Wheeler Creek (Klickitat River Subbasin, Washington) Rapid Aquatic Habitat Assessment Stream Report

Confederated Tribes and Bands of the Yakama Nation
Yakama Nation Fisheries Program, Yakima/Klickitat Fisheries Project
Klickitat Research, Monitoring, and Evaluation Project
Klickitat Watershed Enhancement Project
Klickitat Field Office
1575 Horseshoe Bend Rd
Klickitat, WA 98628

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Prepared by:
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Yakima Klickitat Fisheries Project-Klickitat Monitoring and Evaluation Project (KM&E) and Klickitat Watershed Enhancement Project (KWEP)-Rapid Aquatic Habitat Assessment Stream Report

Stream: Wheeler Creek

LLID: 1211925457947

Basin: Klickitat River

HUC Number: 17070106

Ecoregion: Columbia River Gorge

Watershed Area: 25.2 km^{-2}

Survey Dates: Reach 1 – April 26-28, 2011

Reach 2 – April 29, 2011

Survey Crew: Reach 1 – Nicolas Romero and David Lindley

Reach 2 – Nicolas Romero and David Lindley

Report Prepared By: Kory G. Kuhn and Nicolas Romero

Introduction:

The Rapid Aquatic Habitat Assessment Protocol (RAHAP) is designed to provide quantitative information on stream habitat and fish distribution at the watershed scale. Data collected from the stream inventory surveys are used to provide baseline information for fisheries biologists, hydrologists, and foresters to guide natural resources management and land use practices on Yakama Nation Southern Ceded lands. This protocol establishes hierarchical spatial context and fish habitat relationships at habitat unit, reach, and basin scales. The spatially continuous method is useful when the scale(s) necessary to detect pattern are unknown. This level of pattern detection is useful to managers for refining study designs; locating, identifying, and prioritizing projects; and establishing reference or control sites for project design. Existing stream inventory protocols were reviewed during the development of the RAHAP methodology. Upon review, two widely used Pacific Northwest stream classification systems, Washington Timber, Fish, and Wildlife (TFW) Monitoring Program and the Aquatic Inventory Project (AIP), were incorporated into the RAHAP methodology (Moore et al. 2010, Pleus et al. 1999, and Schuett-Hames et al. 1999).

RAHAP quantifies both the abiotic and biotic state of aquatic habitat. The abiotic components are: geomorphic reach segments, habitat units, bedrock features, wood pieces, wood jams, and streamflow. These physical parameters are coupled with a separate one-pass fish survey that ties fish abundance to habitat. The geomorphic reach and habitat unit level delineation methodology was derived primarily from AIP (Moore et al. 2010). The wood piece and wood jam inventories follow protocols established by Schuett-Hames et al. 1999. Yakama Nation Fisheries personnel identified bedrock features as habitat of interest and subsequently developed survey methodologies. Refer to Romero and Lindley 2012 for the complete RAHAP protocol.

Survey Level Descriptions:

The Wheeler Creek habitat survey began at the confluence with the Klickitat River (rkm 17.7) and extended upstream approximately 1.8 kilometers. The habitat survey ended at a waterfall that delineated the upstream extent to salmonid anadromy. Two reaches were delineated over the length of the habitat survey. A tributary junction delineated Reach 1 from Reach 2. A narrow v-shaped valley was the dominant valley form encountered. The stream channel was generally constrained by alternating terrace and hillslope.

Two side channels were encountered on the survey. The stream gradient was 4.8%. The total wetted area quantified was 7,989.9 m^{-2}. The average wetted and bankfull widths were 3.9 and 8.2 meters, respectively. Cobble and boulder were the dominant substrate accounting for approximately 73% of the primary channel substrate area. Gravel comprised an additional 19% of the quantified primary channel substrate. Riffle was the most common geomorphic unit delineated comprising 50% of the primary channel wetted area and 46% of the length. A total of 33 pools were quantified, with only one of the pools located in a secondary channel. The average residual pool depth was 0.58 meters. Approximately one-third of the pools had a maximum depth ≥1 meter. The number of pools/kilometer and pools ≥1 meter /kilometer was estimated at 17.3 and 5.2, respectively. Pool frequency was measured at 7 (bankfull widths/pool).

Ponderosa Pines and Oregon White Oaks were the most common upslope trees. Willow was the dominant riparian vegetation. The canopy covered approximately 63% of the wetted area. A total of 50 pieces of large wood were counted resulting in a frequency of 2.75 pieces/100 meters and a volume of 0.8m^{-3}/100 meters. Deciduous tree species accounted for 37 of the 50 pieces and 77% of the wood volume. Logs accounted for 47 of the 50 pieces and 77% of the wood volume. None of the large wood pieces qualified as key pieces. Of the 50 large wood pieces, 21, 44, 13, and 6 were located completely or partially in the wetted channel, within bankfull but outside of the wetted channel, above the bankfull channel, and flood plain/terrace, respectively. Of the pieces exhibiting a level of stability, unstable, pinned and buried stability forms were observed in 54%, 48% and 4% of the pieces, respectively. Four pieces functioned as a pool forming agent. Large wood pieces were most commonly oriented upstream (28%) followed by perpendicular (26%), parallel (24%), and downstream (22%). There was one large wood jam observed over the course of the survey.

A total of 31 distinct bedrock features were quantified. The cumulative measured length was 473.3 meters. The dominant cross-sectional shape was sloped bedrock, which accounted for 25 of 31 identified bedrock rock features. Bedrock cliff and ledge accounted for the remaining 11 and 8 bedrock features, respectively. Thirteen bedrock features projected into the wetted channel.

Reach Level Descriptions:

Reach 1 began at the confluence with the Klickitat River (rkm 17.7) and extended upstream approximately 1.6 kilometers. A tributary junction delineated the end of Reach 1. The reach was characterized by a broad valley. The stream channel was constrained by a hillslope on the northeast

bank and road on the southeast bank. The reach gradient was 4.6%. Two side channels were encountered on the survey.

The total wetted area for the primary and secondary channels was 6,930 m^{-2} and 306.4 m^{-2}, respectively. The average wetted and bankfull widths for the primary channel were 4.1 and 8.5 meters, respectively. Cobble and Boulder were the dominant substrate accounting for approximately 38% and 35% of the reach wetted area, respectively. Gravel comprised an additional 19% of the quantified substrate. Riffles were the most common geomorphic unit delineated comprising 51% of the wetted area and 47% of the survey length. A total of 26 pools were quantified for the primary channel. The primary channel average residual pool depth was 0.58 meters. Nine of the pools had a maximum depth ≥1 meter. The number of primary channel pools/kilometer and pools ≥1 meter/kilometer was estimated at 16.2 and 5.6, respectively. Pool frequency was measured at 7.3 (bankfull widths/pool).

Ponderosa Pines and Oregon White Oaks were the most common upslope trees. Willow was the dominant riparian vegetation. The canopy covered approximately 59% and 90% of the primary and secondary channel wetted area, respectively. A total of 43 primary channel wood pieces were counted resulting in a frequency of 2.7 pieces/100 meters and a volume of 0.5 m^{-3}/100 meters. Of the 43 large wood pieces, 16, 37, 9, and 4 were located completely or partially in the wetted channel, within but outside of the bankfull channel, above the bankfull channel, and flood plain/terrace, respectively. All 43 pieces were logs. Deciduous tree species accounted for 30 pieces and 60% of the wood volume. The remaining 13 logs were classified as unknown. The majority of large wood pieces were pinned (56%) followed by pieces that were unstable (47%) and buried (5%). There were 3 pieces that functioned as a pool forming agent. Large wood pieces were most commonly oriented parallel (28%) to the stream channel, followed by perpendicular (28%), upstream (23%) and downstream (21%). One large wood jam was counted consisting of 14 total pieces and 1.68 $meters^{-3}$ of wood.

A total of 28 distinct primary channel bedrock features were quantified. The cumulative measured length was 452.3 meters. The identified bedrock features were comprised of 24 slopes, 10 cliffs, and 8 ledges. Twelve of the features projected into the wetted channel and 4 features functioned as hydraulic surface controls.

In addition to the primary channel, two side channels were encountered on the survey. The total wetted area quantified for the secondary channels was 306.4 m^{-2}. The two side channels consisted of 8 habitat units and a combined length of 87 meters. There was one pool quantified for the secondary channel and had an average residual pool depth of 0.36 meters.

Reach 2 began 1.6 kilometers upstream from the confluence with the Klickitat River (rkm 17.7) and extended upstream 211.8 meters. The habitat survey ended at a waterfall barrier that delineated the upstream extent to salmonid anadromy. A tributary junction delineated Reach 1 from Reach 2. The reach was characterized by a narrow v-shaped valley. The stream channel was generally constrained by alternating terrace and hillslope.

A primary channel was the only channel type encountered. The reach gradient was 6.6%. The total wetted area quantified was 753.1 m^{-2}. The average wetted and bankfull widths were 3.5 and 5.1 meters,

respectively. Boulders and cobble were the dominant substrate accounting for 70% of the substrate area. Gravel comprised an additional 22% of the quantified substrate. Cascade was the most common geomorphic unit delineated comprising 41% of the wetted area and 41% of the survey length. A total of 6 pools were quantified. The average residual pool depth was 0.59 meters. One of the pools had a maximum depth ≥1 meter. The number of pools/kilometer and pools ≥1 meter/kilometer was estimated at 28.3 and 4.7, respectively. Pool frequency was measured at 6.9 (bankfull widths/pool).

Ponderosa Pines and Oregon White Oaks were the most common upslope trees. Willow and Big Leaf Maple were the dominant and sub-dominant riparian vegetation, respectively. The canopy covered approximately 89% of the wetted area. A total of 7 large wood pieces were counted resulting in a frequency of 3.3 pieces/100 meters and a volume of 2.9 m^{-3}/100 meters. Deciduous tree species accounted for all of the pieces and 100% of the wood volume. Logs accounted for 4 of the 7 pieces and 44% of the wood volume. Of the 7 large wood pieces, 5, 7, 4, and 2 were located completely or partially in the wetted channel, within bankfull but outside of the wetted channel, above the bankfull channel, and flood plain/terrace, respectively. All large wood pieces were unstable and one piece was pool forming. Large wood pieces were most commonly oriented upstream (57%) followed by downstream (29%), and perpendicular (14%). There were no large wood jams observed over the course of the survey.

A total of 2 distinct bedrock features were quantified. The cumulative measured length was 18 meters. One encountered bedrock features was sloped and the other a cliff. The sloped bedrock feature projected into the wetted area and functioned as a hydraulic surface control.

References:

Moore, K. K. Jones, J. Dambacher, and C. Stein. 2010. Aquatic Inventories Project: Methods for Stream Habitat Surveys. Oregon Department of Fish and Wildlife, Aquatic Inventories Project, Conservation and Recovery Program, Corvallis, OR 97333.

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Romero, N., and Lindley, D. 2012. Rapid Aquatic Habitat Assessment Protocol: Methods for Stream Inventory Surveys. Yakima/Klickitat Fisheries Project (YKFP). Yakama Nation, Fisheries Program, Klickitat Washington.

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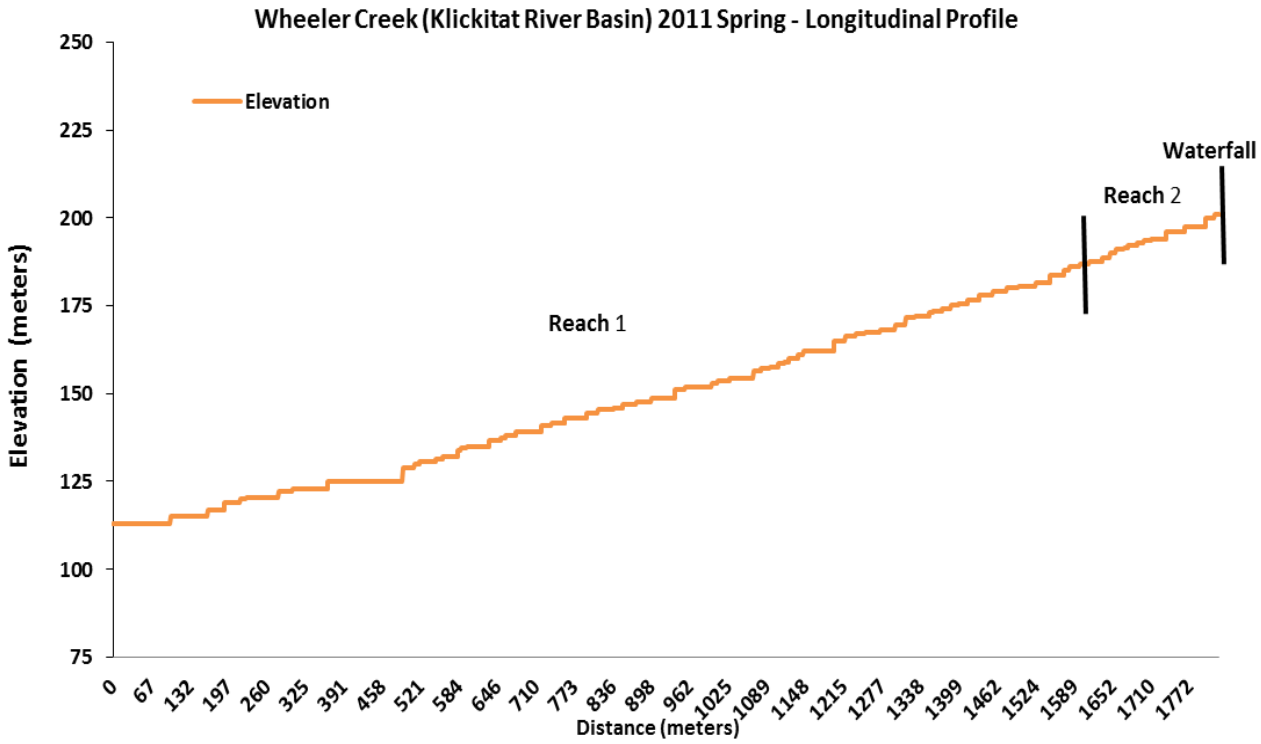
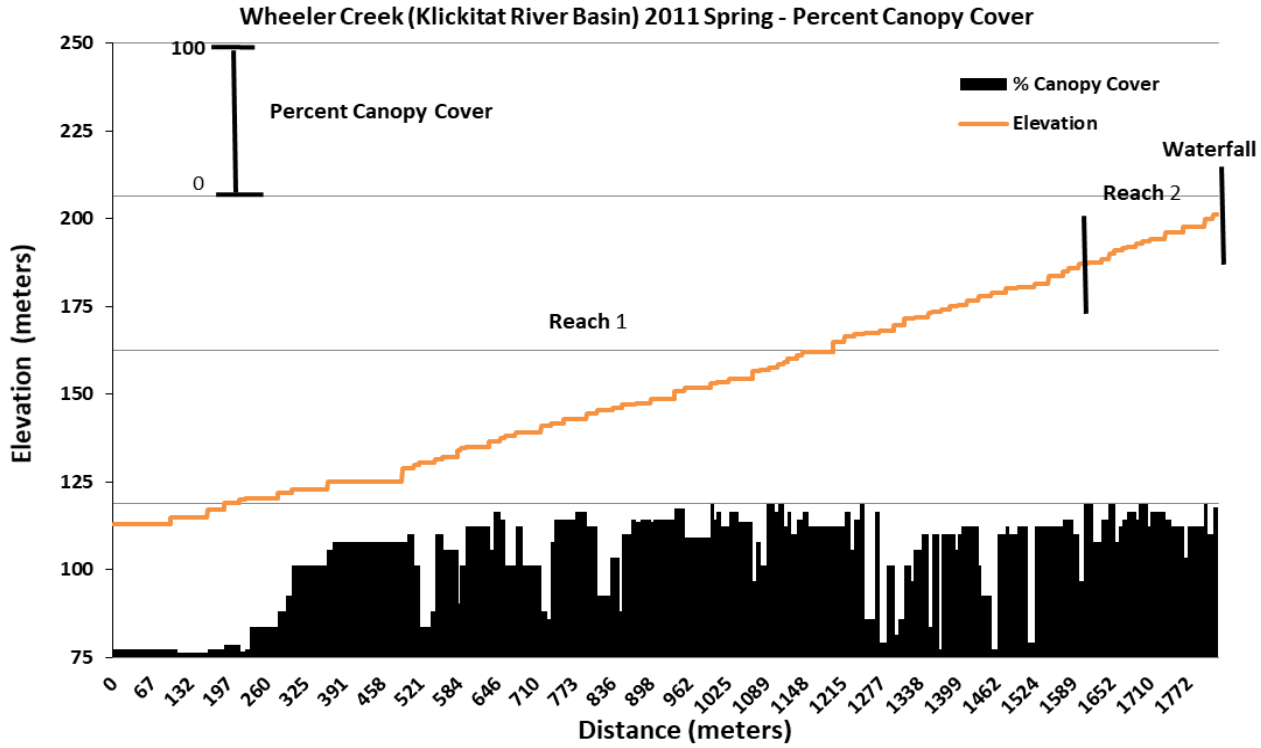
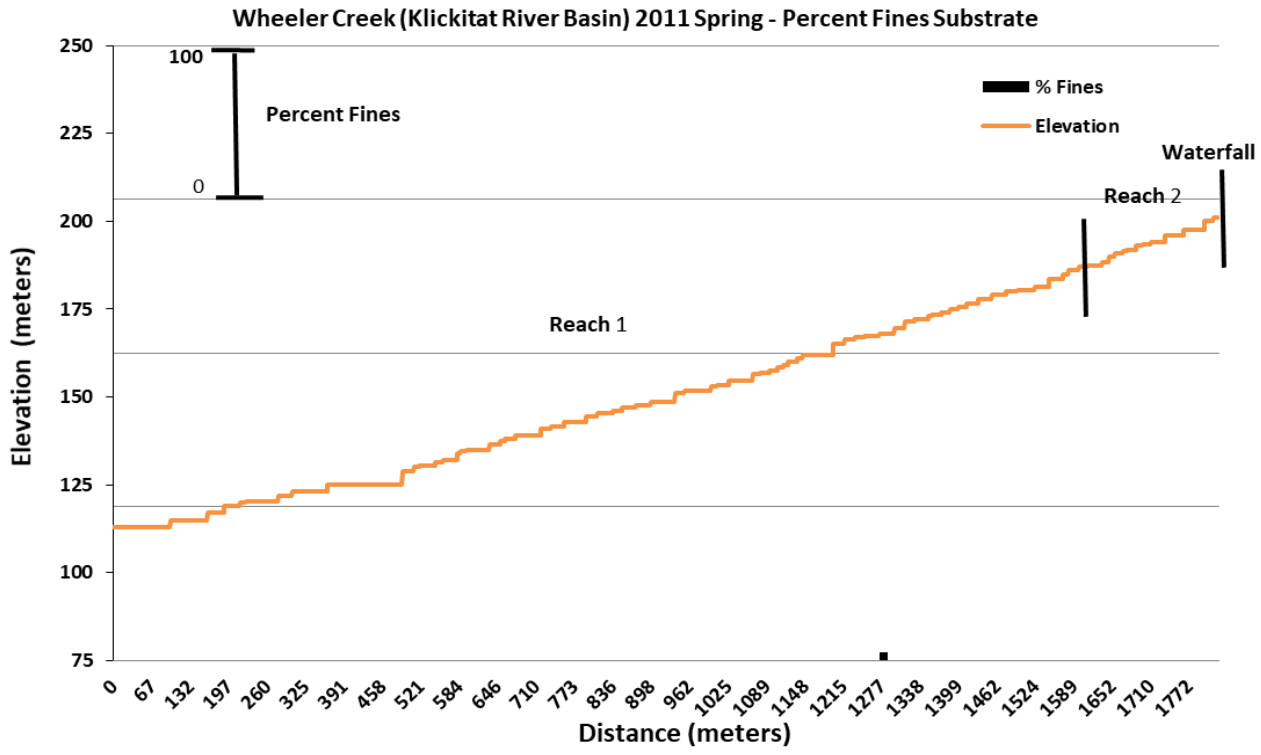
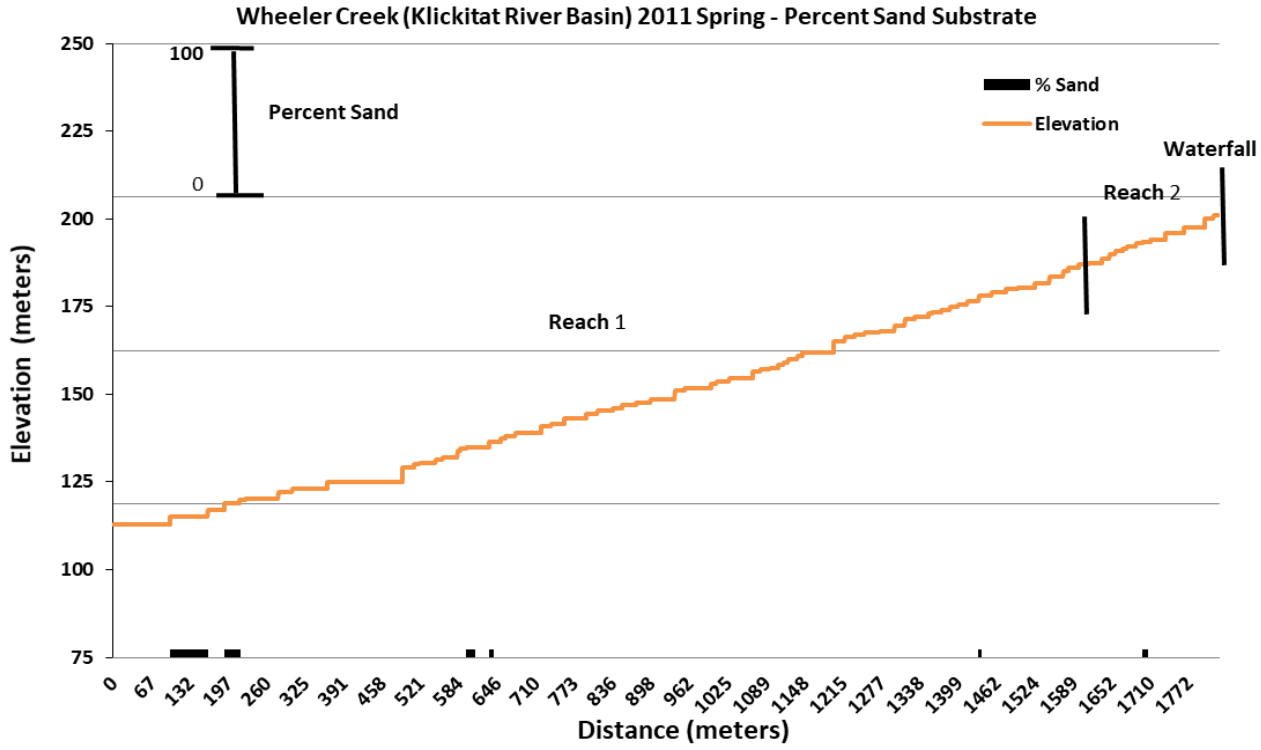
Schuett-Hames, D., A.E. Pleuse, and D. Smith. 1999. TFW Monitoring Program method manual for the salmonid spawning habitat availability survey. Prepared for the Washington Stare Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-00-007. DNR #109. November.

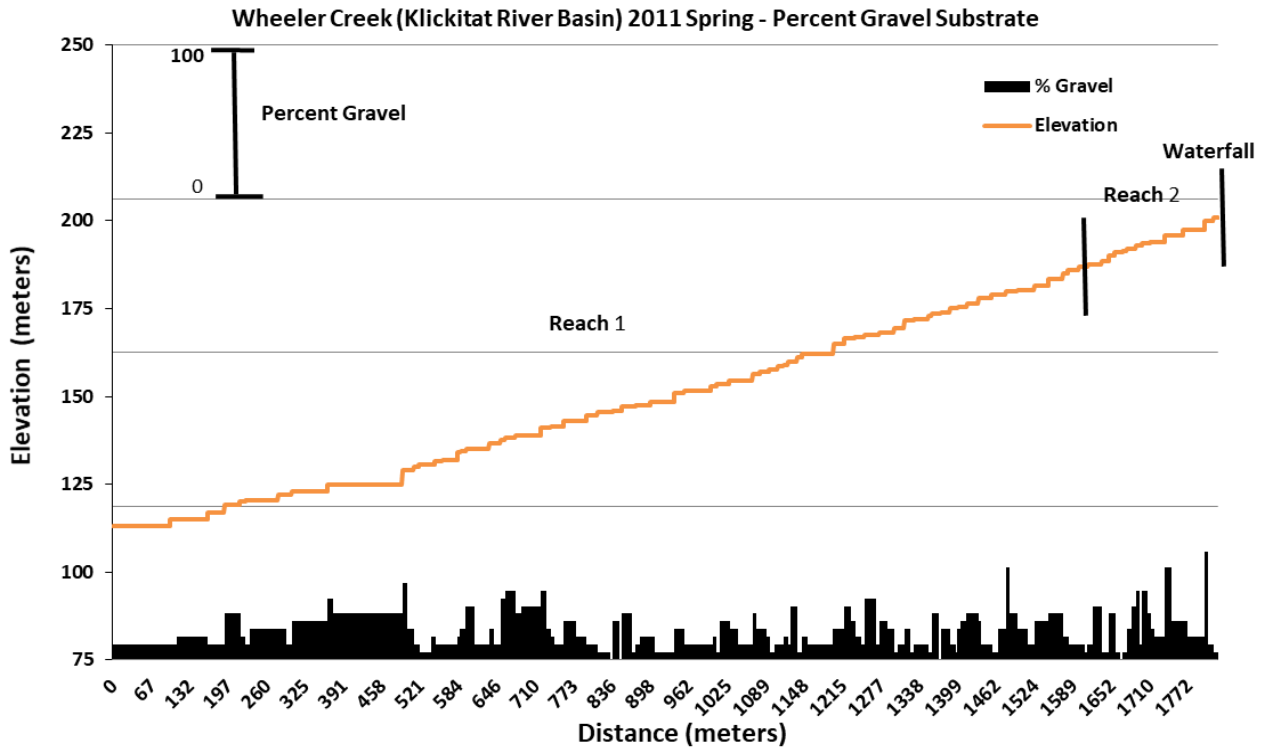
Summary Figures:

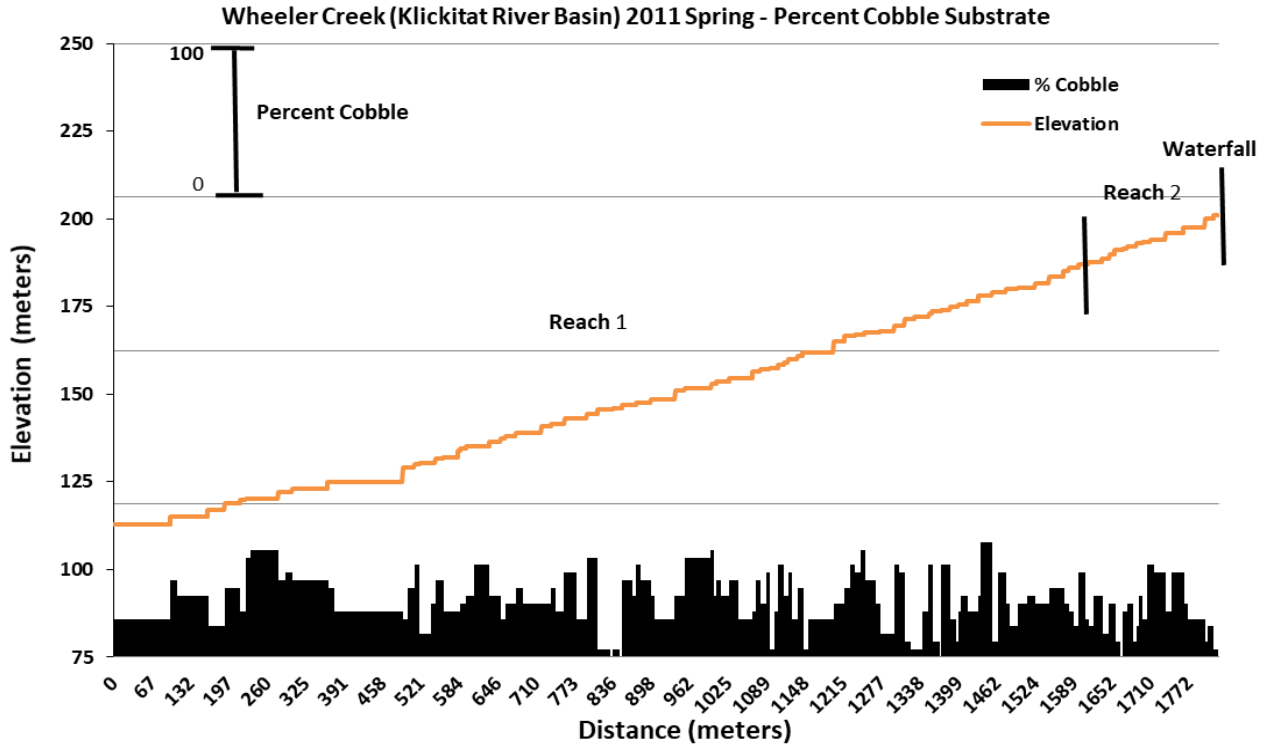


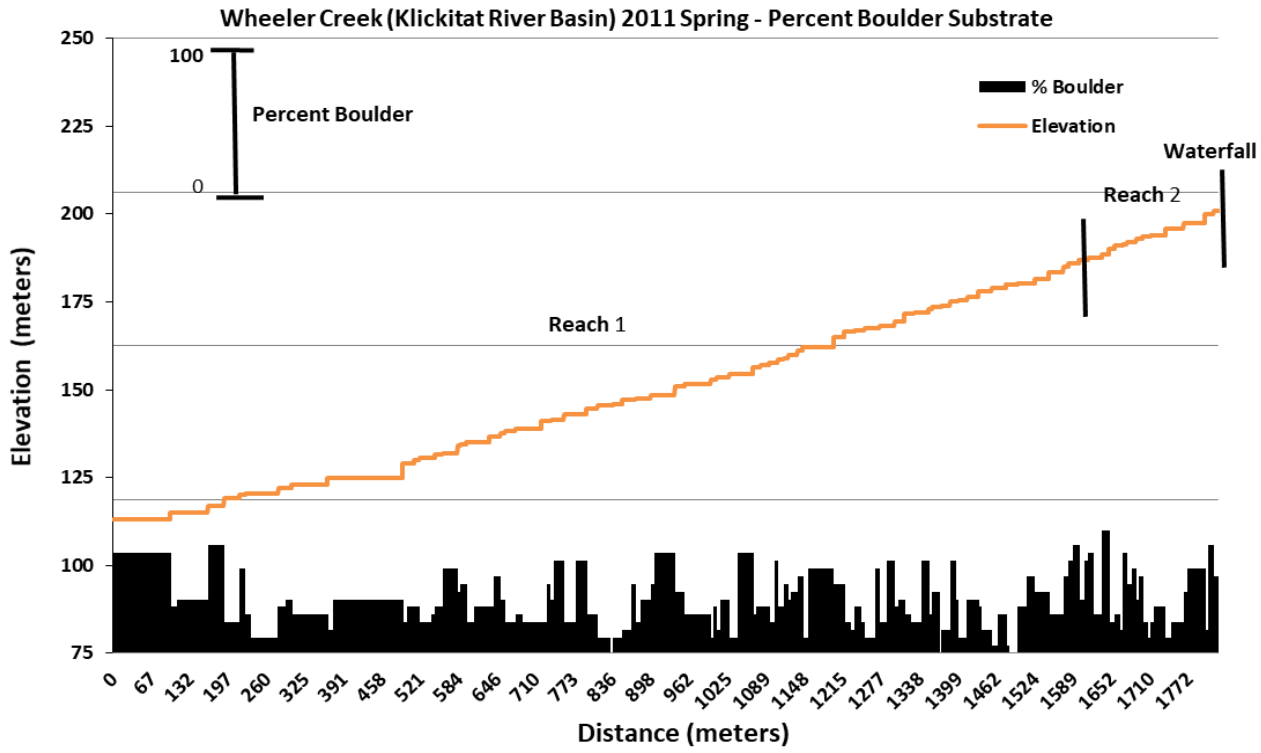


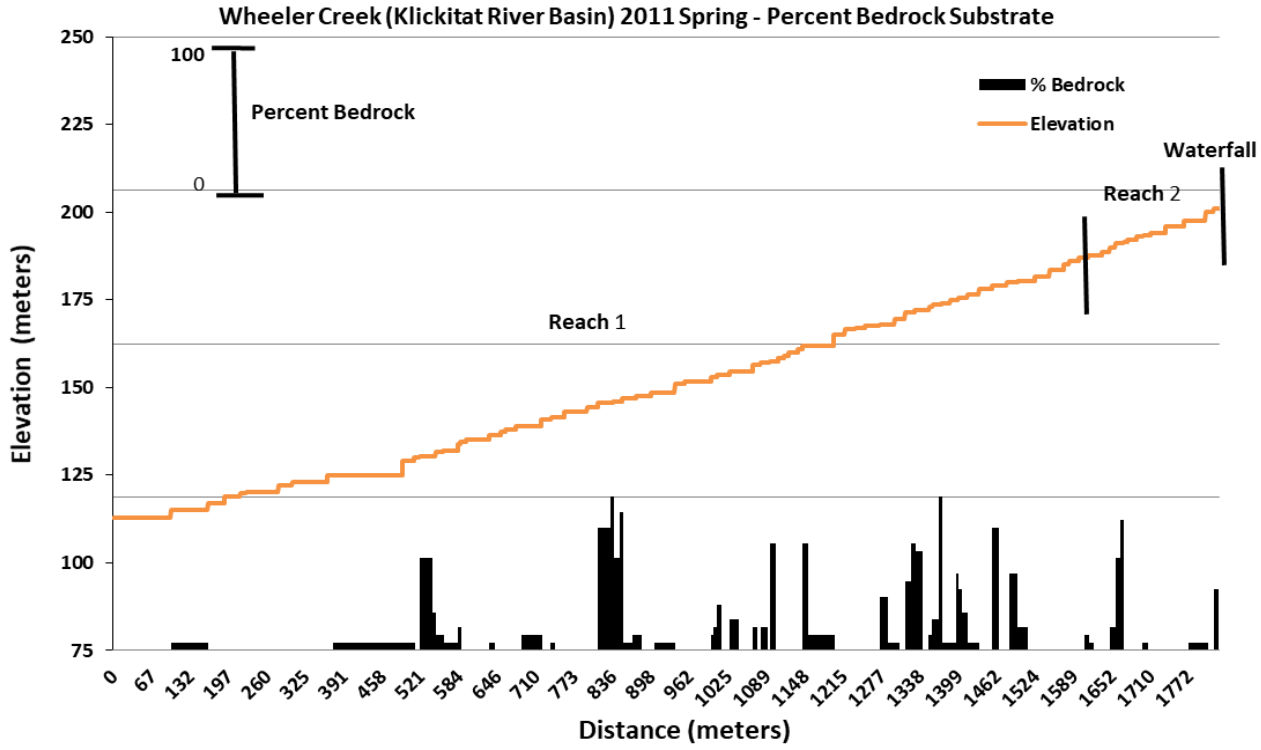

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Fines Substrate
100
Percent Fines
0
% Fines
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)

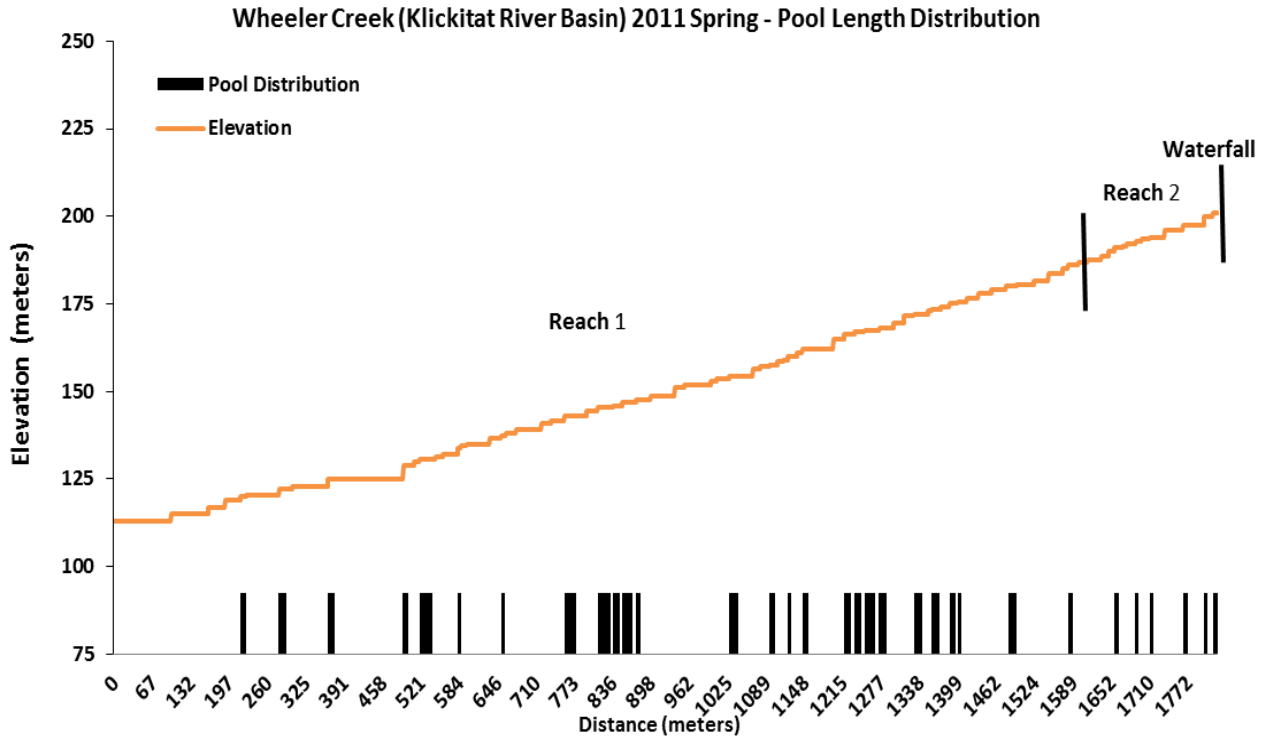

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Sand Substrate
100
Percent Sand
0
% Sand
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)

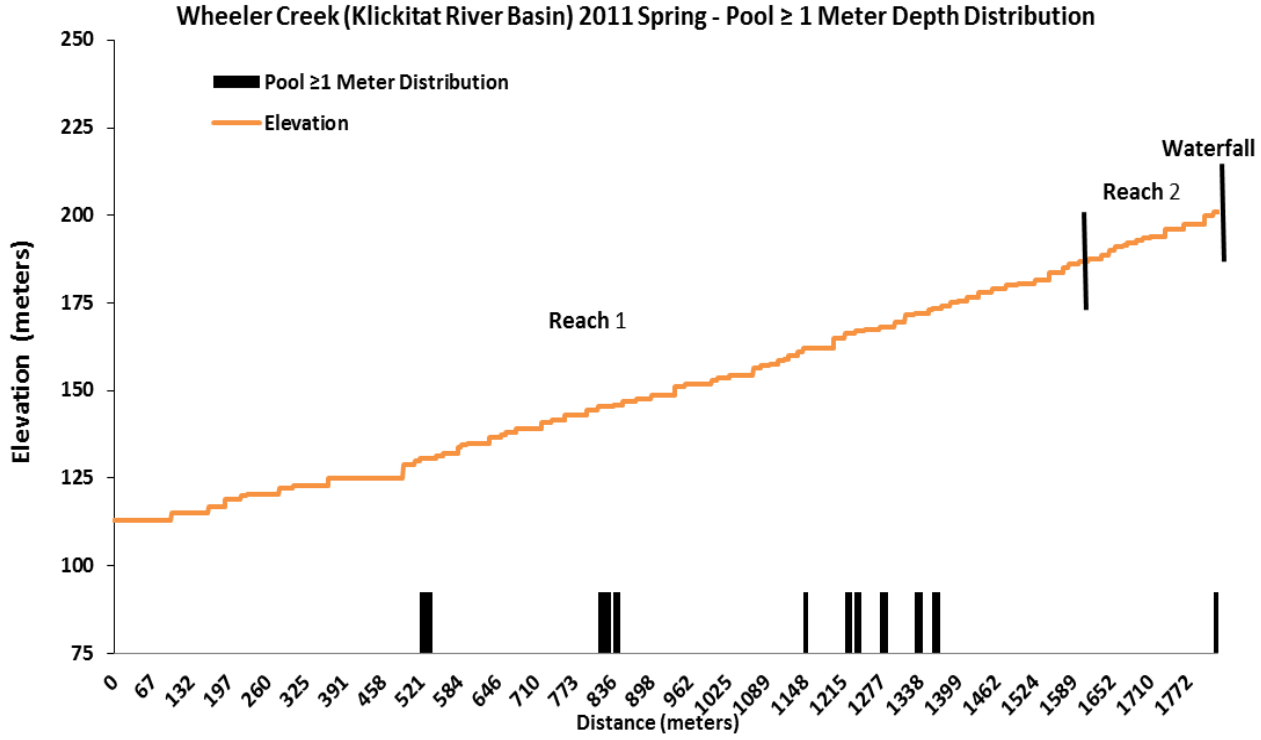

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Gravel Substrate
Percent Gravel
100
0
% Gravel
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)

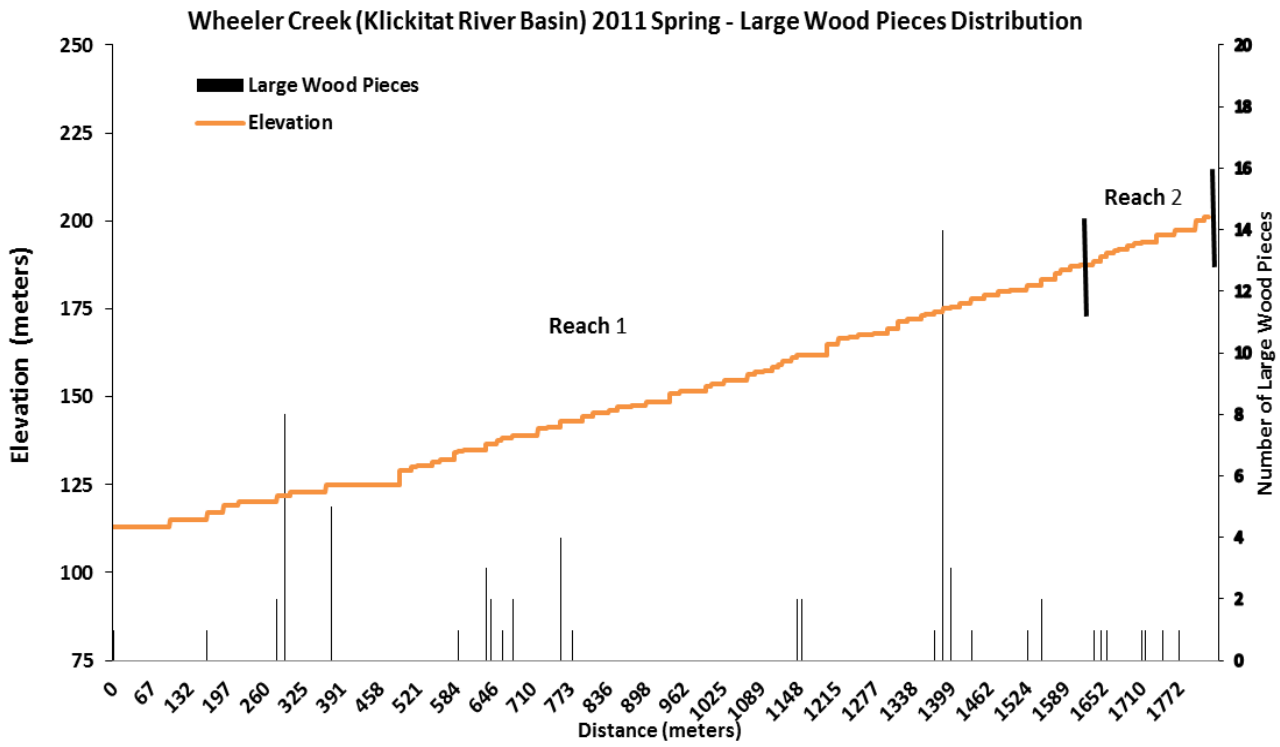

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Cobble Substrate
Percent Cobble
100
0
% Cobble
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)

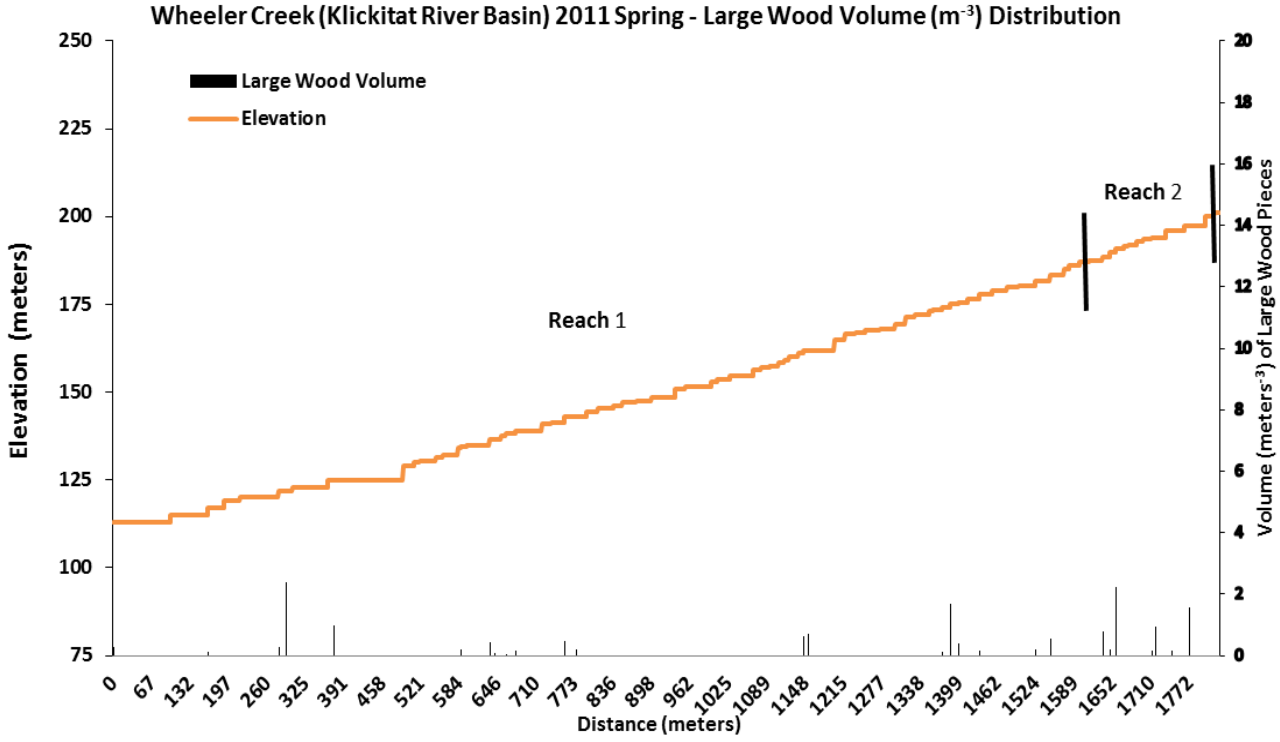

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Boulder Substrate
100
Percent Boulder
0
% Boulder
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)

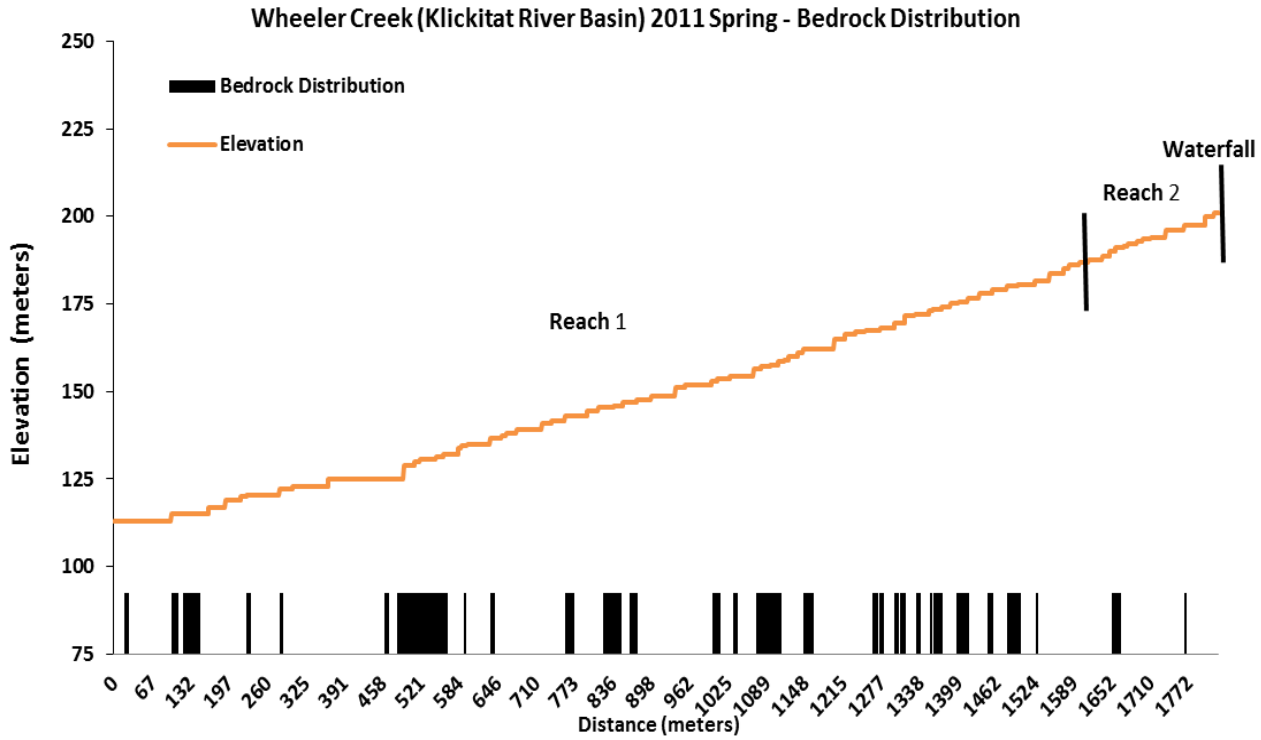

Wheeler Creek (Klickitat River Basin) 2011 Spring - Percent Bedrock Substrate
100
Percent Bedrock
0
% Bedrock
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)


Wheeler Creek (Klickitat River Basin) 2011 Spring - Pool Length Distribution
Pool Distribution
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)


Wheeler Creek (Klickitat River Basin) 2011 Spring - Pool ≥ 1 Meter Depth Distribution
Pool ≥1 Meter Distribution
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772
Distance (meters)


Wheeler Creek (Klickitat River Basin) 2011 Spring - Large Wood Pieces Distribution
Large Wood Pieces
Elevation
Reach 1
Reach 2
Elevation (meters)
Number of Large Wood Pieces
Distance (meters)
250
225
200
175
150
125
100
75
20
18
16
14
12
10
8
6
4
2
0
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772


Wheeler Creek (Klickitat River Basin) 2011 Spring - Large Wood Volume (m-3) Distribution
Large Wood Volume
Elevation
Reach 1
Reach 2
Elevation (meters)
Volume (meters-3) of Large Wood Pieces
Distance (meters)
250
225
200
175
150
125
100
75
20
18
16
14
12
10
8
6
4
2
0
0 67 132 197 260 325 391 458 521 584 646 710 773 836 898 962 1025 1089 1148 1215 1277 1338 1399 1462 1524 1589 1652 1710 1772


Wheeler Creek (Klickitat River Basin) 2011 Spring - Bedrock Distribution
Bedrock Distribution
Elevation
Waterfall
Reach 2
Reach 1
Elevation (meters)
250
225
200
175
150
125
100
75
0
67
132
197
260
325
391
458
521
584
646
710
773
836
898
962
1025
1089
1148
1215
1277
1338
1399
1462
1524
1589
1652
1710
1772
Distance (meters)

Summary Tables:

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1
Survey Date: 04/26-4/28/2011
End Location: 45.79270994, -121.1734864
End Elevation: 187 m
Reach Ending Agent: Tributary Junction

CHANNEL SUMMARY

Channel Characteristics (m)

Channel Type	No. Units	Length (m)	Area (m^{-2})	Gradient (%)	Dry Units
Primary	110	1,607.7	6,930.4	4.6	0
Secondary	8	87.0	306.4	-	0

Channel Dimensions (m)

Channel Type	Unit Avg. Length	Avg. Wetted Width	Avg. Bankfull Width	LB Undercut Bank Length	RB Undercut Bank Length
Primary	14.6	4.1	8.5	0.0	0.67
Secondary	10.9	3.3	-	0.0	0.0

Substrate Summary

	Substrate Percent Wetted Area						Substrate Wetted Area					
Hab Type	Fin	Snd	Grv	Cbl	Bld	Bdrk	Fin	Snd	Grv	Cbl	Bld	Bdrk
Pools	0.4	0.0	21.5	31.7	21.4	24.9	4.5	0.0	248.3	366.3	247.2	287.9
Glides	0.0	0.8	21.7	40.4	26.2	10.9	0.0	5.3	138.2	257.7	167.2	69.8
Runs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riffles	0.0	0.6	20.5	43.9	32.5	2.5	0.0	20.7	759.0	1,625.7	1,203.8	94.2
Rapids	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cascades	0.0	0.0	13.1	30.4	51.6	4.9	0.0	0.0	228.6	530.5	899.1	85.6
Steps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alcoves	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iso Pools	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Obscured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Culverts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.1	0.4	19.0	38.4	34.8	7.4	4.5	26.0	1,374.0	2,780.1	2,517.2	537.5

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Reach: 2
Report Date: 02/18/2021
Survey Date: 04/29/2011
Start Location: 45.79270994, -121.1734864
End Location: 45.79320967, -121.170899
Start Elevation: 187 m
End Elevation: 201 m
Reach Forming Agent: Tributary Junction
Reach Ending Agent: Waterfall Barrier

CHANNEL SUMMARY

Channel Characteristics (m)

Channel Type	No. Units	Length (m)	Area (m^{-2})	Gradient (%)	Dry Units
Primary	24	211.8	753.1	6.6	0
Secondary	-	-	-	-	-

Channel Dimensions (m)

Channel Type	Unit Avg. Length	Avg. Wetted Width	Avg. Bankfull Width	LB Undercut Bank Length	RB Undercut Bank Length
Primary	8.8	3.5	5.1	0.0	0.0
Secondary	-	-	-	-	-

Substrate Summary

	Substrate Percent Wetted Area						Substrate Wetted Area					
Hab Type	Fin	Snd	Grv	Cbl	Bld	Bdrk	Fin	Snd	Grv	Cbl	Bld	Bdrk
Pools	0.0	0.0	24.4	20.9	33.8	21.0	0.0	0.0	32.1	27.5	44.4	27.6
Glides	0.0	1.4	37.5	27.8	30.9	2.4	0.0	1.5	39.5	29.2	32.6	2.5
Runs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riffles	0.0	0.0	26.3	45.3	25.9	2.5	0.0	0.0	55.5	95.5	54.7	5.4
Rapids	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cascades	0.0	0.0	12.7	26.3	53.6	7.4	0.0	0.0	38.8	80.3	163.6	22.6
Steps	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Backwater	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alcoves	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iso Pools	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Obscured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Culverts	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.2	22.0	30.9	39.2	7.7	0.0	1.5	165.8	232.6	295.3	58.0

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Reach: 1
Report Date: 02/18/2021
Survey Date: 04/26-4/28/2011
Start Location: 45.79509258, -121.1928294
End Location: 45.79270994, -121.1734864
Start Elevation: 113 m
End Elevation: 187 m
Reach Forming Agent: Tributary Junction
Reach Ending Agent: Tributary Junction

HABITAT SUMMARY

Geomorphic Habitat Type Summary

	Primary Channel (PC)					Secondary Channel (SC)				
Habitat Type	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^{-2})	% Wetted Area (m^{-2})	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^{-2})	% Wetted Area (m^{-2})
Pools	26	282.6	4.1	1,135.2	16.4	1	6.3	3.0	18.9	6.2
Glides	20	170.7	3.6	617.7	8.9	1	6.6	3.1	20.5	6.7
Runs	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Riffles	34	774.7	4.3	3,607.8	52.1	3	29.4	2.9	93.1	30.4
Rapids	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Cascades	26	379.7	4.1	1,569.8	22.7	2	44.7	3.9	173.9	56.8
Steps	4	0.0	0.0	0.0	0.0	1	0.0	0.0	0.0	0.0
Backwater	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Alcoves	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Isolated Pools	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Obscured	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Dry Channel	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Culvert	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Total	**110**	**1,607.7**	**4.1**	**6,930.5**	**100**	**8**	**87.0**	**3.3**	**306.4**	**100**

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	27	26	1	15.9	16.2	11.5
Pools ≥1m	9	9	-	5.3	5.6	-
Pool frequency (channel widths/pool)	7.4	7.3	-			
Residual pool depth (avg)	0.58	0.58	0.36			

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Reach: 2
Report Date: 02/18/2021
Survey Date: 04/29/2011
Start Location: 45.79270994, -121.1734864
End Location: 45.79320967, -121.170899
Start Elevation: 187 m
End Elevation: 201 m
Reach Forming Agent: Tributary Junction
Reach Ending Agent: Waterfall Barrier

HABITAT SUMMARY

Geomorphic Habitat Type Summary

	Primary Channel (PC)					Secondary Channel (SC)				
Habitat Type	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^{-2})	% Wetted Area (m^{-2})	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^{-2})	% Wetted Area (m^{-2})
Pools	6	34.0	3.8	131.6	17.5	0	0.0	0.0	0.0	0.0
Glides	4	31.9	3.3	105.3	14.0	0	0.0	0.0	0.0	0.0
Runs	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Riffles	6	59.6	3.5	211.0	28.0	0	0.0	0.0	0.0	0.0
Rapids	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Cascades	7	86.3	3.5	305.3	40.5	0	0.0	0.0	0.0	0.0
Steps	1	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Backwater	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Alcoves	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Isolated Pools	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Obscured	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Dry Channel	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Culvert	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Total	**24**	**211.8**	**3.5**	**753.2**	**100**	**0**	**0.0**	**0.0**	**0.0**	**0.0**

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	6	6	-	28.3	28.3	-
Pools ≥1m	1	1	-	4.7	4.7	-
Pool frequency (channel widths/pool)	6.9	6.9	-			
Residual pool depth (avg)	0.59	0.59	-			

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1 and 2
Survey Date: 04/26-4/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

STREAM CHANNEL AND HABITAT SUMMARY

Channel Summary

Channel Type	No. Units	Total Length (m)	Wetted Area (m^2)	Avg Width (m)	Avg Bankfull Width (m)	% Gradient	% Fin	% Snd	% Grv	% Cbl	% Bldr	% Bdrk
PC	134	1,819.5	7,683.6	4.0	8.2	4.8	0.1	0.4	19.1	37.7	35.1	7.7
SC	8	87	306.4	3.3	0.0	-	0.3	0.0	22.4	38.7	36.4	2.2

Geomorphic Habitat Type Summary

	Primary Channel (PC)					Secondary Channel (SC)				
Habitat Type	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^2)	% Wetted Area(m^2)	No. Units	Length (m)	Avg. Width (m)	Wetted Area (m^2)	% Wetted Area (m^2)
Pools	32	316.6	4.0	1,266.8	16.5	1	6.3	3.0	18.9	6.2
Glides	24	202.6	3.6	723.0	9.4	1	6.6	3.1	20.5	6.7
Runs	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Riffles	40	834.3	4.1	3,818.7	49.7	3	29.4	2.9	93.1	30.4
Rapids	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Cascades	33	466.0	4.0	1,875.1	24.4	2	44.7	3.9	173.9	56.8
Steps	5	0.0	0.0	0.0	0.0	1	0.0	0.0	0.0	0.0
Backwater	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Alcoves	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Isolated Pools	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Obscured	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Dry Channel	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Culvert	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Total	**134**	**1,819.5**	**4.0**	**7,683.6**	**100**	**8**	**87.0**	**3.3**	**306.4**	**100**

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	33	32	1	17.3	17.6	11.5
Pools ≥1m	10	10	0	5.2	5.5	-
Pool frequency (channel widths/pool)	7.0	6.9	-			
Residual pool depth (avg)	0.58	0.59	0.36			

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1
Survey Date: 04/26-4/28/2011
End Location: 45.79270994, -121.1734864
End Elevation: 187 m
Reach Ending Agent: Tributary Junction

RIPARIAN AND LARGE WOOD PIECES SUMMARY

Riparian Characteristics

Type	Total Canopy Cover Area (m^{-2})	Total % Canopy Cover	Unit Avg. % Canopy Cover	Dom Canopy Species	Sub-dom Canopy Species
Primary	4,052.8	58.5	65.1	Willow	Willow
Secondary	274.7	89.7	86.4	Big Leaf Maple	Red Alder

Large Wood Piece Inventory Summary

Channel Type	Primary Channel	#Pieces	Volume (m^{-3})	Pieces/100 m	Volume (m^{-3})/100 m
Primary	All Pieces[1]	43	8.5	2.7	0.5
	Key Pieces[2]	0	0.0	0.0	0.0
	Logs	43	8.5	2.7	0.5
	Rootwads	0	0.0	0.0	0.0
	Conifer	0	0.0	0.0	0.0
	Deciduous	30	5.1	1.9	0.3
	Unknown	13	3.4	0.8	0.2
Secondary	All Pieces[1]	-	-	-	-
	Key Pieces[2]	-	-	-	-
	Logs	-	-	-	-
	Rootwads	-	-	-	-
	Conifer	-	-	-	-
	Deciduous	-	-	-	-

[1]Minimum Qualifying Large Wood Piece (≥2 m x ≥0.10 m dia.); [2] Minimum Qualifying Key Pieces (≥2.5 m^{-3})

Large Wood Piece Zone Location Summary

Channel Type	Total Pieces	# Zone 1 (%)	# Zone 2 (%)	# Zone 3 (%)	# Zone 4 (%)
Primary	43	16 (37.2)	37 (86.0)	9 (20.9)	4 (9.3)
Secondary	-	-	-	-	-

*Pieces may span multiple zones
*Zone 1 (wetted channel); Zone 2 (within bankfull); Zone 3 (above bandfull); Zone 4 (flood plain/terrace/hillslope)

Large Wood Piece Stability and Pool Forming Summary

Channel Type	Total Pieces	# Rooted (%)	# Buried (%)	# Pinned (%)	# Unstable (%)	# Pool Forming (%)
Primary	43	0 (0.0)	2 (4.7)	24 (55.8)	20 (46.5)	3 (7.0)
Secondary	-	-	-	-	-	-

Large Wood Piece Orientation Summary

Channel Type	Total Pieces	# Parallel (%)	# Perpendicular (%)	# Downstream (%)	# Upstream (%)
Primary	43	12 (27.9)	12 (27.9)	9 (20.9)	10 (23.3)
Secondary	-	-	-	-	-

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79270994, -121.1734864
Start Elevation: 187 m
Reach Forming Agent: Tributary Junction

Reach: 2
Survey Date: 04/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

RIPARIAN AND LARGE WOOD PIECES SUMMARY

Riparian Characteristics

Type	Total Canopy Cover Area (m^{-2})	Total % Canopy Cover	Unit Avg. % Canopy Cover	Dom Canopy Species	Sub-dom Canopy Species
Primary (PC)	668.9	88.8	90.1	Willow	Big Leaf Maple
Secondary (SC)	-	-	-	-	-

Large Wood Piece Inventory Summary

Channel Type	Primary Channel	#Pieces	Volume (m^{-3})	Pieces/100 m	Volume (m^{-3})/100 m
Primary	All Pieces[1]	7	6.1	3.3	2.9
	Key Pieces[2]	0	-	-	-
	Logs	4	2.7	1.9	1.3
	Rootwads	3	3.4	1.4	1.6
	Conifer	0	-	-	-
	Deciduous	7	6.1	3.3	2.9
Secondary	All Pieces[1]	-	-	-	-
	Key Pieces[2]	-	-	-	-
	Logs	-	-	-	-
	Rootwads	-	-	-	-
	Conifer	-	-	-	-
	Deciduous	-	-	-	-

[1]Minimum Qualifying Large Wood Piece (≥2 m x ≥0.10 m dia.); [2] Minimum Qualifying Key Pieces (≥2.5 m^{-3})

Large Wood Piece Zone Location Summary

Channel Type	Total Pieces	# Zone 1 (%)	# Zone 2 (%)	# Zone 3 (%)	# Zone 4 (%)
Primary	7	5 (71.4)	7 (100)	4 (57.1)	2 (28.6)
Secondary	-	-	-	-	-

*Pieces may span multiple zones
*Zone 1 (wetted channel); Zone 2 (within bankfull); Zone 3 (above bankfull); Zone 4 (flood plain/terrace/hillslope)

Large Wood Piece Stability and Pool Forming Summary

Channel Type	Total Pieces	# Rooted (%)	# Buried (%)	# Pinned (%)	# Unstable (%)	# Pool Forming (%)
Primary	7	0 (0.0)	0 (0.0)	0 (0.0)	7 (100)	1 (14.3)
Secondary	-	-	-	-	-	-

Large Wood Piece Orientation Summary

Channel Type	Total Pieces	# Parallel (%)	# Perpendicular (%)	# Downstream (%)	# Upstream (%)
Primary	7	0 (0.0)	1 (14.3)	2 (28.6)	4 (57.1)
Secondary	-	-	-	-	-

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1 and 2
Survey Date: 04/26-4/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

STREAM RIPARIAN AND LARGE WOOD PIECES SUMMARY

Riparian Characteristics

Type	Total Canopy Cover Area (m^{-2})	Total % Canopy Cover	Unit Avg. % Canopy Cover	Dom Canopy Species	Sub-dom Canopy Species
Primary	4,721.8	61.5	69.5	Willow	Willow
Secondary	274.7	89.7	86.4	Big Leaf Maple	Willow

Large Wood Piece Inventory Summary

Channel Type	Primary Channel	#Pieces	Volume (m^{-3})	Pieces/100 m	Volume (m^{-3})/100 m
Primary	All Pieces[1]	50	14.6	2.7	0.8
	Key Pieces[2]	0	-	-	-
	Logs	47	11.2	2.6	0.6
	Rootwads	3	3.4	0.2	0.2
	Conifer	0	-	-	-
	Deciduous	37	11.2	2.0	0.6
	Unknown	13	3.4	0.7	0.2
Secondary	All Pieces[1]	-	-	-	-
	Key Pieces[2]	-	-	-	-
	Logs	-	-	-	-
	Rootwads	-	-	-	-
	Conifer	-	-	-	-
	Deciduous	-	-	-	-

[1]Minimum Qualifying Large Wood Piece (≥2 m x ≥0.10 m dia.); [2] Minimum Qualifying Key Pieces (≥2.5 m^{-3})

Large Wood Piece Zone Location Summary

Channel Type	Total Pieces	# Zone 1 (%)	# Zone 2 (%)	# Zone 3 (%)	# Zone 4 (%)
Primary	50	21 (42.0)	44 (88.0)	13 (26.0)	6 (12.0)
Secondary	-	-	-	-	-

*Pieces may span multiple zones
*Zone 1 (wetted channel); Zone 2 (within bankfull); Zone 3 (above bankfull); Zone 4 (flood plain/terrace/hillslope)

Large Wood Piece Stability and Pool Forming Summary

Channel Type	Total Pieces	# Rooted (%)	# Buried (%)	# Pinned (%)	# Unstable (%)	# Pool Forming (%)
Primary	50	0 (0.0)	2 (4.0)	24 (48.0)	27 (54.0)	4 (8.0)
Secondary	-	-	-	-	-	-

Large Wood Piece Orientation Summary

Channel Type	Total Pieces	# Parallel (%)	# Perpendicular (%)	# Downstream (%)	# Upstream (%)
Primary	50	12 (24.0)	13 (26.0)	11 (22.0)	14 (28.0)
Secondary	-	-	-	-	-

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1
Survey Date: 04/26-4/28/2011
End Location: 45.79270994, -121.1734864
End Elevation: 187 m
Reach Ending Agent: Tributary Junction

LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

Channel Type	Total Jams	# Pieces	Avg # Pieces	Jam Frequency[1]	# Jams/KM
Primary	1	14	14	189.8	0.62
Secondary	0	-	-	-	-

[1]Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

			Large Wood Piece Size					
Channel Type	Total Jams	Total Pieces	#Rootwad (Dia≥20cm)	#Log (Dia≥10>20cm)	#Log (Dia20<50cm)	#Log (Dia≥50cm)	#Rtwd Key Pieces	#Log Key Pieces
Primary	1	14	0	11	3	0	0	0
Secondary	0	-	-	-	-	-	-	-

Large Wood Piece Zone Location and Pool Forming Summary

Channel Type	Total Jams	Wetted Channel Area (%)	Bankfull Channel Area (%)	Flood plain/Terrace Area (%)	Pool Forming (%)
Primary	1	1 (100)	0	0	0
Secondary	0	-	-	-	-

*A jam was assigned to wetted or bankfull zone if a LWD piece extended 0.1 meters into a zone

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79270994, -121.1734864
Start Elevation: 187 m
Reach Forming Agent: Tributary Junction

Reach: 2
Survey Date: 04/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

Channel Type	Total Jams	# Pieces	Avg # Pieces	Jam Frequency[1]	# Jams/KM
Primary	0	-	-	-	-
Secondary	0	-	-	-	-

[1]Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

			Large Wood Piece Size					
Channel Type	Total Jams	Total Pieces	#Rootwad (Dia≥20cm)	#Log (Dia≥10>20cm)	#Log (Dia20<50cm)	#Log (Dia≥50cm)	#Rtwd Key Pieces	#Log Key Pieces
Primary	0	-	-	-	-	-	-	-
Secondary	0	-	-	-	-	-	-	-

Large Wood Piece Zone Location and Pool Forming Summary

Channel Type	Total Jams	Wetted Channel Area (%)	Bankfull Channel Area (%)	Flood plain/Terrace Area (%)	Pool Forming (%)
Primary	0	-	-	-	-
Secondary	0	-	-	-	-

*A jam was assigned to wetted or bankfull zone if a LWD piece extended 0.1 meters into a zone

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1 and 2
Survey Date: 04/26-4/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

STREAM LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

Channel Type	Total Jams	# Pieces	Avg # Pieces	Jam Frequency[1]	# Jams/KM
Primary	1	14	14	189.8	0.62
Secondary	0	-	-	-	-

[1]Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

			Large Wood Piece Size					
Channel Type	Total Jams	Total Pieces	#Rootwad (Dia≥20cm)	#Log (Dia≥10>20cm)	#Log (Dia20<50cm)	#Log (Dia≥50cm)	#Rtwd Key Pieces	#Log Key Pieces
Primary	1	14	0	11	3	0	0	0
Secondary	0	-	-	-	-	-	-	-

Large Wood Piece Zone Location and Pool Forming Summary

Channel Type	Total Jams	Wetted Channel Area (%)	Bankfull Channel Area (%)	Flood plain/Terrace Area (%)	Pool Forming (%)
Primary	1	1 (100)	0	0	0
Secondary	0	-	-	-	-

*A jam was assigned to wetted or bankfull zone if a LWD piece extended 0.1 meters into a zone

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79509258, -121.1928294
Start Elevation: 113 m
Reach Forming Agent: Tributary Junction

Reach: 1
Survey Date: 04/26-4/28/2011
End Location: 45.79270994, -121.1734864
End Elevation: 187 m
Reach Ending Agent: Tributary Junction

BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

Channel Type	Total #	# Left Bank Loc	# Right Bank Loc	# Channel Bottom Loc	# Channel Span Loc	Total Length (m)
Primary	28	9	18	2	3	452.3
Secondary	1	0	1	0	0	3.0

Bedrock Feature Characteristic Summary

Channel Type	# Ledge	# Slope	# Cliff	# Projecting	# Non-projecting	# Surface Control
Primary	8	24	10	12	16	4
Secondary	0	1	0	1	0	0

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Report Date: 02/18/2021
Start Location: 45.79270994, -121.1734864
Start Elevation: 187 m
Reach Forming Agent: Tributary Junction

Reach: 2
Survey Date: 04/29/2011
End Location: 45.79320967, -121.170899
End Elevation: 201 m
Reach Ending Agent: Waterfall Barrier

BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

Channel Type	Total #	# Left Bank Loc	# Right Bank Loc	# Channel Bottom Loc	# Channel Span Loc	Total Length (m)
Primary	2	1	1	1	0	18.0
Secondary	0	-	-	-	-	-

Bedrock Feature Characteristic Summary

Channel Type	# Ledge	# Slope	# Cliff	# Projecting	# Non-projecting	# Surface Control
Primary	0	1	1	1	1	1
Secondary	-	-	-	-	-	-

Klickitat Monitoring and Evaluation Project and Klickitat Water Enhancement Project Rapid Aquatic Habitat Inventory

Survey Stream: Wheeler Creek
Reach: 1 and 2
Report Date: 02/18/2021
Survey Date: 04/26-4/29/2011
Start Location: 45.79509258, -121.1928294
End Location: 45.79320967, -121.170899
Start Elevation: 113 m
End Elevation: 201 m
Reach Forming Agent: Tributary Junction
Reach Ending Agent: Waterfall Barrier

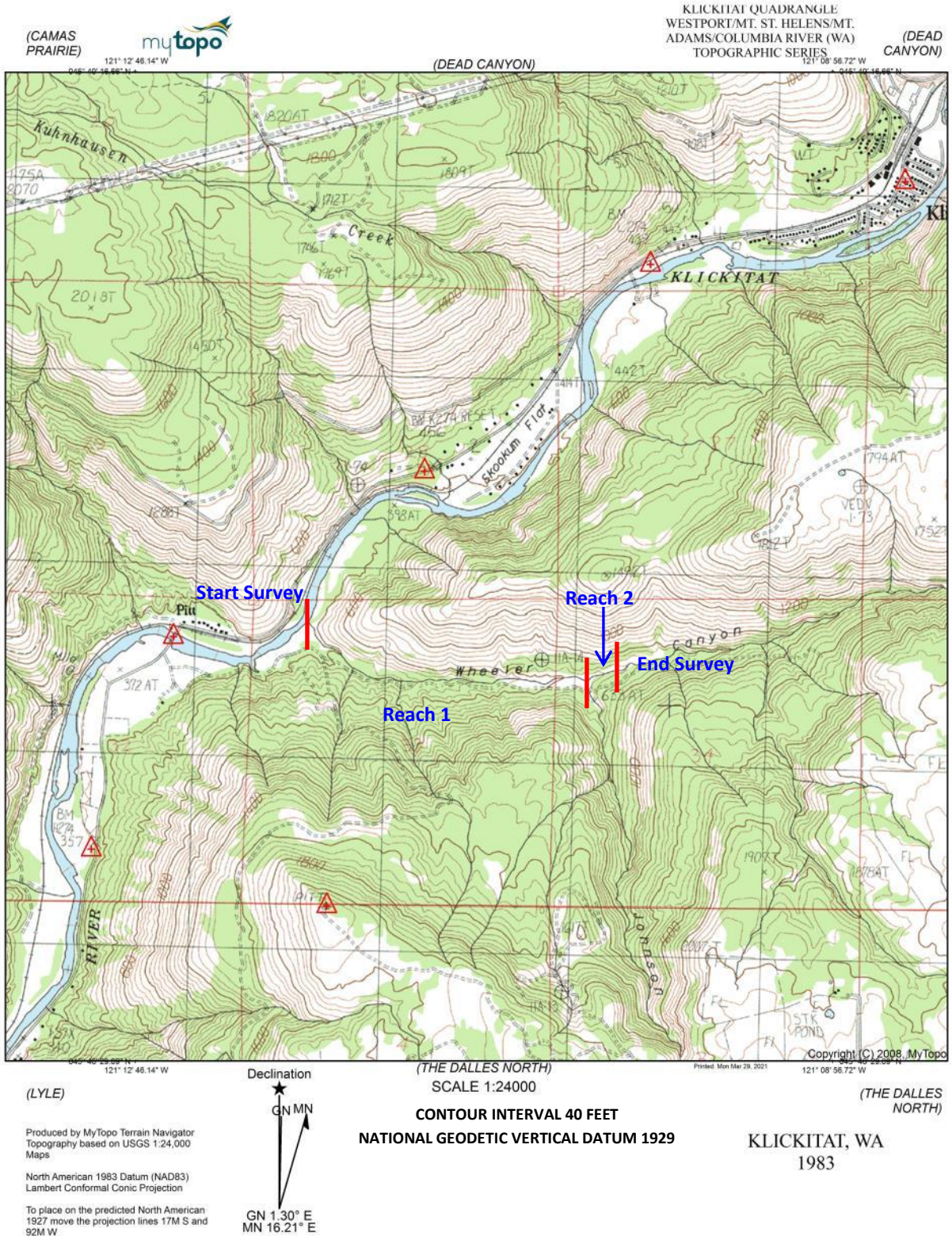
STREAM BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

Channel Type	Total #	# Left Bank Loc	# Right Bank Loc	# Channel Bottom Loc	# Channel Span Loc	Total Length (m)
Primary	30	10	19	3	3	470.3
Secondary	1	0	1	0	0	3.0

Bedrock Feature Characteristic Summary

Channel Type	# Ledge	# Slope	# Cliff	# Projecting	# Non-projecting	# Surface Control
Primary	8	25	11	13	17	5
Secondary	0	1	0	1	0	0


KLICKITAT QUADRANGLE
WESTPORT/MT. ST. HELENS/MT. ADAMS/COLUMBIA RIVER (WA) TOPOGRAPHIC SERIES
(CAMAS PRAIRIE)
(DEAD CANYON)
(DEAD CANYON)
Kuhnhausen Creek
KLICKITAT
Skookum Flat
Start Survey
Reach 2
End Survey
Reach 1
Pitt
Wheeler
canyon
RIVER
Copyright (C) 2008, MyTopo
(LYLE)
(THE DALLES NORTH)
(THE DALLES NORTH)
SCALE 1:24000
CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM 1929
Produced by MyTopo Terrain Navigator
Topography based on USGS 1:24,000 Maps
North American 1983 Datum (NAD83)
Lambert Conformal Conic Projection
To place on the predicted North American 1927 move the projection lines 17M S and 92M W
Declination
GN MN
GN 1.30° E
MN 16.21° E
KLICKITAT, WA
1983

Wheeler Creek (Klickitat River Basin) 2011 Spring Habitat Survey – Reach 1 Photos

Unit 1 – Downstream view of riffle at survey start

Unit 18 – Upstream view of bedrock scour pool

Unit 43 – Lateral view of bedrock cascade

Unit 79 – Upstream view of pool

Unit 98 – Upstream view of glide

Unit 105 – Downstream view of cascade

Wheeler Creek (Klickitat River Basin) 2011 Spring Habitat Survey – Reach 2 Photos

Unit 2 –Upstream view of glide

Unit 7 – Upstream view of cascade

Unit 9 – Upstream view of glide

Unit 18 – Upstream view of riffle

Unit 19 – Upstream view of boulder scour pool

Units 23/24 – Survey ending plunge pool and waterfall