

# Upper Chehalis Watershed Culvert Assessment

Water Resource Inventory Area 23



Lewis County Conservation District

Final Report

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## **Introduction**

The Upper Chehalis River basin, which is located in Lewis County, Washington, WRIA 23, is an important stream for anadromous fish. Culverts, if improperly installed or deteriorated over time, can prevent or limit the ability of adult and juvenile salmonids to access all habitats. Mature chinook salmon spawn in the mainstem of the Upper Chehalis, where there were no culvert crossings. Coho salmon, juvenile chinook, and steelhead travel up into the smaller streams and are therefore more likely to be impacted by blocking culverts. It is important that fish have access to all habitats to spawn, elude predators, find food, and escape high flows. However, a complete database that listed all the culverts in the system did not exist. Therefore, the Lewis County Conservation District undertook the task of finding and evaluating culverts. The data that was acquired was combined with existing information to make a complete map and database. This project was funded by a grant from the Washington State Salmon Recovery Funding Board.

## **Scope**

The purpose of this survey was to identify all culverts on type 1-4 streams, in the Upper Chehalis River basin. Areas where significant natural barriers blocked anadromous fish were excluded (see map). Natural barriers were mapped as being impassable in the *Catalog of Washington Streams and Salmon Utilization, Volume 2, Coastal Region*. Also, the *Fish Passage Barrier Assessment and Prioritization Manual* of the Salmonid Screening, Habitat Enhancement, and Restoration (SSHEAR) Division (August 2000) was used to determine the passability of natural features. This survey involved obtaining information from private landowners, timber companies, Lewis County Public Works, Department of Natural Resources and Washington State Department of Fish and Wildlife. The final goal of the project was to produce a single map detailing all culverts as, passable, impassable or of unknown barrier status.

## **Survey Methods**

### ***Initial Landowner Contact***

Initially, streams typed 1-4 were identified in the Upper Chehalis River Basin. A list of landowners along these streams was generated using information from the Lewis County Assessor's office. All identified landowners were sent a letter explaining the survey and that district personnel would be contacting them at their residence. If a landowner was not at home an attempt was made at contacting them via telephone. Agencies were contacted via telephone or e-mail. In addition, research was conducted at the Washington State Archives to locate Hydraulic Permit Applications (HPA's) to further identify landowners that might have culverts.

### ***Level 'A' Analysis***

Surveying the culverts was completed according to Washington Department of Fish & Wildlife (WDFW) protocol using the *Fish Passage Barrier Assessment and Prioritization Manual* of the Salmonid Screening, Habitat Enhancement, and Restoration (SSHEAR) Division (August 2000). The data was collected on the Site Identification Field Form and the Culvert Evaluation Field Form. Site location was established by the use of a backpack mounted Trimble GPS receiver. Culvert lengths and slopes were obtained using a hand held laser level with a reflector mounted on a survey pole. Other data was obtained using normal field practices.

### ***Level 'B' Analysis***

A level B survey analysis was conducted when results did not clearly distinguish barrier status. A Level B Analysis Elevations Worksheet was completed in the field. The WDFW protocol was used to perform a site evaluation. A laser level mounted on a survey pole was used in conjunction with a rod and reflector to complete cross sections and to

determine culvert elevations. In the office, the Level B 2.3 Barrier Analysis spreadsheet was used to determine fish passage status.

***Previously Surveyed Culverts***

Information on culverts underneath county roads was obtained from Lewis County Public Works. County culverts were surveyed using WDFW guidelines. The District re-surveyed some of the higher priority unknown barrier status county culverts to determine passability. WDFW provided information on Washington State Department of Transportation culverts and additional data on Lewis County road culverts. Weyerhaeuser and the Campbell Group declined to provide data on their culverts. All information on Weyerhaeuser culverts was obtained from Road Maintenance Abandonment Plan (RMAP) data that is available from the Department of Natural Resources.

***Other Survey Methods***

Not all landowners replied to our request to survey their culverts. Aerial photos were viewed to determine locations of crossings. In areas where the stream could be seen from the road, windshield assessments were performed to detect the presence or absence of culverts. If culverts were observed the field forms were filled out with as much detail as possible. In addition, information was obtained from other local landowners. If we could not actually evaluate the culvert, it was listed as unknown barrier status. Overall, the majority of landowners allowed access to their properties for our survey.

**Results**

<b>Sub-basin</b>	<b>Impassable</b>	<b>Passable</b>	<b>Unknown</b>	<b>Totals</b>
<i>Miller Swamp and Hope Creek</i>	1	1	0	2
<i>Dell, Garrett, and Nicholson Creeks</i>	2	2	0	4
<i>Marcuson, Dunn, Absher, Capps, and Hay Creeks</i>	4	3	0	7
<i>Fronia ,Jones, and Stowe Creeks</i>	12	7	0	19
<i>Elk Creek</i>	6	0	1	7
<i>Rock Creek</i>	9	5	0	14
<i>Remaining Upper Chehalis Creeks</i>	9	10	0	19
<b>Totals</b>	43	28	1	72

When culverts are evaluated they fall into the categories of impassable, passable or unknown, based on the ability to pass a 6 inch trout. If a culvert is rated impassable it is not necessarily a total barrier to fish passage. It can be causing a delay or limiting a

certain lifestage of the salmonid. A passable culvert allows the 6 inch fish to pass the culvert at all times. Unknown culverts were unable to have barrier status determined.

## ***Upper Chehalis River Basin***

### ***Sub Basins***

#### ***Miller Swamp and Hope Creek***

Hope Creek had a .8 meter waterfall near the mouth but it would be passable to the coho and steelhead that utilize the stream. Historically, the stream was used by chum. The lower part of the creek had animal access that was breaking down the banks. The pastures were overgrazed up to the stream banks and the riparian buffer consisted of a sparse amount of trees and shrubs. The creek above Highway 6 flowed through timberlands and had a good riparian buffer. The substrate consisted of a clay bottom with cobbles and limited spawning gravel.

Below Highway 6, Miller Swamp was a stream enclosed with high banks. The substrate was mainly a clay bottom with some areas of spawning gravel. Above Highway 6, the stream became a large swamp that was bisected by a logging road. Cross drain culverts seemed to be present but they were plugged by debris. The area around the swamp was relatively undisturbed. Miller Swamp was a high quality rearing area. If the road could be rerouted so that it bypassed the swamp, it would greatly increase the area available for rearing habitat.

#### ***Dell, Garret, and Nicholson Creeks***

Dell, Garret, and Nicholson Creeks are mapped as having coho and most likely steelhead. Up to the first bridge on Garret Creek, good quality spawning gravel was present. The riparian buffer in that section was large conifer and deciduous trees. No brush was present due to livestock that were accessing the stream. Culvert 021(27820)(02631) underneath Meskill Road was blocking access to the majority of Garret Creek. The substrate above the culvert appeared to be primarily sand. Beaver activity was present and the riparian zone consisted of open grasses interspersed with narrow areas of trees and shrubs.

The lower reaches of Dell Creek flowed through an area of scattered houses. The riparian areas were generally left alone by the residents but the widths were narrow. The upper reaches were entirely in Weyerhaeuser property.

Nicholson Creek was completely blocked at the mouth by culvert 1304W03A, underneath the Rails to Trails hiking path. It was impossible to perform slope and length measurements due to the inlet being submerged and plugged with large logs. A large pond was formed by a combination of the plugged culvert and the old railroad dike. A .4 meter outfall drop made the culvert a complete barrier. A priority index was conducted for this stream and the results are included in this report.

### ***Marcuson, Dunn, Absher , Capps and Hay Creeks***

Marcuson Creek was mapped as having coho and would likely be used by steelhead. The lower reaches flowed through agricultural lands. The narrow riparian buffer, from which animals were fenced out, consisted of mixed deciduous trees and shrubs. The upper reaches were in timberlands with a riparian buffer consisting of mixed conifer and deciduous trees. Areas that were observed had excellent spawning gravel and landowners had watched coho spawning.

Dunn Creek was in a deep canyon in the lower reaches and had an excellent riparian buffer of mixed conifer and deciduous trees. Spawning gravel was observed and local landowners commented that both coho and steelhead utilized the stream.

Absher Creek had a good riparian buffer although it was narrow in spots. Capps and Hay Creeks also appeared to have a good riparian buffer. All three creeks originated in timberlands. Unfortunately, all three had blocking culverts where they flowed underneath Chandler Road.

### ***Fronia, Jones, and Stowe Creeks***

Fronia Creek flowed through a farm in its lower reaches. The landowner had observed coho spawning below culvert 1305W23B. The culvert would be difficult for adult fish to negotiate and impossible for juveniles. One culvert upstream from this site was a barrier to fish passage.

Jones Creek had an impassable fall near the mouth that prevented anadromous fish use. The survey crew was uncertain of the passability of the falls so culverts above it were assessed. Two WDFW habitat biologists that were consulted confirmed that the falls were impassable. Five blocking culverts were present in the system above this site.

Stowe Creek had a 1.9 meter high waterfall near its mouth that would be passable to coho and steelhead. The lower reaches of the creek flowed through the town of PeEll and had a low quality riparian buffer. According to local landowners, the PeEll sewer treatment plant in the past had polluted the creek but recent upgrades should prevent any problems. After the creek left PeEll, it meandered through agricultural areas. The upper reaches were in timberlands. Spot checks revealed that Stowe Creek had high quality spawning gravel. Sand Creek, a tributary, appeared to have limited areas of good spawning gravel.

### ***Elk Creek***

Elk Creek is the largest tributary in the Upper Chehalis Watershed. A 3.6 meters waterfall at stream mile 1.5 blocked the upper watershed. Then in 1972 a fish ladder was installed to facilitate fish passage. This creek is used by coho, chinook, and steelhead. Deer Creek, a major tributary, is blocked at the mouth by a 6 meter high waterfall. The lower reaches of Elk Creek had scattered houses along its banks but the majority of the basin flowed through timberlands. Culvert 1305W10A was blocking an unnamed

tributary to Elk Creek. Three blocking culverts existed on an unnamed tributary to Nine Creek. However, it appeared that the gradient of the stream would be too steep for fish utilization. Two blocking culverts existed on an unnamed tributary to Seven Creek. All five of these culverts existed on DNR lands.

### ***Rock Creek***

Rock Creek had a falls near the mouth but coho and steelhead were able to make it over. Three blocking culverts existed on small, unnamed tributaries underneath the Rails to Trails hiking path. Culvert 1205W05B had a large pond on the upstream end, which would provide excellent rearing habitat for salmonids.

McCormick Creek, a Rock Creek tributary, had animal access in the lower reaches and a narrow riparian buffer. The headwaters originated in timberlands. Culvert 1205W05A was completely blocking a significant portion of the mainstem. Two culverts blocked an unnamed tributary but the stream above the culverts was insignificant for fish. Culvert 1303W31A was blocking an unnamed tributary that might have significant salmonid habitat.

### **Remaining Upper Chehalis Creeks**

Robinson Creek had a waterfall at the mouth that was greater than 3.7 meters. Shields Creek had a 15 meter waterfall that completely excluded anadromous fish. Cannonball Creek had a 2.5 meter waterfall that would be completely impassable. Below the waterfall was a flat bedrock glide. No pool was present directly above the falls, further inhibiting fish passage. A small downstream area below the falls was utilized by spawning fish as evidenced by a decaying carcass.

Shields, Browns, and Hull Creeks have impassable cascades at their mouths. Mahaffey Creek has an impassable waterfall at the confluence with the Chehalis River. Roger Creek is mapped as having an impassable waterfall near the mouth. Lester Creek has an impassable waterfall at approximately river mile .75. A small dam is present directly above the falls. The dam was built to create a reservoir for the city of PeEll's water intake.

The West Fork Chehalis is mapped as having three impassable waterfalls. Landowners in the PeEll area thought that anadromous fish could get above the falls. Culvert 1105W29A was blocking near the headwaters. Culvert 1105W23A was blocking an unnamed tributary to the East Fork Chehalis River. Culvert 1105W24 was blocking an unnamed tributary to George Creek. Overall, this part of the Upper Chehalis was not being highly impacted by blocking culverts, as the majority of the crossings were bridges.

Six blocking culverts existed on unnamed mainstem tributaries. Culverts 1304W13B and 1304W13C were blocking the upper reaches of the first north side tributary. The habitat above the two culverts was insignificant for anadromous fish. Culverts 021(28051)(00450) and 1304W23A were blocking the first south side tributary in this basin. Culvert 991542 was blocking the third south side tributary past Hope Creek. On the north side in the same area a small tributary was blocked by culvert 021(27501)(02248).



### **Priority Index**

The amount of culverts that need to be replaced or upgraded in Washington State will probably be enormous. Therefore, the SSHEAR priority index method was developed to determine the culverts that would most benefit fish by being replaced. The priority index takes into account the quantity and quality of the upstream habitat. It considers fish usage and the condition of the stock. The cost of replacement is also taken into consideration.

To determine the priority index for one culvert in the Upper Chehalis basin a full survey assessment was performed. A 20% sampling rate was used where 60 meters out of every 360 meters were sampled. Reaches were areas where the habitat was similar. Reach breaks were made when the habitat changed significantly or a man made barrier was encountered. Pools, riffles and ponds were measured and documented. An estimation of the percent boulder, rubble, gravel and sand was made. A gradient measurement was made with a clinometer. A hip chain was used to measure the length of the stream reaches. After all the field data was collected, the data was analyzed to determine the amount of usable habitat. The results were used to calculate a priority index number.

#### ***Culvert 125 1304W03A***

#### ***Priority Index 16.8***

This culvert, underneath the Rails to Trails hiking path, completely blocked access to Nicholson Creek. The downstream end of the culvert had a .4 meter outfall drop directly into the Chehalis River. The upstream end was underwater and completely plugged with debris.

The main channel of Nicholson Creek was surveyed for 2393 meters. The first reach of Nicholson Creek was a large slough created by a combination of the blocked culvert and an old railroad dike. A passable culvert was encountered underneath Meskill Road. The creek had a good riparian buffer throughout although lacking in conifers in the lower reaches. Spawning habitat was good. Beaver activity had created open swampy areas in the upper reaches. The uppermost reach consisted of a series of beaver dams. The survey was ended just above an old beaver dam where the stream was less than .6 M wide.

An east bank tributary was surveyed for 576 meters. The riparian buffer was deciduous trees and shrubs. A lack of gravel limited spawning areas. Beaver activity had created swampy areas that would be ideal for rearing. The survey was ended when the stream became less than .6 meters wide.

#### ***Culvert 021 (24019)(02040)***

#### ***Priority Index 3.64***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(24019)(02040). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington, County Road Project No. 1998 March 2002.*

## **Conclusion**

The culvert survey of the Upper Chehalis River basin revealed that almost 65% of culverts were impassable. The most significant impassable culverts existed underneath public roads. The county and state are working on a long-range plan to fix impassable culverts. Private timberlands also contained several impassable culverts but they were mainly towards the headwaters. The timber companies are required by law to complete a road management plan that includes fixing barrier culverts by July 2016. Also, a fair amount of blocking culverts existed on private land. The majority of landowners in this basin were cooperative and helpful. This will facilitate the district in going back into the basin to prioritize culvert replacements. In conclusion, culvert replacement projects in the Upper Chehalis River basin would open up significant habitat for anadromous fish.

## ***References***

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