

Dillacort Creek (Klickitat River Sub-basin, Washington) Rapid Aquatic Habitat Assessment Stream Report



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



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Assessment Stream Report**

Prepared by:
Kory G. Kuhn and Nicolas Romero

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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: Dillacort Creek **LLID:** 1212214457414

Basin: Klickitat River **HUC Number:** 17070106

Ecoregion: Columbia River Gorge **Watershed Area:** 30.67 km²

Survey Dates: Reach 1 – April 13 & 14, 2011
Reach 2 – April 14, 2011

Survey Crew: Reach 1-Nicolas Romero, David Lindley, Kory Kuhn
Reach 2-Nicolas Romero, David Lindley, Kory Kuhn

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.

Stream Level Description:

The Dillacort Creek habitat survey began at the confluence with the Klickitat River (rkm 8.6) and extended upstream approximately 1.7 kilometers. The habitat survey ended at a 4.5 meter high waterfall that delineated the upper extent of 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 bottom 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 primary channel gradient was 5.7%. The total wetted area quantified was 7,796.5 m². The average wetted and bankfull width for the primary channel was 4.6 and 7.7 meters, respectively. Boulder and cobble were the dominant substrate accounting for approximately 59% of the substrate area. Cascade was the most common geomorphic unit delineated, comprising 43.5% of the wetted area and 43.9 % of the survey length. A total of 39 pools were quantified. The average residual pool depth was 0.58 meters. Approximately 21% of pools had a maximum depth ≥1 meter. The total number of pools/kilometer and pools ≥1 meter /kilometer was estimated at 23.8 and 4.9, respectively. Pool frequency was measured at 5.4 (bankfull widths/pool).

Ponderosa Pine and Oregon White Oak were the most common upslope trees. Willow and Red Alder were the dominant and sub-dominant riparian vegetation, respectively. The canopy covered approximately 48% of the wetted area. A total of 32 primary channel wood pieces were counted resulting in a frequency of 1.9 pieces/100 meters and a volume of 0.7 m³/100 meters. Logs accounted for 30 of the 32 pieces and 89% of the wood volume. Of the 32 large wood pieces, 9, 24, 23, and 5 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. The majority of the enumerated large wood pieces were mostly unstable (94%) compared to rooted (6%). There were no pieces that functioned as a pool forming agent. Large wood pieces were most commonly oriented upstream (47%) followed by downstream (25%), perpendicular (22%), parallel (6%).

A total of 21 distinct bedrock features were quantified. The cumulative measured length was 566.3 meters. The dominant cross-sectional shape was ledge and slope. Twenty of the bedrock features projected into the wetted channel and nine features possessed surface control.

Reach Level Descriptions:

Reach 1 began at the confluence with the Klickitat River (rkm 8.6) and extended upstream 1,465.2 meters. A tributary junction delineated the end of Reach 1. The reach was characterized by a narrow valley and a stream channel constrained by hillslope and terraces. The reach gradient was 5.8%. Two side channels were encountered within the reach.

The total wetted area quantified for the primary channel was 6,965 m². The average wetted and bankfull widths for the primary channel were 4.7 and 7.7 meters, respectively. Boulder was the dominant reach substrate comprising approximately 31% of the reach wetted area. Cobble, bedrock and gravel comprised an additional 29%, 22% and 14% of the quantified substrate, respectively.

Cascades were the most common geomorphic unit delineated, comprising 44% of the reach wetted area and 44% of the reach length. A total of 35 pools were quantified for the primary channel. The average primary channel residual pool depth was 0.55 meters. Seven of the pools had a maximum depth ≥ 1 meter. The number of primary channel pools/kilometer and pools ≥ 1 meter/kilometer was estimated at 23.9 and 4.8, respectively. Pool frequency for the primary channel was measured at 5.4 (bankfull widths/pool).

Oregon White Oak and Ponderosa Pine were the most common upslope trees. Willow and Red Alder were the dominant and sub-dominant riparian vegetation in primary channel, respectively. The canopy covered approximately 46% of the primary channel wetted area and 87% of the secondary channel wetted area. A total of 26 primary channel wood pieces were counted resulting in frequency of 1.8 pieces/100 meters and a volume of 0.6 m³/100 meters. Of the 26 large wood pieces, 7, 19, 19, and 5 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. Deciduous accounted for 24 of the large wood pieces and 86% of the wood volume. Logs accounted for 25 of the 26 pieces and 95% of the wood volume. Twenty five of the wood pieces were unstable and one piece was rooted. Large wood pieces were most commonly oriented upstream (46%) followed by downstream (27%), perpendicular (23%), and parallel (4%).

One large wood jam was counted that consisted of 11 total pieces of wood. There were no jams located in the secondary channel. Jams were estimated at a frequency of 190.5 bankfulls/jam and 0.7 jams/kilometer. Small and medium logs comprised 73% and 27% of the wood pieces, respectively.

Twenty-three bedrock features were quantified. The cumulative measured length was 431.6 meters and was encountered on the right bank, left bank and channel bottom. Bedrock features consisted of ledges, slopes and cliffs. Nineteen of the twenty-three features projected in to the channel and 8 features functioned as a hydraulic surface control.

In addition to the primary channel, two side channels were encountered on the survey. The total wetted area quantified for the secondary channels was 132.7 m². The two side channels consisted of 6 habitat units and extended upstream 33.8 meters. There were no pools, wood jams, or bedrock features quantified in the secondary channel.

Reach 2 began 1,467.2 meters upstream from the confluence with the Klickitat River (rkm 8.6) and extended upstream 168.4 meters. A waterfall delineated the end of Reach 2. The reach was characterized by a narrow v-shaped valley bottom. The stream channel was constrained by valley hillslopes. The reach gradient was 5.2%. No side channels were encountered on the survey.

The total wetted area quantified for the primary channel was 699 m². The average wetted width for the primary channel was 4.1 meters. Bedrock and cobble were the dominant substrate accounting for 52% of the substrate area combined. Boulder and gravel comprised an additional 24% and 18% of the quantified substrate, respectively. Cascades were the most common geomorphic unit delineated comprising 34% of the reach wetted area and 36% of the reach length. A total of 4 pools were quantified in the primary channel. The average primary channel residual pool depth was 0.84 meters.

One of the pools had a maximum depth >1 meter. The number of pools/kilometer and pools ≥ 1 meter /kilometer for the primary channel was estimated at 23.8 and 5.9, respectively.

Ponderosa Pine and Oregon White Oak were the most common upslope trees. Red Alder and Big Leaf Maple were the dominant and sub-dominant riparian vegetation, respectively. The canopy covered approximately 68% of the primary channel wetted area. A total of 3 large wood pieces were counted resulting in a frequency of 1.8 pieces/100 meters and a volume of 1.1 m³/100 meters. Of the 3 large wood pieces, 2, 3, 1, and 0 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. Deciduous accounted for all 3 pieces and 100% of the wood volume. Logs accounted for 2 of the 3 pieces and approximately 61% of the wood volume. The majority of large wood pieces were unstable (67%). Of the pieces exhibiting a level of stability, all were rooted (33%). There were no pieces that functioned as a pool forming agent. All three large wood pieces were oriented upstream. No large wood jams were encountered.

A total of 1 distinct channel spanning bedrock feature was quantified for the primary channel. The cumulative measured length was 134.7 meters. The bedrock consisted of sloped rock, cliffs and ledges over the length of the feature. The bedrock feature projected into the wetted area and possessed 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.

Plues, A.E., D. Schuette Hames, and L. Bullchild. 1999. TFW Monitoring Program methods manual for the habitat unit survey. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-00-003. DNR #105.

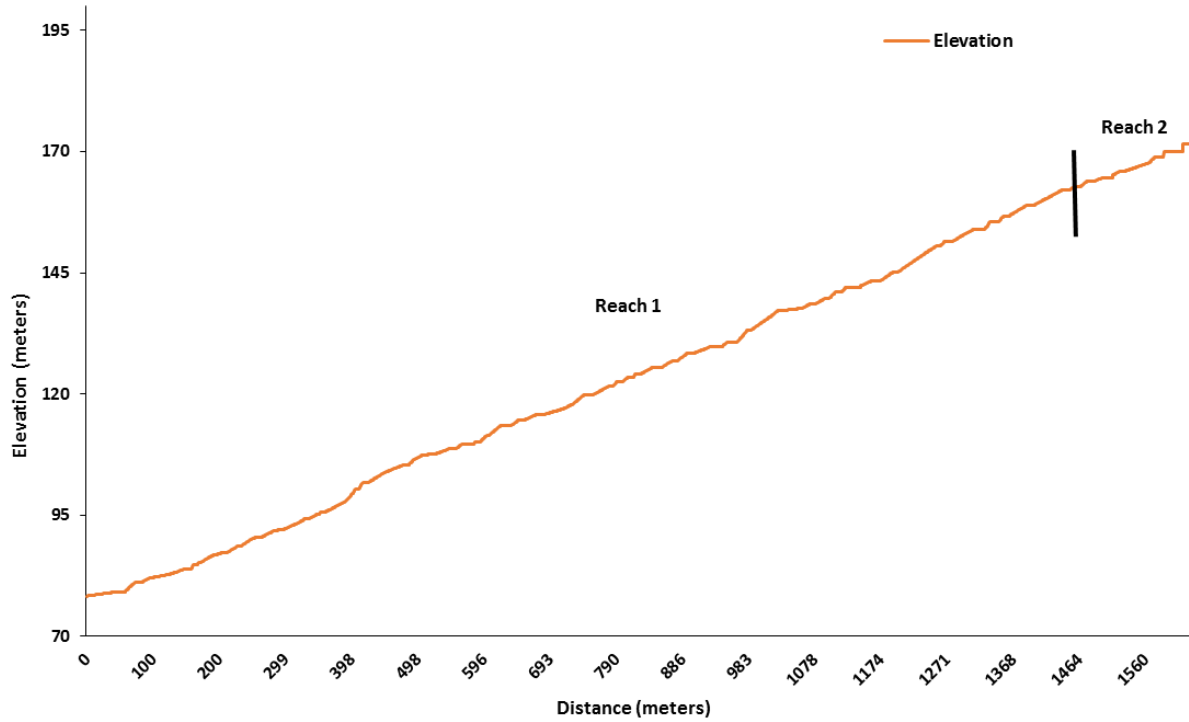
Romero, N., and Lindley, D. 2012. Rapid Aquatic Habitat Assessment Protocol: Methods for Stream Inventory Surveys. Yakima/Klickitat Fisheries Project (YKFP). Yakama Nation, Fisheries Program, Klickitat Washington.

Schuett-Hames, D., A.E. Pleuse, J. Ward, M. Fox, and J. Light. 1999. TFW Monitoring Program method manual for the large woody debris survey. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-00-004. DNR #106.

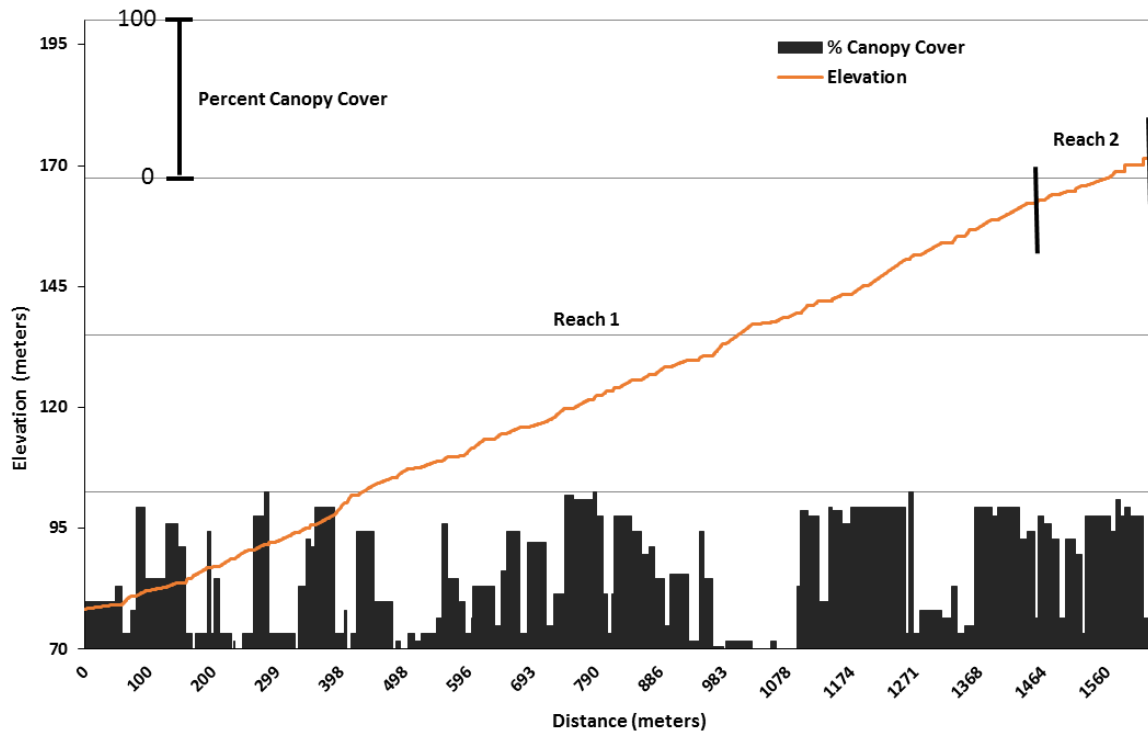
Schuett-Hames, D., A.E. Pleuse, and D. Smith. 1999. TFW Monitoring Program method manual for the salmonid spawning habitat availability survey. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-00-007. DNR #109. November.

Summary Figures:

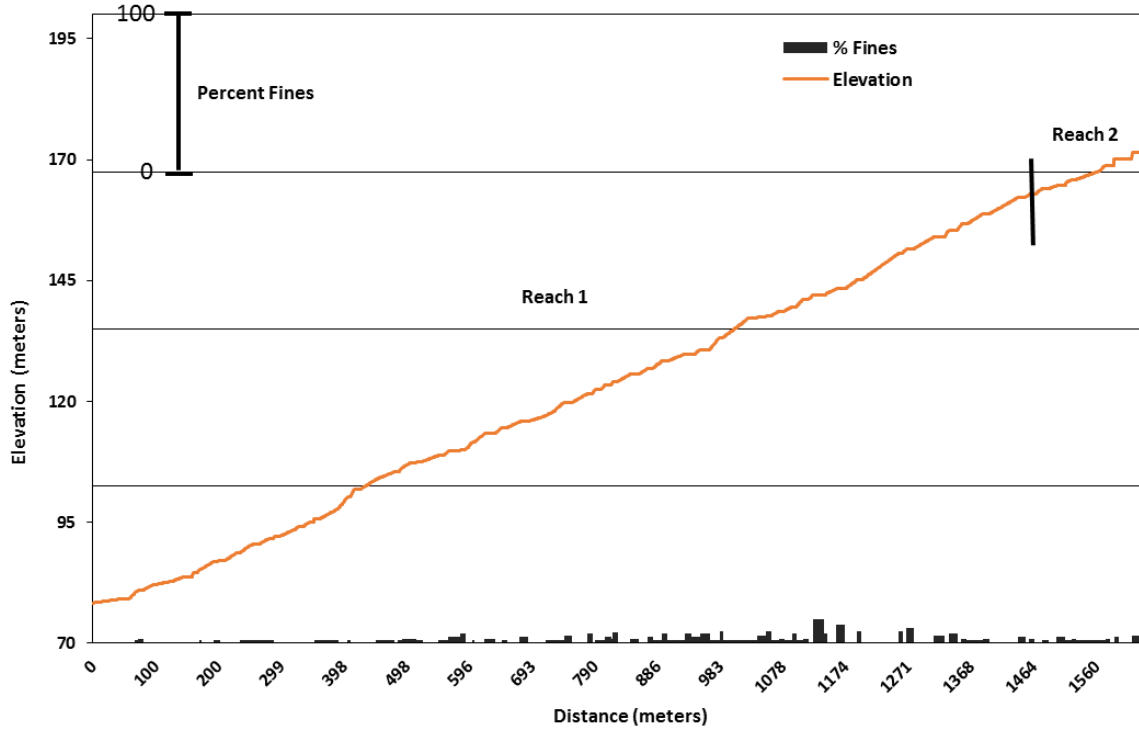
Dillacort Creek (Klickitat River Basin) 2011 Spring - Longitudinal Profile



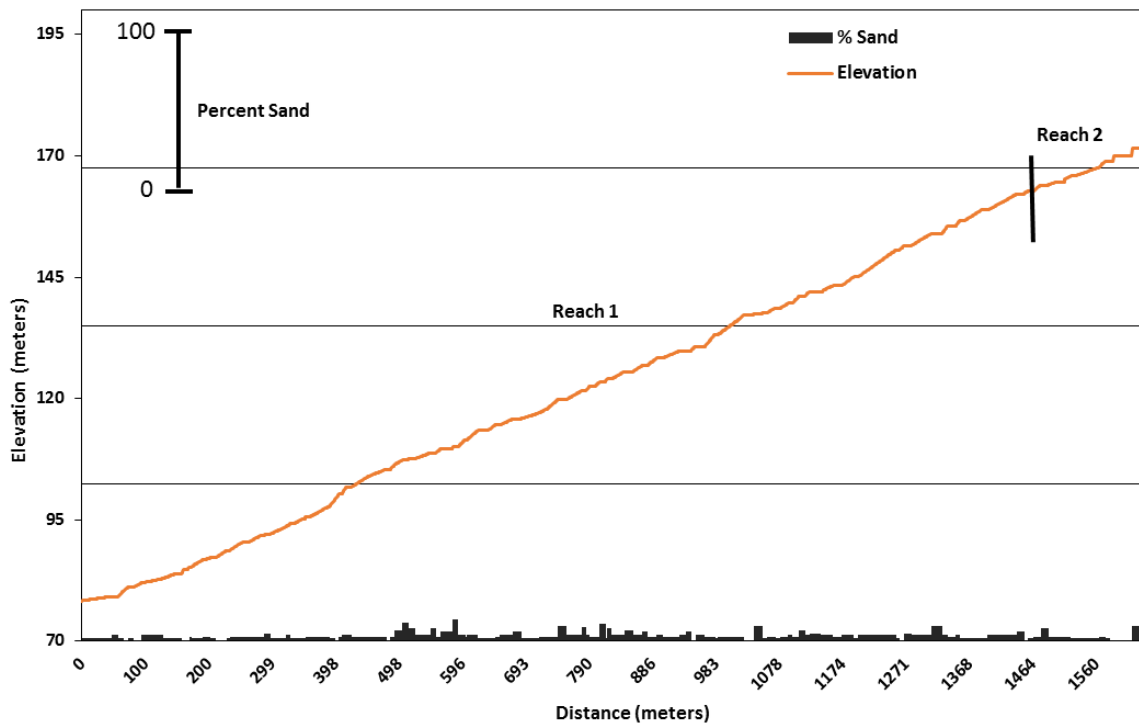
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Canopy Cover



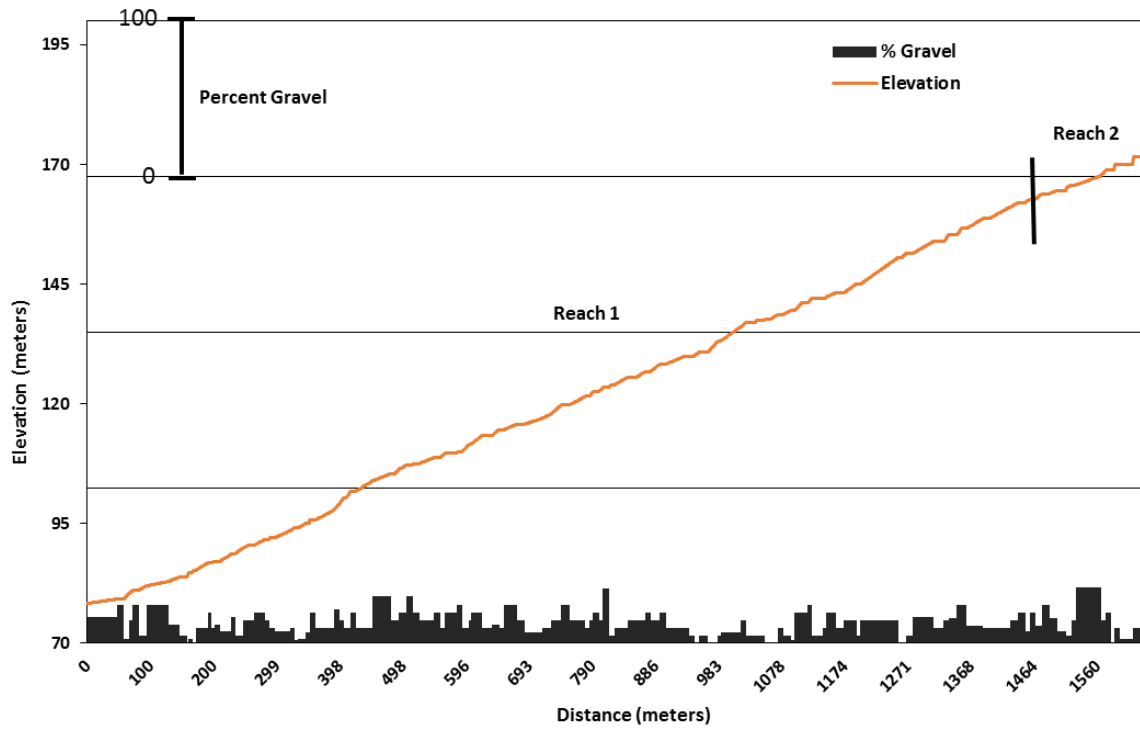
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Fines Substrate



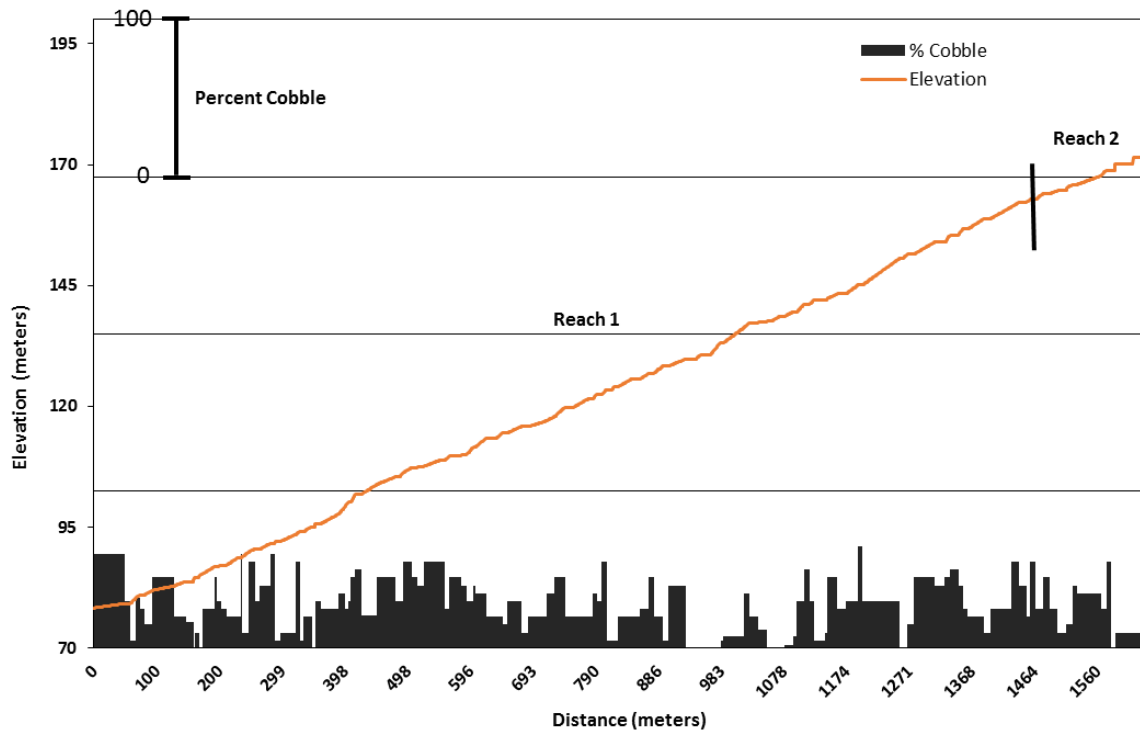
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Sand Substrate



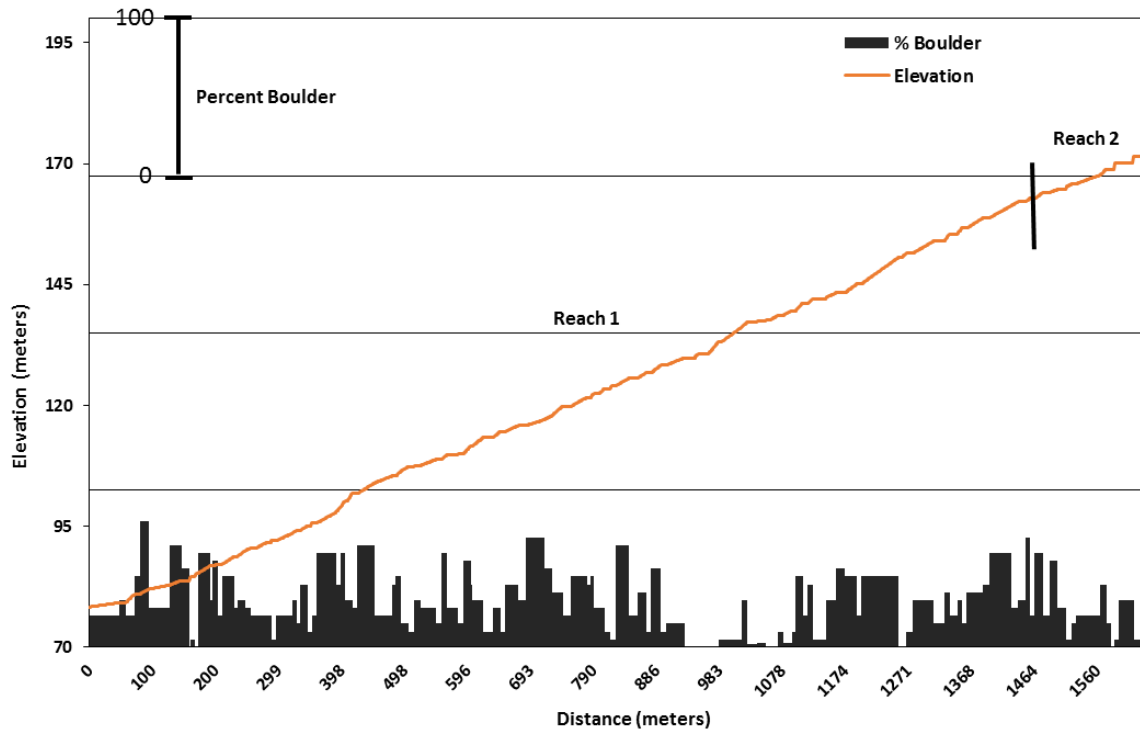
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Gravel Substrate



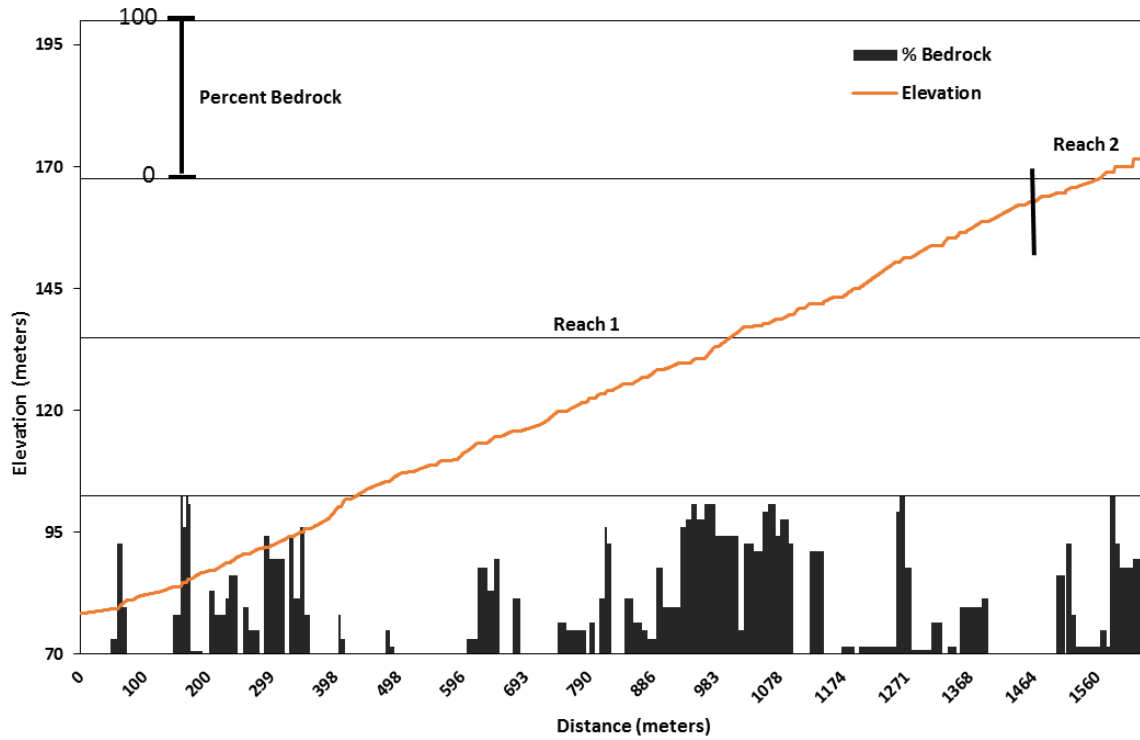
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Cobble Substrate



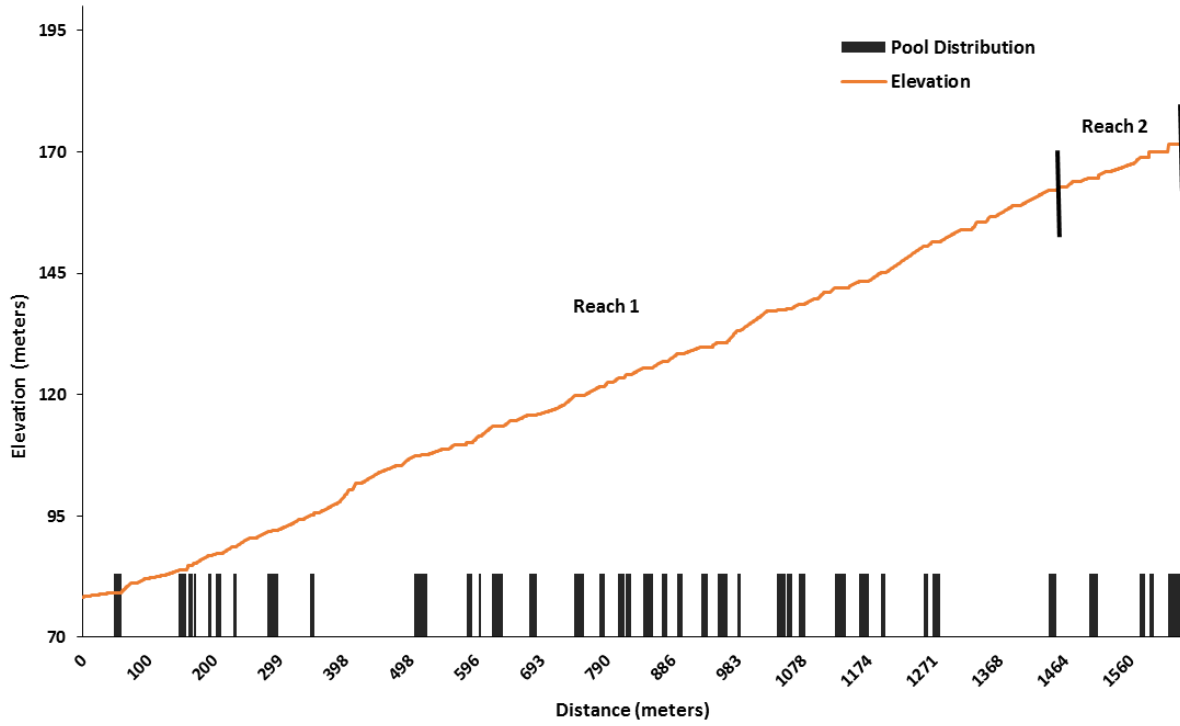
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Boulder Substrate



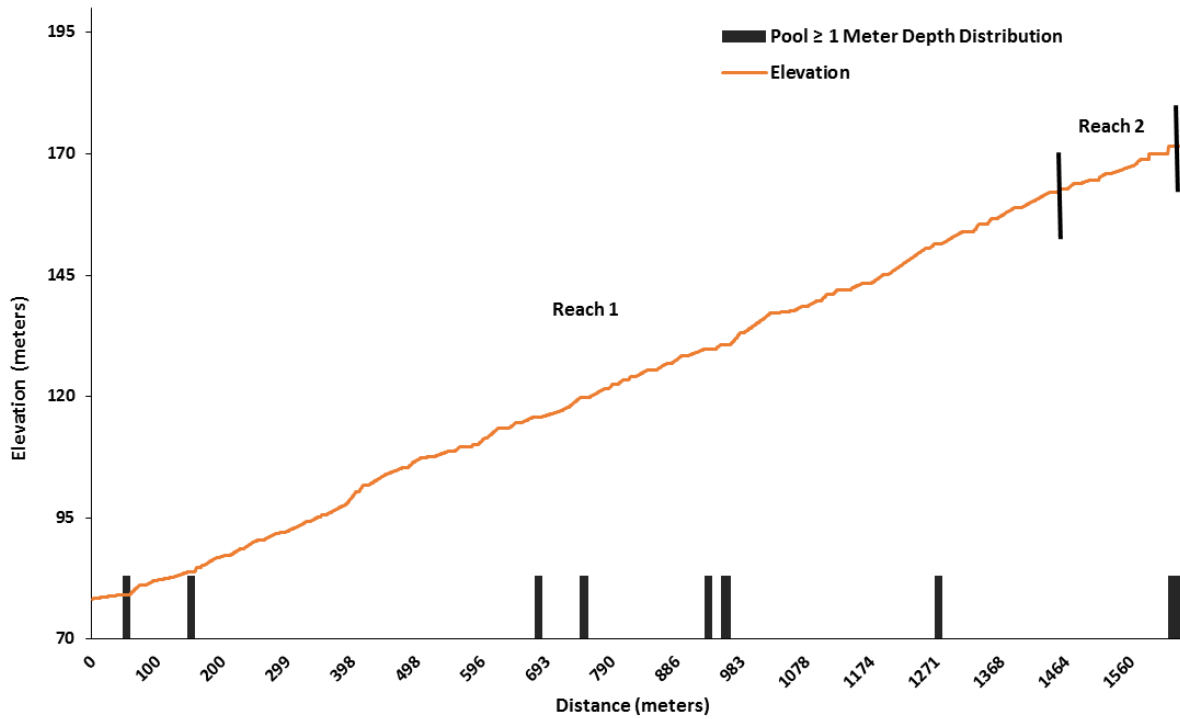
Dillacort Creek (Klickitat River Basin) 2011 Spring - Percent Bedrock Substrate



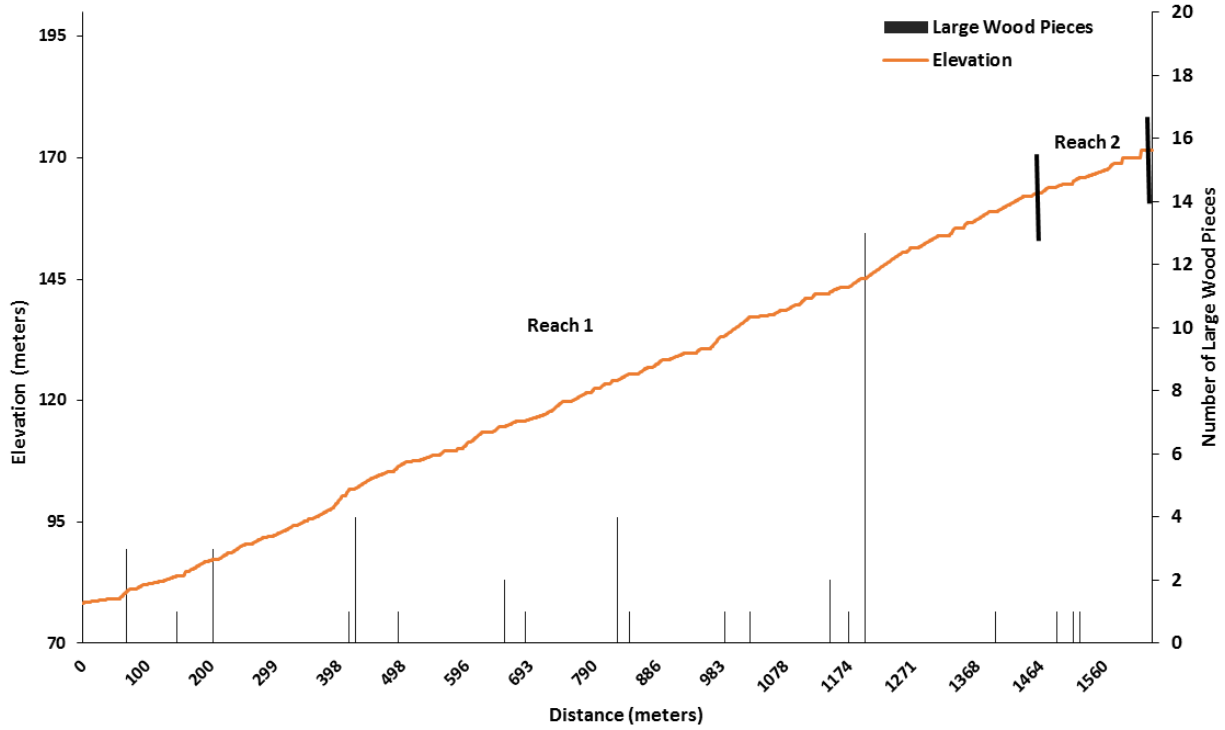
Dillacort Creek (Klickitat River Basin) 2011 Spring - Pool Distribution



Dillacort Creek (Klickitat River Basin) 2011 Spring - Pool \geq 1 Meter Depth Distribution

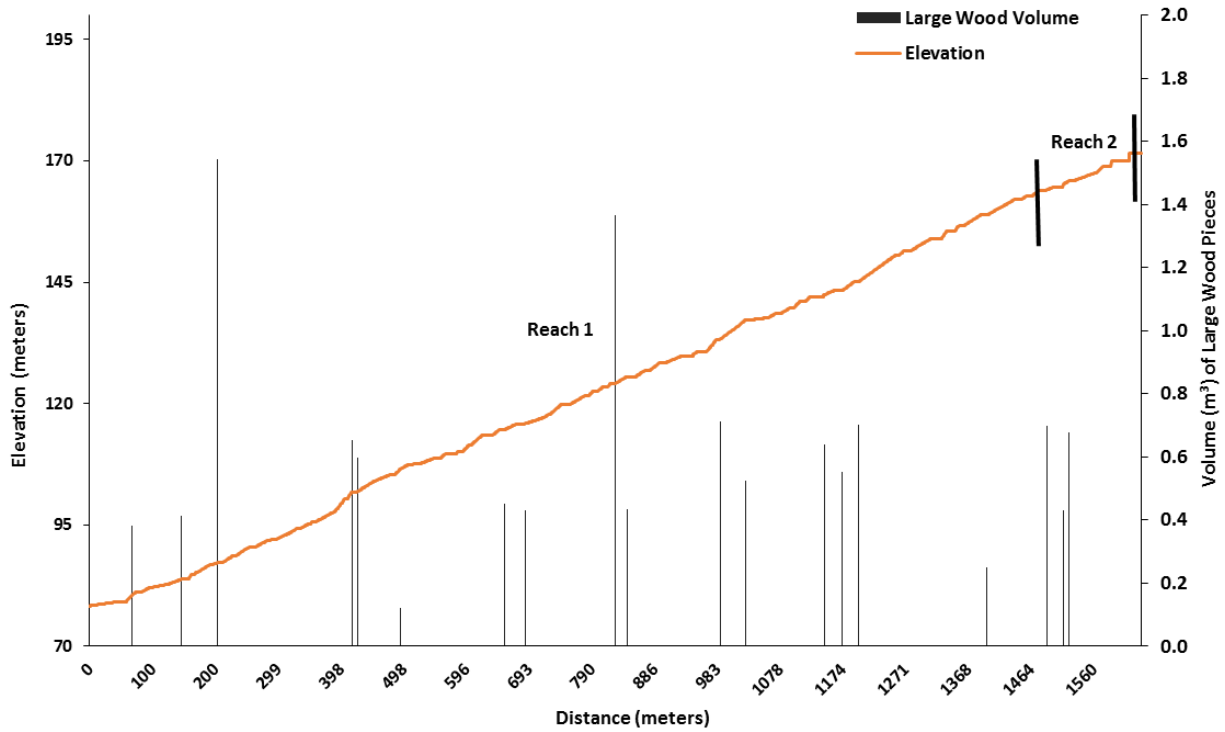


Dillacort Creek (Klickitat River Basin) 2011 Spring - Large Wood Piece Distribution



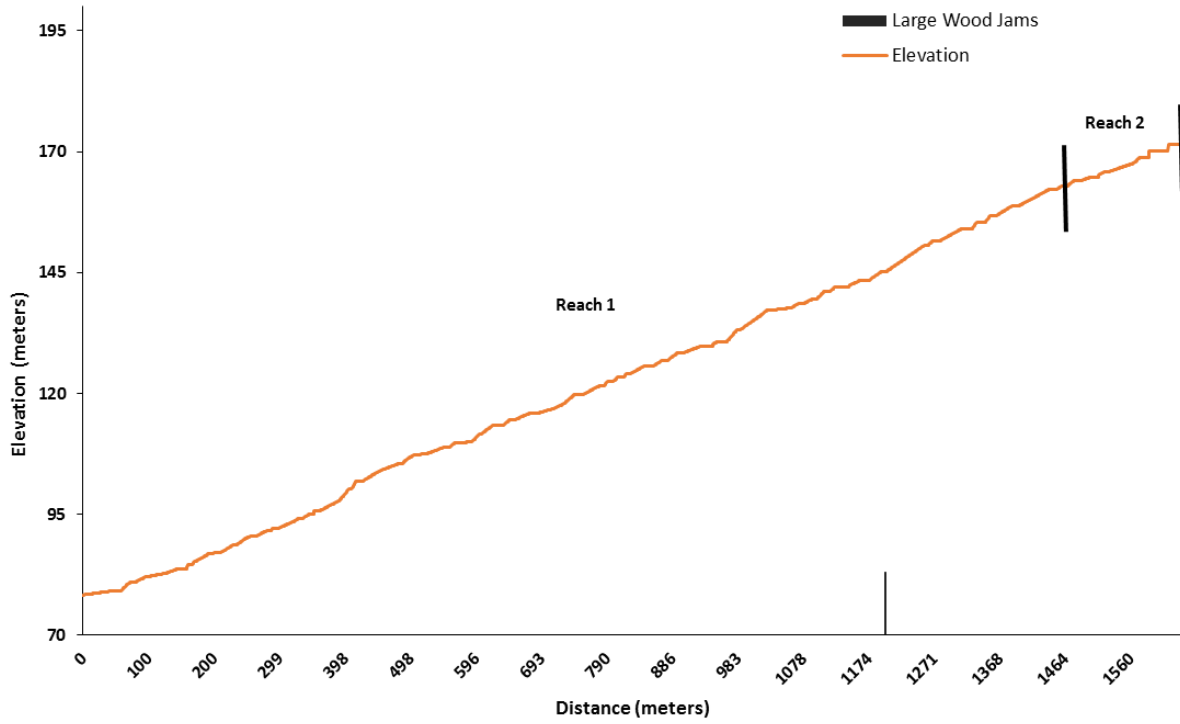
¹Large wood piece tally distribution Includes enumerated pieces from jams

Dillacort Creek (Klickitat River Basin) 2011 Spring - Large Wood Volume (m³) Distribution

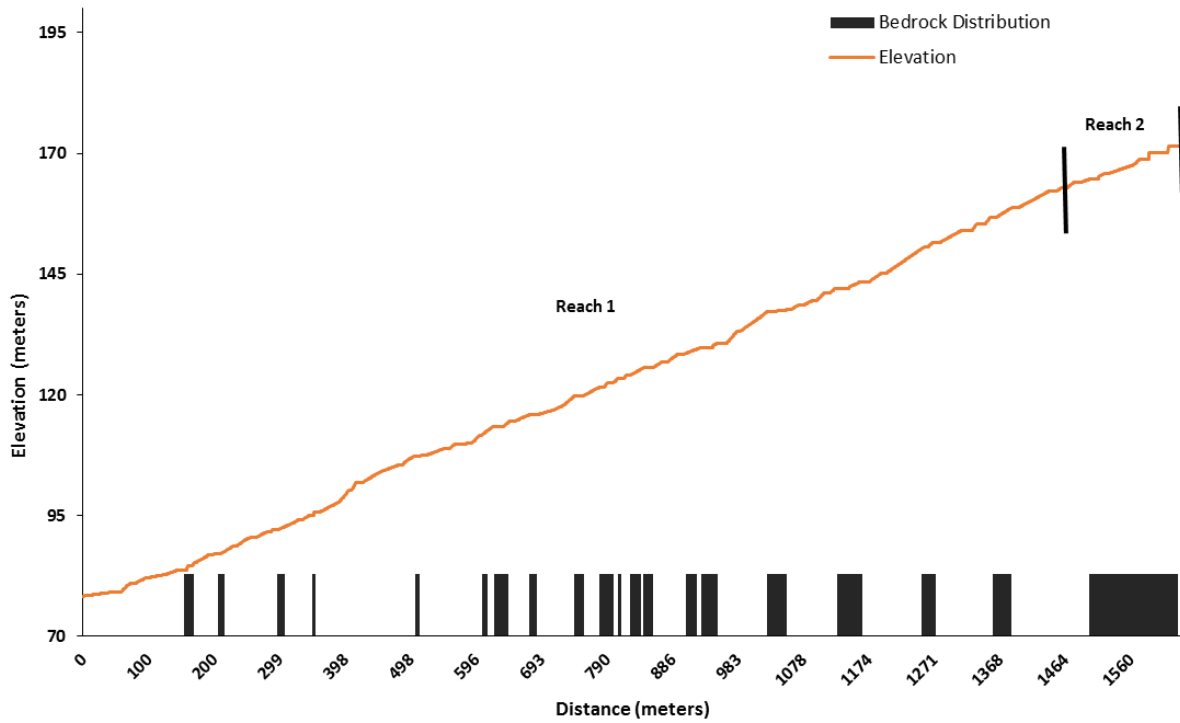


¹Large wood volume distribution Includes volume totals from jams

Dillacort Creek (Klickitat River Basin) 2011 Spring - Large Wood Jam Distribution



Dillacort Creek (Klickitat River Basin) 2011 Spring - Bedrock Distribution



Summary Tables:

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek	Reach: 1
Report Date: 08/18/2020	Survey Date: 04/13-4/14/2011
Start Location: 45.74141, -121.22223	End Location: 45.74047, -121.20676
Start Elevation: 78.3 m	End Elevation: 162.8 m
Reach Forming Agent: Tributary Junction	Reach Ending Agent: Tributary Junction

CHANNEL SUMMARY

Channel Characteristics (m)					
<u>Type</u>	<u>No. Units</u>	<u>Length (m)</u>	<u>Area (m²)</u>	<u>Gradient (%)</u>	<u>Dry Units</u>
Primary	123	1,467.2	6,964.8	5.8	0
Secondary	6	33.8	132.7	-	0

Channel Dimensions (m)					
<u>Type</u>	<u>Unit Avg. Length</u>	<u>Avg. Wetted Width</u>	<u>Avg. Bankfull Width</u>	<u>LB Undercut Bank Length</u>	<u>RB Undercut Bank Length</u>
Primary	11.9	4.7	7.7	-	-
Secondary	5.6	4.0	-	-	-

Substrate Summary

<u>Hab Type</u>	<u>Substrate Percent Wetted Area</u>						<u>Substrate Wetted Area</u>					
	<u>Fin</u>	<u>Snd</u>	<u>Grv</u>	<u>Cbl</u>	<u>Bld</u>	<u>Bdrk</u>	<u>Fin</u>	<u>Snd</u>	<u>Grv</u>	<u>Cbl</u>	<u>Bld</u>	<u>Bdrk</u>
Pools	5.2	5.3	12.9	19.2	18.3	39.1	79.0	81.2	197.2	294.0	279.2	597.8
Glides	3.1	4.3	14.7	33.6	19.4	24.9	29.0	39.8	136.6	311.7	179.6	230.9
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	1.6	3.2	17.5	45.1	24.1	8.5	23.9	49.1	265.5	683.6	364.3	128.4
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	1.2	3.0	11.5	23.8	43.5	17.1	37.0	92.5	359.9	742.8	1,360.0	534.4
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	2.4	3.7	13.5	28.6	30.8	21.5	168.9	262.6	959.3	2,032.2	2,183.1	1,491.5

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 2

Report Date: 08/18/2020

Survey Date: 04/14/2011

Start Location: 45.74038, -121.20661

End Location: 45.73995, -121.20486

Start Elevation: 162.8 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

CHANNEL SUMMARY

Channel Characteristics (m)

<u>Type</u>	<u>No. Units</u>	<u>Length (m)</u>	<u>Area (m²)</u>	<u>Gradient (%)</u>	<u>Dry Units</u>
Primary	15	168.4	699.0	5.2	0
Secondary	0	-	-	-	-

Channel Dimensions (m)

<u>Type</u>	<u>Unit</u> <u>Avg. Length</u>	<u>Avg. Wetted</u> <u>Width</u>	<u>Avg. Bankfull</u> <u>Width</u>	<u>LB Undercut</u> <u>Bank Length</u>	<u>RB Undercut</u> <u>Bank Length</u>
Primary	11.2	4.1	6.0	-	-
Secondary	-	-	-	-	-

Substrate Summary

<u>Hab Type</u>	<u>Substrate Percent Wetted Area</u>						<u>Substrate Wetted Area</u>					
	<u>Fin</u>	<u>Snd</u>	<u>Grv</u>	<u>Cbl</u>	<u>Bld</u>	<u>Bdrk</u>	<u>Fin</u>	<u>Snd</u>	<u>Grv</u>	<u>Cbl</u>	<u>Bld</u>	<u>Bdrk</u>
Pools	4.2	5.1	11.5	19.5	13.5	46.2	6.9	8.5	19.0	32.3	22.3	76.3
Glides	2.4	5.8	21.4	43.2	18.2	9.1	1.7	4.1	15.1	30.4	12.8	6.4
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	2.0	2.2	29.5	30.8	16.9	18.5	4.6	5.1	67.7	70.7	38.7	42.5
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	1.1	2.1	9.2	18.1	41.4	28.1	2.6	4.9	21.6	42.4	96.9	65.8
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	2.2	3.2	17.6	25.1	24.4	27.3	15.7	22.6	123.4	175.8	170.7	190.9

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1

Report Date: 08/18/2020

Survey Date: 04/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.74047, -121.20676

Start Elevation: 78.3 m

End Elevation: 162.8 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Tributary Junction

HABITAT SUMMARY

Geomorphic Habitat Type Summary

Habitat Type	Primary Channel (PC)					Secondary Channel (SC)				
	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	35	314.4	4.8	1,528.4	21.9	0	0.0	0.0	0.0	0.0
Glides	21	187.1	4.6	894.1	12.8	2	8.1	4.2	33.6	25.3
Runs	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Riffles	20	308.5	5.0	1,443.2	20.7	2	17.9	4.1	71.6	54.0
Rapids	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Cascades	41	657.2	4.4	3,099.1	44.5	2	7.8	3.7	27.4	20.7
Steps	6	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	123	1,467.2	4.7	6,964.8	100	6	33.8	4.0	132.6	100

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	35	35	0	23.3	23.9	0.0
Pools ≥1m	7	7	0	4.7	4.8	0.0
Pool frequency (channel widths/pool)	5.6	5.4	0.0	-	-	-
Residual pool depth (avg)	0.55	0.55	-	-	-	-

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 2

Report Date: 08/18/2020

Survey Date: 04/14/2011

Start Location: 45.74038, -121.20661

End Location: 45.73995, -121.20486

Start Elevation: 162.8 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

HABITAT SUMMARY

Geomorphic Habitat Type Summary

Habitat Type	Primary Channel (PC)					Secondary Channel (SC)				
	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	4	44.6	3.7	165.1	23.6	0	-	-	-	-
Glides	2	15.9	4.4	70.5	10.1	0	-	-	-	-
Runs	0	0	0	0	0	0	-	-	-	-
Riffles	2	47.2	5.2	229.3	32.8	0	-	-	-	-
Rapids	0	0	0	0	0	0	-	-	-	-
Cascades	5	60.7	3.7	234.2	33.5	0	-	-	-	-
Steps	2	0	0	0	0	0	-	-	-	-
Backwater	0	0	0	0	0	0	-	-	-	-
Alcoves	0	0	0	0	0	0	-	-	-	-
Isolated Pools	0	0	0	0	0	0	-	-	-	-
Obscured	0	0	0	0	0	0	-	-	-	-
Dry Channel	0	0	0	0	0	0	-	-	-	-
Culvert	0	0	0	0	0	0	-	-	-	-
Total	15	168.4	4.1	699.1	100	0	-	-	-	-

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	4	4	0	23.8	23.8	-
Pools ≥1m	1	1	0	5.9	5.9	-
Pool frequency (channel widths/pool)	-	-	-	-	-	-
Residual pool depth (avg)	0.84	0.84	-	-	-	-

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1 & 2

Report Date: 08/18/2020

Survey Date: 4/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.73995, -121.20486

Start Elevation: 78.3 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

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	138	1635.6	7663.8	4.6	7.7	5.7	2.6	3.6	12.8	25.5	26.0	29.6
SC	6	33.8	132.7	4.0	-	-	1.2	2.5	10.5	48.3	37.5	0.0

Geomorphic Habitat Type Summary

Habitat Type	Primary Channel (PC)					Secondary Channel (SC)				
	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	39	359.0	4.7	1,693.5	22.1	0	0.0	0.0	0.0	0.0
Glides	23	203.0	4.6	964.5	12.6	2	8.1	4.2	33.6	25.3
Runs	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Riffles	22	355.7	5.0	1,672.5	21.8	2	17.9	4.1	71.6	54.0
Rapids	0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Cascades	46	717.9	4.3	3,333.3	43.5	2	7.8	3.7	27.4	20.7
Steps	8	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	138	1,635.6	4.6	7,663.8	100	6	33.8	4.0	132.6	100

Pool Summary

Variable	Total Pool #	PC Pool #	SC Pool #	# Pools/KM	# PC Pools/KM	# SC Pools/KM
All Pools	39	39	0	23.4	23.8	-
Pools ≥1m	8	8	0	4.9	4.9	-
Pool frequency (channel widths/pool)	5.6	5.4	-	-	-	-
Residual pool depth (avg)	0.58	0.58	-	-	-	-

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1

Report Date: 08/18/2020

Survey Date: 04/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.74047, -121.20676

Start Elevation: 78.3 m

End Elevation: 162.8 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Tributary Junction

RIPARIAN AND LARGE WOOD PIECES SUMMARY

Riparian Characteristics

<u>Type</u>	<u>Total Canopy Cover Area (m²)</u>	<u>Total % Canopy Cover</u>	<u>Unit Avg. % Canopy Cover</u>	<u>Dom Canopy Species</u>	<u>Sub-dom Canopy Species</u>
Primary	3,169.2	45.5	38.8	Willow	Red Alder
Secondary	115.0	86.7	93.3	Willow	-

Large Wood Piece Inventory Summary

<u>Channel Type</u>	<u>Primary Channel</u>	<u>#Pieces</u>	<u>Volume (m³)</u>	<u>Pieces/100 m</u>	<u>Volume (m³)/100 m</u>
Primary	All Pieces ¹	26	9.4	1.8	0.6
	Key Pieces ²	0	0.0	0.0	0.0
	Logs	25	8.9	1.7	0.6
	Rootwads	1	0.5	0.1	0.04
	Conifer	2	1.3	0.1	0.1
Secondary	Deciduous	24	8.1	1.6	0.5
	All Pieces ¹	3	0.4	8.9	1.1
	Key Pieces ²	0	0.0	0.0	0.0
	Logs	3	0.4	8.9	1.1
	Rootwads	0	0.0	0.0	0.0
	Conifer	0	0.0	0.0	0.0
	Deciduous	3	0.4	8.9	1.1

¹Large Wood Piece (≥2 m x ≥0.10 m dia.); ² Minimum Qualifying Key Piece (≥2.5 m³)

Large Wood Piece Zone Location Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Zone 1 (%)</u>	<u># Zone 2 (%)</u>	<u># Zone 3 (%)</u>	<u># Zone 4 (%)</u>
Primary	26	7 (26.9)	19 (73.1)	19 (73.1)	5 (19.2)
Secondary	3	0 (0.0)	2 (66.7)	3 (100)	0 (0.0)

*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

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Rooted (%)</u>	<u># Buried (%)</u>	<u># Pinned (%)</u>	<u># Unstable (%)</u>	<u># Pool Forming (%)</u>
Primary	26	1 (3.8)	0 (0.0)	0 (0.0)	25 (96.2)	0 (0.0)
Secondary	3	0 (0.0)	0 (0.0)	0 (0.0)	3 (100)	0 (0.0)

Large Wood Piece Orientation Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Parallel (%)</u>	<u># Perpendicular (%)</u>	<u># Downstream (%)</u>	<u># Upstream (%)</u>
Primary	26	1 (3.8)	6 (23.1)	7 (26.9)	12 (46.2)
Secondary	3	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 2

Report Date: 08/18/2020

Survey Date: 04/14/2011

Start Location: 45.74038, -121.20661

End Location: 45.73995, -121.20486

Start Elevation: 162.8 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

RIPARIAN AND LARGE WOOD PIECES SUMMARY

<u>Type</u>	Riparian Characteristics				
	<u>Total Canopy Cover Area (m²)</u>	<u>Total % Canopy Cover</u>	<u>Unit Avg. % Canopy Cover</u>	<u>Dom Canopy Species</u>	<u>Sub-dom Canopy Species</u>
Primary	472.7	67.6	65.0	Red Alder	Big Leaf Maple
Secondary	-	-	-	-	-

Large Wood Piece Inventory Summary

<u>Channel Type</u>	<u>Primary Channel</u>	<u>#Pieces</u>	<u>Volume (m³)</u>	<u>Pieces/100 m</u>	<u>Volume (m³)/100 m</u>
Primary	All Pieces ¹	3	1.8	1.8	1.1
	Key Pieces ²	0	0.0	0.0	0.0
	Logs	2	1.1	1.2	0.7
	Rootwads	1	0.7	0.6	0.4
	Conifer	0	0.0	0.0	0.0
	Deciduous	3	1.8	1.8	1.1
Secondary	All Pieces ¹	0	-	-	-
	Key Pieces ²	0	-	-	-
	Logs	0	-	-	-
	Rootwads	0	-	-	-
	Conifer	0	-	-	-
	Deciduous	0	-	-	-

¹Large Wood Piece (≥2 m x ≥0.10 m dia.); ² Minimum Qualifying Key Piece (≥2.5 m³)

Large Wood Piece Zone Location Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Zone 1 (%)</u>	<u># Zone 2 (%)</u>	<u># Zone 3 (%)</u>	<u># Zone 4 (%)</u>
Primary	3	2 (66.7)	3 (100)	1 (33.3)	0 (0.0)
Secondary	0	-	-	-	-

*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

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Rooted (%)</u>	<u># Buried (%)</u>	<u># Pinned (%)</u>	<u># Unstable (%)</u>	<u># Pool Forming (%)</u>
Primary	3	1 (33.3)	0 (0.0)	0 (0.0)	2 (66.7)	0 (0.0)
Secondary	0	-	-	-	-	-

Large Wood Piece Orientation Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Parallel (%)</u>	<u># Perpendicular (%)</u>	<u># Downstream (%)</u>	<u># Upstream (%)</u>
Primary	3	0 (0.0)	0 (0.0)	0 (0.0)	3 (100)
Secondary	0	-	-	-	-

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek	Reach: 1 & 2
Report Date: 08/18/2020	Survey Date: 4/13-4/14/2011
Start Location: 45.74141, -121.22223	End Location: 45.73995, -121.20486
Start Elevation: 78.3 m	End Elevation: 170.1 m
Reach Forming Agent: Tributary Junction	Reach Ending Agent: Waterfall Barrier

STREAM RIPARIAN AND LARGE WOOD PIECES SUMMARY

Riparian Characteristics

<u>Type</u>	<u>Total Canopy Cover Area (m²)</u>	<u>Total % Canopy Cover</u>	<u>Unit Avg. % Canopy Cover</u>	<u>Dom Canopy Species</u>	<u>Sub-dom Canopy Species</u>
Primary	3641.9	47.5	41.4	Willow	Red Alder
Secondary	115.0	86.7	93.3	Willow	Willow

Large Wood Piece Inventory Summary

<u>Channel Type</u>	<u>Primary Channel</u>	<u>#Pieces</u>	<u>Volume (m³)</u>	<u>Pieces/100 m</u>	<u>Volume (m³)/100 m</u>
Primary	All Pieces ¹	29	11.2	1.8	0.7
	Key Pieces ²	0	0.0	0.0	0.0
	Logs	27	10.0	1.7	0.6
	Rootwads	2	1.2	0.1	0.1
	Conifer	2	1.3	0.1	0.1
	Deciduous	27	9.9	1.7	0.6
Secondary	All Pieces ¹	3	0.4	8.9	1.1
	Key Pieces ²	0	0	0	0
	Logs	3	0.4	8.9	1.1
	Rootwads	0	0	0	0
	Conifer	0	0	0	0
	Deciduous	3	0.4	8.9	1.1

¹Large Wood Piece (≥2 m x ≥0.10 m dia.); ² Minimum Qualifying Key Piece (≥2.5 m³)

Large Wood Piece Zone Location Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Zone 1 (%)</u>	<u># Zone 2 (%)</u>	<u># Zone 3 (%)</u>	<u># Zone 4 (%)</u>
Primary	29	9 (31.0)	22 (75.9)	20 (69.0)	5 (17.2)
Secondary	3	0 (0.0)	2 (66.7)	3 (100)	0 (0.0)

*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

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Rooted (%)</u>	<u># Buried (%)</u>	<u># Pinned (%)</u>	<u># Unstable (%)</u>	<u># Pool Forming (%)</u>
Primary	29	2 (6.9)	0 (0.0)	0 (0.0)	27 (93.1)	0 (0.0)
Secondary	3	0 (0.0)	0 (0.0)	0 (0.0)	3(100)	0 (0.0)

Large Wood Piece Orientation Summary

<u>Channel Type</u>	<u>Total Pieces</u>	<u># Parallel (%)</u>	<u># Perpendicular (%)</u>	<u># Downstream (%)</u>	<u># Upstream (%)</u>
Primary	29	1 (3.4)	6 (20.7)	7 (24.1)	15 (51.7)
Secondary	3	1 (33.3)	1 (33.3)	1 (33.3)	0 (0.0)

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1

Report Date: 08/18/2020

Survey Date: 04/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.74047, -121.20676

Start Elevation: 78.3 m

End Elevation: 162.8 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Tributary Junction

LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u># Pieces</u>	<u>Avg # Pieces</u>	<u>Jam Frequency</u> ¹	<u># Jams/KM</u>
Primary	1	11	11	190.5	0.7
Secondary	0	-	-	-	-

¹Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u>Total Pieces</u>	<u>Large Wood Piece Size</u>				<u>#Rtwd Key Pieces</u>	<u>#Log Key Pieces</u>
			<u>#Rootwad (Dia≥20cm)</u>	<u>#Log (Dia≥10>20cm)</u>	<u>#Log (Dia20<50cm)</u>	<u>#Log (Dia≥50cm)</u>		
Primary	1	11	0	8	3	0	0	0
Secondary	0	-	-	-	-	-	-	-

Large Wood Piece Zone Location and Pool Forming Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u>Wetted Channel Area (%)</u>	<u>Bankfull Channel Area (%)</u>	<u>Flood plain/Terrace Area (%)</u>	<u>Pool Forming (%)</u>
Primary	1	1 (100)	0 (0.0)	0 (0.0)	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 Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 2

Report Date: 08/18/2020

Survey Date: 04/14/2011

Start Location: 45.74038, -121.20661

End Location: 45.73995, -121.20486

Start Elevation: 162.8 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u># Pieces</u>	<u>Avg # Pieces</u>	<u>Jam Frequency¹</u>	<u># Jams/KM</u>
Primary	0	-	-	-	-
Secondary	0	-	-	-	-

¹Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

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

Large Wood Piece Zone Location and Pool Forming Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u>Wetted Channel Area (%)</u>	<u>Bankfull Channel Area (%)</u>	<u>Flood plain/Terrace Area (%)</u>	<u>Pool Forming (%)</u>
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 Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1 & 2

Report Date: 08/18/2020

Survey Date: 4/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.73995, -121.20486

Start Elevation: 78.3 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

STREAM LARGE WOOD JAM SUMMARY

Large Wood Jam Inventory Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u># Pieces</u>	<u>Avg # Pieces</u>	<u>Jam Frequency</u> ¹	<u># Jams/KM</u>
Primary	1	11	11	190.5	0.68
Secondary	0	-	-	-	-

¹Jam frequency (total bankfull channel widths/jam)

Large Wood Jam Composition Summary

Large Wood Piece Size

<u>Channel Type</u>	<u>Total Jams</u>	<u>Total Pieces</u>	<u>#Rootwad (Dia≥20cm)</u>	<u>#Log (Dia≥10>20cm)</u>	<u>#Log (Dia20<50cm)</u>	<u>#Log (Dia≥50cm)</u>	<u>#Rtwd Key Pieces</u>	<u>#Log Key Pieces</u>
Primary	1	11	0	8	3	0	0	0
Secondary	0	-	-	-	-	-	-	-

Large Wood Piece Zone Location and Pool Forming Summary

<u>Channel Type</u>	<u>Total Jams</u>	<u>Wetted Channel Area (%)</u>	<u>Bankfull Channel Area (%)</u>	<u>Flood plain/Terrace Area (%)</u>	<u>Pool Forming (%)</u>
Primary	1	1 (100)	0 (0.0)	0 (0.0)	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 Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1

Report Date: 08/18/2020

Survey Date: 04/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.74047, -121.20676

Start Elevation: 78.3 m

End Elevation: 162.8 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Tributary Junction

BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

<u>Channel Type</u>	<u>Total #</u>	<u># Left Bank Loc</u>	<u># Right Bank Loc</u>	<u># Channel Bottom Loc</u>	<u># Channel Span Loc</u>	<u>Total Length (m)</u>
Primary	23	7	4	4	8	431.6
Secondary	0	-	-	-	-	-

Bedrock Feature Characteristic Summary

<u>Channel Type</u>	<u># Ledge</u>	<u># Slope</u>	<u># Cliff</u>	<u># Projecting</u>	<u># Non- projecting</u>	<u># Surface Control</u>
Primary	14	14	7	19	1	8
Secondary	-	-	-	-	-	-

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 2

Report Date: 08/18/2020

Survey Date: 04/14/2011

Start Location: 45.74038, -121.20661

End Location: 45.73995, -121.20486

Start Elevation: 162.8 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

<u>Channel Type</u>	<u>Total #</u>	<u># Left Bank Loc</u>	<u># Right Bank Loc</u>	<u># Channel Bottom Loc</u>	<u># Channel Span Loc</u>	<u>Total Length (m)</u>
Primary	1	0	0	0	1	134.7
Secondary	0	-	-	-	-	-

Bedrock Feature Characteristic Summary

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

Klickitat Monitoring and Evaluation Project Rapid Aquatic Habitat Inventory

Survey Stream: Dillacort Creek

Reach: 1 & 2

Report Date: 08/18/2020

Survey Date: 4/13-4/14/2011

Start Location: 45.74141, -121.22223

End Location: 45.73995, -121.20486

Start Elevation: 78.3 m

End Elevation: 170.1 m

Reach Forming Agent: Tributary Junction

Reach Ending Agent: Waterfall Barrier

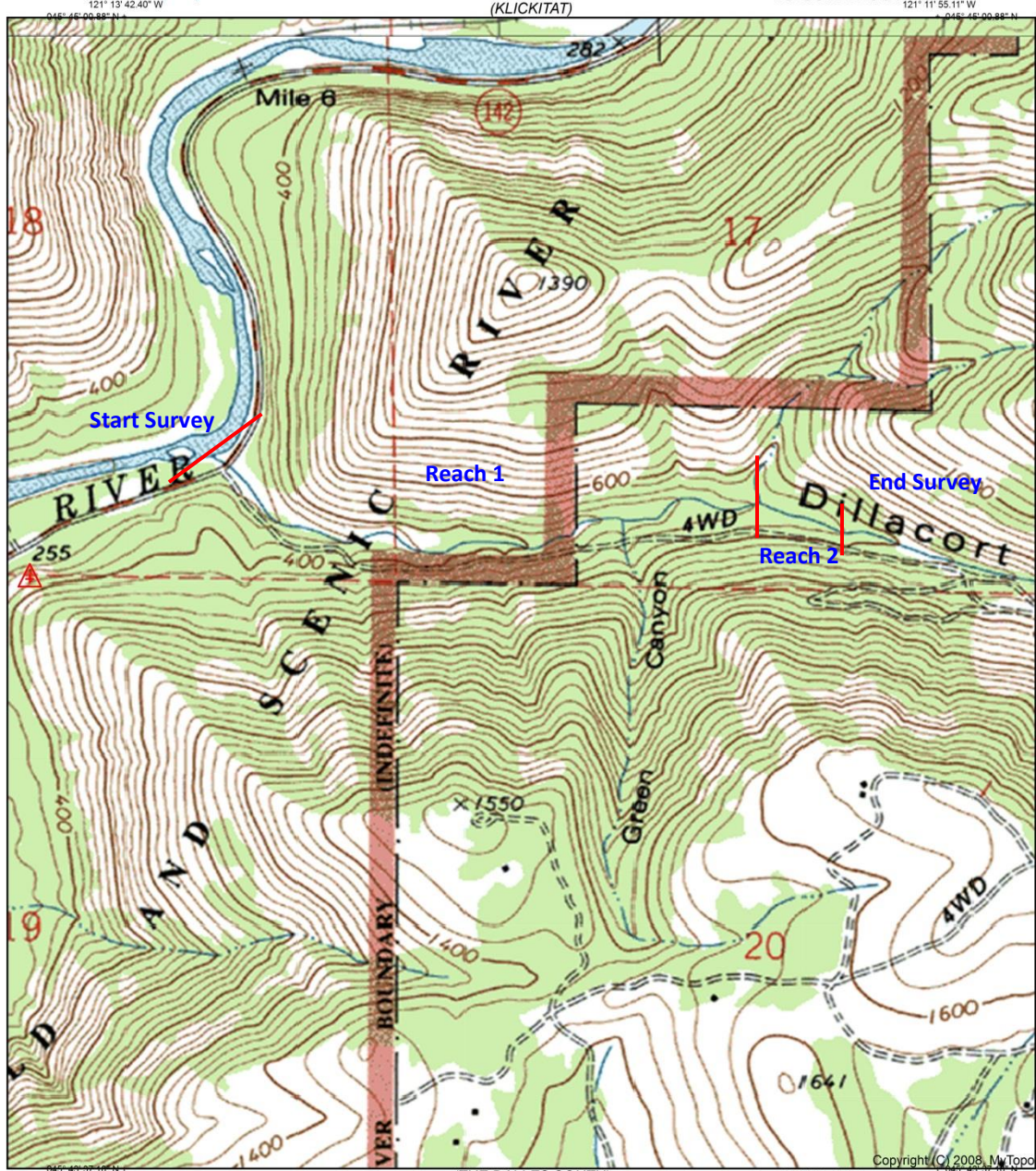
BEDROCK FEATURE SUMMARY

Bedrock Feature Inventory Summary

<u>Channel Type</u>	<u>Total #</u>	<u># Left Bank Loc</u>	<u># Right Bank Loc</u>	<u># Channel Bottom Loc</u>	<u># Channel Span Loc</u>	<u>Total Length (m)</u>
Primary	24	7	4	4	9	566.3
Secondary	0	-	-	-	-	-

Bedrock Feature Characteristic Summary

<u>Channel Type</u>	<u># Ledge</u>	<u># Slope</u>	<u># Cliff</u>	<u># Projecting</u>	<u># Non- projecting</u>	<u># Surface Control</u>
Primary	15	15	8	20	1	9
Secondary	-	-	-	-	-	-



121° 13' 42.40" W
 45° 49' 37.10" N

(THE DALLES SOUTH)
 SCALE 1:12000

Printed: Fri Sep 11, 2020
 121° 11' 55.11" W
 45° 49' 37.10" N
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(Unavailable)

Declination



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 18M S and
 92M W

CONTOUR INTERVAL 40 FEET
 NATIONAL GEODETIC VERTICAL DATUM 1929

(THE DALLES SOUTH)
 E DALLES NORTH, WA
 1994

Dillacort Creek (Klickitat River Basin) 2011 Summer Habitat Survey – Reach 1 Photos



Unit1 – Upstream view of riffle at survey start



Unit 2 – Upstream view of plunge pool



Units 9-12 – Aerial view of PIT tag array



Unit 20 – Upstream view of cascade



Unit 41 – Upstream view of riffle



Unit 86 – Upstream view of bedrock scour plunge pool

Dillacort Creek (Klickitat River Basin) 2011 Summer Habitat Survey – Reach 1 Photos



Unit 86 – Captured steelhead smolt



Unit 87 – Upstream view of cascade



Unit 99.2 – Upstream view of side channel riffle



Unit 107 – Upstream view of LWD jam



Unit 120 – Upstream view of riffle



Unit 123 – Upstream view of glide

Dillacort Creek (Klickitat River Basin) 2011 Summer Habitat Survey – Reach 2 Photos



Unit 2 – Upstream view of glide



Unit 4 – Upstream view of pool



Unit 4 – Captured *O. mykiss* parr



Unit 11 – Upstream view of cascade



Unit 14 – Captured resident *O. mykiss*



Units 15– Upstream view of survey ending falls