

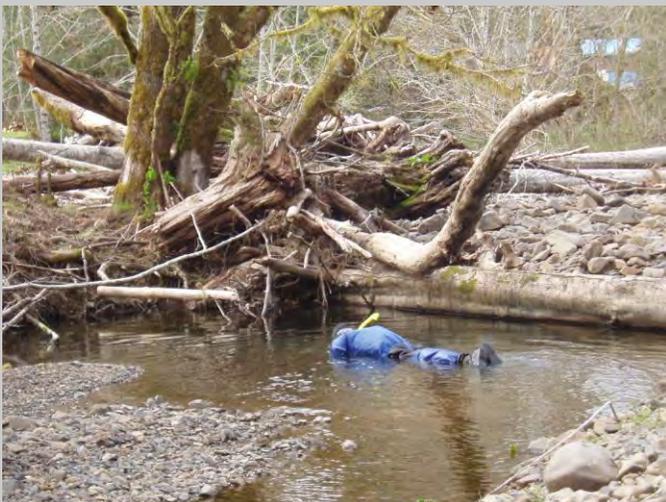
Necanicum River Habitat Assessment Project

Report by Boswell Consultants

May 2006

Priorities For:

- Large Wood Placement
- Riparian Enhancement
- Off-Channel Enhancement



Sponsored By:

- USFWS (US Fish and Wildlife Service)
- Seaside High School – Outdoor Education Class

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Project Summary

We utilized the Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventory protocol to assess habitat on the Necanicum River mainstem. This 2006 report will review the 2005 habitat survey data collected, and identify potential restoration opportunities for the Necanicum River. These identified priority areas could be protected, restored, or rehabilitated by LWD placement, off-channel enhancement, and/or riparian enhancement activities. The project staff also conducted a snorkeling survey to estimate juvenile salmonid distribution and abundance in these off-channel habitat areas.

In addition, the 2003 habitat survey data that was previously completed for all of the small, medium, and large tributaries within the Necanicum Basin, will be revisited to prioritize riparian enhancement activities, which has been successfully applied in more recent habitat assessments conducted in other North Coast Oregon watershed basins. This will include a general summary and evaluation on the current implementation activities by local, state, and federal natural resource agencies this data was targeted to. Finally, the authors will try to use this report as a means to consolidate the 2003 Necanicum Habitat Assessment Project (tributaries) alongside the more recent 2005/2006 Necanicum River Habitat Assessment Project (mainstem), both of which were conducted by the same research staff, Boswell Consultants. From this 2006 report, resource planners should have a focused set of action plans for restoring the Necanicum River Watershed. During the 2003 project season, we surveyed seventy-two (72) stream reaches in thirty-nine (39) streams totaling 57.208 kilometers of habitat.

In 2003 we identified:

- 35 stream reaches using our 2003 habitat survey data that we believe should receive the priority for Large Woody Debris (LWD) placement.
- 6 artificial barriers that impede juvenile coho passage.

We evaluated the effectiveness of 17 LWD placement projects.

We developed two large binders that provided detailed information on each of the 72 stream reaches.

For more information regarding reach specific details for the 2003 habitat report, refer to the Necanicum Habitat Assessment Project, which can be found at either the ODFW Tillamook district office or ODFW Corvallis research lab.

During the 2005 season we identified sixteen (16) reaches on the Necanicum River totaling 23.674 kilometers of habitat. This included starting the habitat survey near the head of tidewater and continuing the primary channel and related secondaries until habitat suitable for coho diminished.

In 2005 we identified:

- 12 stream reaches using our 2005 habitat survey data that we believe should receive the priority for Large Woody Debris (LWD) placement, alcove development, and/or riprap replacement activities in off-channel habitat areas on the Necanicum River.
- 10 stream reaches using our 2005 habitat survey data that we believe should receive the priority for riparian enhancement on the Necanicum River.
- 13 stream reaches where Japanese knotweed is significantly altering the off-channel habitat areas.
- 22 stream reaches using our 2003 habitat survey data that we believe should receive the priority for riparian enhancement on the tributaries within the Necanicum River Watershed.
- 2 culverts using our 2003 habitat data were identified as artificial juvenile fish passage barriers. These two culverts are in addition to the six barriers previously mentioned in the 2003 report.
- A current general summary and evaluation for restoration projects that have been conducted within the Necanicum River Basin, including recommendations for future implementation activities.

The 2003 and 2005 habitat surveys completed the coho freshwater habitat inventory for the Necanicum Watershed, except for a few unnamed tributaries draining less than 300 acres. These two habitat assessment projects have greatly improved our understanding of where our priorities for watershed restoration and rehabilitation should be.

Background

The Necanicum River is a coastal river in Northwest Oregon with a mainstem length of 21 miles, including tidally influenced areas traveling through downtown Seaside. The river is located entirely in the Coast Range. Peak discharge typically occurs during the winter between November and February, however, high flow events can occur as late as June. The watershed has several wild salmonid species including: winter steelhead, chinook, coho, chum, searun and resident cutthroat trout. Stocking of hatchery chinook and steelhead smolts occurs from the Oregon Department of Fish and Wildlife's (ODFW) N.F. Nehalem hatchery in this basin. Several small private hatcheries have operated over the past century by rearing a variety of salmonid species, but no private hatcheries are currently in operation.

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 LWD key pieces, past or current land use, and valley/channel geomorphology.

The 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 habitat surveyed approximately 50 kilometers of streams in the Necanicum Basin. These surveys generally focused on the fish-bearing streams in the watershed. Most of the habitat surveys were conducted during the summer of 1992. The 2003 Necanicum Habitat Assessment project conducted winter habitat surveys in most of the same stream areas where ODFW had surveyed in 1992. However, methods and results for the 2003 winter surveys vary from the ODFW summer 1992 survey results due to the different stream environments found during the winter and summer average flows. Both survey seasons are valuable habitat data sets, and having both winter and summer habitat surveys completed on a specific stream can allow ODFW researchers to further their knowledge on variances between the two distinct seasons.

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.

Prior to the beginning of the 2003 project, the Necanicum Watershed Assessment completed an inventory of road stream crossings in the Necanicum Basin. This watershed assessment followed Oregon Watershed Enhancement Board (OWEB) protocol and was conducted by Environmental Chemistry, Inc and completed in March 2002. They found:

- 1) 259 road stream crossings.
- 2) Twenty-three (23) out of 259 had been surveyed by ODFW. Sixty-nine percent (69%) of the culverts surveyed were considered fish passage barriers.
- 3) Prioritization for culvert replacement was initially based on the apparent gradient³ of the reach made accessible, the area of land drained, fish presence above and below the culvert, and the estimated cost for culvert replacement.

The 2003 project conducted by Boswell Consultants was intended to help the Necanicum Watershed Council (NWC) use the detailed information on coho habitat collected through the winter habitat surveys to guide future culvert replacement projects. Surprisingly, no major fish barriers were identified within the Necanicum Basin. Most barriers identified in the 2003 study were on small tributaries that partially impeded juvenile fish passage. Nevertheless, the NWC should conduct field visits with local ODFW biologists to determine the feasibility of a replacement project for each barrier identified. Unfortunately, implementation for most of the results from the 2003 study has been slow due to limited budgets for planners, a lack of technical assistance for LWD placement projects, and a lack of experienced fish biologists working directly with the Necanicum Watershed Council.

The North Coast Land Conservancy, lead by Neal Maine, and Doug Ray have completed the majority of the projects carried out within the lower watershed in the last five years. These include riparian plantings, shrub removal, and one alcove development project. However, most projects are located on the Necanicum River mainstem. Circle Creek is the one sub-basin in which a project has been implemented, that overlaps with the 2003 habitat assessment priorities.

The NWC contractor, Boswell Consultants, initiated the 2003 Necanicum Habitat Assessment Project to determine the condition of the habitat in small, medium, large streams in the Necanicum Watershed. The 2003 project was funded by OWEB. They provided 75% of the funds for the project. The project leader (Todd Boswell), the Necanicum Watershed Council (NWC), Clatsop Community College (CCC), Seaside High School students and their teacher, Doug Mitchell, provided volunteer time for the required 25% of in-kind local match for the OWEB grant.

³ Map reading at best gives only an approximation of actual field conditions.

Most of the research staff with Boswell Consultants have several years experience working on North Coast ODFW research projects and therefore, the authors wanted to ensure that the information could also be readily available for ODFW staff as part of their ongoing research in the Necanicum Watershed and other North Coast River Basins.

From the results and knowledge obtained from the 2003 project, the authors developed a grant proposal for the U.S. Fish and Wildlife Service (USFWS-Oregon Coast Program) to complete a habitat survey on the Necanicum River mainstem. In 2004, a grant was successfully awarded to the NWC. The grant allowed Boswell Consultants to complete the Necanicum River habitat and snorkel survey, conduct data analysis, and summarize reach reports, following ODFW protocol, on this last significant unsurveyed freshwater habitat for salmonids within the watershed. In October 2005, the habitat survey was started for the Necanicum River. This project was also incorporated into a fall 2005 science class at Seaside H.S. aptly called, "The Outdoor Education Class," where six students, Elliott Hearing, Nick Canary-Fickus, Casey Pappas, Margaret Hinsvark, Eric Bodell, and Amanda Browning, along with their teacher, Doug Mitchell, learned the importance of coho habitat and how it directly relates to the salmon life cycle. This alternative education approach allows students to learn from local research biologists in out-of-classroom settings, while the researchers gained valuable in-kind match from students, teachers, and local citizens.

Boswell Consultants initiated the 2005 Necanicum Habitat Assessment Project to determine the condition of the physical habitat in the Necanicum River. Specifically, the study was designed to determine:

- 1) *Stream reaches most suitable for restoration or rehabilitation* – stream reaches where LWD placement, riparian enhancement, alcove development, and/or artificial barrier replacements will increase off-channel habitat and, hence, coho productivity.
- 2) *Current habitat conditions* – which Necanicum River reaches would have a high potential for increasing coho production, but due to current conditions, the habitat has a low carrying capacity.
- 3) *Evaluate current implementation activities* – where, what, and when should natural resource planners focus limited time to initiate restoration or rehabilitation projects to help salmon within the Necanicum River Watershed.

Methods

Stream Identification

In the 2003 project, we 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 in the last 10 years

We found fifty (50) streams covering 70 kilometers in the Necanicum Basin, which were potential coho bearing streams. In addition, these were streams where LWD placement projects 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 2003 project season, more than fifty-seven (57.208) kilometers were surveyed covering thirty-nine (39) streams. Since some streams are dropped after an initial field visit, this completed the coho habitat inventory in small, medium, and large streams within the watershed draining more than 300 acres. The minimum requirement of 300 acres for the targeted streams follows most state and federal agencies criteria for streams believed to be large enough to conduct an in-stream restoration project within.

From the 2003 project results, the authors identified the Necanicum River mainstem as another significant area where off-channel habitat areas are regularly used by salmonids, particularly during the winter season as refuge from the common high flow events. This was an observation acquired during the 2003 project season while the authors were focusing on the tributary habitat surveys. So, in 2004 funds were sought to obtain the necessary information to guide restoration work along the Necanicum River.

Field Surveys

One two-person survey team conducted the habitat basin survey and snorkel surveys during the 2005/2006 project season. In addition, a variety of biologists from ODFW provided technical assistance in habitat surveying, thru several conversations. Additionally, the project leader, Todd Boswell, has over eight years experience conducting ODFW habitat surveys on the North Coast of Oregon, so most feedback from ODFW was regarding current landowner information, previous LWD projects, and potential alcove development sites observed. This ensured that during the habitat survey, relevant areas where ODFW or other natural resource agencies would likely conduct restoration projects were identified in both the 2003 and 2005 projects.

The survey team used the 2004 ODFW Aquatic Inventory⁴ protocol and associated data forms. The multiple years of prior experience of the project staff conducting habitat surveys eliminated the need for training to conduct ODFW habitat surveys.

The survey crew conducted their Necanicum River habitat survey between October 24 and December 7, 2005. The project leader and technician first obtained the necessary landowner permission⁵ for the survey. This required traveling to the Clatsop County Tax Assessor's Office to obtain landowner information for the non-navigable sections of the Necanicum River, which basically consists above the Hwy 26 crossing (a.k.a. Black Bridge). No landowner contact was conducted if reasonable terrain allowed the crew to stay on Weyerhaeuser property, which alternates sides along the river for lengthy sections throughout the watershed. The crew started the survey close to the head of tidewater and continued the survey until the stream size or gradient precluded stream use by coho.

The survey team took digital photos to record field conditions found during the surveys. The photos focused on the general valley and channel geomorphology and usual or unusual attributes, (varied riparian conditions, general reach representation, in-stream habitat structures, riprap structures, knotweed patches, etc.). All digital photos taken during the survey have been archived on the CD that accompanies the data binder.

Seaside High School students in the Outdoor Education Class assisted on Mondays with the habitat survey crew in selected areas. During the initial session, the project leader trained the students to use the ODFW Aquatic Inventory survey protocol. They were then able to apply the knowledge gained from the training in the field. They helped survey in all areas along the Necanicum River throughout their semester. The fieldwork was completed every Monday from 8am to 12pm during school hours. This included pre-arranged field trips on all survey days. The bus transportation for the students was donated by Seaside High School with strong support for the class from the Principal, Don Wickersham.

The habitat survey crew at Boswell Consultants identified all major off-channel habitats they thought should be snorkeled, and that were believed to be significant juvenile coho winter rearing areas. The project leader conducted snorkel surveys in all significant off-channel areas greater than 0.6m deep identified during the habitat basin survey.

The project leader and staff set-up and conducted the single pass snorkel surveys in these off-channel areas during a one week period in early April 2006. ODFW staff operating two screw

⁴ To obtain more specific methods for the habitat surveys conducted refer to Aquatic Inventory Project: Methods for Streams Habitat Surveys 2004.

⁵ Three stream reaches in the 2003 Habitat Assessment could not be surveyed because landowner permission could not be secured. No denials were issued during the 2005 survey.

traps locally were notified, and the low numbers for out migrating coho smolts gave the project staff (Boswell Consultants) confidence that juvenile coho were still in their over-wintering behavior. The above average rainfall and consistent high flows observed in January, February, and March was ideal for this study. It allowed for the authors to observe what stream areas were protected from high flows and above average flooding events. As the snorkeling results illustrate, most of the significant off-channel areas recorded were not protected well enough for juvenile coho to use as an over-winter refuge during high flows.

Data Management

The ODFW Aquatic Inventory Project provided computer software for data entry and analysis. 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, etc.).
- USGS topographical map (1: 24 000); detailing the survey attributes (start, end, etc.).
- Generate an Excel spreadsheet with both the 2003 & 2005 habitat survey data. This spreadsheet has been developed in more recent habitat assessments conducted by Boswell Consultants in other North Coast watersheds, and the authors wanted to incorporate their previous data into this new format created for identifying priorities.
- Profile graphs using ODFW data analysis software to illustrate significant physical attributes and characteristics found while surveying the Necanicum River.

Data Analysis

Large Wood Placement Priority

During the last four years, the report authors have tried a number of alternative protocols for establishing priorities for specific watershed restoration and rehabilitation activities in Northwestern Oregon. Ultimately, we have 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 equations we have used in the past. We chose to give priority for LWD placement activities to streams that:

- 1) already had coho present⁶,
- 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), or
- 4) had significant off-channel habitat channels where LWD may increase the frequency of deep complex off-channel pools, and
- 5) did not currently have adequate large wood (<2.0* Key Pieces per 100m [Keylwd]).

*It should be noted that although the current ODFW benchmark habitat elements for desirable Key Large Wood per 100m is greater than 3, we chose to target those stream reaches with less than 2 key pieces as high priority areas. This does not imply that those stream reaches with both less than or greater than 3 key pieces does not potentially need additional LWD placement, but that those reaches with less than 2 key pieces per 100m should be given a high priority for large wood placement restoration activities.

In addition to these factors, access to the stream reach will be a significant factor in the choice of sites for large wood placement and/or off-channel enhancement. We developed preliminary judgments about the difficulty of access for industrial equipment from map readings and general field observations.

Riparian Enhancement Priority

The report authors have developed a simple and basic system for establishing priorities for riparian enhancement projects. Ultimately, we opted for an approach that was both easy to understand and easy to apply. The 2005 Necanicum River survey was prioritized by reach, however, in some reaches the riparian conditions were as variable as the landowners, ranging from good to poor. Planners are recommended to use the detailed stream reports to identify specific landowners requiring a riparian enhancement project. The current prioritization approach applied was developed several years after the 2003 Necanicum Habitat Assessment project was completed. Therefore, the authors wanted to revisit the 2003 habitat data in this report to illustrate the riparian enhancement opportunities that can be found on the Necanicum tributaries. We chose to give riparian enhancement priority to streams that:

- 1) had riparian vegetation dominated by hardwoods, shrubs, or grass,

⁶ 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.

- 2) recorded low average shade cover (< 70%),
- 3) did not have conifers well established within the riparian zone, and/or
- 4) had current land use practices which could be adjusted to increase shade and/or large wood recruitment.

Stream reaches with an average shade cover greater than 70%, but lacked conifer establishment in the riparian areas were identified as stream reaches with hardwood conversion potential. These streams may have adequate shade, but were lacking large wood recruitment for the future. The authors understand that the habitat data can be revisited again and additional riparian priority lists could be established using a different set of criteria.

Priorities for Artificial Barriers Impeding Passage for Adult or Juvenile Coho Salmon

The habitat survey crew identified all culverts that were encountered during the winter 2003 habitat surveys. Each culvert identified was evaluated for fish passage using methods similar to those used by ODFW. There were specific fish passage recommendations recorded by the surveyors. This included the current status of each culvert crossing and what observations led them to evaluating a fish friendly culvert or a passage barrier.

We used ODFW aquatic benchmarks supplemented with information on stream gradient and fish presence to assess the value of the habitat in stream reaches above culverts. The desirable and undesirable conditions for the stream reaches are given in Table 1.

Table 1
Desirable and Undesirable Conditions for Stream Reaches⁷
2005 Necanicum Survey

	Desirable	Undesirable
Stream gradient	Less than 3 %	Greater than 6%
Key Large wood/100m	Greater than 3	Less than 1
Conifers/100 ft	Large	Small
Percent Pools	Greater than 35%	Less than 10%
Complex pools/km	Greater than 2.5 per km	Less than 1.0 per km
Percent Gravel	Greater than 35%	Less than 15% gravel
Fish presence down stream	Yes	No

⁷ ODFW Aquatic Inventory Benchmarks.

A General Summary and Evaluation for Previously Completed Restoration Projects

The report author's objective for this section is to aid resource planners in understanding what types of restoration activities have been conducted within the Necanicum Watershed and how effective these activities have been at increasing stream complexity and creating a healthy riparian zone, which is contributing shade cover and LWD to the active channel. During the 2003 project season, we attempted to determine the current effectiveness of LWD placement projects already completed within the Necanicum tributaries. The information was intended to allow ODFW habitat biologists and other resource planners to revisit the sites deemed both effective and ineffective by the 2003 report. Hopefully this would help planners gain additional project planning knowledge of successful and unsuccessful stream restoration projects on the tributaries. To review the specific details from the 2003 project, please review the completed 2003 report. The results section in this report will only list the total number of restoration projects identified during both 2003 and 2005 habitat survey seasons. The discussion section for this report will give the report author's point of view of where resource planners should go from here.

Results

At the completion of the 2005 Necanicum River Habitat Assessment, we found that we had surveyed sixteen (16) stream reaches totaling 23.674 kilometers of habitat. We also had the opportunity to revisit our 2003 habitat data and completion report. This review identified additional riparian enhancement project areas, artificial barrier replacements, and an opportunity to have a retro review of our previous 2003 effort.

Snorkel Surveys

The project leader and staff snorkeled 33 off-channel habitat units including alcoves, secondary channels, and backwaters. They found coho smolt over-wintering in 4 out of 12 alcoves, 6 out of 15 secondary channels, and 0 out of 6 backwaters. The absence of coho smolts in the majority of the off-channel areas was believed to be related to the lack of well-sheltered pools and refugia from the winter high flows. Table 2 illustrates the snorkel surveys of the off-channel habitat areas during the 2005 project.

Table 2
Snorkel Counts for Off-Channel Habitat Areas
2005 Necanicum Survey

Reach	UNIT #	UNIT TYPE	COHO FRY	COHO PRESMOLT	TROUT	CHIN FRY	VIS	NOTES
1	25	AL	0	0	1	0	1	Shuller's Alcove
1	38	AL	0	0	0	0	3	Poor Visibility; Did not snorkel
1	46	LP	100	0	0	0	1	Secondary Pool
1	54	AL	0	0	0	0	3	Don's Pond-Poor Visibility; Did not snorkel
1	69	AL	0	0	0	50	1	Trib fed
2	91	AL	0	0	0	0	1	Powerline crossing; Spring fed
2	93	LP	0	0	0	20	1	Secondary Pool w/boulder stinger and cabled log
2	94	AL	0	0	0	0	2	Beaver Activity
2	98	AL	50	230+	0	0	1	Doug Ray's Alcove; Man-made with new house on right
2	76	AL	0	0	0	0	1	Beaver Activity
2	77	AL	0	20	0	0	1	Beaver Activity
4	125	LP	150	0	0	0	1	Secondary Pool; Nice complexity with Debris Jam
4	129	LP	0	0	0	0	1	Secondary Pool; Nice complexity with Debris Jam
4	131	LP	0	0	0	0	1	Secondary Pool; Nice complexity with Debris Jam
6	168	DC	5	0	2	0	1	Tertiary Channel; Long dry channel
6	166	LP	150	1	0	0	1	Secondary Pool; Undercut with bedrock and fines
6	167	LP	8	31	0	0	1	Secondary Pool; Large root wad over pool
6	171	BW	30	0	0	0	1	Debris Jam; At the top of the dry tertiary channel
6	174	AL	0	60	4	0	2	Above Black Bridge; Nice complexity
6	181	LP	80	0	0	0	1	Secondary Pool; Debris Jam
6	182	LP	30	0	0	0	1	Secondary Pool; Cut and cabled log
6	183	LP	20	0	0	0	1	Secondary Pool; No cover in large pool
6	186	AL	180	45	1	0	1	Recent plantings and shrub control from Doug Ray

7	200	PD	65	12	1	0	1	Secondary Channel; Shallow depth w/ Debris Jam
7	201	LP	0	25	8	0	1	Secondary Pool; Debris Jam
10	266	AL	0	0	0	0	2	Shallow Depth w/ No Cover; Lots of Roughskin Newts
10	267	PD	35	1	0	0	1	Secondary Channel; Scoured to bedrock with gravel
11	293	BW	5	0	0	0	1	Poor Cover w/ No complexity; 2 sculpins observed
11	294	LP	3	0	0	0	1	Primary Pool w/ Debris Jam
11	295	BW	0	0	0	0	1	Debris Jam; Spring fed; Nice complexity
11	N/A	BW	0	0	0	0	1	Poor cover w/ No complexity
11	N/A	BW	0	0	0	0	1	Poor cover w/ No Complexity
11	N/A	BW	0	0	0	0	1	Poor cover w/ No complexity

Table 2 demonstrates the lack of protected areas for coho smolts to over-winter in the majority of significant off-channel habitat areas recorded during the Necanicum River habitat survey. The newly created alcove by Doug Ray and associates had the most protection from the high winter flows, and thus the highest peak count of coho presmolts. The authors believe most areas snorkeled were impacted more severely by the high flows this winter, and the smolts were involuntarily flushed out earlier than normal. A few alcoves appeared to have adequate protection from the high flows, but lacked either complexity or sufficient juvenile access to utilize the protected rearing areas. Therefore, the results suggest creating additional protected areas and also improving complexity and high flow protection in off-channel areas that currently exist.

Priority Areas For Off-Channel Habitat Restoration or Rehabilitation

Table 3 lists the twelve (12) stream reaches that met our criteria for LWD placement, alcove development, and/or riprap replacement activities during the 2005 habitat survey season.

*Table 3
Stream Reaches Given Priority for
Off-Channel Habitat Enhancement
2005 Necanicum Survey*

<u>Reach #</u>	<u># of key pieces</u>	<u>KeyLWD/100m</u>	<u>Gradient</u>	<u>Pools w/>3 LWD</u>	<u>Complex pools/1km</u>	<u>Meters of primary</u>	<u>Meters of secondary</u>	<u>Road Access</u>
1	22	0.5	0.6	13	2.3	4,873	857	good
2	6	0.2	0.8	4	1.2	2,453	895	good
6	37	2.2	0.7	14	5.2	1,715	977	fair
7	10	0.7	0.9	5	1.9	1,452	1,144	poor
8	3	0.2	1.4	2	1.3	1,278	273	good
10	4	0.5	1.5	2	1.6	842	405	poor
11	10	1	1.4	6	5.3	955	182	poor
12	2	0.3	0.9	3	3	690	298	good
13	4	0.3	1.7	0	0	1,351	170	fair
14	5	0.3	2.6	4	2.2	1,656	163	fair

15	17	0.6	2.1	12	3.9	2,734	356	poor
16	2	0.3	2.8	1	1.5	595	52	good

Priority Areas For Necanicum Riparian Enhancement Activities

There are two tables illustrating riparian opportunities located within the Necanicum River Watershed Council boundaries. Table 4 lists areas along the mainstem of the Necanicum River, while table 5 details potential areas on small, medium, and large tributaries.

Table 4 lists the ten (10) stream reaches that met our criteria for riparian enhancement priority during the 2005 project season.

Table 4
Necanicum River Reaches Given Priority for Riparian Enhancement
2005 Necanicum Survey

<u>Reach</u>	<u>Shade Cover</u>	<u>Current Veg</u>	<u>Recommended Action and Comments</u>
1	42	G/M30	Two large Landowners with potential planting areas
2	44	M30/G	Landowners on the right need work, and around the power line crossings
5	62	M30	Potential planting area on the right just above the Johnson Creek confluence
6	57	M30	Thin alders surrounding recent conifer plantings near alcove
7	63	M30/M3	Potential planting areas, but conifers are dominating in some areas
11	79	M30	Good potential planting areas in the second half of reach on the left
12	72	M30	Potential planting areas on the left side
13	75	M30/C30	Potential planting areas on the left side
15	78	D15	Poor large wood recruitment, riparian dominated by hardwoods
16	80	D15/M15	Prior ODFW project/Large area of girdled alders with additional planting opportunities

Table 5 lists the twenty-two (22) stream reaches that met our criteria for riparian enhancement priority for the habitat data completed during the 2003 project season. Again, this data was revisited in 2005 by the report authors to illustrate riparian planting opportunities located on the Necanicum tributaries where significant coho habitat was surveyed during the 2003 winter.

Table 5
Stream Reaches Given Priority for
Riparian Enhancement
2003 NWC Surveys

<u>Stream</u>	<u>Reach</u>	<u>Current Veg</u>	<u>Shade Cover</u>	<u>Land Use</u>
Alder Creek	1	D30/S	98	ST/MT
Beerman Creek	1	G	34	RR
Beerman Creek	2	G	82	RR
Bergsvik Creek	1	D15/G	86	RR
Charlie Creek	1	D15/S	89	RR
Circle Creek	3	P	13	LG
Kloutchie Seg 2	2	D15/M15	96	ST
Lindsley Creek	1	D15/S	10	ST
Little Humbug Creek	1	D15/S	50	ST
Little Humbug Creek	2	D15	59	ST
Mail Creek	1	M15/P	86	ST
Neawanna Trib 3	1	D15/P	88	ST/WL
China Creek	1	D15/G	75	RR
Coho Creek	1	D30/C30	72	UR/ST
Shangrila Creek	1	D15/P	75	ST/YT
S.F. Necanicum River	2	C3	98	ST
Brandis Creek	1	D15/S	85	TH/ST
Thompson Creek	1	G/S	76	AG/RR
Unnamed Trib 2	1	D30/G	90	ST
Upper Necanicum	1	D15/G	98	ST
Upper Necanicum	2	C15/D15	89	ST
Volmer Creek	1	M30/C15	85	YT/RR

Priorities for Artificial Barriers Impeding Passage for Adult or Juvenile Coho Salmon

The 2003 Necanicum habitat surveys on the tributaries identified 6 culverts that impede passage for coho. Surprisingly, none of the barriers blocked more than 1 km of coho habitat. Several culvert replacement projects appear to have dealt with the major passage problems in the Necanicum Watershed. However, during the process of revisiting the 2003 habitat data the authors found two additional artificial barriers that may impede juvenile fish passage. Finally, no artificial barriers were identified for juveniles or adults during the 2005 habitat survey.

Table 6 lists all 8 culverts that block juvenile coho passage on tributaries to the Necanicum. None are of high priority, but are still blocking at least 200 meters or more of habitat suitable for coho, and may restrict some seasonal juvenile migrations.

Table 6
Culverts That Block Coho Passage
2003 NWC Surveys

<u>Stream</u>	<u>Reach</u>	<u>Barrier</u>	<u>Owner</u>	<u>Comments</u>
Unnamed Tributary #3	1	Culvert (Hwy 26)	ODOT	Carcasses were observed upstream
Wolf Creek	1	Culvert (Hwy 26)	ODOT	Landowner denied access above culvert
Coho Creek	2	Culvert	Clatsop County	Marginal coho habitat above
Kloutchie Creek seg. II	1	Culvert	Weyco	Severe erosion/old culverts left R2
Alder Creek	1	Culvert (Hwy 26)	ODOT	Partial barrier, marginal habitat upstream
Brandis Creek	1	Sugarloaf ML	Weyco	Low flow barrier, marginal habitat upstream
S.F. Necanicum River	3	Concrete dam	City of Seaside	Fish steps with adults observed above
Unnamed Tributary #1	1	Concrete dam	Private	Dam is from an old hatchery rearing pens

A General Summary and Evaluation for Previously Completed Restoration Projects

Table 7 listed below, briefly describes the total number of LWD placement projects and riparian enhancement activities recorded while habitat surveying during the 2005 mainstem survey and the winter 2003 tributaries. Previously completed restoration projects were only included in table 7 if the habitat surveyors noted recently planted trees (<5yrs), or in-stream cabled and uncabled LWD placements. Most of the projects identified on the Necanicum mainstem were riprap projects, whose primary objective was to prevent bank erosion with cabled logs, but a few appear to have improved complexity. Although, all of the projects identified on the Necanicum tributaries were for habitat improvement and not bank erosion control.

Table 7
Previously Completed Restoration Projects
2003 and 2005 NWC Surveys

<u>River or Tribs</u>	<u># of Rip Projects</u>	<u># of LWD Projects</u>	<u>Comments</u>
Necanicum (MS)	4	2	Multiple cabled logs, but most are for erosion control
Necanicum Tributaries	3	17	Most projects identified were conducted by ODFW

Discussion and Recommendations

There are three (3) maps included in this report. The first map (Appendix A) includes habitat survey information from both the 2003 and 2005 survey seasons. The map does not include earlier ODFW surveys. Significant overlap exists between the 2003 NWC surveys and previous ODFW surveys conducted during the 1992 summer season, however, the information was collected at different times of year. Additionally, the 2003 NWC surveys were conducted after the 1996 flood, where major channel alterations occurred changing stream habitat conditions. Thus, the authors believe the post-1996 survey data reflects the current habitat conditions, which were used for prioritizing restoration project planning in this report. The second map (Appendix B) lists all recommended reaches in the Necanicum Watershed for LWD placement, alcove development, and/or riprap replacement activities. The third map (Appendix C) lists those reaches that received priority for riparian enhancement projects.

Large Wood Placement, Alcove Development, and Riprap Replacement Activities

The 2003 and 2005 NWC surveys identified a total of 37 stream reaches that have good in-stream habitat project potential. The findings from the 2005 habitat survey focus our concern on 12 river reaches. The reaches identified were located on the mainstem of the Necanicum River. These 12 reaches mentioned are ideal for off-channel LWD placement, alcove development, and/or riprap replacement activities. Specific target areas are in secondary channels and alcoves associated with spring seeps. The authors strongly recommend that resource planners use the detailed habitat stream summaries and reach descriptions to effectively plan any restoration project within the survey areas of 2003 and 2005. This information can be found in the habitat data binder that accompanies this report. Additionally, smaller restoration opportunities may be identified through revisiting the information found in the 2003 and/or 2005 data binders.

During the next year, Watershed Council staff should visit all 12 stream reaches with ODFW biologists and landowners to determine the feasibility of LWD placement, alcove development, and/or riprap replacement activities. The NWC should either remove from the list or give lower priority to stream reaches that are not accessible from roads or where restoration or rehabilitation activities would threaten existing residential or commercial structures.

NWC should begin discussions with the Oregon Department of Forestry (ODF), Weyerhaeuser, and Longview Fibre, with the intent of developing OWEB grant proposals for LWD placement and alcove development in the 2005 priority reaches on their land.

It is recommended that NWC review the previously completed 2003 Necanicum Habitat Assessment Project and form an implementation sub-committee within the Watershed Council to develop specific annual action plan goals for habitat restoration within the Watershed Council boundaries.

Riparian Enhancement Priorities

The 2003 and 2005 NWC surveys identified a total of 32 stream reaches that have good riparian enhancement potential. The third map included in this report illustrates riparian priorities with two types of riparian projects identified (Appendix C). These included: hardwood conversion and conifer planting. Hardwood conversion projects would help establish conifers in hardwood dominated riparian areas. The objective for the potential project would be to increase large wood recruitment potential in future years. Secondly, the conifer planting projects would be in riparian areas lacking adequate shade cover. The poor shade cover has usually occurred where the land use is from rural residential, agriculture, or urban. Both types of riparian improvements recommended here are important for the restoration of the Necanicum Watershed. The degraded riparian areas identified are all located on freshwater coho bearing streams. Moreover, the lack of large wood recruitment is a significant limiting factor to improving winter rearing habitat for juvenile coho.

During the next year NWC, ODF, and ODFW staff should visit the 32 stream reaches with riparian enhancement potential to determine the feasibility to conduct a project.

Invasive Plant Species

A number of noxious non-native weeds were observed during the 2005 Necanicum River habitat survey. Two common weeds encountered during our surveys were Scotch Broom and Japanese knotweed. The most significant of those observed was the overwhelming presence of Japanese, Himalayan, and/or giant knotweed and/or their hybrids, in the lower thirteen (13) reaches of the survey. Most of the large patches were observed below the HWY 26 crossing (a.k.a. Black Bridge) in reaches 1 through 6, although a few large as well as smaller patches were still recorded up to reach 13. There are a number of areas of the riparian area that are heavily overrun by knotweed, and measures should be implemented soon to eradicate this noxious weed, as it is beginning to choke out a number of smaller trees, as well as dominate and significantly impact off-channel habitat, where it is taking over entire terraces separating the secondary channels from the primary channel.

Knotweed is a very aggressive species that is capable of crowding out all other vegetation. In addition, the plant can create a fire hazard in the dormant season. The species forms dense

stands that crowd out all other vegetation, degrading native plant and animal habitat. This perennial plant is difficult to control because it has extremely vigorous rhizomes that form a deep, dense mat. In addition, the plant can resprout from fragments; along streams, plant parts may fall into the water to create new infestations downstream. Knotweed spreads quickly to form dense thickets that exclude native vegetation and greatly alter natural ecosystems. It poses a significant threat to riparian areas, where it can survive severe floods and is able to rapidly colonize scoured shores and islands.

Subsequently, there is an excellent riparian restoration opportunity in removing the invasive, noxious knotweed within the Necanicum Basin, especially due to its problems of the reduction of biodiversity through out-shading native vegetation, the restriction of access to riverbanks for anglers, bank inspection and amenity use, as well as the increased risk of soil erosion and bank instability following removal of established stands in riparian areas.

The NWC should consult with the appropriate natural resources agencies in the near future in order to determine the proper eradication measures for removing knotweed, before additional patches develop, and valuable salmonid habitat is lost.

Priorities for Artificial Barriers Impeding Passage for Adult or Juvenile Coho Salmon

The NWC 2003 surveys identified six (6) culverts that impede fish passage. In 2005, the previous 2003 habitat data was revisited and two (2) additional barriers were identified. The total number of fish passage barriers is now eight (8). This was accomplished by reviewing data recorded from all of the barriers and specifically how they affect juvenile fish seasonal migrations. None of the eight barriers have been characterized as high priority, due to the limited amount of habitat located above each barrier. However, these barriers are blocking varying amounts of habitat suitable for coho, and should be visited for a potential replacement project.

During the next year ODFW staff should visit all 8 identified barriers and determine what could improve their status. Landowners should be included to address other concerns. Additional culverts should also be investigated in the upper reaches of the tributaries in the watershed, specifically in stream reaches above coho use, but still within cutthroat habitat. ODFW (Tillamook District) may have readily available information on electro-shocking data with planned timber harvest, which is mandatory under the Forest Practices Act. This will identify any additional culverts that block passage for resident cutthroat trout.

General Summary and Evaluation for Previously Completed Restoration Projects

There have been a variety of restoration activities conducted in the Necanicum Basin. There are two major habitat project types that we have identified during our 2003 and 2005 habitat surveys, LWD placement and riparian enhancement. In addition, one alcove development site was recorded during the 2005 survey.

Past Restoration Projects – LWD Placement

First, in-stream habitat projects have tried to restore stream areas where complexity and deep pools are lacking compared to historically predicted levels. The most common factor to this lack of complexity is believed to be from the lack of in-stream large woody debris, which can be attributed to the aggressive commercial logging activities and frequent cutting of large downed woody debris from landowners and drift boaters. Both active timber harvesting and cutting of recently downed key LWD pieces are common throughout Clatsop County and most other Oregon coastal counties. There are four types of in-stream habitat projects encountered during our surveys on the Necanicum Basin including: LWD cabled placement, LWD non-cabled placement, cabled boulders, and gablons (bolted in LWD). All of these in-stream habitat projects have attempted to increase the frequency of deep pools, off-channel habitat rearing areas, and/or deposit spawning gravel. Some have had limited success due to one or more of the following: the lack of available LWD (>.6cm dbh) for projects, budget planning restrictions, and/or poor site selection.

Past Restoration Projects – Riparian Enhancement

Secondly, riparian enhancement projects have attempted to establish and restore native plants as the dominant riparian vegetation. These types of plants include: willow, conifers, and a variety of deciduous trees. Most of the riparian projects previously conducted within the Necanicum Basin have been in the lower half of the basin, not including replanted areas after a timber harvest operation. Two significant noxious non-native weeds (Scotch-broom and Knotweed) are becoming more common and problematic, but little or no effort has been made to eradicate these invaders. Some may require regional or countywide plans to implement successful eradication.

Future Restoration Projects – LWD Placement & Riparian Enhancement

Again, the two major types of stream restoration projects encountered during our 2003 & 2005 surveys were: in-stream LWD placement and riparian enhancement projects. The authors still believe that these projects should be initiated further, despite varying degrees of success. Primarily the future project areas should be focused on the stream segments identified as high

priority in the 2003 and/or 2005 habitat surveys. Additionally, focusing future restoration work in stream areas where previous work has been conducted may further restore habitat conditions. Pre-project planning should include site visits of all 17 previously completed LWD projects by NWC and ODFW staff. Future projects should either connect additional habitats to an effective LWD project or revisit a previously completed project with another prescription of LWD and/or riparian enhancement. The larger stream areas, including the Necanicum River mainstem channel has two planning options for successful implementation for in-stream restoration projects. First, conduct LWD placement projects within the secondary channels identified in the 2005 habitat survey. These will require site specific planning to insure adequate access for industrial equipment, effective site selection, and protecting private property from damage. Another type of mainstem river restoration or rehabilitation activity is the development and/or restoration of alcoves in the off-channel habitat areas identified during the 2005 habitat survey. Priority should be given to areas where alcoves already exist, but poor access may be a limiting factor to its usage by juvenile coho as a winter rearing area. Secondary priority should be given to the non-alcove areas mentioned as possible development sites during the 2005 habitat survey. These areas either have spring fed seeps or have some sort of tributary in a low-lying shallow pool, which is believed to have potential for off-channel enhancement activities.

Future Seaside High School Participation

The Seaside High School Outdoor Education Class was a successful community outreach project involving local students in watershed research within the Necanicum Basin. The class teachers, Doug Mitchell and Todd Boswell, helped incorporate this learning experience into a class where most students received science credit from the high school. The Principal, Don Wickersham, was very supportive, providing school bus transportation to the survey areas, and helped with student recruitment for the class. The six students, Elliott Hearing, Nick Canary-Fickus, Casey Pappas, Margaret Hinsvark, Eric Bodell, and Amanda Browning, enjoyed the out-of-classroom learning experience. Doug and Todd, whom also worked together with Seaside High School students on the 2003 Habitat Assessment, felt it was important to develop a more involved learning opportunity for the students, and were able to use the 2005 Habitat Assessment Project as a vehicle for the Outdoor Education Class. The feedback from students was overwhelmingly positive, and all agreed that more such learning opportunities should be available.

Both Doug and Todd concur that such a class should be continued in the future, and should be incorporated into future restoration project proposals within the Necanicum Basin whenever possible. This will provide a great alternative learning experience in salmon recovery efforts for

the high school students, which is lacking in many Oregon high schools. Additionally, the new Astoria High School Applied Science Center could be used as a focal point for more involved student research, allowing kids to work with students from other area schools, as well as incorporate a variety of natural resource issues faced in Northwest Oregon.

Overall Habitat Conditions in the Necanicum Watershed

In conclusion, the 2003 and 2005 assessment projects have provided a baseline data set for the current freshwater habitat conditions for coho bearing streams within the Necanicum Basin. This information provides an essential tool to guide future restoration work by a variety of interest groups including: city councils, watershed and other non-profit groups, state and federal agencies, and private landowners. All of which have a vested stake in local salmon recovery efforts.

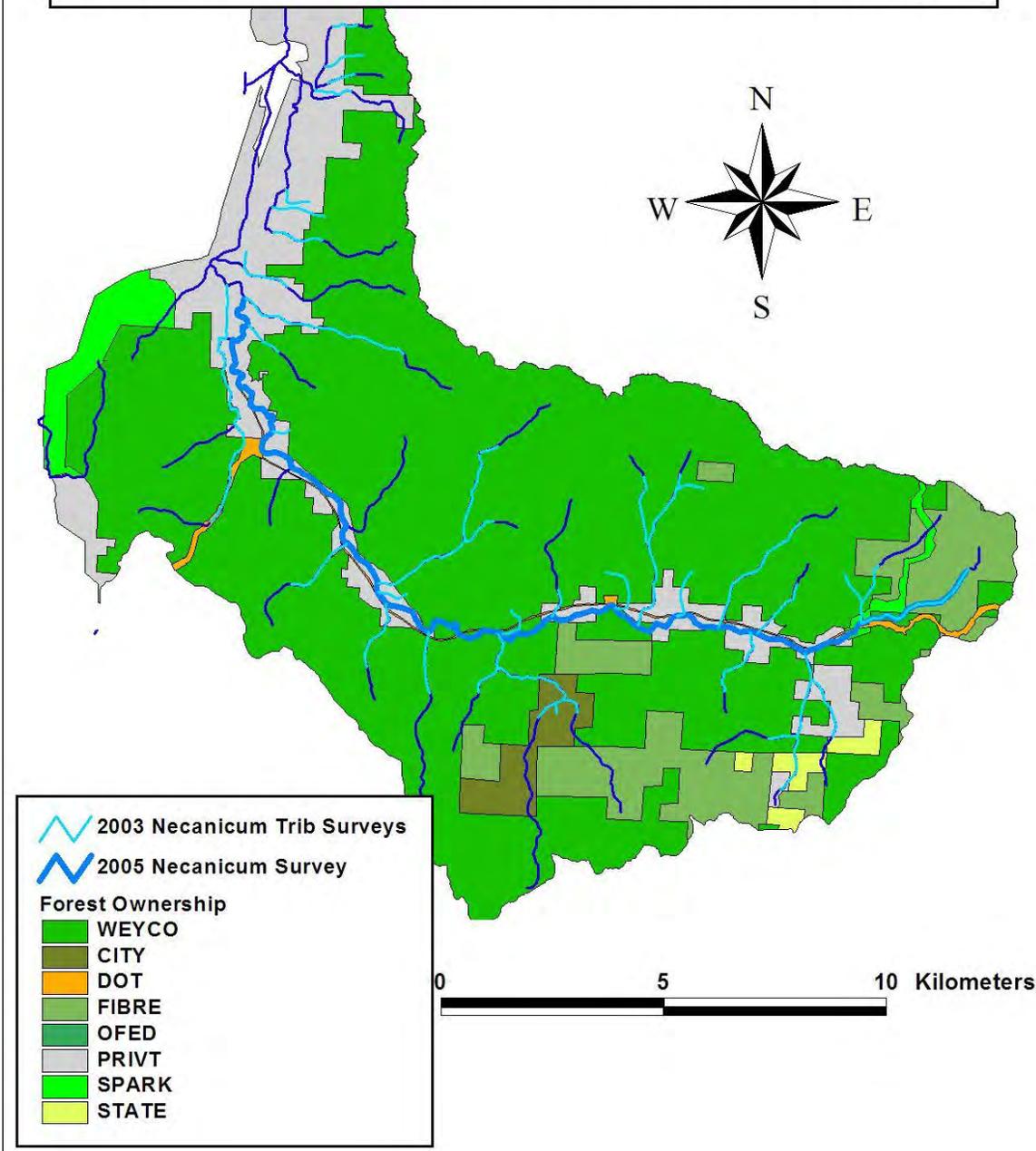
The authors have used statewide benchmarks to establish priorities for guiding future restoration work in this report. From this process, we have identified 54% of tributary habitat and 87% of mainstem habitat as falling below the desirable benchmarks for in-stream complexity and were, therefore, deemed as high priority areas for LWD placement and/or off-channel habitat enhancement activities. Additionally, 35% of tributary habitat and 75% of mainstem habitat has also been identified as high priority areas for riparian enhancement activities. The percentages of surveyed habitat requiring improvement within the Necanicum Basin illustrate the lack of critical stream characteristics needed for a healthy watershed ecosystem. The authors hope this report will provide an overview of the landscape and will allow planners to focus their restoration activities in the areas with the greatest potential for recovery.

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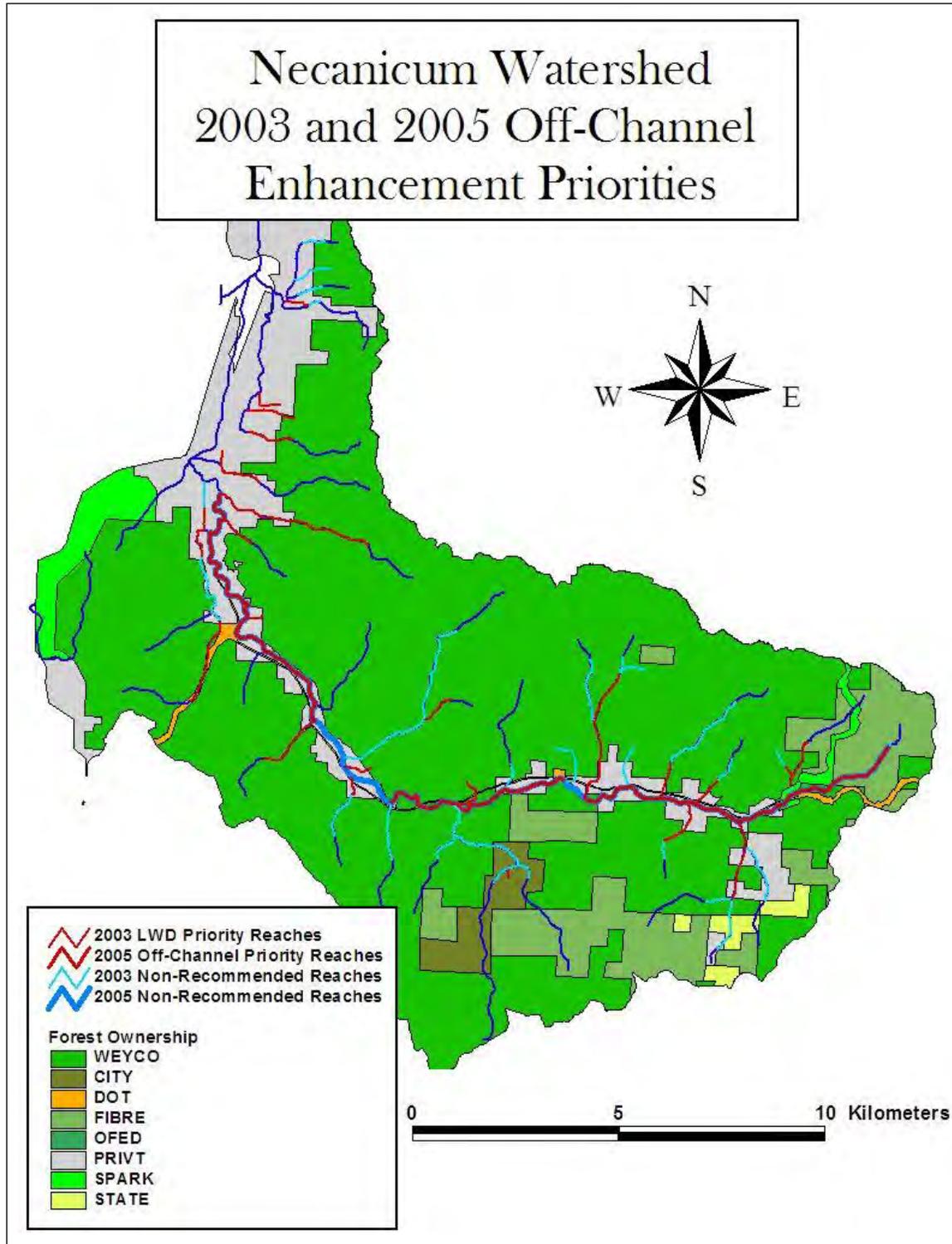
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Appendix A

Necanicum Watershed 2003 and 2005 Habitat Surveys



Appendix B



Appendix C

