

**Underwood Conservation District
National Fish and Wildlife Foundation and Salmon Recovery Funding Board
Community Salmon Fund
Little Wind River Habitat Data Compilation**

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1. Introduction

The mission of Underwood Conservation District is “to enhance the level of natural resource stewardship for all district landowners and occupiers”.

Working with landowner Dan Gundersen, Underwood Conservation District applied for a Community Salmon Fund (National Fish and Wildlife Foundation & Salmon Recovery Funding Board) grant for a project entitled "Little Wind River Stream Habitat Survey and Restoration". National Fish and Wildlife Foundation funding for the project was granted by Salmon Recovery Funding Board.

The project deliverables are:

- Conduct stream habitat survey along a one-mile privately owned portion of Little Wind River.
- Involve at least 60 Wind River Middle School Students in the survey work, and facilitate their presentation of findings to the Wind River Watershed Council and at least 30 community members.
- Plant at least 200 conifers in 20,000 square feet along the Little Wind River riparian corridor in areas needing vegetation and slope stabilization.
- Assess specific restoration needs for the Little Wind River subwatershed and propose funding for future work.

This document is a summary of research and surveys that have been conducted on the Little Wind River in Skamania County, an analysis of this historical data, and a discussion on the implications of this analysis on potential aquatic species habitat enhancement and restoration needs for the basin.

2. Historical Background

Underwood Conservation District contacted the USFS Gifford Pinchot forest to inquiry about previous surveys and research completed within the Little Wind River basin. Three separate surveys were found, dating from 1983 (2a.), 1992 (2b) and 2007 (2c).

Underwood CD has also received information pertaining to aquatic species sampling performed by US Geological Survey, Columbia Research Laboratory on the Little Wind River in 2005 and 2006.

Underwood CD performed basic GIS analysis using SalmonScape, a GIS tool of the Salmon and Steelhead Habitat Inventory and Assessment Program co-managed by

2a. Gifford Pinchot National Forest Stream Survey Data from 1983.

The 1983 unpublished data was received from the USFS in the form of copied data sheets. The survey was apparently done between the USFS boundary at river mile 2.8 and river mile 5.9. This 2.49 mile area, known as the “Willard Planning Area”, was broken into 5 reaches. A summary of the data from this survey is shown in Table 1. Exact protocols for each parameter are unknown.

	Reach 1 RM 2.8 to 3.07	Reach 2 RM 3.07 to 3.8	Reach 3 RM 3.8 to 3.95	Reach 4 RM 3.95 to 4.83	Reach 5 RM 4.83 to 5.29
Average Reach Gradient (%)	4.1	2.9	2.5	3.1	4.7
Avg. % Stream Shaded (%)	16	44	11	53	61
Avg. Stream Width (ft)	23	17.3	52.5	12.6	11
Should Road Crossings Allow for Fish Passage?	Yes	Yes	Yes	Yes	Yes
Total Spawning Gravel (Sq. Yards)	1	56	0	19	5
Rearing Habitat (% of reach)	23	46	40	37	33
Water Temperature (°C)	6.0	6.4	6.5	7.9	9.8

Table 1. Summary of stream survey data collected by USFS staff on Little Wind River from Forest Service boundary at river mile 2.8 to river mile 5.29 on May 16th, 1983.

The survey crew also looked at Large Woody Debris (LWD) and the results for each reach are shown in Tables 2 through 6 for reaches 1 through 5 respectively.

LWD Size	Embedded	Not Embedded
8-15"	0.71 / 100 ft	2.43 / 100 ft
> 15"	0.86 / 100 ft	0.29 / 100 ft

Table 2. Large Woody Debris in Reach 1 (RM 2.8 to 3.07) of Little Wind River recorded by USFS on May 16th, 1983.

LWD Size	Embedded	Not Embedded
8-15"	4.9 / 100 ft	5.1 / 100 ft
> 15"	4.3 / 100 ft	0.74 / 100 ft

Table 3. Large Woody Debris in Reach 2 (RM 3.07 to 3.8) of Little Wind River recorded by USFS on May 16th, 1983.

LWD Size	Embedded	Not Embedded
8-15"	0.5 / 100 ft	2.75 / 100 ft
> 15"	0.25 / 100 ft	0.0

Table 4. Large Woody Debris in Reach 3 (RM 3.8 to 3.95) of Little Wind River recorded by USFS on May 16th, 1983.

LWD Size	Embedded	Not Embedded
8-15"	1.9 / 100 ft	3.6 / 100 ft
> 15"	2.6 / 100 ft	0.26 / 100 ft

Table 5. Large Woody Debris in Reach 4 (RM 3.95 to 4.83) of Little Wind River recorded by USFS on May 16th, 1983 and May 23rd, 1983.

LWD Size	Embedded	Not Embedded
8-15"	2.3 / 100 ft	6.8 / 100 ft
> 15"	3.3 / 100 ft	0.4 / 100 ft

Table 6. Large Woody Debris in Reach 5 (RM 4.83 to 5.29) of Little Wind River recorded by USFS on May 23rd, 1983.

A more in depth review of these data sheets revealed several other notable facts. These notable facts are listed below, organized by reach.

Reach 1: In the final section entitled "Project Needs" of the Reach 1 form, the first item listed states, "LWD, C, substrate small boulders, cobble, riffle type, area of clearcuts".

Reach 2: Line 23 of the "Other Limiting Factors" section states, "Jam- Migration Barrier due to percolation down through – no falls", while Line 25 states "Log jam creating possible barrier – fish sighted above jam". Each of these log jams were given a GPNF Log Jam Survey Field Inspection, in which one was shown to be a "barrier" and the other was shown to be a "possible barrier"

Reach 3: On line 27 of the "Other Limiting Factors" a 7 foot waterfall was identified, while lines 28 through 30 indicate gradient, substrate, chutes and falls as potential factors limiting fish passage.

Reach 4: Line 52 of “Other Limiting Factors” a log jam is identified as, “Presently a barrier, due to water falling 2-3’ through debris instead of over”.

Reach 5: Line 60 of “Other Limiting Factors” identifies a “15-18 ft vertical drop in 20’ horizontal length. Cascade-falls combination. Each falls is 7-9 feet with holding pools between. Impassable due to slope of falls + cascade”.

2b. Gifford Pinchot National Forest Little Wind River Stream Survey 1992.

The Little Wind River was surveyed during the period of September 16th, 1992 to November 16th, 1992. The surveyors were Katie Serres and Danalyn Loitz.

The survey began at the mouth of the Little Wind River at the confluence with the Wind River, RM 0.0, and ended at RM 6.5. At the beginning of the survey report, the author describes an executive summary of the findings:

“The overall quality of the fish habitat for the Little Wind River was rated as fair. The effective fish cover was rated as fair with substrate and woody debris providing the primary sources of cover. Woody debris densities and pool frequencies were below Mount Hood National Forest Plan’s Standards and Guidelines, however the applicability of these standards to the stream system in question has not been determined. The pool to riffle habitat area ratio was rated as good in all reaches with the exception of Reach 3. Reach 1 had a ratio of 1:6.4, Reach 2 was good at 1:0.5, Reach 3 had a ratio of 1:11 and Reach 4 was 1:6.1. Embeddedness was considered a problem, possibly related to the unstable banks noted in many areas and past timber activities observed near the headwaters. Spawning gravels are present but the siltation commonly observed may be causing degradation in the quality of spawning areas.”

The author goes on, within the executive summary, to state that “Unidentified fish were observed in the pools and pocket water throughout the stream. There were numerous natural barriers to fish passage encountered on this stream, such as falls at RM 4.2, RM 4.3 and RM 5.4 and the numerous chutes throughout. “

Finally, recommendations for enhancement projects ...”may include: the addition of large woody debris in Reaches 1 and 2 to help create better pool habitat and effective cover, reduce siltation and prevent erosion.”

A summary of the data from this survey has been arranged in Table 7.

	Reach 1: RM 0.0 to 3.6	Reach 2: RM 3.6 to 4.2	Reach 3: RM 4.2 to 5.9	Reach 4: RM 5.9 to 6.5
Reach Length	3.6 miles	0.6 miles	1.7 miles	0.6
Average Gradient	3%	8%	13%	9%
Discharge	2.2 cfs	n/a	N/A	N/A
Valley Description	U-shaped	Moderate V-	Moderate V-	Moderate V-

		shaped	shaped	shaped
Channel Width to Depth Ratio	21.61	30.0	30.0	9.17
Dominant/Subdominant Riparian Vegetation	Alder/cedar	Cedar/grass and forbs	Cedar/grass and forbs	Doug fir/cedar
Streambank Shading	Between 31% and 60%	Between 20% and 30%	Between 20% and 30%	Between 20% and 30%
Dominant/Subdominant Substrate	Cobble/Cobble	Gravel/Cobble	Gavel/Cobble	Cobble/gravel
Effective Cover Percentages	21% to 40%	21% to 40%	21% to 40%	0% to 5%
Woody Debris (Lrg and Sml Sized)	3.8 pieces per 1000 feet	17 pieces per 1000 feet	17 pieces per 1000 feet	4.2 pieces per 1000 feet
Pool to Riffle Habitat Area Ratio and %	1:6.4 ; 13.2% pools 84.1% riffles	1:0.5; 64.6% pools 31.9% riffle	1:0.5;64.6% pool 31.9% riffle	1:6.1; 14% pool 86% riffle
Fish Species Observed	Unknown	Unknown	Unknown	Unknown

Table 7. Summary of stream survey completed by GPNF on the Little Wind River between September 16th and November 16th 1992.

2c. Gifford Pinchot National Forest Little Wind River Aquatic Ecosystem Inventory Data Summary from 2007.

The stream survey conducted by the GPNF in 2007 is the most extensive survey of the Little Wind River to date. The survey was performed on September 13th and September 20th, 2007. The survey was completed using the published protocol for the USFS Region 6 Stream Inventory Handbook Level I & II 2007 Version 2.7 (R6 Westside AL_AB Presence). The survey looks at a number of different environmental and ecological parameters. While a full report of the survey has not been published, the raw and summarized data from the survey was made available to Underwood CD for the purposes of review. Survey was split into 2 reaches, reach 01-01 starts at the mouth and goes to river kilometer 5.793 while reach 01-02 starts at river kilometer 5.793 and ends at river kilometer 6.759. The data provided in this report is taken directly from the raw data of the Level II Inventory-Aquatic Ecosystem Inventory.

Fish Habitat

The percentage of habitat types is shown for reaches 01-01 and 01-02 is shown in Table 8a. The percent of pools to and riffles constitutes a 1:9 ratio in reach 01-01 while a 1:3.9 ratio in reach 01-02. Included in this protocol is a more in depth look at the pools within the aquatic ecosystem which is summarized in Table 8b.

	Percent Pool	Percent Riffle	Pool: Riffle Ratio	Percent S Channel	Percent Spec H
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Reach 01-01	9.81	88.89	1:9.06	1.28	0.01
Reach 01-02	22.79	77.19	1:3.39	0.0	0.02

Table 8a. Habitat percentages in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory completed by the GPNF on September 13th and 20th of 2007.

	Total # of Pools	Pools Per Mile	Pools 3 ft Deep Per Mile	Average Pool Depth
Reach 01-01	60	16.85	3.37	1.93
Reach 01-02	15	20.27	5.41	2.43

Table 8b. Pool frequency and depth in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory by the GPNF on September 13th and 20th of 2007.

Large Woody Debris

The amount and frequency of Large Wood Debris (LWD), Medium Woody Debris (MWD), Small Woody Debris was also surveyed and the results are summarized in Table 9a. Woody debris definitions from the protocol used in this survey are summarized in Table 9b while a more thorough explanation of the LWD protocol can be found in the stream inventory handbook.

	LWD Per Mile	MWD Per Mile	SWD Per Mile	Large Wood Frequency
Reach 01-01	2.81	6.49	14.89	0.01
Reach 01-02	27.03	36.49	37.84	0.07

Table 9a. Amount and frequency of Large, Small and Medium Woody Debris in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory completed by the GPNF on September 13th and 20th of 2007.

Large Woody Debris	Diameter > 26 in, at a length of 50 ft from the large end
Medium Woody Debris	Diameter > 24 in, at a length of 50 ft from the large end
Small Woody Debris	Diameter > 12 in, at a length of 25 ft from the large end

Table 9b. Minimum diameter and length criteria for Level II Aquatic Habitat Inventory stream surveys by the USFS Region 6.

Fluvial Morphology and Hydrology

The GPNF stream survey of 2007 also inventoried some of the physical characteristics of the stream, including Bankfull Width (BFW), Floodprone Width (FPW), Bankfull Depth (BFD), Bankfull Maximum Depth (BFmaxD), Ent Ratio. The results of all of these parameters, and the calculated average bankfull width to depth ratio, are shown in Table 10a. In addition, the inventory also measured the lineal distance of actively eroding banks along the sides of every measured channel unit. The percent of unstable left bank (% Unstable L), the percent of unstable right bank (% Unstable R) and the total percent unstable banks (% Unstable T) is shown in Table 10b. Finally, the stream inventory is able to assess the characteristics of the valley and channel morphology that plays a key

role in aquatic ecosystem processes. The channel length, valley width, valley length and gradient were all calculated using geographic information systems (GIS) software and 1:24,000 scale USGS topographic maps. The sinuosity was calculated by dividing the channel length by the channel width. Stream order and valley form was designated using the Strahler method and a 1:24,000 scale USGS topographic map as described in Appendix B of the Stream Inventory Handbook Region 6 Version 2.5 on page 80. Valley form was designated from the system described in Appendix C of the Stream Inventory Handbook Version 2.5 on page 81. A code 3 valley form indicates a “Moderate V-shaped” with a “floor width<100ft” and slide slopes “Moderate: 30-60%”. Discharge was measured using the standard protocol described in the Stream Inventory Handbook on September 13th, 2007.

	Avg. BFW (ft.)	Avg. FPW (ft.)	Avg. BFmaxD (ft.)	Avg BFD (ft.)	Avg Ent Rat?	Average BF Width: Depth Ratio
Reach 01-01	29.11 ft	65.67	1.87	1.33	2.35	23.31
Reach 01-02	16.00	95.00	2.30	1.80	5.94	8.89

Table 10a. Channel and floodplain physical characteristics in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory completed by the GPNF on September 13th and 20th of 2007.

	% Unstable L	% Unstable R	% Unstable T
Reach 01-01	1.31	0.26	0.78
Reach 01-02	0.46	1.29	0.88

Table 10b. Percent unstable left bank, percent unstable right bank and total percent of unstable banks in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory completed by the GPNF on September 13th and 20th of 2007.

	Channel Length (ft)	Valley Length (ft.)	Valley Width (ft)	Sinuosity	Gradient (%)	Discharge (cfs)	Stream Order	Valley Form
Reach 01-01	1906.83	17793.87	197.01	1.07	4.39	4.90	2	3
Reach 01-02	3169.45	3293.16	126.01		4.70		2	3

Table 10c. Discharge, stream order, valley form and mapped channel length, valley length and valley width in reaches 01-01 and 01-02 of the Little Wind River from the raw data of the 2007 Level II Aquatic Ecosystem Inventory completed by the GPNF on September 13th and 20th of 2007.

Channel length appears to be less than valley length, which is a physical impossibility? Channel length must be at least as long as valley length, or if very sinuous, much longer than valley length.

2d. US Geological Survey, Columbia River Research Laboratory Aquatic Species Sampling Data Summary from 2005 and 2006.

In 2005 and 2006 the US Geological Columbia River Research Laboratory conducted a series of aquatic species sampling round. Please see additional attachment to view this data sheet.
