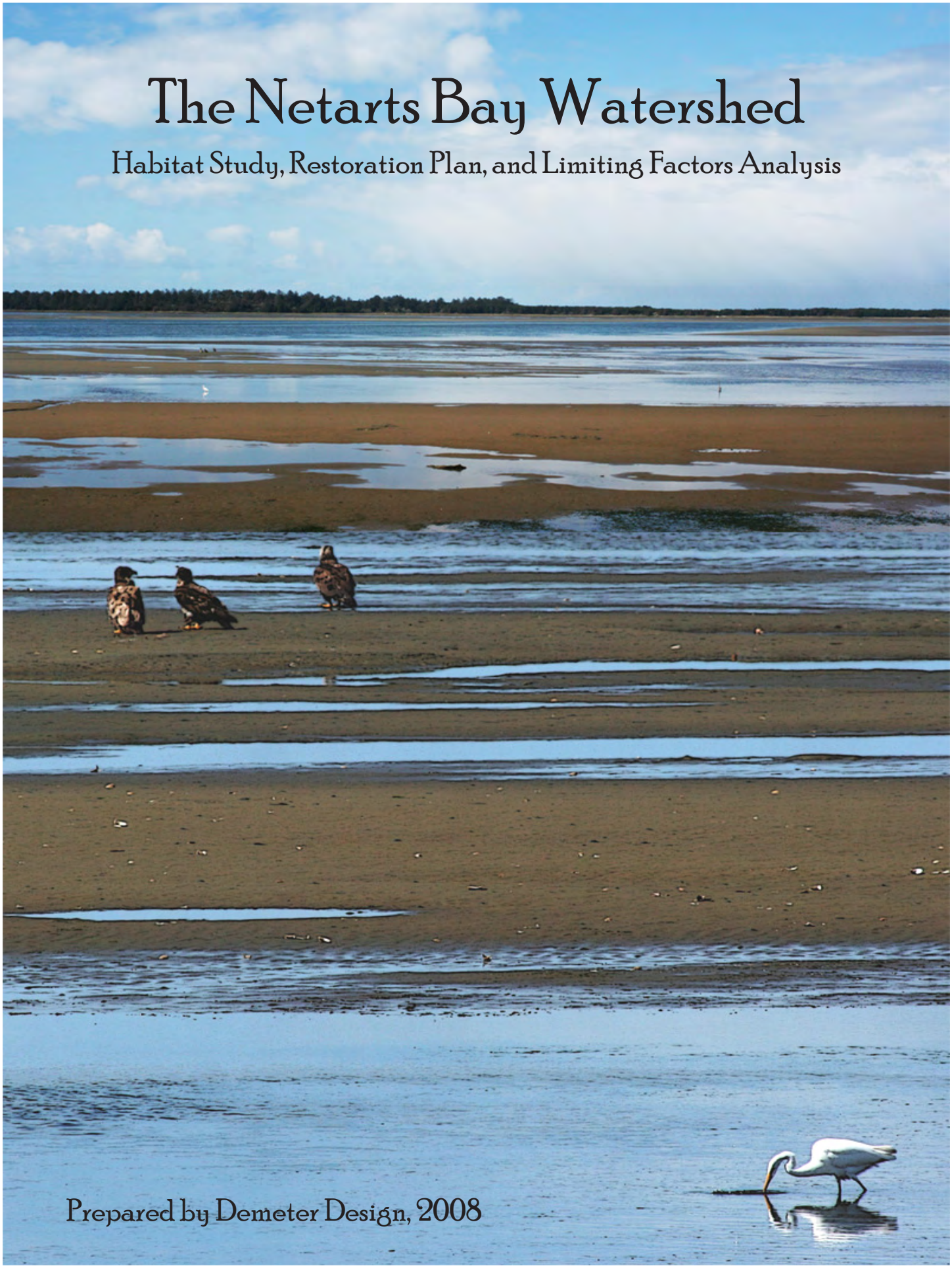
The Netarts Bay Watershed

Habitat Study, Restoration Plan, and Limiting Factors Analysis



Prepared by Demeter Design, 2008

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Prepared for the Tillamook Estuaries Partnership

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Tables and Maps

We would like to thank Kim Jones and Charlie Stein for putting forth great efforts towards training and data cleaning, the ODFW Corvallis Research Lab for the development of GIS data layers, the Tillamook Estuaries Partnership for sponsoring this project, the ODEQ for providing research time, the members of the technical advisory team for providing input on the draft, Stimson Lumber Company and the Oregon Parks and Recreation District for supporting restoration efforts on their property, **every private landowner who agreed to participate in this study**, and OWEB for providing funding for this project.

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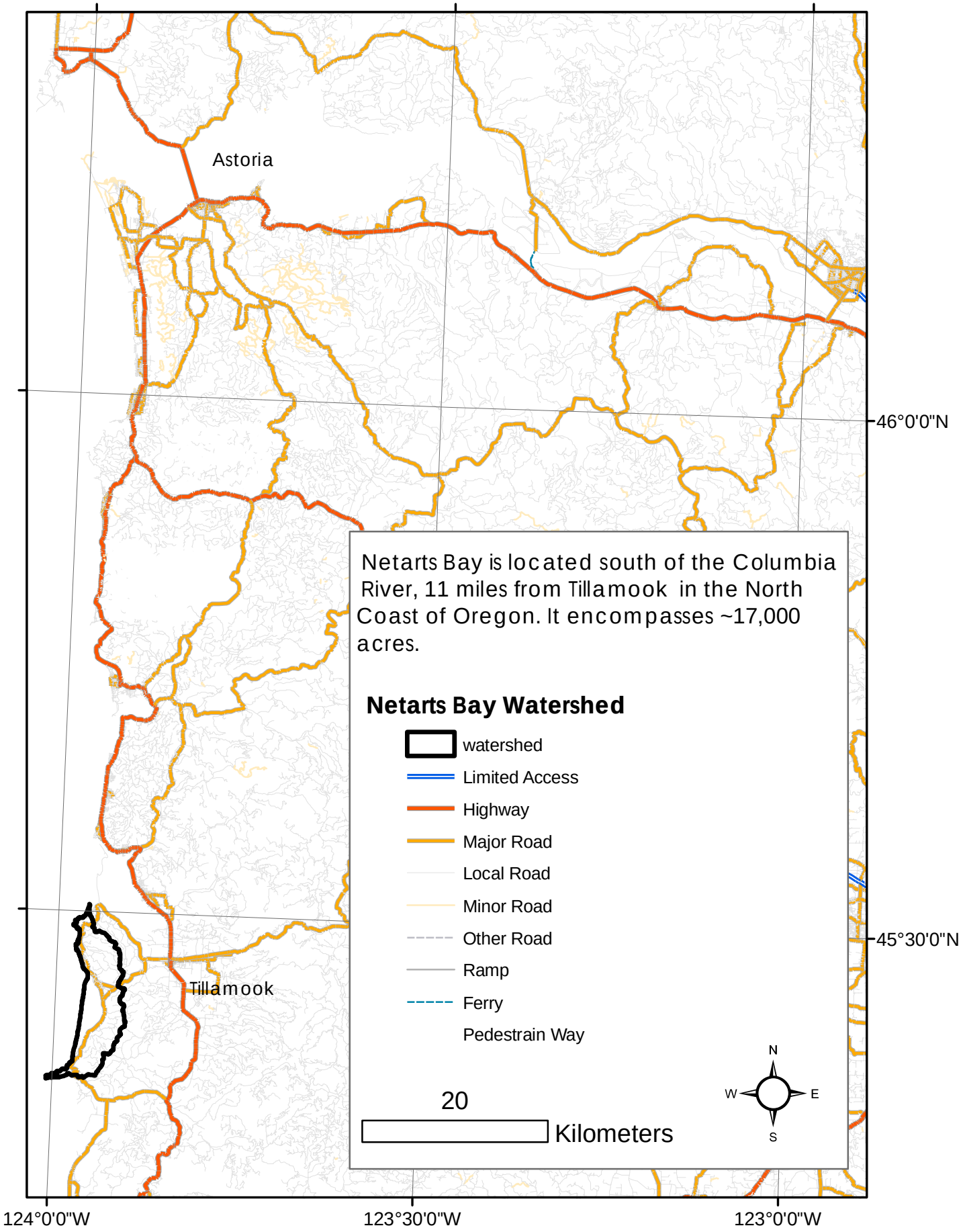
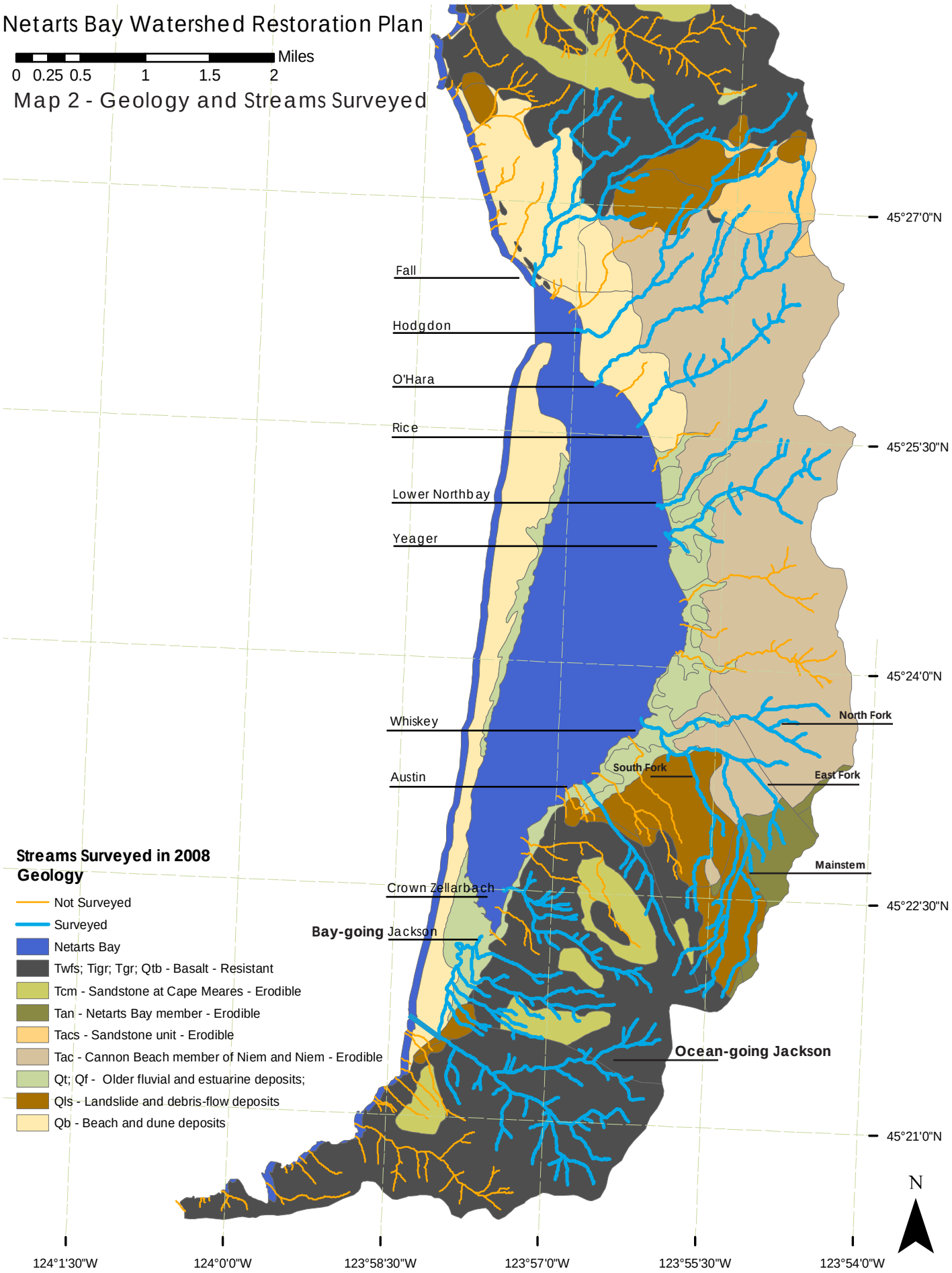


Map 1 - Context


Netarts Bay Watershed Restoration Plan
Miles
0 0.25 0.5 1 1.5 2
Map 2 - Geology and Streams Surveyed
45°27'0"N
45°25'30"N
45°24'0"N
45°22'30"N
45°21'0"N
124°1'30"W
124°0'0"W
123°58'30"W
123°57'0"W
123°55'30"W
123°54'0"W
N
Fall
Hodgdon
O'Hara
Rice
Lower Northbay
Yeager
Whiskey
Austin
Crown Zellarbach
Bay-going Jackson
Ocean-going Jackson
North Fork
South Fork
East Fork
Mainstem
Streams Surveyed in 2008
Geology
Not Surveyed
Surveyed
Netarts Bay
Twfs; Tigr; Tgr; Qtb - Basalt - Resistant
Tcm - Sandstone at Cape Meares - Erodible
Tan - Netarts Bay member - Erodible
Tacs - Sandstone unit - Erodible
Tac - Cannon Beach member of Niem and Niem - Erodible
Qt; Qf - Older fluvial and estuarine deposits;
Qls - Landslide and debris-flow deposits
Qb - Beach and dune deposits

Executive Summary

Netarts Bay is a saline dominated estuary covering ~2000 acres. Shallow and sinuous mudflats exposed during low tide provide habitat for native Oregon oysters, mussels and clams, seals, shore birds, raptors, and eel-grass. The sand spit on the western extent of the bay is "the best example of a dune ecosystem in Oregon."[1] Several moderately sized streams provide habitat for Coho, Steelhead, and Chum salmon. These streams drain into the bay from the ~14,000 acre watershed. The Netarts Bay Watershed is rare among neighboring coastal watersheds in that it contains such a wide variety of habitat in a very small area. Ownership is predominantly private industrial timber (Stimson Lumber Company) but there is a sizable urban (City of Netarts) and rural population as well as Oregon Parks and Recreation Department (OPRD), Tillamook County, United States Forest Service (USFS), and Oregon State University (OSU) ownership. In 2007 the Tillamook Estuaries Partnership (TEP) identified the Netarts Bay Watershed as a priority for restoration efforts within Tillamook County. A grant was submitted to the Oregon Watershed Enhancement Board (OWEB) to secure funds for the assessment of habitat within the watershed using the Oregon Department of Fish and Wildlife (ODFW) Aquatic Inventories (AQI) protocol and a modified Limiting Factors Assessment (LFA) protocol. The streams with the most substantial flow (Whiskey, the Jackson Complex, O'Hara, Austin, Crown Zellarbach, Fall, Rice, Yeager, Lower Northbay, and Hodgdon Creeks) were surveyed using the AQI protocol. Spawning gravel quality and quantity data was collected for all of the aforementioned streams. The seasonal habitat limitation for Coho was identified using the Nickolson Smolt Production model. This information was used to develop a restoration plan focusing on the improvement of Coho, Steelhead, Chum, and Cutthroat habitat. Representatives from TEP; ODFW; the Nature Conservancy; Stimson Lumber; Water, Estuary, Beaches, and Sand (WEBS); OPRD; USFS; Bureau of Land Management (BLM) employees not representing BLM lands; Oregon Department of Forestry (ODF) employees not representing ODF lands; and Demeter Design were consulted in the development of this report. This document is intended to serve as a tool for agencies and organizations interested in conducting further research and restoration projects within the watershed.

The results of this study indicate that habitat quality was generally better within private timber and OPRD ownership that in other ownerships, although habitat impacts were ubiquitous throughout the watershed. Further, survey results indicate that a lack of well sorted spawning gravels, largely as a result of low wood volumes, is the primary limiting factor for Chum salmon. Poor and absent spawning habitat limit Coho production as well although poor summer rearing habitat is an equivalent limiting factor (not temperature limited). It is hypothesized that the lack of suitable spawning substrate limits Steelhead production as well. Although gravels were abundant, appropriately sized, and of a volcanic nature, they were rarely well sorted and often highly embedded. Juvenile salmonids (predominantly Steelhead and Coho) were observed throughout the watershed albeit in low numbers and were most abundant on Whiskey Creek. Few absolute barriers to passage were identified although many culverts surveyed on non-timber owned property were undersized and/or failing. Temperature data was collected for Ocean Going Jackson, O'Hara, and Fall Creeks. This data indicated that temperatures did not exceed State of Oregon water quality standards. Riparian condition on private non-industrial land was highly variable being poor to moderate although small areas of good riparian habitat did occur. Riparian condition on land managed for private timber was less variable and consistently moderate to good, although a few riparian buffers had blown down in the winter windstorm of 2007.

1 Oregon Coastal Conservation and Development Commission. Wilsey and Ham Inc. 1974

Study Justification - Historical vs. Current Salmon Utilization

Netarts Bay is often regarded as one of the most pristine bays within Oregon. Although upland disturbance is frequent and extensive as a result of timber management, no other agriculture is active within the watershed, no commercial fishing occurs within the bay, and no industry contributes point-source pollution to any of the rivers nor to the bay itself. Further the total population of the region is small and, while tourism is a large industry within the basin, recreation is limited to boating, crabbing, and shell-fishing. While the Netarts Bay watershed has minimal anthropogenic disturbances compared to many other North Coast estuaries, declines in salmon populations (Coho, Steelhead, and Chum) over the past 30 years have sparked concern among land managers and local residents.

Although Coho salmon are certainly a species of concern within the Netarts Bay Watershed, Chum salmon is a high priority given the recent reduction of their native range. Once found as far south as Santa Barbara, the Netarts Bay Watershed currently functions as the southern most extent of Chum distribution.[1] Although no data has been consistently collected throughout the basin, on-going Chum spawning surveys have occurred on Whiskey Creek since 1949. This data indicates that Chum salmon were historically the most abundant species within the watershed with Coho, Steelhead, and Cutthroat present as well but in far lower numbers.[2] Local residents have historically seen Chum throughout the watershed although current Chum production is believed to be limited to Whiskey Creek below the hatchery diversion.[3] Volunteers at the Tillamook Anglers fish hatchery and other local residents have seen progressively fewer salmon returning to the watershed. This is consistent with the spawning data which suggests that Chum spawners plummeted from a high of nearly 1500 in 1973 (Chum fry were released from 1969-1984) to a low of ~2-4 in the last decade in Whiskey Creek. During the Ocean Tributaries Rapid Bio Assessment conducted by the Mid-Coast Watershed Council, two drainages within the Netarts Bay watershed were surveyed for juvenile Coho presence and abundance. During this survey, every fifth pool was snorkeled and juvenile Coho were counted. Low numbers of Steelhead, Coho, and Cutthroat were observed during the three years the study was conducted. Additionally, the Coho population appeared highly variable by cohort with no Coho juveniles observed in 2005 and ~500 juveniles observed in 2006 in the Whiskey Creek drainage.[4] Coho spawners have been consistently low during the previous 50 years in Whiskey Creek with the most recent estimates suggesting ~5 Coho escapees. Solitary Chinook salmon were observed in 2 of the 50 years surveyed.

The Netarts Bay Watershed Council identified a need to collect habitat and abundance data throughout the Netarts Bay Watershed in the 1999 Watershed Assessment. In 2007, an OWEB grant was submitted and funded through TEP to collect AQI survey data throughout the watershed and to conduct a limiting factors analysis for Chum, Coho, and Steelhead Salmon. During the spring of 2008 AQI surveys were conducted throughout the Netarts Bay Watershed on the 10 streams identified in the Netarts Bay Watershed Assessment as lacking critical habitat information. The streams surveyed included: Jackson, Austin, Whiskey, Yeager, Crown Zellarbach, Lower Northbay, Rice, O'Hara, Hodgdon, and Fall Creeks. This document identifies factors that potentially limit the production of Chum, Coho, and Steelhead Salmon within the Netarts Bay Watershed. Restoration projects were identified to address the limiting factors within the basin.

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1 Oregon Native Fish Status Report - Volume 2 - Chum

2 Coastal Rivers Investigation Information Report 74-5. 1974

3 Personal communication ODFW and Hatchery Volunteers* It is unclear whether Chum can jump the current hatchery pond.

4 Technical Report prepared for the Mid Coast Watershed Council. Bio-Surveys LLC.

Watershed Overview

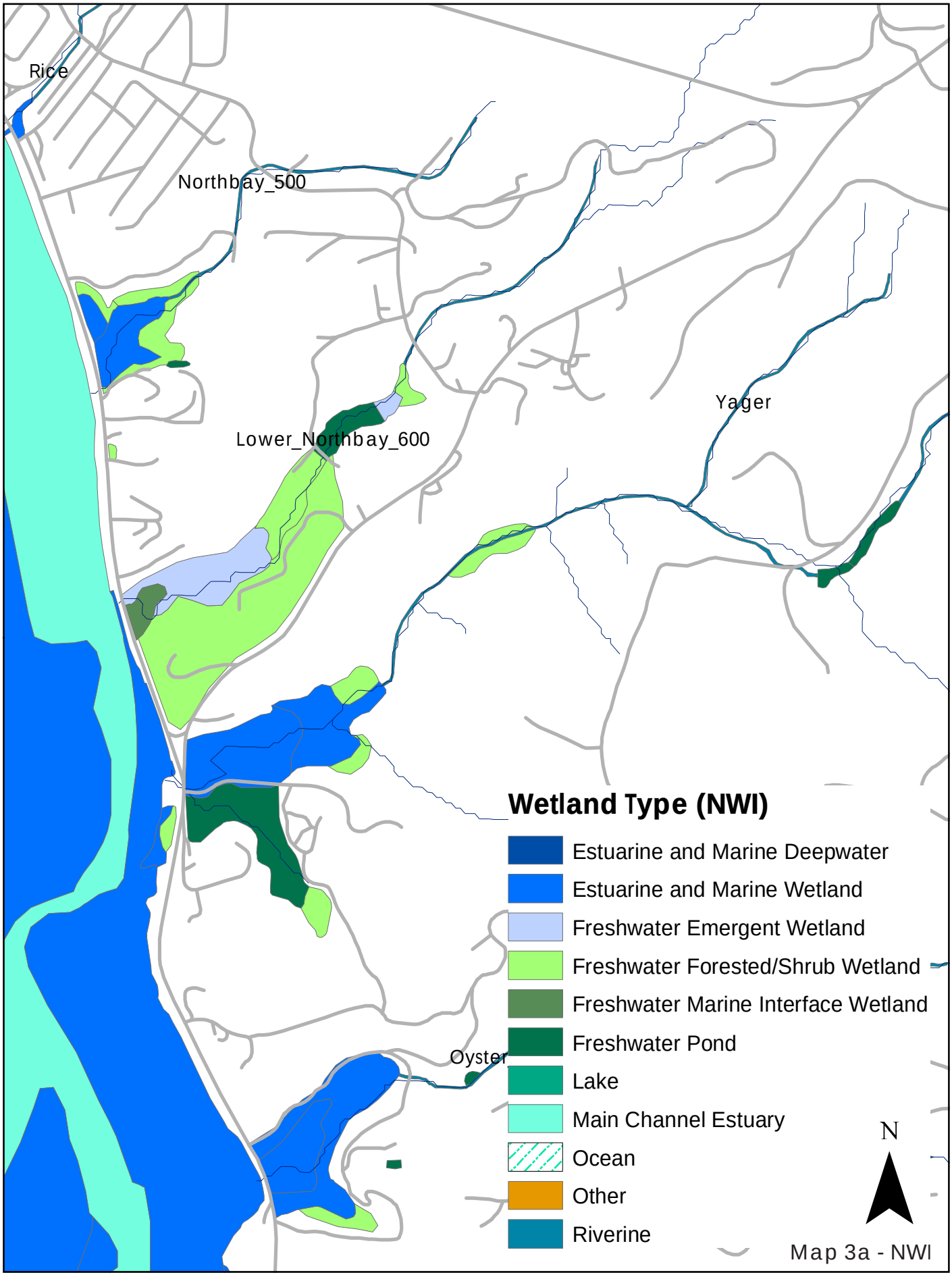
The Netarts Bay Watershed is part of a larger North Coast 5th Field (HUC #1710020309) that includes Neskowin, Sand Lake, Netarts Bay, and Lake Lytle. Netarts Bay, which lies west of the Tillamook River basin and south and west of the Tillamook Bay Watershed, is fed by 14 creeks. The Netarts Bay 6th field sub-watershed (HUC #171002030901) contains nearly 17,000 acres (including the spit & bay). Most streams within Netarts are confined by alternating hill slopes and terraces. Many streams are entrenched and disconnected from their floodplains. Beaver presence is high in Yeager, Lower Northbay, and North Fork Whiskey, low in Jackson, and non-existent throughout the remainder of the watershed. As a result of timber activities western hemlock and Douglas-fir, dominate the hill-slopes. Historically, the Netarts Watershed was dominantly vegetated with Sitka spruce, western red cedar, western hemlock, and Douglas-fir. Several species of sedges, rushes, and other associated riparian plants are present in wetland areas. Red alder and Oregon (big leaf) maple are the most common riparian hardwood species. Willows are present near the estuary and beach. Today few stands of mature spruce remain in the watershed. The 2007 windstorm uprooted and blighted many trees although these were often young.

The Netarts Bay Watershed has a mixed lithology dominated by an erodible substrate. Cape Lookout and the Cape south of Cape Meares is predominantly resistant volcanic basalts. A sand-spit buffets the southwest side of the bay. The predominant land-use within the watershed is private industrial timber. The lowlands have limited but growing numbers of private residences. There is no other agriculture within the watershed although there are remnant abandoned dairy fields. Forestry accounts for 73.7% of the land-use within the watershed while urban land-use is 6.7%, rural residential 5.5%, and parks account for 14.1%.

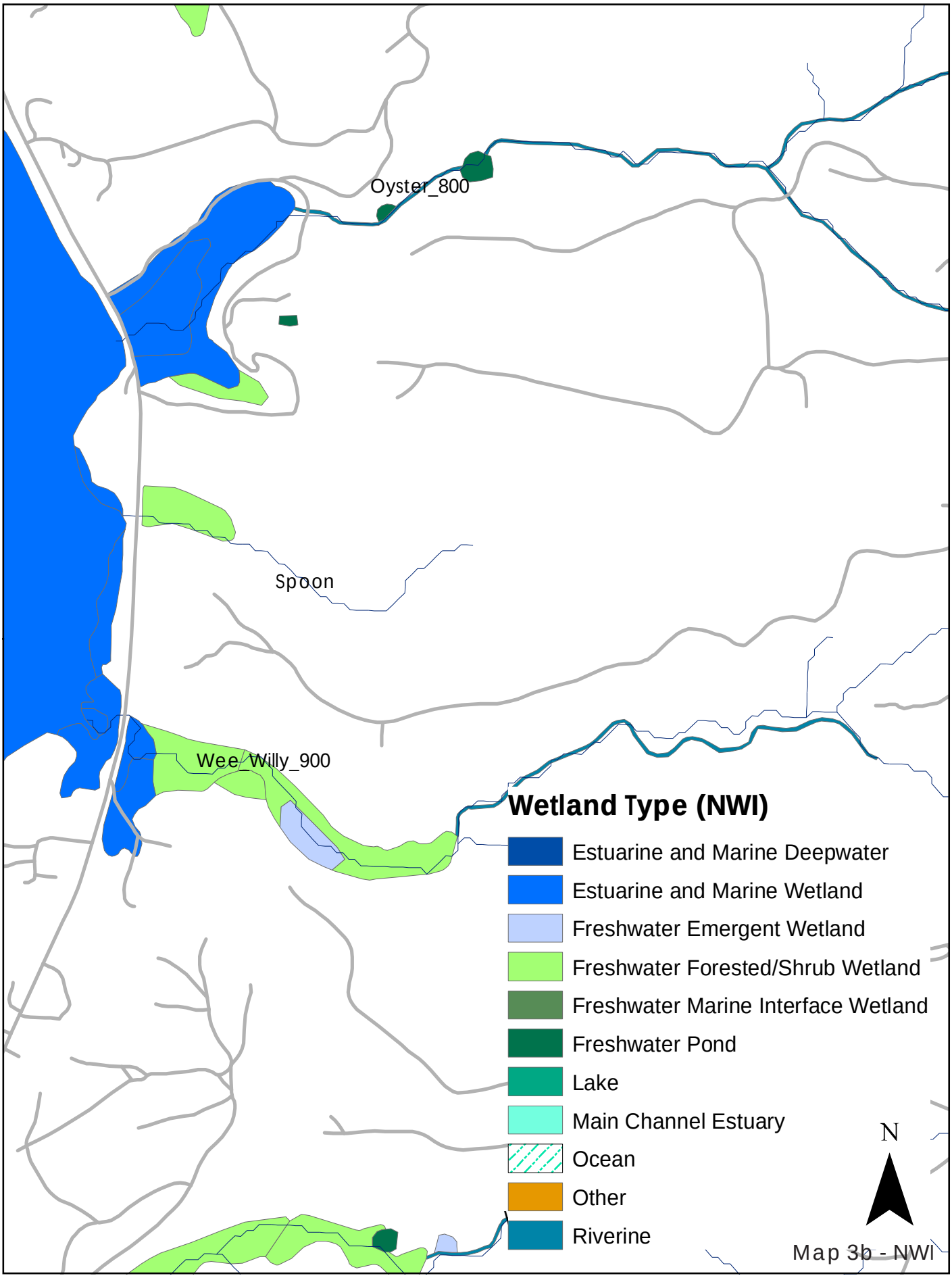
Although National Wetlands Inventory (NWI) data was collected after extensive wetland modifications had already been made, it is an indication of potential historical conditions. Many streams which would have provided extensive brackish wetland habitat have been disconnected from tidal influence and are now freshwater. This is most apparent when wetland habitat change corresponds with the road layer. Yeager and Lower Northbay Creek provide the most abundant brackish wetland habitat yet only half of the historical saline wetland remains due to ditching, diking, and damming. The mouth of O'Hara creek has been modified drastically flowing through a 100 meter failing culvert. The Jackson Creek Complex has also been significantly modified as a result of roads, undersized culverts and a constructed channel. As these modifications were all made before the wetland inventory occurred it is unclear as to what the southern most freshwater wetland complex would historically look like. Almost every creek south of Lower Northbay has been impacted by the presence of the main road and associated culverts, although some of these culverts have been replaced and the historical habitat somewhat restored. Refer to the maps on pages 12-16 for wetland type and extent. Those streams with no significant wetland habitat were not mapped.

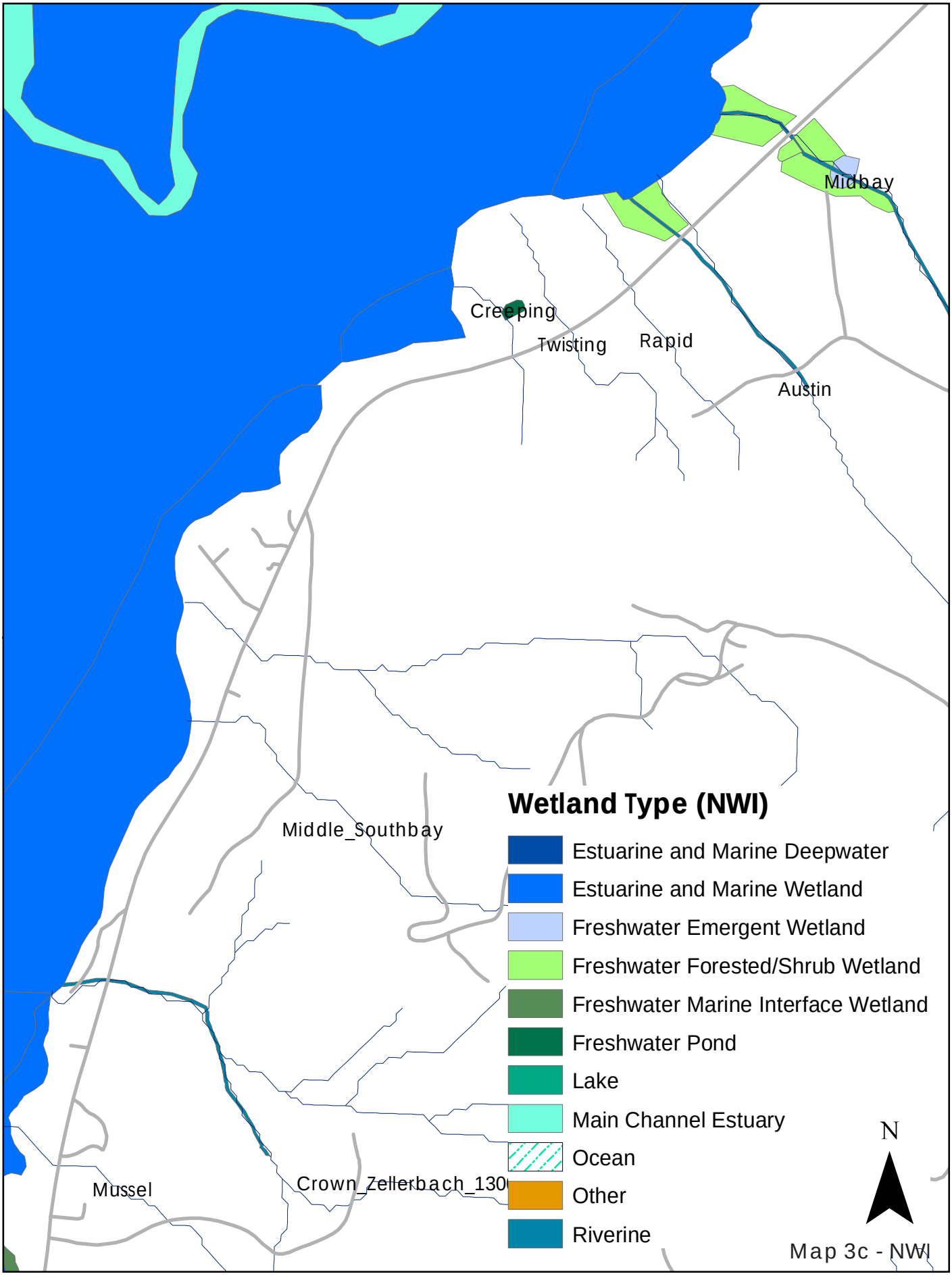
Other modifications include wood removal on mainstem Whiskey Creek, seawall construction to protect the campground near Jackson Creek which was removed in 1998,[1] and the numerous developments which have occurred within the previous decade with Rice Creek being the most impacted. A large community development has recently been erected on the banks of Rice Creek, which is naturally prone to disturbances and had already been modified significantly as a result of a large RV Park at the mouth.

1 Netarts Watershed Assessment. 1999

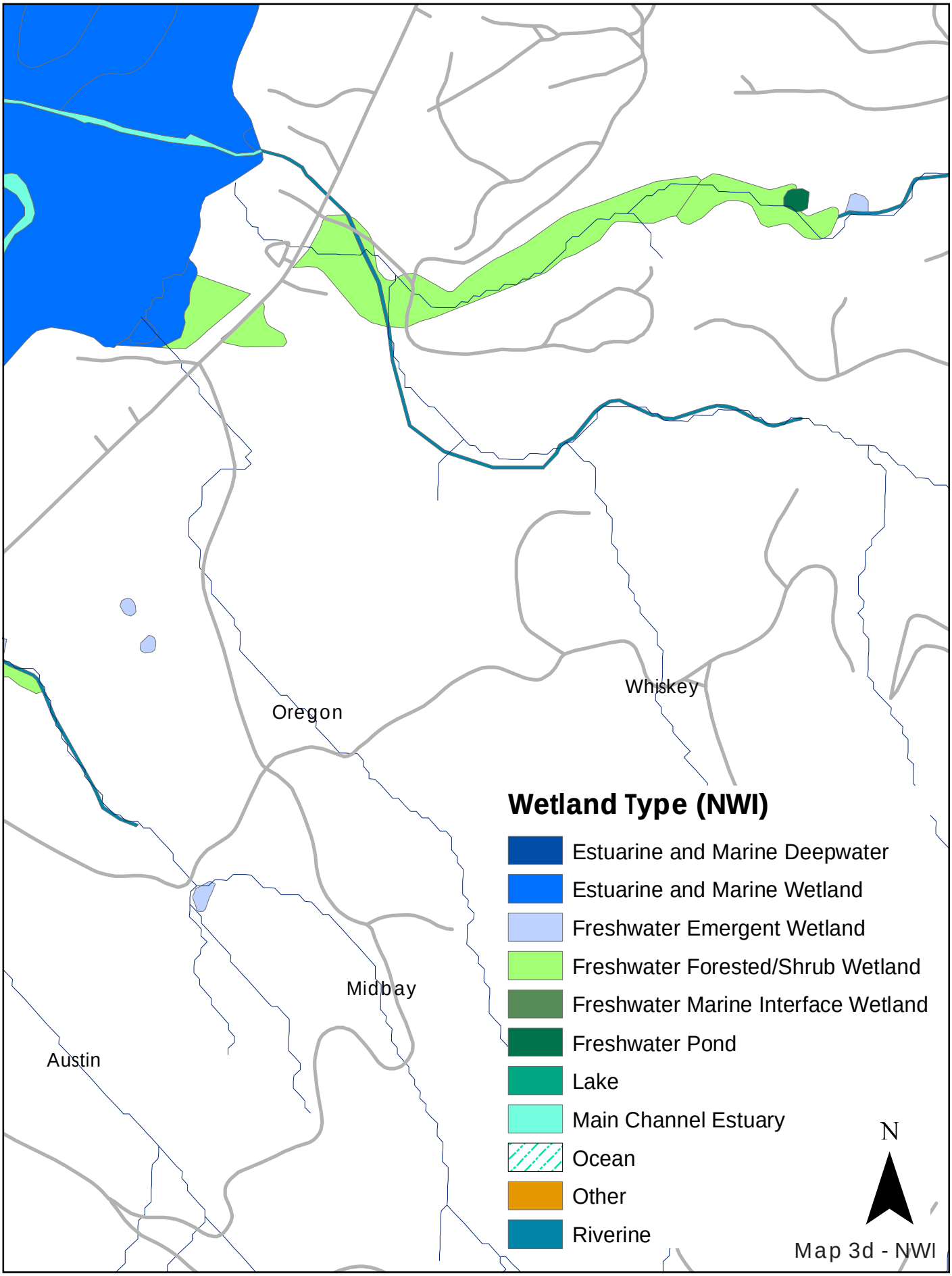

Rice
Northbay_500
Lower_Northbay_600
Yager
Oyster
Wetland Type (NWI)
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Marine Interface Wetland
Freshwater Pond
Lake
Main Channel Estuary
Ocean
Other
Riverine
N

Map 3a - NWI

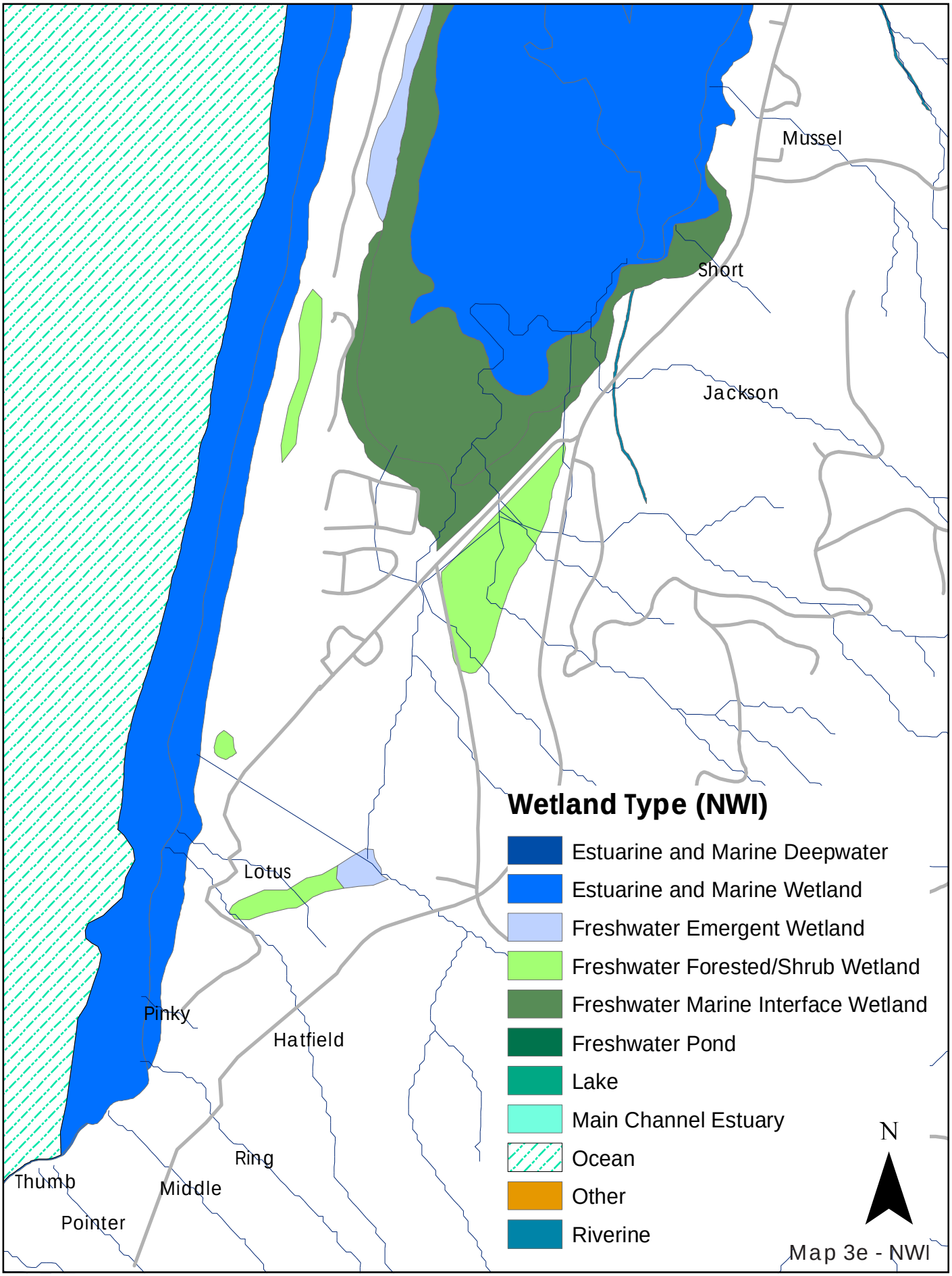

Oyster_800
Spoon
Wee_Willy_900
Wetland Type (NWI)
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Marine Interface Wetland
Freshwater Pond
Lake
Main Channel Estuary
Ocean
Other
Riverine
N
Map 3b - NWI


Midbay
Creeping
Twisting
Rapid
Austin
Middle_Southbay
Mussel
Crown_Zellerbach_130
Wetland Type (NWI)
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Marine Interface Wetland
Freshwater Pond
Lake
Main Channel Estuary
Ocean
Other
Riverine
N

Map 3c - NWI


Oregon
Whiskey
Midbay
Austin
Wetland Type (NWI)
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Marine Interface Wetland
Freshwater Pond
Lake
Main Channel Estuary
Ocean
Other
Riverine
N

Map 3d - NWI


Mussel
Short
Jackson
Lotus
Pinky
Hatfield
Ring
Middle
Thumb
Pointer
Wetland Type (NWI)
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Marine Interface Wetland
Freshwater Pond
Lake
Main Channel Estuary
Ocean
Other
Riverine
N
Map 3e - NWI

Materials and Methods

The ODFW AQI protocol was used to identify and quantify existing habitat parameters within each drainage of the Netarts Bay Watershed. The standard protocol (no e-fishing, etc.) was used except for instream temperature. Temperature data was collected in bay-going Jackson above the parking lot culvert and near the mouth of the ocean-going channel, above the boat dock on O'Hara, and near the mouth of Fall using Hobo Data Loggers. Where landowner access was granted, stream surveyors collected data for the following metrics: Habitat unit; habitat type (e.g. riffle, pool, glide); Physical parameters (e.g. modal depth, slope, terrace height); Substrate; Spawning gravels; Shade (%); Wood volume; Biotic species present; Riparian vegetation; Floodplain connectivity. Refer to "AI - Guide to Interpreting Stream Habitat Surveys AI - Guide to Interpreting Stream Habitat Survey Reports.[1]

The Mid-Coast Watershed Council Limiting Factors Analysis protocol was expanded to consider Chum and Steelhead habitat concerns, to incorporate pre-existing GIS data, and to better suit the Netarts Bay Watershed. Chum habitat was assessed by evaluating estuarine connectivity to spawning areas. Projects were developed for any stream that was not at historical or reference function in addition to those with seasonal limitations. Restoration projects were not ranked sequentially (but were ranked high, medium, low). The definition of Anchor, Critical Contributing Area, and Branch Habitat was removed.

A presence absence fish survey was conducted visually estimating (counting) and classifying fish species observed. Although census snorkel surveys of every riffle and pool would provide more accurate estimations of fish abundance, the estimates provided within this report (for Whiskey Creek) are comparable to what was found during the Ocean Tributaries Rapid Bio-Assessment (OTRBA) surveys where every fifty pool was snorkeled (expanded estimates). Although the fry and juvenile numbers provided within this report should only be considered preliminary, they provide a relative estimation (when comparing the various streams in the watershed) of salmonid abundance and usage.

Questions that Guided the Assessment

- How are biota currently using the system?
- What temperature problems are apparent?
- Where are the barriers to fish migration?
- What is the state of salmonid spawning and rearing habitat within the system?
- Within each stream what are the dominant limiting factors?
- Within the 6th field, what are the dominant limiting factors?

Resources Used in Developing this Plan

- Netarts Bay Watershed Assessment
- National Wetlands Inventory Data
- Summer snorkel surveys of the Whiskey and Jackson Creeks
- ODFW Spawning and Oregon Plan surveys
- Oregon Department of Forestry rapidly moving landslide risk assessment maps
- Field Surveys

1 http://nrimp.dfw.state.or.us/crl/Reports/AI/interpgd.pdf

High Risk Slopes

High risk slopes were evaluated using the DOGAMI "Rapidly Moving Landslide" (RML) data layer. Additionally, those slopes deemed high risk during the field surveys as a result of slope, lithology, or land-use were also included in the results section. High risk slopes are those slopes greater than 65% that are likely to contribute sediments and wood to the system below. The protection of these areas is critical for the long-term fuction of stream systems and salmonid production.

Culverts

Culverts were evaluated by classifying culvert type, measuring size, substrate, slope, drop, and channel measurements of bankful width up and downstream and channel type downstream of the culvert. Standard guidelines for standard culvert sizing and placement which require culverts to be at least as wide as the active channel widths and at most a 6" drop for juveniles were applied to surveyed culverts. Those that did not meet size and/or placement guidelines were deemed undersized and those that did not meet passage guidelines were deemed barriers to passage. Adult passage was analyzed in two ways; spawning upstream and size. In Netarts spawning occurred upstream of all but one culvert (which was not undersized) and therefore it was determined unneccesary to analyze culvert data using the Fish-Xing program. Finally, ODFW biologists were consulted about potential Chum barriers.

Identifying Areas Suitable for Restoration

Areas suitable for LWD placement were identified by potential for floodplain connection, presence of suitable spawning gravels, low to moderate gradient, and a current lack of large wood. Channel confinemt is evaluated as a component of the AQI protocol. In the northern Oregon coast, bankfull events (where the channel accesses its floodplain) occur approximately every 1.5-2 years. These are channel maintaining events. Additionally, more intense flooding occures at semi-regular intervals of 5, 10, 50, 100, etc. years. These events, although occurring more regularly within the last decade, are channel changing events. Floodplain disconnection commonly occurs when the channel cannot access its floodplain during bankfull events. It is possible (and in some areas likely) that the floodplain is accessed during these more intense events, however flow is often too high for fish to utilize the resulting off-channel habitat. In this study floodplain disconnection was measured by evaluating the percentage of side-channel habitat as well as the ratio of the active channel to the bankful channel. Finally, areas that did not meet benchmarks for shade were recommended for planting as were areas where riparian community complexity was lacking.

GIS Assessment of Winter Rearing Intrinsic Potential

Intrinsic potential modeling is an analytical process developed and implemented by the Coastal Landscape Analysis and Modeling Study (CLAMS) based at OSU. Valley width, channel gradient, and stream flow are combined to generate a single metric which represents overwintering intrinsic potential (IP). For Coho, high IP areas are those with large valley widths, low gradients, and flows above a certain cut off (to effectively exclude headwater drainages). Steelhead are assumed to prefer higher gradients. Modeling parameters are based on research conducted by CLAMS. IP modeling was used as one tool for determining winter rearing potential.

Coho Production Modeling Methods

Production modeling is a helpful tool used to determine the Coho production seasonal habitat limitation. The ODFW Coho Smolt Production Model (NSPM) developed by Tom Nickelson of the ODFW Research Lab was utilized in this study for this purpose. The NSPM is used to develop restoration plans that are specifically designed to address Coho habitat needs. The alternative is to use reference benchmarks which describe how the habitat deviates from minimally disturbed conditions. Both methods used in conjunction allow restoration planners to develop plans which address the specific needs of Coho salmon (the NSPM) by addressing habitat issues such as water quality, sediment, or shade issues. Both methods were used in this study. The NSPM uses expected juvenile rearing densities by habitat type and habitat data to produce estimates of spawning, rearing, and smolt production by creek. These estimates are based on extensive coast wide data collected by the ODFW Research Lab. This analysis estimates the extent of the seasonal limitation (spawning, summer, or winter rearing) in terms of potential Coho smolts produced.

Spawning productivity was determined using the extent and quality of spawning gravels measured during field surveys. Spawning gravels used by Coho were measured (in square meters) and classed into three categories of gravel quality : good, fair, or poor. Good quality gravels are those gravels that are well sorted, not embedded with sands and fines, and resting on a surface of gravels (as opposed to bedrock or sand). Fair gravels are well sorted but sands and fines are present in low quantities and are not necessarily resting on a bed of gravels. Poor gravels are well sorted but are embedded and are not resting on a bed of gravels. Only gravels expected to be utilized by adult Coho Salmon for spawning were included. The following assumptions were made to estimate spawning potential. Each spawning female can utilize 3 square meters of well sorted gravels, and will deposit on average 2500 eggs (within 3 redds). Egg to fry survival rates for fair gravels were estimated at 0.5 that of good gravels; those for poor gravels were estimated at .25 that of good. The result is an estimate of the number of eggs based upon the amount and quality of spawning gravel. This number is multiplied by an egg to smolt survival rate to produce a smolt production estimate for the area of interest.

Summer rearing potential is defined as the number of juvenile Coho which can reside over the summer in the basin of interest and is based upon the extent and type of habitat (e.g. the total square meters of riffles, pools, etc.) within the stream system. Habitat units are assigned expected rearing densities based upon research conducted by ODFW throughout coastal Oregon. Habitat extent is then multiplied by estimated densities to generate summer rearing potential by drainage.

Winter rearing potential is defined as the number of Coho which can reside over the winter in the basin of interest and is ideally based upon winter habitat surveys. However, it is not always feasible to collect winter habitat data; the AQI surveys conducted for this assessment occurred in the summer during low flow conditions, therefore estimates of winter habitat extent was quantified using a boot-strap procedure. ODFW has used coast wide survival data to develop a regression equation which estimates smolt densities based on the following metrics: gradient, Beaver presence, and %Pools. Essentially the summer habitat and smolt data is used to determine winter rearing potential. Effectively 90% (ODFW survival rates) of the fish alive during the winter are assumed to survive to smolt. By dividing the number of smolts a stream will produce based on summer to smolt data by 0.9 the number of juveniles reared in the winter can be determined. If 9 fish smolt then 10 reared during the winter.

Summer – Habitat type	Fish/sq m	Winter – Habitat type	Fish/sq m
Cascades	0.24	Cascades	0
Rapids	0.14	Rapids	0.01
Riffles	0.12	Riffles	0.01
Glides	0.77	Glides	0.12
Trench Pools	1.79	Trench Pools	0.15
Plunge Pools	1.51	Plunge Pools	0.28
Lateral Scour Pools	1.74	Lateral Scour Pools	0.35
Mid Channel Scour Pools	1.74	Mid Channel Scour Pools	0.35
Dam Pools	1.84	Dam Pools	0.56
Alcoves	0.92	Alcoves	1.84
Beaver Ponds	1.84	Beaver Ponds	1.84
Backwaters	1.18	Backwaters	0.58
Riffles w/ Pockets	0.34	Riffles w/ Pockets	0.10
Riffle with Pockets equal to 75% Riffle and 25% Midchannel Scour Pool			
Table 1 - Coho rearing density for each summer and winter stream habitat type.			

The relative spawning, summer, and winter rearing potentials represent one way of evaluating the data. More commonly, estimated season to smolt survival rates are used to estimate smolt production from that season onwards. The season with the lowest smolt production numbers is generally considered the limiting factor to seasonal smolt production. Two sets of survival estimates are used in this document. The first is based on the standard published work provided by the ODFW research lab. Like the rearing densities, these rates are based on coast wide research and monitoring efforts. A second set of survival rates has also been utilized in this analysis. The original data source is the Alsea Watershed Study (AWS). This approach to modeling has been used extensively by Bio Surveys LLC in the LFA projects completed for the Mid Coast Watershed Council. The underlying motivation for using the AWS data has not been peer reviewed and the results of any analysis using these assumptions should be considered exploratory.

Alsea Watershed Study

A study conducted in the Alsea watershed resulted in significantly different survival rates. These survival rates are used in parallel in this and other limiting factors studies to produce a more conservative smolt production estimate. ODFW survival rates are density independent (this conclusion is based upon descriptions obtained from previous LFAs conducted in the Mid Coast) while the Alsea Watershed season to smolt survival rates are density dependent. A density dependent rate is a generally nonlinear function; a linear application is therefore questionable. Despite these issues, the Alsea rates have been used in this analysis for the following reasons. First: at a minimum they provide an alternative set of assumptions to those provided by ODFW. Agreement between the two models improves confidence in the final results. Second: one of the goals of this project was to adapt and improve the process applied in the Mid Coast. Application of these survival rates helps provides consistency among the various coastal LFAs performed to date, and facilitates comparison. Finally, the AWS winter rearing estimates are potentially weaker than the ODFW winter rearing estimates as an additional error term is introduced during the boot-strap procedure.

ODFW Survival Rates		AWS Survival Rates	
Life stage	Survival rate	Life stage	Survival rate
Egg to smolt	0.3200	Egg to smolt	0.0270
Summer to smolt	0.7200	Summer to Smolt	0.0644
Winter to smolt	0.9000	Winter to smolt	0.2870
Rates used by Tom Nickelson (ODFW)		Rates credited to Jim Hall (OSU) in past LFAs	

Table 2 - Coho Survival Rates

Error within the Model

One of the primary weaknesses of the NSPM approach is the lack of quantifiable error and associated confidence intervals among the seasonal estimates. Each component of the model has two error components; sampling error and measurement error. Error estimates have not been included in the model. A Monte Carlo approach could be used to develop confidence intervals for the seasonal rearing and smolt production estimates. As much of the model is based on unpublished data, it was not possible to develop error estimates for the modeling completed for the Netarts Bay Watershed. Future work should explicitly include the incorporation of error into the model. Without it, it is not possible to distinguish between seasonal limitations when the values are close.

Results

Netarts Bay Watershed Summary

The only agricultural use within the watershed is forestry and shellfish production. There is no commercial fishing in the bay, few wetlands have been lost although many have been altered, and the only industries likely to contribute point-source pollution is the fish hatchery on Whiskey Creek and the boat rental service on Rice Creek (no data). Boating activities in general along with road runoff likely contribute hydrocarbons as well. The total human population of Netarts proper is small and while tourists are abundant, recreation is limited to boating, crabbing, and shell-fishing in the bay and hunting in the upper watershed. Although these activities do impact watershed health, the upper-watershed is predominantly owned by Stimson Lumber and access is granted by permit only. Stimson Lumber has pro-actively engaged in restoration activities on much of its land throughout the region including the ongoing replacement of culverts identified as barriers to passage on their property. They have expressed an interest in partnering in future restoration activities within the basin. OPRD also manages a significant portion of the watershed including the spit and a large section of the Jackson Creek Complex. Other owners include OSU, USFS, and Tillamook County. Local concerns include sedimentation, lack of healthy salmon runs, increasing human impacts such as housing developments and effluent treatment, temperature, and toxic substances within the bay from boating activities.

Current Habitat Condition

	Square Meters of Habitat Type												
Stream	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Whiskey Main	0	508	4,233	3,412	128	0	157	782	336	45	0	0	48
E.F Whiskey	0	0	266	265	0	0	117	111	0	419	23	47	0
S.F Whiskey	16	237	129	343	0	0	27	0	0	18	0	0	0
N.F Whiskey	0	3	1,925	8	328	148	101	588	150	867	30	476	191
O'Hara	0	22	2,178	0	0	0	187	284	1,361	537	0	0	0
Rice	0	358	0	0	0	0	208	335	427	1,501	0	0	0
Yeager	0	0	384	0	0	0	0	0	0	2,550	40	8,560	0
L. Northbay	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin	0	0	723	285	53	0	20	0	0	357	0	0	0
Hodgdon	0	748	0	2,191	0	0	10	242	463	105	0	0	0
Fall	0	40	8,368	3,226	0	0	13	23	0	130	62	0	18
N Fork Fall	40	130	875	455	0	0	0	0	18	160	0	0	0
BG Jackson	0	1	1,793	240	15	0	29	7	67	8	0	36	0
OG Jackson	1	1,930	1,056	660	8	0	98	34	30	205	0	88	4
Jackson Trib 1	0	0	890	0	0	0	0	0	0	0	0	0	0

Table 3 - Netarts Summer Habitat Data

Cascades - 1
Rapids - 2
Riffles - 3
Riffles with Pockets - 4
Glides - 5
Trench Pools - 6
Plunge Pools - 7
Lateral Scour Pools - 8
Mid Channel Scour Pools - 9
Dam Pools - 10
Alcove Pools - 11
Beaver Ponds - 12
Backwater Pools - 13

Stream	Active channel width (m)	Gradient (%)	# Beaver ponds	%Pools	Reach length (m) surveyed
Whiskey Main	4	1.14	0	0	3,079
East Fork Whiskey	3	0.82	2	1	601
South Fork Whiskey	3	2.08	0	0	379
North Fork Whiskey	4	0.81	6	0	2,119
O'Hara	3	0.70	0	0	2,331
Rice	5	0.16	0	1	1,473
Yeager	7	0.20	14	1	4,500
Austin	2	0.64	0	0	586
Hodgdon	3	1.18	0	0	1,682
Fall	3	1.71	0	0	3,769
North Fork Fall	3	2.70	0	0	754
Bay-going Jackson	4	1.38	1	0	702
Ocean-going Jackson	2	1.32	2	0	1,360
Jackson Channel 1	4	1.70	0	0	310
Jackson Channel 2	1	0.40	0	0	535

Table 4 - Netarts Stream Summary Data (used to estimate winter smolt production)

Temperature

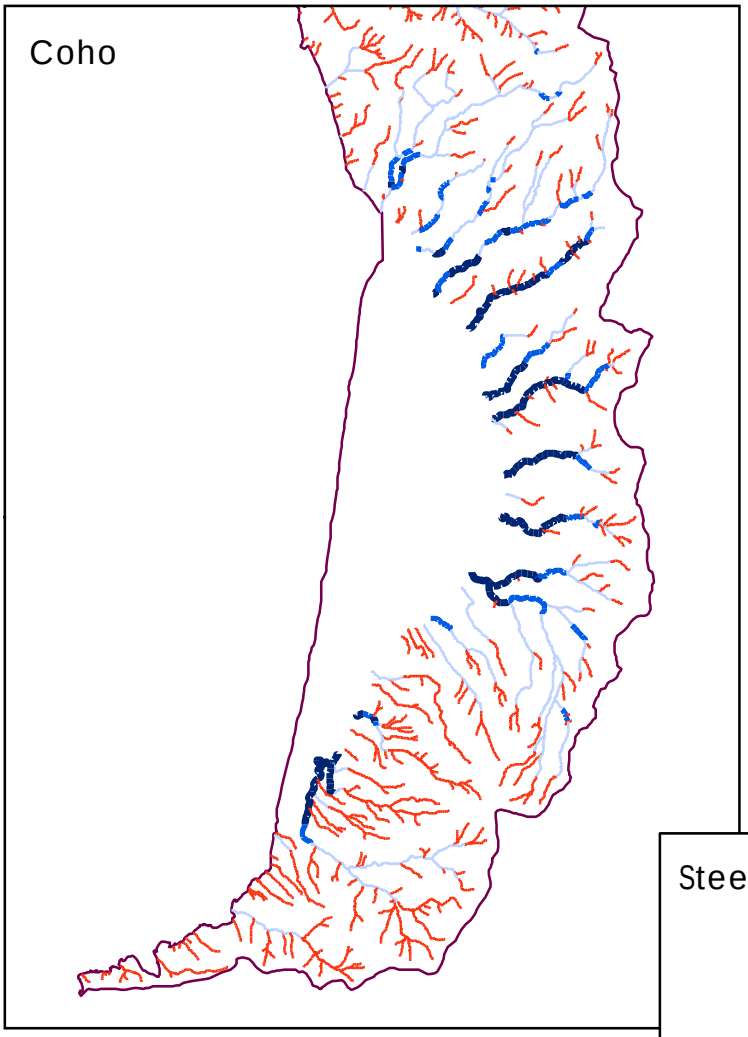
Although the AQI protocol includes a grab temperature sample this was not included in this study for several reasons. The first reason being that most surveys began in the late spring and some were conducted in the late fall, before and after peak summer temperatures. Secondly temperature impairment in Oregon is defined as a 7 day average maximum of 64˚ F or greater which grab samples cannot provide. Finally, the ODEQ provided data loggers and staff time to place 5 loggers within the Netarts Bay Watershed. The logger placed on the North Fork of Whiskey Creek was miscalibrated and the data collected was discarded. The logger placed on Bay-going Jackson indicated that the stream channel went dry for a significant period of time (verified by field surveys) and the data collected was also discarded. The data collected indicated that only O'Hara Creek exceeded 64˚ F for one day during the time the loggers were active. The temperature data collected indicates that there is not a temperature problem on three of the largest streams in the Netarts Bay Watershed.

Site Name	Start Date	Stop date	Seasonal Maximum	
			Date	Value
O'Hara Creek	05/30/08	09/02/08	08/13/08	18.0
Ocean Going Jackson	05/31/08	09/03/08	08/14/08	13.6
Fall Creek	05/31/08	09/03/08	08/14/08	13.4

Table 5 - Temperature Data

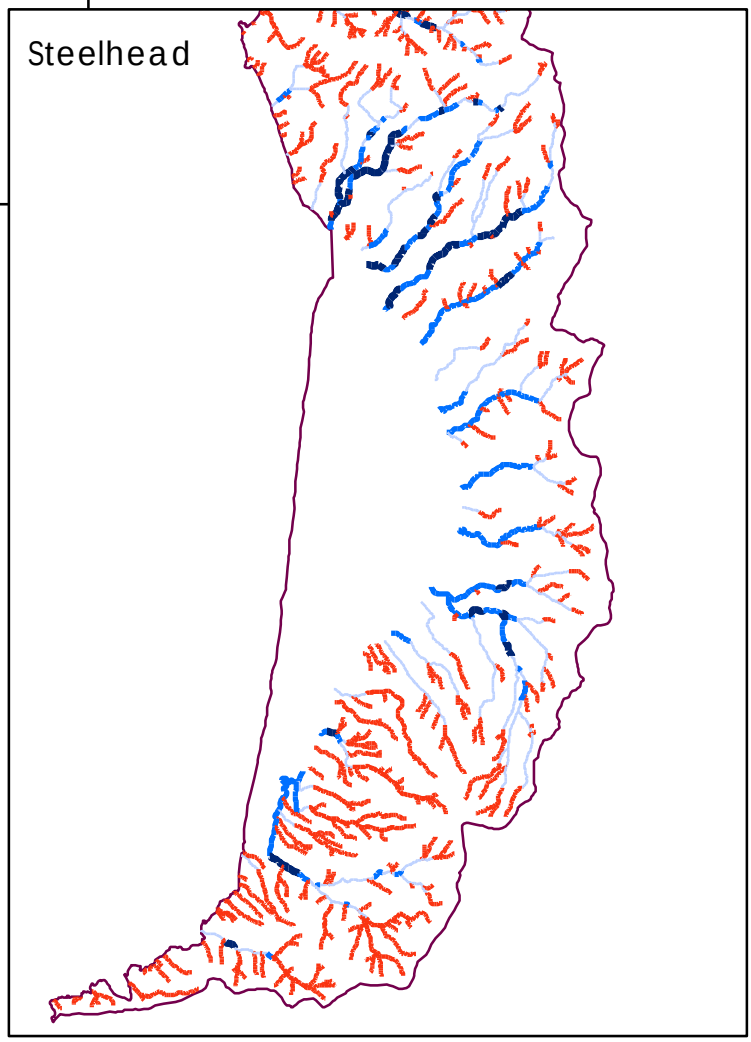
Site Name	7-Day averages		Days > 55°F	Days > 55°F	Days > 55°
	Date	Maximum	12.8°C (55°F)	17.8°C (64°F)	20°C (68°F)
O'Hara Creek	08/13/08	16.8	74	1	0
Ocean Going Jackson	08/13/08	13.2	10	0	0
Fall Creek	08/13/08	13.0	7	0	0

Table 5 - Temperature Data continued



Map 4 - Intrinsic Potential

Although the intrinsic potential modeling displayed in the maps below and left are good "first-pass" identifications of streams that could support Coho and Steelhead during the winter, some streams were field verified as being unlikely to do so. Yeager is likely unsuitable for either Coho and Steelhead as is Lower Northbay,. The North Fork of Whiskey is extremely important for overwintering salmonids although access is somewhat limited due to hatchery practices and Jackson Creek is disconnected from much of a freshwater wetland which would increase its overwintering potential reducing the IP of this stream.



Coho and Steelhead Overwintering Potential

N

- High
- Medium
- Low
- Not Modeled

Spawning Gravel Inventory

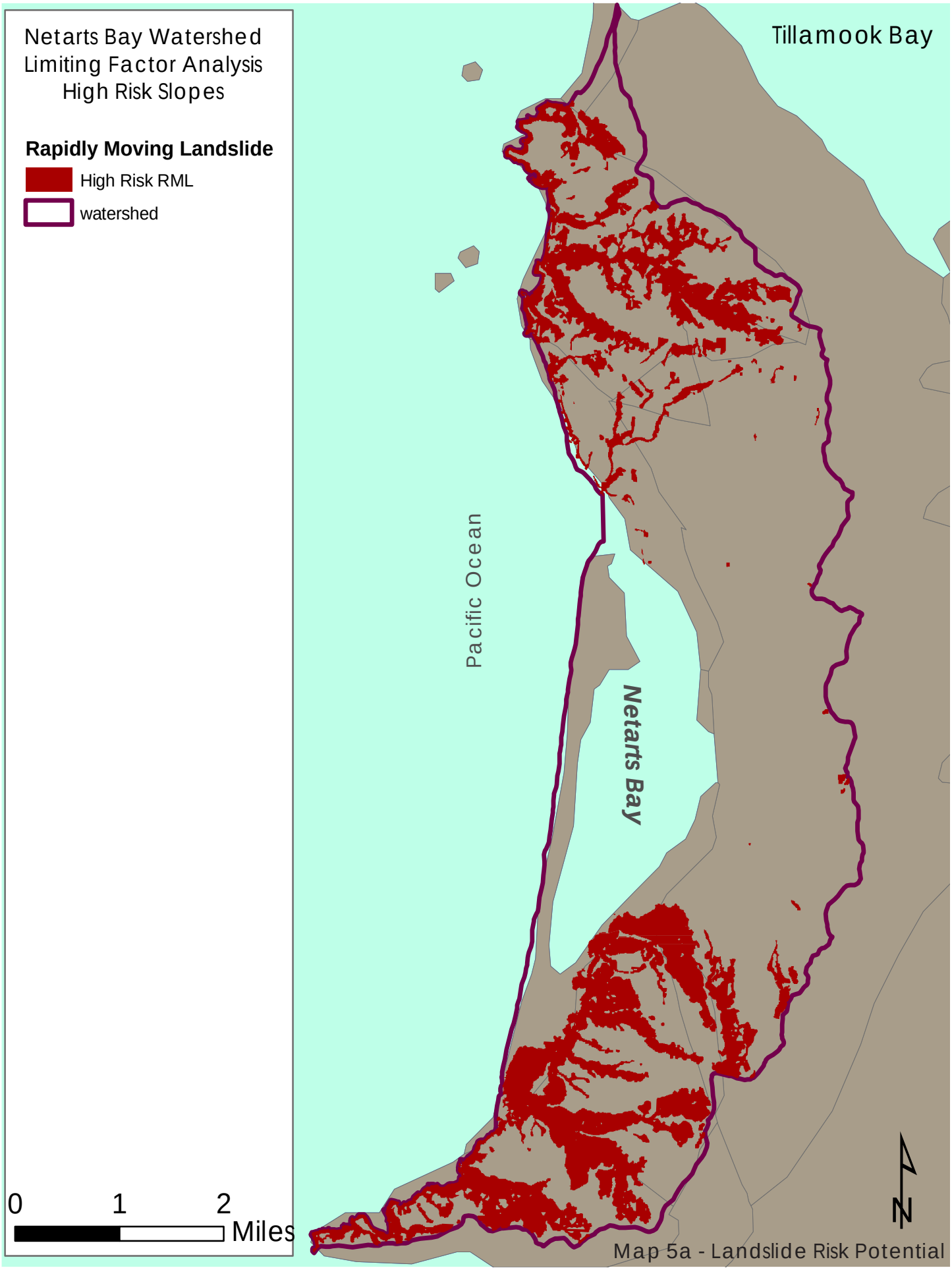
These counts are conservative estimates of the number of spawning sites that are a minimum of one sq m in area and are located in a zone having hydrology suitable for successful spawning by Coho, Chum, or Steelhead salmon. A simplifying assumption was made that all salmonids target similar substrate types. Further direct evaluation of spawning in the watershed should be conducted to verify these estimates. The counts are qualitatively grouped (Poor, Fair, Good) based on the amount of fines associated with the gravel (state of embeddedness). The counts can also be used to represent the availability of spawning sites appropriate for Steelhead trout, but not for chinook salmon or cutthroat trout. There is limited well sorted spawning gravel within the Netarts Bay Watershed. Although gravels are abundant in almost every stream, low wood volumes and to a lesser extent, geomorphology, prevent sorting. Although spawning gravels were limited, juveniles were present in many streams.

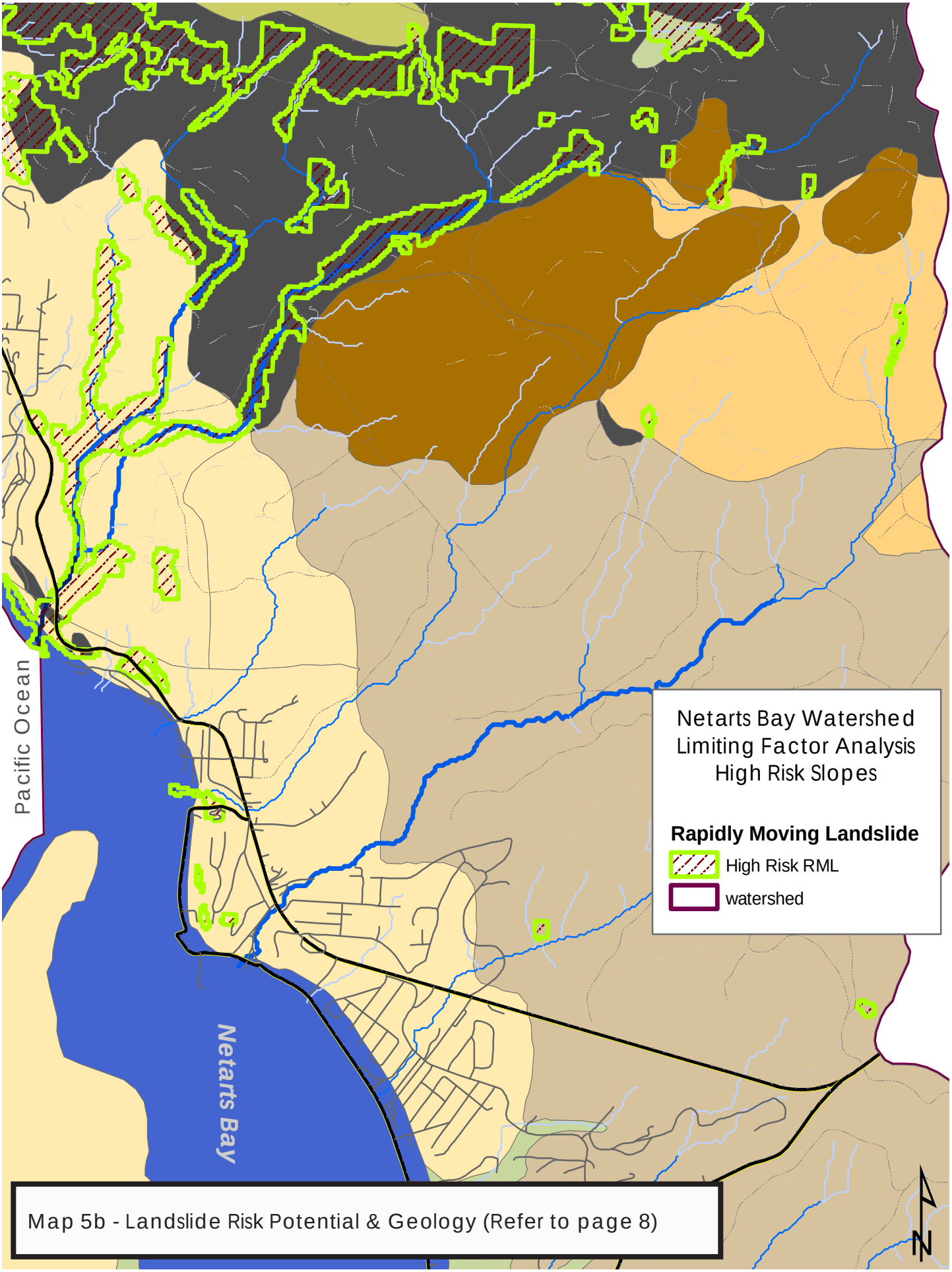
Stream	Poor	Fair	Good	Meters Surveyed
Whiskey Main	0	0	20	3,079
E Fork Whiskey	0	0	0	601
S Fork Whiskey	0	0	0	379
N Fork Whiskey	0	0	3	2,119
O'Hara	0	6	0	2,331
Rice	0	3	0	1,473
Yeager	0	0	0	4,500
Lower North Bay	0	0	0	800
Austin	0	0	0	586
Hodgdon	0	3	0	1,682
Fall	0	25	0	3,769
N Fork Fall	0	0	0	754
BG Jackson	0	0	20	702
OG Jackson	0	0	10	1,360
Jackson Channel 2	0	0	5	310
Jackson Channel 3	0	0	0	535
Total	0	37	58	

Table 6 - Spawning Gravel (m2) and Survey Length (m)

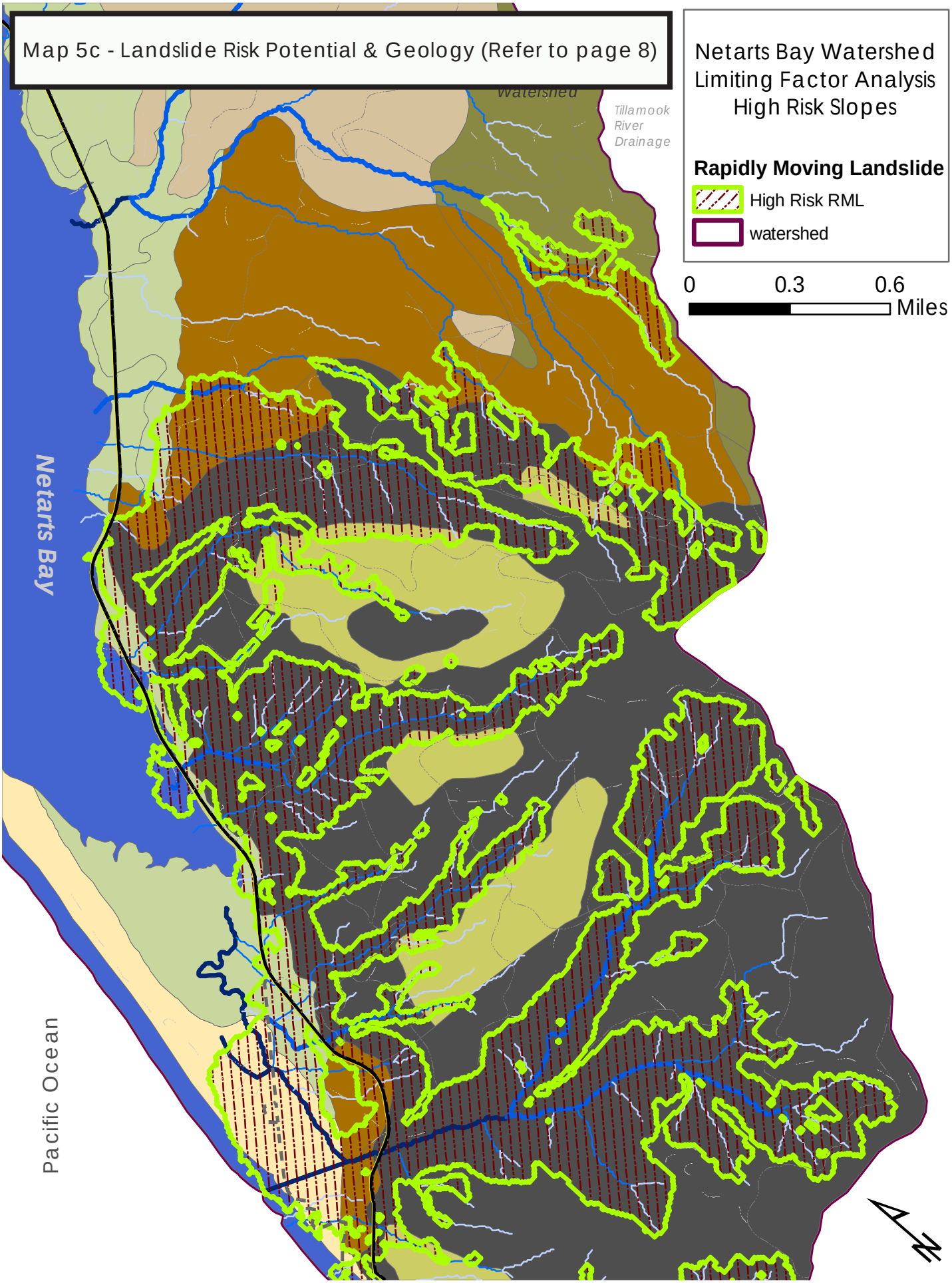
High Risk Slopes

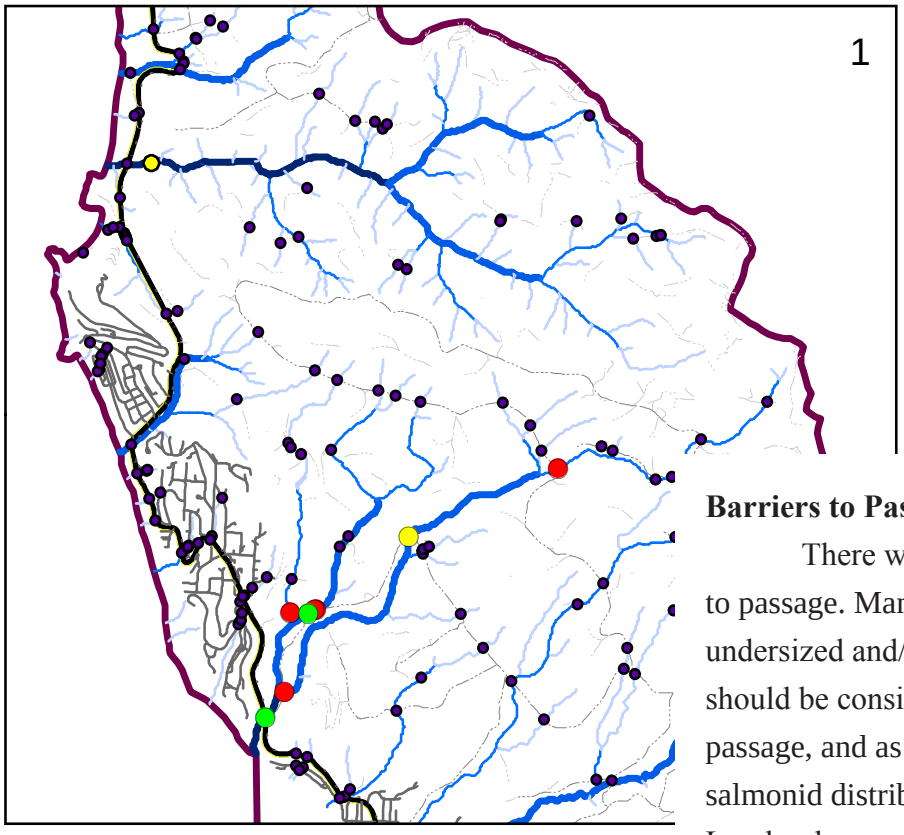
High risk slopes can potentially provide the stream channel with large wood and spawning substrate. GIS analysis indicates that substantial high risk slopes exist on Fall Creek, Austin Creek, the Jackson Creek Complex, and the upper extent of Whiskey Creek. This analysis was verified during field survey. Other smaller localized high risk slopes exist and these are restricted to a few headwater channels throughout the basin. Refer to the three maps on the following pages for high risk RML locations are. High risk slopes adjacent to fish bearing stream channels should be prioritized for conservation. Culverts which block movement of wood and substrate from high risk slopes should be considered for removal where feasible.


Netarts Bay Watershed
Limiting Factor Analysis
High Risk Slopes
Rapidly Moving Landslide
High Risk RML
watershed
Tillamook Bay
Pacific Ocean
Netarts Bay
0
1
2
Miles
N
Map 5a - Landslide Risk Potential



Map 5b - Landslide Risk Potential & Geology (Refer to page 8)


Map 5c - Landslide Risk Potential & Geology (Refer to page 8)
Netarts Bay Watershed
Limiting Factor Analysis
High Risk Slopes
Rapidly Moving Landslide
High Risk RML
watershed
0
0.3
0.6
Miles
Tillamook River Drainage
Netarts Bay
Pacific Ocean
N

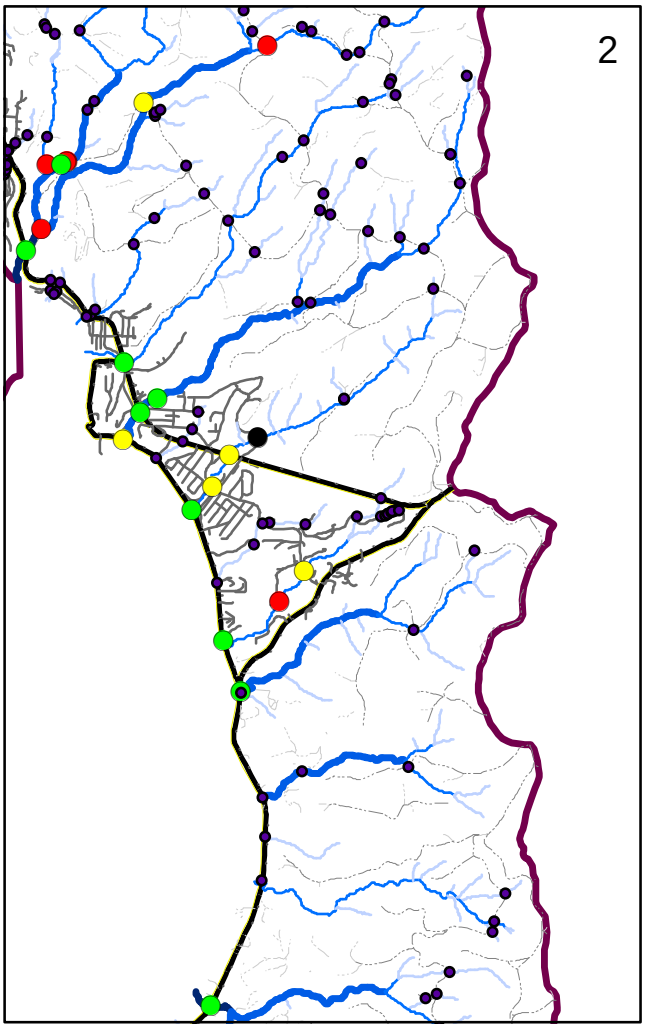


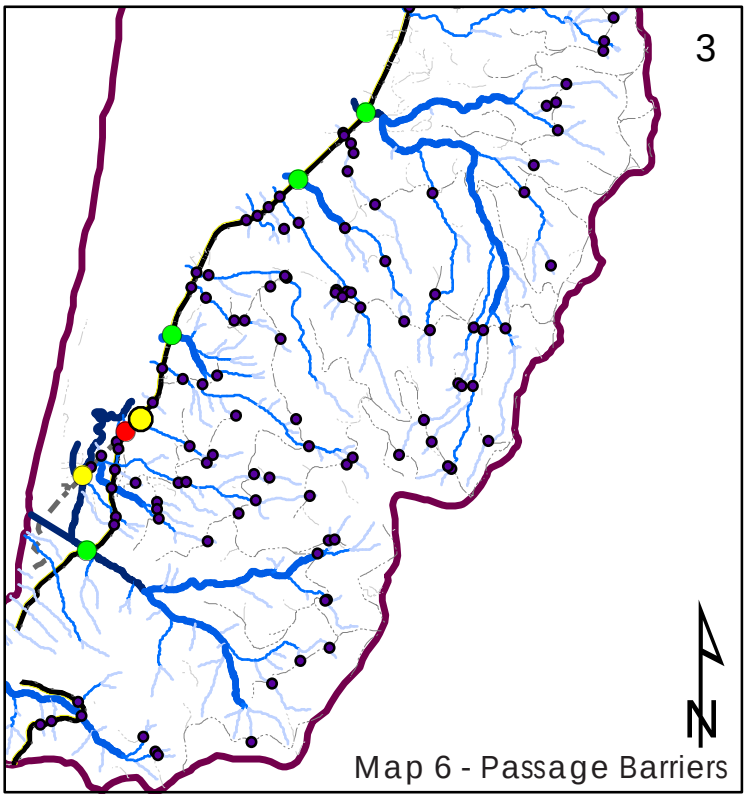
Netarts Bay Watershed
Limiting Factor Analysis
Barriers to Passage

- Other Crossings
- Maybe
- N
- Unknown
- Y
- watershed

Barriers to Passage

There were few definitively identified barriers to passage. Many culverts however were either undersized and/or actively failing. These culverts should be considered significant impediments to passage, and as a whole they may be restricting salmonid distribution. At a watershed scale, Stimson Lumber has expended significant resources to replace undersized, poorly placed, and failing culverts within their management boundary. Almost no barriers to passage occur on private forestry ownership. For comprehensive culvert results refer to appendix A.





Map 6 - Passage Barriers

Fish Usage

There has been no comprehensive presence/absence/abundance surveys conducted within the watershed. Coho Salmon numbers have been low since at least 1949. Between 1952 and 1998 Coho spawners seen in Whiskey have never been greater than 10.[1] Additionally, one surveyor noted in 1949 that other streams in the area were also poorly seeded.[2] The results of the Ocean Tributary Rapid Bio Assessment (OTRBA) found no juvenile Coho in 2005 and 494 in 2006 in Whiskey Creek, and no juvenile Coho in either year in Jackson Creek. Additionally 170 juvenile Steelhead were observed in 2005 while 270 were found in 2006 in Whiskey Creek. 560 juvenile Steelhead (primarily overwintered) were found in Jackson Creek in 2005 and 390 juveniles (primarily overwintered) were found in Jackson in 2006. During this study, over 500 juvenile Coho and Steelhead (few overwintered) were observed throughout the watershed with the majority occurring in Whiskey and Jackson Creeks. Juvenile Coho were observed in the wetland that connects lower Bay-going Jackson and Netarts Creek. This wetland is impounded by the campground road and contains spawning gravels being utilized by Coho. Jackson Creek was surveyed twice, once in the beginning of May and once at the end of May. In the first survey, emerging fry were observed near well sorted gravels downstream of the culvert that crosses the parking lot road. During this first survey water flowed moderately through a gravel bottomed channel and braided into a gravel wetland that contained good pools and cover. A small sand-bottomed branch broke off from the main channel and braided through the campground. A boulder weir had been placed across this diversion to prevent this from happening. However, when the portion of Bay-going Jackson below this weir was resurveyed, the flow had dropped so that all flow traveled beneath the weir, went sub-surface under a tree, and went into the bay via mudflats. Further, small fry were also observed in a small pool in the middle of the campground. Juvenile salmonids (unidentified) are spawning and rearing in Rice Creek downstream of a perched culvert as well as in Hodgdon Creek. Austin and Twisting Creeks have potential to support salmonids although none were observed during the 2008 AQI surveys. Fish were observed in the brackish wetland of Yeager Creek although these were not identified and no spawning gravels were seen on Yeager. Coho and Steelhead were seen in the first few reaches of Fall Creek and although an extremely undersized and failing culvert limits passage to this stream, there is great potential for Fall Creek to spawn and rear salmonid.

Although Chum salmon were not observed during the study due to the brief duration of their freshwater residence, ODFW has tracked their abundance during spawning surveys which have occurred for almost 5 consecutive decades on Whiskey Creek. The OSU fish hatchery has also discovered stray Chum salmon in their raceways having entered from the intake on Whiskey Creek. A former owner of the RV park on Rice Creek noted that Chum were present in Rice Creek before 1960. Before Chum fry were released into Whiskey Creek (225,000-900,000 released per year between 1969-1984) peak counts ranged from 150 to 670 Chum on Whiskey. In the years following hatchery releases trap counts were as 1500 Chum. Recent (post 1993) peak counts have been extremely low averaging ~20 with a high of 79. One hypothesis is that the hatchery fish have negatively impacted wild Chum populations. It has not been determined as to what stock the remaining Chum are related; wild or hatchery. Regardless, they are doing very poorly.

The OTRBA found Numerous resident Cutthroat in Whiskey and Jackson Creeks both in 2005 and 2006. Cutthroat were observed in every drainage during this study although only one sea-run Cutthroat was found in the entire basin and this was observed in the first pool in Fall Creek.

1 Netarts Watershed Assessment

2 Coastal Rivers Investigation Information Report 74-5. 1974

Coho Production Modeling

The results of this modeling analysis (under both sets of assumptions – ODFW and Alsea, with Yeager removed, refer to discussion on page 32) indicate that both spawning and summer rearing habitat limit Coho production within the watershed. Under both sets of assumptions, values for these two seasons are extremely close (in the absence of quantitative error estimates, they should be considered identical). Low spawning potential results from low quantities of well sorted gravels. A general lack LWD has limited gravel sorting although gradient, lithology, and floodplain disconnection influences gravel sorting strongly as well with spawning gravel abundance and quality generally being greater in those streams dominated by a resistant lithology. There is a strong correlation however between land-use and lithology with erodible streams supporting the majority of the human residents within the watershed. The spawning potential on Rice, Hodgdon, and O'Hara is significantly reduced by human activities. Fall creek is unique among the streams in the Netarts Bay Watershed in that it functions very well given the valley confinement (~<2.5 VWI) and the high levels of sand present. Additionally, the intrinsic potential for Fall Creek is high for Steelhead given the gradient and riffle dominated channel. The low estimates for summer rearing and smolt production are due to a consistent relative lack of pools throughout the watershed, although an increase in Beaver activity would drastically improve this. It is likely that the lack of pool habitat is limiting spawning habitat as well given that gravels generally sort at the pool to riffle transition.

Stream Name	Spawning	Summer	Winter
Whiskey Mainstem	16,667	4,160	3,850.52
East Fork Whiskey	0	1,370	1,101.76
South Fork Whiskey	0	243	324.74
North Fork Whiskey	2,500	4,912	8,019.82
O'Hara	2,500	4,397	2,414.87
Rice	1,250	4,452	2,841.67
Yeager - Naturally low spawning potential	0	20,525	39,622.10
Austin*	0	912	483.15
Hodgdon	1,250	2,285	1,604.88
Fall	10,417	2,484	3,212.92
North Fork Fall	0	613	528.37
Bay-going Jackson	16,667	562	1,030.71
Ocean-going Jackson	8,333	1,431	1,753.50
Netarts Creek (Jackson Channel 2 or Trib 2 in the AQI data)	4,167	107	311.18
Jackson Channel 1	0	0	266.99
Totals	**63,750**	**48,453**	**67,367**

Table 7 - Rearing capacity * Spawning potential may increase as a result of recent wood recruitment

Name	Spawning	Summer	Winter
Whiskey Mainstem	5333.33	2994.88	3465.46
East Fork Whiskey	0	986.71	991.58
South Fork Whiskey	0	174.97	292.26
North Fork Whiskey	800	3536.89	7217.83
O'Hara	800	3165.98	2173.38
Rice	400	3205.38	2557.5
Hodgdon	400	1644.96	1444.39
Fall	3333.33	1788.29	2891.63
North Fork Fall	0	441.52	475.53
Bay-going Jackson	5333.33	404.61	927.64
Ocean-going Jackson	2666.67	1030.25	1578.15
Netarts Creek (Jackson Channel 2 or Trib 2 in the AQI data)	1333.33	76.9	280.06
Jackson Channel 1	0	0	240.29
Total	**20,400**	**19,451**	**24,536**

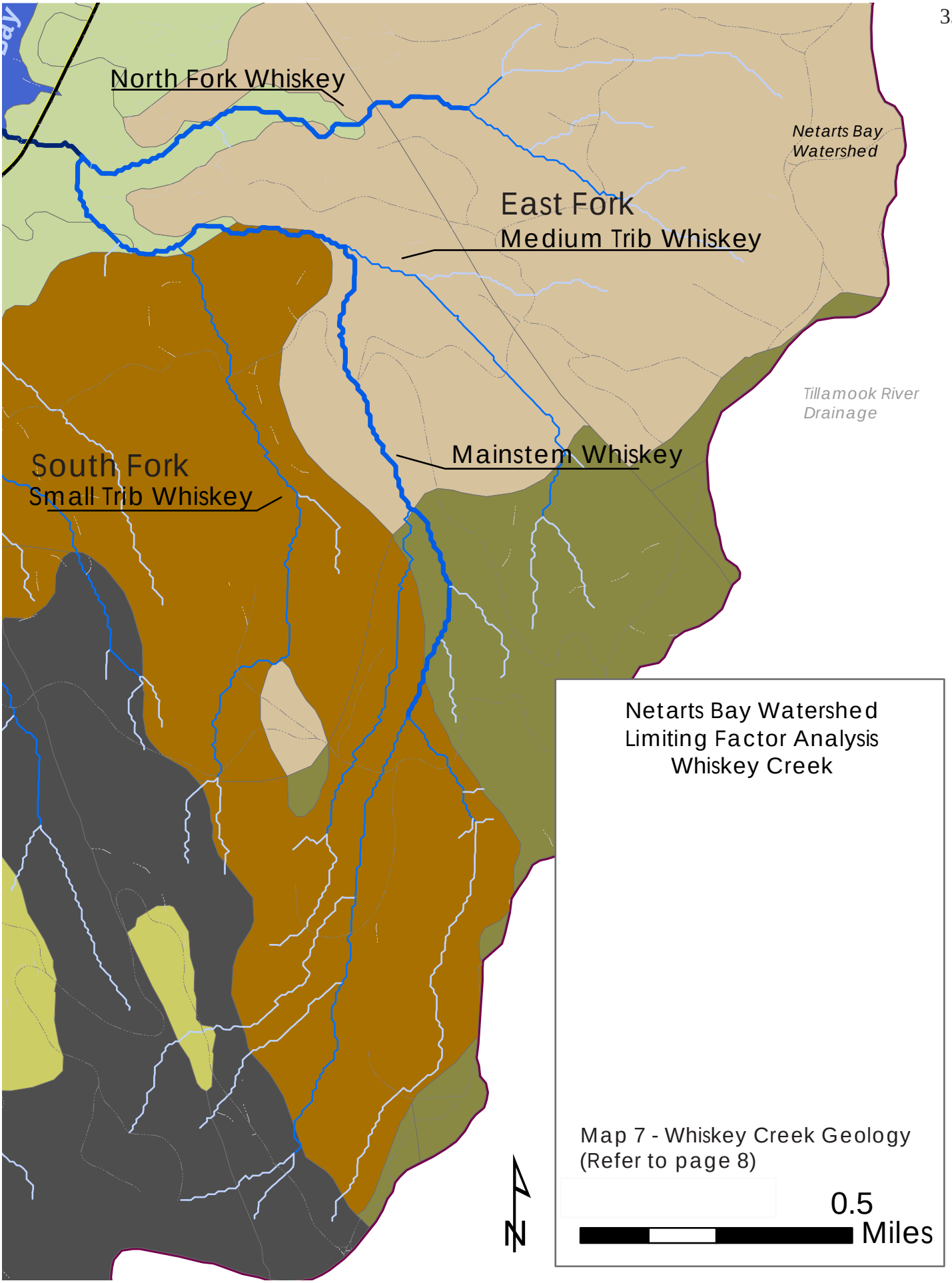
Table 8 - Upland potential smolt production based on ODFW survival rates.

Name	Spawning	Summer	Winter
Whiskey Mainstem	450	267.88	1105.1
East Fork Whiskey	0	88.26	316.2
South Fork Whiskey	0	15.65	93.2
North Fork Whiskey	67.5	316.36	2301.69
O'Hara	67.5	283.18	693.07
Rice	33.75	286.7	815.56
Hodgdon	33.75	147.13	460.6
Fall	281.25	159.95	922.11
North Fork Fall	0	39.49	151.64
Bay-going Jackson	450	36.19	295.81
Ocean-going Jackson	225	92.15	503.25
Netarts Creek (Jackson Channel 2 or Trib 2 in the AQI data)	112.5	6.88	89.31
Jackson Channel 1	0	0	76.63
Total	**1,721**	**1,740**	**7,824**

Table 9. Upland potential smolt production based on Alsea study survival rates.

One of the challenges in developing production estimates for the Netarts Bay Watershed is the disconnected nature of the stream drainages. Generally juveniles within a 6th field watershed (Netarts is a 6th field) are able to move from stream to stream as needed based on the habitat conditions which they encounter. For example, when mainstem temperatures rise during the summer, juveniles can often move to smaller cold water streams. In many streams within the Netarts Bay Watershed, juvenile Coho would need to pass through a highly saline estuarine environment in order to migrate from stream to stream. For the purposes of this analysis, a conservative assumption was made that juvenile Coho would be confined to the stream complex within which they were spawned. Stream reaches with no spawning gravels were therefore excluded from the analysis. Yeager Creek in particular represents the creek most impacted by this modification. Yeager Creek has extensive Beaver activity and drains a highly erodible lithology. The wetlands at its mouth have excellent potential to provide habitat for juvenile Chum, but are unlikely to be utilized by juvenile Coho.

Juvenile Chum salmon do not require the extensive freshwater rearing that juvenile Coho and Steelhead do. Chum rearing generally occurs over a month long period in an estuarine habitat. Netarts Bay provides extensive estuarine habitat relative to its freshwater habitat. As this project did not explicitly include an evaluation of estuarine function, it is not possible to definitively state that it does not affect Chum productivity, but it seems unlikely to be a limiting factor. Additional work would be needed to definitively clarify this issue. The low levels of well sorted, accessible spawning gravel will clearly affect Chum production however, and likely represent the current limiting factor to Chum production. In spite of these conclusions, recent Chum returns and summer counts of juvenile Coho are extremely low (much less than the model predicts based on either set of assumptions). The limited freshwater habitat available under even the best of conditions may have kept the historic populations small relative to nearby basins such as the Tillamook or Nestucca. For example, the total potential for the Netarts 6th field is substantially less than those for the Bewley Creek 7th field (a tributary of the Tillamook River). Small populations are proportionally more at risk of extinction as a result of impacts outside of their natal watersheds such as poor ocean conditions or fishing pressures. Additionally, hatchery impacts were extensive within Netarts for a time, and may have contributed to the pressure exerted by habitat degradation. Finally, Coho, Chum, and Steelhead may be forced to compete for gravels, effectively reducing the available spawning sites even further.


North Fork Whiskey
Netarts Bay Watershed
East Fork
Medium Trib Whiskey
Tillamook River Drainage
Mainstem Whiskey
South Fork
Small Trib Whiskey
Netarts Bay Watershed
Limiting Factor Analysis
Whiskey Creek
Map 7 - Whiskey Creek Geology
(Refer to page 8)
N
0.5
Miles

1 a) North Fork Whiskey Creek

Summary

The surveyed length of the North Fork of Whiskey Creek was 2119 meters (including ~200m of the mainstem from the bay to the confluence of the true North Fork). Confinement was variable ranging from deep entrenchment and a channel of ~2.5 meters wide to a broad wetland with a channel greater than 30m across. At one point the stream was 60 meters wide with 5 main channels. This wetland habitat was most common in the upper reaches but could potentially exist throughout the entire North Fork downstream of the survey end-point. The substrate, unlike the mainstem Whiskey Creek, is dominated by an erodible geology with the lower extent exhibiting more fluvial and estuarine deposits. It is possible that during periods of higher sea-levels much of the North Fork would have been brackish wetland (refer to geology map). Gravels within the North Fork were small and often poorly sorted. Although wood volume did not meet benchmarks the absence of gravel sorting appeared to be driven more by lithology in all but the last 500 meters of the survey. The North Fork also exhibits a clay/gravel hardpan stream bottom although this did not appear to contribute many fine sediments to the system. Gravels became more common towards the termination of the survey where resistant bedrock flanked the south bank. Cobbles were rare and few small boulders were observed at the survey terminus.

Although the volume of old growth LWD in the stream was high, the potential for future recruitment was low. The majority of the riparian area was dominated by older Alders and few mature western hemlock (Tsuga heterophylla) and Sitka spruce (Picea sitchensis). Although old growth cedar (Thuja plicata) stumps were present no cedar trees were observed. There were few (<50 total) saplings of any species observed, the majority being Sitka. Due to the high beaver presence, it is hypothesized that planting young conifers and alders would greatly benefit the area as the beaver are aiding in the reconnection of the channel to the floodplain. Lack of shade does not appear to be a limiting factor as there is ~80% cover in the more open areas with an average of 86%. Connectivity is another issue as there are two diversions; one which blocks entirely and one which limits access to the North Fork from the Mainstem of Whiskey.

There was little understory complexity. The hill-slope understory immediately adjacent to the riparian corridor was dominated by sword fern. One hypothesis is that the terrain is such that elk and deer have browsed the shrub vegetation so that only non-palatable plants remain. This dry, flat, corridor is unique in Netarts and is a sign that ungulates may rely on it for feeding habitat.[1] This may keep future recruitment potential low.

1 Personal communication, Bestcha, B. 2008

Land-use

Although the entire North Fork of Whiskey Creek is owned by Stimson Lumber, the majority of the stream runs through wetland habitat unsuitable for timber production. This area was not replanted after the last harvest and many mature Sitka spruce remain. The uplands, which in most cases are far from the stream channel which migrates frequently across the valley bottom, are planted with Hemlock trees between 10 and 30 years of age.

Spawning sites

Steelhead and Coho overwinter in the North Fork but spawning sites are limited with roughly 3 square meters of spawning gravel observed. Gravels are present however near the termination of the survey; were wood recruited gravel sorting may increase increasing spawning habitat.

Rearing sites

The majority of the North Fork provides excellent summer and winter rearing habitat. Deep pools are common and significant complex habitat, including numerous beaver ponds, is available. Large wood provides cover from predation in many of these pools. Beaver activity is increasing the quantity and quality of off channel habitat. Shade is not a limiting factor throughout the stream although riparian complexity could be improved through planting. It is unclear if the Coho are migrating into the North Fork from the mainstem or are spawning in the North Fork.

Unique Biotic Usage

One Cutthroat was observed at the end of the last reach. Beaver presence was noted throughout the entire North Fork of Whiskey. Although the stream was downcut and confined along much of its channel, beaver dams had formed a series of step pools that were aggrading the channel and helping to reconnect the stream to its floodplain. Several beaver dams had created disconnected off-channel ponds. These dams did not

appear to block juvenile migration although it is not clear where the overwintering fish were spawned; ~30 juvenile Coho were observed in these pools.

Coho were more common closer to the confluence of the North Fork with the mainstem Whiskey Creek. Observed densities were roughly 2-8 juveniles per pool although this number would be expected to increase with snorkel survey methods. Although few fish were observed, hundreds of rough-skinned newts utilized the area for breeding and feeding. Rough-skinned newts were most common in the channels with connected floodplain habitat. One egg sack was found with ~500 rough-skinned newts about to emerge (see photograph at left). Few (~5) red-legged frogs were seen (see photograph on bottom). "Northern red-legged frogs often share breeding sites with rough-skinned newts (Taricha granulosa)."i The abundance of rough-skinned newts may be limiting the presence of red-legged frogs as these newts feed on red-legged frogs and their larvae.

Bird species present included Winter Wrens, Chickadees, and grouse which was encountered at the confluence of the North Fork and Mainstem. This particular grouse was attending a burn pile being conducted by a hatchery volunteer. The grouse was feeding on bugs and leafy greens and allowed the volunteer and surveyors to not only approach and photograph but also to touch it. One hypothesis is that it was luring potential predators away from a nearby nest

Road crossings and barriers – Only one remnant road crossing occurred on the North Fork of Whiskey Creek and this culvert had been removed. A tarp blocks a side-channel to the Mainstem of Whiskey Creek. During low flow some of the larger beaver dams may block juvenile migration.

High Risk Slopes

Although there were no definitive high risk slopes within the area surveyed, hill-slopes became much more steep past the survey terminus. This region (not a high risk slope area using the RML data; it is possible this layer is too coarse) could provide large wood and gravels were they to fail.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000'	SAFN in riffles
9.8	0.4	100	86	500	14
Table 10 - North Fork Whiskey Key AQI Metrics					

gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
64***	26.6	16.6	25	6
Table 10 - North Fork Whiskey - Key AQI Metrics *** Driven by mouth of Whiskey included in this fork.				

Summary of Limiting Factors

A lack of spawning habitat is the limiting factor on the North Fork of Whiskey. While volcanics do occur within the basin, they almost never sort (only one potential spawning site observed). Beaver appear to be restoring floodplain connection although riparian food sources may become a limiting factor and could benefit from a riparian planting focusing on vine maples and other riparian shrubs.

1b) Mainstem Whiskey Creek

Segment Summary

Mainstem Whiskey Creek enters the southern end of Netarts Bay. The confluence with the North Fork is located ~135 meters upstream from the mouth of the main channel. Almost immediately after this confluence the OSU owned hatchery, whose outflow is near the mouth, maintains a channel spanning concrete dam for their intake pond. Behind this dam, which during low flow has a drop of ~.3 meters, is a pool ~1.5 meters deep and an intake pipe which is covered by two steel grates the with gaps of ~2-3 cm. The hatchery records temperature data daily during the fall at this point. Several fish were noted in the pool in front of the diversion pipe including two Cutthroat and several juvenile salmonids. The hatchery has reported that stray Chum have previously made their way into the holding pens via the intake pipe. The lowest reach mainstem has excellent floodplain potential with a historic side channel occurring between the North Fork mouth and the confluence with the mainstem. This has been blocked to water flow with wood and black plastic presumably to increase flow to the hatchery diversion. Several discussions with local residents suggest that timber activities resulted in wood removal from the channel. This was substantiated by the lower wood volumes in the lower reaches. A recent timber harvest has exposed much of the southern bank after the wind storm of December 2007. This blow down provided needed wood to the stream but reduced riparian complexity and shade.

The South Fork is a small tributary which contains high wood volumes, a good riparian corridor, and could potentially contribute large wood, gravels, and cold water inputs. The gradient is generally too high for juvenile salmonid migratory use although this is an excellent Cutthroat stream.

Within the first 10 meters upstream of the confluence of the mainstem with the East Fork, the channel becomes a deeply incised hardpan with a beaver-dam log-jam complex with a drop of .5 meters. Upstream of this dam is a 50 meter beaver pond. The East Fork terminates in a small (~1.5 meter) incised channel with good cover and thick vegetation. The headwaters of this channel are puddled channels.

Past the confluence with the East Fork the mainstem becomes somewhat more confined. Gravels are abundant although poorly sorted. Emerging Coho fry utilize poor to marginal spawning gravels in this area. The only road crossing in the mainstem occurs at reach break 5 and was decommissioned some time ago. Reach 5 marks the significant habitat change where the valley width index (VWI) becomes 1.5-3 and the gradient increases significantly. Prior to reach 5 the wood volumes in the mainstem are somewhat lower than benchmark standards and often driven by debris jams of smaller alders. Upstream of reach 5 the habitat improves markedly and emerging Coho fry were almost always associated with spawning habitat. Floodplain connectivity improves past reach 5 as well. Observed Coho distribution ends ~200 meter downstream of the end survey point, although it is likely that Cutthroat and Steelhead could utilize the stream past the end of the survey.

Spawning Sites

Chum redds were observed at the mouth of Whiskey Creek upstream to ~100 meters past the hatchery intake. Anecdotal evidence of Chum migration suggests that Chum utilization is limited to the mainstem Whiskey Creek. Juveniles were present throughout the mainstem but fewer fish were seen than in the North Fork and in the mainstem past the confluence with the East Fork. Sorting was poor and was likely a result of low wood volumes and minimal key pieces. There are ~5 square meters of spawning gravels before the confluence with the East Fork and ~15 square meters of spawning gravels past this point.

Rearing Sites

Rearing habitat on the mainstem of Whiskey Creek is limited largely as a result of floodplain disconnection and low pool volume. Additionally, migration from the mainstem into the North Fork is somewhat inhibited as a result of hatchery activities (see photograph below). Recent downed wood upstream of reach 5 has created an intricate series of pools and a fry was seen in some of the best spawning gravels directly upstream of this jam although it isn't clear if adults will be able to pass the newly created jam as the majority of the flow is subsurface beneath a log although series of step pools might allow access during high flows. Rearing potential in the East Fork is high as a result of pool area although current function is lower than potential due to entrenchment and poor floodplain connectivity. Juvenile access is limited if not impossible as a result of high beaver dams. Wood volume and riparian condition indicate that the East Fork is on an upward trajectory.

Land-use

Private homeowners own small lots on the north bank of the mouth although their impact on stream habitat appears to be negligible. The only non forestry industrial ownership (>.01%) within the watershed is located at the mouth of Whiskey Creek. The volunteer run fish hatchery (owned by OSU) is situated on the southern bank, receives water from the mainstem of Whiskey to maintain the rearing ponds and releases effluents into Whiskey Creek when cleaning the holding tanks. Although hatchery fish are no longer released into Whiskey Creek (formerly a Chum hatchery, currently a trout farm for recreational fishing), hatchery activities may cause direct mortality of juvenile salmonids and deter access to Chum spawning habitat. The dominant land-use within the drainage is private forestry. This had significant impacts on Whiskey Creek sometime within the last century (history of logging practices is unclear) although harvest methods have improved somewhat. Buffers on recent clear cuts were not wide enough to sustain the 150+ mile/hour winds that occurred during the winter of 2007. A great deal of these buffers blew down and although the downed wood does provide instream habitat, buffers are often not replanted by timber companies which may result in reduced riparian complexity.

Barriers and Roads

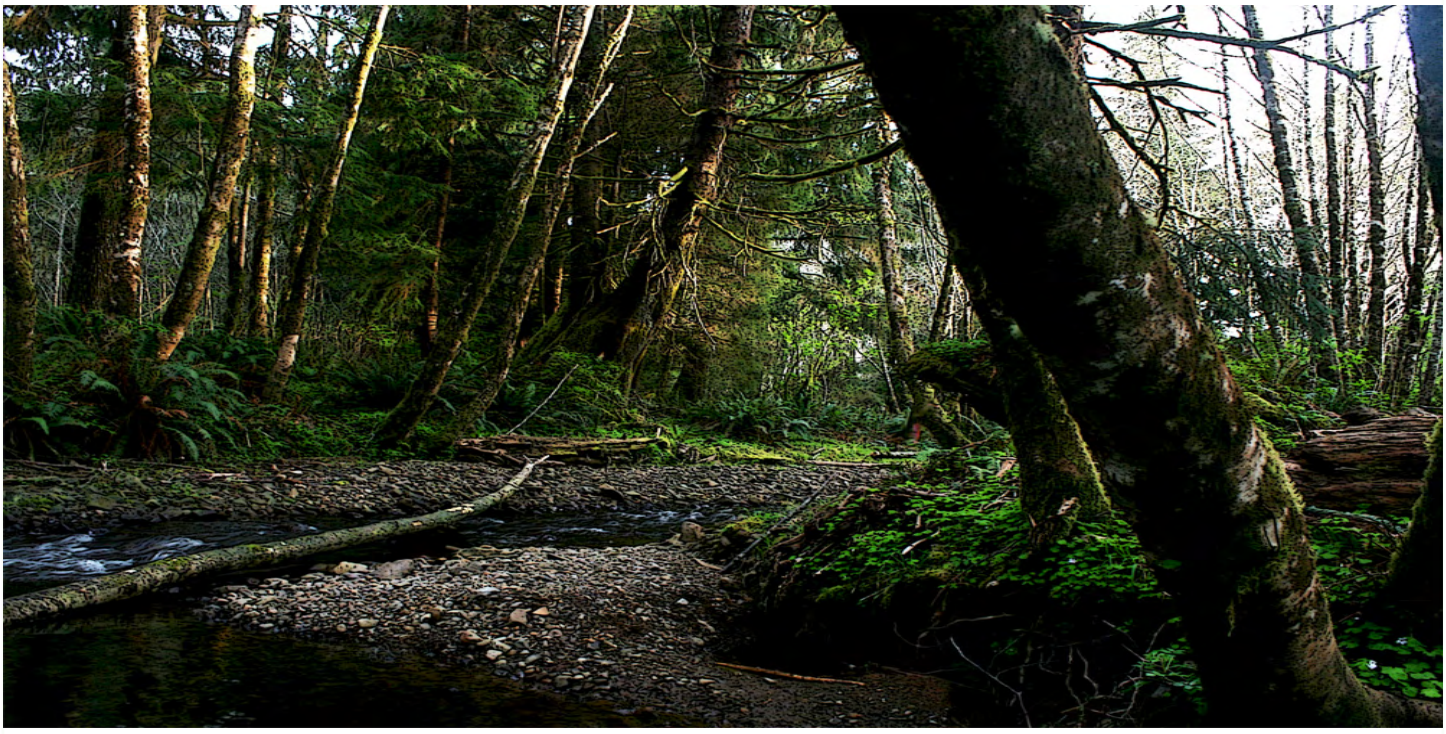
The hatchery dam is a juvenile passage barrier leaving only the North Fork for over-wintering habitat for any juvenile salmonid washed or spawned downstream of it. Additionally, the Hatchery has placed a tarp over the entrance to a side channel to the North Fork (see photograph above). This coupled with the danger of the hatchery intake may limit the ability of juvenile salmonids to access the North Fork to rear. One remnant road crossing occurs on the mainstem although the road had been decommissioned. Additionally, 6 road crossings block wood passage on high risk slopes.

Biotic Usage

Few rough-skinned newts were seen and no frogs were observed. Beaver activity is not as common on the mainstem of Whiskey Creek as on the North Fork. There was minimal beaver activity on the mainstem although where present increased channel complexity. Fish rearing was minimal although spawning was significantly greater. Wetland habitat was not frequent on the mainstem which likely accounts for the reduction in associated amphibians. Ungulate browse was not dominating the riparian corridor as was the case in the North Fork suggesting that elk and deer do not utilize this area as commonly.

High Risk Slopes

No landslides or debris torrents were observed although many of the hill-slopes were steep. The majority of the high risk slopes are found south of Whiskey Creek in Austin and Jackson Creeks although some of the hill-slopes near the terminus of the survey were unstable, steep, and likely prone to failure (not verified by the RML data layer).



Creek	SAFN in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
MF Whiskey	10	35	12.1	0.9	14	0
EF Whiskey	36	20.5	52.9	39.1	12.3	2
SF Whiskey	15	28	5.7	2.2	13.2	0

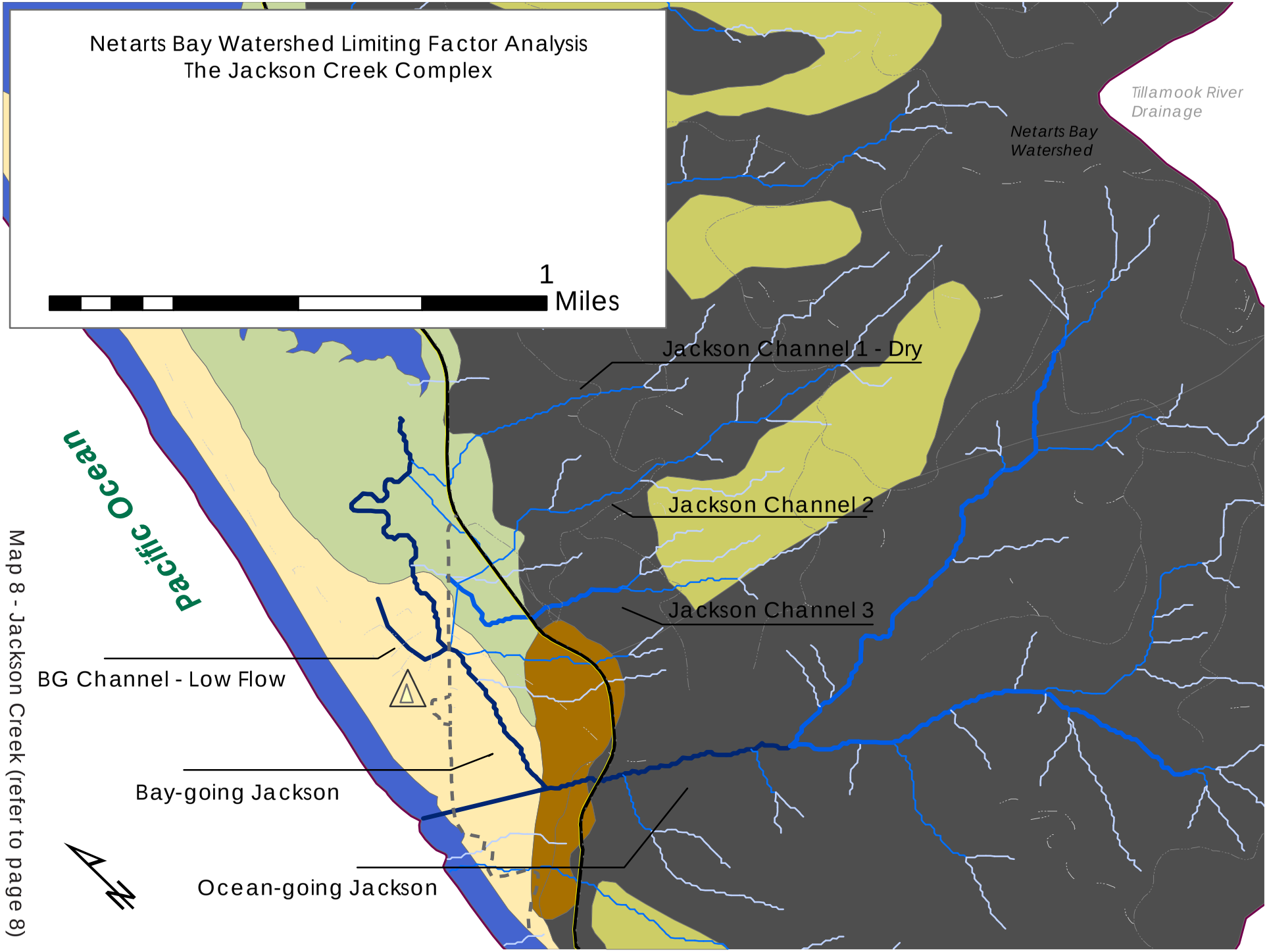
Table 11 - Mainstem Whiskey Key AQI Metrics

Creek	LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
MF Whiskey	21.3*	0.2	100	98	650
EF Whiskey	17.7	0	100	93	945
SF Whiskey	25.3	0.9	100	98	1341

*This is highly driven by reach 5 which exceeds benchmarks; the lower 4 reaches do not meet benchmarks.

Summary of Limiting Factors

This area has the greatest potential in all of the Netarts Bay Watershed. Rearing habitat is low and connection to the North Fork is limited due to the hatchery diversion. Spawning habitat is the limiting factor. Historic logging activities removed large woody debris resulting in poorly sorted gravels, poor pool development, and floodplain disconnection. Although the gradient increases upstream of the confluence with the East Fork, spawning potential is still high. This area should be conserved to provide for future downstream LWD.


Netarts Bay Watershed Limiting Factor Analysis
The Jackson Creek Complex
1
Miles
Tillamook River Drainage
Netarts Bay Watershed
Jackson Channel 1 - Dry
Jackson Channel 2
Jackson Channel 3
Pacific Ocean
BG Channel - Low Flow
Bay-going Jackson
Ocean-going Jackson
N
Map 8 - Jackson Creek (refer to page 8)

2) Jackson Creek Complex

Jackson Creek has a unique history in that it was diverted completely out of its ocean-going channel in the middle twentieth century to supply additional fresh water believed necessary to sustain commercial oyster production.[1] The creek was re-routed into a smaller basin at the south end of Netarts Bay. This channel has since aggraded and only ~10%-20% of Jackson Creek still flows into the constructed channel. This has caused a significant problem for both the State Parks Cape Lookout but also for spawning salmonids. Coho currently use the entire length of Bay-going Jackson. The watershed drains from resistant rock material supplying the basin with copious quantities of spawning gravels which are present throughout of all five Jacksons. From this point onward "Ocean-going Jackson Creek" will refer to the larger stream which flows directly into the ocean with stream which enters the bay referred to as "Bay-going Jackson."

2a) Ocean-Going Jackson Creek

Segment Summary

The mouth of Ocean-going Jackson flows into the ocean directly south of the bay and is near a picnic area for the campground. There is excellent potential for floodplain reconnection through large wood placement and good potential for spawning. A wetland is located adjacent to the channel along the entire length of the north bank from the mouth to the diversion. The water intake for the park is located downstream of the diversion on the south bank and directly above the only beaver dam on all of Ocean-going Jackson. Were this area opened to develop off-channel habitat the water intake may need to be relocated. Additionally, the channel is actively eroding the bank upon which the water pipeline runs and also may need to be relocated at some point. Approximately 100 meters upstream of the diversion the Netarts-Pacific City Highway crosses the creek. The fish ladder appears to be adult passable but may deter juveniles migrating upstream. The impacts of this (if any) are likely minimal as the majority of the rearing habitat is located downstream of this road crossing. Additionally, the north-east wall (upstream) is crumbling as is the ceiling at this point (see photo on following page). This damage is the result of a dynamite blast which was used to clear a debris jam during a winter storm within the last decade.

Ocean-going Jackson could potentially support sustainable salmonid populations. Specifically Steelhead could utilize the reaches upstream of the diversion for spawning and rearing if floodplain connectivity were restored. Additionally, the diversion allows for access into the bay (were flow issues addressed) which may improve rearing potential. When Bay-going Jackson was surveyed, over-wintering and emerging Coho were present throughout the length and beyond the diversion suggesting it may be possible for juvenile salmon to migrate from and into Ocean-going Jackson Creek using the main ocean-going channel to spawn and the bay to rear. Cutthroat currently utilize the entire length of Jackson to the first natural fork (see map) and likely beyond into both forks.

Land-use

The lowest reach of Ocean-going Jackson Creek is predominantly managed for the parks and recreation district (Cape Lookout State Park) with the remainder of the stream managed by Stimson Lumber Company and the United States Forest Service.

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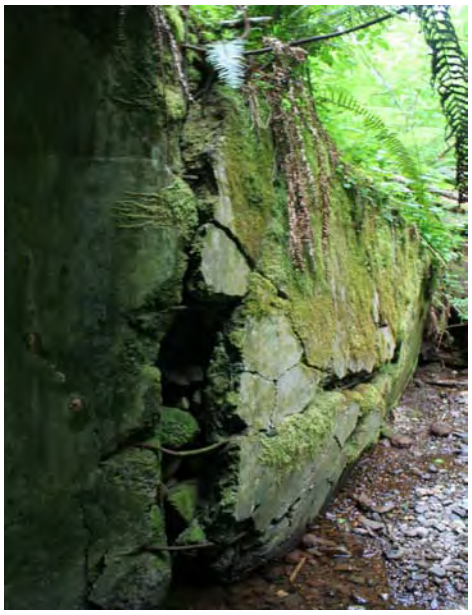
1 Anecdotal and physical evidence, no documentation on the timing and reason

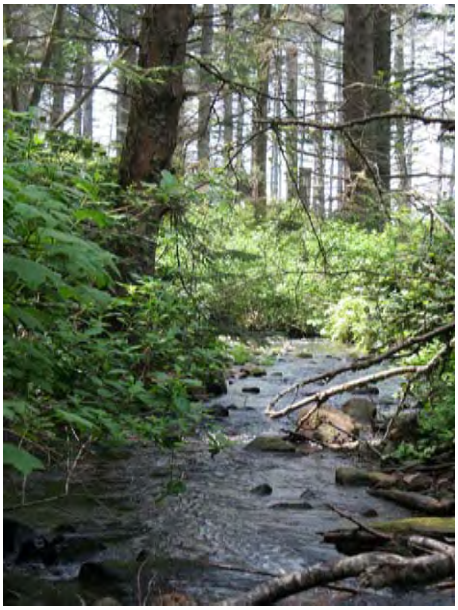
Barriers and Roads

A remnant road crossing in the park (adjacent to a picnic area) serves as a juvenile barrier. The old road grade is essentially a series of concrete blocks that raises the stream bed behind the dam by ~ 1m. The fill behind this dam is predominantly well sorted gravels and cobble. The spawning potential downstream of this juvenile barrier is minimal (it is nearly at the mouth) and does not justify dam removal. The use of this site as a ford should be limited however, riparian planting between the picnic table and the stream would reduce local foot-traffic through potentially good spawning habitat. The park water intake blocks access to a rearing pond created by a beaver Finally, the fish ladder may not pass juvenile salmonids. The failing retaining wall is displayed in the photograph below.



Spawning Sites

Gravels are not well sorted throughout the majority of Ocean-going Jackson and floodplain connection is limited, however 1 emergent fry was seen on Ocean-going Jackson Creek. There were roughly 10 square meters of spawning gravels.



Rearing Sites

A freshwater wetland along the length of Jackson Creek downstream of the diversion could provide excellent rearing habitat although floodplain disconnection may make this area inaccessible. It is possible that the loss of rearing habitat as a result of this disconnection could be mitigated by the diversion and the rearing habitat provided in the wetland complex near the bay (see discussion of Bay-going Jackson Creek).

High Risk Slopes

All of Cape Lookout is at risk for rapidly moving landslides suggesting that bed-load and LWD transport is high. Gravels were abundant although not well sorted suggesting that there is a general lack of LWD. Future recruitment potential appears high with mature conifers along the riparian areas.

Biotic Usage

Ocean-going Jackson exhibited limited salmonid usage. One beaver was present downstream of the diversion. No birds were observed although the potential for nesting habitat is high. No amphibians were observed although a detailed inventory of the wetland on the north bank of the creek has not been conducted.

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
13.7	0.2	100	96	732

Table 12 - Ocean-going Jackson Creek Key AQI Metrics

SAFN in riffles	gravel in riffles	% pools	%slackwater pools	%secondary channel	Beaver Ponds
8	36	9.8	6.7	15.7	2

Table 12 - Ocean-going Jackson Creek Key AQI Metrics

Summary of Limiting Factors

The Jackson Creek complex is a complicated system. As seen in the photograph above, this stream flows in two directions: the mainstem flows west into the Pacific Ocean and the modified channel flows north and west into Netarts bay (See map of Jackson Creek and photograph above). This is the result of direct channel manipulation in the middle of the 20th century meant to increase fresh water inputs to the bay.

Ocean-going Jackson – Limited gravel sorting and to a lesser extent floodplain disconnection are the limiting factors below the diversion. Gravels are present within the drainage as a result of the volcanic parent material and high risk slopes. Upstream of the highway Ocean-going Jackson has good future LWD recruitment potential although instream wood volume and gravel sorting is poor. A ford at the picnic grounds (possibly how park accesses water intake, see photograph below) is being supported by concrete blocks. This is one of the few places where gravels sort well although spawning potential might be limited by use of the ford. Wood placement would likely allow for greater floodplain connection and gravel sorting. Fencing of the riparian area would encourage park visitors to use the pedestrian bridge downstream. High terraces and low pool volumes limit rearing potential although this may be mitigated with access to the bay.

2b) Bay-going Jackson Creek

Segment Summary

Bay-going Jackson is not a completely artificial channel. Ocean-going Jackson Creek was diverted into an existing (small) channel in order to provide more freshwater to the bay (no documentation). The diversion completely altered the hydrology of the area immediately adjacent to the campground and most likely opened some areas to spawning at the expense of others. The channel downstream of the constructed channel is only somewhat confined by low terraces and there is some connection between Bay-going Jackson Creek and the headwaters of an adjacent wetland on the eastern bank (refer to photograph C). This wetland is predominantly fed by Netarts Creek (refer to discussion of Jackson Channel 2). During the summer flow into Bay-going Jackson Creek is significantly reduced. Aside from one deep pool upstream of a failing culvert (refer to photograph D on page 49 - this pool housed several salmonids suggesting migration upstream to Ocean-going Jackson might be less common than migration into the bay) in the park and a few other minor pools most of Bay-going Jackson is dry. Additionally, attempts at maintaining the flow within the campground have not been successful. Bay-going Jackson flows subsurface under the campground stranding juvenile salmonids in shallow pools or high and dry (see photograph below left with water and below right without water two weeks later). Upstream of this culvert water flows overland and down the road almost perennially, even during low flow. Downstream the nearly dry channel runs subsurface, through several undersized culverts, over a road at one point and into mudflats. A boulder weir has been built in an attempt to prevent the channel from taking this subterranean channel under the campground. The last reach (the constructed channel) of Bay-going Jackson is extremely confined by hill-slope with sheer banks of ~3-4 meters in height.

Rearing Sites

Rearing potential is greatly reduced as a result of flow issues. Connection to the Netarts wetland is almost completely non-existent and needs improvement. Several culverts need to be replaced and some channel reconfiguration may need to occur. The entire length of Bay-going Jackson supported juvenile salmonids Numerous (~30-50) emerging Coho fry were located at the spawning site depicted in the two photographs above right. Two weeks later the pools adjacent to the campground were dry and the stream went subsurface. Juveniles were seen in a shallow puddle in the middle of the campground. This pool had good shade and perhaps enough flow to allow for later access to the estuary although feeding habitat was poor and access to the estuary was swampy with no clear channel.

Spawning Sites

Spawning gravels were present throughout Bay-going Jackson and emergent fry were noted from the mouth to the diversion. Spawning gravel availability is complicated throughout the Jackson Creek complex. Coho spawn in Bay-going Jackson. There are ~20 square meters of spawning gravels in Bay-going Jackson.

Barriers and Roads

The culvert at the campground road may be partially blocked (see photograph D at left). Fish utilize the pool upstream of this culvert but flow is significantly reduced. Additionally, Bay-going Jackson is flanked on the eastern bank with a historical road which directs high flows away from the Netarts Creek (Jackson Channel 2) and into the campground.

Land-use

Bay-going Jackson is managed entirely by OPRD.

High Risk Slopes

Although all of Cape Lookout is at risk for rapidly moving landslides, Bay-going Jackson is dominated by its constructed channel at the diversion from Ocean-going Jackson. While bedload transport is high, this channel unnaturally bisects the hill-slope reducing the capacity for the stream to recruit LWD. Gravels are frequent but there is almost no wood aside from those pieces placed in the campground for restoration purposes which are not in the stream channel but rather above it. It is likely the flow regime has changed since the placement of this wood.

Biotic Usage

Bay-going Jackson currently supports Coho although the lack of suitable rearing habitat is limiting their production. Bear, deer, elk, raccoon, and other large mammals all use the unique habitat of the park for feeding and rearing their young. The freshwater-saline wetland interface also provides unique habitat.

Aquatic Inventories Summary Data

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
9	36	6.4	2	0	1
Table 13 - Bay-going Jackson Key AQI Metrics					

LWD Volume/100m	Key Pieces LWD/100m	%constrained	% shade	#conifers/1000ft
2.4	0	40	98	813
Table 13 - Bay-going Jackson Key AQI Metrics				

Summary of Limiting Factors

Bay-going Jackson –Poor access to a freshwater wetland fed by all but Ocean-going Jackson is the limiting factor in this anthropogenically altered channel. During high flows the engineered channel is accessible to spawning salmonids. These salmonids utilize the abundant gravel flats throughout the entire channel and perhaps migrate from the bay into Ocean-going Jackson below the diversion. During low flow, the channel north of the campground road is subsurface. Rearing potential is low in this channel as it runs directly through the campground and ends in a dry mudflat.

2c) Netarts Creek or Jackson Channel 2

Segment Summary

It appears that the headwaters of Netarts Creek (Jackson Channel 2) periodically flow into Jackson Channel 1, which during the 2008 surveys was dry. It appears that the flow which Jackson Channel 1 receives on occasion was diverted by a fallen tree and a landslide. Netarts Creek contains abundant gravels although they are only moderately sorted. An emergent fry was seen in the wetland complex between the campground road and the Netarts – Pacific City Highway. The culvert on Netarts Creek is very undersized at ~.3m diameter with bankful above and below between 1.5 and 3 meters. Additionally, the road drainage ditch upstream of this culvert diverts the majority of the winter flow down the road. This may reduce the summer input of water into critical spawning areas near the campground. The headwaters of Netarts Creek are confined by high risk unstable hill-slopes. This area supplies large quantities of resistant spawning gravels. One emergent fry was seen in a very shallow pool/riffle complex just below the road in this wetland. Additionally, the wetland supports juvenile over-wintering Coho as well. Beaver presence is high and maintains several step-pools over reeds, rushes, and sedges. This area is impacted by an undersized culvert that restricts passage into and out of these beaver ponds but also reduces the capacity of this wetland to recharge the lowest reaches of Bay-going Jackson near the campground (see photograph below).

High Risk Slopes

The uppermost reaches of Netarts Creek are extremely prone to natural disturbance related to channel changes. Based on the age and type of vegetation present in the historic channel and the condition of the fallen tree blocking this channel, the stream appears to have migrated twice within the last ~10.

Land-use

Netarts Creek is managed by Oregon Parks and Recreation Depart and by Stimson Lumber Company.

Biotic Usage

Beaver are present in Netarts creek and utilize the park road and associated undersized culverts to construct their dams. One emergent fry was observed upstream of the wetland shown in the photograph above.

Barriers and Roads

The culverts on Netarts Creek are undersized and serve as a juvenile passage barrier and possibly an adult barrier (flow dependent). Additionally, the undersized culverts serve as flow impediments which impacts both spawning and rearing habitat. If more water were allowed to enter the wetland below the campground road more water would be available to salmonids during the summer in these areas. This could be accomplished in several ways; increasing the winter flow capacity of the culvert on the highway would increase the water that enters the eastern boarder of the wetland. Further if larger culverts were placed under the park road more water may be available below the road and stranded fish in lower Bay-going Jackson may be better able to access the adjacent wetland habitat.

Spawning Sites

There is a high potential for spawning upstream of the Netarts Creek wetland if access were improved. There were ~5 square meters of spawning gravels present although the opportunity for sorting may increase were winter flow increased through culvert replacement.

Rearing Sites

Netarts Creek feeds a large wetland that forms the southern most extent of the bay. This wetland is fed by four of Jackson's five streams and is disconnected from half of its potential habitat (refer to the NWI maps) by undersized and poorly placed culverts and campsites.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
12.4	0	87	94	762
Table 14 - Netarts Creek Key AQI Metrics * Wood volume is low but future recruitment potential is high.				

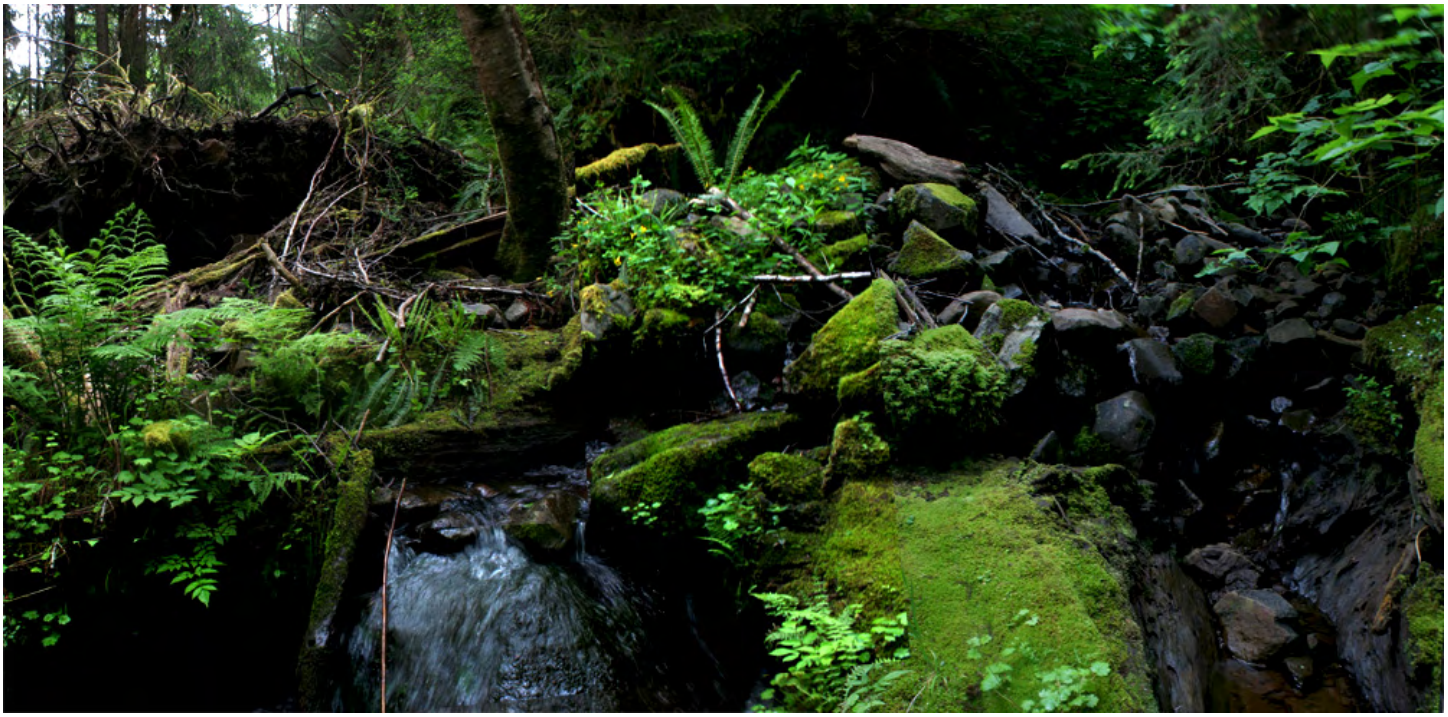
safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
19	33	0.0	0	0	12.4
*Pool habitat is minimal in the stream channel but wetland habitat is abundant mitigating the impacts.					

Habitat Issues

- Access to rearing habitat is limited by poor-channel/campground design and undersized culverts
- Spawning habitat is not accessible as a result of undersized culverts

Summary of Limiting Factors

The headwaters of Netarts Creek are dynamic and change channels frequently (See photograph below). There are very few pools and these are of minimal size. Spawning occurs directly upstream of a large freshwater wetland fed by four of Jackson's five creeks. Access to this wetland are likely the limiting factors for both Bay-going Jackson and Netarts Creek, both of which have undersized culverts not passable to juvenile salmonids and possibly adults. Neither stream has abundant pool (winter and summer rearing) habitat outside of this wetland.



The culvert at Netarts-Pacific City Highway is undersized and impassible and may also be a hazard during flood events (see photograph below). Several work crew members stated that during the most recent flood event they had been called out to clear the blocked culvert and that water had been running over the road. The authors of this report have observed this culvert during high flow events and have noted water flowing adjacent and across the road and into currently-dry portion of the wetland.

2d) Jackson Channel 1

Segment Summary

Jackson Channel 1 is a puddle channel. This channel appears to carry water from the road-side drainage ditch and from Short Creek during extremely high flows. Recent scour was not evident and the channels contained salmonberry suggesting that Ch. 1 had not carried much water for a few years. Two culverts had minor flow (see photograph on bottom left).

Barriers and Roads

There are two small culverts perched high above the channel although minimal flow was observed during the field season.

High Risk Slopes

The uppermost reaches of Netarts Creek are extremely prone to disturbance and migrated channels many times. At the time of survey it appeared to have drastically changed channels twice within the last 10 years or so. Many trees were down at the time of survey due to the previous years windstorm.

Spawning Sites

There is no current potential for spawning on Channel 1.

Rearing Sites

Low flow limits summer rearing although there is some winter potential (see production modeling).

Land-use

OPRD manages Jackson Channel 1.

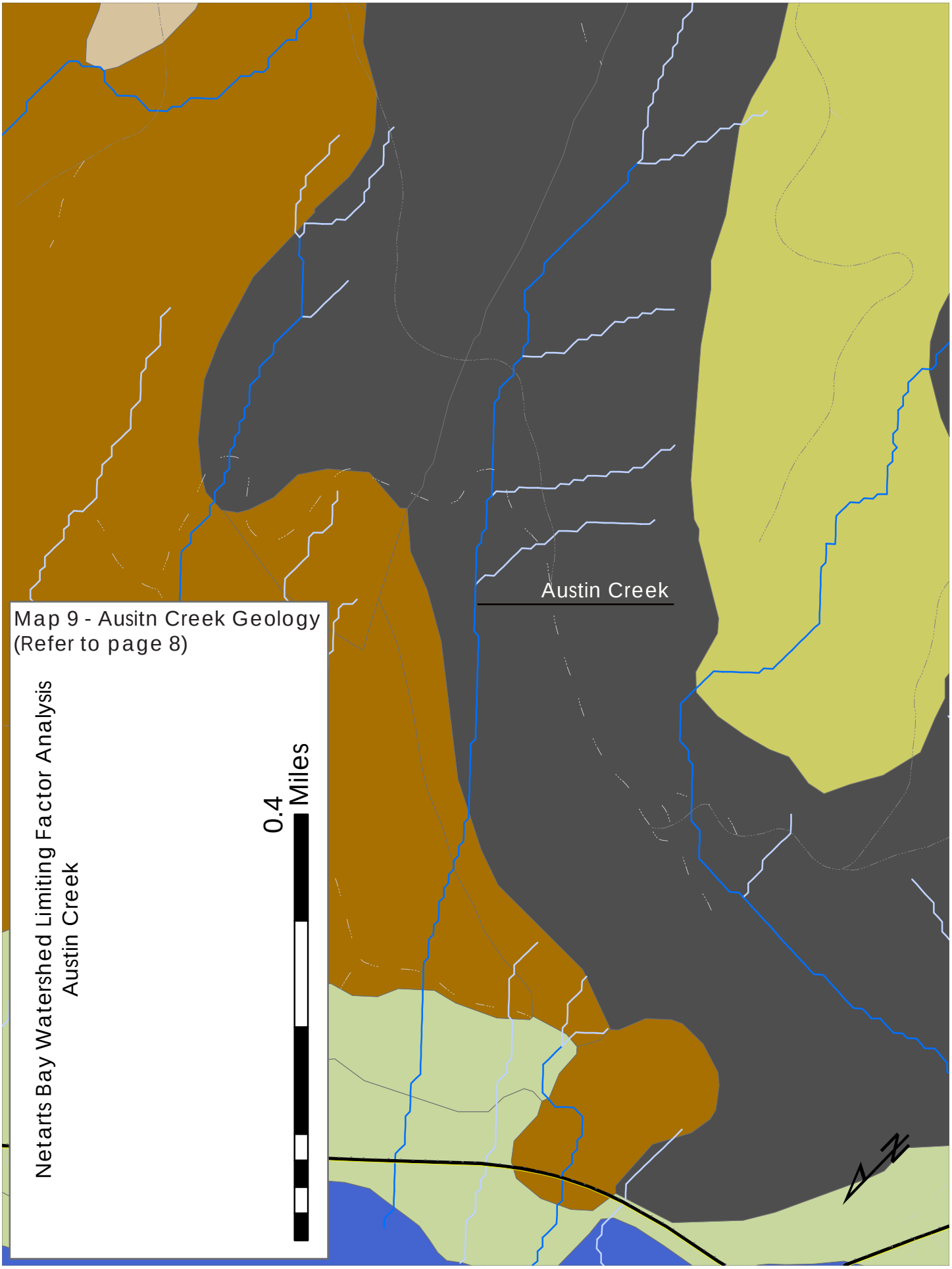
Barriers and Roads

The culverts on Netarts Creek are undersized and serve as a juvenile passage barrier and possibly an adult barrier (flow dependent) although there is currently no flow.

Habitat Issues

• No water

•Undersized and improperly placed culverts based on flood-scour evidence although there is currently no water


Austin Creek
Map 9 - Ausitn Creek Geology
(Refer to page 8)
Netarts Bay Watershed Limiting Factor Analysis
Austin Creek
0.4 Miles
N

5) Austin Creek

Segment Summary

Austin Creek enters the bay through a freshwater wetland. This wetland is likely the result of the road impoundment but it is maintained by beaver activity (see photograph below). The first culvert, although undersized, appears passable to adults and juveniles although it may be a winter juvenile velocity barrier. The entire southern hill-slope along lower Austin Creek had been harvested and replanted within the past three years. The riparian buffer was largely reduced by the most recent windstorm and large volumes of wood had entered into the channels either from topping or more commonly from uprooting. This wood immediately created a great deal of habitat complexity. A remnant road crossing had been recently decommissioned the banks of which had not been replanted (see photograph below). These banks are possibly supplying excess fine sediments which settle in downstream beaver ponds. Measurements of ponded-sediment (predominantly silt) depths were consistent at ~1 meter deep. Resistant substrate and spawning gravels were observed throughout Austin upstream of this. Low volumes of instream wood were observed upstream of the second road crossing. The entire upper-Austin drainage is comprised of a volcanic substrate providing large quantities of gravels to the system although spawning is limited to a very short reach as a result of poor sorting. Spawning reaches are dominated by landslide deposits perhaps explaining the quantities of fine sediments found there.

Barriers and Roads

Although there are no barriers to passage the first culvert at Netarts Bay Road is significantly undersized. Were this culvert to be replaced it is likely that the wetland would form a more definitive channel allowing more sediments to flush and gravels to sort potentially increasing spawning habitat. Neither culvert can pass wood.

Biotic Usage

Beaver presence is very high and could potentially transform Austin Creek into a high functioning salmonid stream.

Land-use

Austin Creek is predominantly managed for private timber although private rural residential lots surround the mouth.

High Risk Slopes

Almost all of Austin Creek is dominated by high risk slopes. This was validated by field surveys. The decommissioned road crossing occurs within one of these high risk areas.

Spawning Sites

Although no redds or juvenile fish were observed during this survey several areas of low to medium quality spawning gravels were noted. Sorting was fair and wood volume was high. Four hypotheses were developed to explain why no fish were observed during surveys, numbers were so low that any fish present were not visible to surveyors; the winter storm event was so drastic that redds were disturbed by debris; the culvert at the main road was blocked by debris; or the 2007 cohort did not return. It is likely that spawning potential will increase as wood continues to sort gravels. Very few (< 3 square meters) spawning gravels were observed.

Rearing Sites

Rearing potential is extremely high in this stream with the presence of beaver ponds and the large quantities of LWD that entered the stream from the most recent wind storm.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
47.5**	3.5	72	*83	528

Table 15 - Austin Creek Key AQI Metrics
** Driven by recent blowdown, Wood volume in upper reach very low. *High in upper reach, low at mouth.

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
57	19	32.2	25.5	1.7	*1

Table 15 - Ausitn Creek Key AQI Metrics continued * 1 contiguous beaver complex with several dams

Austin Creek

Spawning habitat is the limiting factor in Austin Creek. Although undersized, the culvert at the Netarts-Pacific City Highway crossing appears passable. There is extensive wetland habitat due to the presence of beavers. The most recent windstorm blew down the buffer from a recent timber harvest exposing the lower reach of Austin to solar radiation (see photograph below). This may become a systemic problem if the buffer is not replanted although the total area exposed is rather small. Upstream reaches of Austin were lacking in LWD but there was good potential for future LWD recruitment.

Map 10 - Crown Zellarbach Creek Geology (Refer to page 8)

Netarts Bay Watershed Limiting Factor Analysis
Crown Zellarbach

5) Crown Zellarbach or Hathaway Creek

Segment Summary

Crown Zellarbach Creek (CZ) like many drainages in the Netarts Bay Watershed, has been recently harvested although unlike Whiskey and Austin Creek, the riparian buffer is relatively intact and is comprised of many large conifers. The mouth of CZ is zoned rural residential although historically a campground was situated where a house now lies. This private residence is surrounded by a large cyclone fence which traverses the stream channel leaving roughly two inches of clearance over the waters surface. It is likely that this fence is an adult fish passage barrier. The culvert at the road is undersized although passable. CZ Creek drains an entirely volcanic watershed and the substrate is dominated by gravels. Further, the gradient is such that from the mouth to ~500 meters upstream is ideal habitat for salmonid spawning. Coho rearing habitat may be limited. Steelhead habitat is generally good and this stream could support significant numbers.

Land-use

Rural residential ownership at the mouth and private timber ownership upstream of the road.

High Risk Slopes

The entire CZ Creek drainage is comprised of high risk slopes.

Spawning Sites

Spawning habitat is available throughout the lower reaches of the watershed and likely minimal spawning 500 meters upstream from the mouth.

Rearing Sites

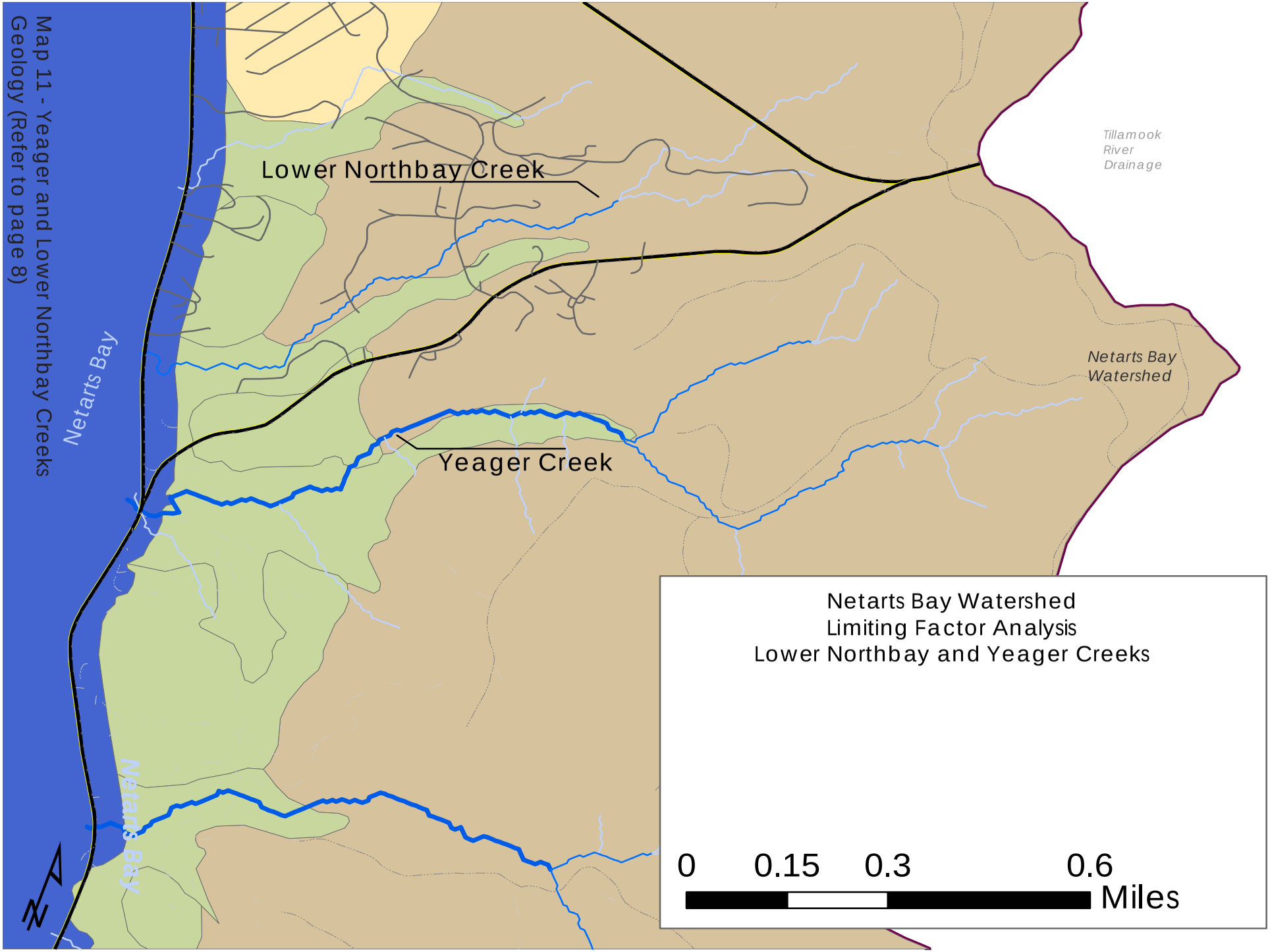
Pool volume is low.

Barriers and Roads

A private fence likely blocks adult passage to spawning habitat.

Summary of Limiting Factors

Pool volume and access is the limiting factor. Gravels are abundant and the riparian buffer includes many large conifers that provide shade. The stream becomes high gradient within 500 meters of the mouth and provides few rearing ponds. A private fence across the stream provides roughly two inches clearance during low flow and is likely a barrier during high flows. The culvert at the road is also undersized.


Map 11 - Yeager and Lower Northbay Creeks
Geology (Refer to page 8)
Netarts Bay
Lower Northbay Creek
Yeager Creek
Tillamook
River
Drainage
Netarts Bay
Watershed
Netarts Bay
Netarts Bay Watershed
Limiting Factor Analysis
Lower Northbay and Yeager Creeks
0
0.15
0.3
0.6
Miles

5) Yeager Creek

Segment Summary

Yeager is dominated by wetland habitat (see photograph below). The lowest ~200 m of stream are tidally influenced marsh. The stream channel surveyed is an unconfined braided channel dominated by a sandstone geology. Unidentified fish were observed in this area. As the stream becomes freshwater beaver activity dominates the landscape. Nearly the entire lower creek is beaver dominated. No spawning gravels were present and no salmonids were observed. Historically lower Yeager was straightened and diked from half of its potential wetland habitat. The south fork of Yeager Creek is blocked to all fish passage by a failed culvert. The road forming the dike is currently protected only by a small beaver dam directly in front of the failed culvert which filters all debris and prevents complete blockage.

Biotic Usage

18 red-legged frogs were observed as were several rough-skinned newts. Beaver presence is high.

Land-use

The lowest kilometer of stream is privately owned rural residential and access was denied or not obtained so that surveys need be conducted on a public road. Where access was granted, rural residential use had no observed impact on the stream. Timber management is the secondary land-use.

High Risk Slopes

There are minimal high risk slopes on Yeager and these occur in isolated headwater channels where there is little possibility of LWD and bedload transport to fish-bearing streams.

Barriers and Roads

The culvert to the south Fork of Yeager Creek is an adult barrier to passage. There are no other barriers to adult passage on Yeager Creek although the beaver dams at low flow may impede juvenile passage.

Spawning sites

There are minimal (<1 square meter) spawning gravels in the North Fork of Yeager and little opportunity for gravel recruitment as Yeager is dominated by a sandstone lithology.

Rearing sites

Rearing potential is high in Yeager both in freshwater and saline habitats although cover is limited. Were shade and cover from predation in the estuary addressed Yeager could potentially support rearing Chum.

Aquatic Inventories Summary Data

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
78	20	91.4	96.7	6	14

Table 16 - Yeager Creek Key AQI Metrics

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
2.8	0.1	26	95	274

Table 16 - Yeager Creek Key AQI Metrics continued

Summary of Limiting Factors

Lack of spawning habitat limits production. Estuarine habitat is reduced by ~1/2 due to the imapcts of the access road and failing culvert.

6) Lower Northbay Creek

Segment Summary

Lower Northbay Creek is a severely altered stream channel. The mouth is fairly brushy up to a large dam that impounds several hundred meters of creek to create a recreational pond. Beyond this pond the creek becomes brushy up to timber land where flow stops. Access was denied for the majority of the stream channel and surveys of this reach were conducted from a public road.

Land-use

Predominantly rural residential with timber in the headwaters where flow stops.

Barriers and Roads

The dam is impassible to fish.

High Risk Slopes

There are no high risk slopes.

Spawning Sites

There were no spawning gravels observed.

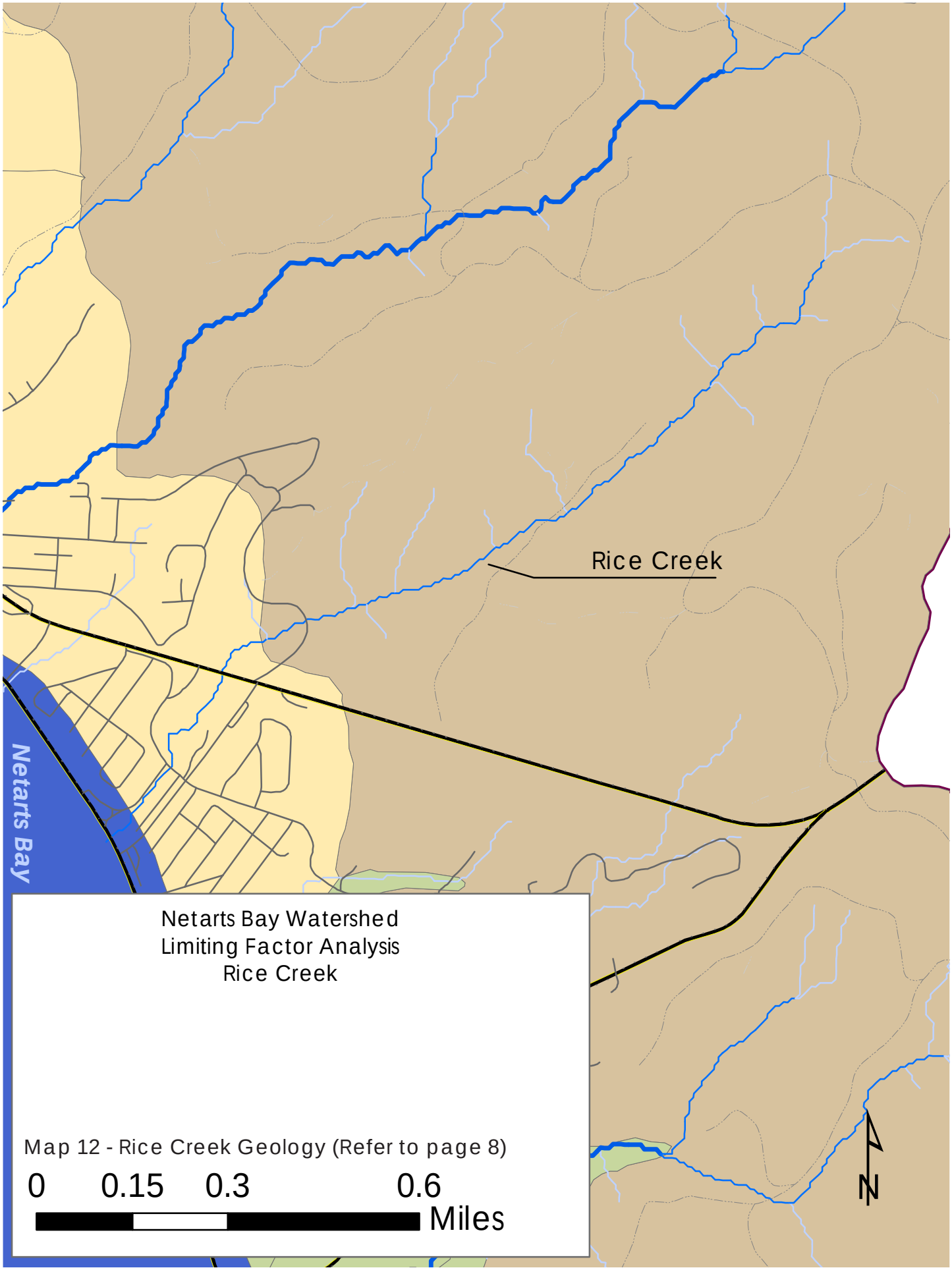
Rearing Sites

Rearing could be high with the presence of deep beaver ponds and wetlands.

Summary of Limiting Factors

Lower Northbay Creek is not accessible to fish 600 meters from the mouth due to the presence of a dam built to create a private recreational pond. No spawning gravels were seen above or below this reservoir.

* Some of the AQI metrics were not collected properly and has been ommitted from the analysis.


Rice Creek
Netarts Bay
Netarts Bay Watershed
Limiting Factor Analysis
Rice Creek
Map 12 - Rice Creek Geology (Refer to page 8)
0
0.15
0.3
0.6
Miles
N

7) Rice Creek

Segment Summary

Rice Creek is one of the few streams within Netarts which has no culvert at the mouth. The lowest ~300 meters of Rice Creek riparian area is managed as a recreational vehicle park which also offers boat rentals. The bridge at mouth allows for passage of these boats to the bay (this may be a source of hydrocarbons). Rice Creek is characterized by a low gradient for the majority of its length. Additionally, although low gradient, there is very little opportunity for floodplain connection as a result of land-use. Juvenile salmonids were observed near the mouth of Rice Creek. Gravels were common throughout the entire survey. These gravels did not sort well possible as a result of entrenchment and lack of wood although the gradient does not increase until the channel becomes much smaller (2.5% with a width of ~1-2 m). Pool volume is high although channel complexity is low. Shade is good throughout most of Rice Creek. Rice Creek is impacted throughout private non-timber ownership. One culvert on Rice is not passable to juvenile fish and may pose a barrier to adult salmonids. The AQI survey ended at a landslide where the creek flowed sub-surface ~1.5 km upstream from the mouth. A decommissioned road crossing upstream by ~1 km on private timber land also appeared to have created a localized landslide where the stream went sub-surface. The stream at this point appears to have had a bankful event suggesting that stream flow is not a winter limitation. This remnant crossing may be supplying fine sediments as there was no pull back and both banks which once supported a culvert are actively failing.

Barriers and Roads

Two culverts may block fish passage (see photograph on left). Additionally, Rice is prone to bank failure and slumping. Road maintenance and construction should take this into special consideration.

High Risk Slopes

While Rice Creek is predominantly a low gradient system, there are at least three landslides: one which covers the stream for ~4 meters, another which covers the stream for ~6 meters (both in Ocean Highlands) and one that covers the stream for ~2 meters (on Stimson ownership). It is likely that the erodible substrate within the Rice Creek drainage is more prone to failure than other more resistant catchments such as Jackson or Whiskey Creeks.

Land-use

Rice Creek is mixed private commercial, private rural residential, and private timber. A marina is intensively used at the mouth for commercial boat rentals (crabbing, touring, etc.). The lowest reach runs through the largest RV park in Netarts. This reach is not connected to a floodplain and is highly entrenched. Upstream of Netarts-Oceanside Highway, Rice Creek flows through a newly built private housing development named Ocean Highlands. Managed by Centex, Ocean Highlands is not complete but encompasses the stream corridor until private industrial ownership. A pedestrian trail at the Highway (named Beaver Creek Trail) travels through the riparian area and across the stream channel. Landscape maintenance practices and storm-drain placement have created an artificial wetland on Centex property. Stimson manages Rice Creek upstream of Centex.

Spawning Sites

Spawning is limited in Rice Creek. Although gravels are abundant the stream is extremely low gradient and these gravels do not sort well. Additionally, where gravels do begin to sort well the wetted width falls to ~1 meter. There may be a greater potential for spawning on private timber land but landslides are reducing the productivity of these spawning sites. Additionally, there was a high rate of embeddedness as a result of bank erosion. Abundance was estimated at 3 sq m.

Rearing Sites

Although pool volume within Rice Creek is high, there is very little wood and no secondary channels. Channel complexity appears to be a limitation for summer rearing.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
1.3	0	100	89	1179

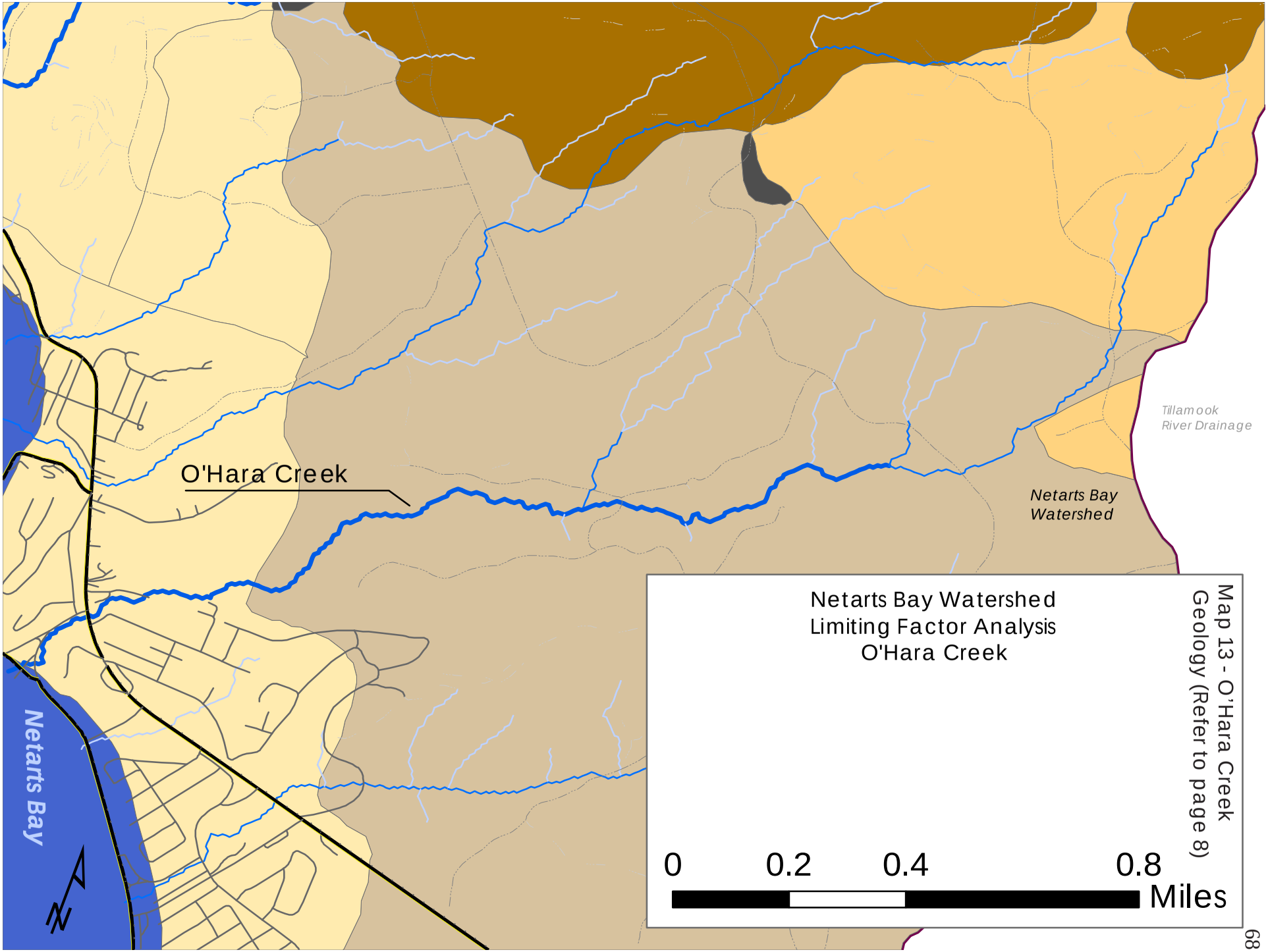
Table 18 - Rice Creek Key AQI Metrics

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
No riffles*	No riffles*	86.3	52	6.8	0

* This may be an artificact of the channel unit classification. Rapids were classified throughout the the stream. It is possible that these would have been better characterized as Riffles.

Summary of Limiting Factors

Salmonid production on Rice Creek, much like Hodgdon and O'Hara Creeks, is limited by the presence of urban development and gravel abundance. Where Rice Creek enters private forestry ownership the habitat quality increases moderately although the morphology and gradient is such that it would not likely support a large salmonid population at this point. Gravels are present but slopes are unstable and prone to failure resulting in spawning potential reduction. Access is also a secondary limiting factor with several culverts directly upstream of known spawning reaches are undersized and likely impassible.


O'Hara Creek
Netarts Bay
Tillamook
River Drainage
Netarts Bay
Watershed
Netarts Bay Watershed
Limiting Factor Analysis
O'Hara Creek
0
0.2
0.4
0.8
Miles
Map 13 - O'Hara Creek
Geology (Refer to page 8)

8) O'Hara Creek

Segment Summary

O'Hara Creek flows beneath the Tillamook County boat launch through a ~100m long double culvert. During the 2008 surveys juvenile salmonids were observed several hundred meters upstream of the mouth. This creek is extremely confined until land-use becomes forestry dominated at which point complexity increases. There is very little wood within O'Hara Creek and spawning gravels do not sort well despite the ideal gradient. O'Hara Creek is highly sinuous and there is good potential for floodplain connectivity. Low terraces (~.5-1m high) run along much of the timber managed length of O'Hara Creek. Pool volume is low throughout the stream. There are ~10 square meters of spawning gravels on O'Hara Creek.

Barriers and Roads

Although poorly placed and failing (see photograph above), the culvert at the boat launch is passable to adult salmonid (possibly not Chum) and spawning does occur upstream. Likewise, two small waterfalls on private non-industrial land and the first culvert past these cascades are also passable to adult salmon despite the fact that water is flowing under rather than through the culvert. These are all however barriers to juvenile salmon seeking cooler waters and deeper pools upstream. The first road crossing on land managed for timber appears to have a planned replacement with larger culverts staged along the roadside adjacent to the culvert. The construction staging and road use (maybe road grading to some extent) also appears to be delivering some fine sediments immediately downstream.

Land-use

A public boat launch (Tillamook County owned) dominates the mouth of O'Hara Creek. The mouth of the creek was largely filled for a public parking lot and diverted into a double culvert (~100m long) that enters the bay immediately north of the launch ramp. There is a ~.5m jump over rip rap from the bay into the culvert. The southern culvert is failing at the upstream side. Were the channel not constricted by the Netarts-Pacific City Highway on the north bank the culvert would be considered undersized. The second largest RV park in Netarts occurs upstream of the Netarts-Oceanside Highway culvert. This sits on a high terrace which was likely filled to accommodate the rental spaces. These terraces remain high throughout the rural residential reach of the stream. Once O'Hara Creek nears private timber land the hill-slope upon which private houses sit rises and the channel begins to meander.

High Risk Slopes

The terraces on private non-forestry lands are often eroding or were being stabilized by landowners with tire, wood, or rock. The hill-slope on forestry lands was often steep but well vegetated with no signs of active erosion. There are very few high risk slopes and those that do occur are well within the headwaters and unlikely to deliver gravels and wood to fish-bearing streams.

Spawning Sites

Spawning potential is high in O'Hara Creek especially on land managed for timber. Spawning is occurring on O'Hara Creek but gravels are so poorly sorted that it is far from seeded to potential capacity. Gravel abundance was estimated at 6 sq m.

Rearing Sites

Pool volume is minimal throughout most of the stream although greater where wood is locally present. Pools within timber management are often shallow and of poor rearing quality.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
0.5	0	100	97	5121

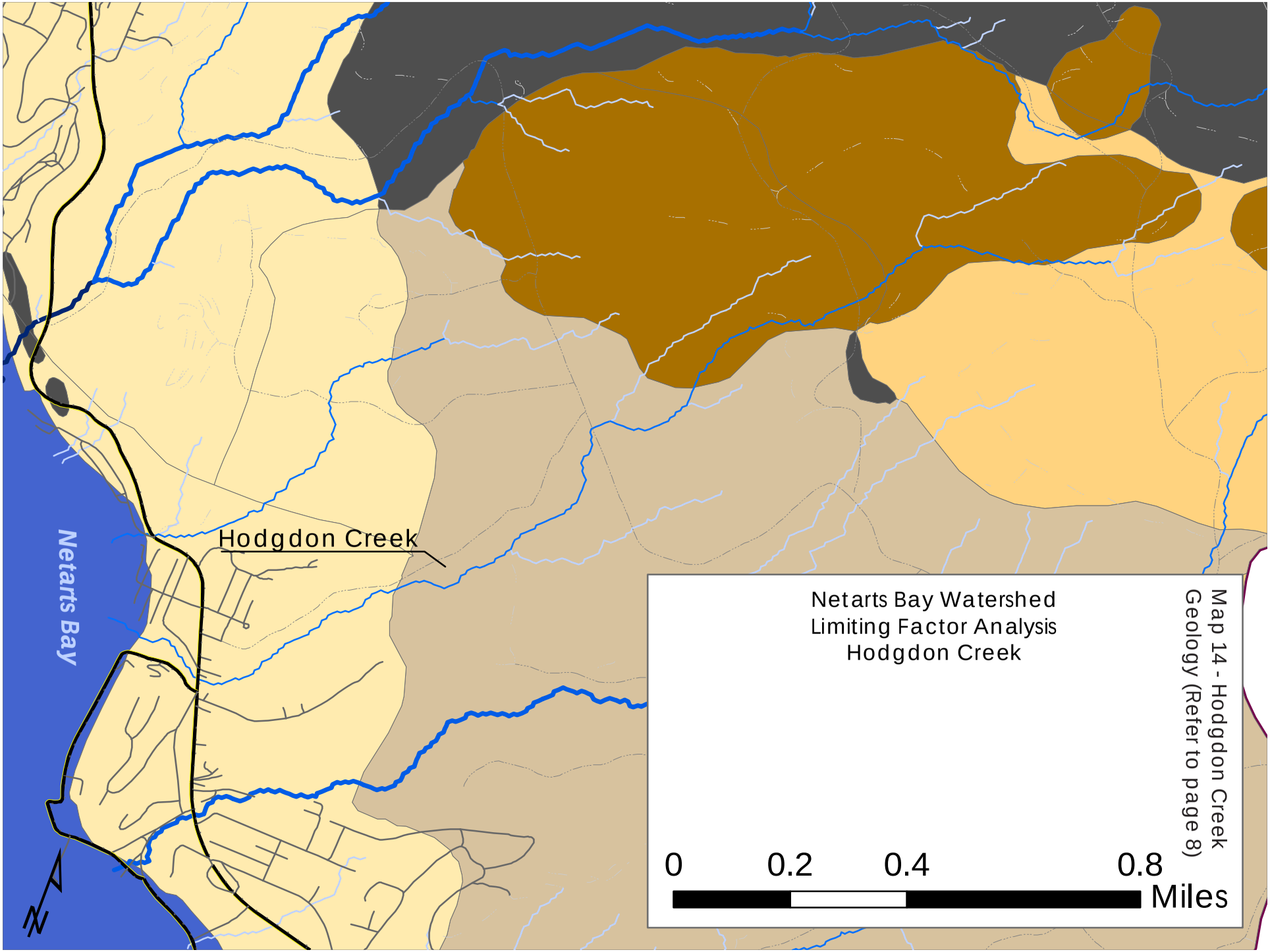
Table 19 - O'Hara Creek Key AQI Metrics

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
33	53	49.4	11.1	1.5	0

*Pool volume is driven by a few very large pools in rural residential ownership.

Summary of Limiting Factors

O'Hara Creek is primarily limited by access, well sorted spawning gravels, and pool volume in private forestry ownership.


Netarts Bay
Hodgdon Creek
Netarts Bay Watershed
Limiting Factor Analysis
Hodgdon Creek
Map 14 - Hodgdon Creek
Geology (Refer to page 8)
0
0.2
0.4
0.8
Miles
N

9) Hodgdon Creek

Segment Summary

Hodgdon Creek contains large quantities of gravel, although generally poorly sorted. The mouth is confined by hill-slope although it is likely that the northern hill-slope was a historical terrace modified for building. The creek remains fairly confined throughout its length although it exhibits a moderate floodplain. Hodgdon is relatively short and is dry throughout much of private timber ownership. AQI surveys ended at a landslide ~50m long where the flow went subsurface. Fish were noted during the summer of 2008.

Land-use

The dominant land-use is private rural residential. Hodgdon flows through backyards often within 5-10 meters of homes. The creek becomes much smaller and is dry for most of its length on land managed for private timber. Running through Netarts, Hodgdon Creek is highly impacted by invasive weeds, most notably knotweed.

Barriers and Roads

No barriers to adults, likely all culverts are juvenile barriers.

High Risk Slopes

The AQI surveys ended at a landslide suggesting that hill-slopes within the Hodgdon drainage are prone to failure.

Spawning Sites

Although gravels are abundant, they are poorly sorted. Abundance was estimated at 3 sq m.

Rearing Sites

There is adequate pool volume (on break of low benchmark) for Hodgdon Creek's small size but there are no side-channels.

Aquatic Inventories Summary Data

LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade
1.4	0	100	90

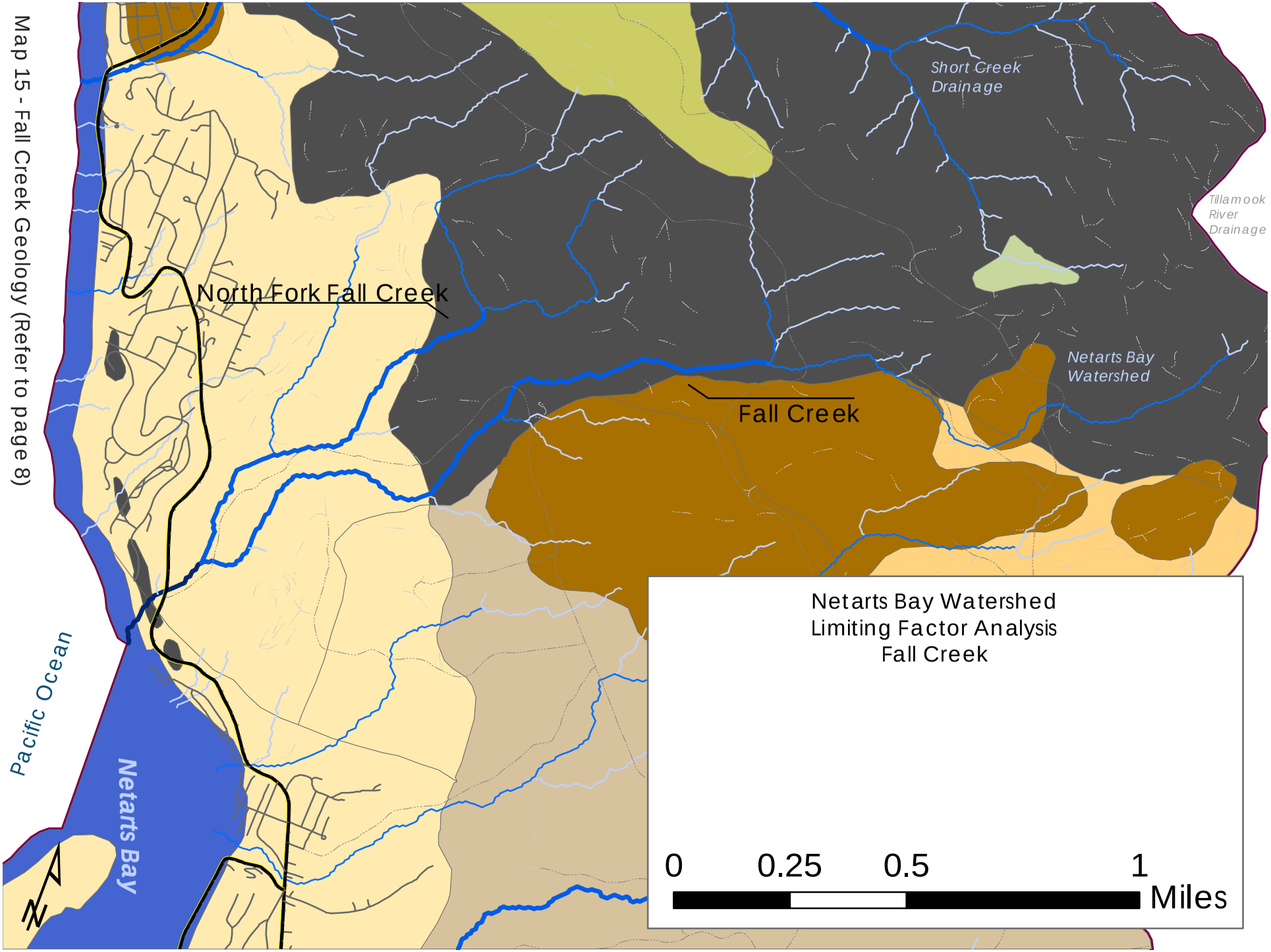
Table 20 - Hodgdon Creek Key AQI Metrics

safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
35	65	21.8	2.8	0	0

Table 20 - Hodgdon Creek Key AQI Metrics

Summary of Limiting Factors

Hodgdon Creek is the most impacted of the urban streams in Netarts. It is severely entrenched with little room to migrate until well within private forestry where unstable hill-slopes bury the channel in several places with sediments. Knotweed is also present along the banks of Hodgdon Creek.


Map 15 - Fall Creek Geology (Refer to page 8)
Short Creek Drainage
Tillamook River Drainage
North Fork Fall Creek
Netarts Bay Watershed
Fall Creek
Pacific Ocean
Netarts Bay
N
Netarts Bay Watershed
Limiting Factor Analysis
Fall Creek
0
0.25
0.5
1
Miles

10) Fall Creek

Segment Summary

Fall Creek is the northern-most creek that enters the bay and flows into the mouth of Netarts Bay. There is a wide cobble plume that maintains a relatively deep channel ~.5 meters wide. Sea-worn wood has created a pool at the mouth which was home to a Cutthroat at the end of May. The lower reach of the river runs between the Capes housing development and the Netarts-Oceanside Highway. The stream is a sand-bottomed stream and unlike many other north Oregon coastal sand bottom streams the sand is beach sand. This sand forms a hard surface and is larger grained than many other coastal systems. A seep on the east-facing slope runs off of an unpaved foot-path into the creek. There are two culverts downstream of the confluence with the North Fork. From the second culvert to well past the Netarts Water District intake plant, gravels are abundant and moderately well sorted. There is a high volume of wood and good shade. Spawning potential extends well past the Netarts Water District property.

Barriers and Roads

Although neither of the first two culverts on the mainstem of Fall Creek are definitive barriers to passage as spawning occurred upstream of both, the first culvert is a juvenile salmonid barrier with a drop of ~10 cm and the second is an extreme adult deterrent and juvenile barrier. The first culvert is undersized at 1.2 meters X 1.5 meters and bankful widths above and below 2 m and 3 meters respectively. The concrete substrate of the culvert does not appear to accumulate fine sediments or gravels. The ~30 m culvert is relatively flat on the channel bottom but surveyors noted a depression in the middle which may indicate future failure; the culvert appears to be sinking slightly. The second culvert is extremely undersized and is failing (refer to photograph below - water seeping around and beneath the culvert). Were this culvert to fail the resultant debris would not pass through the downstream culvert possibly reducing the integrity of the road. The North Fork Fall Creek confluence is directly upstream of the second culvert where the valley widens and Fall Creek becomes much more connected to its floodplain. The first culvert on the North Fork of Fall Creek is failing; the mouth is crushed nearly shut.

High Risk Slopes

Nearly the entire length of Fall Creek has been identified as containing high risk hill-slopes. This was verified during field surveys with high wood volumes and copious gravels.

Land-use

Downstream land-use is mixed; the beach at the mouth of Fall Creek is public, upstream portions are mixed private non-industrial and private industrial with a water withdraw on the North Fork for Netarts municipal water.

Rearing Sites

Rearing within Fall Creek is limited to shallow pools along stream side margins. It is likely with future wood recruitment, deeper pools will form providing more rearing habitat.

Spawning Sites

There are Cutthroat in the lowest 10 m of Fall Creek (As of May 30) but it is unclear as to whether these are sea-run Cutthroat or resident. There is potential spawning gravels from the second culvert to well past the water diversion. Fall Creek contains ~25 square meters of spawning gravels, although like the rest of Netarts, these gravels are often only of fair quality.

Aquatic Inventories Summary Data

Creek	LWD Volume/100m	Key Pieces LWD/100m	%constrained	%shade	#conifers/1000ft
NF Fall	32	1.9	100	90	na
Fall	27.6	1.1	100	97	884

Table 21 - Fall Creek Key AQI Metrics

Creek	safn in riffles	gravel in riffles	%pools	%slackwater pools	%secondary channel	Beaver Ponds
NF Fall	52	18	10.4	9.4	17.2	0
Fall	32	39	4.3	3	23	0

Table 21 - Fall Creek Key AQI Metrics

Summary of Limiting Factors

Mainstem – Fall Creek is unique both in geomorphology and in potential. Mainstem Fall is the most intact, highly functional stream segment in the watershed. It is currently limited by fish passage barriers. The mouth is confined largely as a consequence of road fill used to build the Oceanside-Netarts Highway. The first of the two culverts in question is undersized and covered by Ivy. The second is extremely undersized and failing. It is expected that the second culvert is only passable under certain flow conditions. There is extremely good floodplain connection beyond this with large volumes of wood, good gravels, complex habitat, and good future LWD recruitment potential. This area should be considered for culvert replacement (possible bridge conversion at Netarts-Oceanside Highway) and conservation.

North Fork – The North Fork of Fall Creek has less potential for spawning than the Mainstem although rearing potential is high. Conservation easements are recommended. High risk slopes occur throughout the Fall Creek drainage and there is good potential for LWD recruitment.

Restoration Projects

Restoration projects were developed to address the limiting factors on each stream. All projects are listed below and ranked as high, medium, or low priority. High priorities are those judged to address the limiting factors identified in this document either directly or by addressing passage issues. Conservation of functional areas was also rate as high. Medium priorities are those which will improve or maintain long term function, but to a lesser extent. Low priorities should be considered as need and opportunities arise. Details on these projects are included in the sections that follow.

High Priority

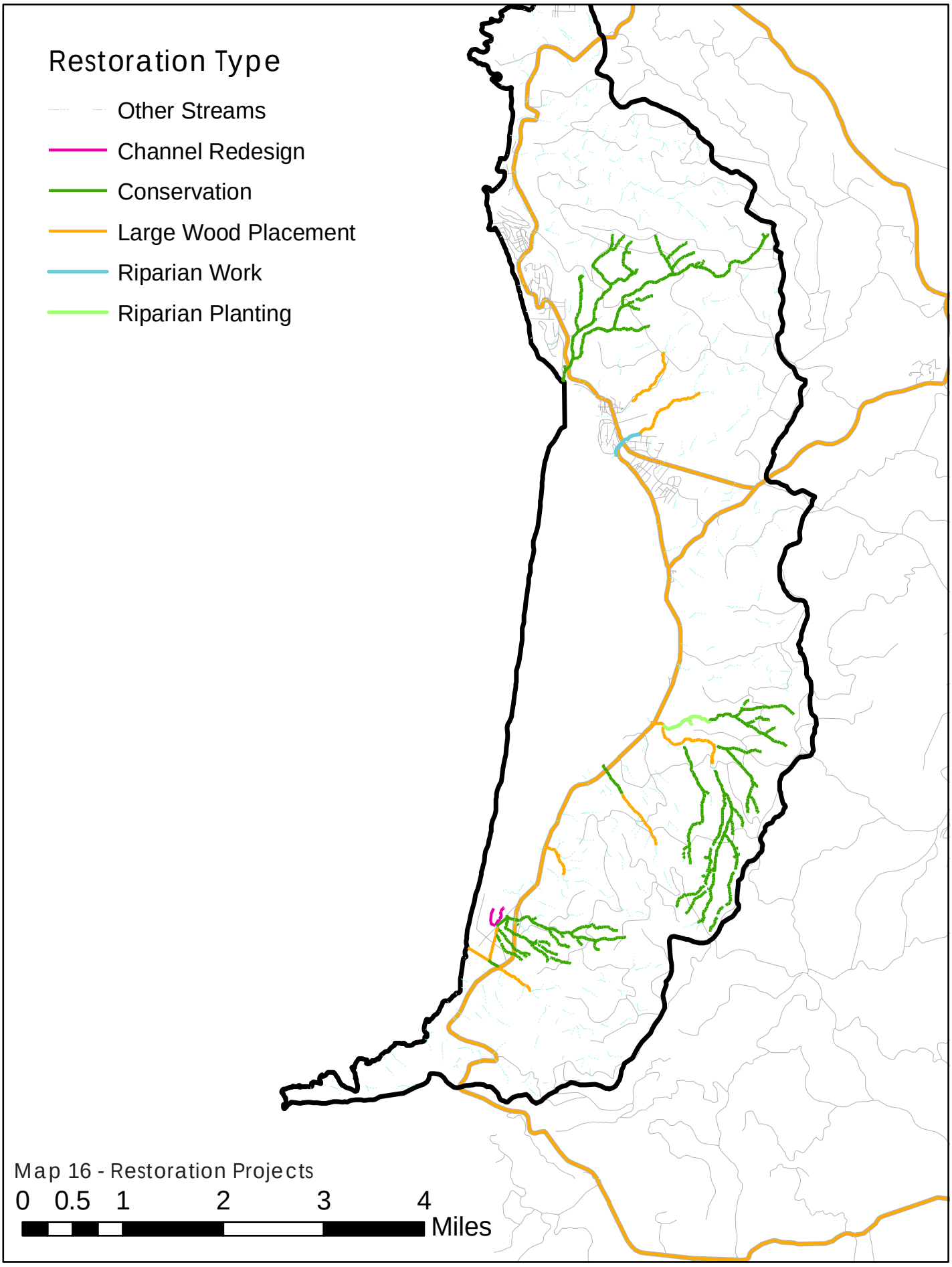
- Conservation easement on the North Fork of Whiskey Creek - High
- Culvert replacement (2nd) on Fall Creek - High
- Conservation easement on Fall Creek - High
- Campground reconfiguration and road reconfiguration on Bay-going Jackson Creek - High
- Wood placement on Bay-going Jackson Creek for floodplain reconnection and gravel sorting - High
- Culvert replacement on Netarts Creek for rearing habitat access - High
- LWD placement on mainstem Whiskey Creek to increase floodplain connectivity and gravel sorting - High
- Tarp diversion removal on Whiskey Creek - High
- Hatchery diversion upgrade on Whiskey Creek - High
- Ensure that blow-down throughout the watershed (especially on Austin Creek) is not removed - High
- 2 Culvert replacements on O'Hara Creek - High
- LWD placement on O'Hara Creek to increase floodplain connectivity and gravel sorting - High

Medium Priority

- Daylighting of O'Hara Creek at boat launch - Medium
- Silvicultural treatment on North Fork Whiskey Creek to promote long term riparian function - Medium
- Riparian plantings on Hodgdon, O'Hara, and Rice Creeks on private non-forestry lands - Medium
- LWD placement in bay for cover from seal and bird predation - Medium
- Culvert to bridge conversion on the first culvert on Fall Creek - Medium
- Wetland reconnection at mouth of Yeager Creek to increase brackish habitat - Medium

Low Priority

- Invasive species removal on Hodgdon Creek - Low
- Riparian plantings on blow-down sites - Low
- Boat wash station to prevent invasive species from spreading - Low
- Bioswales along parking lots (specifically at RV parks and at boat launch) to reduce car runoff - Low
- Road-fill removal of decommissioned culverts on Austin and Rice Creeks - Low
- Hatchery holding tank upgrade - Low


Restoration Type
Other Streams
Channel Redesign
Conservation
Large Wood Placement
Riparian Work
Riparian Planting
Map 16 - Restoration Projects
0 0.5 1 2 3 4
Miles

Fall Creek

Primary problem(s): Deterred access to high quality spawning habitat upstream of two culverts is the primary issue on Fall Creek. The first road crossing (Netarts-Oceanside Highway) fills the valley (~1/2 - 2/3 total valley height from valley floor) at a low gradient reach ~200 meters upstream from the mouth of the Netarts Bay leaving only an undersized (1.2 meters wide with a bankful of ~3 meters) possibly failing box culvert. The hill-slopes behind the culvert are slumping some-what (the banks are designated high risk slopes) and are beginning to become impacted by English ivy. Additionally, it appears that the center of the culvert is sinking suggesting that it may fail soon. The second road crossing is used as an access road for a private property, the water district, and private timber haulers. This culvert is undersized at 1 meter wide with bankful of ~3-4 meters, is failing (water flowing beneath the culvert), is not passable to juvenile salmonids (perched at ~30cm), and is a likely an adult deterrent at the highest flows. Similar to the first culvert (which is ~150 meters downstream) the valley was filled by roughly 50% to provide this road crossing. Even if the first culvert is passed and salmon spawn below the second culvert, any juveniles spawned downstream of this second culvert cannot migrate upstream to rear. There are roughly 2 km of potential habitat (likely most utilized by Steelhead, maybe some Coho) upstream of these culverts.

Solution to primary problem: Decommission ~200 meters of road and remove the second culvert. There are several alternative access roads, including one that could connect to the small 40 acres private property, the owner of which has road easement. Possibly replace the first culvert with a bridge to allow for channel migration, spawning gravel sorting, and pool development. This slope is a high risk for landslide and this culvert cannot pass wood, it is possible that this road will fail were a landslide to occur immediately upstream.

Secondary problem(s): English ivy is spreading upstream from the first culvert and may be limiting access in addition to the danger it poses to trees.

Solution to secondary problem: If the first culvert were replaced with a bridge the majority of the ivy would be eradicated as it is growing on the fill. Until this occurs, the ivy needs to be mechanically removed and the banks should be replanted with a shrub such as salmon berry (fast growing and cheap so that not much effort is lost should the bridge conversion take place) to prevent recolonization.

Expected Results: Improved access will increase salmonid spawning and rearing throughout Fall Creek. A bridge and road decommissioning would allow for greater stream meander throughout the lowest reach of Fall Creek potentially increasing available spawning habitat. Conservation easements should ensure future inputs of LWD and gravels to maintain habitat quality throughout Fall Creek. Removing invasives will protect a relatively healthy, intact riparian community. Downstream properties (the Capes is built on the bank directly opposite the two culverts at danger for complete failure, by addressing these safety concerns before they occur, the cost of repairing fallen homes is mitigated.

Potential Challenges: The high risk slopes may complicate building a bridge here.

O'Hara Creek

Primary problem(s): Floodplain connection is limited and missing throughout most of O'Hara Creek resulting in low pool volumes and poorly sorted gravels. This is the result of two land-use practices. The first is that the city of Netarts surrounds the lowest kilometer or so of stream until the mouth. The second is that the riparian area within private industrial forestry ownership had been harvested in the past (possibly including wood salvage) and instream wood volumes are low resulting in channel downcutting and floodplain disconnection. Rearing is limited on O'Hara Creek as are spawning gravels. O'Hara Creek could support significant numbers of salmonids. Specifically, were pool volume and gravel sorting to be improved, Coho and, to a lesser extent, Steelhead populations should increase.

Solution to primary problem: In order to address both spawning and rearing habitat concerns, wood placement on private industrial timber from property boundary with rural residential to the first culvert upstream should be considered. This could largely be accomplished using ground-based equipment as a private timber access road runs just outside the riparian area for most of this length.

Secondary problem(s): Chum access to O'Hara Creek is limited due to a 127 meter long failing culvert with a ~1 meter rise over rip-rap out of an extremely shallow saline pool. This culvert straightens the mouth and redirects it to the north side of the boat ramp. The boat launch, the confluence of two major roads, and private property along the bank upstream of this until private industrial timber work together to entrench the channel until timber management. No spawning gravels were seen until well within Stimson ownership but this is not the result of gradient limitations, the entire lower kilometer of O'Hara Creek could potentially support Chum spawning. Additionally, the direct connection to the estuary make O'Hara Creek suitable habitat for Chum.

Solution to secondary problem: Daylighting of O'Hara Creek at the boat launch and bridging the first road crossing would increase low gradient rearing habitat and Chum habitat as well as improve access to upstream spawning habitat. Additionally, purchase easements along key riparian reaches on private non-industrial ownership to allow for wood placement below non-timber ownership.

Expected Results: Wood placement will increase floodplain connectivity and gravel sorting increasing both rearing and spawning habitat. Daylighting the mouth of O'Hara Creek may increase salmonid access to upstream habitat in addition to increasing brackish and freshwater wetland habitat, and low gradient spawning habitat.

Potential Challenges: Wood migration into rural residential properties could pose a serious threat to properties.

Hodgdon Creek

Primary problem(s): Floodplain connection is limited and missing throughout most of Hodgdon Creek resulting in lowered pool volumes and poorly sorted gravels. Chum potential may naturally be low in Hodgdon Creek as it flows into the lower, deeper portion of estuary where brackish marsh habitat is less abundant.

Solution to primary problem: Wood placement on private industrial timber from property boundary with rural residential to end of spawning habitat.

Secondary problem(s): Invasive weeds, including knotweed, are present along much of the rural residential length. Unstable slopes may supply excess fine sediments to spawning habitat and can block stream flow.

Solution to secondary problem: Invasive weed eradication through continuous mechanical removal and planting to prevent revegetation by knotweed. Conservation of unstable slopes to allow for future LWD recruitment.

Expected Results: Wood placement will increase floodplain connectivity and gravel sorting increasing both rearing and spawning habitat.

Potential Challenges: Wood migration into rural residential properties could pose a serious threat to properties.

Rice Creek

Primary problem(s): Floodplain connection is limited and missing throughout most of lower Rice Creek (below private industrial timber) resulting in poorly sorted gravels. A private RV Park surrounds the mouth of Rice Creek and continues ~400 meters upstream. The stream at this point is incredibly entrenched. Spawning reaches are limited as sorting occurs in a small section of stream near the mouth. Upstream of the Netarts-Oceanside Highway, a new housing development has been built. This housing development has constructed a walking path over the stream (culvert crossing). Upstream of this development on private timber property, beaver activity and channel complexity increases, but gravel sorting does not.

Solution to primary problem: Wood placement from mouth of Rice to private industrial timber property boundary would increase floodplain connection and gravel sorting. In order for this to occur, a purchase of the riparian area downstream of the highway is needed. It may even be necessary to purchase larger set-backs to ensure that flooding does not impact RV owners.

Secondary problem(s): Two culverts block juvenile passage and may block adult passage (one is perched at ~1 meter and the other is failing). Both of these culverts are on private non-industrial ownership.

Solution to secondary problem: Remove or upgrade the road crossing in the RV park and replace the culvert at Old Netarts Highway.

Other issues: Unstable slopes supply excess fine sediments to spawning habitat and can block stream flow. Several meters of stream were covered by recent landslides. Minimal spawning habitat is upstream of this point with most of the potential occurring on private non-industrial ownership.

Solution to other issues: Increasing the riparian buffer along unstable slopes will ensure future LWD and gravel recruitment. Planting unstable slopes will help in the interim to reduce excess fine sediment inputs.

Expected Results: Wood placement will increase floodplain connectivity and gravel sorting increasing spawning habitat. Culvert modifications will improve access to the upstream habitat available.

Potential Challenges: Wood migration into rural residential properties and in RV park could pose a serious threat to properties. If spawning and rearing habitat is not improved, it may not be imrpovements to passage may have a minimal impact.

Lower Northbay Creek

Primary problem(s): No salmonid access past man made dam.

Solution to primary problem: It is unlikely that Lower Northbay Creek would provide substantial spawning habitat, so no projects are recommended. A fish ladder may not be necessary as there is minimal habitat available upstream of the dam.

Expected Results: NA

Yeager Creek

Primary problem(s): No access to South Fork of Yeager Creek and associated freshwater wetland.

Solution to primary problem: Reconnect the freshwater wetland with the brackish wetland to increase estuarine habitat. Additionally, the current brackish wetland has very little shade and this may limit the use by anadramous fish. Planting with saline tolerant species to increase shade may improve this habitat. Finally, the channel within the brackish wetland was straightened and could be reconnected to the historical channel to increase complexity.

Expected Results: Increased brackish wetland habitat could be used for by juvenile Chum and other esturary dependent species.

Potential problems: An access road runs through the wetland complex at the mouth, and consideration must be given to addressing landowner needs and concerns.

Whiskey Creek

Primary problem(s): Available spawning habitat is much lower than potential and pool volume is limited. Floodplain connection is limited and missing throughout most of the mainstem of Whiskey Creek resulting in poorly sorted gravels and minimal rearing habitat. A splash dam may have been used on the mainstem. Wood volumes are currently low.

Solution to primary problem: Wood placement should occur from the mouth to the site of the presumed splash dam origin. This would increase floodplain connectivity and gravel sorting throughout this part of Whiskey. Implementation of riparian area easements/setbacks allowing for an increased buffer width on Whiskey may increase future LWD recruitment potential.

Secondary problem(s): Two modifications related to the hatchery water diversion may limit passage. The first is a dam for an impoundment intake pond for the located upstream of the confluence with the North Fork. Juveniles moving downstream may be pulled into the diversion intake. The second modification is a plastic tarp structure presumably apparently built to increase flow to the intake pond downstream. The second modification blocks a natural side channel which connects the mainstem to the high quality rearing habitat of the North Fork.

Solution to secondary problem: Remove tarp diversion over side-channel to increase access to North Fork. Update hatchery diversion to prevent juveniles from entering intake pipe and allow for Chum passage. Additional pool habitat could be made available if the hatchery cleaning pond (the pool the hatchery pumps tank water in after cleaning the tanks) could also be made available for rearing were the hatchery to be updated.

Other issues: The diversion dam may be a Chum barrier or deterrent under some conditions. North Fork riparian community lacking shrub species. A large drop (~1m) limits juvenile access to significant rearing habitat in the East Fork,

Solution to other issues: Plant North Fork with shrub species from confluence with mainstem to first major gradient change. LWD placement on the mainstem should include structures at this confluence.

Expected Results: Wood placement will increase floodplain connectivity and gravel sorting thus increasing spawning habitat. The diversion update will reduce juvenile mortality and increase spawning access for Chum. Removal of the tarp diversion will increase access to North Fork thus increasing rearing habitat. Increasing riparian shrub community will maintain healthy riparian communities.

Potential Challenges: Flow into the hatchery must be maintained in order to raise fish. A helicopter may be needed to place wood due to access limitations.

Austin Creek

Primary problem(s): Poorly sorted gravels in spawning reaches is the primary limiting factor within Austin Creek. There is newly downed wood in the lowest 400 meters of stream. Above this point wood volumes are low.

Solution to primary problem: Wood placement from the mouth of Austin Creek to the second culvert would aid in gravel sorting. Purchase of the riparian area in order to increase buffer widths would ensure potential future LWD recruitment.

Secondary problem(s): Narrow buffer was blown down in windstorm increasing solar radiation. If this area were to remain unvegetated temperature limitations may become an issue.

Solution to secondary problem: Increase riparian buffer along unstable slopes to ensure future LWD recruitment and to maintain shade. Plant the lowest reach to maintain shade.

Expected Results: Wood placement will increase floodplain connectivity and increase gravel sorting thus increasing spawning habitat. Planting of the riparian area will maintain shade.

Potential Challenges: Wood migration downstream may plug undersized culvert and cause hazard.

Crown Zellarbach Creek

Primary problem(s): Low LWD levels along the lower stretch limit natural function. Additionally, a private fence near the mouth may block access to upstream habitat.

Solution to primary problem(s): Place LWD along the lower 500m of the stream to connect floodplains and sort spawning gravels. Remove the lowest bar from fence to allow for fish passage.

Expected Results: Wood placement will increase floodplain connectivity and increase gravel sorting thus increasing spawning habitat. Increased access will increase salmonid production.

Potential Challenges: Both issues should be addressed concurrently to ensure maximum impact. The downstream landowner may be unwilling to modify the fence.

Jackson Creek Complex

Ocean-going Jackson:

Primary problem(s): Floodplain connection is limited and missing throughout most of Ocean-going Jackson Creek resulting in poorly sorted gravels and few rearing areas. Although extensive wetland habitat is available within the complex, it is largely inaccessible during low flows. Additionally, gravels only sort where a local gradient break occurs at a ford in the state park.

Solution to primary problem(s): Wood placement from the mouth to the first split past the Pacific City-Netarts Highway would increase gravel sorting for Steelhead and Coho habitat. Additionally, there is very little rearing habitat below the diversion. Were wetlands reconnected to the stream channel rearing habitat could increase significantly.

Expected Results: Wood placement will increase floodplain connectivity and gravel sorting increasing both spawning and rearing habitat.

Potential Challenges: The park water intake is below the diversion and may need to be moved. The Hwy131 culvert is failing and may fail if large wood migrated downstream to block this culvert (as has happened in the past).

Bay-going Jackson and Netarts Creek:

Primary problem(s): Access to a freshwater wetland and upstream spawning areas is limited by undersized culverts. This is compounded by the current design of the constructed channel. During low flow the stream channel flows subsurface through the campground stranding many juvenile salmonids in exposed shallow pools.

Solution to primary problem(s): Replace or remove all culverts on park property and those that are on the Pacific City-Netarts Highway. Increase channel connectivity by removing boulder weir and increasing connection to freshwater wetland fed by Netarts Creek to increase access to rearing areas. Move the campground out of the floodplain to allow for natural channel migration. This may address safety concerns as well. Additional channel reconfiguartion may be needed. LWD placement should be considered in the design on the project to increase gravel sorting.

Expected Results: Increasing access to rearing areas will increase juveniles survival.

Potential Challenges: Engineering services will be needed to develop and implement these projects. Consideration must be given to recreational uses of the area.

Conclusion

It is hypothesized that the low salmonid abundance within the watershed is the result of disturbances to freshwater aquatic habitat coupled with periods of poor ocean condition. All streams within the watershed have experienced some form of anthropogenic disturbance which has resulted in degraded spawning and/or rearing habitat. Despite the complexity of the interaction between creek, it appears that spawning limits (both naturally as a result of lithology and unnaturally as a result of poor gravel sorting) salmonid production in the Netarts Bay Watershed as a whole. In addition to Coho salmon (for which modeling results are available) this is likely most true for Chum salmon (which have more specific spawning requirements than Coho salmon but need less in the way of freshwater rearing habitat) as well as Steelhead (which can use a wider variety of freshwater rearing habitat than Coho).

Coho production is limited by both spawning and summer rearing (caused by a lack of pools not temperature) throughout the basin. Additionally, where pools do occur they are shallow and not complex. Continuous temperature recordings collected for this project indicate that summer temperatures do not negatively impact salmonid populations. While reduced spawning habitat is the primary limiting factor for salmonid production, current salmonid populations are well below the levels expected based on the minimal quantities of spawning gravels observed suggesting that reduced spawning habitat is not the only limiting factor. Pool habitat was often minimal except in areas with areas with no spawning habitat (i.e. Yeager, Lower Northbay, North Fork of Whiskey Creeks). Fall Creek contained the most functioning spawning habitat associated with functioning rearing habitat although the culverts near the mouth and the unique nature of the habitat available have limited production of this stream. Winter habitat is variable throughout the watershed, and is dependent on floodplain connection and beaver presence as well as morphology. Placement of LWD and long term conservation of riparian corridors will result in improved pool frequency and volume, side channel development and off channel habitat, and the development of complex habitat which will reduce freshwater predation thus improving chances of survival during rearing (effectively improving rearing habitat).

Most current instream habitat indicators within the watershed do not meet benchmarks; although salmon can reproduce and rear, it is hypothesized that they cannot do so in the numbers needed to sustain populations in years with poor ocean conditions. During visual presence/absence surveys conducted as part of this assessment, juvenile salmonids were observed throughout the watershed but their numbers were very low. This observation is consistent with summer snorkel surveys conducted in 2005 and 2006. Although some of the returning spawners may have originated in the watershed, it is possible that they were strays from adjacent basins such as the Tillamook Bay Watershed. Development of the appropriate channel morphology needed for sorting and storing spawning gravels should be the top priority for restoration projects within the watershed. Although it is likely streams within the watershed will recover from past land-use practices given ample time, many are significantly lacking wood and will not return to historical conditions quickly enough for failing salmon populations unless wood is placed within them.

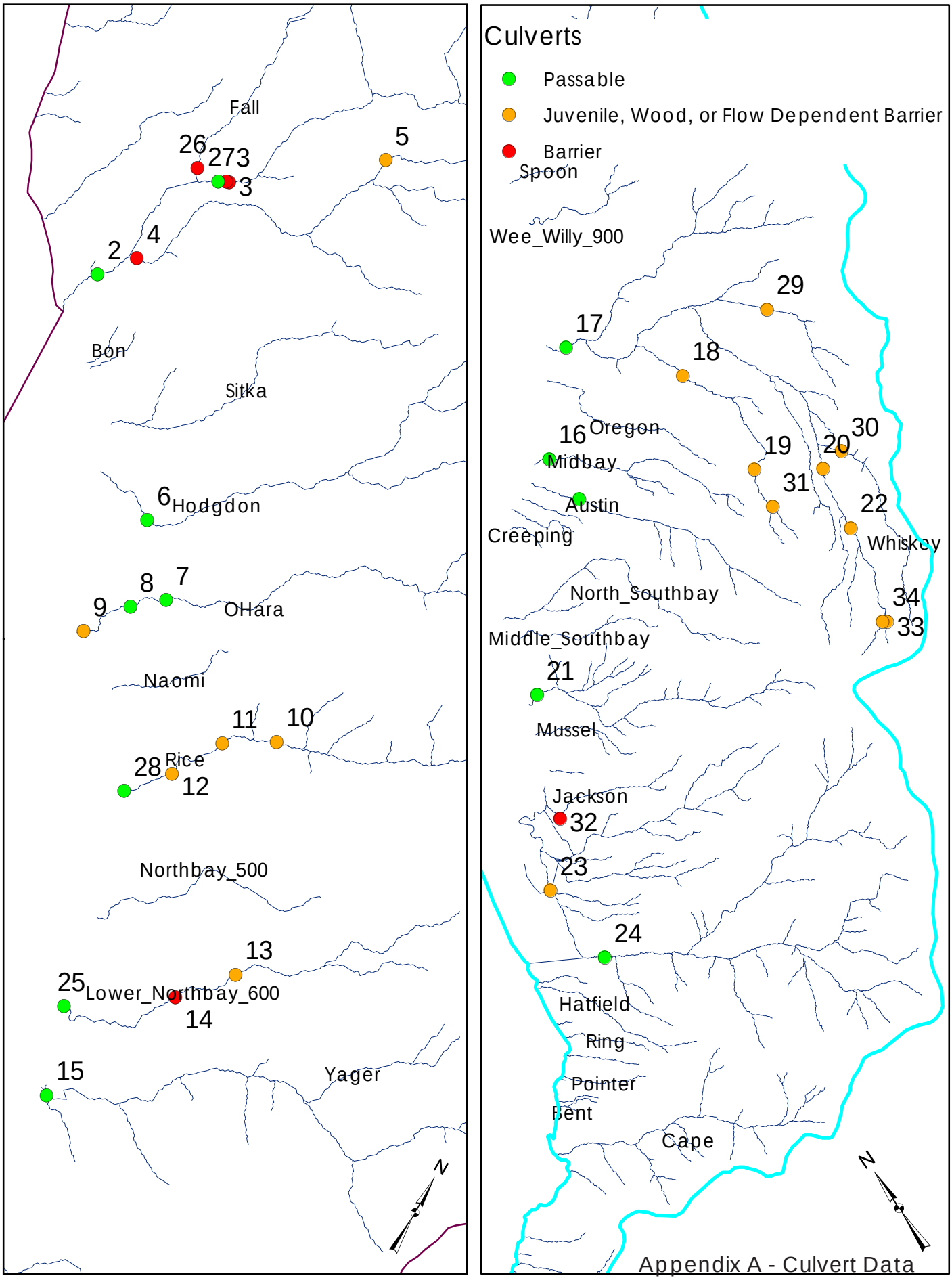
Although the habitat issues limiting Steelhead and Coho production can be addressed in a straightforward fashion, Chum are more complex. The Netarts Bay Watershed is currently the southernmost extent of remaining Chum populations. Historically, Chum salmon were the most abundant of all salmon species, and their range extended into the Sacramento River Valley. Chum require a narrower set of habitat requirements than Steelhead or Coho all of which were historically present within the Netarts Bay Watershed

but are now absent. Projects aimed at increasing spawning gravel abundance should be prioritized when addressing Chum. Additionally, restoration efforts aimed at Chum salmon will need to include the removal of barriers to Chum potential spawning habitat including the diversion at Whiskey Creek and the first culvert on O'Hara Creek.

In general, seasonal habitat limitations within the Netarts Bay Watershed can be categorized as either naturally occurring such as lack spawning as a result of lithology (Yeager, Lower Northbay, Hodgdon, Wee Willy Creeks, etc.), rearing due to geomorphology (Crown Zellarbach or Austin Creeks), or as being limited in spawning and/or rearing as a result of past and present land-use issues (Whiskey, Jackson, and O'Hara Creeks). In order to address the immediate problem of declining (crashing) salmonid populations within the Netarts Bay Watershed restoration of those streams facing habitat limitations as a result of past land-use practices but with high potential (Whiskey and Jackson Creek) should be prioritized. Second priorities are those streams limited by current land-use practices or those streams limited by rearing (Hodgdon, O'Hara, Austin, and Crown Zellarbach Creeks). Third priorities should go to the remaining streams to boost Chum rearing habitat as Chum can spawn in other streams and migrate to the brackish wetlands associated with Yeager and Lower Northbay Creeks. Fall Creek is unique within the basin and warrants not only restoration and conservation but on-going investigation of salmonid use.

Monitoring efforts within the basin should include spawning surveys on Fall, O'Hara, Hodgdon, Rice, Whiskey, Austin, Crown Zellarbach Creeks and the Jackson Creek Complex before and after wood placement and in both good and poor ocean years and conducting surveys of spawning gravels on a decadal basis. The current salmonid populations within the watershed may not be sufficiently large to naturally reseed the available habitat, and it is possible that a reintroduction program may be needed. Additional information, particularly on Chum spawning, is needed to make this determination. Riparian habitat should be also monitored over time to ensure that buffers survive winter storm events and that beavers have an adequate food supply.

Finally, streams within the Netarts Bay Watershed are unique both in valley form, geology, size, and their association with the estuary. It is hypothesized that this diversity may support genetically diverse salmonid populations. It was noted that although salmonids were present throughout the basin, no system was seeded to capacity based on the observed amount of available gravels. One hypothesis is that fish are actively seeking and choosing the unique habitat characteristics of the stream in which they spawn. If this is a valid assumption and habitat within basin were to be restored, the Netarts Bay watershed could not only support sustainable populations but may actually enhance coastal-wide genetic diversity through straying into neighboring watersheds. Lastly, as with all restoration efforts, conservation should be considered the highest priority in order to maintain and improve the diverse habitat within the watershed.



Appendix A - Culvert Data

#	NAME	VWI	MeanAnnCFS	Barriers	Notes and Condition
34	170	18.55	0.12	Wood	RML SLOPES UPSTREAM
33	170	19.80	0.10	Wood	RML SLOPES UPSTREAM
32	Cape lookout	10.86	0.66	Y	
31	300 X-OVER	13.80	0.30	Wood	RML SLOPES UPSTREAM
30	300 X-OVER	15.46	1.03	Wood	RML SLOPES UPSTREAM
29	150	10.82	1.24	Wood	RML SLOPES UPSTREAM
28	Netarts Bay	12.07	4.59	N	Bridge at tidal - Channel migration constrained
27		7.29	2.05	N	Undersized
26		6.64	0.95	Y	Water diversion - No water immediately upstream
25	Netarts Bay	18.92	1.80	N	
24	Sandlake	5.92	7.80	N	East wall crumbling, collapsing
23	Cape lookout	92.04	8.53	Maybe	Undersized - Possibly failing, not much flow
22	362	14.60	0.77	Wood	RML SLOPES UPSTREAM
21	Cape lookout	30.24	2.53	N	Concrete circular
20	300 X-OVER	8.10	1.43	Wood	RML SLOPES UPSTREAM
19	365	8.19	0.49	Wood	RML SLOPES UPSTREAM
18	150	9.84	1.37	Wood	
17	Cape lookout	23.32	11.42	N	Bridge
16	Cape lookout	11.87	1.57	N	Building up wetland and sediments behind
15	Cape lookout	46.20	0.42	N	
14		18.72	1.53	Y	No fish ladder
13	Old Netarts HWY	17.20	1.31	Maybe	Possibly failing?
12	Old Netarts HWY	9.96	4.54	Maybe	
11	Netarts Hwy	9.52	4.16	Maybe	Can't see through
10		9.24	3.93	Unknown	
9	Netarts Bay	9.40	6.80	Maybe	One is failing, Chum barrier, high jump - Modified channel
8	Netarts Hwy	4.22	6.74	N	Small jump, bank on south side eroding
7		9.92	6.60	N	Data not taken
6	Netarts Hwy	10.94	3.55	N	Data not taken
5	200-N	4.13	4.11	Maybe	6 inch drop, undersized
4	200-N	7.28	6.18	Y	Failing, undersized, velocity and juvenile barrier
3	200-N	7.29	2.05	Y	1-failing undersized 10cm drop 2-water coming under culvert
2	Netarts Hwy	4.37	9.47	N	Fill limits migration. Mouth covered with English ivy. 4” drop
1	250	7.95	1.82	Y	Failing, front collapsed, rusted

#	Habitat Up/Downstream	bnkfl_up	bnkfl_dn	Size_Meter	type
34					Data not taken
33					Data not taken
32					Data not taken
31					Data not taken
30					Data not taken
29					Data not taken
28	DP/Bay	Bay	Bay	4 meters	Bridge at tidal
27	RI/SP	2 meters	4.5 meters	.6 meters	Concrete, circular, segmented, no drop
26	DRY/RI	Spring?	2.5 meters	.5 meters	Dry channel upstream
25	Tidal			1.5 meters	Circular, plastic
24	RB/PP			3 meters	Box culvert with fish ladder
23	DP/SP	4 meters	4.5 meters	1.8 meters	Circular, metal
22					Data not taken
21				1 meter	Data not taken
20					Data not taken
19					Data not taken
18					Data not taken
17					Data not taken
16	RI/PP	1 meter	5 meters	1 meter	Circular metal
15	DP/Bay			1.5 meters	Circular, metal
14	DP/DP				Data not taken
13	LP/DP				Data not taken
12	LP/DP	1.5 meters	4 meters		Data not taken
11	DP/RI	1 meter	1 meter		Closed bottom box cement
10	RI/PP	1 meter	3.5 meters	2 meters	Data not taken
9	DP/Bay	5 meters	tidal	1.4 meters	Double, segmented, cement, circular
8	RP/PP	2.5 meters	4 meters	1 meter	Square, closed bottom, cement
7	RP/SP	1 meters	2.5 meters		Data not taken
6	DP/RP	2.5 meter	1 meter		Data not taken
5	RI/RI	3.5 meters	4 meters	1.1 meters	Concrete, circular, segmented
4	DP/RP	4 meters	3.5 meters	1 meter	Cement, circular, segmented
3	RI/RP	2.5 meters	2.5 meters	.5 meters	1-segmented concrete circular 2-H20diversion
2	RI/PP	3 meters	6 meters	1.2 meters	Square, cement, closed-bottom, box
1	RI/RP	3 meters	2 meters	.8 meters	Circular, metal

Parameter	Definition	Low	High
%Pools	Channel area (%) represented by pool habitat	< 19	> 45
Deep pools/km	Pools > 1m deep/km of main channel	0	> 3
% Slackwater pools	Area (%) beaver ponds, backwaters, alcoves, or isolated pools	0	> 7
% Secondary channels	Area (%) secondary channels	< 0.8	> 5.3
Pieces LWD/100m	# of LWD pieces > 0.15m diameter X 3m length/100m	< 8	> 21
Volume LWD/100m	Cubic meters of LWD > 0.15m diameter X 3m length/100m	< 17	> 58
Key pieces LWD/100m	# LWD pieces > 60 cm diameter X > 12 meters long/100m	< 0.5	> 3
%SAFN in riffles	Surface area (%) composed of < 2mm diameter particles	< 8	> 22
%Gravels in riffles	Surface area (%) composed of 2-64mm diameter particles	< 26	> 54
%Bedrock	Channel bottom surface area (%) composed of solid bedrock	< 1	> 11
# conifers > 50 cm dbh	Conifers >50 cm dbh within 30m both sides of stream/305m	< 22	> 153
# conifers > 90 cm dbh	Conifer > 90 cm dbh within 30m both sides of stream/305m	0	> 79
%Shade	% of 180 degree sky shaded	< 76	> 91
AQI Benchmark Metric Data			

Appendix C - AQI Reach Reports

DEMETER DESIGN **YEAGER CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/28/2008

REACH 1 **T02S-R10W-S08LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	13%
Open V-shape	0%	Wide Floodplain	87%

Valley Width Index: 14.5 VWI Range: 3 - 30

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	87%
Bedrock	0%	Multiple Channel	13%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,497	8,479	0
Secondary	25	78	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 2	
Width:	7.0	Width:	5.7	36.0	(4 – 100)	4.5	(4.5 - 4.5)
Depth:	0.79	Height:	0.4	0.9	(0.6 - 1.4)	1.1	(1 - 1.1)

W:D ratio: 13.2
Stream Flow Type: MF
Average Unit Gradient: 0.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 4.4
Habitat Units/100m (total channel length): 0.9
Habitat Units/100m (primary channel 0.9

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	MT
Riparian Vegetation:	P	G

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	14%	Reach avg: 93%
Undercut Banks:	14%	Range: 22 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	14	0.9
Volume (m^3):	35	2.3
Key pieces (>=12m x 0.60m):	1	0.1

DEMETER DESIGN **YEAGER CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/28/2008

REACH 2 **T02S-R10W-S09LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 17.3 VWI Range: 3 - 40

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	435	2,777	0
Secondary	100	200	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	4.6	Width:	7.5	56.0	(12 - 100)	(-)	
Depth:	0.30	Height:	0.6	1.2	(1 - 1.4)	(-)	

W:D ratio: 11.3
Stream Flow Type: MF
Average Unit Gradient: 0.3%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 6.8
Habitat Units/100m (total channel length): 1.1
Habitat Units/100m (primary channel 1.4

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	WL	MT
Riparian Vegetation:	M30	P

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	0%	Reach avg: 100%
Undercut Banks:	0%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	7	1.6
Volume (m^3):	20	4.7
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **YEAGER CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/28/2008

REACH 1 **T02S-R10W-S08LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-ALCOVE	1	10	4.0	0.10	40	0		10	90	0	0	0	0
POOL-BEAVER DAM	11	662	8.0	0.94	5,967	0		10	90	0	0	0	0
POOL-DAMMED	2	850	3.0	0.35	2,550	0		6	51	0	43	0	0
Total:	14	1,522	7.0	0.79	8,557	0	**Avg:**	9	84	0	6	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Wetted Area Percent	Large Boulders Number	Large Boulders (# / 100m^2)
Dammed & BW Pools	14	1,522	7.0	0.79	8,557	100.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	0	0			0	0.00%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	14	9.2	9.4
Pools >=1m deep:	5	3.3	3.3
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	19.2		
Residual pool depth (avg):	0.80		

DEMETER DESIGN **YEAGER CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/28/2008

REACH 2 **T02S-R10W-S09LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BEAVER DAM	3	317	7.5	0.47	2,593	0		10	90	0	0	0	0
RIFFLE	3	218	1.7	0.13	384	0		0	78	20	2	0	0
Total:	6	535	4.6	0.30	2,977	0	**Avg:**	5	84	10	1	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Percent	Large Boulders Number	(# / 100 m^2)
Dammed & BW Pools	3	317	7.5	0.47	2,593	87.10%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	3	218	1.7	0.13	384	12.90%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	3	5.6	6.9
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	23.8		
Residual pool depth (avg):	0.30		

STREAM SUMMARY **YEAGER CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
20	2,057	6.3	0.65	11,534	8	84	3	5	0	0	0

Habitat Group	Wetted Area	
	(m^2)	Percent
Dammed & BW Pools	11,150	96.67%
Scour Pools	0	0.00%
Glides	0	0.00%
Riffles	384	3.33%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **YEAGER**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) **2. transects 66**

Total hardwoods/1000	1029
Total conifers/1000 ft	274
Total conifers >20" dbh/1000 ft	23
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.4	3.8	0.8	4.5	2.6	2.6	3.8	10.9
15-30cm	0.0	1.5	0.0	2.6	0.4	0.4	0.4	4.5
30-50cm	0.0	0.4	0.0	0.0	0.0	1.1	0.0	1.5
50-90cm	0.0	0.0	0.0	0.0	0.4	0.0	0.4	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.4	5.6	0.8	7.1	3.4	4.1	1.5	5.6

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	38	30	42
Shrub cover	39	28	26
Grass/forb cover	73	60	26

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	38	56

High terrace	0	19	0
Low terrace	0	0	0
Floodplain	113	38	38
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	17	12	42

DEMETER DESIGN **YEAGER CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 6/28/2008

Summary of Riparian Zone (0-30m) for all reaches **2. transects**
66

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	1029
Total conifers/1000 ft	274
Total conifers >20" dbh/1000 ft	23
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	3.8	10.9
15-30cm	0.4	4.5
30-50cm	0.0	1.5
50-90cm	0.4	0.0
>90cm	0.0	0.0

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	FP	0	50	20	80	**Conifer**	0	0	0	0	0	
								Hardwood	1	2	0	0	0	
1	LF	2	HT	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HS	10	0	0	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	1	FP	0	0	100	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
2	LF	1	FP	0	100	75	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	

2	LF	2	FP	0	100	40	100	**Conifer**	0	0	0	0	0
								Hardwood	0	0	0	0	0
2	LF	3	FP	0	100	30	100	**Conifer**	0	0	0	0	0
								Hardwood	0	1	3	0	0
2	RT	1	FP	0	0	25	100	**Conifer**	0	0	0	0	0
								Hardwood	0	0	0	0	0
2	RT	2	FP	0	0	100	0	**Conifer**	0	0	0	0	0
								Hardwood	0	0	0	0	0
2	RT	3	FP	0	10	100	0	**Conifer**	0	0	0	1	0
								Hardwood	0	0	0	0	0
3	LF	1	FP	0	50	15	60	**Conifer**	1	0	0	0	0
								Hardwood	3	0	0	0	0
3	LF	2	HS	30	25	0	40	**Conifer**	2	0	0	0	0
								Hardwood	6	0	0	0	0
3	LF	3	HS	100	50	0	20	**Conifer**	4	0	0	0	0
								Hardwood	7	0	0	0	0
3	RT	1	FP	100	25	0	100	**Conifer**	0	0	0	0	0
								Hardwood	6	2	1	0	0
3	RT	2	HS	30	25	0	60	**Conifer**	0	0	0	0	0
								Hardwood	6	7	0	0	0
3	RT	3	HS	100	50	0	10	**Conifer**	3	1	0	0	0
								Hardwood	0	0	0	0	0

DEMETER DESIGN **SOUTH FORK WHISKEY**
HABITAT INVENTORY Report Date: 12/31/2008 Survey Date: 5/14/2008

REACH 1 **T02S-R10W-S21LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 8.2 VWI Range: 2 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	165	324	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	2.4	Width:	2.3	4.5	(3 - 6)	(-)	
Depth:	0.19	Height:	0.3	0.5	(0.4 - 0.6)	(-)	

W:D ratio: 9.6
Stream Flow Type: MF
Average Unit Gradient: 1.4%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 2.0
Habitat Units/100m (total channel length): 6.7
Habitat Units/100m (primary channel 6.7

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	ST	MT
Riparian Vegetation:	C15	M30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	48%	Reach avg: 100%
Undercut Banks:	31%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	34	20.6
Volume (m 3):	42	25.3
Key pieces (>=12m x 0.60m):	3	1.8

DEMETER DESIGN **SOUTH FORK WHISKEY**
HABITAT INVENTORY Report Date: 12/31/2008 Survey Date: 5/14/2008

REACH 2 **T02S-R10W-S21LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.9 VWI Range: 1 - 5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	164	418	0
Secondary	50	56	2

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	2.5	Width:	3.5	4.5	(4 - 5)	(-)	
Depth:	0.19	Height:	0.2	0.5	(0.4 - 0.5)	(-)	

W:D ratio: 16.0
Stream Flow Type: MF
Average Unit Gradient: 2.6%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.3
Habitat Units/100m (total channel length): 7.5
Habitat Units/100m (primary channel 9.7

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	ST	LT
Riparian Vegetation:	C15	M30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	29%	Reach avg: 96%
Undercut Banks:	21%	Range: 89 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	40	24.4
Volume (m 3):	41	25.2
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **SOUTH FORK WHISKEY**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

REACH 1 **T02S-R10W-S21LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-PLUNGE	2	6	4.3	0.50	27	7		3	5	20	43	25	5
RIFFLE	2	38	1.8	0.18	72	13		0	13	28	38	23	0
RIFFLE W/ POCKETS	3	120	1.8	0.22	223	26		1	14	25	32	27	2
STEP/BOULDERS	1	0	2.0	0.08	0	3		0	0	10	10	80	0
STEP/LOG	3	1	2.3	0.00	2	0		3	97	0	0	0	0
Total:	11	165	2.4	0.19	324	49	**Avg:**	2	33	16	24	23	1

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Percent	Large Boulders Number	(# / 100 m^2
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	2	6	4.3	0.50	27	8.33%	7	25.9
Glides	0	0			0	0.00%	0	0.0
Riffles	5	158	1.8	0.20	295	90.84%	39	13.2
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	4	1	2.3	0.02	3	0.83%	3	111.1
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	2	12.1	12.1
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	36.7		
Residual pool depth (avg):	0.39		

DEMETER DESIGN **SOUTH FORK WHISKEY**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

REACH 2 **T02S-R10W-S21LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CASCADE/BOULDERS	1	8	2.0	0.25	16	10		0	5	10	20	65	0
DRY CHANNEL	2	30	0.9	0.00	26	0		15	50	30	5	0	0
POOL-DAMMED	1	5	3.5	0.45	18	1		5	25	30	25	15	0
RAPID/BOULDERS	7	100	2.5	0.21	237	35		1	14	18	23	44	1
RIFFLE	2	21	2.5	0.23	57	3		0	20	30	30	20	0
RIFFLE W/ POCKETS	2	50	3.8	0.20	120	2		3	13	33	40	13	0
STEP/LOG	1	0	3.0	0.03	1	0		0	100	0	0	0	0
Total:	16	214	2.5	0.19	474	51	**Avg:**	3	25	22	22	28	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m^2)	Wetted Area Percent	Large Boulders Number	Large Boulders (# / 100 m^2)
Dammed & BW Pools	1	5	3.5	0.45	18	3.69%	1	5.7
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	4	71	3.1	0.21	177	37.35%	5	2.8
Rapids	7	100	2.5	0.21	237	49.92%	35	14.8
Cascades	1	8	2.0	0.25	16	3.38%	10	62.5
Step/Falls	1	0	3.0	0.03	1	0.13%	0	0.0
Dry	2	30	0.9	0.00	26	5.54%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	4.7	6.1
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	61.2		

Residual pool depth (avg): 0.3

STREAM SUMMARY **SOUTH FORK WHISKEY**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m^2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
27	379	2.5	0.19	798	2	28	20	23	26	1	100

Habitat Group	Wetted Area	
	(m^2)	Percent
Dammed & BW Pools	18	2.19%
Scour Pools	27	3.38%
Glides	0	0.00%
Riffles	472	59.07%
Rapids	237	29.64%
Cascades	16	2.00%
Step/Falls	3	0.41%
Dry	26	3.29%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **SOUTH FORK WHISKEY**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	122
Total conifers/1000 ft	1341
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	3.0	0.0	2.0	0.0	2.0	0.0	7.0	0.0
15-30cm	1.0	0.0	3.0	1.0	5.0	1.0	9.0	2.0
30-50cm	2.0	0.0	1.0	0.0	3.0	0.0	6.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	6.0	0.0	6.0	1.0	10.0	1.0	7.3	0.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	95	83	88
Shrub cover	10	19	24
Grass/forb cover	3	3	3

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0

Surface slope (%) 38
35 28

DEMETER DESIGN **SOUTH FORK WHISKEY**

HABITAT INVENTORY - RIPARIAN SURVEY 5/14/2008

Summary of Riparian Zone (0-30m) for all reaches **1 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	122
Total conifers/1000 ft	1341
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	7.0	0.0
15-30cm	9.0	2.0
30-50cm	6.0	0.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
12	LF	1	HS	35	95	5	0	**Conifer**	1	0	2	0	0	RIP FOR RCH1 = RCH 3 OF MAIN
								Hardwood	0	0	0	0	0	
12	LF	2	HS	30	85	2	0	**Conifer**	1	1	1	0	0	
								Hardwood	0	0	0	0	0	
12	LF	3	HS	20	85	2	0	**Conifer**	0	3	2	0	0	
								Hardwood	0	1	0	0	0	
12	RT	1	HS	40	95	15	5	**Conifer**	2	1	0	0	0	
								Hardwood	0	0	0	0	0	
12	RT	2	HS	40	80	35	5	**Conifer**	1	2	0	0	0	
								Hardwood	0	1	0	0	0	
12	RT	3	HS	35	90	45	5	**Conifer**	2	2	1	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN **RICE CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/8/2008

REACH 1 **T02S-R10W-S05LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.1 VWI Range: 1 - 4.5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	100%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	843	1,850	1
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 0	
Width:	2.1	Width:	7.7	8.0	(5 - 14)	(-)	
Depth:	0.21	Height:	0.5	1.1	(0.6 - 1.4)	(-)	

W:D ratio: 14.6
Stream Flow Type: MF
Average Unit Gradient: 0.2%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.1
Habitat Units/100m (total channel length): 3.3
Habitat Units/100m (primary channel 3.3

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	UR	RR
Riparian Vegetation:	G	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	10%	Reach avg: 80%
Undercut Banks:	13%	Range: 6 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	10	1.2
Volume (m3):	11	1.3
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **RICE CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/8/2008

REACH 2 **T02S-R10W-S05LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 5.2 VWI Range: 3 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	461	920	0
Secondary	100	20	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 0	
Width:	1.6	Width:	3.7	4.5	(3.5 - 5)	(-)	
Depth:	0.24	Height:	0.8	1.7	(1 - 2)	(-)	

W:D ratio: 4.0
Stream Flow Type: MF
Average Unit Gradient: 0.1%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.8
Habitat Units/100m (total channel length): 3.0
Habitat Units/100m (primary channel 3.7

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	RR
Riparian Vegetation:	S	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	7%	Reach avg: 100%
Undercut Banks:	5%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	2	0.4
Volume (m3):	0	0.1
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **RICE CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/8/2008

REACH 3 **T02S-R10W-S05LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.2 VWI Range: 2 - 3

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	69	96	1
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	1.4	Width:	1.3	2.3	(2 - 2.5)	(-)	
Depth:	0.21	Height:	0.3	0.6	(0.2 - 1)	(-)	

W:D ratio: 8.5
Stream Flow Type: MF
Average Unit Gradient: 0.1%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.9
Habitat Units/100m (total channel length): 7.2
Habitat Units/100m (primary channel 7.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	RR
Riparian Vegetation:	S	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	17%	Reach avg: 100%
Undercut Banks:	30%	Range: 94 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	1	1.4
Volume (m3):	7	10.2
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

REACH 1 **T02S-R10W-S05LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
DRY CHANNEL	1	4	2.5	0.00	10	0		35	35	30	0	0	0
POOL-DAMMED	7	364	2.8	0.36	990	0		57	20	21	2	0	0
POOL-LATERAL SCOUR	2	142	2.0	0.25	258	0		60	15	23	3	0	0
POOL-STRAIGHT SCOUR	6	110	2.3	0.28	263	0		32	9	40	14	5	0
RAPID/BOULDERS	11	191	1.6	0.10	281	0		37	16	33	10	5	0
STEP/LOG	1	32	1.5	0.10	48	0		75	25	0	0	0	0
Total:	28	843	2.1	0.21	1,850	0	**Avg:**	44	16	29	8	3	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	7	364	2.8	0.36	990	53.51%	0	0.0
Scour Pools	8	252	2.3	0.28	521	28.16%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	0	0			0	0.00%	0	0.0
Rapids	11	191	1.6	0.10	281	15.20%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	1	32	1.5	0.10	48	2.59%	0	0.0
Dry	1	4	2.5	0.00	10	0.54%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	15	17.8	17.8
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	7.3		
Residual pool depth (avg):	0.22		

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

REACH 2 **T02S-R10W-S05LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-DAMMED	4	168	2.8	0.31	433	0		75	15	10	0	0	0
POOL-LATERAL SCOUR	2	41	1.5	0.20	62	0		13	15	73	0	0	0
POOL-PLUNGE	2	68	3.0	0.50	208	0		87	5	8	0	0	0
POOL-STRAIGHT SCOUR	2	109	1.5	0.38	164	0		48	18	35	0	0	0
RAPID/BOULDERS	7	175	0.6	0.09	74	0		45	8	39	6	3	0
Total:	17	561	1.6	0.24	940	0	**Avg:**	53	11	32	2	1	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	4	168	2.8	0.31	433	46.02%	0	0.0
Scour Pools	6	218	2.0	0.36	433	46.07%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	0	0			0	0.00%	0	0.0
Rapids	7	175	0.6	0.09	74	7.92%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

		Total of all Channel Lengths	Primary Channel Length
	Total	# / Km	# / Km
All Pools:	10	17.8	21.7
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	15.3		
Residual pool depth (avg):	0.24		

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

REACH 3 **T02S-R10W-S05LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
DRY CHANNEL	1	6	0.0	0.00	0	0		85	15	0	0	0	0
POOL-DAMMED	2	52	1.8	0.40	78	0		88	3	10	0	0	0
POOL-LATERAL SCOUR	1	5	3.0	0.20	15	0		90	5	5	0	0	0
RAPID/BOULDERS	1	6	0.5	0.05	3	0		0	10	90	0	0	0
Total:	5	69	1.4	0.21	96	0	**Avg:**	70	7	23	0	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	2	52	1.8	0.40	78	81.15%	0	0.0
Scour Pools	1	5	3.0	0.20	15	15.71%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	0	0			0	0.00%	0	0.0
Rapids	1	6	0.5	0.05	3	3.14%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	1	6	0.0	0.00	0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	3	43.5	43.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	18.4		

Residual pool depth (avg): 0.27

STREAM SUMMARY **RICE CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
50	1,473	1.9	0.22	2,886	50	14	30	5	2	0	0

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	1,500	51.98%
Scour Pools	969	33.58%
Glides	0	0.00%
Riffles	0	0.00%
Rapids	359	12.43%
Cascades	0	0.00%
Step/Falls	48	1.66%
Dry	10	0.35%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transect

Total hardwoods/1000	183
Total conifers/1000 ft	61
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0
15-30cm	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	0.0	0.0	0.0	1.0	3.0	0.3	1.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	20	20	20
Shrub cover	0	10	10
Grass/forb cover	20	20	50

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	50	50	0
High terrace	0	0	100
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	50	50	0
Surface slope (%)	30	30	0

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transect

Total hardwoods/1000	6888
Total conifers/1000 ft	671
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	5.0	11.0	0.0	60.0	0.0	40.0	5.0	111.0
15-30cm	0.0	1.0	1.0	0.0	5.0	1.0	6.0	2.0
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	5.0	12.0	1.0	60.0	5.0	41.0	3.7	37.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	50	10	30
Shrub cover	80	80	80
Grass/forb cover	20	20	20

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	1	3	30

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	9144
Total conifers/1000 ft	2804
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	2.0	10.0	4.0	20.0	40.0	60.0	46.0	90.0
15-30cm	0.0	20.0	0.0	20.0	0.0	20.0	0.0	60.0
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	2.0	30.0	4.0	40.0	40.0	80.0	15.3	50.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	75	40	0
Shrub cover	100	100	10
Grass/forb cover	0	0	90

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	70	60	0

DEMETER DESIGN **RICE CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 7/8/2008

Summary of Riparian Zone (0-30m) for all reaches **3 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	5405
Total conifers/1000 ft	1179
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	17.3	67.3
15-30cm	2.0	21.3
30-50cm	0.0	0.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

DEMETER DESIGN RICE CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	RR	30	20	0	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	2	RR	30	20	10	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HT	0	20	10	50	**Conifer**	1	0	0	0	0	
								Hardwood	0	1	0	0	0	
1	RT	1	HS	30	20	0	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	HS	30	20	10	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	HT	0	20	10	50	**Conifer**	0	0	0	0	0	
								Hardwood	1	1	0	0	0	

DEMETER DESIGN RICE CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
29	LF	1	HS	1	50	80	20	**Conifer**	5	0	0	0	0	
								Hardwood	1	0	0	0	0	
29	LF	2	HS	3	10	80	20	**Conifer**	0	1	0	0	0	
								Hardwood	10	0	0	0	0	
29	LF	3	HS	30	30	80	20	**Conifer**	0	2	0	0	0	
								Hardwood	30	0	0	0	0	
29	RT	1	HS	1	50	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	10	1	0	0	0	
29	RT	2	HS	3	10	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	50	0	0	0	0	
29	RT	3	HS	30	30	80	20	**Conifer**	0	3	0	0	0	
								Hardwood	10	1	0	0	0	

DEMETER DESIGN RICE CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
46	LF	1	HS	70	75	100	0	**Conifer**	1	0	0	0	0	
								Hardwood	5	10	0	0	0	
46	LF	2	HS	60	40	100	0	**Conifer**	2	0	0	0	0	
								Hardwood	10	10	0	0	0	
46	LF	3	HS	0	0	10	90	**Conifer**	20	0	0	0	0	
								Hardwood	30	10	0	0	0	
46	RT	1	HS	70	75	100	0	**Conifer**	1	0	0	0	0	
								Hardwood	5	10	0	0	0	
46	RT	2	HS	60	40	100	0	**Conifer**	2	0	0	0	0	
								Hardwood	10	10	0	0	0	
46	RT	3	HS	0	0	10	90	**Conifer**	20	0	0	0	0	
								Hardwood	30	10	0	0	0	

DEMETER DESIGN **OHARA CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/9/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.8 VWI Range: 1 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	100%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,658	3,584	0
Secondary	36	72	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 49		First Terrace *n* = 0	
Width:	2.5	Width:	2.9	4.7	(2 - 9)	(-)	
Depth:	0.27	Height:	0.3	0.9	(0.2 - 3)	(-)	

W:D ratio: 11.7
Stream Flow Type: MF
Average Unit Gradient: 0.7%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.8
Habitat Units/100m (total channel length): 3.2
Habitat Units/100m (primary channel 3.3

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	RR
Riparian Vegetation:	S	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	26%	Reach avg: 97%
Undercut Banks:	14%	Range: 50 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	27	1.6
Volume (m 3):	11	0.7
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN INC **OHARA CREEK**

HABITAT INVENTORY Report Date: 12/18/2008 Survey Date: 7/9/2008

REACH 2 **T01S-R10W-S32LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.0 VWI Range: 1 - 5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	873	1,550	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 15		First Terrace *n* = 0	
Width:	1.9	Width:	2.4	5.9	(3 - 30)	(-)	
Depth:	0.26	Height:	0.2	0.7	(0.2 - 2.4)	(-)	

W:D ratio: 13.8
Stream Flow Type: MF
Average Unit Gradient: 0.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 2.4
Habitat Units/100m (total channel length): 1.7
Habitat Units/100m (primary channel 1.7

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	TH	MT
Riparian Vegetation:	S	M30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	7%	Reach avg: 97%
Undercut Banks:	12%	Range: 75 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	10	1.1
Volume (m3):	2	0.2
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **OHARA CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/9/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	3	150	1.4	0.05	251	0		0	17	40	30	0	13
POOL-DAMMED	4	69	2.8	0.39	182	0		38	4	59	0	0	0
POOL-LATERAL SCOUR	3	77	2.8	0.43	198	0		40	12	48	0	0	0
POOL-PLUNGE	4	33	5.8	0.85	187	0		5	5	81	6	3	0
POOL-STRAIGHT SCOUR	19	461	2.9	0.31	1,265	0		23	6	60	10	1	0
RAPID/BEDROCK	1	11	2.0	0.05	22	0		5	5	84	5	0	0
RIFFLE	21	893	1.6	0.13	1,552	0		22	8	59	10	0	0
Total:	55	1,694	2.5	0.27	3,656	0	**Avg:**	22	8	60	9	1	1

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	4	69	2.8	0.39	182	4.98%	0	0.0
Scour Pools	26	571	3.3	0.41	1,649	45.11%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	21	893	1.6	0.13	1,552	42.44%	0	0.0
Rapids	1	11	2.0	0.05	22	0.60%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	3	150	1.4	0.05	251	6.87%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	30	17.7	18.1
Pools >=1m deep:	2	1.2	1.2
Complex pools (LWD pieces>=3):	1	0.6	0.6
Pool frequency (channel widths/pool):	19.5		
Residual pool depth (avg):	0.34		

DEMETER DESIGN **OHARA CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/9/2008

REACH 2 **T01S-R10W-S32LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-DAMMED	1	71	5.0	0.50	355	0		30	60	10	0	0	0
POOL-LATERAL SCOUR	1	57	1.5	0.65	86	0		10	10	40	40	0	0
POOL-STRAIGHT SCOUR	2	48	2.0	0.33	96	0		10	25	58	8	0	0
RIFFLE	6	461	1.7	0.19	656	0		30	11	30	28	1	0
Total:	10	637	2.1	0.30	1,192	0	**Avg:**	24	19	35	23	1	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	1	71	5.0	0.50	355	29.78%	0	0.0
Scour Pools	3	105	1.8	0.43	182	15.23%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	6	461	1.7	0.19	656	54.99%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	4	6.3	6.3
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	61.3		

Residual pool depth (avg): 0.35

STREAM SUMMARY **OHARA CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
65	2,331	2.4	0.28	4,848	22	9	56	11	1	1	0

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	537	11.08%
Scour Pools	1,831	37.76%
Glides	0	0.00%
Riffles	2,207	45.53%
Rapids	22	0.45%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	251	5.18%
Unsurveyed	0	0.00%

DEMETER DESIGN **OHARA CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/9/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 3 transects

Total hardwoods/1000	7722
Total conifers/1000 ft	5121
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	24.7	27.7	19.0	49.0	29.3	43.7	73.0	120.3
15-30cm	2.3	1.7	2.3	1.0	6.0	3.7	10.7	6.3
30-50cm	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	27.3	29.3	21.3	50.0	35.3	47.3	28.0	42.2

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	43	20	38
Shrub cover	61	25	25
Grass/forb cover	19	52	48

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	67	67	100
Low terrace	0	0	0
Floodplain	33	33	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0

Surface slope (%) 19
15 30

DEMETER DESIGN **OHARA CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 7/9/2008

Summary of Riparian Zone (0-30m) for all reaches **3 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	7722
Total conifers/1000 ft	5121
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	73.0	120.3
15-30cm	10.7	6.3
30-50cm	0.3	0.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

DEMETER DESIGN OHARA CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/9/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	HT	25	30	100	0	**Conifer**	10	1	0	0	0	
								Hardwood	20	2	0	0	0	
1	LF	2	HT	0	0	0	100	**Conifer**	10	0	0	0	0	
								Hardwood	20	0	0	0	0	
1	LF	3	HT	0	0	0	100	**Conifer**	10	10	0	0	0	
								Hardwood	25	5	0	0	0	
1	RT	1	HT	65	30	100	0	**Conifer**	10	1	0	0	0	
								Hardwood	20	0	0	0	0	
1	RT	2	HT	0	0	0	100	**Conifer**	10	2	0	0	0	
								Hardwood	20	0	0	0	0	
1	RT	3	HT	0	0	0	100	**Conifer**	10	0	0	0	0	
								Hardwood	22	2	0	0	0	
51	LF	1	HT	3	60	40	0	**Conifer**	20	0	0	0	0	
								Hardwood	20	0	0	0	0	
51	LF	2	HT	25	30	30	0	**Conifer**	15	0	0	0	0	
								Hardwood	50	0	0	0	0	
51	LF	3	HT	50	70	20	0	**Conifer**	30	0	0	0	0	
								Hardwood	40	0	0	0	0	
51	RT	1	HT	3	60	40	0	**Conifer**	20	0	0	0	0	
								Hardwood	20	0	0	0	0	
51	RT	2	HT	25	30	30	0	**Conifer**	15	0	0	0	0	
								Hardwood	50	0	0	0	0	
51	RT	3	HT	50	70	20	0	**Conifer**	30	0	0	0	0	
								Hardwood	40	0	0	0	0	
54	LF	1	FP	0	20	20	80	**Conifer**	4	3	1	0	0	
								Hardwood	0	1	0	0	0	
54	LF	2	FP	0	0	20	80	**Conifer**	2	0	0	0	0	
								Hardwood	0	0	0	0	0	
54	LF	3	HT	20	10	30	70	**Conifer**	3	3	0	0	0	
								Hardwood	0	0	0	0	0	
54	RT	1	FP	20	60	65	35	**Conifer**	10	2	0	0	0	
								Hardwood	3	2	0	0	0	
54	RT	2	FP	40	60	70	30	**Conifer**	5	5	0	0	0	
								Hardwood	7	3	0	0	0	
54	RT	3	HT	60	75	80	20	**Conifer**	5	5	0	0	0	
								Hardwood	4	4	0	0	0	

DEMETER DESIGN **OG JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	100%	Wide Floodplain	0%

Valley Width Index: 15.6 VWI Range: 10 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	276	942	0
Secondary	11	15	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 1	
Width:	2.9	Width:	5.3	6.8	(2 – 14)	20.0	(20 – 20)
Depth:	0.34	Height:	0.4	0.8	(0.5 - 1.1)	2.8	(1.5 - 4)

W:D ratio: 13.3
Stream Flow Type: MF
Average Unit Gradient: 2.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 8.7
Habitat Units/100m (primary channel 9.1

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	
Riparian Vegetation:	C50	C15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	54%	Reach avg: 86%
Undercut Banks:	22%	Range: 53 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	81	29.3
Volume (m 3):	71	25.6
Key pieces (>=12m x 0.60m):	2	0.7

DEMETER DESIGN **OG JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 2 **T02S-R10W-S30LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	100%	Wide Floodplain	0%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	252	861	0
Secondary	62	147	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 4		First Terrace *n* = 0
Width:	2.7	Width:	3.6	6.1	(2.5 - 10)	
Depth:	0.29	Height:	0.3	0.7	(0.4 - 0.9)	

W:D ratio: 10.9
Stream Flow Type: MF
Average Unit Gradient: 3.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.7
Habitat Units/100m (total channel length): 7.6
Habitat Units/100m (primary channel 9.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	
Riparian Vegetation:	C50	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	46%	Reach avg: 96%
Undercut Banks:	12%	Range: 67 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	40	15.9
Volume (m 3):	28	11.1
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **OG JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 3 **T02S-R10W-S30LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.5 VWI Range: 4 - 5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	94	348	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 1	
Width:	4.7	Width:	4.5	4.5	(4.5 - 4.5)	8.0	(8 - 8)
Depth:	0.33	Height:	0.4	0.8	(0.8 - 0.8)	1.0	(1 - 1)

W:D ratio: 11.3
Stream Flow Type: MF
Average Unit Gradient: 3.0%
Water temperature (°C): -
Entrenchment (ACW:FPW ratio): 1.0
Habitat Units/100m (total channel length): 3.2
Habitat Units/100m (primary channel 3.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	30%	Reach avg: 100%
Undercut Banks:	5%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):		
Volume (m):	3	
Key pieces (>=12m x 0.60m):		

DEMETER DESIGN **OG JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 4 **T02S-R10W-S30LL** **REACH 4**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.2 VWI Range: 2.5 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	525	1,907	0
Secondary	140	113	3

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 3	
Width:	2.8	Width:	3.8	4.0	(2.5 - 5.5)	7.3	(6 - 8)
Depth:	0.29	Height:	0.3	0.7	(0.5 - 0.8)	1.3	(1 - 1.5)

W:D ratio: 11.3
Stream Flow Type: MF
Average Unit Gradient: 5.2%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.1
Habitat Units/100m (total channel length): 2.0
Habitat Units/100m (primary channel 2.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	MT
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	41%	Reach avg: 100%
Undercut Banks:	2%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	52	9.9
Volume (m 3):	58	11.1
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BACKWATER	1	2	2.0	0.45	4	0		15	40	15	10	0	20
POOL-DAMMED	4	33	4.6	0.54	205	0		5	20	41	24	5	5
POOL-LATERAL SCOUR	3	14	2.3	0.53	34	0		2	8	37	49	1	3
POOL-PLUNGE	2	5	3.8	0.40	17	0		1	5	43	50	3	0
RIFFLE	9	208	2.8	0.20	623	0		0	5	38	44	6	6
RIFFLE W/ POCKETS	2	23	2.8	0.30	67	0		0	15	38	35	13	0
STEP/BEAVER DAM	1	2	3.5	0.15	7	0		0	20	40	40	0	0
STEP/LOG	3	1	1.6	0.28	1	0		0	20	40	40	0	0
Total:	25	287	2.9	0.34	957	0	**Avg:**	2	12	38	39	4	4

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	5	35	4.1	0.52	209	21.78%	0	0.0
Scour Pools	5	18	2.9	0.48	51	5.33%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	11	231	2.8	0.22	689	72.02%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	4	3	2.1	0.25	8	0.87%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	10	34.9	36.2
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	5.4		
Residual pool depth (avg):	0.33		

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 2 **T02S-R10W-S30LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders	Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CASCADE/BEDROCK	1	1	1.0	0.03	1	0	0	0	0	0	0	100
GLIDE	1	4	2.0	0.45	8	1	5	35	25	15	20	0
POOL-BEAVER DAM	1	25	3.5	0.40	88	0	35	65	0	0	0	0
POOL-PLUNGE	3	10	3.2	0.53	35	0	0	5	32	37	27	0
POOL-STRAIGHT SCOUR	2	13	2.5	0.68	30	0	0	3	23	18	8	50
RAPID/BOULDERS	4	35	2.6	0.23	100	1	0	3	25	36	36	0
RIFFLE	6	118	2.5	0.18	353	4	2	11	36	35	17	0
RIFFLE W/ POCKETS	4	108	3.4	0.28	393	1	0	5	33	36	24	3
STEP/LOG	2	0	2.1	0.05	1	0	0	20	40	40	0	0
Total:	24	314	2.7	0.29	1,008	7	**Avg:** 2	11	29	31	19	9

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	1	25	3.5	0.40	88	8.68%	0	0.0
Scour Pools	5	23	2.9	0.59	65	6.40%	0	0.0
Glides	1	4	2.0	0.45	8	0.79%	1	12.5
Riffles	10	226	2.9	0.22	746	74.02%	5	0.7
Rapids	4	35	2.6	0.23	100	9.92%	1	1.0
Cascades	1	1	1.0	0.03	1	0.10%	0	0.0
Step/Falls	2	0	2.1	0.05	1	0.08%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

		Total of all Channel Lengths	Primary Channel Length
	Total	# / Km	# / Km
All Pools:	6	19.1	23.8
Pools >=1m deep:	1	3.2	4.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	14.4		
Residual pool depth (avg):	0.31		

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 3 **T02S-R10W-S30LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	40	3.0	0.15	120	0		0	5	15	20	0	60
POOL-PLUNGE	1	4	7.0	0.50	28	0		0	5	55	35	5	0
RIFFLE W/ POCKETS	1	50	4.0	0.35	200	4		0	5	40	25	30	0
Total:	3	94	4.7	0.33	348	4	**Avg:**	0	5	37	27	12	20

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	1	4	7.0	0.50	28	8.05%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	1	50	4.0	0.35	200	57.47%	4	2.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	1	40	3.0	0.15	120	34.48%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	10.6	10.6
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	20.9		
Residual pool depth (avg):	0.40		

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/19/2008

REACH 4 **T02S-R10W-S30LL** **REACH 4**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-PLUNGE	1	5	3.5	0.70	18	2		0	5	25	20	50	0
PUDDLED UNIT	3	130	0.8	0.03	93	0		28	9	29	21	12	0
RAPID/BOULDERS	7	505	3.4	0.36	1,830	17		0	1	25	24	50	0
RIFFLE	2	25	3.0	0.25	80	1		3	8	23	25	43	0
Total:	13	665	2.8	0.29	2,020	20	**Avg:**	7	4	26	23	40	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	1	5	3.5	0.70	18	0.87%	2	11.4
Glides	0	0			0	0.00%	0	0.0
Riffles	2	25	3.0	0.25	80	3.96%	1	1.3
Rapids	7	505	3.4	0.36	1,830	90.59%	17	0.9
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	3	130	0.8	0.03	93	4.58%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	1.5	1.9
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	177.3		

Residual pool depth (avg): 0.40

STREAM SUMMARY **OG JACKSON CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
65	1,359	2.9	0.31	4,333	3	10	32	32	17	6	31

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	296	6.83%
Scour Pools	161	3.72%
Glides	8	0.18%
Riffles	1,715	39.59%
Rapids	1,930	44.54%
Cascades	1	0.02%
Step/Falls	9	0.21%
Dry	93	2.14%
Culverts	120	2.77%
Unsurveyed	0	0.00%

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	0
Total conifers/1000 ft	792
Total conifers >20" dbh/1000 ft	122
Total conifers >35" dbh/1000 ft	61

Average number of trees in a 5-meter wide band

Diameter class (cm)	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
15-30cm	0.0	0.0	2.0	0.0	3.0	0.0	5.0	0.0
30-50cm	0.0	0.0	2.0	0.0	3.0	0.0	5.0	0.0
50-90cm	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
>90cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Total/100m2	2.0	0.0	4.0	0.0	7.0	0.0	4.3	0.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	43	63	45
Shrub cover	95	65	65
Grass/forb cover	5	18	18

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	100	100	100
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	0

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	183
Total conifers/1000 ft	792
Total conifers >20" dbh/1000 ft	488
Total conifers >35" dbh/1000 ft	244

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-30cm	0.0	0.0	1.0	1.0	1.0	1.0	2.0	2.0
30-50cm	0.0	0.0	2.0	1.0	1.0	0.0	3.0	1.0
50-90cm	1.0	0.0	1.0	0.0	2.0	0.0	4.0	0.0
>90cm	1.0	0.0	1.0	0.0	2.0	0.0	4.0	0.0
Total/100m2	2.0	0.0	5.0	2.0	6.0	1.0	4.3	1.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	58	70	65
Shrub cover	95	95	93
Grass/forb cover	3	3	5

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	50	50	50
High terrace	50	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	28	20	18

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	671
Total conifers/1000 ft	244
Total conifers >20" dbh/1000 ft	244
Total conifers >35" dbh/1000 ft	122

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0
15-30cm	0.0	3.0	0.0	4.0	0.0	2.0	0.0	9.0
30-50cm	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
50-90cm	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0
>90cm	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0
Total/100m2	0.0	4.0	0.0	5.0	4.0	2.0	1.3	3.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	75	70	83
Shrub cover	78	88	73
Grass/forb cover	8	5	5

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	100	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	20	10

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 4 **REACH 4**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	671
Total conifers/1000 ft	1097
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	1.0	0.0	1.0	0.0	1.0	0.0	3.0
15-30cm	1.0	3.0	1.0	0.0	3.0	2.0	5.0	5.0
30-50cm	0.0	3.0	5.0	0.0	8.0	0.0	13.0	3.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	1.0	7.0	6.0	1.0	11.0	3.0	6.0	3.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	68	83	78
Shrub cover	85	83	33
Grass/forb cover	5	0	8

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	100
High terrace	100	50	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0

Surface slope (%)	0
23	50

DEMETER DESIGN **OG JACKSON CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 5/19/2008

Summary of Riparian Zone (0-30m) for all reaches **4 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	381
Total conifers/1000 ft	732
Total conifers >20" dbh/1000 ft	213
Total conifers >35" dbh/1000 ft	107

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	0.3	1.0
15-30cm	3.0	4.0
30-50cm	5.3	1.3
50-90cm	1.8	0.0
>90cm	1.8	0.0

DEMETER DESIGN OG JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	HT	0	25	95	5	**Conifer**	1	0	0	0	1	
								Hardwood	0	0	0	0	0	
1	LF	2	HT	0	65	50	15	**Conifer**	0	2	2	0	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HT	0	60	50	15	**Conifer**	0	1	3	1	0	
								Hardwood	0	0	0	0	0	
1	RT	1	HT	0	60	95	5	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	HT	0	60	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	HT	0	30	80	20	**Conifer**	0	2	0	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN OG JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
26	LF	1	HT	0	30	90	5	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
26	LF	2	HT	0	65	95	5	**Conifer**	0	0	2	1	0	
								Hardwood	0	0	1	0	0	
26	LF	3	HT	0	50	90	10	**Conifer**	0	0	1	2	1	
								Hardwood	0	0	0	0	0	
26	RT	1	HS	55	85	100	0	**Conifer**	0	0	0	1	1	
								Hardwood	0	0	0	0	0	
26	RT	2	HS	40	75	95	0	**Conifer**	0	1	0	0	1	
								Hardwood	0	1	0	0	0	
26	RT	3	HS	35	80	95	0	**Conifer**	0	1	0	0	1	
								Hardwood	0	1	0	0	0	

DEMETER DESIGN OG JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
50	LF	1	HT	0	70	85	5	**Conifer**	0	0	0	0	0	
								Hardwood	0	1	1	0	0	
50	LF	2	HT	0	60	95	0	**Conifer**	0	0	0	0	0	
								Hardwood	1	0	0	0	0	
50	LF	3	HT	0	85	65	0	**Conifer**	0	0	0	2	2	
								Hardwood	0	1	0	0	0	
50	RT	1	HT	0	80	70	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	
50	RT	2	HS	40	80	80	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	4	0	0	0	
50	RT	3	HS	20	80	80	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	1	0	0	0	

DEMETER DESIGN OG JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/19/2008

RIPARIAN ZONE VEGETATION

Reach 4 Reach 4

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
54	LF	1	HT	0	60	85	5	**Conifer**	0	1	0	0	0	
								Hardwood	1	1	0	0	0	
54	LF	2	HT	0	80	95	0	**Conifer**	0	1	3	0	0	
								Hardwood	0	0	0	0	0	
54	LF	3	HS	50	70	50	10	**Conifer**	0	2	3	0	0	
								Hardwood	1	2	0	0	0	
54	RT	1	HT	0	75	85	5	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	3	0	0	
54	RT	2	HS	45	85	70	0	**Conifer**	0	0	2	0	0	
								Hardwood	1	0	0	0	0	
54	RT	3	HS	50	85	15	5	**Conifer**	0	1	5	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 1 **T02S-R10W-S17LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.0 VWI Range: 4 - 4

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	150	750	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted	Active	Floodprone *n* = 1	First Terrace *n* = 1
Width: 5.0	Width: 10.0	12.0 (12 – 12)	14.0 (14 - 14)
Depth: 0.20	Height: 0.4	0.7 (0.7 - 0.7)	1.5 (1.5 - 1.5)

W:D ratio: 28.6
Stream Flow Type: MF
Average Unit Gradient: 0.5%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 0.7
Habitat Units/100m (primary channel 0.7

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	GN
Riparian Vegetation:	G	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	60%	Reach avg: 50%
Undercut Banks:	25%	Range: 50 - 50

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):		
Volume (m 3):		
Key pieces (>=12m x 0.60m):		

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 2 **T02S-R10W-S17LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.0 VWI Range: 4 - 4

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	100	537	0
Secondary	10	85	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1	First Terrace *n* = 1
Width:	6.7	Width:	9.0	11.0 (11 – 11)	13.0 (13 - 13)
Depth:	0.52	Height:	0.4	0.7 (0.7 - 0.7)	2.5 (2.5 - 2.5)

W:D ratio: 25.7
Stream Flow Type: MF
Average Unit Gradient: 1.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 4.5
Habitat Units/100m (primary channel 5.0

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	LT	GN
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	40%	Reach avg: 84%
Undercut Banks:	5%	Range: 72 - 92

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	9	9.0
Volume (m 3):	1	0.8
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 3 **T02S-R10W-S17LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	100%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 5.8 VWI Range: 4 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,135	6,982	1
Secondary	509	626	3

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 12	First Terrace *n* = 10
Width:	2.5	Width:	2.9	5.5 (1 – 10)	9.4 (1.2 - 40)
Depth:	0.39	Height:	0.3	0.6 (0.2 - 0.9)	0.9 (0.4 - 1.5)

W:D ratio: 11.2
Stream Flow Type: MF
Average Unit Gradient: 0.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 2.4
Habitat Units/100m (total channel length): 6.3
Habitat Units/100m (primary channel 9.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	LT	
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	12%	Reach avg: 89%
Undercut Banks:	4%	Range: 44 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	69	6.1
Volume (m 3):	153	13.5
Key pieces (>=12m x 0.60m):	6	0.5

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 4 **T02S-R10W-S16LL** **REACH 4**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.0 VWI Range: 4 - 4

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	205	445	0
Secondary	10	8	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1	First Terrace *n* = 1
Width:	1.8	Width:	3.0	4.5 (4.5 - 4.5)	6.5 (6.5 - 6.5)
Depth:	0.29	Height:	0.2	0.4 (0.4 - 0.4)	0.6 (0.6 - 0.6)

W:D ratio: 15.0
Stream Flow Type: MF
Average Unit Gradient: 1.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.5
Habitat Units/100m (total channel length): 7.0
Habitat Units/100m (primary channel 7.3

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	LT	MT
Riparian Vegetation:	M30	P

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	2%	Reach avg: 89%
Undercut Banks:	0%	Range: 33 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	5	2.4
Volume (m 3):	2	1.1
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 1 **T02S-R10W-S17LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
RIFFLE	1	150	5.0	0.20	750	0		0	10	30	60	0	0
Total:	1	150	5.0	0.20	750	0	**Avg:**	0	10	30	60	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	1	150	5.0	0.20	750	100.00%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	0	0.0	0.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	0.0		
Residual pool depth (avg):			

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 2 **T02S-R10W-S17LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BACKWATER	1	10	8.5	0.70	85	0		10	35	10	5	0	40
POOL-LATERAL SCOUR	1	18	8.0	0.85	144	0		1	29	30	40	0	0
POOL-TRENCH	1	15	7.5	0.75	113	0		0	5	80	5	0	10
RIFFLE	2	67	4.8	0.15	280	0		0	5	78	18	0	0
Total:	5	110	6.7	0.52	622	0	**Avg:**	2	16	55	17	0	10

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	10	8.5	0.70	85	13.68%	0	0.0
Scour Pools	2	33	7.8	0.80	257	41.27%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	2	67	4.8	0.15	280	45.05%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	3	27.3	30.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	4.1		
Residual pool depth (avg):	0.68		

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 3 **T02S-R10W-S17LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
DRY CHANNEL	3	100	1.0	0.00	100	0	100	0	0	0	0	0
GLIDE	6	140	2.2	0.27	328	0	4	58	5	0	0	33
POOL-ALCOVE	1	15	2.0	0.40	30	0	10	40	5	0	0	45
POOL-BACKWATER	2	100	1.0	0.20	100	0	90	10	0	0	0	0
POOL-BEAVER DAM	6	174	2.6	0.85	476	0	8	49	13	4	0	26
POOL-DAMMED	15	382	2.3	0.59	837	0	20	63	10	0	1	5
POOL-LATERAL SCOUR	12	158	2.7	0.63	426	0	4	39	29	2	0	26
POOL-PLUNGE	6	34	1.5	0.63	52	0	0	32	42	0	0	27
POOL-STRAIGHT SCOUR	5	105	1.7	0.58	150	0	0	63	25	0	0	12
POOL-TRENCH	5	33	1.2	0.72	35	0	6	36	1	0	0	57
PUDDLED UNIT	1	90	50.0	0.20	4,500	0	90	10	0	0	0	0
RAPID/BEDROCK	1	3	1.0	0.20	3	0	0	0	0	0	0	100
RIFFLE	23	303	1.8	0.18	555	0	0	13	61	3	0	23
STEP/BEAVER DAM	5	2	2.6	0.12	4	0	0	100	0	0	0	0
STEP/BEDROCK	1	1	1.0	0.10	1	0	0	50	0	25	25	0
STEP/LOG	12	5	2.6	0.13	14	0	0	100	0	0	0	0
Total:	104	1,644	2.5	0.39	7,608	0	**Avg:** 10	47	23	1	0	19

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Wetted Area Percent	Large Boulders Number	Large Boulders (# / 100m2)
Dammed & BW Pools	24	671	2.3	0.62	1,443	18.96%	0	0.0
Scour Pools	28	329	2.0	0.63	662	8.70%	0	0.0
Glides	6	140	2.2	0.27	328	4.30%	0	0.0
Riffles	23	303	1.8	0.18	555	7.29%	0	0.0
Rapids	1	3	1.0	0.20	3	0.04%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	18	8	2.5	0.13	19	0.25%	0	0.0
Dry	4	190	13.3	0.05	4,600	60.46%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total of all Channel Lengths Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	52	31.6	45.8
Pools >=1m deep:	8	4.9	7.1
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	11.1		
Residual pool depth (avg):	0.51		

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

REACH 4 **T02S-R10W-S16LL** **REACH 4**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BACKWATER	1	3	2.0	0.40	6	0		0	30	70	0	0	0
POOL-DAMMED	1	10	3.0	0.50	30	0		0	80	20	0	0	0
POOL-LATERAL SCOUR	1	12	1.5	0.50	18	0		0	80	20	0	0	0
POOL-PLUNGE	3	30	1.7	0.55	49	0		0	30	40	7	10	13
RIFFLE	6	151	1.9	0.13	340	0		0	22	78	0	0	0
RIFFLE W/ POCKETS	1	8	1.0	0.25	8	0		0	5	95	0	0	0
STEP/LOG	2	1	1.8	0.10	2	0		0	100	0	0	0	0
Total:	15	215	1.8	0.29	453	0	**Avg:**	0	41	53	1	2	3

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	2	13	2.5	0.45	36	7.95%	0	0.0
Scour Pools	4	42	1.7	0.54	67	14.76%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	7	159	1.8	0.15	348	76.90%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	2	1	1.8	0.10	2	0.39%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	6	27.9	29.3
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	11.9		

Residual pool depth (avg): 0.39

STREAM SUMMARY **NORTH FORK WHISKEY CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
125	2,119	2.6	0.38	9,433	8	45	28	2	1	16	0

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	1,564	16.58%
Scour Pools	985	10.45%
Glides	328	3.47%
Riffles	1,933	20.49%
Rapids	3	0.03%
Cascades	0	0.00%
Step/Falls	21	0.22%
Dry	4,600	48.77%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transect

Total hardwoods/1000	366
Total conifers/1000 ft	122
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0
15-30cm	0.0	0.0	0.0	3.0	0.0	2.0	0.0	5.0
30-50cm	0.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	0.0	1.0	3.0	1.0	3.0	0.7	2.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	0	5	15
Shrub cover	0	10	10
Grass/forb cover	100	35	25

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	100	100	100
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	15

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transect

Total hardwoods/1000	488
Total conifers/1000 ft	914
Total conifers >20" dbh/1000 ft	305
Total conifers >35" dbh/1000 ft	61

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	1.0	0.0	1.0	0.0	0.0	1.0	2.0
15-30cm	2.0	1.0	4.0	2.0	0.0	2.0	6.0	5.0
30-50cm	1.0	0.0	0.0	0.0	2.0	0.0	3.0	0.0
50-90cm	1.0	1.0	2.0	0.0	1.0	0.0	4.0	1.0
>90cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
Total/100m2	6.0	3.0	6.0	3.0	3.0	2.0	5.0	2.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	80	75	75
Shrub cover	35	40	30
Grass/forb cover	65	60	70

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	8	6	6

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	1341
Total conifers/1000 ft	152
Total conifers >20" dbh/1000 ft	30
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter class (cm)	Zone 1 0-10 meters Conifer	Zone 1 0-10 meters Hardwood	Zone 2 10 - 20 meters Conifer	Zone 2 10 - 20 meters Hardwood	Zone 3 20 - 30 meters Conifer	Zone 3 20 - 30 meters Hardwood	Zones 1-3 0-30 meters Conifer	Zones 1-3 0-30 meters Hardwood
3-15cm	1.0	1.0	0.0	4.5	0.5	2.5	1.5	8.0
15-30cm	0.0	2.5	0.5	5.5	0.0	6.0	0.5	14.0
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	1.0	3.5	0.5	10.0	1.0	8.5	0.8	7.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	56	76	71
Shrub cover	13	30	20
Grass/forb cover	88	70	55

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	25	50	50
Low terrace	75	50	50
Floodplain	0	0	0

Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	8	6	8

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 4 **REACH 4**

Summary of Riparian Zone (0-30m) 1 transect

Total hardwoods/1000	122
Total conifers/1000 ft	1158
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-30cm	7.0	2.0	0.0	0.0	0.0	0.0	7.0	2.0
30-50cm	1.0	0.0	5.0	0.0	6.0	0.0	12.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	8.0	2.0	5.0	0.0	6.0	0.0	6.3	0.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	95	95	95
Shrub cover	0	0	0
Grass/forb cover	0	0	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	0	0	0
Low terrace	100	50	50
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	2	31	31

DEMETER DESIGN **NORTH FORK WHISKEY CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 4/1/2008

Summary of Riparian Zone (0-30m) for all reaches **5 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	732
Total conifers/1000 ft	500
Total conifers >20" dbh/1000 ft	73
Total conifers >35" dbh/1000 ft	12

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	0.8	3.8
15-30cm	2.8	8.0
30-50cm	3.4	0.0
50-90cm	1.0	0.2
>90cm	0.2	0.0

DEMETER DESIGN NORTH FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	HT	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	2	HT	0	10	20	70	**Conifer**	0	0	1	0	0	
								Hardwood	0	3	0	0	0	
1	LF	3	HT	30	30	20	50	**Conifer**	0	0	1	0	0	
								Hardwood	1	2	0	0	0	
1	RT	1	HT	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	HT	0	0	0	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	HT	0	0	0	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN NORTH FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
2	LF	1	HS	15	90	30	70	**Conifer**	0	0	0	1	1	
								Hardwood	1	1	0	0	0	
2	LF	2	HS	10	90	40	60	**Conifer**	0	1	0	2	0	
								Hardwood	1	2	0	0	0	
2	LF	3	HS	10	90	20	80	**Conifer**	0	0	2	1	0	
								Hardwood	0	0	0	0	0	
2	RT	1	HS	1	70	40	60	**Conifer**	1	2	1	0	0	
								Hardwood	0	0	0	1	0	
2	RT	2	HS	1	60	40	60	**Conifer**	0	3	0	0	0	
								Hardwood	0	0	0	0	0	
2	RT	3	HS	1	60	40	60	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	

DEMETER DESIGN NORTH FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 4/1/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
7	LF	1	HT	30	80	40	60	**Conifer**	0	0	0	0	0	
								Hardwood	0	3	0	0	0	
7	LF	2	HT	0	80	40	60	**Conifer**	0	0	0	0	0	
								Hardwood	5	1	0	0	0	
7	LF	3	HT	5	60	0	0	**Conifer**	1	0	0	0	0	
								Hardwood	5	1	0	0	0	
7	RT	1	LT	0	75	10	90	**Conifer**	1	0	0	0	0	
								Hardwood	2	1	0	0	0	
7	RT	2	HT	25	85	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
7	RT	3	HT	25	85	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
90	LF	1	LT	0	30	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
90	LF	2	LT	0	60	0	100	**Conifer**	0	1	0	0	0	
								Hardwood	4	0	0	0	0	
90	LF	3	LT	0	60	0	100	**Conifer**	0	0	0	1	0	
								Hardwood	0	1	0	0	0	
90	RT	1	LT	0	40	0	100	**Conifer**	1	0	0	0	0	
								Hardwood	0	1	0	0	0	
90	RT	2	LT	0	80	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	10	0	0	0	
90	RT	3	LT	0	80	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	10	0	0	0	

RIPARIAN ZONE VEGETATION

Reach 4 Reach 4

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
118	LF	1	LT	1	90	0	0	**Conifer**	0	1	0	0	0	
								Hardwood	0	2	0	0	0	
118	LF	2	LT	2	90	0	0	**Conifer**	0	0	2	0	0	
								Hardwood	0	0	0	0	0	
118	LF	3	LT	2	90	0	0	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	0	0	0	
118	RT	1	LT	2	100	0	0	**Conifer**	0	6	1	0	0	
								Hardwood	0	0	0	0	0	
118	RT	2	HS	60	100	0	0	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	0	0	0	
118	RT	3	HS	60	100	0	0	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN **NORTH FORK FALL CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/17/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.5 VWI Range: 1 - 3

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	624	1,545	0
Secondary	130	165	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 1	
Width:	2.4	Width:	2.0	3.5	(3 – 4)	4.0	(4 – 4)
Depth:	0.13	Height:	0.3	0.6	(0.5 - 0.6	0.5	(0.5 - 0.5)

W:D ratio: 7.3
Stream Flow Type: MF
Average Unit Gradient: 2.7%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.8
Habitat Units/100m (total channel length): 2.1
Habitat Units/100m (primary channel 2.6

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	MT
Riparian Vegetation:	C30	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	10%	Reach avg: 90%
Undercut Banks:	16%	Range: 0 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	137	22.0
Volume (m 3):	200	32.0
Key pieces (>=12m x 0.60m):	12	1.9

DEMETER DESIGN **NORTH FORK FALL CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/17/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CASCADE/BEDROCK	1	10	4.0	0.10	40	0		0	0	0	0	0	100
CULVERT CROSSING	3	60	0.5	0.08	32	0		0	7	27	13	0	53
POOL-DAMMED	1	20	8.0	0.20	160	0		40	55	5	0	0	0
POOL-STRAIGHT SCOUR	1	4	4.5	0.55	18	0		0	90	10	0	0	0
RAPID/BOULDERS	2	50	2.8	0.10	130	0		0	38	15	33	15	0
RIFFLE	6	420	1.8	0.08	875	0		0	54	17	11	2	17
RIFFLE W/ POCKETS	2	190	2.3	0.13	455	0		0	50	20	23	8	0
Total:	16	754	2.4	0.13	1,710	0	**Avg:**	3	42	17	13	3	23

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	20	8.0	0.20	160	9.36%	0	0.0
Scour Pools	1	4	4.5	0.55	18	1.05%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	8	610	1.9	0.09	1,330	77.78%	0	0.0
Rapids	2	50	2.8	0.10	130	7.60%	0	0.0
Cascades	1	10	4.0	0.10	40	2.34%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	3	60	0.5	0.08	32	1.87%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	2	2.7	3.2
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	188.5		
Residual pool depth (avg):	0.33		

STREAM SUMMARY **NORTH FORK FALL CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
16	754	2.4	0.13	1,710	3	42	17	13	3	23	0

Habitat Group	Wetted Area (m2)	Percent
Dammed & BW Pools	160	9.36%
Scour Pools	18	1.05%
Glides	0	0.00%
Riffles	1,330	77.78%
Rapids	130	7.60%
Cascades	40	2.34%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	32	1.87%
Unsurveyed	0	0.00%

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 1 **T02S-R10W-S17LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	438	1,739	0
Secondary	12	39	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 1	
Width:	3.9	Width:	4.4	5.5	(4.5 – 7)	7.0	(7 - 7)
Depth:	0.48	Height:	0.5	0.9	(0.7 - 1.1)	1.7	(1.5 - 2)

W:D ratio: 9.6
Stream Flow Type: MF
Average Unit Gradient: 1.1%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.5
Habitat Units/100m (total channel length): 6.2
Habitat Units/100m (primary channel 6.4

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	LT	ST
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	33%	Reach avg: 96%
Undercut Banks:	22%	Range: 83 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	51	11.6
Volume (m 3):	74	16.9
Key pieces (>=12m x 0.60m):	2	0.5

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 2 **T02S-R10S-S20LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 9.6 VWI Range: 8 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	215	752	1
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 0	
Width:	3.1	Width:	4.5	11.7	(8 - 17)	(-)	
Depth:	0.46	Height:	0.7	1.5	(0.8 - 1.9)	(-)	

W:D ratio: 7.7
Stream Flow Type: MF
Average Unit Gradient: 1.1%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 3.6
Habitat Units/100m (total channel length): 6.5
Habitat Units/100m (primary channel 6.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	TH	ST
Riparian Vegetation:	M30	D30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	31%	Reach avg: 92%
Undercut Banks:	18%	Range: 47 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	25	11.7
Volume (m 3):	32	15.1
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 3 **T02S-R10W-S21LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 10.0 VWI Range: 1 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	719	2,898	0
Secondary	95	160	1

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 4		First Terrace *n* = 1	
Width:	3.7	Width:	6.0	7.3	(5 – 10)	7.0	(7 - 7)
Depth:	0.38	Height:	0.3	0.5	(0.4 - 0.6)	0.5	(0.5 - 0.5)

W:D ratio: 25.0
Stream Flow Type: MF
Average Unit Gradient: 1.4%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 3.7
Habitat Units/100m (primary channel 4.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	ST	MT
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	26%	Reach avg: 99%
Undercut Banks:	32%	Range: 94 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	49	6.8
Volume (m3):	115	16.0
Key pieces (>=12m x 0.60m):	1	0.1

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 4 **T02S-R10W-S21LL** **REACH 4**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 7.4 VWI Range: 6 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	410	1,490	0
Secondary	211	382	6

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 0	
Width:	2.7	Width:	3.4	5.3	(1 - 9)	(-)	
Depth:	0.24	Height:	0.2	0.4	(0.2 - 0.5)	(-)	

W:D ratio: 16.7
Stream Flow Type: MF
Average Unit Gradient: 2.3%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.5
Habitat Units/100m (total channel length): 3.2
Habitat Units/100m (primary channel 4.9

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	LT	MT
Riparian Vegetation:	M30	D15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	18%	Reach avg: 98%
Undercut Banks:	15%	Range: 94 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	46	11.2
Volume (m 3):	66	16.0
Key pieces (>=12m x 0.60m):	2	0.5

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 5 **T02S-R10W-S21LL** **REACH 5**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 3.1 VWI Range: 1 - 8

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	364	1,171	0
Secondary	113	149	4

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 5		First Terrace *n* = 4	
Width:	2.7	Width:	3.7	4.0	(1.5 – 6)	8.5	(5 - 11)
Depth:	0.27	Height:	0.3	0.5	(0.2 - 0.8	1.3	(0.5 - 2)

W:D ratio: 19.8
Stream Flow Type: MF
Average Unit Gradient: 2.9%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.1
Habitat Units/100m (total channel length): 8.0
Habitat Units/100m (primary channel 10.4

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	MT
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	45%	Reach avg: 100%
Undercut Banks:	14%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	101	27.7
Volume (m 3):	162	44.6
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 6 **T02S-R10W-S21LL** **REACH 6**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.6 VWI Range: 1 - 5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	502	1,365	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 1	
Width:	2.7	Width:	3.0	6.0	(4 – 8)	10.0	(10 - 10)
Depth:	0.33	Height:	0.5	0.9	(0.9 - 0.9)	2.0	(2 - 2)

W:D ratio: 6.7
Stream Flow Type: MF
Average Unit Gradient: 0.4%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 2.5
Habitat Units/100m (total channel length): 2.8
Habitat Units/100m (primary channel 2.8

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	MT
Riparian Vegetation:	M15	M30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	56%	Reach avg: 100%
Undercut Banks:	24%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	83	16.5
Volume (m 3):	116	23.1
Key pieces (>=12m x 0.60m):	1	0.2

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 1 **T02S-R10W-S17LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	10	4.5	0.30	45	0		1	4	80	15	0	0
POOL-BACKWATER	2	12	3.3	0.80	39	0		2	22	12	44	1	20
POOL-DAMMED	1	8	4.5	1.00	36	0		2	4	45	49	0	0
POOL-LATERAL SCOUR	4	55	4.4	0.98	233	0		1	8	47	39	1	5
POOL-PLUNGE	1	7	6.0	0.65	39	0		1	9	30	60	0	0
POOL-STRAIGHT SCOUR	4	30	3.8	0.65	113	1		1	4	54	25	1	15
RIFFLE	15	329	3.8	0.23	1,274	5		1	4	43	48	2	2
Total:	28	450	3.9	0.48	1,778	6	**Avg:**	1	6	44	42	1	5

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	3	20	3.7	0.87	75	4.22%	0	0.0
Scour Pools	9	92	4.3	0.79	385	21.63%	1	0.3
Glides	1	10	4.5	0.30	45	2.53%	0	0.0
Riffles	15	329	3.8	0.23	1,274	71.63%	5	0.4
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	12	26.7	27.4
Pools >=1m deep:	3	6.7	6.8
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	8.5		
Residual pool depth (avg):	0.62		

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 2 **T02S-R10S-S20LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	15	4.5	0.55	68	0		2	4	27	65	2	0
POOL-DAMMED	1	5	2.0	1.10	9	2		1	3	50	45	1	1
POOL-PLUNGE	1	10	3.5	0.75	35	0		3	1	60	36	0	0
POOL-STRAIGHT SCOUR	2	28	4.0	0.83	110	0		1	17	40	38	3	0
PUDDLED UNIT	1	15	0.5	0.30	8	0		5	20	70	5	0	0
RIFFLE	8	142	3.1	0.27	523	11		1	7	47	41	2	2
Total:	14	215	3.1	0.46	752	13	**Avg:**	2	8	47	39	2	1

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	5	2.0	1.10	9	1.20%	2	22.2
Scour Pools	3	38	3.8	0.80	145	19.29%	0	0.0
Glides	1	15	4.5	0.55	68	8.98%	0	0.0
Riffles	8	142	3.1	0.27	523	69.53%	11	2.1
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	1	15	0.5	0.30	8	1.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	4	18.6	18.6
Pools >=1m deep:	1	4.7	4.7
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	11.9		
Residual pool depth (avg):	0.72		

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 3 **T02S-R10W-S21LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-LATERAL SCOUR	8	114	4.6	0.59	527	8		2	9	40	37	8	5
POOL-STRAIGHT SCOUR	3	24	4.3	0.55	102	2		2	20	34	30	14	0
PUDDLED UNIT	1	30	2.0	0.60	60	3		0	10	30	45	15	0
RIFFLE	17	596	3.2	0.25	2,094	59		1	7	36	39	16	1
RIFFLE W/ POCKETS	1	50	5.5	0.20	275	6		1	5	18	58	15	3
Total:	30	814	3.7	0.38	3,058	78	**Avg:**	1	9	36	38	14	2

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	11	138	4.5	0.58	629	20.57%	10	1.6
Glides	0	0			0	0.00%	0	0.0
Riffles	18	646	3.3	0.25	2,369	77.47%	65	2.7
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	1	30	2.0	0.60	60	1.96%	3	5.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	11	13.5	15.3
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	12.3		
Residual pool depth (avg):	0.41		

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 4 **T02S-R10W-S21LL** **REACH 4**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
DRY CHANNEL	4	160	1.4	0.00	330	0		16	60	11	13	0	0
POOL-BACKWATER	1	3	2.0	0.50	6	0		5	30	20	15	30	0
POOL-PLUNGE	2	9	5.0	0.40	48	5		1	3	24	25	47	0
POOL-STRAIGHT SCOUR	1	0	3.0	0.45	0	1		0	25	20	15	40	0
PUDDLED UNIT	2	40	0.8	0.15	30	0		5	39	13	29	14	0
RIFFLE	5	164	2.7	0.25	520	17		0	12	24	35	29	0
RIFFLE W/ POCKETS	5	245	3.7	0.29	938	48		1	9	26	29	32	3
Total:	20	621	2.7	0.24	1,872	71	**Avg:**	4	24	20	26	25	1

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	3	2.0	0.50	6	0.32%	0	0.0
Scour Pools	3	9	4.3	0.42	48	2.56%	6	12.5
Glides	0	0			0	0.00%	0	0.0
Riffles	10	409	3.2	0.27	1,458	77.88%	65	4.5
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	6	200	1.2	0.05	360	19.24%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	4	6.4	9.8
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	45.4		
Residual pool depth (avg):	0.21		

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 5 **T02S-R10W-S21LL** **REACH 5**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	4	4.0	0.30	14	0	9	36	27	18	9	0
POOL-BACKWATER	1	2	1.5	0.35	3	0	10	40	20	5	25	0
POOL-PLUNGE	2	4	1.8	0.58	7	1	1	3	26	20	50	0
POOL-STRAIGHT SCOUR	1	4	3.0	0.60	11	1	2	8	30	35	20	5
PUDDLED UNIT	4	63	0.9	0.04	55	0	14	36	31	14	5	0
RAPID/BOULDERS	10	161	2.7	0.27	454	12	2	9	30	25	35	0
RIFFLE	8	89	2.7	0.30	255	4	3	13	40	27	16	0
RIFFLE W/ POCKETS	10	151	3.4	0.25	521	14	2	8	34	30	28	0
STEP/LOG	1	0	4.0	0.04	1	0	0	100	0	0	0	0
Total:	38	477	2.7	0.27	1,319	32	**Avg:** 4	16	32	24	24	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	2	1.5	0.35	3	0.23%	0	0.0
Scour Pools	3	8	2.2	0.58	18	1.33%	2	11.4
Glides	1	4	4.0	0.30	14	1.06%	0	0.0
Riffles	18	240	3.1	0.27	776	58.82%	18	2.3
Rapids	10	161	2.7	0.27	454	34.37%	12	2.6
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	1	0	4.0	0.04	1	0.06%	0	0.0
Dry	4	63	0.9	0.04	55	4.13%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	4	8.4	11.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	32.2		
Residual pool depth (avg):	0.38		

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

REACH 6 **T02S-R10W-S21LL** **REACH 6**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	5	3.0	0.30	15	0	5	20	25	50	0	0
POOL-LATERAL SCOUR	2	11	2.0	0.50	22	0	5	23	30	23	20	0
POOL-PLUNGE	2	8	3.5	0.78	28	1	4	12	28	38	20	0
RAPID/BOULDERS	1	27	2.0	0.35	54	2	0	10	25	35	30	0
RIFFLE	1	20	4.5	0.20	90	0	5	15	30	35	15	0
RIFFLE W/ POCKETS	4	430	3.6	0.26	1,155	5	4	16	28	36	16	0
STEP/LOG	3	1	1.0	0.04	1	0	0	100	0	0	0	0
Total:	14	502	2.7	0.33	1,365	8	**Avg:** 3	34	22	28	14	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	4	19	2.8	0.64	50	3.66%	1	2.0
Glides	1	5	3.0	0.30	15	1.10%	0	0.0
Riffles	5	450	3.8	0.25	1,245	91.23%	5	0.4
Rapids	1	27	2.0	0.35	54	3.96%	2	3.7
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	3	1	1.0	0.04	1	0.05%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	4	8.0	8.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	41.8		

Residual pool depth (avg): 0.49

STREAM SUMMARY **MIDDLE FORK WHISKEY CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
144	3,078	3.2	0.36	10,143	3	15	34	33	14	2	208

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	93	0.92%
Scour Pools	1,274	12.56%
Glides	142	1.40%
Riffles	7,643	75.36%
Rapids	508	5.00%
Cascades	0	0.00%
Step/Falls	2	0.01%
Dry	482	4.75%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	853
Total conifers/1000 ft	0
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	3.0	0.0	3.0	0.0	0.0	0.0	6.0
15-30cm	0.0	1.0	0.0	2.0	0.0	3.0	0.0	6.0
30-50cm	0.0	1.0	0.0	0.0	0.0	1.0	0.0	2.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	5.0	0.0	5.0	0.0	4.0	0.0	4.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	90	90	90
Shrub cover	35	25	50
Grass/forb cover	25	35	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	0	50	100
Low terrace	50	0	0
Floodplain	50	50	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	1

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	305
Total conifers/1000 ft	610
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	1.0	1.0	0.0	1.0	0.0	2.0	1.0
15-30cm	0.0	2.0	2.0	2.0	6.0	0.0	8.0	4.0
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	3.0	3.0	2.0	7.0	0.0	3.3	1.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	55	40	60
Shrub cover	80	85	45
Grass/forb cover	20	5	15

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	100	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	1	21	21

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	1341
Total conifers/1000 ft	792
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	4.0	0.0	5.0	0.0	3.0	0.0	12.0	0.0
15-30cm	0.0	2.0	0.0	6.0	0.0	10.0	0.0	18.0
30-50cm	0.0	3.0	0.0	0.0	1.0	1.0	1.0	4.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	4.0	5.0	5.0	6.0	4.0	11.0	4.3	7.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	78	88	80
Shrub cover	30	45	20
Grass/forb cover	20	0	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	50	50	50
High terrace	50	50	50
Low terrace	0	0	0
Floodplain	0	0	0

Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	20	3	0

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 4 **REACH 4**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	853
Total conifers/1000 ft	732
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	3.0	3.0	3.0	3.0	0.0	7.0	6.0
15-30cm	4.0	1.0	0.0	4.0	0.0	2.0	4.0	7.0
30-50cm	1.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	6.0	4.0	3.0	7.0	3.0	3.0	4.0	4.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	88	83	90
Shrub cover	28	15	15
Grass/forb cover	10	0	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	100	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	20	3	15

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 5 **REACH 5**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	610
Total conifers/1000 ft	884
Total conifers >20" dbh/1000 ft	91
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	2.0	0.5	4.0	0.0	3.0	1.5	9.0	2.0
15-30cm	0.5	0.0	0.0	0.5	1.0	2.0	1.5	2.5
30-50cm	0.0	1.5	1.5	2.5	1.0	1.5	2.5	5.5
50-90cm	1.0	0.0	0.0	0.0	0.5	0.0	1.5	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	3.5	2.0	5.5	3.0	5.5	5.0	4.8	3.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	75	75	73
Shrub cover	63	65	66
Grass/forb cover	9	1	1

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	24	38	21

DEMETER DESIGN **MIDDLE FORK WHISKEY CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 5/12/2008

Summary of Riparian Zone (0-30m) for all reaches **6 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	762
Total conifers/1000 ft	650
Total conifers >20" dbh/1000 ft	30
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	6.5	2.8
15-30cm	2.5	6.7
30-50cm	1.2	3.0
50-90cm	0.5	0.0
>90cm	0.0	0.0

DEMETER DESIGN MIDDLE FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	LT	0	90	60	40	**Conifer**	0	0	0	0	0	
								Hardwood	3	1	0	0	0	
1	LF	2	FP	0	90	10	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	1	0	0	0	
1	LF	3	HT	1	90	100	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	3	1	0	0	
1	RT	1	FP	0.25	90	10	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	1	0	0	
1	RT	2	HT	0	90	40	60	**Conifer**	0	0	0	0	0	
								Hardwood	3	1	0	0	0	
1	RT	3	HT	0	90	0	0	**Conifer**	0	0	0	0	0	ROAD
								Hardwood	0	0	0	0	0	

DEMETER DESIGN MIDDLE FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
29	LF	1	HT	1	90	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	1	1	0	0	0	
29	LF	2	HT	1	60	90	10	**Conifer**	1	2	0	0	0	
								Hardwood	0	0	0	0	0	
29	LF	3	HT	1	100	60	30	**Conifer**	1	3	0	0	0	
								Hardwood	0	0	0	0	0	
29	RT	1	HT	0	20	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	1	0	0	0	
29	RT	2	HS	40	20	80	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	
29	RT	3	HS	40	20	30	0	**Conifer**	0	3	0	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN MIDDLE FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
43	LF	1	HT	20	80	40	0	**Conifer**	3	0	0	0	0	
								Hardwood	0	2	3	0	0	
43	LF	2	HT	0	80	50	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	5	0	0	0	
43	LF	3	HT	0	80	20	0	**Conifer**	0	0	1	0	0	
								Hardwood	0	2	0	0	0	
43	RT	1	HS	20	75	20	40	**Conifer**	1	0	0	0	0	
								Hardwood	0	0	0	0	0	
43	RT	2	HS	5	95	40	0	**Conifer**	5	0	0	0	0	
								Hardwood	0	1	0	0	0	
43	RT	3	HS					**Conifer**	3	0	0	0	0	
								Hardwood	0	8	1	0	0	

DEMETER DESIGN MIDDLE FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION

Reach 4 Reach 4

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
77	LF	1	HT	15	85	25	10	**Conifer**	0	0	0	0	0	
								Hardwood	3	1	0	0	0	
77	LF	2	HT	0	75	20	0	**Conifer**	0	0	0	0	0	
								Hardwood	3	2	0	0	0	
77	LF	3	HT	0	90	20	0	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
77	RT	1	HT	25	90	30	10	**Conifer**	1	4	1	0	0	
								Hardwood	0	0	0	0	0	
77	RT	2	HS	5	90	10	0	**Conifer**	3	0	0	0	0	
								Hardwood	0	2	0	0	0	
77	RT	3	HS	30	90	10	0	**Conifer**	3	0	0	0	0	
								Hardwood	0	2	1	0	0	

DEMETER DESIGN MIDDLE FORK WHISKEY CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/12/2008

RIPARIAN ZONE VEGETATION

Reach 5 Reach 5

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
93	LF	1	HS	30	65	70	10	**Conifer**	3	0	0	0	0	
								Hardwood	1	0	1	0	0	
93	LF	2	HS	20	60	70	5	**Conifer**	3	0	0	0	0	
								Hardwood	0	1	1	0	0	
93	LF	3	HS	20	60	75	5	**Conifer**	0	0	1	0	0	
								Hardwood	2	1	0	0	0	
93	RT	1	HS	20	75	60	15	**Conifer**	0	0	0	1	0	
								Hardwood	0	0	1	0	0	
93	RT	2	HS	35	80	90	0	**Conifer**	3	0	0	0	0	
								Hardwood	0	0	0	0	0	
93	RT	3	HS	40	70	90	0	**Conifer**	2	0	0	0	0	
								Hardwood	0	0	3	0	0	
130	LF	1	HS	10	85	60	0	**Conifer**	1	1	0	1	0	
								Hardwood	0	0	0	0	0	
130	LF	2	HS	50	75	60	0	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	1	0	0	
130	LF	3	HS	5	75	60	0	**Conifer**	2	0	0	1	0	
								Hardwood	0	1	0	0	0	
130	RT	1	HS	35	75	60	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	1	0	0	
130	RT	2	HS	45	85	40	0	**Conifer**	2	0	0	0	0	
								Hardwood	0	0	3	0	0	
130	RT	3	HS	20	85	40	0	**Conifer**	2	2	1	0	0	
								Hardwood	1	2	0	0	0	

DEMETER DESIGN **LOWER NORTH BAY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 7/8/2008

REACH 1 **T02S-R10W-S05LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	34%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	66%

Valley Width Index: 5.8 VWI Range: 1 - 12

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	15%	Single Channel	51%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	34%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,183	24,415	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 7		First Terrace *n* = 0	
Width:	7.6	Width:	16.8	32.9	(10 - 120)	(-)	
Depth:	0.72	Height:	1.5	3.1	(2 - 4)	(-)	

W:D ratio: 9.9
Entrenchment (ACW:FPW ratio): 6.0
Stream Flow Type: MF
Habitat Units/100m (total channel length): 0.6
Average Unit Gradient: 0.0%
Habitat Units/100m (primary channel 0.6
Water temperature (°C): -

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	WL	RR
Riparian Vegetation:	P	G

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	7%	Reach avg: 46%
Undercut Banks:	4%	Range: 17 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	29	2.5
Volume (m3):	15	1.2
Key pieces (>=12m x 0.60m):	1	0.1

DEMETER DESIGN **LOWER NORTH BAY CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

REACH 1 **T02S-R10W-S05LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BEAVER DAM	2	134	1.3	0.38	166	0		75	25	0	0	0	0
POOL-DAMMED	2	1,000	24.0	1.75	24,200	0		100	0	0	0	0	0
POOL-LATERAL SCOUR	2	43	1.0	0.30	43	0		48	53	0	0	0	0
RIFFLE	1	6	1.0	0.20	6	0		70	30	0	0	0	0
Total:	7	1,183	7.6	0.72	24,415	0	**Avg:**	74	26	0	0	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	4	1,134	12.6	1.06	24,366	99.80%	0	0.0
Scour Pools	2	43	1.0	0.30	43	0.18%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	1	6	1.0	0.20	6	0.02%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	6	5.1	5.1
Pools >=1m deep:	2	1.7	1.7
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	11.7		
Residual pool depth (avg):	0.69		

STREAM SUMMARY **LOWER NORTH BAY CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
7	1,183	7.6	0.72	24,415	74	26	0	0	0	0	0

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	24,366	99.80%
Scour Pools	43	0.18%
Glides	0	0.00%
Riffles	6	0.02%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **LOWER NORTH BAY CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	2195
Total conifers/1000 ft	6706
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	26.0	10.5	32.5	6.5	25.0	10.0	83.5	27.0
15-30cm	7.5	3.0	7.5	1.0	11.0	1.0	26.0	5.0
30-50cm	0.0	1.0	0.0	0.0	0.5	3.0	0.5	4.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	33.5	14.5	40.0	7.5	36.5	14.0	36.7	12.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	35	25	38
Shrub cover	50	48	48
Grass/forb cover	50	53	53

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	75
High terrace	0	0	0
Low terrace	50	50	0
Floodplain	50	50	25
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	8	27	41

DEMETER DESIGN **LOWER NORTH BAY CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 7/8/2008

Summary of Riparian Zone (0-30m) for all reaches **2 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	2195
Total conifers/1000 ft	6706
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	83.5	27.0
15-30cm	26.0	5.0
30-50cm	0.5	4.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

DEMETER DESIGN LOWER NORTH BAY CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/8/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	FP	1	0	5	95	**Conifer**	12	0	0	0	0	
								Hardwood	9	0	0	0	0	
1	LF	2	FP	3	15	0	100	**Conifer**	25	0	0	0	0	
								Hardwood	5	0	0	0	0	
1	LF	3	FP	9	90	0	100	**Conifer**	40	15	0	0	0	
								Hardwood	5	0	0	0	0	
1	RT	1	FP	1	0	5	95	**Conifer**	40	15	0	0	0	
								Hardwood	10	0	0	0	0	
1	RT	2	FP	3	15	0	100	**Conifer**	40	15	0	0	0	
								Hardwood	5	0	0	0	0	
1	RT	3	HS	9	5	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	6	2	6	0	0	
3	LF	1	LT	15	80	95	5	**Conifer**	0	0	0	0	0	
								Hardwood	1	2	1	0	0	
3	LF	2	LT	50	40	95	5	**Conifer**	0	0	0	0	0	
								Hardwood	1	0	0	0	0	

3	LF	3	HS	85	30	95	5	**Conifer**	0	3	1	0	0
								Hardwood	5	0	0	0	0
3	RT	1	LT	15	60	95	5	**Conifer**	0	0	0	0	0
								Hardwood	1	4	1	0	0
3	RT	2	LT	50	30	95	5	**Conifer**	0	0	0	0	0
								Hardwood	2	2	0	0	0
3	RT	3	HS	60	25	95	5	**Conifer**	10	4	0	0	0
								Hardwood	4	0	0	0	0

DEMETER DESIGN **JACKSON CREEK TRIB 1**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/27/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	100%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	13%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	87%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	310	896	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2	First Terrace *n* = 1
Width:	2.3	Width:	3.5	101.8 (3.5 – 200)	4.0 (4 - 4)
Depth:	0.15	Height:	0.4	0.7 (0.5 - 0.9)	1.5 (1.5 - 1.5)

W:D ratio: 10.9
Stream Flow Type: MF
Average Unit Gradient: 1.7%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 29.1
Habitat Units/100m (total channel length): 1.0
Habitat Units/100m (primary channel 1.0

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	
Riparian Vegetation:	M30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	86%	Reach avg: 94%
Undercut Banks:	26%	Range: 0 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	29	9.4
Volume (m 3):	38	12.4
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **JACKSON CREEK TRIB 1**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	20	0.3	0.15	6	0		0	0	0	0	0	100
RIFFLE	1	40	3.5	0.10	140	0		15	30	50	5	0	0
RIFFLE W/ POCKETS	1	250	3.0	0.20	750	0		5	10	30	35	15	5
Total:	3	310	2.3	0.15	896	0	**Avg:**	7	13	27	13	5	35

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	2	290	3.3	0.15	890	99.33%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	1	20	0.3	0.15	6	0.67%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	0	0.0	0.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	0.0		
Residual pool depth (avg):			

STREAM SUMMARY **JACKSON CREEK TRIB 1**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
3	310	2.3	0.15	896	7	13	27	13	5	35	0

Habitat Group	Wetted Area (m2)	Percent
Dammed & BW Pools	0	0.00%
Scour Pools	0	0.00%
Glides	0	0.00%
Riffles	890	99.33%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	6	0.67%
Unsurveyed	0	0.00%

DEMETER DESIGN **JACKSON CREEK TRIB 1**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	427
Total conifers/1000 ft	762
Total conifers >20" dbh/1000 ft	213
Total conifers >35" dbh/1000 ft	30

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.5	0.0	0.0	2.5	0.5	2.5	1.0
15-30cm	0.0	1.0	1.0	0.5	1.0	0.0	2.0	1.5
30-50cm	1.5	1.0	2.0	1.5	1.0	2.0	4.5	4.5
50-90cm	0.0	0.0	1.5	0.0	1.5	0.0	3.0	0.0
>90cm	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total/100m2	2.0	2.5	4.5	2.0	6.0	2.5	4.2	2.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	89	88	86
Shrub cover	66	73	64
Grass/forb cover	6	4	10

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	50	50	50
Low terrace	0	0	0
Floodplain	0	0	0

Wetland/meadow	50	50	50
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	0

DEMETER DESIGN **JACKSON CREEK TRIB 1**

HABITAT INVENTORY - RIPARIAN SURVEY 5/27/2008

Summary of Riparian Zone (0-30m) for all reaches **2 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	427
Total conifers/1000 ft	762
Total conifers >20" dbh/1000 ft	213
Total conifers >35" dbh/1000 ft	30

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	2.5	1.0
15-30cm	2.0	1.5
30-50cm	4.5	4.5
50-90cm	3.0	0.0
>90cm	0.5	0.0

DEMETER DESIGN **JACKSON CREEK TRIB 1**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) **2 transects**

Total hardwoods/1000	427
Total conifers/1000 ft	762
Total conifers >20" dbh/1000 ft	213
Total conifers >35" dbh/1000 ft	30

Average number of trees in a 5-meter wide band

Diameter class (cm)	Zone 1 0-10 meters Conifer	Hardwood	Zone 2 10 - 20 meters Conifer	Hardwood	Zone 3 20 - 30 meters Conifer	Hardwood	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	0.0	0.5	0.0	0.0	2.5	0.5	2.5	1.0
15-30cm	0.0	1.0	1.0	0.5	1.0	0.0	2.0	1.5
30-50cm	1.5	1.0	2.0	1.5	1.0	2.0	4.5	4.5
50-90cm	0.0	0.0	1.5	0.0	1.5	0.0	3.0	0.0

>90cm	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
Total/100m2	2.0	2.5	4.5	2.0	6.0	2.5	4.2	2.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	89	88	86
Shrub cover	66	73	64
Grass/forb cover	6	4	10

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	50	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	50	50	50
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	0

DEMETER DESIGN **JACKSON CREEK TRIB 2**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/27/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	100%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	100%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	535	829	4
Secondary	145	171	2

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	1.4	Width:	1.2	2.5	(2.5 - 2.5)	(-)	
Depth:	0.02	Height:	0.2	0.3	(0.22 - 0.44)	(-)	

W:D ratio: 13.6
Stream Flow Type: PD
Average Unit Gradient: 0.4%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.3
Habitat Units/100m (total channel length): 1.2
Habitat Units/100m (primary channel 1.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	WL
Riparian Vegetation:	M30	M3

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	2%	Reach avg: 94%
Undercut Banks:	0%	Range: 0 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	5	0.9
Volume (m 3):	5	0.9
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **JACKSON CREEK TRIB 2**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	2	40	0.4	0.00	14	0		0	0	0	0	0	100
DRY CHANNEL	2	440	1.3	0.00	610	0		85	10	5	0	0	0
PUDDLED UNIT	4	200	2.0	0.04	375	0		88	9	4	0	0	0
Total:	8	680	1.4	0.02	999	0	**Avg:**	65	7	3	0	0	25

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	0	0			0	0.00%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	6	640	1.8	0.03	985	98.60%	0	0.0
Culverts	2	40	0.4	0.00	14	1.40%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	0	0.0	0.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	0.0		
Residual pool depth (avg):			

STREAM SUMMARY **JACKSON CREEK TRIB 2**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
8	680	1.4	0.02	999	65	7	3	0	0	25	0

Habitat Group	Wetted Area (m2)	Percent
Dammed & BW Pools	0	0.00%
Scour Pools	0	0.00%
Glides	0	0.00%
Riffles	0	0.00%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	985	98.60%
Culverts	14	1.40%
Unsurveyed	0	0.00%

DEMETER DESIGN **JACKSON CREEK TRIB 2**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	762
Total conifers/1000 ft	457
Total conifers >20" dbh/1000 ft	91
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.5	0.0	1.0	1.0	0.0	0.5	2.5	1.5
15-30cm	1.0	3.0	0.5	2.0	1.5	5.0	3.0	10.0
30-50cm	0.0	1.0	0.0	0.0	0.5	0.0	0.5	1.0
50-90cm	0.0	0.0	1.0	0.0	0.5	0.0	1.5	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	2.5	4.0	2.5	3.0	2.5	5.5	2.5	4.2

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	58	51	58
Shrub cover	63	65	60
Grass/forb cover	31	33	33

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0

Wetland/meadow	100	100	100
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	0

DEMETER DESIGN **JACKSON CREEK TRIB 2**

HABITAT INVENTORY - RIPARIAN SURVEY 5/27/2008

Summary of Riparian Zone (0-30m) for all reaches **2 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	762
Total conifers/1000 ft	457
Total conifers >20" dbh/1000 ft	91
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	2.5	1.5
15-30cm	3.0	10.0
30-50cm	0.5	1.0
50-90cm	1.5	0.0
>90cm	0.0	0.0

DEMETER DESIGN JACKSON CREEK TRIB 2

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/27/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	WL	0	30	30	65	**Conifer**	0	1	0	0	0	
								Hardwood	0	1	0	0	0	
1	LF	2	WL	0	20	35	65	**Conifer**	1	0	0	0	0	
								Hardwood	1	0	0	0	0	
1	LF	3	WL	0	50	45	50	**Conifer**	0	0	0	1	0	
								Hardwood	1	1	0	0	0	
1	RT	1	WL	0	35	40	55	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	WL	0	10	40	55	**Conifer**	1	0	0	0	0	
								Hardwood	1	0	0	0	0	
1	RT	3	WL	0	0	10	70	**Conifer**	0	0	0	0	0	

								Hardwood	0	3	0	0	0
5	LF	1	WL	0	85	85	5	**Conifer**	1	1	0	0	0
								Hardwood	0	3	1	0	0
5	LF	2	WL	0	90	90	5	**Conifer**	0	1	0	2	0
								Hardwood	0	0	0	0	0
5	LF	3	WL	0	90	90	5	**Conifer**	0	0	1	0	0
								Hardwood	0	3	0	0	0
5	RT	1	WL	0	80	95	0	**Conifer**	2	0	0	0	0
								Hardwood	0	2	1	0	0
5	RT	2	WL	0	85	95	5	**Conifer**	0	0	0	0	0
								Hardwood	0	4	0	0	0
5	RT	3	WL	0	90	95	5	**Conifer**	0	3	0	0	0
								Hardwood	0	3	0	0	0

DEMETER DESIGN **HODGDON CREEK**
HABITAT INVENTORY Report Date: 12/19/2008 Survey Date: 7/14/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.9 VWI Range: 1 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,019	2,273	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 36		First Terrace *n* = 0	
Width:	2.4	Width:	2.8	4.4	(2 - 10)	(-)	
Depth:	0.28	Height:	0.4	0.6	(0.2 - 3)	(-)	

W:D ratio: 13.5
Stream Flow Type: MF
Average Unit Gradient: 1.3%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.8
Habitat Units/100m (total channel length): 3.5
Habitat Units/100m (primary channel 3.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	UR	RR
Riparian Vegetation:	S	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	33%	Reach avg: 83%
Undercut Banks:	2%	Range: 22 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	20	2.0
Volume (m3):	20	2.0
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **HODGDON CREEK**
HABITAT INVENTORY Report Date: 12/19/2008 Survey Date: 7/14/2008

REACH 2 **T01S-R10W-S32LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.1 VWI Range: 1 - 1.5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	663	1,485	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 4		First Terrace *n* = 0	
Width:	2.5	Width:	3.0	5.0	(3 - 7)	(-)	
Depth:	0.33	Height:	0.5	0.8	(0.4 - 1.2)	(-)	

W:D ratio: 5.0
Stream Flow Type: MF
Average Unit Gradient: 1.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.7
Habitat Units/100m (total channel length): 0.6
Habitat Units/100m (primary channel 0.6

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	RR
Riparian Vegetation:	S	D30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	25%	Reach avg: 100%
Undercut Banks:	1%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	2	0.3
Volume (m3):	4	0.6
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **HODGDON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/14/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-DAMMED	3	27	3.8	0.35	105	0		0	40	60	0	0	0
POOL-LATERAL SCOUR	5	83	2.3	0.25	194	0		0	33	67	0	0	0
POOL-PLUNGE	1	2	5.0	1.00	10	0		0	30	70	0	0	0
POOL-STRAIGHT SCOUR	10	189	2.5	0.33	463	23		0	32	69	0	0	0
RAPID/BEDROCK	4	170	2.9	0.15	748	0		0	34	66	0	0	0
RIFFLE W/ POCKETS	13	548	1.6	0.23	754	40		0	36	64	0	0	0
Total:	36	1,019	2.4	0.28	2,273	63	**Avg:**	0	34	66	0	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	3	27	3.8	0.35	105	4.62%	0	0.0
Scour Pools	16	274	2.6	0.35	666	29.30%	23	3.5
Glides	0	0			0	0.00%	0	0.0
Riffles	13	548	1.6	0.23	754	33.17%	40	5.3
Rapids	4	170	2.9	0.15	748	32.91%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	19	18.6	18.6
Pools >=1m deep:	1	1.0	1.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	19.5		
Residual pool depth (avg):	0.26		

DEMETER DESIGN **HODGDON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/14/2008

REACH 2 **T01S-R10W-S32LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-LATERAL SCOUR	1	12	4.0	0.50	48	0		0	80	20	0	0	0
RIFFLE W/ POCKETS	3	651	2.0	0.27	1,437	21		0	28	72	0	0	0
Total:	4	663	2.5	0.33	1,485	21	**Avg:**	0	41	59	0	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	1	12	4.0	0.50	48	3.23%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	3	651	2.0	0.27	1,437	96.77%	21	1.5
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	1.5	1.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	221.0		
Residual pool depth (avg):	0.00		

STREAM SUMMARY **HODGDON CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
40	1,682	2.4	0.29	3,758	0	35	65	0	0	0	84

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	105	2.79%
Scour Pools	714	19.00%
Glides	0	0.00%
Riffles	2,191	58.30%
Rapids	748	19.90%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **HODGDON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/14/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	1524
Total conifers/1000 ft	2743
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	11.0	11.5	5.0	3.0	14.0	7.0	30.0	21.5
15-30cm	0.0	0.0	9.5	0.0	5.5	3.5	15.0	3.5
30-50cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	11.0	11.5	14.5	3.0	19.5	10.5	15.0	8.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	70	70	70
Shrub cover	53	65	68
Grass/forb cover	18	18	23

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	50	50	50
High terrace	0	0	50
Low terrace	0	0	0

Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	50	50	0
Surface slope (%)	28	25	16

DEMETER DESIGN **HODGDON CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 7/14/2008

Summary of Riparian Zone (0-30m) for all reaches **2 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	1524
Total conifers/1000 ft	2743
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	30.0	21.5
15-30cm	15.0	3.5
30-50cm	0.0	0.0
50-90cm	0.0	0.0
>90cm	0.0	0.0

DEMETER DESIGN HODGDON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 7/14/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	RR	30	50	70	30	**Conifer**	0	0	0	0	0	BEACH
								Hardwood	0	0	0	0	0	
1	LF	2	RR	30	50	70	30	**Conifer**	0	0	0	0	0	
								Hardwood	1	0	0	0	0	
1	LF	3	HT	15	50	70	30	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	1	RR	60	50	10	10	**Conifer**	1	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	RR	40	50	60	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	HT	20	50	60	10	**Conifer**	0	0	0	0	0	

								Hardwood	11	0	0	0	0
36	LF	1	HS	10	90	60	10	**Conifer**	0	0	0	0	0
								Hardwood	19	0	0	0	0
36	LF	2	HS	15	90	60	10	**Conifer**	0	0	0	0	0
								Hardwood	0	0	0	0	0
36	LF	3	HS	15	90	70	30	**Conifer**	18	1	0	0	0
								Hardwood	3	0	0	0	0
36	RT	1	HS	10	90	70	20	**Conifer**	21	0	0	0	0
								Hardwood	4	0	0	0	0
36	RT	2	HS	15	90	70	20	**Conifer**	10	19	0	0	0
								Hardwood	5	0	0	0	0
36	RT	3	HS	15	90	70	20	**Conifer**	10	10	0	0	0
								Hardwood	0	7	0	0	0

DEMETER DESIGN **FALL CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/12/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.5 VWI Range: 1.5 - 1.5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	343	622	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 0	
Width:	2.4	Width:	2.5	3.5	(3.5 - 3.5)	(-	)
Depth:	0.26	Height:	0.4	0.7	(0.7 - 0.7)	(-	)

W:D ratio: 7.1
Stream Flow Type: MF
Average Unit Gradient: 0.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.4
Habitat Units/100m (total channel length): 2.0
Habitat Units/100m (primary channel 2.0

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	GN
Riparian Vegetation:	C15	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	17%	Reach avg: 89%
Undercut Banks:	1%	Range: 89 - 89

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	26	7.6
Volume (m 3):	25	7.3
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **FALL CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/12/2008

REACH 2 **T01S-R10W-S31LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.5 VWI Range: 1.5 - 2

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	308	700	0
Secondary	60	57	1

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 0	
Width:	2.3	Width:	2.4	2.5	(1 - 4)	(-)	
Depth:	0.19	Height:	0.3	0.4	(0.2 - 0.5)	(-)	

W:D ratio: 16.0
Stream Flow Type: MF
Average Unit Gradient: 1.6%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.1
Habitat Units/100m (total channel length): 3.3
Habitat Units/100m (primary channel 3.9

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	RR
Riparian Vegetation:	C30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	2%	Reach avg: 95%
Undercut Banks:	8%	Range: 83 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	55	17.9
Volume (m 3):	86	28.1
Key pieces (>=12m x 0.60m):	7	2.3

DEMETER DESIGN **FALL CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/12/2008

REACH 3 **T01S-R10W-S31LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.5 VWI Range: 1 - 3

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	712	2,554	0
Secondary	417	936	1

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 6		First Terrace *n* = 2	
Width:	3.5	Width:	3.5	6.1	(2.5 – 12)	6.0	(6 - 6)
Depth:	0.11	Height:	0.4	0.7	(0.3 - 1.1)	0.5	(0.5 - 0.5)

W:D ratio: 10.1
Stream Flow Type: MF
Average Unit Gradient: 1.7%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.8
Habitat Units/100m (total channel length): 4.6
Habitat Units/100m (primary channel 7.3

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	ST
Riparian Vegetation:	C30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	0%	Reach avg: 96%
Undercut Banks:	9%	Range: 50 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	92	12.9
Volume (m 3)	368	51.7
Key pieces (>=12m x 0.60m):	11	1.5

DEMETER DESIGN **FALL CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 6/13/2008

REACH 4 **T01S-R10W-S31LL** **REACH 4**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	100%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 1.8 VWI Range: 1 - 2

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	1,539	6,260	0
Secondary	390	1,115	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 2		First Terrace *n* = 0	
Width:	3.6	Width:	2.5	3.3	(3 - 3.5)	(-)	
Depth:	0.12	Height:	0.3	0.6	(0.5 - 0.6)	(-)	

W:D ratio: 9.2
Stream Flow Type: MF
Average Unit Gradient: 1.9%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.3
Habitat Units/100m (total channel length): 0.9
Habitat Units/100m (primary channel 1.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	ST
Riparian Vegetation:	C30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	1%	Reach avg: 100%
Undercut Banks:	7%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	180	11.7
Volume (m 3):	320	20.8
Key pieces (>=12m x 0.60m):	15	1.0

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

REACH 1 **T01S-R10W-S31LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	30	1.3	0.10	39	0		0	0	0	0	0	100
POOL-DAMMED	1	35	2.5	0.40	88	0		0	80	20	0	0	0
POOL-PLUNGE	1	3	3.0	0.40	8	0		0	50	30	0	20	0
RIFFLE W/ POCKETS	3	275	2.2	0.13	488	0		0	47	27	27	0	0
STEP/BOULDERS	1	0	3.5	0.50	1	3		0	0	0	0	0	100
Total:	7	343	2.4	0.26	622	3	**Avg:**	0	39	19	11	3	29

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	1	35	2.5	0.40	88	14.06%	0	0.0
Scour Pools	1	3	3.0	0.40	8	1.21%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	3	275	2.2	0.13	488	78.33%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	1	0	3.5	0.50	1	0.14%	3	342.9
Dry	0	0			0	0.00%	0	0.0
Culverts	1	30	1.3	0.10	39	6.27%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	2	5.8	5.8
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	68.6		
Residual pool depth (avg):	0.28		

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

REACH 2 **T01S-R10W-S31LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	30	1.0	0.50	30	0	0	0	0	10	5	85
DRY CHANNEL	1	25	0.5	0.00	13	0	100	0	0	0	0	0
POOL-DAMMED	1	8	4.0	0.40	32	0	0	60	40	0	0	0
POOL-LATERAL SCOUR	1	5	4.5	0.40	23	0	5	90	5	0	0	0
RIFFLE	4	160	2.8	0.11	380	0	0	34	58	9	0	0
RIFFLE W/ POCKETS	4	140	1.7	0.14	280	0	8	50	35	8	0	0
Total:	12	368	2.3	0.19	757	0	**Avg:** 11	40	35	6	0	7

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	8	4.0	0.40	32	4.23%	0	0.0
Scour Pools	1	5	4.5	0.40	23	2.97%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	8	300	2.2	0.13	660	87.18%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	1	25	0.5	0.00	13	1.65%	0	0.0
Culverts	1	30	1.0	0.50	30	3.97%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	2	5.4	6.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	76.1		
Residual pool depth (avg):	0.33		

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

REACH 3 **T01S-R10W-S31LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-ALCOVE	4	23	3.6	0.10	62	0		53	48	0	0	0	0
POOL-BACKWATER	1	6	3.0	0.05	18	0		30	55	15	0	0	0
POOL-DAMMED	5	23	6.0	0.31	162	0		7	67	18	8	0	0
POOL-PLUNGE	1	2	3.5	0.40	5	0		0	95	5	0	0	0
PUDDLED UNIT	1	30	2.5	0.02	75	0		0	40	30	30	0	0
RIFFLE	32	783	3.1	0.08	2,563	0		0	30	37	33	0	0
RIFFLE W/ POCKETS	7	261	3.0	0.09	598	0		0	38	34	29	0	0
STEP/LOG	1	1	7.0	0.10	7	0		0	20	30	50	0	0
Total:	52	1,129	3.5	0.11	3,490	0	**Avg:**	5	38	31	26	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	10	52	4.8	0.20	242	6.93%	0	0.0
Scour Pools	1	2	3.5	0.40	5	0.15%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	39	1,044	3.1	0.08	3,161	90.57%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	1	1	7.0	0.10	7	0.20%	0	0.0
Dry	1	30	2.5	0.02	75	2.15%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

		Total of all Channel Lengths	Primary Channel Length
	Total	# / Km	# / Km
All Pools:	11	9.7	15.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	29.3		
Residual pool depth (avg):	0.28		

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/13/2008

REACH 4 **T01S-R10W-S31LL** **REACH 4**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	2	40	1.0	0.08	40	5		0	0	40	50	10	0
POOL-DAMMED	1	4	2.5	0.50	10	0		40	50	10	0	0	0
RAPID/BOULDERS	1	20	2.0	0.10	40	0		0	10	30	55	5	0
RIFFLE	9	1,610	2.9	0.10	5,425	0		6	22	46	26	1	0
RIFFLE W/ POCKETS	5	255	6.4	0.09	1,860	0		0	20	46	34	0	0
Total:	18	1,929	3.6	0.12	7,375	5	**Avg:**	5	20	42	31	2	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	1	4	2.5	0.50	10	0.14%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	14	1,865	4.1	0.10	7,285	98.79%	0	0.0
Rapids	1	20	2.0	0.10	40	0.54%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	2	40	1.0	0.08	40	0.54%	5	12.7

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	0.5	0.6
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	771.6		
Residual pool depth (avg):	0.45		

STREAM SUMMARY **FALL CREEK**

Number Units	Total Length	Avg Width	Avg Depth	Total Area	Substrate Percent Wetted Area						Large Boulders
	(m)	(m)	(m)	(m2)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk	(#>0.5m)
89	3,768	3.2	0.13	12,244	6	35	33	23	1	3	8

Habitat Group	Wetted Area (m2)	Percent
Dammed & BW Pools	372	3.03%
Scour Pools	35	0.29%
Glides	0	0.00%
Riffles	11,593	94.69%
Rapids	40	0.33%
Cascades	0	0.00%
Step/Falls	8	0.06%
Dry	88	0.71%
Culverts	109	0.89%
Unsurveyed	0	0.00%

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	122
Total conifers/1000 ft	732
Total conifers >20" dbh/1000 ft	122
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
15-30cm	1.0	1.0	1.0	0.0	3.0	0.0	5.0	1.0
30-50cm	2.0	1.0	0.0	0.0	2.0	0.0	4.0	1.0
50-90cm	0.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	4.0	2.0	2.0	0.0	6.0	0.0	4.0	0.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	90	88	90
Shrub cover	55	40	63
Grass/forb cover	8	8	10

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0

Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	30	30	30

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	61
Total conifers/1000 ft	427
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15-30cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30-50cm	0.0	0.0	3.0	0.0	3.0	1.0	6.0	1.0
50-90cm	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	0.0	4.0	0.0	3.0	1.0	2.3	0.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	85	85	88
Shrub cover	73	58	68
Grass/forb cover	10	15	15

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	18	20	28

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	61
Total conifers/1000 ft	1463
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	4.0	0.0	2.0	0.0	2.0	0.0	8.0	0.0
15-30cm	4.0	0.0	1.0	0.0	4.0	1.0	9.0	1.0
30-50cm	1.0	0.0	4.0	0.0	1.0	0.0	6.0	0.0
50-90cm	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	9.0	0.0	8.0	0.0	7.0	1.0	8.0	0.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	88	83	83
Shrub cover	50	53	43
Grass/forb cover	8	15	15

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	20	23	30

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/13/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 4 **REACH 4**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	366
Total conifers/1000 ft	914
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	3.0	2.0	3.0	0.0	6.0	0.0	12.0	2.0
15-30cm	2.0	0.0	0.0	2.0	1.0	1.0	3.0	3.0
30-50cm	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	5.0	2.0	3.0	2.0	7.0	2.0	5.0	2.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	85	75	80
Shrub cover	38	25	25
Grass/forb cover	13	10	10

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	100	100	100
High terrace	0	0	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0

Surface slope (%)	25
30	33

DEMETER DESIGN **FALL CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 6/12/2008

Summary of Riparian Zone (0-30m) for all reaches **4 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	152
Total conifers/1000 ft	884
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	5.3	0.5
15-30cm	4.3	1.3
30-50cm	4.0	0.8
50-90cm	1.0	0.0
>90cm	0.0	0.0

DEMETER DESIGN FALL CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	HS	30	90	50	5	**Conifer**	1	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	2	HS	30	90	50	10	**Conifer**	0	0	0	1	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HS	30	95	50	10	**Conifer**	0	1	1	0	0	
								Hardwood	0	0	0	0	0	
1	RT	1	HS	30	90	60	10	**Conifer**	0	1	2	0	0	
								Hardwood	0	1	1	0	0	
1	RT	2	HS	30	85	30	5	**Conifer**	0	1	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	HS	30	85	75	10	**Conifer**	0	2	1	1	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN FALL CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 6/12/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

Cover (percent) **Diameter class (cm)**

Unit	Side	Zone	Surface	Slope	Canopy	Shrub	Grass		3-15	15-30	30-50	50-90	>90	Notes
8	LF	1	HS	20	80	70	10	**Conifer**	0	0	0	0	0	LOTS OF BLOWDOWN
								Hardwood	0	0	0	0	0	
8	LF	2	HS	20	90	60	20	**Conifer**	0	0	1	1	0	
								Hardwood	0	0	0	0	0	
8	LF	3	HS	25	85	65	15	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	0	0	0	
8	RT	1	HS	15	90	75	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
8	RT	2	HS	20	80	55	10	**Conifer**	0	0	2	0	0	
								Hardwood	0	0	0	0	0	
8	RT	3	HS	30	90	70	15	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	1	0	0	

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
20	LF	1	HS	20	85	60	5	**Conifer**	3	2	1	0	0	
								Hardwood	0	0	0	0	0	
20	LF	2	HS	20	80	75	15	**Conifer**	2	1	1	0	0	
								Hardwood	0	0	0	0	0	
20	LF	3	HS	30	85	60	10	**Conifer**	0	3	1	0	0	
								Hardwood	0	1	0	0	0	
20	RT	1	HS	20	90	40	10	**Conifer**	1	2	0	0	0	
								Hardwood	0	0	0	0	0	
20	RT	2	HS	25	85	30	15	**Conifer**	0	0	3	1	0	
								Hardwood	0	0	0	0	0	
20	RT	3	HS	30	80	25	20	**Conifer**	2	1	0	0	0	
								Hardwood	0	0	0	0	0	

RIPARIAN ZONE VEGETATION

Reach 4 Reach 4

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
72	LF	1	HS	20	90	40	20	**Conifer**	2	1	0	0	0	
								Hardwood	2	0	0	0	0	
72	LF	2	HS	25	70	20	10	**Conifer**	3	0	0	0	0	
								Hardwood	0	0	0	0	0	
72	LF	3	HS	30	80	30	10	**Conifer**	4	0	0	0	0	
								Hardwood	0	0	0	0	0	
72	RT	1	HS	30	80	35	5	**Conifer**	1	1	0	0	0	
								Hardwood	0	0	0	0	0	
72	RT	2	HS	35	80	30	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	
72	RT	3	HS	35	80	20	10	**Conifer**	2	1	0	0	0	
								Hardwood	0	1	1	0	0	

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/19/2008 Survey Date: 5/14/2008

REACH 1 **T02S-R10W-S16LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 10.0 VWI Range: 10 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	477	1,090	0
Secondary	59	71	1

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 5		First Terrace *n* = 5	
Width:	2.4	Width:	3.2	3.7	(2.5 - 8)	4.4	(2.5 -10)
Depth:	0.31	Height:	0.2	0.3	(0.1 - 0.6)	0.7	(0.3 - 1)

W:D ratio: 38.7
Stream Flow Type: MF
Average Unit Gradient: 0.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 7.7
Habitat Units/100m (primary channel 8.6

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	ST	LT
Riparian Vegetation:	M15	C30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	78%	Reach avg: 92%
Undercut Banks:	62%	Range: 67 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	95	19.9
Volume (m3):	92	19.3
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **EAST FORK WHISKEY CREEK**
HABITAT INVENTORY Report Date: 12/19/2008 Survey Date: 5/14/2008

REACH 2 **T02S-R10W-S16LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 10.0 VWI Range: 10 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	50	75	0
Secondary	15	15	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1	First Terrace *n* = 1
Width:	1.3	Width:	2.5	3.0 (3 – 3)	1.0 (1 - 1)
Depth:	0.23	Height:	0.2	0.3 (0.3 - 0.3)	1.0 (1 - 1)

W:D ratio: 16.7
Stream Flow Type: MF
Average Unit Gradient: 1.0%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.2
Habitat Units/100m (total channel length): 3.1
Habitat Units/100m (primary channel 4.0

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	ST	LT
Riparian Vegetation:	S	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	83%	Reach avg: 100%
Undercut Banks:	84%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	5	10.0
Volume (m 3):	1	2.0
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

REACH 1 **T02S-R10W-S16LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
DRY CHANNEL	1	10	1.0	0.00	10	0	100	0	0	0	0	0
POOL-ALCOVE	2	23	1.0	0.15	23	0	10	80	3	3	5	0
POOL-BEAVER DAM	2	23	2.5	0.45	47	0	10	56	18	15	0	2
POOL-DAMMED	8	105	3.4	0.39	419	1	8	48	13	19	9	3
POOL-LATERAL SCOUR	5	67	1.6	0.46	111	0	6	30	18	34	10	2
POOL-PLUNGE	5	27	3.2	0.52	89	2	4	17	17	36	26	1
RIFFLE	10	156	1.5	0.18	251	75	3	21	27	27	14	7
RIFFLE W/ POCKETS	3	120	1.7	0.35	190	1	8	47	15	23	7	0
STEP/BEAVER DAM	2	4	3.3	0.10	16	0	3	50	38	10	0	0
STEP/LOG	3	1	4.3	0.16	6	0	0	53	33	13	0	0
Total:	41	536	2.4	0.31	1,161	79	**Avg:** 8	37	20	23	10	3

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	12	151	2.8	0.36	489	42.12%	1	0.2
Scour Pools	10	94	2.4	0.49	200	17.18%	2	1.0
Glides	0	0			0	0.00%	0	0.0
Riffles	13	276	1.5	0.22	441	37.96%	76	17.2
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	5	5	3.9	0.14	22	1.88%	0	0.0
Dry	1	10	1.0	0.00	10	0.86%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	22	41.1	46.2
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	7.6		
Residual pool depth (avg):	0.36		

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

REACH 2 **T02S-R10W-S16LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
RIFFLE	1	15	1.0	0.20	15	0		0	40	5	35	5	15
RIFFLE W/ POCKETS	1	50	1.5	0.25	75	0		0	20	20	40	5	15
Total:	2	65	1.3	0.23	90	0	**Avg:**	0	30	13	38	5	15

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	2	65	1.3	0.23	90	100.00%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total of all Channel Lengths Total	# / Km	Primary Channel Length # / Km
All Pools:	0	0.0	0.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	0.0		
Residual pool depth (avg):			

STREAM SUMMARY **EAST FORK WHISKEY CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
43	601	2.3	0.31	1,251	7	36	19	24	10	3	79

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	489	39.09%
Scour Pools	200	15.95%
Glides	0	0.00%
Riffles	531	42.42%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	22	1.75%
Dry	10	0.80%
Culverts	0	0.00%
Unsurveyed	0	0.00%

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	853
Total conifers/1000 ft	1097
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	1.0	3.0	0.0	3.0	3.0	7.0	4.0
15-30cm	0.0	5.0	2.0	1.0	2.0	4.0	4.0	10.0
30-50cm	0.0	0.0	4.0	0.0	2.0	0.0	6.0	0.0
50-90cm	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	1.0	6.0	9.0	1.0	8.0	7.0	6.0	4.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	78	90	88
Shrub cover	35	28	18
Grass/forb cover	8	5	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	100
High terrace	100	50	0
Low terrace	0	0	0

Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	23	15	30

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/14/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	2256
Total conifers/1000 ft	792
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	30.0	4.0	3.0	4.0	1.0	8.0	34.0
15-30cm	0.0	0.0	0.0	0.0	3.0	3.0	3.0	3.0
30-50cm	1.0	0.0	0.0	0.0	1.0	0.0	2.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	1.0	30.0	4.0	3.0	8.0	4.0	4.3	12.3

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	93	93	93
Shrub cover	25	68	45
Grass/forb cover	3	0	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	100	50	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	18	23	18

DEMETER DESIGN **EAST FORK WHISKEY CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 5/14/2008

Summary of Riparian Zone (0-30m) for all reaches **2 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	1554
Total conifers/1000 ft	945
Total conifers >20" dbh/1000 ft	30
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	7.5	19.0
15-30cm	3.5	6.5
30-50cm	4.0	0.0
50-90cm	0.5	0.0
>90cm	0.0	0.0

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	HT	35	80	50	5	**Conifer**	1	0	0	0	0	
								Hardwood	1	2	0	0	0	
1	LF	2	HT	5	95	20	0	**Conifer**	1	2	3	0	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HS	30	90	10	0	**Conifer**	3	2	1	1	0	
								Hardwood	3	1	0	0	0	
1	RT	1	HT	10	75	20	10	**Conifer**	0	0	0	0	0	
								Hardwood	0	3	0	0	0	
1	RT	2	HS	25	85	35	10	**Conifer**	2	0	1	0	0	
								Hardwood	0	1	0	0	0	
1	RT	3	HS	30	85	25	0	**Conifer**	0	0	1	0	0	
								Hardwood	0	3	0	0	0	

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

Cover (percent) **Diameter class (cm)**

Unit	Side	Zone	Surface	Slope	Canopy	Shrub	Gras		3-15	15-30	30-50	50-90	>90	Notes
42	LF	1	HT	30	90	10	5	**Conifer**	0	0	0	0	0	
								Hardwood	30	0	0	0	0	
42	LF	2	HT	5	90	85	0	**Conifer**	3	0	0	0	0	
								Hardwood	3	0	0	0	0	
42	LF	3	HT	5	90	90	0	**Conifer**	2	1	1	0	0	
								Hardwood	1	1	0	0	0	
42	RT	1	HT	5	95	40	0	**Conifer**	0	0	1	0	0	
								Hardwood	0	0	0	0	0	
42	RT	2	HS	40	95	50	0	**Conifer**	1	0	0	0	0	
								Hardwood		0	0	0	0	
42	RT	3	HS	30	95	0	0	**Conifer**	2	2	0	0	0	
								Hardwood	0	2	0	0	0	

DEMETER DESIGN **BAY GOING JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	100%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	100%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	307	1,032	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 3		First Terrace *n* = 2	
Width:	2.9	Width:	3.3	6.3	(5 – 8)	49.0	(8 - 90)
Depth:	0.43	Height:	0.3	0.7	(0.2 - 1.30)	0.7	(0.35 - 1)

W:D ratio: 22.5
Stream Flow Type: MF
Average Unit Gradient: 1.2%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 3.5
Habitat Units/100m (total channel length): 6.8
Habitat Units/100m (primary channel 6.8

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	WL
Riparian Vegetation:	M15	M30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	48%	Reach avg: 96%
Undercut Banks:	15%	Range: 0 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	23	7.5
Volume (m 3):	13	4.4
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **BAY GOING JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 2 **T02S-R10W-S31LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	100%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	283	845	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 1	
Width:	2.1	Width:	4.0	6.0	(6 – 6)	6.0	(6 - 6)
Depth:	0.34	Height:	0.6	1.2	(1.2 - 1.2)	2.0	(2 - 2)

W:D ratio: 6.7
Stream Flow Type: MF
Average Unit Gradient: 1.4%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.5
Habitat Units/100m (total channel length): 1.4
Habitat Units/100m (primary channel 1.4

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	GN
Riparian Vegetation:	M30	C30

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	100%	Reach avg: 100%
Undercut Banks:	12%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	5	1.8
Volume (m 3):	2	0.6
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **BAY GOING JACKSON CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 3 **T02S-R10W-S31LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	100%

Valley Width Index: 20.0 VWI Range: 20 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	100%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	112	336	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 1	
Width:	3.0	Width:	3.0	5.0	(5 – 5)	6.0	(6 - 6)
Depth:	0.38	Height:	0.6	1.2	(1.2 - 1.2)	2.0	(2 - 2)

W:D ratio: 5.0
Stream Flow Type: MF
Average Unit Gradient: 1.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.7
Habitat Units/100m (total channel length): 1.8
Habitat Units/100m (primary channel 1.8

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	GN	GN
Riparian Vegetation:	C30	M15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	100%	Reach avg: 100%
Undercut Banks:	16%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	10	8.9
Volume (m3):	2	1.7
Key pieces (>=12m x 0.60m):	0	0.0

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders	Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)	S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	9	1.8	1.20	17	0	0	20	30	30	0	20
GLIDE	1	5	3.0	0.30	15	0	0	10	70	20	0	0
POOL-DAMMED	1	2	4.0	1.20	8	0	5	20	50	25	0	0
POOL-LATERAL SCOUR	1	2	3.0	0.50	6	0	5	5	65	20	5	0
POOL-PLUNGE	2	8	3.8	0.55	29	0	3	8	35	28	28	0
POOL-STRAIGHT SCOUR	5	19	2.9	0.52	63	0	5	22	35	35	4	0
RAPID/BOULDERS	1	2	0.5	0.10	1	0	0	10	20	25	45	0
RIFFLE	8	260	3.1	0.21	893	0	1	11	39	41	8	1
STEP/BOULDERS	1	1	2.0	0.40	1	0	0	0	0	0	100	0
Total:	21	307	2.9	0.43	1,032	0	**Avg:** 2	13	38	32	14	1

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	1	2	4.0	1.20	8	0.78%	0	0.0
Scour Pools	8	28	3.1	0.53	98	9.50%	0	0.0
Glides	1	5	3.0	0.30	15	1.45%	0	0.0
Riffles	8	260	3.1	0.21	893	86.48%	0	0.0
Rapids	1	2	0.5	0.10	1	0.10%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	1	1	2.0	0.40	1	0.10%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	1	9	1.8	1.20	17	1.60%	0	0.0

POOL SUMMARY

		Total of all Channel Lengths	Primary Channel Length
	Total	# / Km	# / Km
All Pools:	9	29.3	29.3
Pools >=1m deep:	1	3.3	3.3
Complex pools (LWD pieces>=3):	3	9.8	9.8
Pool frequency (channel widths/pool):	10.2		
Residual pool depth (avg):	0.51		

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 2 **T02S-R10W-S31LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length	Avg Width	Avg Depth	Total Area	Large Boulders		Substrate Percent Wetted Area					
		(m)	(m)	(m)	(m2)	(#>0.5m)		S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-LATERAL SCOUR	1	1	0.5	0.30	1	0		3	2	29	38	5	24
POOL-STRAIGHT SCOUR	1	2	2.0	0.60	4	0		2	3	10	20	40	25
RIFFLE	1	200	3.0	0.20	600	6		3	2	30	35	15	15
RIFFLE W/ POCKETS	1	80	3.0	0.25	240	3		2	3	25	35	20	15
Total:	4	283	2.1	0.34	845	9	**Avg:**	2	2	23	32	20	20

HABITAT SUMMARY

Habitat Group	Number Units	Total Length	Avg Width	Avg Depth	Wetted Area		Large Boulders	
		(m)	(m)	(m)	(m2)	Percent	Number	(# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	2	3	1.3	0.45	5	0.53%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	2	280	3.0	0.23	840	99.47%	9	1.1
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

		Total of all Channel Lengths	Primary Channel Length
	Total	# / Km	# / Km
All Pools:	2	7.1	7.1
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	35.4		
Residual pool depth (avg):	0.38		

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/15/2008

REACH 3 **T02S-R10W-S31LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m^2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
POOL-BEAVER DAM	1	12	3.0	0.50	36	1		10	40	15	20	15	0
RIFFLE	1	100	3.0	0.25	300	3		2	3	25	35	15	20
Total:	2	112	3.0	0.38	336	4	**Avg:**	6	22	20	28	15	10

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	1	12	3.0	0.50	36	10.71%	1	2.8
Scour Pools	0	0			0	0.00%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	1	100	3.0	0.25	300	89.29%	3	1.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	1	8.9	8.9
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	1	8.9	8.9
Pool frequency (channel widths/pool):	37.3		
Residual pool depth (avg):	0.40		

STREAM SUMMARY **BAY GOING JACKSON CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
27	702	2.8	0.41	2,213	3	12	34	32	15	5	13

Habitat Group	Wetted Area	
	(m2)	Percent
Dammed & BW Pools	44	1.99%
Scour Pools	103	4.63%
Glides	15	0.68%
Riffles	2,033	91.86%
Rapids	1	0.05%
Cascades	0	0.00%
Step/Falls	1	0.05%
Dry	0	0.00%
Culverts	17	0.75%
Unsurveyed	0	0.00%

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/15/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 2 transects

Total hardwoods/1000	1097
Total conifers/1000 ft	732
Total conifers >20" dbh/1000 ft	122
Total conifers >35" dbh/1000 ft	61

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	1.5	1.0	1.5	1.0	2.0	2.0	5.0
15-30cm	0.0	2.5	1.0	2.5	2.5	3.5	3.5	8.5
30-50cm	0.0	1.5	2.5	2.5	2.0	0.5	4.5	4.5
50-90cm	0.0	0.0	0.5	0.0	0.5	0.0	1.0	0.0
>90cm	0.0	0.0	0.5	0.0	0.5	0.0	1.0	0.0
Total/100m2	0.0	5.5	5.5	6.5	6.5	6.0	4.0	6.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	70	83	76
Shrub cover	79	65	45
Grass/forb cover	16	5	4

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	75	75	25
Low terrace	0	0	0

Floodplain	0	0	0
Wetland/meadow	25	25	75
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	11	9	0

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/15/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	853
Total conifers/1000 ft	975
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	4.0	0.0	1.0	4.0	1.0	3.0	6.0	7.0
15-30cm	0.0	0.0	2.0	1.0	2.0	4.0	4.0	5.0
30-50cm	2.0	2.0	1.0	0.0	2.0	0.0	5.0	2.0
50-90cm	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	6.0	2.0	4.0	5.0	6.0	7.0	5.3	4.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	80	75	70
Shrub cover	50	58	53
Grass/forb cover	5	5	5

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	50	50
High terrace	100	50	0
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	50
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	60	8	5

DEMETER DESIGN **BAY GOING JACKSON CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 5/15/2008

Summary of Riparian Zone (0-30m) for all reaches **3 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	1016
Total conifers/1000 ft	813
Total conifers >20" dbh/1000 ft	102
Total conifers >35" dbh/1000 ft	41

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	3.3	5.7
15-30cm	3.7	7.3
30-50cm	4.7	3.7
50-90cm	1.0	0.0
>90cm	0.7	0.0

DEMETER DESIGN BAY GOING JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/15/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
1	LF	1	HT	0	80	60	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	
1	LF	2	HT	15	85	50	5	**Conifer**	0	2	3	0	0	
								Hardwood	0	1	0	0	0	
1	LF	3	WL	0	75	45	10	**Conifer**	0	2	1	0	0	
								Hardwood	2	1	0	0	0	
1	RT	1	WL	0	75	90	10	**Conifer**	0	0	0	0	0	
								Hardwood	3	0	0	0	0	
1	RT	2	WL	5	85	90	5	**Conifer**	0	0	0	0	1	
								Hardwood	0	2	0	0	0	
1	RT	3	WL	0	70	95	5	**Conifer**	0	0	1	0	1	
								Hardwood	0	1	0	0	0	
21	LF	1	HT	15	60	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	0	2	0	0	0	
21	LF	2	HT	15	70	65	10	**Conifer**	0	0	0	0	0	
								Hardwood	2	2	3	0	0	
21	LF	3	HT	0	85	40	0	**Conifer**	2	2	2	1	0	

								Hardwood	0	1	0	0	0	
21	RT	1	HT	30	65	85	15	**Conifer**	0	0	0	0	0	
								Hardwood	0	1	3	0	0	
21	RT	2	HT	0	90	55	0	**Conifer**	2	0	2	1	0	
								Hardwood	1	0	2	0	0	
21	RT	3	WL	0	75	0	0	**Conifer**	0	1	0	0	0	
								Hardwood	2	4	1	0	0	

DEMETER DESIGN BAY GOING JACKSON CREEK

HABITAT INVENTORY Report Date: 12/15/2008 Survey Date: 5/15/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
26	LF	1	HT	60	90	25	0	**Conifer**	2	0	2	0	0	
								Hardwood	0	0	0	0	0	
26	LF	2	HS	15	90	30	0	**Conifer**	0	1	1	0	0	
								Hardwood	0	0	0	0	0	
26	LF	3	HS	10	90	20	0	**Conifer**	1	2	2	0	0	
								Hardwood	0	0	0	0	0	
26	RT	1	HT	60	70	75	10	**Conifer**	2	0	0	0	0	
								Hardwood	0	0	2	0	0	
26	RT	2	HT	0	60	85	10	**Conifer**	1	1	0	0	0	
								Hardwood	4	1	0	0	0	
26	RT	3	WL	0	50	85	10	**Conifer**	0	0	0	1	0	
								Hardwood	3	4	0	0	0	

DEMETER DESIGN **AUSTIN CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 13.2 VWI Range: 4 - 20

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	100%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	165	377	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1	First Terrace *n* = 2
Width:	1.5	Width:	1.5	1.5 (1.5 - 1.5)	10.0 (10 - 10)
Depth:	0.29	Height:	0.4	0.8 (0.8 - 0.8)	1.0 (1 - 1)

W:D ratio: 3.8
Stream Flow Type: MF
Average Unit Gradient: 0.5%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.0
Habitat Units/100m (total channel length): 8.5
Habitat Units/100m (primary channel 8.5

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	RR	MT
Riparian Vegetation:	S	C50

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	84%	Reach avg: 60%
Undercut Banks:	70%	Range: 0 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	59	35.8
Volume (m3):	70	42.2
Key pieces (>=12m x 0.60m):	3	1.8

DEMETER DESIGN **AUSTIN CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 2 **T02S-R10W-S30LL** **REACH 2**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	100%
Moderate V-shape	0%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 4.2 VWI Range: 3 - 10

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	0%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	100%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	146	199	0
Secondary	10	10	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 0	
Width:	1.5	Width:	1.5	4.5	(4.5 - 4.5)	(-)	
Depth:	0.29	Height:	0.5	0.9	(0.9 - 0.9)	(-)	

W:D ratio: 3.3
Stream Flow Type: MF
Average Unit Gradient: 0.5%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 3.0
Habitat Units/100m (total channel length): 5.8
Habitat Units/100m (primary channel 6.2

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	
Riparian Vegetation:	C30	S

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	100%	Reach avg: 79%
Undercut Banks:	72%	Range: 33 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	67	45.9
Volume (m 3):	151	103.1
Key pieces (>=12m x 0.60m):	13	8.9

DEMETER DESIGN **AUSTIN CREEK**
HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 3 **T02S-R10W-S30LL** **REACH 3**

Valley and Channel Summary

Valley Characteristics (Percent Reach Length)

Narrow Valley Floor		Broad Valley Floor	
Steep V-shape	0%	Constraining Terraces	0%
Moderate V-shape	100%	Multiple Terraces	0%
Open V-shape	0%	Wide Floodplain	0%

Valley Width Index: 2.3 VWI Range: 1 - 5

Channel Morphology (Percent Reach Length)

Constrained		Unconstrained	
Hillslope	100%	Single Channel	0%
Bedrock	0%	Multiple Channel	0%
Terrace	0%	Braided Channel	0%
Alt. Terrace/Hill	0%		
Landuse	0%		

Channel Characteristics

Type	Length (m)	Area (m2)	Dry Units
Primary	265	873	0
Secondary	0	0	0

Channel Dimensions (m)

Wetted		Active		Floodprone *n* = 1		First Terrace *n* = 2	
Width:	2.7	Width:	3.0	1.7	(1.7 - 1.7)	3.4	(2.7 - 4)
Depth:	0.27	Height:	0.5	1.0	(1 – 1)	1.5	(1 - 2)

W:D ratio: 2.0
Stream Flow Type: MF
Average Unit Gradient: 0.8%
Water temperature (°C): -

Entrenchment (ACW:FPW ratio): 1.7
Habitat Units/100m (total channel length): 1.1
Habitat Units/100m (primary channel 1.1

Riparian, Bank, and Wood Summary

	Primary	Secondary
Land Use:	MT	
Riparian Vegetation:	C30	C15

Bank Condition and Shade

Bank Status	Percent Reach Length	Shade (% of 180)
Actively Eroding:	98%	Reach avg: 100%
Undercut Banks:	47%	Range: 100 - 100

Large Wood Debris

	Total	Total / 100m primary channel
All pieces (>=3m x 0.15m):	40	15.1
Volume (m3):	53	20.1
Key pieces (>=12m x 0.60m):	4	1.5

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 1 **T02S-R10W-S30LL** **REACH 1**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
CULVERT CROSSING	1	22	1.0	0.15	22	0		0	0	0	0	0	100
POOL-DAMMED	5	85	2.5	0.36	279	0		50	30	14	6	0	0
POOL-PLUNGE	3	17	1.2	0.40	20	0		33	23	20	20	3	0
RIFFLE	5	41	1.2	0.19	57	0		35	20	17	13	15	0
Total:	14	165	1.6	0.29	377	0	**Avg:**	38	23	15	11	6	7

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	5	85	2.5	0.36	279	74.01%	0	0.0
Scour Pools	3	17	1.2	0.40	20	5.17%	0	0.0
Glides	0	0			0	0.00%	0	0.0
Riffles	5	41	1.2	0.19	57	14.99%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	1	22	1.0	0.15	22	5.84%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	8	48.5	48.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	13.8		
Residual pool depth (avg):	0.29		

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 2 **T02S-R10W-S30LL** **REACH 2**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)		Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	20	1.5	0.20	30	0		55	15	15	15	0	0
POOL-DAMMED	3	35	2.3	0.40	78	0		87	10	0	0	0	3
RIFFLE	4	66	1.0	0.21	66	0		38	18	16	15	0	14
RIFFLE W/ POCKETS	1	35	1.0	0.35	35	0		70	20	10	0	0	0
Total:	9	156	1.5	0.29	209	0	**Avg:**	59	15	10	8	0	7

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Percent	Large Boulders Number	(# / 100m2)
Dammed & BW Pools	3	35	2.3	0.40	78	37.17%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	1	20	1.5	0.20	30	14.39%	0	0.0
Riffles	5	101	1.0	0.24	101	48.44%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	3	19.2	20.5
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	34.7		
Residual pool depth (avg):	0.30		

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

REACH 3 **T02S-R10W-S30LL** **REACH 3**

HABITAT DETAIL

Habitat Type	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Large Boulders (#>0.5m)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk
GLIDE	1	15	1.5	0.35	23	0	70	20	10	0	0	0
RIFFLE	1	150	4.0	0.20	600	0	20	20	30	30	0	0
RIFFLE W/ POCKETS	1	100	2.5	0.25	250	0	15	20	30	35	0	0
Total:	3	265	2.7	0.27	873	0	**Avg:** 35	20	23	22	0	0

HABITAT SUMMARY

Habitat Group	Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Wetted Area (m2)	Wetted Area Percent	Large Boulders Number	Large Boulders (# / 100m2)
Dammed & BW Pools	0	0			0	0.00%	0	0.0
Scour Pools	0	0			0	0.00%	0	0.0
Glides	1	15	1.5	0.35	23	2.58%	0	0.0
Riffles	2	250	3.3	0.23	850	97.42%	0	0.0
Rapids	0	0			0	0.00%	0	0.0
Cascades	0	0			0	0.00%	0	0.0
Step/Falls	0	0			0	0.00%	0	0.0
Dry	0	0			0	0.00%	0	0.0
Culverts	0	0			0	0.00%	0	0.0

POOL SUMMARY

	Total	Total of all Channel Lengths # / Km	Primary Channel Length # / Km
All Pools:	0	0.0	0.0
Pools >=1m deep:	0	0.0	0.0
Complex pools (LWD pieces>=3):	0	0.0	0.0
Pool frequency (channel widths/pool):	0.0		
Residual pool depth (avg):			

STREAM SUMMARY **AUSTIN CREEK**

Number Units	Total Length (m)	Avg Width (m)	Avg Depth (m)	Total Area (m2)	Substrate Percent Wetted Area S/O	Snd	Grvl	Cbl	Bldr	Bdrk	Large Boulders (#>0.5m)
26	586	1.7	0.29	1,458	45	20	14	11	3	6	0

Habitat Group	Wetted Area (m^2)	Percent
Dammed & BW Pools	357	24.45%
Scour Pools	20	1.34%
Glides	53	3.60%
Riffles	1,008	69.10%
Rapids	0	0.00%
Cascades	0	0.00%
Step/Falls	0	0.00%
Dry	0	0.00%
Culverts	22	1.51%
Unsurveyed	0	0.00%

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 1 **REACH 1**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	0
Total conifers/1000 ft	305
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	0.0	0.0	3.0	0.0	3.0	0.0
15-30cm	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
30-50cm	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	0.0	0.0	0.0	0.0	5.0	0.0	1.7	0.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	0	0	35
Shrub cover	0	0	38
Grass/forb cover	100	100	60

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	0	0	50
Low terrace	0	0	0
Floodplain	100	100	50

Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	0	0	13

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 2 **REACH 2**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	853
Total conifers/1000 ft	549
Total conifers >20" dbh/1000 ft	61
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	1.0	4.0	3.0	5.0	2.0	5.0	6.0	14.0
15-30cm	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
30-50cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
50-90cm	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	3.0	4.0	4.0	5.0	2.0	5.0	3.0	4.7

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	55	55	45
Shrub cover	58	43	53
Grass/forb cover	15	8	8

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	0
High terrace	50	50	100
Low terrace	0	0	0
Floodplain	50	50	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	10	8	5

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION SUMMARY

REACH 3 **REACH 3**

Summary of Riparian Zone (0-30m) 1 transects

Total hardwoods/1000	183
Total conifers/1000 ft	732
Total conifers >20" dbh/1000 ft	0
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-meter wide band

Diameter	Zone 1 0-10 meters		Zone 2 10 - 20 meters		Zone 3 20 - 30 meters		Zones 1-3 0-30 meters	
class (cm)	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood	Conifer	Hardwood
3-15cm	0.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0
15-30cm	0.0	3.0	2.0	0.0	0.0	0.0	2.0	3.0
30-50cm	2.0	0.0	3.0	0.0	3.0	0.0	8.0	0.0
50-90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
>90cm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total/100m2	2.0	3.0	6.0	0.0	4.0	0.0	4.0	1.0

Canopy closure and ground cover

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Canopy closure	93	55	48
Shrub cover	45	33	36
Grass/forb cover	5	0	0

Predominant landform in each zone

	Zone 1 0-10 meters (%)	Zone 2 10 - 20 meters (%)	Zone 3 20 - 30 meters (%)
Hillslope	0	0	50
High terrace	100	100	50
Low terrace	0	0	0
Floodplain	0	0	0
Wetland/meadow	0	0	0
Stream channel	0	0	0
Roadbed/Railroad	0	0	0
Riprap	0	0	0
Surface slope (%)	30	8	5

DEMETER DESIGN **AUSTIN CREEK**

HABITAT INVENTORY - RIPARIAN SURVEY 5/28/2008

Summary of Riparian Zone (0-30m) for all reaches **3 transects**

Summary of riparian zone (0-100 feet) extrapolated to 1,000 feet along stream

Total hardwoods/1000	345
Total conifers/1000 ft	528
Total conifers >20" dbh/1000 ft	20
Total conifers >35" dbh/1000 ft	0

Average number of trees in a 5-m wide band

Diameter class (cm)	Zones 1-3 0-30 meters Conifer	Hardwood
3-15cm	3.7	4.7
15-30cm	1.3	1.0
30-50cm	3.3	0.0
50-90cm	0.3	0.0
>90cm	0.0	0.0

DEMETER DESIGN AUSTIN CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION

Reach 1 Reach 1

Unit	Side	Zone	Surface	Slope	Cover (percent) Canopy	Shrub	Grass		Diameter class (cm) 3-15	15-30	30-50	50-90	>90	Notes
1	LF	1	FP	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	2	FP	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	LF	3	HT	25	55	75	20	**Conifer**	2	1	1	0	0	
								Hardwood	0	0	0	0	0	
1	RT	1	FP	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	2	FP	0	0	0	100	**Conifer**	0	0	0	0	0	
								Hardwood	0	0	0	0	0	
1	RT	3	FP	0	15	0	100	**Conifer**	1	0	0	0	0	
								Hardwood	0	0	0	0	0	

DEMETER DESIGN AUSTIN CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION

Reach 2 Reach 2

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
15	LF	1	FP	0	65	80	20	**Conifer**	0	0	0	0	0	
								Hardwood	4	0	0	0	0	
15	LF	2	FP	0	90	85	15	**Conifer**	1	0	0	0	0	
								Hardwood	5	0	0	0	0	
15	LF	3	HT	10	90	85	15	**Conifer**	2	0	0	0	0	
								Hardwood	5	0	0	0	0	
15	RT	1	HT	20	45	35	10	**Conifer**	1	0	1	1	0	
								Hardwood	0	0	0	0	0	
15	RT	2	HT	15	20	0	0	**Conifer**	2	1	0	0	0	
								Hardwood	0	0	0	0	0	
15	RT	3	HT	0	0	20	0	**Conifer**	0	0	0	0	0	Clear Cut
								Hardwood	0	0	0	0	0	

DEMETER DESIGN AUSTIN CREEK

HABITAT INVENTORY Report Date: 12/17/2008 Survey Date: 5/28/2008

RIPARIAN ZONE VEGETATION

Reach 3 Reach 3

					Cover (percent)				Diameter class (cm)					
Unit	**Side**	**Zone**	**Surface**	**Slope**	**Canopy**	**Shrub**	**Grass**		**3-15**	**15-30**	**30-50**	**50-90**	**>90**	**Notes**
24	LF	1	HT	30	95	30	0	**Conifer**	0	0	1	0	0	
								Hardwood	0	1	0	0	0	
24	LF	2	HT	10	95	45	0	**Conifer**	0	0	3	0	0	
								Hardwood	0	0	0	0	0	
24	LF	3	HS	10	95	60	0	**Conifer**	1	0	3	0	0	
								Hardwood	0	0	0	0	0	
24	RT	1	HT	30	90	60	10	**Conifer**	0	0	1	0	0	
								Hardwood	0	2	0	0	0	
24	RT	2	HT	5	15	20	0	**Conifer**	1	2	0	0	0	1/2 Clear Cut
								Hardwood	0	0	0	0	0	
24	RT	3	HT	0	0	12	0	**Conifer**	0	0	0	0	0	Clear Cut
								Hardwood	0	0	0	0	0	