

Newaukum Watershed Culvert Assessment

Water Resource Inventory Area 23



Lewis County Conservation District

Final Report

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Table of Contents

Newaukum Basin Culvert Survey

Introduction	3
Scope	4
Survey Methods	4
<i>Initial Landowner Contact</i>	4
<i>Level 'A' Analysis</i>	4
<i>Level 'B' Analysis</i>	4
<i>Previously Surveyed Culverts</i>	5
<i>Other Survey Methods</i>	5
Results	5
Newaukum River Basin	6
Sub Basins	6
<i>North Fork Newaukum Basin</i>	6
<i>Middle Fork Newaukum Basin</i>	6
<i>South Fork Newaukum Basin</i>	7
Priority Indexes	7
<i>Culvert 1301W23D</i>	7
<i>Culvert 021(45011)(07070)</i>	8
<i>Culvert 021(09001)(15790)</i>	8
<i>Culvert 1301E10B</i>	8
<i>Culvert 1301E23A</i>	9
Conclusion	9
References	10
Appendix	
<i>Access Database-Lewis County Conservation District Culverts Only</i>	
<i>Excel Database-All Culverts (On CD version only)</i>	
<i>Newaukum Watershed Culvert Assessment Map</i>	



Introduction

The Newaukum 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 North Fork, South Fork and the mainstem of the Newaukum, where there are 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 grants from the Chehalis Fisheries Restoration Program of the United States Fish and Wildlife Service and the Washington State Salmon Recovery Funding Board.

A secondary goal of this project was to locate oxbows, which are important off-channel rearing areas for young salmonids. In the Newaukum Basin, oxbows were limited and generally of poor quality. A few were discovered that were disconnected from the mainstem. Unfortunately, landowners either were not interested or did not have oxbows

worth connecting. However, the main goal of this survey was to identify the location and passage status of culverts in the Newaukum River basin.

Scope

The purpose of this survey was to identify all culverts on type 1-4 streams, in the Newaukum River basin. Above Carlisle Lake was excluded from the survey, due to an impassable concrete dam. Areas where significant natural barriers blocked anadromous fish were also 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 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 Newaukum 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 hand held GPS receiver. Culvert lengths and slopes were obtained using a hand held laser level with a reflector mounted on a survey pole. Stream flow velocities were estimated using the cork float method. 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. In a few areas, the level B analysis could not be applied due to interior slope breaks within the culvert or an inaccessible downstream control. Sites where the level B analysis could not be applied were listed as unknown barrier 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's Vail Operations provided information about culverts on their lands. However, Weyerhaeuser used unspecified survey methods to determine barrier status, but as per their request, no spot checks were performed. Additional 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. A few landowners stated that they had culverts but did not feel it was necessary for us to survey them. 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

Sub-basin	Impassable	Passable	Unknown	Totals
<i>Newaukum</i>	5	8	1	14
<i>North Fork</i>	13	7	5	25
<i>Middle Fork</i>	18	5	3	26
<i>South Fork</i>	17	13	4	34
Totals	53	33	13	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 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.

Newaukum River Basin

Sub Basins

Newaukum

Allen and Taylor Creeks are the two tributaries of the mainstem Newaukum. The more extensive system, Allen Creek, also had more culverts. The most significant impassable barrier on this tributary, culvert 121 (94006)(013150), existed at the Rush Road crossing. This culvert would prevent upstream migration of juveniles and limit adults. In the upper third of the smaller system, Taylor Creek, there were two impassable culverts. (See map for additional information.)

North Fork Newaukum

The North Fork Newaukum River has several tributaries including Lucas, Mitchell, Jested, and several unnamed Creeks. Six of the tributaries to Lucas Creek were blocked near the mouth by impassable culverts underneath Lucas Creek Road. Mitchell Creek is almost entirely in private forestland and had no significant culverts. An impassable barrier underneath a private driveway, culvert 1301W10A, existed at the mouth of Jested Creek. Two unnamed tributaries had blocking culverts near the mouth, but they had insignificant upstream habitat for anadromous fish. (See map for additional information.)

Middle Fork Newaukum

The smallest of the three forks of the Newaukum, the Middle Fork, had the most significant blockages. An impassable barrier, culvert 1301W23D, which would prevent juvenile passage and severely limit adult migration, blocked several miles of the mainstem. The culvert, which served as a field crossing on private land, was undersized and large rocks created an infall drop. The mainstem also had impassable barrier culverts underneath Middle Fork and Centralia Alpha Roads that blocked upstream spawning and rearing habitat. Two of the tributaries to the Middle Fork had culverts that blocked one to two miles of upstream habitat. A tributary that runs parallel and then under Centralia Alpha Rd. had several impassable culverts in a row near the end of anadromous fish usage. (See map for additional information.)

South Fork Newaukum

The South Fork Newaukum is the largest subbasin and had the greatest abundance of culverts. Several tributaries make up this system including Lost, Kearney, Beaver, Frase, Bernier, and unnamed Creeks. Lost Creek, which had abundant coho spawning at the time of this survey, had two impassable culverts. The lower, culvert 1301E34A, in the system would probably only be an impedance to juveniles at high flows. Adult coho were easily swimming through the culvert in December 2001, when the culvert was evaluated. The impassable barrier uppermost in the system, culvert 1301E23B, was set too high and at too much slope. At normal flows the water depth would be too shallow for adults and too swift for juvenile salmonids. The tributary with the most culverts, Kearney Creek, flows through agricultural land with the headwaters originating in timberlands. A barrier, culvert 991296, existed underneath Highway 508, which limited upstream access to several miles of habitat. Five other impassable culverts existed but they were higher in the system. Beaver Creek had an impassable barrier, culvert 1302E04A, on private timberland that blocked approximately two miles of upstream habitat. Frase Creek had an impassable barrier, culvert 021 (64022)(00529), at the mouth. Repairing this culvert would open up a few miles of habitat with the rest blocked by a natural waterfall. Bernier Creek had no culverts. The other impassable barrier in this system, culvert 1402E28A, which was located on private timberland, blocked over one mile of habitat. (See map for additional information.)

Priority Indexes

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 Newaukum 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 1301W23D

Priority Index 18

This culvert on the Middle Fork of the Newaukum was significantly undersized. Approximately, 15,197 meters of stream was surveyed. The mainstem was sampled to the headwaters. The survey was ended when the stream was less than .6 meters wide. The substrate for the majority of the stream consisted of large cobbles with areas of spawning gravel. In the lower reaches of the mainstem, animal access to the stream was a limiting factor but the large rock in the stream was minimizing the damage. Old growth cedar logs

were abundant in the stream for most of the reaches. Canopy cover consisted of mainly deciduous trees and shrubs. Open swampy areas were present in the upper reaches. Three additional impassable culverts on the mainstem were also given priority indexes.

Two tributaries were also included in the survey. The first tributary branched off the east side of the mainstem and roughly paralleled Centralia Alpha Road. The canopy cover consisted of dense deciduous trees and shrubs. The substrate was mainly cobble with few quality spawning areas. The stream then passes through a culvert whose barrier status was unable to be determined. A large swampy area was present just downstream of a man made pond. The pond had a culvert control structure, which prevented all fish passage. Above the pond the habitat was poor. The survey of this tributary was ended when the stream went into the county road ditch.

The second tributary branched off the west side of the Middle Fork of the Newaukum. This stream had some gravel but the substrate was generally clay. This tributary has three blocking culverts. The last culvert was a control structure for a man made pond. Above the pond, the substrate was large cobbles and the gradient was becoming steep. The survey was ended when the stream narrowed to .6 meters.

Other tributaries to the mainstem of the Middle Fork of the Newaukum were insignificant. Small numbers of juvenile fish, most likely coho, were observed throughout the system. Replacement of this culvert would be beneficial to this stream.

Culvert 021(45011)(07070) Priority Index 15

This culvert is 2400 meters upstream of culvert 1301W23D. It is located underneath Middle Fork Road and would mainly be a velocity barrier during high flows to adults and juveniles. Approximately, 9678 meters of stream, including two tributaries, was surveyed above this culvert.

Culvert 021(94001)(15790) Priority Index 12

This culvert is located 1900 meters above culvert 021 (45011)(07070) and is underneath Centralia Alpha Road. It would mainly be a velocity barrier to adults and juveniles during high flows. Approximately, 4340 meters of stream, including one tributary, was surveyed above this culvert.

Culvert 1301E10B Priority Index 10

This culvert is located 1250 meters above 021 (45011)(07070) and is underneath a private driveway. It is located in the middle of a swampy area where there was abundant beaver activity. The culvert would mainly be a velocity barrier to juveniles during high flows. Approximately, 1818 meters of stream was surveyed above this culvert.

Culvert 1301E23A Priority Index 13

This culvert is underneath a private driveway at the end of Marko Road. It would be an impassable barrier at most flows. The culvert is located on a small tributary to the South Fork of the Newaukum. The main limiting factor of this stream is that during the summer low flow period areas of the flow are subsurface. This may change in the future however as the canopy matures. A local landowner informed us that the entire area had been logged 20 years ago and that the creek used to completely dry up in the summer. The canopy cover and the instream cover was excellent throughout most of the reaches. Gravel was available for spawning. Juvenile coho and cutthroat were abundant throughout the lower reaches. Approximately, 879 meters of the stream was surveyed. The survey was ended when the stream was less than .6 meters and no longer significant for anadromous fish.

Conclusion

The culvert survey of the Newaukum River basin revealed that almost 50% of culverts were impassable. Of those, over half were blocking at least one mile of upstream habitat. 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. However, the timber companies are required by law to complete a road management plan that includes fixing barrier culverts by July 2016. A few impassable culverts existed on private lands with one significant barrier on Middle Fork Newaukum.

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 Newaukum River basin would open up significant habitat for anadromous fish.

References

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