

# **Middle Chehalis Watershed Culvert Assessment**

Water Resource Inventory Area 23



Lewis County Conservation District

Final Report

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## **Introduction**

The Middle Chehalis River basin, which is located in Lewis County, Washington, WRIA 23, contains several streams of importance 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. Coho salmon, searun cutthroat, 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. The maps and database should be viewed in conjunction with this report for total comprehension.

## **Scope**

The purpose of this survey was to identify all culverts on type 1-4 streams, in the Middle 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, the Department of Natural Resources and the Washington State Department of Fish and Wildlife. The final goal of the project was to produce two maps 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 Middle 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. The Department of Natural Resources (DNR) gave us information on their culverts. Weyerhaeuser 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 DNR.

### *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>Bunker Creek</i>	35	7	3	<b>45</b>
<i>Stearns Creek</i>	45	8	6	<b>59</b>
<i>Van Ornum Creek</i>	7	0	0	<b>7</b>
<i>Mill Creek</i>	6	2	1	<b>9</b>
<i>Coal Creek</i>	4	0	1	<b>5</b>
<i>Unnamed tributaries to Chehalis River</i>	18	7	2	<b>27</b>
<b>Totals</b>	<b>115</b>	<b>24</b>	<b>13</b>	<b>152</b>

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 a 6 inch fish to pass the culvert at all times. Unknown culverts were unable to have barrier status determined.

## **Middle Chehalis River Basin**

### ***Sub Basins***

#### ***Bunker Creek***

Bunker Creek roughly parallels Bunker Creek Road and Bunker Road. It meanders through a broad agricultural valley with its origin in timberlands. The riparian zone was generally narrow throughout. Spot checks revealed numerous coho fry were present in the headwaters. Beaver activity had created large swampy areas which provided rearing habitat while other areas had quality spawning habitat. Culvert 1404W15A, located at river mile 5.7, was blocking several miles of upstream habitat. Three culverts at the end of Bunker Rd., past county road maintenance, were causing problems. Culverts 1404W19C and 1404W19D were listed as unknown barrier status but at minimum they needed maintenance. Both culverts were blocked with beaver dams and the stream was flowing down the gravel road. Numerous coho fry were observed in the water on the road. Upstream, culvert 1405W24A was blocking over one mile of habitat.

The first unnamed tributary to Bunker Creek had six barriers along its length and two insignificant barriers on tributaries. The stream is mapped as having coho but spot checks revealed a mud bottom with no spawning gravel. In the lower reaches the stream has been dredged out in the past and animal access was present.

Five other unnamed tributaries had culvert blockages but they are mapped as having only small amounts of upstream habitat. Major named tributaries in this system were Deep Creek, Prairie Creek, and Shaw Creek.

Deep Creek, which closely parallels Deep Creek Road, is an important stream for anadromous fish. Spot checks revealed excellent spawning and rearing habitat. The riparian buffer was narrow in spots but no animal access was observed. A habitat survey was completed by Lewis County Public Works for culvert 021 (24024)(03932), near the end of Deep Creek Road, and information is provided in the priority index section. Tapp, Rudolph, and Byron Creeks, and the headwaters of Deep Creek, all had blocking culverts located on DNR land. Culvert 1404W24A, located on Gabel Creek, was a complete blockage to fish passage due to a .75 M outfall drop. The stream is mapped as having at least a half mile of upstream habitat.

Culvert 021(24034)(05678), underneath Bunker Creek Road, was blocking Prairie Creek near the mouth. Shaw Creek had a blocking culvert on DNR land near the headwaters. Both creeks were almost entirely in timberlands.

#### ***Stearns Creek***

Stearns Creek is an important stream for coho. Historically, it was also utilized by chum. The creek has been highly impacted by agriculture with over two miles of the lower mainstem having been ditched in the past. Several unnamed tributaries in this section have also been ditched. The lower watershed had limited animal access due to high banks and some fencing.

The first eastside tributary to Stearns Creek is connected by a type five stream. It is mapped as having coho usage. This stream and its tributary had five culverts that we were not able to evaluate for passability. Four of the culverts were on private land where the landowners would not allow access. The unknown county culvert was inaccessible for surveying. At the end of Nix Road the stream had nice spawning habitat. Unfortunately, a large farm was allowing cattle free access to the stream.

Four blocking culverts existed on the first westside unnamed tributary to Stearns Creek. The stream ran through a corn field below Pleasant Valley Road. It had been ditched in the past and had little riparian cover. Above Pleasant Valley Road the stream flowed through timberlands. The second unnamed tributary in the system had two blocking culverts.

Blockage 1303W13A, consisting of three smooth concrete pipes, was encountered at river mile 2.84. A habitat survey was completed and the results are in the priority index section of this report.

The two major tributaries in this system were West Fork Stearns Creek and Ripple Creek. Culvert 021(22601)(00748), underneath Brown Road West, was blocking a small unnamed tributary. The West Fork Tributary A flowed entirely through timberlands and had a quality buffer. Beaver activity had created a huge swamp in the lower reaches. Culvert 1303W35A was a blockage located above the swamp. The majority of the spawning habitat in the West Fork Stearns Creek basin was located above this culvert.

In the lower reaches of West Fork Stearns Creek, the stream was being highly impacted by livestock access. The riparian buffer was narrow with most of the underbrush having been grazed. Cattle were breaking down the banks and the water quality was visibly degraded. The substrate consisted of large cobbles and bedrock with little to no spawning areas. Two miles upstream a waterfall exists that completely excluded anadromous fish from the upper watershed.

Stearns Creek Tributaries A, C, and D were included in this survey because coho fry were observed utilizing the systems. The tributaries were field drainage ditches that had been dredged deep enough that fish could access them. The bottoms were mud, little riparian cover existed, and the water temperatures were warm. The culvert blockages that existed on them should be considered very low priority to repair.

Tributary B had also been dredged out in the past in the lower reaches. Tributary D was the original channel but the stream had been rerouted. Five barrier culverts existed on Tributary B. Valuable habitat for spawning and rearing existed above blocking culvert 1303W24E.

Culvert 1302W30A was blocking access to most of Tributary F. However, the stream quickly became steep with large cobbles.

Culvert 1302W31A was blocking access to Tributary G. A habitat assessment was completed for this culvert and more information is included in the priority index section.

Ripple Creek flowed through a mix of agricultural and timberlands with the origin near the City of Napavine. The stream had a good mix of spawning habitat and swamps for rearing. Unfortunately, the areas with the highest quality spawning habitat were being impacted by animal access. The riparian buffer consisted primarily of canary grass with areas of deciduous trees. Near the City of Napavine, the stream turned into a large swamp. Above Highway 603 the water quality was visibly degraded, stagnant, and



unsuitable for fish. It has recently been dredged and road ditches were bringing storm runoff water from the City. Eight blocking culverts were impacting the Ripple Creek Basin. Culvert 021 (31013)(02557), underneath Haywire Road, had a habitat assessment completed by Lewis County Public Works. A priority index number was calculated for culvert 1302W28B and is included in this report.

Tributary H had four blocking culverts along its length. A habitat assessment was completed for culvert 1302W32B and more information is included in the priority index section of this report.

Tributary I had areas of spawning habitat and large swampy areas for rearing. The survey of this tributary concluded at an impassable waterfall.

### ***Van Ornum Creek***

Van Ornum Creek was being impacted by agriculture in the lower reaches. The riparian buffer was narrow and animal access had broken down the banks. In the headwaters where the stream flowed through timberlands, spot checks revealed excellent spawning habitat. Four barrier culverts existed along its length with Culvert 021(24034)(00730), underneath Bunker Creek Road, blocking the greatest amount of habitat. Culvert 1403W32A was a barrier near the mouth of an unnamed tributary that flowed through woodland acreage. Near the headwaters, two more barrier culverts existed.

### ***Mill Creek***

Mill Creek is a direct Chehalis River tributary that is mapped as being utilized by coho. In the lower reaches the stream flowed through swamps. The stream is mapped as flowing through culvert 021(24005)(01131), a barrier of unknown status underneath Stearns Road. However, it is believed that Mill Creek in this area has been rerouted to flow under a bridge on Highway 6. This needs to be confirmed with a habitat survey. A housing development was encroaching on the stream between Highway 6 and Chilvers Road on land that was formerly agricultural. The upper reaches flowed through a mix of timberlands and rural residences.

Culvert 1403W34A was blocking a significant portion of Mill Creek. A priority index was completed by Lewis County Public Works for Culvert 021(24002)(01505), underneath Jefferies Road and information is provided in the priority index section. At river mile 3.7 a dam existed that formed a small pond. We were unable to gain access but it is believed that a fish ladder exists.

### ***Coal Creek***

Coal Creek is mapped as having coho usage. Culvert 021(14030)(02805), underneath Scheuber Road, was a barrier. Coal Creek flowed through agricultural lands below the road and timberlands above. Culvert 1403W23A was a barrier of unknown status due to the fact that it was completely submerged. Above the crossing a large swamp existed and no spawning habitat was observed. An unnamed tributary that flowed parallel to Scheuber

Road had three blocking culverts. However, the stream was little more than a dredged out drainage ditch without much fish habitat. The stream had no riparian buffer and was mostly dry. At the headwaters of the unnamed tributary a small dam existed. However, it was not evaluated for passability as it was above fish usage.

### ***Unnamed tributaries to Chehalis River***

Blocking culverts existed on several of the unnamed tributaries to the Chehalis River in the Middle Chehalis Basin. An unnamed tributary, whose confluence with the Chehalis River was at river mile 81.7, had five blocking culverts. The most significant blockage was Culvert 021(24034)(00730) underneath Bunker Creek Road.

An unnamed tributary at river mile 81.35 flows through agricultural lands in the lower reaches. The upper reaches flow through a mix of timberlands and rural residences. Seven blocking culverts existed in this system. Lewis County Public Works completed a habitat survey for culvert 021(23000)(00460), underneath Penning Road and information is provided in the priority index section.

An unnamed tributary that paralleled Cousins Road had four blocking culverts. The stream had a two meter outfall drop into the Chehalis River. A landowner who had lived in the area for many years stated that coho could access the tributary when the river flooded. Below Twin Oakes Road, cattle were accessing the stream. The substrate in this area was primarily silt with a few pools for rearing. Above Twin Oakes Road spot checks revealed spawning gravel was present.

### **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 culverts in the Middle Chehalis basin full survey assessments were 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. Lewis County had previously completed five priority indexes in the Middle Chehalis basin.

***Culvert 125 1303W13A***

***Priority Index 50.37***

Three identical culverts made up this crossing, which was located on Stearns Creek only 2.8 miles from the confluence with the Chehalis River. A combination of slopes greater than 1%, smooth concrete pipes, and .15 meter outfalls resulted in this culvert being rated as passable only 33% of the time for juveniles and resident fish. Adult anadromous fish should be able to pass the majority of the time due to flooding during the migratory period. A total of 44,784.8 linear meters of habitat was surveyed above this barrier. Approximately, 23,341.48 square meters of spawning habitat was present. Rearing habitat was abundant with 73,526.6 square meters present.

***Culvert 021(31013)(02557)***

***Priority Index 23.88***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(31013)(02557). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington*.

***Culvert 125 1202W04B***

***Priority Index 21.13***

Two culverts made up this crossing on Stearns Creek located at river mile 8.71. The 1.21 meter culvert was collapsing. The streambed in the center of the culvert was almost at the top making this culvert 33% passable to juveniles and resident fish. It would be impossible for adult anadromous fish to fit through. The .91 meter culvert was also collapsing but not quite as severely. It would be 67% passable to juvenile and adult anadromous fish. A total of 624.82 square meters of spawning habitat existed above this crossing. A total of 3292.02 square meters of rearing habitat existed.

***Culvert 021(24002)(01505)***

***Priority Index 20.74***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(24002)(01505). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington*. (Personnel communication with Rod Lakey from Lewis County Public Works confirmed this culvert is misidentified in his report as culvert 021(24002)(01773).

***Culvert 021(24024)(03932)***

***Priority Index 20.31***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(24024)(03932). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington*.

***Culvert 125 1202W04C***

***Priority Index 18.81***

Two identical culverts made up this crossing, which was located at river mile 8.64 on the mainstem of Stearns Creek. This crossing was 67% passable due to no streambed material and over 1% slope. A total of 2426.8 linear meters of stream was surveyed above

this barrier. Approximately 729.72 square meters of spawning habitat existed. Rearing habitat was less limited with 3407.57 square meters available. The riparian buffer was primarily deciduous trees. Cattle and horses were accessing the stream in several areas.

***Culvert 125 1302W32B***                      ***Priority Index 15.8***

This culvert crossing on Tributary H was located not far from the confluence with Stearns Creek. A combination of a smooth concrete pipe and a .25 meter outfall drop made this culvert completely impassable to juvenile anadromous and resident fish. It would be only 33% passable to adult anadromous fish. The 3296.5 linear meters of this stream that were surveyed, meandered through timberlands. The riparian buffer consisted of alders and replanted fir. Large swamps existed which contributed to the 6109.72 square meters of rearing habitat that was present. A total of 1537.3 square meters of spawning habitat was present.

***Culvert 021(23000)(00460)***                      ***Priority Index 14.87***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(23000)(00460). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington*.

***Culvert 125 1302W28B***                      ***Priority Index 13.4***

This culvert was located at river mile 1.56 on Ripple Creek. This crossing was rated as 67% passable due to a slope greater than 1%. It was primarily a barrier to juveniles and resident fish. A total of 3216.2 meters of stream was surveyed. A large portion of this stream was swamp which contributed to the 3621.11 square meters of rearing habitat. A total of 1483.31 square meters of spawning habitat was present. The riparian area consisted primarily of canary grass, shrubs and deciduous trees. Cedars were present in limited numbers. Cattle had access to the stream near the culvert. However, degradation was limited due to low cattle numbers.

***Culvert 021(24038)(07422)***                      ***Priority Index 13.04***

Lewis County Public Works hired a consulting firm to do a priority index on blocking culvert 021(24038)(07422). The information on this culvert can be found in the *Culvert Inventory and Assessment, Lewis County, Washington*.

***Culvert 125 1302W31A***                      ***Priority Index 11.48***

This private field crossing culvert, located on Tributary G, was a barrier due a slope greater than 1% and no stream bed material. It was rated as 67% passable and was primarily a barrier to juveniles. Correcting this barrier is important due the close proximity to Stearns Creek. Juveniles attempting to escape high flows in the main stem

would have to navigate this culvert. Adult salmonids should easily be able to pass the culvert due to it only being 4.4 meters long with sufficient water depth.

Approximately, 4246 linear meters of upstream habitat was surveyed. Only 465 square meters of spawning habitat was present. This stream was more important for rearing, with 2910 square meters of rearing habitat being present. The lower reaches, where the majority of the spawning habitat was present, had been fenced to prevent animal access. Trees had been planted to provide riparian cover. Further upstream, the riparian buffer was primarily reed canary grass. The stream was primarily pools formed by beaver activity. Culvert 1302W31B was a 33% passable barrier culvert located at 2871 linear meters upstream. The majority of the quality habitat was below this barrier.

## **Conclusion**

The culvert survey of the Middle Chehalis River basin revealed that 75% 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 Middle Chehalis River basin would open up significant habitat for anadromous fish.

## ***References***

1. ***Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual.*** Washington Department of Fish and Wildlife Habitat Program Environmental Restoration Division. Salmonid Screening, Habitat Enhancement, and (SSHEAR) Section. August 2000
2. Phinney, Lloyd and Bucknell, Patrick. ***A Catalog of Washington Streams and Salmon Utilization. Volume 2 Coastal Region.*** Washington Department of Fisheries. November 1975
3. Ringen, Pete, et al. ***Culvert Inventory and Assessment, Lewis County, Washington.*** County Road Project No. 1998 March 2002 Lewis County, WA
4. Washington State Department of Natural Resources, Central Region, 1405 Rush Rd., Chehalis, WA 98532.