/24/03 Time: 1415 pst

Comment:
staff at recorder was 0.82, logger was 0.86 at 0745

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	9.00	0.00	0.02	0.00	0.00	0.00
2	8.50	0.39	0.19	0.25	0.00	0.05
3	8.00	0.67	0.31	0.76	0.00	0.24
4	7.50	0.55	0.21	0.79	0.00	0.17
5	7.25	0.50	0.13	1.07	0.00	0.14
6	7.00	0.51	0.13	1.26	0.00	0.16
7	6.75	0.52	0.13	1.38	0.00	0.18
8	6.50	0.48	0.12	1.34	0.00	0.16
9	6.25	0.49	0.12	0.78	0.00	0.09
10	6.00	0.45	0.17	0.39	0.00	0.06
11	5.50	0.38	0.20	0.69	0.00	0.13
12	5.00	0.40	0.19	0.45	0.00	0.08
13	4.50	0.23	0.11	0.78	0.00	0.09
14	4.00	0.00	0.01	0.00	0.00	0.00

Total Area = 2.03 sq. ft.
Average Velocity = 0.76 ft./sec.

Total Discharge = 1.55 cfs



Stream Discharge Calculation

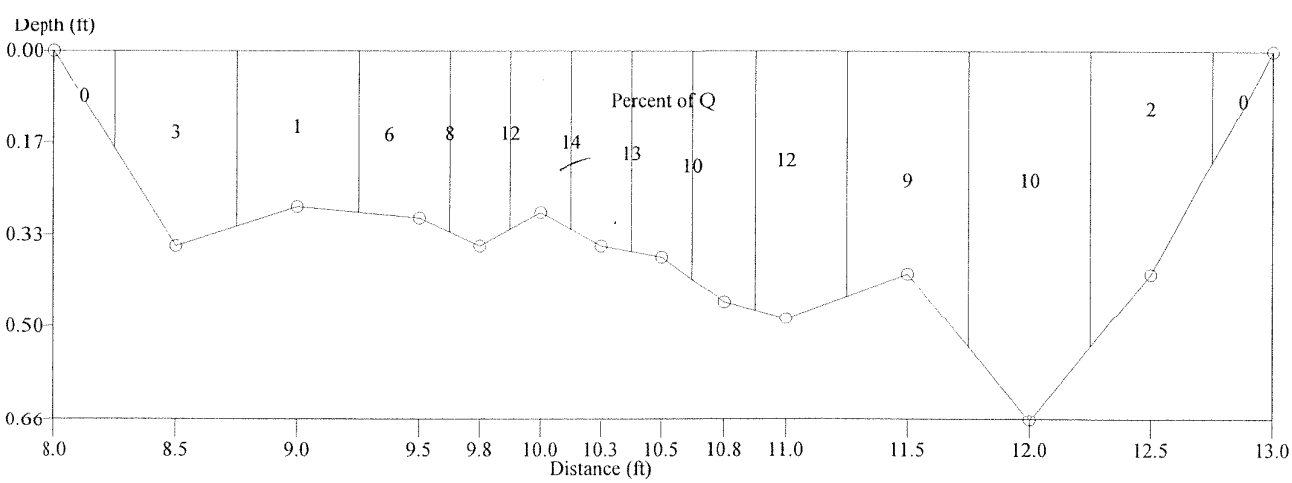
Site ID = SC-7
Site Name = East Fork Siebert Creek
Stage: 0.73 ft. Date: 9/3/03 Time: 0830 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	8.00	0.00	0.02	0.00	0.00	0.00
2	8.50	0.35	0.15	0.13	0.00	0.02
3	9.00	0.28	0.15	0.05	0.00	0.01
4	9.50	0.30	0.11	0.33	0.00	0.04
5	9.75	0.35	0.08	0.58	0.00	0.05
6	10.00	0.29	0.08	0.92	0.00	0.07
7	10.25	0.35	0.09	0.93	0.00	0.08
8	10.50	0.37	0.09	0.78	0.00	0.07
9	10.75	0.45	0.11	0.50	0.00	0.06
10	11.00	0.48	0.17	0.39	0.00	0.07
11	11.50	0.40	0.22	0.24	0.00	0.05
12	12.00	0.66	0.30	0.19	0.00	0.06
13	12.50	0.40	0.19	0.05	0.00	0.01
14	13.00	0.00	0.03	0.00	0.00	0.00

Total Area = 1.79 sq. ft.
Average Velocity = 0.32 ft./sec.

Total Discharge = 0.58 cfs



Stream Discharge Calculation

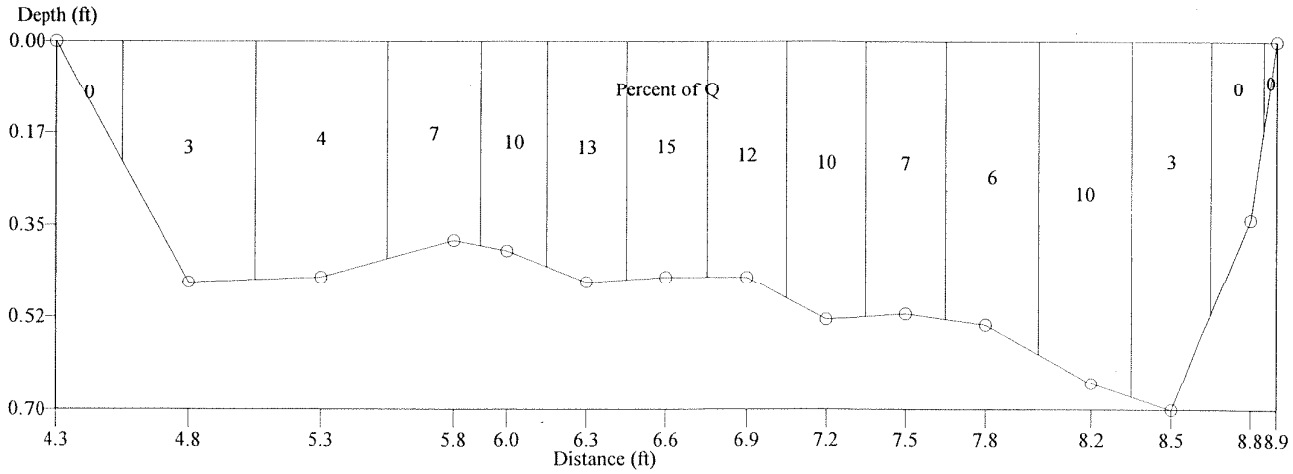
Site ID = SC-7
Site Name = East Fork Siebert Creek
Stage: 0.80 ft. Date: 10/14/03 Time: 1000

Comment:
Stream had dropped 0.05 feet overnight at the gage - since 10/13/03

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	4.30	0.00	0.03	0.00	0.00	0.00
2	4.80	0.46	0.20	0.16	0.09	0.03
3	5.30	0.45	0.22	0.21	0.17	0.04
4	5.80	0.38	0.14	0.49	0.52	0.07
5	6.00	0.40	0.10	0.89	0.90	0.09
6	6.30	0.46	0.14	0.91	0.84	0.12
7	6.60	0.45	0.14	0.99	1.07	0.14
8	6.90	0.45	0.14	0.77	0.79	0.11
9	7.20	0.53	0.16	0.57	0.60	0.09
10	7.50	0.52	0.16	0.42	0.45	0.07
11	7.80	0.54	0.19	0.31	0.30	0.06
12	8.20	0.65	0.22	0.41	0.39	0.09
13	8.50	0.70	0.19	0.15	0.00	0.03
14	8.80	0.34	0.08	0.05	0.00	0.00
15	8.90	0.00	0.00	0.00	0.00	0.00

Total Area = 2.11 sq. ft.
Average Velocity = 0.44 ft./sec.

Total Discharge = 0.93 cfs



Stream Discharge Calculation

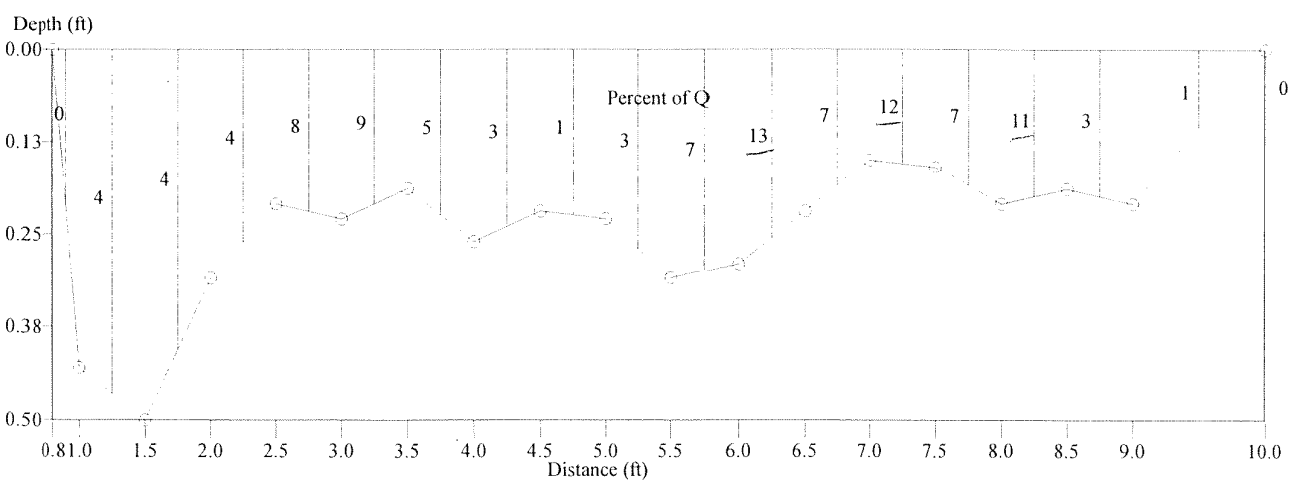
Site ID = SC-8
Site Name = West Fork Siebert Creek
Stage: ft. Date: 6/24/03 Time: 1330 pst

Comment:
staff at recorder was 0.82, logger was 0.86

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	0.80	0.00	0.01	0.00	0.00	0.00
2	1.00	0.43	0.14	0.22	0.00	0.03
3	1.50	0.50	0.23	0.13	0.00	0.03
4	2.00	0.31	0.16	0.22	0.00	0.04
5	2.50	0.21	0.11	0.56	0.00	0.06
6	3.00	0.23	0.11	0.68	0.00	0.08
7	3.50	0.19	0.10	0.41	0.00	0.04
8	4.00	0.26	0.12	0.18	0.00	0.02
9	4.50	0.22	0.11	0.05	0.00	0.01
10	5.00	0.23	0.12	0.19	0.00	0.02
11	5.50	0.31	0.15	0.35	0.00	0.05
12	6.00	0.29	0.14	0.71	0.00	0.10
13	6.50	0.22	0.11	0.51	0.00	0.06
14	7.00	0.15	0.08	1.17	0.00	0.09
15	7.50	0.16	0.08	0.65	0.00	0.05
16	8.00	0.21	0.10	0.88	0.00	0.09
17	8.50	0.19	0.10	0.21	0.00	0.02
18	9.00	0.21	0.13	0.05	0.00	0.01
19	10.00	0.00	0.03	0.00	0.00	0.00

Total Area = 2.15 sq. ft.
Average Velocity = 0.37 ft./sec.

Total Discharge = 0.80 cfs



Stream Discharge Calculation

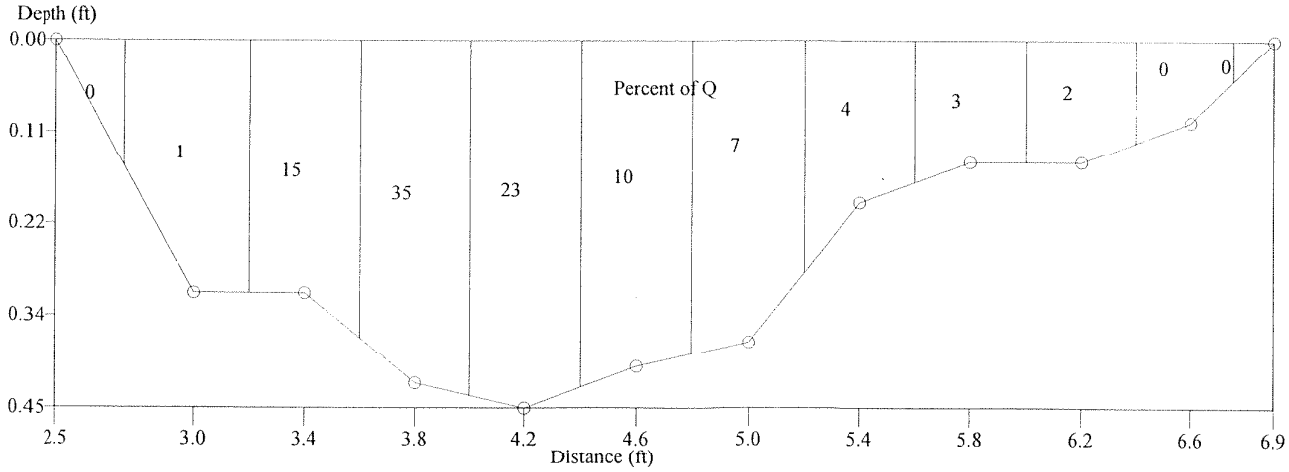
Site ID = SC- 8
Site Name = West Fork Siebert Creek
Stage: 0.73 ft. Date: 9/3/03 Time: 0930 PST

Comment:

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	2.50	0.00	0.02	0.00	0.00	0.00
2	3.00	0.31	0.12	0.05	0.00	0.01
3	3.40	0.31	0.13	0.56	0.00	0.07
4	3.80	0.42	0.16	1.03	0.00	0.17
5	4.20	0.45	0.18	0.64	0.00	0.11
6	4.60	0.40	0.16	0.29	0.00	0.05
7	5.00	0.37	0.14	0.26	0.00	0.04
8	5.40	0.20	0.09	0.22	0.00	0.02
9	5.80	0.15	0.06	0.27	0.00	0.02
10	6.20	0.15	0.06	0.15	0.00	0.01
11	6.60	0.10	0.03	0.05	0.00	0.00
12	6.90	0.00	0.00	0.00	0.00	0.00

Total Area = 1.15 sq. ft.
Average Velocity = 0.42 ft./sec.

Total Discharge = 0.49 cfs



Stream Discharge Calculation

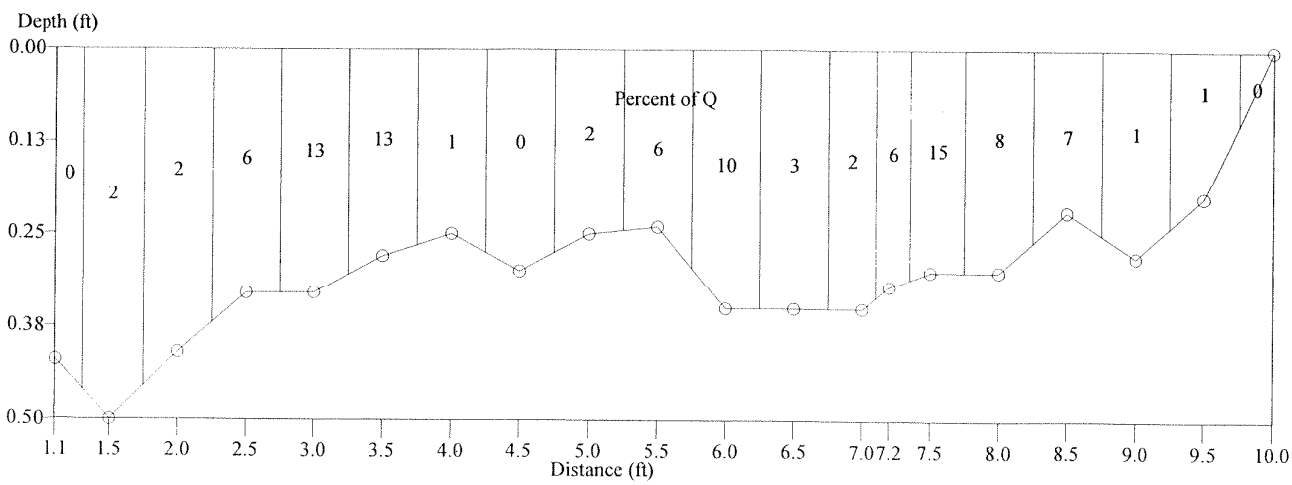
Site ID = SC-8
Site Name = West Fork Siebert Creek
Stage: 0.80 ft. Date: 10/14/03 Time: 1030

Comment:
Stream had dropped 0.05 feet overnight at the gage since 10/13/03

Point	Distance	Depth	Area	Velocity1	Velocity2	q
1	1.10	0.42	0.09	0.00	0.00	0.00
2	1.50	0.50	0.22	0.05	0.00	0.01
3	2.00	0.41	0.21	0.05	0.00	0.01
4	2.50	0.33	0.17	0.25	0.00	0.04
5	3.00	0.33	0.16	0.50	0.55	0.08
6	3.50	0.28	0.14	0.59	0.66	0.09
7	4.00	0.25	0.13	0.06	0.00	0.01
8	4.50	0.30	0.14	0.02	0.00	0.00
9	5.00	0.25	0.13	0.13	0.00	0.02
10	5.50	0.24	0.13	0.32	0.00	0.04
11	6.00	0.35	0.17	0.35	0.41	0.06
12	6.50	0.35	0.17	0.11	0.00	0.02
13	7.00	0.35	0.12	0.13	0.00	0.02
14	7.20	0.32	0.08	0.51	0.00	0.04
15	7.50	0.30	0.12	0.79	0.87	0.10
16	8.00	0.30	0.15	0.38	0.00	0.06
17	8.50	0.22	0.12	0.41	0.42	0.05
18	9.00	0.28	0.13	0.05	0.00	0.01
19	9.50	0.20	0.09	0.10	0.00	0.01
20	10.00	0.00	0.01	0.00	0.00	0.00

Total Area = 2.68 sq. ft.
Average Velocity = 0.25 ft./sec.

Total Discharge = 0.67 cfs



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Appendix B

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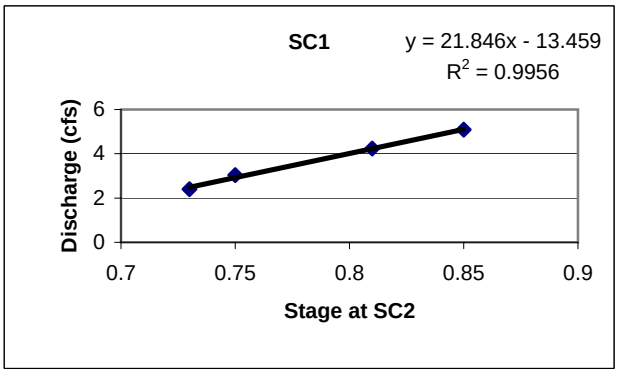
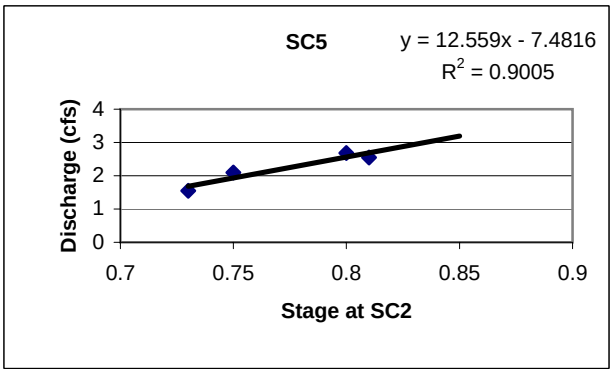
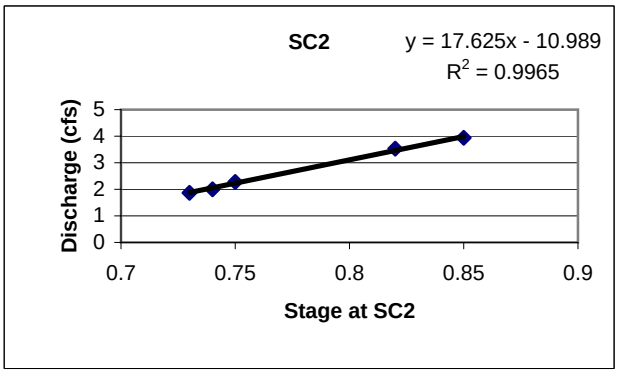
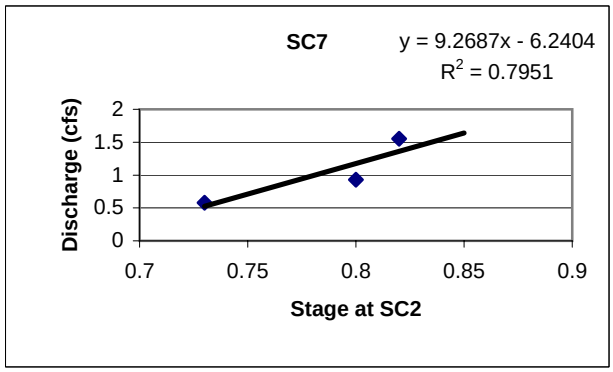
Appendix B.

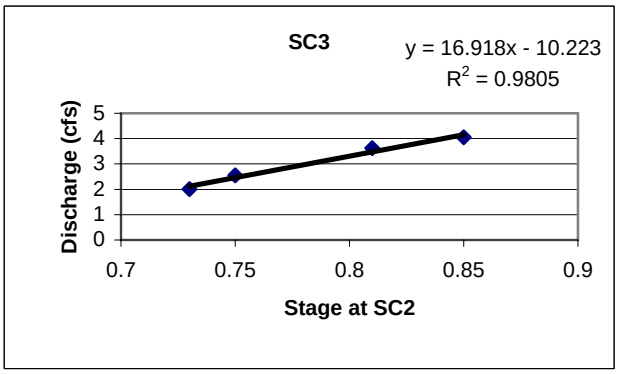
Regression equations relating discharge at the study sites with stage recorded at station SC2.

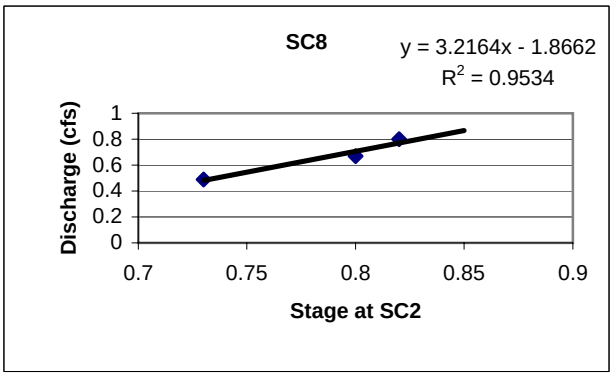


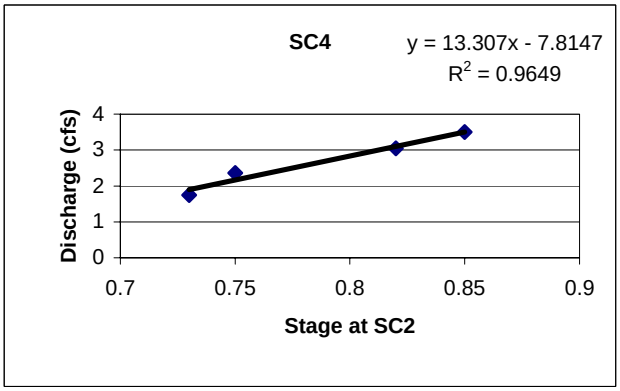












Equations were used to convert the continuous stage record at SC2 to continuous discharge at each station (see Appendix C)

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Appendix C

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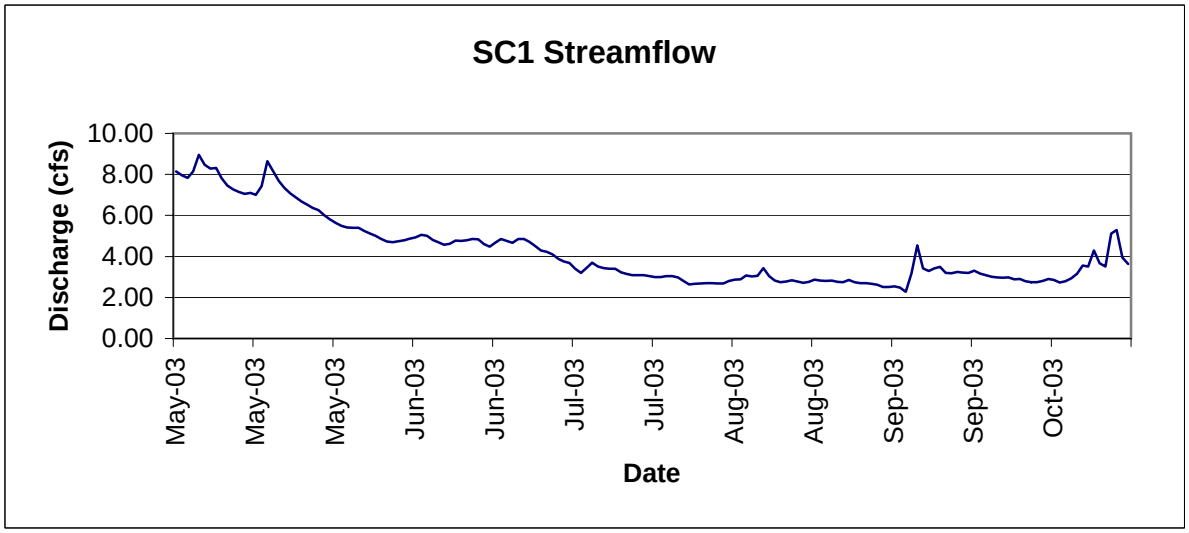
Siebert Creek above mouth (SC1) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	8.1	5.4	4.9	2.7	2.6	2.9
2	7.9	5.4	4.7	2.7	2.5	2.9
3	7.8	5.2	4.5	2.7	2.5	2.7
4	8.1	5.1	4.3	2.7	2.5	2.8
5	9.0	5.0	4.2	2.7	2.5	2.9
6	8.5	4.8	4.1	2.8	2.3	3.2
7	8.3	4.7	3.9	2.9	3.2	3.6
8	8.3	4.7	3.8	2.9	4.5	3.5
9	7.8	4.7	3.7	3.1	3.4	4.3
10	7.5	4.8	3.4	3.0	3.3	3.7
11	7.3	4.9	3.2	3.1	3.4	3.5
12	7.1	4.9	3.4	3.4	3.5	5.1
13	7.0	5.0	3.7	3.0	3.2	5.3
14	7.1	5.0	3.5	2.8	3.2	3.9
15	7.0	4.8	3.4	2.8	3.2	3.6
16	7.4	4.7	3.4	2.8	3.2	
17	8.6	4.6	3.4	2.8	3.2	
18	8.2	4.6	3.2	2.8	3.3	
19	7.7	4.8	3.2	2.7	3.2	
20	7.3	4.8	3.1	2.8	3.1	
21	7.1	4.8	3.1	2.9	3.0	
22	6.9	4.9	3.1	2.8	3.0	
23	6.7	4.8	3.0	2.8	3.0	
24	6.5	4.6	3.0	2.8	3.0	
25	6.4	4.5	3.0	2.8	2.9	
26	6.3	4.7	3.0	2.7	2.9	
27	6.0	4.8	3.0	2.8	2.8	
28	5.8	4.8	3.0	2.8	2.7	
29	5.6	4.7	2.8	2.7	2.7	
30	5.5	4.9	2.6	2.7	2.8	
31	5.4		2.7	2.7		
Average	**7.2**	**4.8**	**3.5**	**2.8**	**3.0**	**3.6**

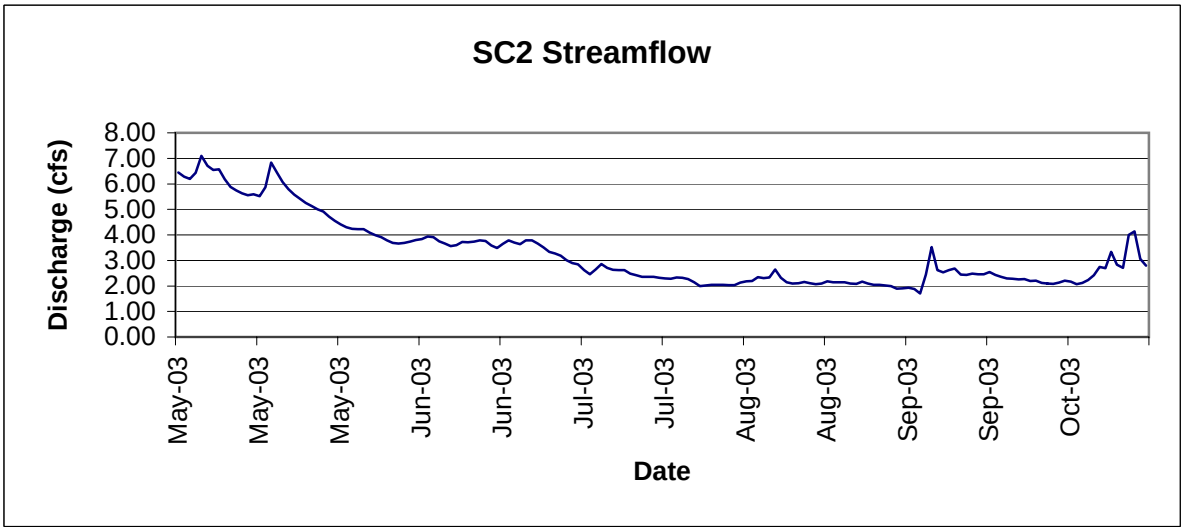
Study Period Avg. 4.2 cfs



Siebert Creek at old Olympic Highway (SC2) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	6.4	4.2	3.8	2.0	2.0	2.2
2	6.3	4.2	3.7	2.0	1.9	2.2
3	6.2	4.1	3.5	2.0	1.9	2.1
4	6.4	4.0	3.3	2.0	1.9	2.1
5	7.1	3.9	3.3	2.0	1.9	2.2
6	6.7	3.8	3.2	2.1	1.7	2.4
7	6.5	3.7	3.0	2.2	2.4	2.7
8	6.6	3.7	2.9	2.2	3.5	2.7
9	6.2	3.7	2.8	2.3	2.6	3.3
10	5.9	3.7	2.6	2.3	2.5	2.8
11	5.7	3.8	2.5	2.3	2.6	2.7
12	5.6	3.8	2.6	2.6	2.7	4.0
13	5.6	3.9	2.9	2.3	2.4	4.1
14	5.6	3.9	2.7	2.1	2.4	3.1
15	5.5	3.8	2.6	2.1	2.5	2.8
16	5.9	3.7	2.6	2.1	2.5	
17	6.8	3.6	2.6	2.2	2.5	
18	6.5	3.6	2.5	2.1	2.5	
19	6.1	3.7	2.4	2.1	2.4	
20	5.8	3.7	2.4	2.1	2.4	
21	5.6	3.7	2.4	2.2	2.3	
22	5.4	3.8	2.4	2.1	2.3	
23	5.3	3.8	2.3	2.1	2.3	
24	5.1	3.6	2.3	2.1	2.3	
25	5.0	3.5	2.3	2.1	2.2	
26	4.9	3.6	2.3	2.1	2.2	
27	4.7	3.8	2.3	2.2	2.1	
28	4.6	3.7	2.3	2.1	2.1	
29	4.4	3.6	2.1	2.0	2.1	
30	4.3	3.8	2.0	2.0	2.1	
31	4.2		2.0	2.0		
Average	**5.7**	**3.8**	**2.7**	**2.1**	**2.3**	**2.8**

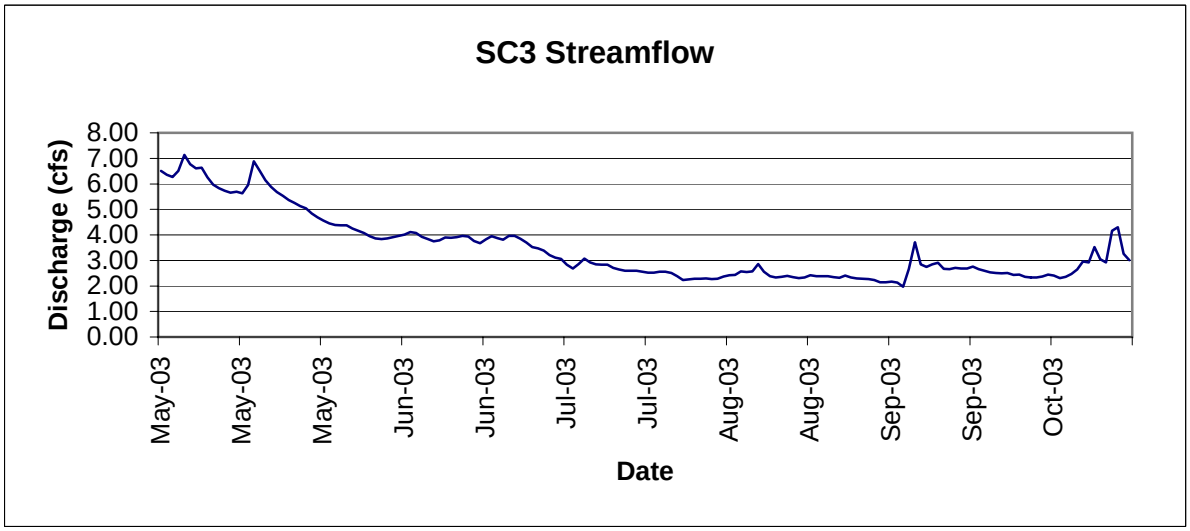
Study Period Avg. 3.2 cfs



Siebert Creek above Highway 101 (SC3) - Streamflow (cfs) for 2003.

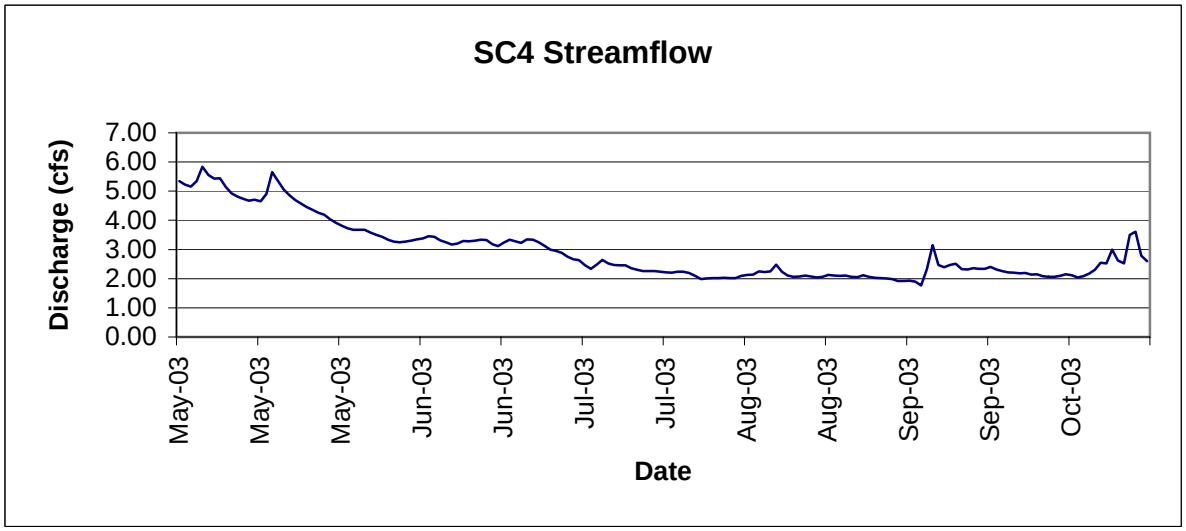
Day	May	Jun	Jul	Aug	Sep	Oct
1	6.5	4.4	4.0	2.3	2.2	2.4
2	6.4	4.4	3.8	2.3	2.1	2.4
3	6.3	4.3	3.7	2.3	2.1	2.3
4	6.5	4.2	3.5	2.3	2.2	2.4
5	7.1	4.1	3.5	2.3	2.1	2.5
6	6.8	4.0	3.4	2.4	2.0	2.6
7	6.6	3.9	3.2	2.4	2.7	3.0
8	6.6	3.8	3.1	2.4	3.7	2.9
9	6.3	3.9	3.1	2.6	2.8	3.5
10	6.0	3.9	2.8	2.5	2.8	3.0
11	5.8	4.0	2.7	2.6	2.8	2.9
12	5.7	4.0	2.9	2.9	2.9	4.2
13	5.7	4.1	3.1	2.6	2.7	4.3
14	5.7	4.1	2.9	2.4	2.7	3.3
15	5.6	3.9	2.9	2.3	2.7	3.0
16	6.0	3.8	2.8	2.4	2.7	
17	6.9	3.7	2.8	2.4	2.7	
18	6.5	3.8	2.7	2.3	2.8	
19	6.1	3.9	2.6	2.3	2.7	
20	5.9	3.9	2.6	2.3	2.6	
21	5.7	3.9	2.6	2.4	2.5	
22	5.5	4.0	2.6	2.4	2.5	
23	5.4	3.9	2.6	2.4	2.5	
24	5.3	3.8	2.5	2.4	2.5	
25	5.1	3.7	2.5	2.3	2.4	
26	5.0	3.8	2.6	2.3	2.4	
27	4.8	4.0	2.6	2.4	2.4	
28	4.7	3.9	2.5	2.3	2.3	
29	4.6	3.8	2.4	2.3	2.3	
30	4.5	4.0	2.2	2.3	2.4	
31	4.4		2.3	2.3		
Average	**5.8**	**4.0**	**2.9**	**2.4**	**2.5**	**3.0**

Study Period Avg. 3.4 cfs



Siebert Creek near Transfer Station (SC4) - Streamflow (cfs) for 2003.

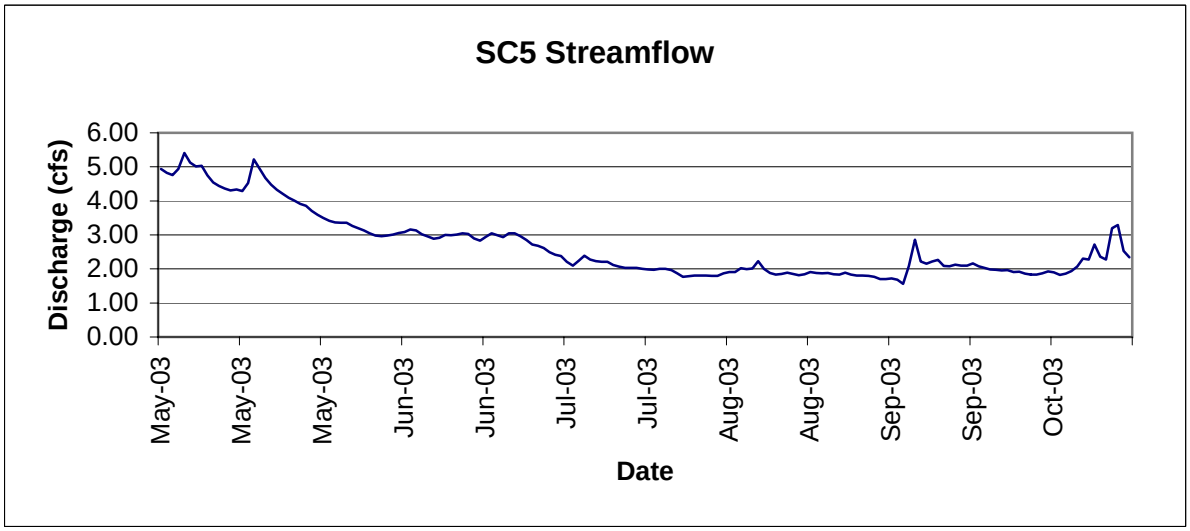
Day	May	Jun	Jul	Aug	Sep	Oct	
1	5.3	3.7	3.3	2.0	2.0	2.2	
2	5.2	3.7	3.2	2.0	1.9	2.1	
3	5.2	3.6	3.1	2.0	1.9	2.0	
4	5.3	3.5	3.0	2.0	1.9	2.1	
5	5.8	3.4	3.0	2.0	1.9	2.2	
6	5.5	3.3	2.9	2.1	1.8	2.3	
7	5.4	3.3	2.8	2.1	2.3	2.6	
8	5.4	3.2	2.7	2.1	3.1	2.5	
9	5.1	3.3	2.6	2.3	2.5	3.0	
10	4.9	3.3	2.5	2.2	2.4	2.6	
11	4.8	3.3	2.3	2.2	2.5	2.5	
12	4.7	3.4	2.5	2.5	2.5	3.5	
13	4.7	3.5	2.6	2.2	2.3	3.6	
14	4.7	3.4	2.5	2.1	2.3	2.8	
15	4.7	3.3	2.5	2.1	2.4	2.6	
16	4.9	3.2	2.5	2.1	2.3		
17	5.6	3.2	2.5	2.1	2.3		
18	5.4	3.2	2.4	2.1	2.4		
19	5.1	3.3	2.3	2.0	2.3		
20	4.9	3.3	2.3	2.1	2.3		
21	4.7	3.3	2.3	2.1	2.2		
22	4.6	3.3	2.3	2.1	2.2		
23	4.4	3.3	2.2	2.1	2.2		
24	4.4	3.2	2.2	2.1	2.2		
25	4.3	3.1	2.2	2.1	2.1		
26	4.2	3.2	2.2	2.1	2.1		
27	4.0	3.3	2.2	2.1	2.1		
28	3.9	3.3	2.2	2.1	2.1		
29	3.8	3.2	2.1	2.0	2.1		
30	3.7	3.3	2.0	2.0	2.1		**Study**
31	3.7		2.0	2.0			**Period Avg.**
Average	**4.8**	**3.3**	**2.5**	**2.1**	**2.2**	**2.6**	**2.9 cfs**



Siebert Creek near mid basin (SC5) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	4.9	3.4	3.0	1.8	1.8	1.9
2	4.8	3.4	3.0	1.8	1.7	1.9
3	4.8	3.3	2.8	1.8	1.7	1.8
4	4.9	3.2	2.7	1.8	1.7	1.9
5	5.4	3.1	2.7	1.8	1.7	1.9
6	5.1	3.0	2.6	1.9	1.6	2.1
7	5.0	3.0	2.5	1.9	2.1	2.3
8	5.0	3.0	2.4	1.9	2.9	2.3
9	4.8	3.0	2.4	2.0	2.2	2.7
10	4.5	3.0	2.2	2.0	2.2	2.4
11	4.4	3.1	2.1	2.0	2.2	2.3
12	4.4	3.1	2.2	2.2	2.3	3.2
13	4.3	3.2	2.4	2.0	2.1	3.3
14	4.3	3.1	2.3	1.9	2.1	2.5
15	4.3	3.0	2.2	1.8	2.1	2.3
16	4.5	3.0	2.2	1.9	2.1	
17	5.2	2.9	2.2	1.9	2.1	
18	4.9	2.9	2.1	1.9	2.2	
19	4.7	3.0	2.1	1.8	2.1	
20	4.5	3.0	2.0	1.8	2.0	
21	4.3	3.0	2.0	1.9	2.0	
22	4.2	3.0	2.0	1.9	2.0	
23	4.1	3.0	2.0	1.9	2.0	
24	4.0	2.9	2.0	1.9	2.0	
25	3.9	2.8	2.0	1.8	1.9	
26	3.9	2.9	2.0	1.8	1.9	
27	3.7	3.0	2.0	1.9	1.9	
28	3.6	3.0	2.0	1.8	1.8	
29	3.5	2.9	1.9	1.8	1.8	
30	3.4	3.0	1.8	1.8	1.9	
31	3.4		1.8	1.8		
Average	**4.4**	**3.0**	**2.2**	**1.9**	**2.0**	**2.3**

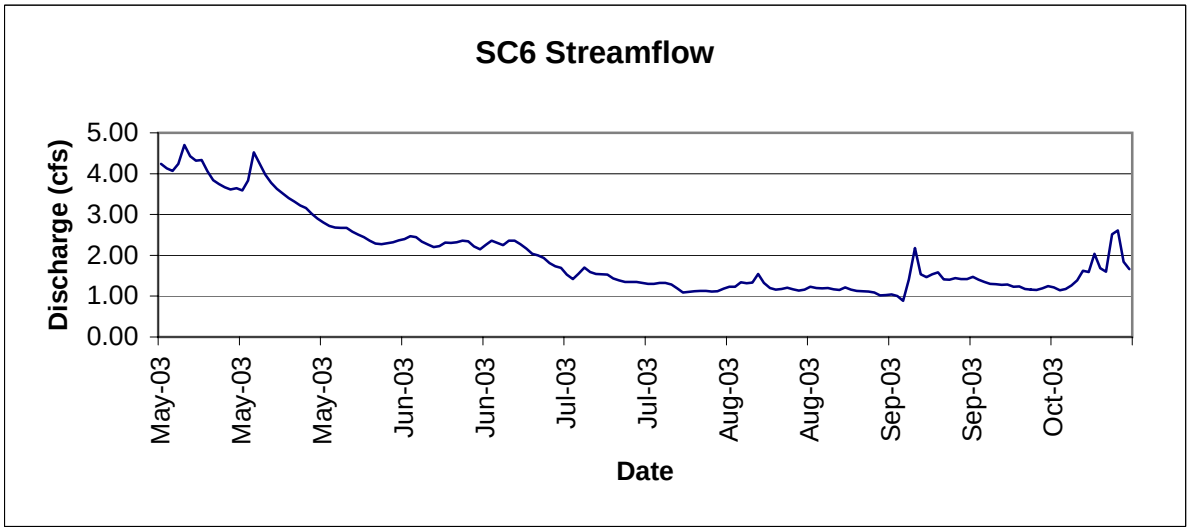
Study Period Avg. 2.7 cfs



Siebert Creek below forks (SC6) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	4.2	2.7	2.4	1.1	1.1	1.2
2	4.1	2.7	2.3	1.1	1.0	1.2
3	4.1	2.6	2.2	1.1	1.0	1.1
4	4.2	2.5	2.0	1.1	1.0	1.2
5	4.7	2.4	2.0	1.1	1.0	1.3
6	4.4	2.4	1.9	1.2	0.9	1.4
7	4.3	2.3	1.8	1.2	1.4	1.6
8	4.3	2.3	1.7	1.2	2.2	1.6
9	4.1	2.3	1.7	1.3	1.5	2.0
10	3.8	2.3	1.5	1.3	1.5	1.7
11	3.7	2.4	1.4	1.3	1.5	1.6
12	3.7	2.4	1.6	1.5	1.6	2.5
13	3.6	2.5	1.7	1.3	1.4	2.6
14	3.6	2.4	1.6	1.2	1.4	1.8
15	3.6	2.3	1.5	1.2	1.4	1.7
16	3.8	2.3	1.5	1.2	1.4	
17	4.5	2.2	1.5	1.2	1.4	
18	4.2	2.2	1.4	1.2	1.5	
19	4.0	2.3	1.4	1.1	1.4	
20	3.8	2.3	1.3	1.2	1.4	
21	3.6	2.3	1.4	1.2	1.3	
22	3.5	2.4	1.3	1.2	1.3	
23	3.4	2.3	1.3	1.2	1.3	
24	3.3	2.2	1.3	1.2	1.3	
25	3.2	2.1	1.3	1.2	1.2	
26	3.2	2.3	1.3	1.2	1.2	
27	3.0	2.4	1.3	1.2	1.2	
28	2.9	2.3	1.3	1.2	1.2	
29	2.8	2.2	1.2	1.1	1.2	
30	2.7	2.4	1.1	1.1	1.2	
31	2.7		1.1	1.1		
Average	**3.7**	**2.4**	**1.6**	**1.2**	**1.3**	**1.6**

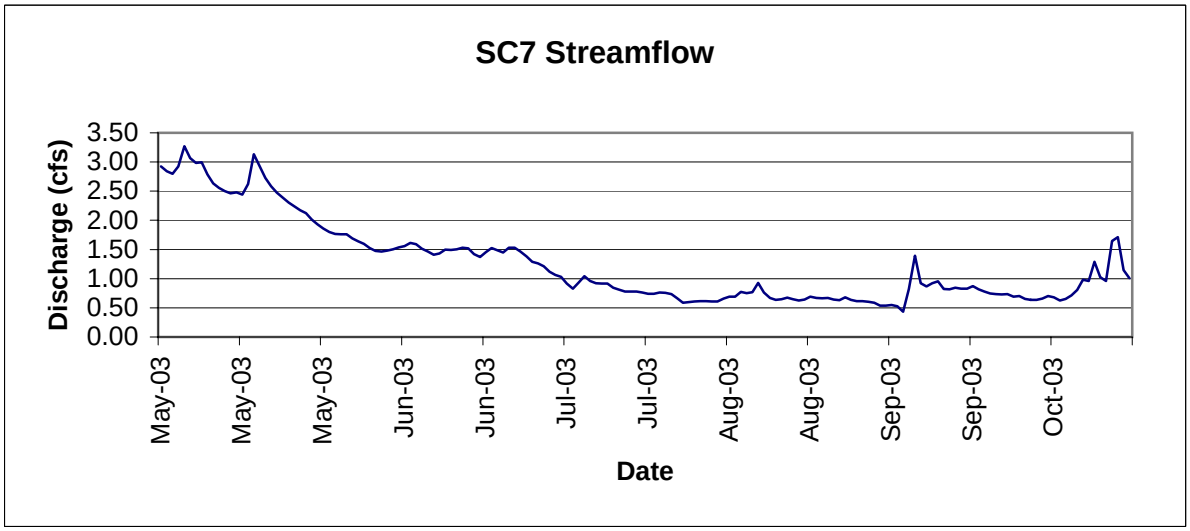
Study Period Avg. 2.0 cfs



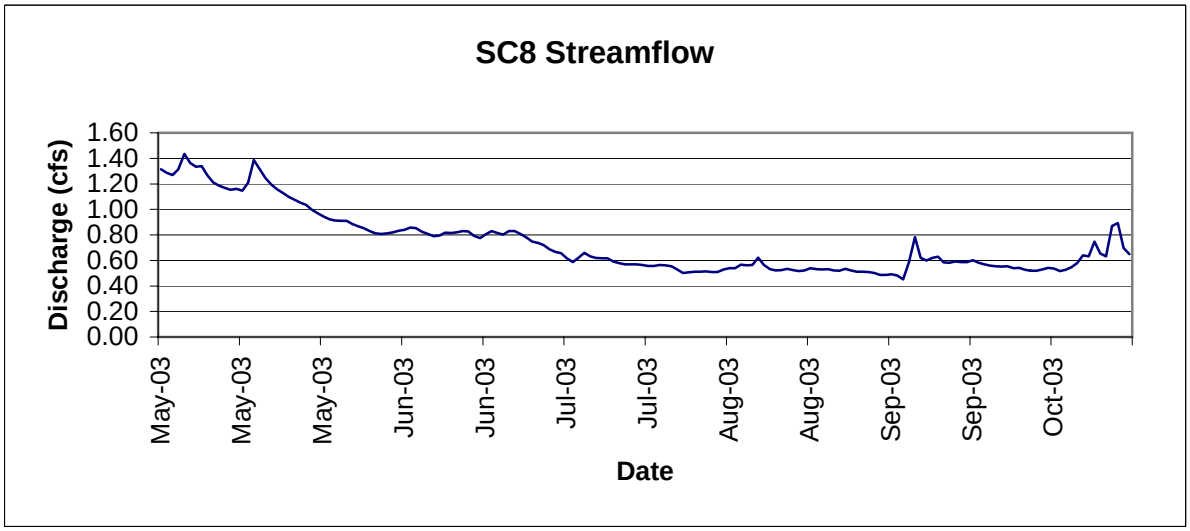
East Fork Siebert Creek (SC7) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	2.9	1.8	1.5	0.6	0.6	0.7
2	2.8	1.8	1.5	0.6	0.5	0.7
3	2.8	1.7	1.4	0.6	0.5	0.6
4	2.9	1.6	1.3	0.6	0.6	0.7
5	3.3	1.6	1.3	0.6	0.5	0.7
6	3.1	1.5	1.2	0.7	0.4	0.8
7	3.0	1.5	1.1	0.7	0.8	1.0
8	3.0	1.5	1.1	0.7	1.4	1.0
9	2.8	1.5	1.0	0.8	0.9	1.3
10	2.6	1.5	0.9	0.8	0.9	1.0
11	2.6	1.5	0.8	0.8	0.9	1.0
12	2.5	1.6	0.9	0.9	1.0	1.6
13	2.5	1.6	1.0	0.8	0.8	1.7
14	2.5	1.6	1.0	0.7	0.8	1.1
15	2.4	1.5	0.9	0.6	0.8	1.0
16	2.6	1.5	0.9	0.6	0.8	
17	3.1	1.4	0.9	0.7	0.8	
18	2.9	1.4	0.8	0.6	0.9	
19	2.7	1.5	0.8	0.6	0.8	
20	2.6	1.5	0.8	0.6	0.8	
21	2.5	1.5	0.8	0.7	0.7	
22	2.4	1.5	0.8	0.7	0.7	
23	2.3	1.5	0.8	0.7	0.7	
24	2.2	1.4	0.7	0.7	0.7	
25	2.2	1.4	0.7	0.6	0.7	
26	2.1	1.5	0.8	0.6	0.7	
27	2.0	1.5	0.8	0.7	0.7	
28	1.9	1.5	0.7	0.6	0.6	
29	1.9	1.4	0.7	0.6	0.6	
30	1.8	1.5	0.6	0.6	0.7	
31	1.8		0.6	0.6		
Average	**2.5**	**1.5**	**0.9**	**0.7**	**0.8**	**1.0**

Study Period Avg. 1.2 cfs



West Fork Siebert Creek (SC8) - Streamflow (cfs) for 2003.

Day	May	Jun	Jul	Aug	Sep	Oct
1	1.3	0.9	0.8	0.5	0.5	0.5
2	1.3	0.9	0.8	0.5	0.5	0.5
3	1.3	0.9	0.8	0.5	0.5	0.5
4	1.3	0.9	0.7	0.5	0.5	0.5
5	1.4	0.9	0.7	0.5	0.5	0.5
6	1.4	0.8	0.7	0.5	0.5	0.6
7	1.3	0.8	0.7	0.5	0.6	0.6
8	1.3	0.8	0.7	0.5	0.8	0.6
9	1.3	0.8	0.7	0.6	0.6	0.7
10	1.2	0.8	0.6	0.6	0.6	0.7
11	1.2	0.8	0.6	0.6	0.6	0.6
12	1.2	0.8	0.6	0.6	0.6	0.9
13	1.2	0.9	0.7	0.6	0.6	0.9
14	1.2	0.9	0.6	0.5	0.6	0.7
15	1.1	0.8	0.6	0.5	0.6	0.7
16	1.2	0.8	0.6	0.5	0.6	
17	1.4	0.8	0.6	0.5	0.6	
18	1.3	0.8	0.6	0.5	0.6	
19	1.2	0.8	0.6	0.5	0.6	
20	1.2	0.8	0.6	0.5	0.6	
21	1.2	0.8	0.6	0.5	0.6	
22	1.1	0.8	0.6	0.5	0.6	
23	1.1	0.8	0.6	0.5	0.6	
24	1.1	0.8	0.6	0.5	0.6	
25	1.1	0.8	0.6	0.5	0.5	
26	1.0	0.8	0.6	0.5	0.5	
27	1.0	0.8	0.6	0.5	0.5	
28	1.0	0.8	0.6	0.5	0.5	
29	0.9	0.8	0.5	0.5	0.5	
30	0.9	0.8	0.5	0.5	0.5	
31	0.9		0.5	0.5		
Average	**1.2**	**0.8**	**0.6**	**0.5**	**0.6**	**0.6**

Study Period Avg. 0.7 cfs