Coos Bay Lowland Assessment and Restoration Plan

Chapter 2:
Kentuck Creek Sub-Basin Assessment

Kentuck Creek tidal reach from the tide gate. Photo CoosWA,2006.

Table of Contents

Kentuck Creek Sub-basin

Introduction

Landform

The Kentuck sub-basin is oriented east to west, and enters the north end of Coos Bay through Kentuck Inlet. The stream system is made up of two major tributaries, Kentuck and Mettman creeks (see Figure K-1). These streams converge in the lowlands to form Kentuck Slough which drains into the Bay through a tide gate. There are tidal and high salt marshes near the mouth.

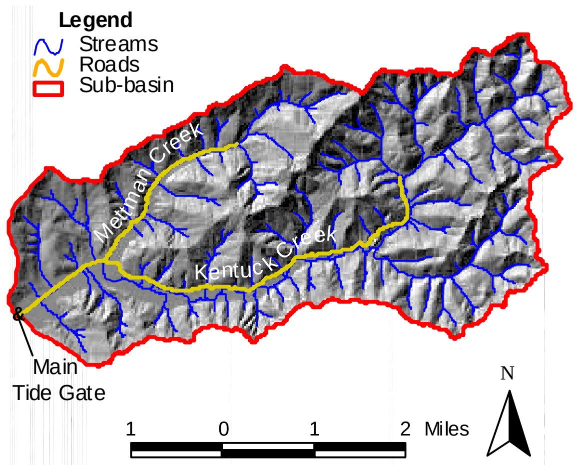


Figure K-1 General Sub-basin

Kentuck and Mettman creeks are both dendritic river systems. Kentuck Creek is a forth order stream system, and Mettman is a third order system. The drainage area of the sub-basin is approximately 10637 acres (16.62 miles^{2}), which is the largest in the lowlands assessment area. The total river miles of streams within Kentuck is approximately 59.28 miles, including every section of stream from mainstems to very small intermittent and perennial headwater streams. From the tide gate at East Bay Drive, Kentuck mainstem is approximately 8.1 miles long, and Mettman Creek mainstem is 3.4 miles long. The elevation in the basin ranges from 0 to 1334 feet above sea level (OWRD,2005).

The main type of underlying geology in the Kentuck sub-basin is the Tyee silt/sandstone (76%). Other types include Tuffaceous siltstone/sandstone (11%), and Siletz River Volcanic (13%). Due to the type of these parent materials, a fair amount of the area in this sub-basin is prone to landslides. Soils in the Kentuck sub-basin consist of the following three general types. The Templeton-Salander soil type, most common in the lowlands area, is well-drained and loamy. Steeper areas in the uplands are characterized by the Preacher-Bohannon type which is deep, gravely to loamy and prone to erosion. The headwaters of Kentuck are on the Milbury-Bohannon-Umpcoos type that is moderately deep and shallow, gravelly to loamy (Haagen, 1989).

Isolated basalt deposits are found in some headwater areas of Kentuck, which have been used as rock sources for over 50 years.

Landuse and Ownership

Landuse in the Kentuck sub-basin (see Figure K-2 and Table K-1)) is dominated by forestry, which covers 81% of the area. Forests are managed by both private industrial and small woodlot owners. Agricultural use is confined to the bottom lands along the main tributaries, and comprises 11% of the area. Most agricultural land is managed for grazing, hay production and small hobby farms. Rural residential use is spotted along the mainstem and lower valley. The Kentuck golf course is located along Kentuck slough, comprising 1.5% of recreational use. Two large rock quarries are located along Kentuck creek.

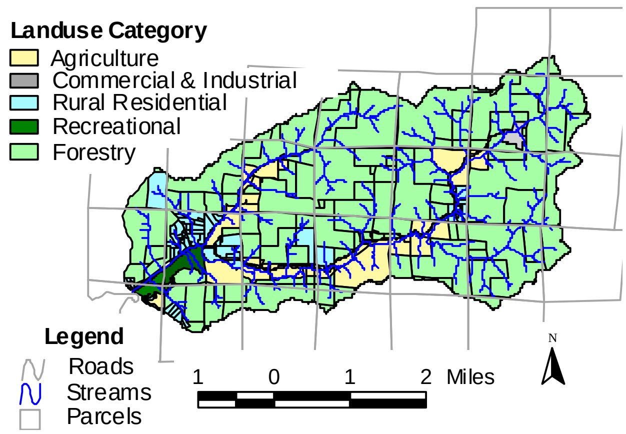


Figure K-2 Landuse Distribution

Table K-1 Landuse

Landuse	Acres	Percent
Agricultural	972	11
Forestry	7207	81
Rural Residential	557	6
Commercial & Industrial	48	0.5
Recreational	134	1.5
Total	8918	

Hydrology

Precipitation

Annual precipitation is 67 inches in the lowest elevations in the Kentuck sub-basin. Due to the west facing orientation, rainfall gradually increases as the elevation increases to a maximum of 73 inches, averaging 70 inches for the whole sub-basin (OCS, 2003). The precipitation intensity for a 2-year 24-hour event is 2.95 inches (OWRD, 2005).

Stream flow

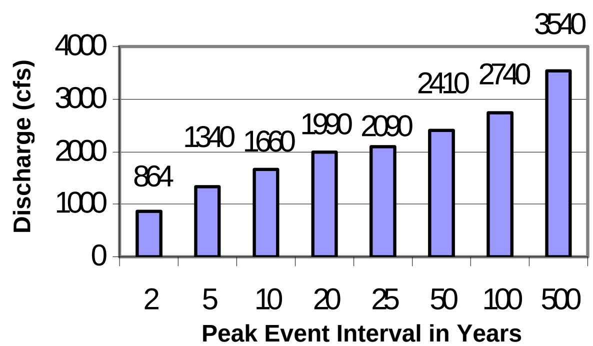


Figure K-3 Annual Peak Discharge Estimates (OWRD, 2005)

Annual peak stream flow was obtained using the Peak Flow Estimation Program (OWRD, 2005). They use hydrologic prediction equations and physical watershed characteristics to estimate peak flows. Figure K-3 shows the estimated discharge at the mouth of Kentuck creek for storm events for two to five hundred year reoccurrence intervals. The bankfull flow event is estimated to be 864 cfs. On the other extreme, a maximum discharge of 3540 cfs is estimated for a 500-year storm event in Kentuck Creek.

No data for summer flow measurements were available for Kentuck and Mettman Creeks.

Landuse Effects on Hydrology

Landuses, as they affect ground surface conditions, can be used to make general evaluations of the hydrologic condition of a watershed. Of particular concern is the effect of land uses on peak stream flow, since increases in runoff can contribute to flooding, erosion, and culvert failures. The most important determinant for peakflow increases is the ability of soils to absorb rainfall.

The impacts from agriculture on hydrology are dependent on the type of cover and management treatments, as well as the characteristics of the soils (OWEB, 1999). We assessed these factors and compared them to the change in runoff from the background condition. This change will be rated as followed: < 0.5 inches, 0.5 to 1.0 inches, and > 1.5 inches.

The main types of hydrologic soil groups (HSG) present in the agriculture lands are, 61% of HSG Class D, and 39% of HSG Class B. The HSG

Class D has very slow infiltration rates and high runoff rates. The HSG B has moderate infiltration rates and moderate runoff. Agriculture has a greater affect on runoff in areas where soils have a high infiltration rate compared to areas where soils are relatively impermeable in their natural state (USDA, 1986). In the Kentuck sub-basin, the change in runoff from the background conditions increased by 0.52 inches. Because of this, the potential risk of peak-flow increases is moderate.

Forest and Rural land use will be assessed by their percentage of area that is comprised of roads. They will be rated as: low < 4%, medium 4% - 8%, and high > 8%.

Within the forest use area, there are 81.25 linear miles of forest roads, the largest of the assessment area. These roads take up approximately 3.3 percent of the forested area. Because of the low percentage present, relative potential risk for peak-flow enhancement is low in the Kentuck sub-basin.

There are approximately 15.24 linear miles of rural roads in the Kentuck Creek. Of this area, there is 5 percent area in roads. This percentage ranks Kentuck Creek residential and industrial area as a relatively moderate potential risk for peak-flow enhancement.

Overall, Kentuck sub-basin's potential risk of peak-flow increases from land use impacts is low to moderate.

Water rights

There are three main types of water rights in Kentuck sub-basin: surface water, groundwater, and instream. The most senior water right in was established in 1927 for domestic and livestock use of surface water. Table K-2 lists the different types of water use in the Kentuck sub-basin, and their potential maximum water use. The storage rights for Kentuck sub-basin are 2.64 acre feet for irrigation use. Total allocated water rights for the entire sub-basin are 47.82 cubic feet per second. The total consumptive use is 1.16 cfs. Both Kentuck and Mettman creek instream rights were established in 1992. Mettman Creek rights extend 3.3 miles up Mettman Creek. Kentuck Creek instream rights extend from the confluence of Mettman creek up Kentuck Creek for 4.9 miles. However, there are no instream rights from the tide gate to the confluence of Mettman Creek. The instream water rights were established for migration, spawning, egg incubation, fry emergence, juvenile rearing (12 cfs) on Mettman creek, and fish life (34 cfs) on Kentuck Creek.

Table K-2 Water Use

Type of Use	CFS	Ac-ft
Domestic	0.42	0.00
Irrigation	1.40	2.64
Instream	46.00	0.00
Total	47.82	2.64

Water Availability

Water availability for the Kentuck sub-basin is estimated using the Water Availability Report System (OWRD, 2005). The average water available is based on the 50% annual exceedance level. The expected flow was derived by subtracting the consumptive uses from the estimated natural stream flow and is shown in Table K-3 for Kentuck creek above and Table K-4 for Mettman creek below. In the months of July to October, there is between 1.05 and 2.56 cfs of expected flows in Kentuck Creek. During this low flow period, there is between .02 and .34 cfs of consumptive use. In Kentuck creek the consumptive water use has increased by more than 10% since 1993.

Table K-3 Kentuck Creek Monthly Net Water Available (OWRD, 2005)

Month	Natural Flow	Consumptive Uses	Reserved Instream Flow	Expected Flow (cfs)
Jan	43.50	0.01	34.00	43.49
Feb	47.00	0.01	34.00	46.99
Mar	34.40	0.01	34.00	34.39
Apr	23.80	0.02	23.80	23.78
May	12.10	0.08	12.10	12.02
Jun	6.06	0.22	6.02	5.84
Jul	2.90	0.34	2.85	2.56
Aug	1.50	0.28	1.46	1.22
Sep	1.17	0.12	1.14	1.05
Oct	1.38	0.02	1.34	1.36
Nov	9.46	0.01	9.34	9.45
Dec	35.80	0.01	34.00	35.79

In Mettman Creek, the instream flow is equal to the natural flow for the months March to June and in December. The predicted natural flow patterns of the stream create very low flow summer conditions with less than 1 cfs from July through October. There is very little consumptive use on Mettman creek and the consumptive use has not increased by more than 10% since 1993.

Table K-4 Mettman Creek Monthly Net Water Available (OWRD, 2005)

Month	Natural Flow	Consumptive Uses	Reserved Instream Flow	Expected Flow (cfs)
Jan	14.20	0.00	12.00	14.2
Feb	15.40	0.00	12.00	15.4
Mar	11.30	0.00	11.30	11.3
Apr	7.58	0.00	7.58	7.58
May	3.76	0.00	3.76	3.76
Jun	2.01	0.01	1.98	2.0
Jul	0.99	0.01	0.96	0.98
Aug	0.51	0.01	0.49	0.5
Sep	0.40	0.00	0.37	0.4
Oct	0.47	0.00	0.44	0.47
Nov	3.08	0.00	3.00	3.08
Dec	11.50	0.00	11.50	11.5

Aquatic Habitat

Aquatic habitat surveys addressed in this assessment include unit type, substrate type, riffle sediment, pool depth, large wood, and bank stability (bank stability is presented in Sediment Sources).

The Tidal reach, Kentuck Slough, lies in a large, low-gradient floodplain and is constrained by Kentuck Way Lane on the north and a dike on the south. As the mainstem reaches progress upstream they are constrained by the dike, then by terraces, and then by hillslopes in a narrow, moderate, v-shaped valley. Mettman creek is also constrained by hillslopes in a narrow, moderate v-shaped valley. See Appendix A for specific channel morphology metrics.

The Kentuck aquatic habitat survey starts near the mouth of Kentuck Slough at the tide gate. Aquatic habitat survey reaches are shown in Figure K-4. These reach names will be used to describe locations within the Kentuck sub-basin throughout this assessment.

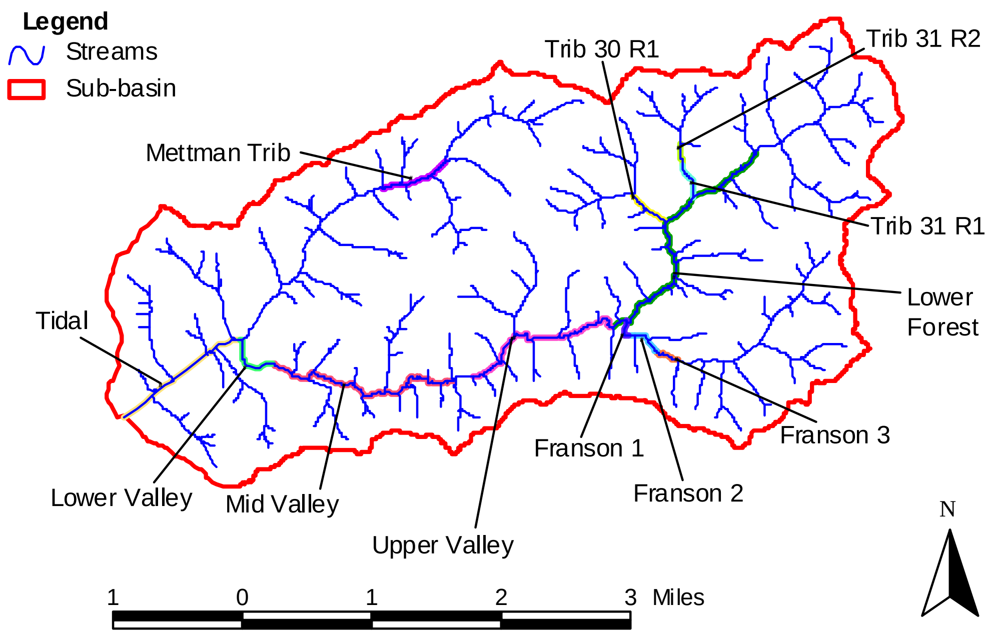


Figure K-4 Aquatic Habitat Study Reaches

In Figure K-5, unit types, the Mettman Trib reach has a very diverse group of unit types, including a large percentage of step units, rapid units, and cascade units. Tributary 30, Reach 1, also has a high percentage of cascade units, culvert crossings, step units, and rapid over boulders. In Franson Creek, Reach 3 has 47% of the units are rapid or step units.

Figure K-5
Unit Types

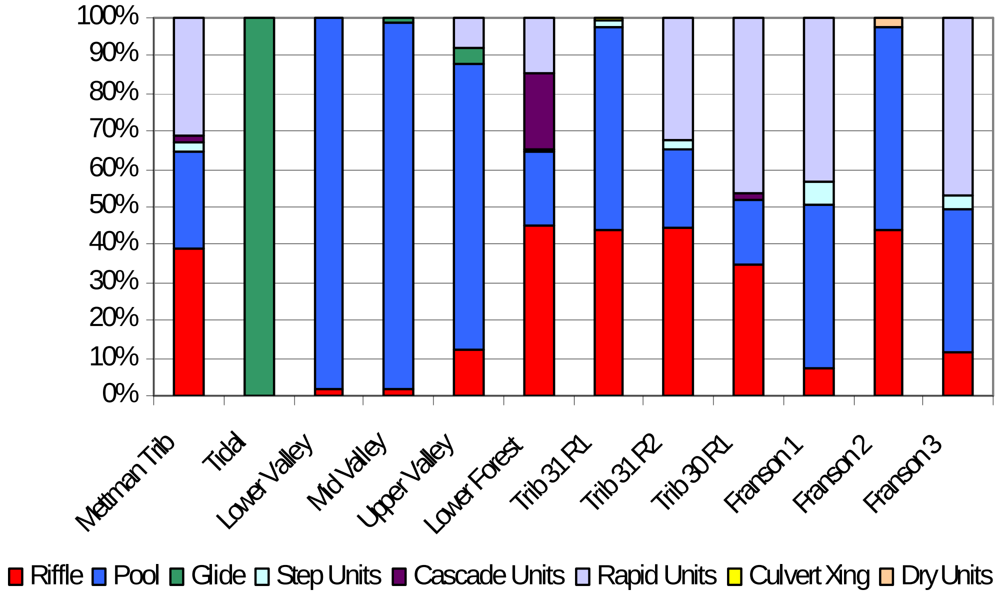
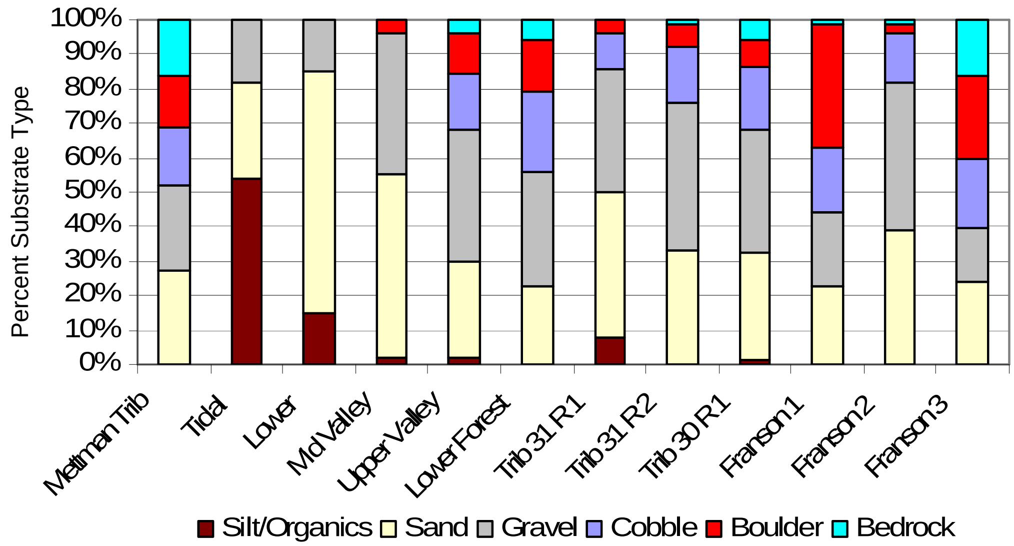


Figure K-6 illustrates the substrate type for each reach. The substrate types correspond with the unit types. Higher gradient reaches tend to have more cobble, boulders, and bedrock; lower tidal areas tend to have higher sand/silt/organic substrates.

Figure K-6
Substrate Types



In figure K-7, riffle sediment, there is no data for the Main Tidal reach because there were no riffles to analyze. All other reaches had excellent levels of gravel and poor levels of fine sediments. The Upper Valley and Lower Forest, as well as three other tributary reaches, have fine sediment levels below the unacceptable levels. The Lower Valley reach has a very high level of fine sediment in the riffles.

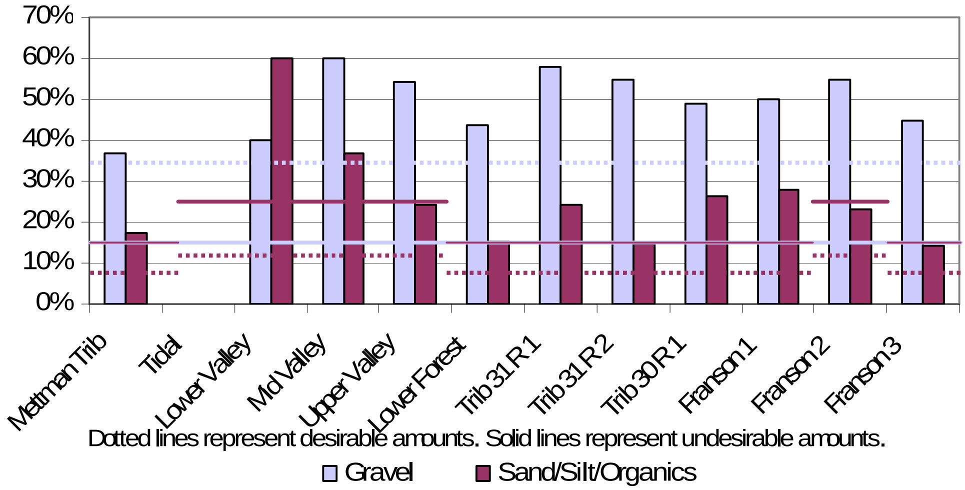


Figure K-7 Riffle Sediment

The average residual pool depths are shown in Figure K-8. The Tidal reach does not have any data because it did not have any pool units. The best depths, according to the ODFW benchmarks, were in all reaches but the Mettman, Tributary 31, Reach 2, Tributary 30, and the Franson Reaches. Deep pools are used by young salmonids for rearing habitat.

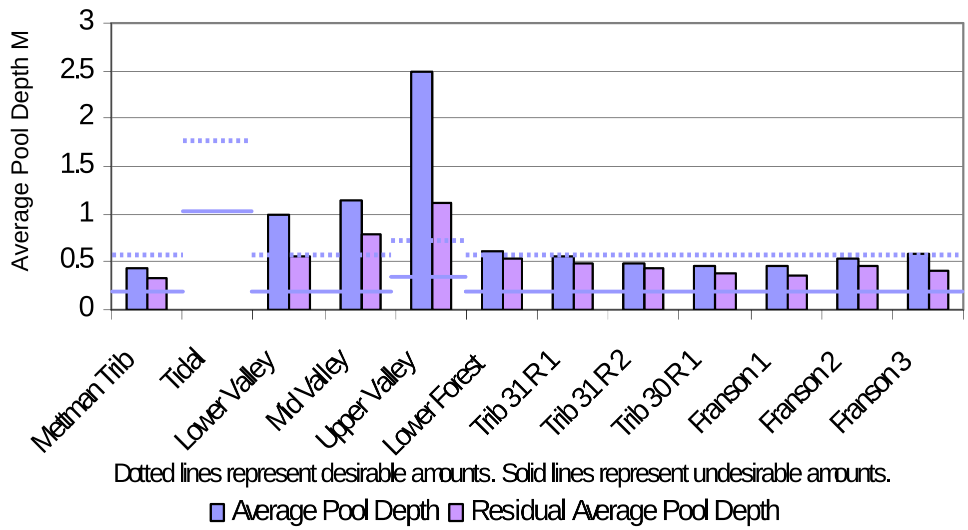
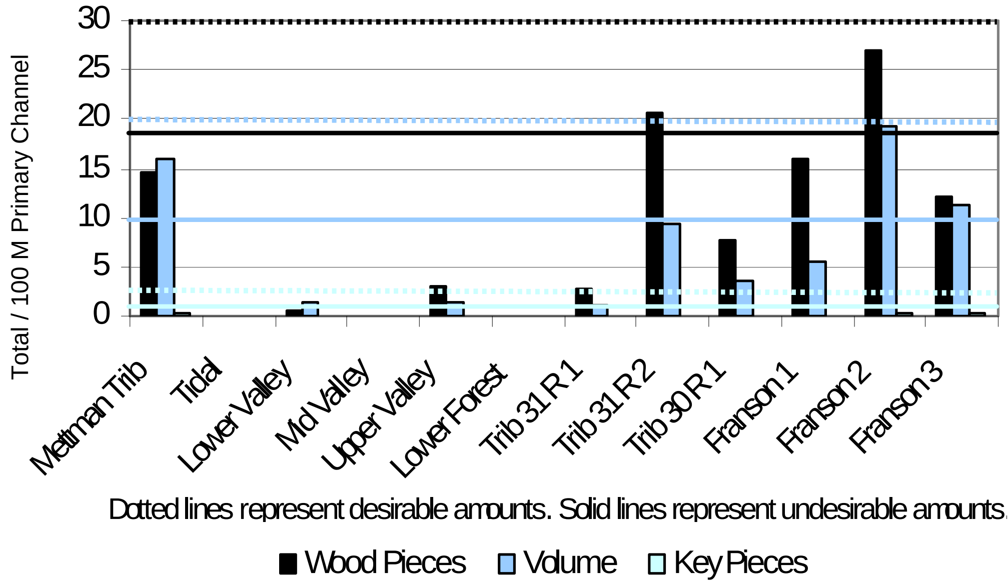


Figure K-8 Pool Depth

As seen in Figure K-9, the mainstem area (Tidal through Lower Forest) has little to no large wood. None of the reaches surveyed in the Kentuck sub-basin contain even the minimum benchmark levels for key pieces of large wood.

Figure K-9 Large Wood



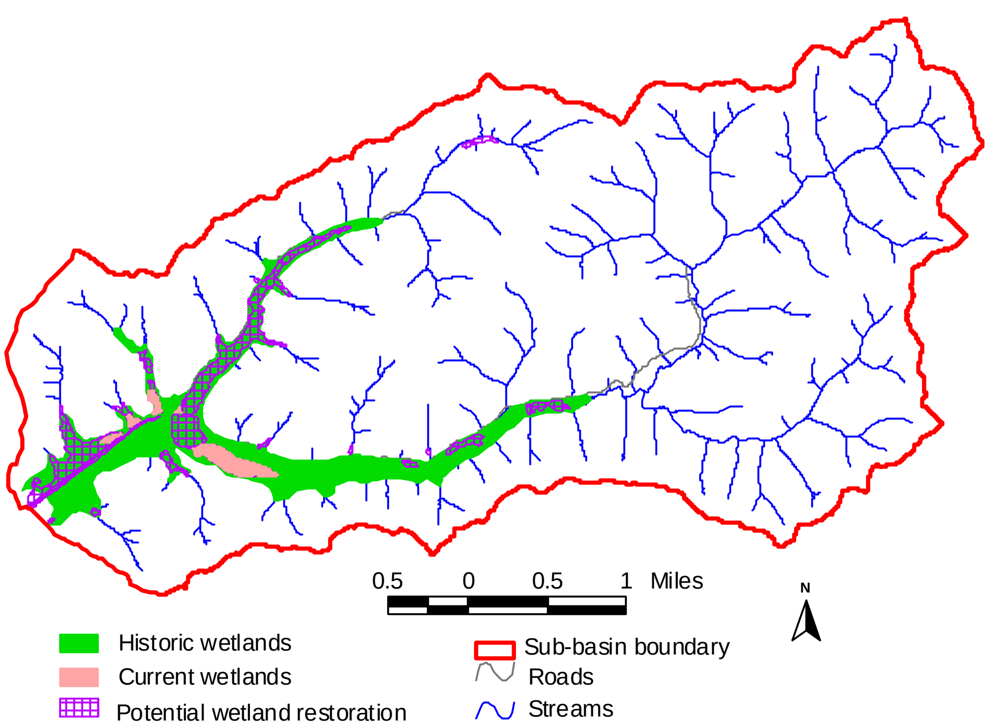
Wetlands

Historic, current and potentially restored wetlands in the Kentuck sub-basin are shown in Figure K-10 and Table K-5. The current (2005) wetland extent, determined by CoosWA using aerial photography analysis, is land presently dominated by wetland vegetation and not showing signs of recent agricultural production. In most cases, however, 'current wetland' is not a properly functioning wetland and is included in the area of potential wetland restoration. The area considered current wetland is only 6% of the historic wetland extent in this sub-basin. Historic wetland extents are based on soil type and plant characteristics. Twenty-nine percent (174 acres) of the historic wetlands in this sub-basin are described in the National Wetland Inventory as 'emergent', meaning they were dominated by rooted herbaceous plants, and are seasonally flooded. It is primarily the emergent seasonally-flooded areas, not currently functioning as wetland, that CoosWA recommends for restoration consideration as these areas are often more difficult to manage for crop production. Wetland restoration is discussed in more depth in Chapter 3, and National Wetland Inventory categories are provided in Appendix A.

Table K-5
Wetland Areas

Wetland Type	Acres
Historic wetlands	608
Current wetlands	37
Potential wetland restoration	185

Figure E-10
Wetlands



Sediment Sources

Sediment sources considered in this assessment include unstable stream banks, unstable slopes, erosion associated with roads, and stream crossings with road fill at risk of failure.

Bank Stability

Bank stability surveys are conducted as part of the aquatic habitat surveys. Figure K-11 shows the bank stability survey results for each aquatic habitat reach. The data indicate a very high percentage of covered/unstable banks, especially along the mainstem of Kentuck creek. This area is largely managed for grazing and riparian cover is grass. The Tidal, Mettman Trib, and Franson reaches have the most stable banks, however these are barely within the acceptable benchmark range.

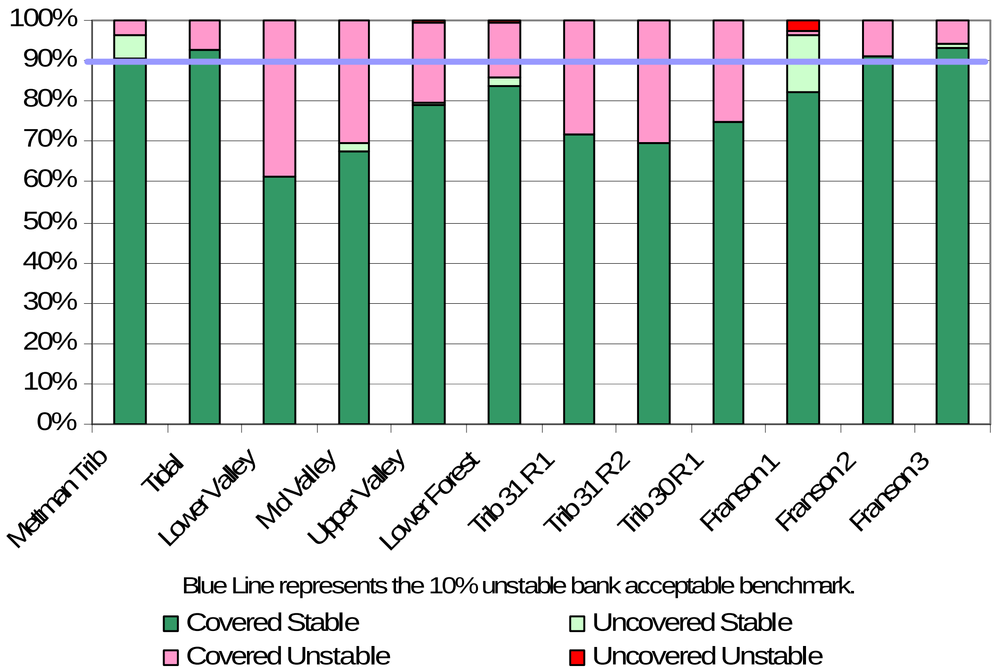


Figure K-11 Bank Stability

Slope Stability

The slope analysis, shown in Figure K-12, indicates that 72.4% of the land area in the Kentuck sub-basin is at low risk for landslide potential, 22.1% is at medium risk, 3.5% is at high risk, and 2.1% is at extremely high risk. The most unstable slopes are located in the headwaters of Kentuck creek, in the highest elevations of the most eastern part of the sub-basin. The steepest slopes are found in areas of Tyee silt/sandstone, which means that there is high potential for slope failure in these areas.

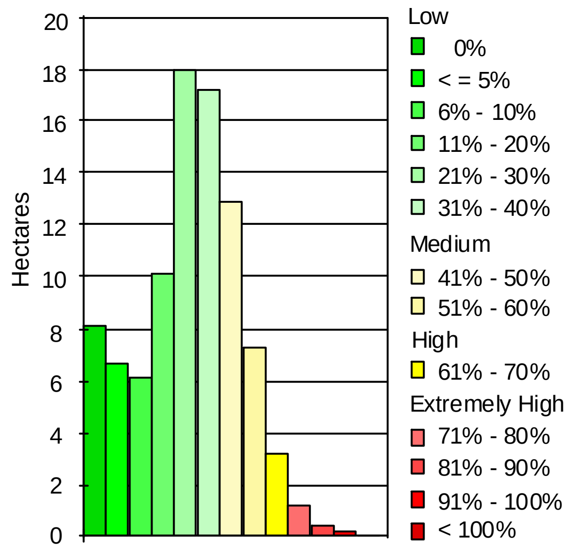


Figure K-12 Slope Stability Risk Classifications

Road-Related Erosion

The Kentuck sub-basin has the most complex road system in the Lowlands area, and many roads are used by both the quarries and the large logging companies.

The Kentuck sub-basin road and landing survey was conducted between March 2001 and March 2005. The survey was divided into two groups, county roads and private roads. The county survey started at the junction of East Bay Drive and Kentuck Way Lane and ended at the junction with the Gould Quarry Road. Mettman Creek Road was included in the county survey. All private roads were surveyed where landowner permission was granted.

A total of 47.9 miles of road were surveyed in the

Table K-5 Road and Landing Survey Results

Site Type	Number of Sites	Number of Ditches	Existing Ditch Lengths(ft)
Stream Crossing	99	127	Avg. 470 Min. 50 Max. 3030
Ditch Relief	140	172	Avg. 382 Min. 50 Max. 1840
Ditch Out	68	88	Avg. 464 Min. 70 Max. 2530
Potential Landslide	7	9	Avg. 119 Min 50 Max 350.
Gullied Road Surface	2	2	Avg. 395 Min. 230 Max. 830
Totals	330	398	

Kentuck sub-basin. The average number of drainage feature sites per mile was 7.6. Table K-5 provides a summary of the data collected. Within the Kentuck survey, there were 99 stream crossings, 140 ditch relief culverts, 68 ditch outs, seven potential landslides and two gullied road surface sites. Treatment recommendations are presented later in Discussion and Restoration Opportunities.

Stream Crossing Drainage Evaluation

The 99 stream crossing culverts studied in the road and landing survey were also ranked for their ability to properly drain the area upstream during a 50-year rain event. Of those 99 stream crossings, 42 (42.4%) were evaluated as at risk of failure during a 50-year rain event.

Table K-6 At-risk Stream Crossing Evaluation

50-Yr. Rainfall Fill Failure Risk	Fill Volume Size Class									
	Minimal		Small		Medium		Large		Very Large	
	Sites	Yds^3	Sites	Yds^3	Sites	Yds^3	Sites	Yds^3	Sites	Yds^3
Low	-	-	4	138	-	-	5	1481	-	-
Moderate	1	0	2	84	1	75	3	603	-	-
High	1	0	5	165.5	1	54	3	720	-	-
Very High	1	8	4	98.5	5	401	6	1402	-	-

Failure Risk, Low = 76% - 100%; Moderate = 51% - 75%; High = 26% - 50%; Very High = 0% - 25%
Fill Volumes, Minimal = ≤ 10 $yds.^3$; Small = 10 - 50 $yds.^3$; Medium = 51 - 100 $yds.^3$; Large = 101 - 500 $yds.^3$; and Very Large = > 500 $yds.^3$.

At-risk culverts are ranked in Table K-6 for failure risk based on the percentage of associated drainage area they can properly drain during a 50-year rain event. The number of culverts in each failure risk level (left column) spread across the table depending on the associated fill volume size class. It is important to consider both failure risk and fill volume since it is the fill that becomes a major sediment source upon failure of the crossing.

These 42 stream crossing sites contain a total of 5230 $yards^3$ of fill. Sixteen of these ranked as having very high risk of failure, potentially releasing 1909.5 $yards^3$ of fill. Ten of them ranked as having high risk of failure, potentially releasing 939.5 $yards^3$. Seven ranked as having moderate risk, potentially releasing 762 $yards^3$ of fill, and nine ranked as having low risk, potentially releasing 1619 $yards^3$ of fill as sediment downstream.

Stream Temperatures

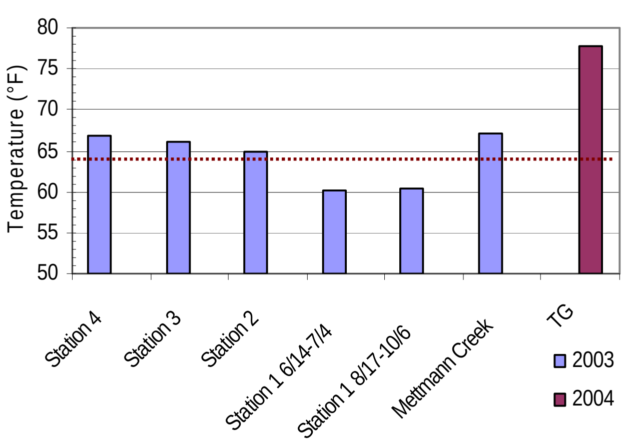
Kentuck creek is located south of Larson creek. The basin is accessed by Kentuck Way and flows into the bay though a tide gate under East Bay Drive. Approximately 2 kilometers upstream, Mettman creek enters Kentuck Slough. In 2003 four temperature loggers were placed on Kentuck creek and one on the Mettman tributary. One temperature logger was located on Mettman creek in 2004, but it disappeared by mid-summer. Two units were located on Kentuck itself in 2004, one upstream in the mid-valley which was stripped off its rebar stake by high flows, and the other was located just upstream of the tide gate.

Table K-7 Temperature Summary and Exceedance of Standards

Site	Year	7-Day averages			Days >64°F	Days >70°F	Hours >64°F	Hours >70°F
		Max.	Min.	Daily D T				
Site 4	2003	67.0	62.4	4.6	59	0	558.5	0.0
Site 3	2003	66.1	59.5	6.6	44	0	273.5	0.0
Site 2	2003	64.8	56.2	8.6	17	0	69.5	0.0
Site 1 (6/14-7/4)	2003	60.1	53.8	6.3	0	0	0.0	0.0
Site 1 (8/17-10/6)	2003	60.4	55.4	5.0	0	0	0.0	0.0
Trib	2003	67.1	57.1	9.9	48	0	243.5	0.0
Tide gate	2004	77.9	69.5	8.4	110	72	2153.0	778.0

Table K-7 shows the 7-day average maximum and minimum temperatures, and the number of days and hours spent exceeding 64 and 70 °F for each temperature logging site in the Kentuck sub-basin. Exceedance of standards is shown in Figure K-13. The data indicate that in 2003, all of the sites except Site 1 exceeded the 64 °F standard, but none exceeded 70 °F. In 2004, the 7-day average maximum temperature at the tide gate did exceed 70 °F, and the 7-day average minimum exceeded 64 °F. This means that during the hottest 7 day period of the season, the average daily minimum temperature remained above 64 °F.

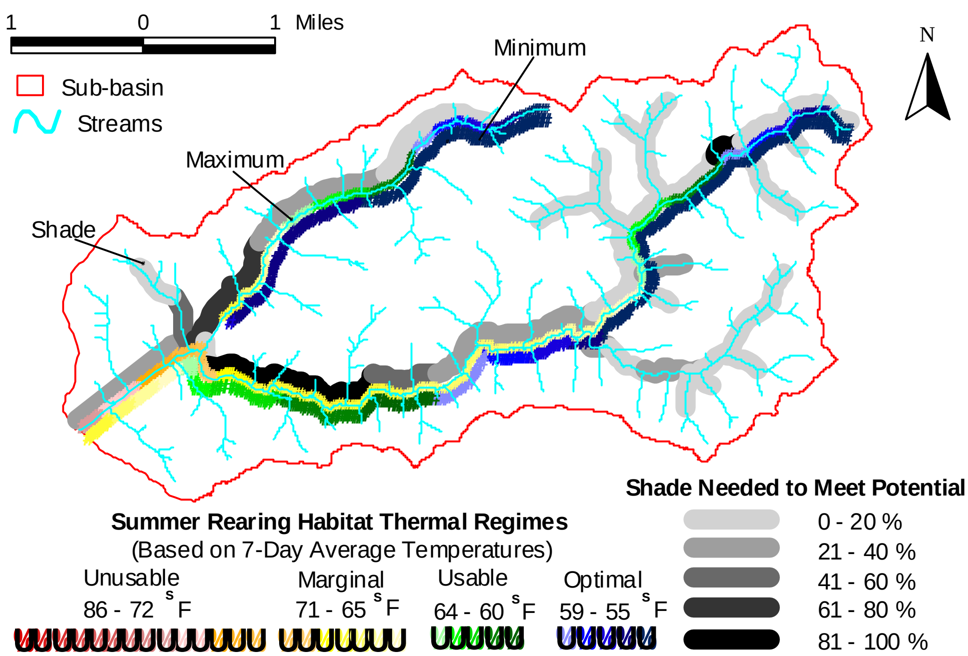
Figure K-13 7-Day Moving Averages of Daily Maximum Temperatures



Red dotted line represents 64 °F std, higher temperatures undesirable

Figure K-14, below, illustrates the temperature trends within the sub-basin using 7-day average maximums, and colors them according to salmonid usability. The map shows that temperature over the length of the stream increases from 55 °F at the headwaters to 78 °F at the tide gate (tide gate data are from 2004). The 2003 overall downstream change in temperature from Site 1 to Site 4, the lowest downstream site was -0.102 °F per 1000 ft, meaning the temperatures actually decreased at the mouth. This can be attributed to the tidal cooling effects due to the tide gate.

Figure K-14 Temperature Trends and Riparian Shade Condition

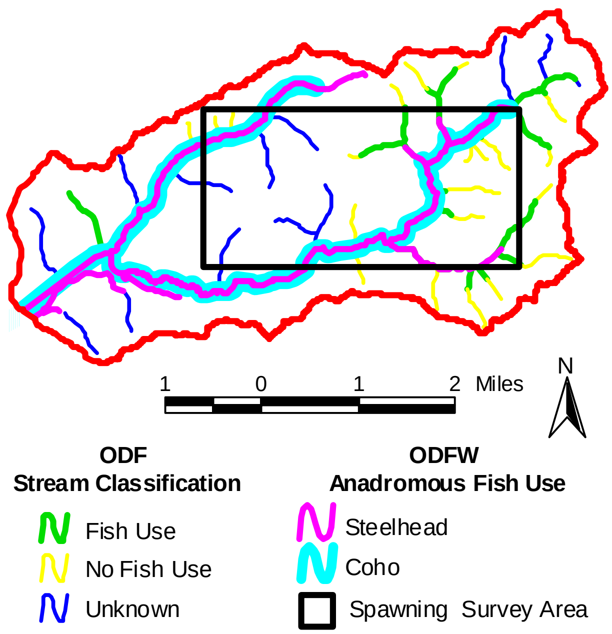


Riparian Shade

The difference between current and potential shade is shown in Figure K-14, above, and is expressed as shade needed to meet potential. The darker riparian areas on the map have the least amount of current shade. Current and potential shade values in the Kentuck sub-basin are 89% and 98% respectively, in the upper-most, steep canyon areas. The upper valley has 78% and 96% respectively, and the lower valley area has only 30% and 86% respectively.

Salmonid Distribution

Figure K-15 Salmonid Distribution



Coho and winter steelhead distribution, according to ODFW, is shown in Figure NS-15. Kentuck Slough is also used by fall chinook. Oregon Department of Forestry (ODF) classifies general fish use streams including cutthroat trout (green line is hidden under the steelhead and coho lines). The spawning survey area is enlarged below in Figure K-16.

Stocking Records

The Kentuck sub-basin has only a few records of juvenile hatchery releases. One of these being earlier, in 1958, when 5,050 coho fry were released directly into Kentuck Slough. In 1981 Mettman Creek was stocked with 12,000 coho, and the following year there was another release of 11,250 Steelhead into Mettman. (See Table K-8).

Table K-8 Stocking Records

Creek	Species	Year	# of Juveniles Released
Kentuck Slough	Coho	1958	5,050
Mettman Cr.	Coho	1981	12,000
Mettman Cr.	Steelhead	1982	11,250
			28,300

Spawning Surveys

Spawning surveys were conducted on Kentuck creek by ODFW in 2001 and by Coos WA in 2002. Coos WA also conducted spawning surveys on Mettman creek in 2003. Two existing ODFW survey reaches on Kentuck were each divided into four smaller reachs. The Mettman Creek Survey was divided into a reach 2-1 on the mainstem, and 3-1 on a tributary to Mettman Creek (see Figure K-16 below).

The lower reaches (1-1 through 1-4) in Kentuck Creek are low gradient with steep constraining terraces. The quantity of gravel is high however, its quality is poor. Gravel is mixed with large cobble and boulders and is imbedded with fines. The upper reaches in Kentuck Creek have a higher gradient, with more riffle and less pool area. Reaches 2-1 and 2-2 have little spawning gravel, but the habitat is highly utilized (See Table K-9). In the upper end of the reach the substrate contains more boulders and large cobbles, and spawning beds are more embedded with fines. The stream is highly constrained, and there is little in the way of pools or complex habitat.

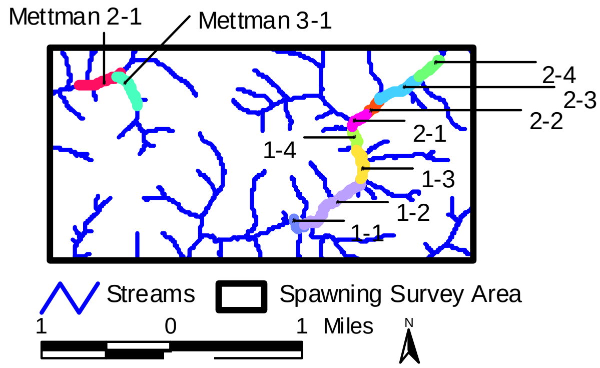


Figure K-16 Spawning Survey Reaches

The 2001 total adult coho AUCs were 131 on the lower reaches 1-1 through 1-4 and 75 on reaches 2-1 through 2-4. These compare to 2002 AUCs of 116 for the lower reaches and 62 on the upper reaches. Figure K-17 below shows the total estimated number of spawners per reach for Kentuck in 2002 and Mettman in 2003.

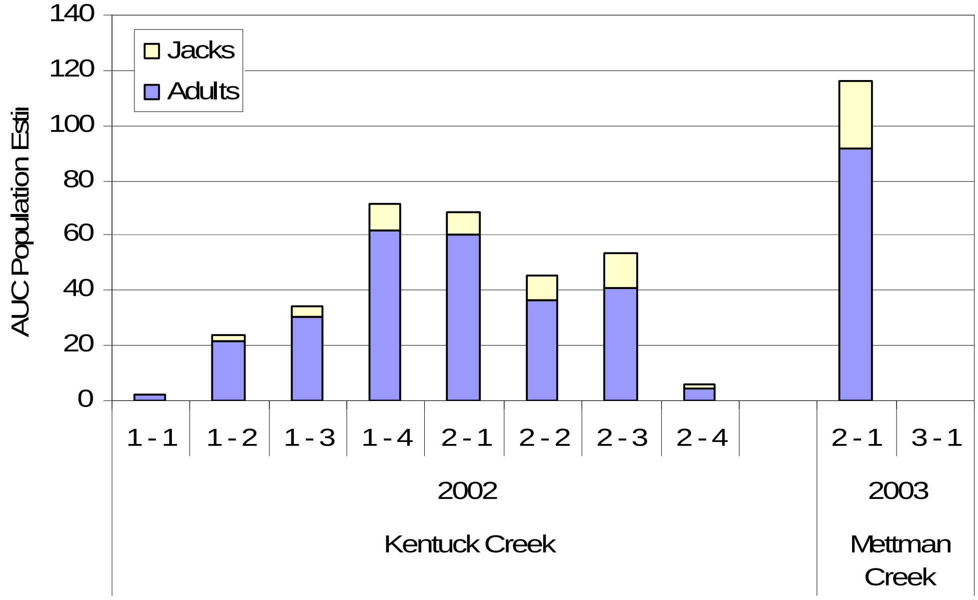
	Reach	YEAR	Total AUC/Km	Gravel (m^2)	Gravel (m^2)/ Female
Kentuck	1 - 1	2002	29	52	52.0
	1 - 2	2002	42	390	35.5
	1 - 3	2002	68	160	10.3
	1 - 4	2002	189	413	13.3
	2 - 1	2002	381	130.5	4.4
	2 - 2	2002	167	217	6.5
	2 - 3	2002	96	194	9.5
	2 - 4	2002	18	14	5.6
Mettman	2 - 1	2003	315	144	3.1
	3 - 1	2003	0	24	0.0

Table K-9 Spawning Density

In terms of coho spawner densities, the lower reaches had a coho AUC/Km of 77, and the upper reaches had a coho AUC/Km of 110. In the lower reaches there is 71.5 m^2 available gravel per female, and 7.9 m^2 gravel per female in the upper reaches. The data indicate that the habitat in the upper reaches is preferentially selected over the lower reach(see Gravel (M^2)/ Female in Table K-9).

Mettman Creek mainstem provides good coho spawning habitat. In reach 2-1, there was a large amount of gravel and many pools. The adult coho AUC/km was 248, with a jack coho AUC/km of 67. Only one steelhead was observed in this reach (see Table K-9).

Figure K-17 Spawning Survey AUC Coho Population Estimate



On the tributary reach 3-1 the spawning habitat is much poorer. It has a higher gradient with less holding pools and low quantity gravel. No fish or redds were observed in this reach during the 2003 spawning season.

Overall, productivity was fair for Mettman creek mainstem (315 AUC/Km). However, with only 3.1 m^2 of gravel per female in reach 2-1, the available habitat was highly utilized.

In order to better understand the fish trends in this sub-basin, more data should be collected on both of these creeks. It would also be useful to do surveys on more of the tributaries in order to identify all available coho habitat.

Coho Habitat Limiting Factors

The limiting factors analysis (based on Reeves et al., 1989), shown in Table K-10 below, indicated that summer rearing habitat is the most limiting factor to coho smolt production at only 23% of the area needed to support potential populations. The Tidal reach was removed from the summer rearing current usable area due to sustained temperatures above 77°F (25°C) that made this reach unfit for salmonids during the hottest months. Winter habitat was limited by lack of refugia from high flows. Current spawning area is more than sufficient for potential populations.

Table K-10 Limiting Factors to Coho Populations

Kentuck Habitat Component	Potential Summer Population	Area/ Survival Factor	Area Needed (M^2)	Current Usable Area (M^2)	Smolt Factor	Smolts Produced
Spawning	83,484	0.006	501	2,063	95.5	197,017
Spring Rearing	83,484	0.3	25,045	11,575	1.7	46,560
Summer Rearing	83,484	0.6	50,091	11,575	0.9	24,650
Winter Rearing	83,484	0.4	33,394	18,254	1.2	21,905

Resource Issues

The Kentuck stream system is affected by the introduction of upland sediment that is then stored in the lower reaches since it can not be flushed out due to the low gradient and the tide gate at the mouth of Kentuck Slough that is does not function properly. With the cessation of tidal flushing, flocculated clays have been allowed to accumulate in the immediate area of the Kentuck lowlands. Between 1939 and 1961, the marsh at the mouth of Kentuck Slough doubled in size, and is still growing. (Beaulieu, 1975) The main sources of sediment include upland logging operations, unstable stream banks, and rock quarry spoils.

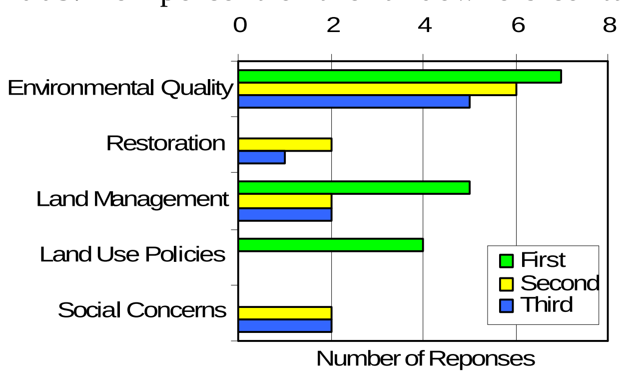
Kentuck has two large rock quarries along the mainstem; during high precipitation fine sediments from these quarries contribute to the stream system. There is also a holding pond downstream from Franson creek that is supposed to help catch and filter fine sediment. During high flow events this pond becomes a secondary channel.

Isolated basalt outcroppings near the headwaters serve as sources for rock quarries operating in the Kentuck sub-basin. Quarry operators deposit unusable rock spoils in the area, and in some cases require NPDES permits for stormwater discharge. The Kentuck area has been known historically for mineral deposits, and in 1906 experienced as small "gold rush" (Youst, 2003).

Landowner Concerns and Desired Future Conditions

Landowners in the Kentuck sub-basin expressed concerns about land management issues in the area at a Coffee Klatch meeting on April 21, 2005. Ten percent of the landowners contacted attended the meeting. As shown in Figure K-18, the majority of concerns were for environmental issues, which included restoration of fish habitat and passage, restoration of wildlife populations and local ecosystems, and water quality and quantity. Land management concerns were, again, based around drainage issues such as culvert and ditch maintenance. Other concerns within this sub-basin included, in the land management category- control of noxious weeds, and problems with beavers. Landowners in the Kentuck area, more than the other sub-basins, also expressed a number of social concerns including the need for educating the public about land use regulation and issues affecting the watershed, such as riparian management and non-native versus native vegetation. Other social concerns included negative effects of trespassing ATV's, and garbage dumping.

Figure K-18 Landowner Concerns



Residents at the Kentuck Coffee Klatch agreed that they would generally want the area to stay the same in the future. However, positive changes would include more robust fish populations, stream restoration, ditches restored to streams, and improved drainage.