

# **South Fork Chehalis Watershed Culvert Assessment**

Water Resource Inventory Area 23



Lewis County Conservation District

Final Report

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## **Introduction**

The South Fork Chehalis River basin, which is located in Lewis and Cowlitz Counties, 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 South Fork, 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 South Fork Chehalis River basin. Areas where significant natural barriers blocked anadromous fish were excluded (see map). 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 South Fork 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 (HPAs) 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. No stream flow velocities were taken due to unseasonably low water levels. 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 and Campbell Group 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>Beaver Creek</i>	2	4	0	6
<i>Lake Creek</i>	10	7	1	18
<i>Stillman Creek</i>	17	23	0	40
<i>Other Mainstem Tributaries</i>	19	16	0	35
<b>Totals</b>	48	50	1	99

When culverts are evaluated they fall into the categories of impassable, passable or unknown, based on the ability to pass a 6 inch salmonid. 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 life stage 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.

### ***South Fork Chehalis River Basin***

## ***Sub Basins***

### ***Lake Creek***

Lake Creek is the first major tributary in the South Fork Chehalis River basin. The riparian buffer in the agricultural areas was generally poor. The upper watershed was in timberlands where the riparian buffer was of higher quality. Barney Creek, a tributary, had one passable and two impassable culverts. Culvert 021(24017)(08876) underneath King Road was blocking a significant amount of upstream habitat. Further upstream, culvert 09015 was also a blockage. A priority index was conducted to determine the value of replacing both culverts.

An unnamed tributary to Lake Creek was blocked by culvert 021(24017)(12280). At least a half mile of upstream habitat was blocked. It appeared that most of habitat was a swamp which might provide valuable rearing habitat. Two other unnamed tributaries to Lake Creek had culverts blocking at least a mile of upstream habitat. The other blocking culverts in this system were blocking only a small amount of habitat.

### ***Beaver Creek***

Beaver Creek, which is parallel to Beaver Creek Road, is mapped as being used by coho and steelhead. The lower reaches flowed primarily through agricultural lands with the upper reaches in timberlands. In the lower reaches the riparian buffer was variable with some areas having trees and other areas open. The banks appeared to be eroding in spots. This problem was worsened in the areas with animal access.

Culvert 1304W35A was blocking more than a mile of upstream habitat. The landowner was interested in the plight of salmon and might be willing to pursue a replacement project. Replacing the culvert would most benefit juvenile fish by allowing them to freely migrate up and downstream. Culvert 021(28261)(01813) was blocking a small tributary to Beaver Creek. The other four culverts identified in this sub basin were passable.

### ***Stillman Creek***

Stillman Creek is the largest tributary in the South Fork Chehalis basin. It is utilized by coho, steelhead, and chinook. Historically, it was also utilized by chum. The majority of the basin was in timberlands. In several areas, logging roads were in close proximity to the streams, thus limiting the width of the riparian buffer. Though lacking conifers in areas, the riparian buffer was of high quality. Numerous coho were observed spawning where gravel was present. The lack of sediment in the gravel was remarkable and the water was clear.

Lost Creek is the first major tributary to Stillman Creek. Culvert 021 (25401)(01657), underneath Lost Valley Road, was blocking at least one mile of habitat on an unnamed tributary. Culvert 021 (25510)(00106) was blocking at least two miles of upstream habitat. A total of nine barrier culverts were present in this system.

Halfway Creek is the largest tributary to Stillman Creek. This creek closely paralleled PeEll McDonald Road and crisscrossed several times. The riparian buffer consisted of shrubs and trees although its width was limited by the proximity of the road. Culvert 021(24019)(04778), on Halfway Creek, was blocking at least a mile of upstream habitat. Two other barrier culverts were present above this site. The majority of the tributaries to Halfway Creek were only used by fish in the lower reaches, as gradients quickly became steep.

No culverts crossed the mainstem in Lewis County. Little Mill Creek, a Stillman Creek tributary, is mapped as having only steelhead because coho are unable to negotiate the falls at the mouth.

### ***Other Mainstem Tributaries***

The South Fork has numerous small tributaries; both named and unnamed. The first tributary in the system was blocked near the mouth by a culvert underneath Boistfort Road. It is doubtful if fish would utilize the stream as an old millpond existed directly upstream of the culvert. The second tributary in the system was blocked by a culvert towards the headwaters. It would be of little value to replace, as not far from the site, a manmade pond existed above an area where the stream was piped underneath an airstrip. No habitat existed above this.

The next three unnamed tributaries had culverts blocking at least a half mile of stream. The habitat was generally poor, as the streams had probably been ditched in the past. Animal access was occurring in spots and the buffer consisted of small brush.

Culvert 09065 blocked a significant portion of Lentz Creek. Above this culvert were timberlands managed by the Campbell Group.

Culvert 1203W30A was blocking Root House Creek near the mouth. The lower reaches flowed through agricultural lands. The riparian buffer was poor but animals were fenced out. The landowner where the culvert was located has enrolled his property into the Conservation Reserve Enhancement Program (CREP). This will facilitate the development of a high quality riparian buffer along the South Fork and the lower portion of Root House Creek. The upper portion flowed through timberlands.

Three tributaries to the South Fork were blocked by culverts underneath Wildwood Road. Culvert 021 (92004)(07883) was blocking almost two miles of Bull Pen Creek. Lewis County performed a priority index and gave this Bull Pen Creek culvert an 11.49. It was determined that the habitat was poor for spawning and moderate for rearing. Culvert 021 (92004)(07883) was blocking approximately a half mile of Point Hill Creek. Culvert 021 (92004)(07238) was blocking over one mile of Sears Creek. Newland and Sep Creeks each had one blocking culvert. The culvert on Newland Creek was blocking almost one mile of habitat. The culvert on Sep Creek was blocking over two miles of habitat. Culvert 1103W18A was blocking a small amount of habitat on an unnamed stream. These streams were entirely on Campbell Group land.

Culvert 021 (92004)(02786), which was located underneath Wildwood Road, was blocking a small tributary to Black Creek. Culvert 1104W34A was blocking a small tributary to Hanlan Creek. Overall, a significant number of main stem tributaries were being impacted by blocking culverts.

## **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 select culverts in the South Fork Chehalis basin a full survey assessment was performed. A 20% sampling rate was used where 60 meters out of every 360 meters was 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 021(24017)(08876)***

### **Priority Index 14.77**

This Barney Creek culvert was located underneath King Road. An outfall drop combined with sheet flow in the cement box culvert made it only 33% passable. Downstream of the culvert, the creek flowed through a large farm. Animals had been fenced out although there was a limited access watering site. At the time of this report, the farm landowner was considering enrolling Barney Creek and some of Lake Creek into CREP. Above the culvert was a small amount of acreage belonging to the farm and the rest belonged to a large timber company.

The survey revealed that the stream had a good riparian buffer for most of its length, although it was lacking in conifers. The highest quality spawning area was at the start of timberland and up approximately 1,500 meters. The fall of 2002 was an exceptionally dry year and the falls rains did not occur until late. In December, numerous coho were observed spawning above and below the culvert. The spawning habitat below was inferior but the culvert was hindering upstream migration. Multiple fish were observed in the plunge pool below trying to jump into the culvert. One fish had died in the culvert and several others were struggling to make it through.

In the north fork of Barney Creek, numerous juvenile coho and cutthroats were observed although the water levels were unseasonably low. A total of 4390 meters of the Barney Creek watershed was assessed. The survey was ended when the gradient became greater than 20% for over 160 meters.

### ***Culvert 09015***

### **Priority Index 8.68**



This culvert on Barney Creek was 67% percent passable. Adult coho were making it through but it would be difficult for juveniles to negotiate due to velocity. Spawning areas above the culvert were interspersed with areas of large cobbles and bedrock. The north fork of Barney Creek had mostly shallow pools but numerous coho and cutthroat fry were present. The mainstem past where the creek forked became too steep within 1000 meters to be utilized by fish. Woody debris consisting of large cedar logs was abundant throughout. A total of 2974 meters was surveyed above this culvert.

***Culvert 1203W30A***

**Priority Index 8.54**

This culvert on Root House Creek was rated as 67% passable and was mainly a barrier to juveniles. The lower reaches were in agricultural areas and were buffered mainly with reed canary grass. The first landowner through which the stream flowed was enrolled in CREP. A diverse buffer had been planted but was not yet effective in providing shade. According to local landowners, salmon mainly utilized the lower reaches for spawning. The gravel was of high quality and little sediment was present in the water. Pools were generally over .5 M deep. A passable culvert was also present in the agricultural area. A total of 1377 meters of Root House Creek was surveyed.

***Culvert 1203W31B***

**Priority Index 8.76**

This culvert was located 360 meters upstream from culvert 1203W30A. It was only 33% passable due to a .35 meter outfall drop. Past the agricultural areas, the stream flowed through timberlands where the riparian buffer was of higher quality. Shrubs and scattered mixed species trees adequately shaded the stream. As the gradient of the stream increased the gravel became larger and was not as suitable for spawning. Rearing pools also became shallow. Impassable culvert 1204W36A was present towards the end of the survey but only a small amount of habitat was located above it. The survey was ended when the stream was over 20% gradient for more than 160 M.

***Culvert 021(24019)(04778)***

**Priority Index 12.87**

Culvert 021(24019)(14778) was located underneath PeEll McDonald Road on Halfway Creek. The width of the riparian buffer on the north side was limited by the proximity to the road. Shrubs and mixed species of deciduous trees made up the majority of the buffer. However, large conifers were scattered throughout. Instream cover was high and pools tended to be greater than .5 M deep. Interspersed beaver ponds provided high quality rearing areas. No true gravel was observed throughout. Instead, hardened clay pieces seemed to be functioning well as spawning substrate.

A south side tributary seemed to be a major spawning area. Approximately 400 meters upstream, several coho carcasses were observed. Large woody debris was abundant and more conifers were present in the riparian buffer. A total of 3513 meters of stream was surveyed in the Halfway Creek basin.

***Culvert 021(24019)(04032)***

**Priority Index 7.42**

This culvert was located approximately 1600 M upstream from culvert 021(240190)(14778). It was located on Halfway Creek underneath PeEll McDonald Road. A tributary flowed from the west and connected with the mainstem just above the culvert. It provided very little in the way of spawning and rearing habitat. The mainstem above the road had poor spawning habitat. Pools were generally shallow with the exception of a few beaver ponds that provided rearing habitat. A total of 935 meters of stream was surveyed above this culvert. The survey was stopped when the stream became less than .6 meters wide. Impassable culvert 1204W05C was located towards the headwaters but a priority index was not calculated for it.

## **Conclusion**

The culvert survey of the South Fork Chehalis River basin revealed that almost 50% 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. In addition, 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 South Fork Chehalis River basin would open significant habitat for anadromous fish.

## ***References***

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