

Juvenile Coho Winter Habitat



Priorities for Large Wood Placement

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Written by

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Table of Contents

Project Summary.....	2
Background.....	3
Methods	5
Results	9
Discussion and Recommendations	12
References	13
Maps	14,15

Project Summary

Project staff utilized the ODFW Aquatic Inventory protocol to assess habitat in selected small and medium sized streams in the Nehalem basin. In addition, the project personnel conducted a snorkeling survey to estimate juvenile salmonid abundance in these streams. This project season is the second and final year for the Lower Nehalem Watershed. The 2003 surveys completed the remainder of the Lower Nehalem Basin that was not surveyed during the first project season (2002).

During the 2003 season we surveyed fifty (50) stream reaches in thirty-three (33) streams totaling 39.634 kilometers of habitat.

We identified:

- 9 stream reaches using our 2003 habitat survey data that we believe should receive the priority for Large Woody Debris (LWD) placement
- 12 stream reaches using previous ODFW habitat surveys that we believe should receive priority for LWD placement
- 5 large stream (> 12m active channel width) reaches using our 2003 habitat survey data that we believe should be investigated for large wood placement in the secondary channels

We evaluated the effectiveness of 9 LWD placement projects.

We developed one large binder that provided detailed information on each of the 50 stream reaches.

This project has greatly improved our understanding of where our priorities for habitat restoration and LWD placement should be.

Background

The Nehalem River is the longest coastal river in Oregon with a mainstem length of over 120 miles. The river is located entirely in the Coast Range and averages an annual discharge of 2,672 cfs and historically has ranged from 34 – 70,300 cfs. Peak discharge typically occurs during the winter between November and February.

During the last 150 years land management practices have drastically affected the rivers that coho use. Dike building, logging, water diversions, and road construction significantly reduced the availability of habitat for coho¹. Road culverts became barriers that restrict use of streams by coho. The loss of large wood from streams reduced the number of pools and the amount of winter rearing habitat for coho.

Winter can produce a harsh environment for juvenile coho. Heavy rains create violent water surges that can kill these small fish. The primary defense for the juveniles is to retreat into calmer off-channel habitat². The amount of this kind of rearing habitat is a function of stream gradient, amount of large woody debris, and valley and channel morphology.

The Oregon Department of Fish and Wildlife's (ODFW) Aquatic Inventory Project developed an excellent protocol for gathering information about stream habitat. This survey methodology came into use around 1989. In the last 12 years ODFW surveyed about 114.3 kilometers of streams in the Lower Nehalem basin. These surveys generally focused on the larger streams in the watershed.

Prior to the beginning of the 2002 project the Lower Nehalem Watershed Council (LNWC) completed an inventory of road stream crossings in the Lower Nehalem. Council volunteers:

- 1 identified 190 road stream crossings that appeared to be on low gradient streams.
- 2 visited all but six of these crossings³ to determine if there was a culvert that appeared to block coho passage⁴.
- 3 generated preliminary priorities for culvert replacement based on apparent gradient⁵ of the reach made accessible, area of land drained, fish presence below culvert and estimated cost of culvert replacement

¹ The Oregon Plan recognizes that availability of off-channel rearing habitat is a limiting factor for the productivity of Coastal Coho Salmon Stocks.

² Includes backwaters, alcoves, isolated pools, and significant secondary channels

³ Six road crossings in the Salmonberry watershed on private industrial timberland remain to be checked.

⁴ This survey did not include an analysis of the blockage. All culverts with a drop of over six inches were considered to have a potential for blocking coho passage.

Table 1 shows the completed culvert priorities identified during the 2002 Habitat Assessment. The 2002 project allowed LNWC to use the detailed information on coho habitat to guide future culvert replacements (see 2002 report for additional information). In addition, the 2002 project surveyed 81 stream reaches in 46 streams totaling 60 kilometers of habitat.

Table 1
Culverts that block coho passage

<u>Culvert</u>	<u>Stream</u>	<u>Comment</u>
Gods Valley 6	God's Valley Trib B	Crosses abandoned road
Little North Fork 12	Little North Fork Trib D	Crosses abandoned road, Partial barrier
Roy Cr.	Roy Creek 1 and 2	Design work in process
Jetty Cr	Jetty Cr	ODOT Culvert
God's Valley 19	God's Valley Trib I	Partial Barrier
Neahkahnie 39	Neahkahnie Cr	ODOT Culvert Replacement Planned for 2003

The Lower Nehalem Watershed Council initiated the 2nd year (2003) Habitat Assessment Project to determine the condition of the habitat in the remainder of the Lower Nehalem streams not surveyed. Specifically, the study was designed to determine:

- 1) *Stream reaches most suitable for LWD placement* - stream reaches where LWD placement will increase off channel habitat and hence coho productivity,
- 2) *Current habitat conditions in streams* - which stream reaches would have a high potential for increasing coho production. Effectiveness of current LWD projects completed in previous years.

In addition, we wished to produce information that could be used by the Oregon Department of Fish and Wildlife (ODFW) as part of their ongoing research in the Lower Nehalem Basin.

The Oregon Watershed Enhancement Board (OWEB) provided a grant for 3/4 of the cost of the project. The project leader, the Lower Nehalem Watershed Council (LNWC), Neahkahnie High School students and their teacher provided volunteer time for the required 1/4 in kind local match.

⁵ Map reading at best gives only an approximation of actual field conditions.

Methods

Stream Identification

The report authors used Geographic Information System (GIS) data layers to create maps showing the locations of streams which:

- 1) appeared to be low gradient;
- 2) drained an area of greater than 300 acres
- 3) had not been surveyed by ODFW;

We found one hundred and twenty seven (127) streams covering 225.8 kilometers in the Lower Nehalem Basin. These streams were potential coho streams. These were streams where LWD placement might be expected to improve coho productivity, but where existing data did not provide enough information to determine which stream segments were most important. During the 2002 project season, sixty (60) kilometers were surveyed covering forty-six (46) streams. Since some streams are dropped after a field visit, this left approximately half of the Lower Nehalem watershed to be surveyed. The 2003 project's objective was to complete the remaining streams missed during the 2002 project's season.

Field Surveys

One, two person survey teams conducted the habitat surveys. The third member of the survey team assisted with snorkel surveys, landowner contacts, and habitat survey. The Project Leader, provided technical assistance for the habitat surveys, conducted the snorkel surveys, and coordinated survey schedules. In addition, ODFW provided an expert in habitat surveying to assist with surveys for three days. This ensured that the information collected was almost identical to the ODFW surveys completed.

Survey teams used the 2002 ODFW Aquatic Inventory⁶ protocol and associated data forms. The project leader and the surveyors had several years experience working as ODFW habitat surveyors. The project leader trained inexperienced surveyors in the same way ODFW trains surveyors each summer prior to the survey season.

⁶ To obtain more specific methods for the habitat surveys conducted refer to Aquatic Inventory Project: Methods for Streams Habitat Surveys 2002. LNWC and OWEB received assurances from ODFW research staff that winter habitat surveys produce results as good as, or better than, those produced by summer surveys.

The survey teams conducted their surveys between December 15 and March 31, 2003. The project leader and field staff first obtained landowner permission⁷ for the surveys. They started their surveys at the mouth of each stream and continued until the stream size or gradient precluded stream use by coho.

The survey team took photos to record field conditions found during the surveys. The photos focused on the general valley and channel geomorphology and unusual attributes, (culvert, dikes, etc.).

Neahkahnie High School students (4H Natural Resource Club) conducted independent surveys in selected study areas. During the initial session, the project leader trained the students to use ODFW Aquatic Inventory survey protocol. They were then able to apply the knowledge gained in the field. They surveyed Jack Horner Creek and Soapstone Creek. The work was completed during weekends and school holidays.

The high school students resurveyed an area previously surveyed by ODFW (Jack Horner Creek) to determine whether surveys conducted by different teams and at different times of the year produced the same results.

The habitat survey crew flagged pools they thought should be snorkeled. They flagged every fourth pool greater than six tenths of a meter deep, and all major off-channel habitats. The project leader conducted snorkel surveys in the flagged pools after the survey crews completed the habitat surveys. If necessary, he continued the snorkel survey above the flagged area until he found the end of coho presence.

The project leader conducted the snorkel surveys at night⁸ to obtain the best counts of juvenile coho^{9,10}. For quality control, 10% of the snorkel surveys were resurveyed within 48 hours of the first count. This provided quality assurance that the snorkelers were observing the same fish species in similar densities in the pools snorkeled.

Data management

The ODFW Aquatic Inventory Project provided computer programs for data entry and analysis. The problems associated with data entry and analysis during the 2002 project were foreseen and

⁷ Three stream reaches could not be surveyed because landowner permission could not be secured.

⁸ To support the night sampling design a few surveys provided day/night comparisons.

⁹ During cold winter conditions Coho are quiet during the day and move about and feed during the night.

¹⁰ He needed two underwater lights: Underwater Kinetics High Pressure xenon lamp with a medium penetrating beam with a 3.2 in diameter lens and a Browning Submersible High Pressure xenon lamp with high penetrating beam with a 2.0 in diameter lens.

not encountered during the 2003 project (see 2002 report). ODFW Access programs were used to generate summary data for each stream reach in the study. The process included:

- Data entry for all habitat surveys conducted
- Calibrate estimated lengths and widths for surveys
- Generate stream reports summarizing database reports. This included a general summary, specific reach descriptions, and information on unusual attributes (LWD project potential, current LWD project effectiveness)
- USGS topographical map (1: 24 000); detailing the survey attributes (start, end, etc.)

Data analysis

Large wood placement priority

Last year the report authors tried a number of alternative protocols for establishing priorities for LWD placement. Ultimately, we opted for an approach that was both easy to understand and easy to apply. This approach gives us almost the same result as the more complicated equation. We chose to give priority to streams that:

- 1) already had coho present¹¹,
- 2) were in a valley wide enough that large wood could create off channel habitat (Valley Width Index [VWI] greater than 3),
- 3) had a channel width small enough for wood to stay in place after periods of heavy rain. (Active Channel Width [ACW] less than 12 meters) and
- 4) did not currently have adequate large wood (<2.0 Key pieces per 100 m [Keylwd])

In addition to these factors access to the stream reach will be a significant factor in choice of sites for wood placement. We developed preliminary judgments about the difficulty of access from map readings.

Finally, larger streams with potential off channel LWD placement were identified using 2003 LNWC surveyor notes. The large stream criteria included:

- >12m ACW - larger streams category
- surveyor notes identifying LWD project potential

The larger streams identified for LWD placement potential were based solely on surveyor field notes. Further investigation is needed to plan effective placement sites.

¹¹ Coho were considered to be in a stream reach if they are found in a higher reach of the same stream. Coho were also considered to be in streams that had fish passage barriers if there were coho below the barrier.

Assessing current LWD placement projects for their effectiveness

The authors used a variety of information obtained during the 2003 project season to determine the current effectiveness of LWD placement projects already completed within the Lower Nehalem. The information used included: habitat survey data, habitat surveyor notes, peak count snorkel data (presmolt coho), and snorkel surveyor notes. The assessment was given one of two categories:

1. *Effective LWD Project*- appears to be creating stream complexity needed for juvenile coho winter rearing
2. *Non-effective LWD Project*- appears to not be creating stream complexity needed for juvenile coho winter rearing.

This is only a rough approximation for LWD project effectiveness. This information could be used to direct ODFW habitat biologists to revisit sites deemed non-effective. Hopefully, this will identify current LWD placement projects that could be modified to increase their productivity. Also, it is believed that successful LWD placement projects can be identified and modeled for future LWD placement projects.

Results

The field staff dropped a number of streams from the survey due to:

- 1) the small size of the stream;
- 2) natural barriers that blocked any possibility of fish passage; and
- 3) lack of permission to access the stream.

In addition, we learned that we had overestimated the length of the low gradient sections of survey streams. This was due to natural gradient barriers located in the NF Salmonberry, SF Cronin, and several other smaller tributaries. This eliminated some target sites after an initial field visit. At the completion of the survey we found that we had surveyed fifty (50) stream reaches in thirty-three (33) streams totaling 39.634 kilometers of habitat.

Snorkel Surveys

The Project Leader snorkeled one hundred and seventeen (117) pools. He found cutthroat in 106 of these pools, coho in 74 (fry in 32 pools¹² and pre-smolts in 74 pools), sea-run cutthroat in 14 pools, and adult steelhead in 14 pools. No chinook fry were found.

Priority For Large Wood Placement

Table 2 lists the 9 stream reaches that met our criteria for LWD placement priority during the 2003 winter survey season.

*Table 2
Stream Reaches Given Priority for
Large Wood Placement
2003 LNWC Surveys*

<u>Stream</u>	<u>Reach</u>	<u>VWI</u>	<u>ACW</u>	<u>Keylwd</u>	<u>Landowner</u>	<u>Road Access</u>
<i>Anderson (mainstem)</i>	1	7.4	11.0	1.4	<i>ODF</i>	<i>Fair</i>
<i>Foley Trib A</i>	1	20	7.0	0.0	<i>PNI</i>	<i>Good</i>
<i>Foley Trib A</i>	2	3.0	6.4	1.4	<i>PNI</i>	<i>Limited</i>
<i>Foley Trib E</i>	1	12.4	6.3	0.3	<i>Simpson</i>	<i>Fair</i>
<i>Foley Trib F</i>	2	10.0	2.6	0.0	<i>Simpson</i>	<i>Good</i>
<i>Foley Trib G</i>	1	10.0	5.5	0.3	<i>Simpson</i>	<i>Good</i>
<i>Foley Trib G</i>	2	7.8	3.9	0.3	<i>Simpson</i>	<i>Good</i>
<i>Foley Trib G-1</i>	1	10.0	4.5	0.5	<i>Simpson</i>	<i>Good</i>
<i>Foley Trib H</i>	1	10.0	4.8	0.0	<i>Simpson</i>	<i>Good</i>

¹² Some of the surveys were done before the fry had a chance to emerge from the gravels.

Applying the same criteria to the streams surveyed by ODFW we found thirteen (12) additional stream reaches that are good candidates for LWD placement (see Table 3).

Table 3
Stream Reaches Given Priority for
Large Wood Placement
ODFW Surveys

<u>Stream</u>	<u>Reach</u>	<u>VWI</u>	<u>ACW</u>	<u>Keylwd</u>	<u>Landowner</u>	<u>Road Access</u>
E.F. Foley	1	8.3	11.3	.20	Private	Fair - Good
E.F. Foley	2	3.0	10.9	.70	ODF	Fair
Foley (Mainstem)	1	20	6.7	0.0	Private	Good
Foley (Mainstem)	2	20	8.2	0.0	Private	Fair – Good
Foley (Mainstem)	3	20	6.1	0.0	Private	Fair - Good
Foley (Mainstem)	4	17.3	4.5	.10	Private	Fair – Good
Foley (Mainstem)	5	9.5	8.1	.10	Private	Good
Foley (Mainstem)	6	20	10.1	.10	Private	Good
Foley (Mainstem)	7	20	6.6	.10	Private	Fair – Good
Soapstone	1	5.7	18.1	.90	Longview Fibre	Poor
Soapstone	3	3.1	10.2	1.1	Longview Fibre	Poor
Soapstone	6	4.4	7.5	1.6	Longview Fibre	Poor

Finally, using surveyor notes from LNWC surveys in large streams the authors identified LWD placement priorities for larger streams (Table 4). ODFW large stream surveys were not prioritized, because there was a lack of surveyor notes addressing LWD placement potential.

Table 4
Large Stream Reaches Given Priority for
Large Wood Placement in off-channel areas
2003 LNWC Surveys

<u>Stream</u>	<u>Reach</u>	<u>VWI</u>	<u>ACW</u>	<u>Landowner</u>	<u>Road Access</u>	<u>Comments</u>
Cook Cr	3	8.0	24.3	ODF	Good	2 LWD projects already exists
Cook Cr	5	5.4	15.2	ODF	Good	1 LWD project already exists
NF Cronin Cr	2	1.8	16.8	ODF	Limited	Flashy winter flows; potential backwater/alcove development
NF Cronin Cr	1	1.8	18.1	Private	Good	Flashy winter flows; potential backwater/alcove development
Cronin Cr	1	4.3	15.0	Private	Good	Road within ACW; potential backwater/alcove development;

Effectiveness of current LWD projects

The 2003 LNWC habitat surveys identified 9 previous LWD placement projects that overlapped with our target survey sites. The authors wanted to identify the current conditions of the projects and attempt to categorize the projects as currently effective or non-effective (Table 5).

Table 5
Current Effectiveness of
Large Wood Placement Projects
2003 LNWC Surveys

<u>Stream</u>	<u>Reach</u>	<u>Channel Location</u>	<u>PEAK Coho Presmolt Count</u>	<u>Landowner</u>	<u>Effective</u>	<u>Comments</u>
Cook Cr	3	Secondary (Lt)	0	ODF	No	Boulder stinger has been inserted to protect road; blocking flow to project
Cook Cr	3	Secondary (Rt)	150	ODF	Yes	Productive at creating pool complexity
Piatt Canyon	1	Primary	0	ODF	No	Does not slow water velocity and no pooling present
Cook Cr	5	Secondary w/ Left Trib	30	ODF	Yes	Productive at creating pool complexity
Strahm Cr	1	Primary	9	ODF	Yes	Productive at creating pool complexity
Cook Cr	7	Secondary	0	ODF	No	Artificial DJ used to protect road is blocking flow to project
Hanson Cr	1	Primary	0	ODF	Yes	Productive at creating pool complexity
Foley Trib F	1	Primary	10	Simpson	Yes	Good Alcove & pool complexity
Foley Trib G	1	Primary	4	Simpson	Yes	Productive at creating pool complexity with medium sized logs(<.6m dbh)

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Discussion and Recommendations

Large Wood Placement

The findings from this study focus our concern on 26 stream reaches. There are 21 stream reaches identified in small and medium sized streams and 5 stream reaches identified for potential off-channel LWD placement in larger streams.

There are two maps included in this report. The first map (Appendix A) lists all recommended large wood placement sites for the Lower Nehalem Watershed. This includes habitat survey information from 2002, 2003 LNWC project seasons and all earlier ODFW surveys. The second map (Appendix B) lists large wood placement sites within side channels from LNWC habitat surveys. In addition, both maps identify areas not recommended for large wood placement.

During the next year Watershed Council staff should visit all 27 stream reaches with ODFW biologists and landowners to determine the feasibility of LWD placement. The Watershed Council should either remove from the list or give lower priority to stream reaches that are not accessible from roads or where large wood placement would threaten existing structures.

LNWC should begin discussions with the Oregon Department of Forestry, Simpson Timber and Longview Fibre with the intent of developing OWEB grant proposals for LWD placement in priority stream segments on their land.

It is recommended that LNWC snorkel survey all ODFW habitat survey sites. During data analysis, the authors found that only a small amount of the ODFW habitat surveys have snorkel surveys completed. This information on fish distribution may identify additional LWD placement sites above ODFW habitat surveys.

Effectiveness of Current LWD Projects

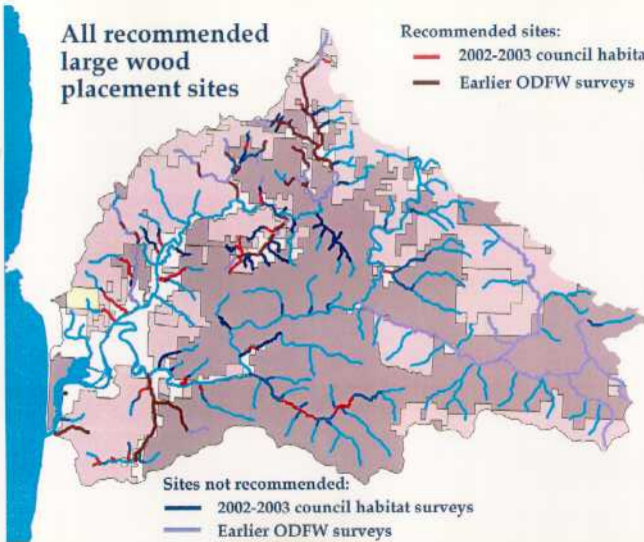
The 2003 LNWC surveys identified 9 previously completed LWD placement projects. There were six (6) projects that were considered effective at increasing pool complexity. There were three (3) projects that were considered non-effective at creating pool complexity.

During the next year Oregon Department of Forestry (ODF) and ODFW staff should visit the 3 non-effective LWD placement projects to determine what modifications could improve their status.

All recommended large wood placement sites

Recommended sites:

- 2002-2003 council habitat surveys
- Earlier ODFW surveys



Sites not recommended:

- 2002-2003 council habitat surveys
- Earlier ODFW surveys

2003 Habitat Survey

Private Industrial
Timber Land

State Land

Large Wood Placement Recommended

- In main channel
- In side channels

Large wood placement not recommended

