Limiting Factors Assessment and Restoration Plan

NF Yachats

A Tributary of the Yachats River

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Introduction

This document provides watershed restoration actions proposed to enhance the Coho Salmon population within the North Fork Yachats basin in Lincoln County, Oregon. The stream is a 5th order contributor to the Yachats River, which enters the Pacific Ocean through a narrow estuary directly south of Yachats, OR.

The goal of the restoration effort has been to identify the dominant processes and habitat characteristics that currently limit the production of Coho salmon smolts in the basin, and to develop a prioritized list of actions ("prescriptions") for removing the limitations in ways that normalize landscape and stream channel function.

Restoration and assessment protocols used in developing the plan are described in "Midcoast Limiting Factors Analysis, A Method for Assessing 6th field subbasins for Restoration", available at www.midcoastwatershedscouncil.org/GIS or by contacting the Midcoast Watersheds Council. Please refer to this document for detailed information on assessment, nomenclature, prioritization rationale and methodology.

Physical setting

The North Fork Yachats River watershed comprises approximately 2,861 hectares in the Oregon Coast Range. Slopes are of moderate relief when compared to other midcoast drainages, valley floor widths are 3 to 40 times the active channel width, and gentle gradients characterize most of the mainstem and its major tributaries, Williamson Creek and Fish Creek. The very upper reaches of these valleys and some of the minor valleys are narrow and steep, with slide-prone headlands. The geologic setting is bedrock overlain with soft alluvial soils. The potential for recruitment of large substrate (boulders) to the aquatic system is minor.

The watershed has been heavily logged in its upper hillslopes especially during the 1950-1975 period , while agriculture and rural residential use has altered lower landscapes. The effects of these uses have been profound changes in the aquatic and riparian systems, the effects of which continue to be evident. Principle among these is heavy siltation, loss of larger mobile substrates, loss of instream wood, and elevated temperatures in the mainstem and its major tributaries.

Debris torrents in the mainstem NF removed much of the mobile substrates and large expanses of exposed bedrock remain, exhibiting a simple channel structure. Adjacent hillslopes have gentle slopes that are not failure-prone, and thus tend not to replenish instream mobile substrates. Logging debris initially contributed to instream wood, but most of this has been removed by natural flow processes, and by human intervention. The riparian canopy is composed primarily of deciduous re-growth. The lack of large coniferous wood has combined with low substrate recruitment to maintain a simplified post-logging aquatic system dominated by shallow bedrock pools. Although gentle and varying valley floor gradients combine with adequate floodplain width to provide multiple opportunities for the storage of small mobile substrates, the channel lacks the large wood and locally constricted valley walls to trap the substrates. This picture of mainstem habitats and resources prevails up to just below the entrance of Glines Creek, where valley morphology changes in ways favorable to the development of functional Coho rearing habitat. The lack of a torrent track history in this zone is apparent from an increase in meander despite low quantities of instream wood.

Williamson Creek, due primarily to it's lack of a torrent track history, has maintained more of its pool structure and substrate. The channel has substantial meander, with undercut banks and lateral scour pools that do not characterize the mainstem. These conditions and woody debris left by logging in the early 1970's encouraged beaver colonization. By 1980, at least 14 beaver ponds existed in this stream, presumably providing extensive summer and winter rearing habitat for juvenile salmonids. These dams have since been abandoned, and the beaver pond habitat is essentially gone.

Fish Creek, as it enters the mainstem and passes through the broad NF Yachats floodplain is terrace confined and so deeply entrenched that it lacks a reasonable potential for the development of quality rearing habitat (summer or winter). Above this section, the channel shows evidences of torrent activity such as exposed bedrock. Further up are sections of both moderate gradients with retained cobble and smaller substrates, and gentler gradients with gravel/sand domination. A pinch point (valley constriction) aids in the retention of sediments. Thus the upper areas of this stream are morphologically better suited to habitat development that favors Coho than are the lower sections.

Depew, Glines, and Early Creeks reside in small, steep canyon like valleys. These properties and low flows mean that they offer little potential for habitat development.

Several other tributaries are smaller yet, providing very low and/or intermittent flows unsuited to significant Coho rearing.

The mainstem is listed as water quality limited for summer temperature. The July 1997 AQHI survey of the mainstem recorded temperatures at the mouths of most tributaries. These records show that water entering the mainstem in the late afternoon throughout its course almost always exceeded 14 degrees C. There appears to be no effective cool water input to the mainstem.

Coho migrating downstream from the North Fork enter the Yachats River approximately eight miles from the ocean. The lower two miles of the Yachats River is a narrow estuary confined by road construction, residential development and hillslopes. The estuary is small (about 16 hectares), lies mostly within the city limits of Yachats, and lacks significant marsh or wetland habitat. However, it does provide shoreline edges and functionally impounded habitats that are utilized by multiple salmonid species for feeding, rearing and transitional habitats prior to migrating to the ocean. This habitat compliments the remainder of the spawning and rearing habitat in the Yachats basin and could be classified as the most critical habitat for native Fall Chinook. The Yachats River mainstem between the estuary and the confluence of the North Fork (a distance of about six miles) is simple, entrenched, historically manipulated and provides minimal low velocity winter rearing potential. It currently functions primarily as spawning, incubation and summer parr habitat.

Current status of Coho

The status of Oregon Coast Coho in the Yachats River basin has been monitored extensively by the Midcoast Watershed Council for the period between 1998 and 2003. Annual Rapid Bio-Assessment snorkel surveys have been conducted to document the abundance and distribution of juvenile Coho (as well as other salmonid species) during summer flow regimes. The surveys have consistently been conducted in early July and all three cohorts have been assayed for recovery and trend analysis.
The North Fork Yachats, and it's tributaries, accounted for 34% of basin wide Coho production (16,995 – expanded) during the 2002 inventory. Habitat in the North Fork sub-basin exhibiting Coho rearing potential totaled 10.3 miles. 52% of the production in the North Fork sub-basin occurred in 5.5 miles of the mainstem, mostly in the lowest 3.7 miles. Average rearing densities here were low (0.3 Coho/sq. meter). The second largest producer (29%) in the North Fork sub-basin was the 2.5 miles of Williamson Creek. Average rearing densities here were higher at 0.6 Coho/sq.meter. Williamson has exhibited incredible population stability throughout the last 6 year period and could be classified as one of the systems primary strongholds for Coho.

Yachats Basin Population comparison between years (1998-2002)

Expanded Snorkel Counts (estimates include only pool dwelling portions of the population, and excludes portions of the population rearing in the estuary, in addition, only the upper limit of Coho and Chinook distribution is included in this expansion, additional production exists for Cut, Sthd, and 0+ above the upper limit of Coho).

Year	*Coho*	*20% visual bias*	*Cut*	*Sthd*	*0+*	*Chin*
2002	49,535	61,919	5,715	2,070	20,760	3,155
2001	36,245	45,306	4,620	7,070	14,560	2,955
2000	15,470	19,338	4,290	5,180	17,270	2,665
1999	9,040	11,300	3,750	1,905	14,440	815
1998	13,680	17,110	2,645	1,815	7,430	305

Resources used in developing the plan

Oregon Department of Fish and Wildlife aquatic habitat surveys conducted in July of 1997 by Kip Wood and Mark Stone.

Summer snorkel surveys of the NF Yachats subbasin conducted between 1998 and 2002. These "Rapid Bio Assay" fish inventories identify the species, age class, density and distribution of salmonids in pools (sampling frequency is every 5th pool).

Coho habitat assessment model developed by the Oregon Department of Fish and Wildlife Research Division. This model evaluates the quantity of spawning gravel, egg deposition rates, and amount of aquatic habitat by season in order to identify which seasonal habitat and Coho life stage limit the production of smolts from a stream section (referred to as the smolt production bottleneck).

Oregon Department of Forestry slide assessment maps, which identify failure-prone headwater slopes that are considered to be potential sources of wood and substrate to the aquatic corridor.

Bio-Surveys Field assessment conducted on June 15, 2003 in conjunction with the development of this restoration plan.

General questions that guide the assessment

The following questions should be addressed within the field assessment and questionnaire portion of this document. Review this guide as an aide for delivering a comprehensive review that deals with key issues.

- How well and in what mode is the current system functioning for Coho production (what part does each of the habitat subdivisions play)
- What temperature problems are apparent?
- Where are temperature refugia located?
- Where are the barriers?
- What are the sediment issues in the system?
- Where are the spawning areas, and how are they integrated with the summer and winter rearing sites?
- What needs to be done to make the Core habitat function for all life phases, and to function at a higher level?
- What work should be done in each area to facilitate a more completely functional whole?
- What is the best upslope work that supports the instream work?
- How are the fish currently using the system?

- What problems are generated by the current habitat configuration (eg, temperature dependant movements that expose juveniles to predation)
- How and when are the greatest losses generated to the population?
- Within the Core habitat, what are the dominant limiting factors?
- Within the 6th field, what are the dominant limiting factors?
- Within the 4th field, what are the dominant limiting factors?
- Does the presence or absence of adequate winter habitat outside the spatial boundaries of the 6th field suggest or preclude the need for expanding the quantity or quality of winter habitat.

Pre-survey Mapping / Location of habitat subdivisions

Core Areas

The Core area describes the current summer distribution of juvenile Coho. The Core extends from RM 0 at the confluence of the NF and SF Yachats to a point 5.5 miles up the NF Yachats mainstem. In addition, the Core extends up Fish (1.4 m), Williamson (2.5 m), Depew (0.4 m) and Glines (0.6 m), all tributaries of the NF Yachats. See habitat distribution Map.

Anchor Habitats (prioritized for greatest potential for restoration)

1) Williamson Lower – 8,875 lineal ft, low terraces with greatest potential for improving connectivity, greatest potential for increasing sinuosity, highest quality and quantity gravels, Current function rated as good
2) Mainstem Lower – 2,600 lineal ft, occasional low terrace, low in system (Williamson contributes to the center of this site), location is significant as potential winter refuge because most of subbasins spawning resources exist above this site. Current function rated as poor
3) Mainstem Upper – 5,000 lineal ft, low terraces are common and currently interactive, site currently exhibits good sinuosity, close to gravel resource, lowest sediment content, immediate response expected in survival and retention with increase of wood complexity
4) Mainstem Middle – 800 lineal ft, potentially interactive low terrace, some substrate accumulation, provides linkage between upper and lower
5) Fish Upper – 3,600 lineal ft, moderate terrace height, historical beaver activity, excellent gravel resource, low potential for increase in sinuosity, relatively narrow valley width (VWI=3)
6) Fish Lower – 800 lineal ft, broader valley width index (VWI=4), minor potential for increase in sinuosity
7) Williamson Upper – 1,200 lineal ft, evidence of historical beaver activity, significantly narrower VWI than observed in lower anchor site, rearing potential reduced by dwindling pool habitat surface areas

Anchor sites 5 – 7 will be excluded from the subsequent restoration prioritization because they represent sites with radically lower cost/benefit ratios due to geomorphological confinement

Secondary Branch Habitats

Depew contains 10 sq.m of spawning gravel, (4 poor, 3 fair, 3 good)
Glines contains 29 sq.m of spawning gravel,(3 poor, 22 fair, 4 good)
Early contains an unknown minor quantity, has not contained Coho in any of the last 5 years
WF Williamson contains 13 sq.m of spawning gravel, (0 poor, 0 fair, 13 good)
Trib A Fish contains 8 sq.m of spawning gravel, (8 poor, 0 fair, 0 good)

Critical Contributing Areas

- Overall Prioritization of critical contributing areas (considers all attributes: spawning, rearing, resource contribution, water quantity, water quality)
  1) Williamson – contains high risk landslide sites (2,4,5,6,9,11,16,17)
  2) Fish – contains high risk landslide sites (7,15)
  3) Glines – contains no high risk sites (direct or indirect)
  4) Depew – contains no high risk sites (direct or indirect)
  5) Early – contains no high risk sites (direct or indirect)

- Tributaries below Core Area / Anchor Sites
  2) Fish enters below all of the identified Core areas (this suggests that production in Fish is highly dependant on winter habitats located in the mainstem Yachats including the lowland area from Hwy 101 to RM 1.9 at Wolf Cr). restoration should consider provision of winter refuge closer to summer rearing from Fish to reduce losses during non volitional downstream migrations. Ranked #2 primarily because of it's gravel resource and fry production potential.

- Tributaries above Core Area / Anchor Sites
  5) Early contributes above any of the identified Anchor sites, its primary provision is flow, resources, and should be prioritized for the protection of water quality (temperature, inorganic compounds). Ranked #5 because of it's diminished rearing surface area, it's location near the end of Coho distribution and it's lack of a production history.

- Tributaries that contribute directly to Anchor Sites
  1) Williamson contributes directly to anchor site priority #2, WF Williamson contributes directly to anchor site priority #1, ranked # 1 because of it's extensive fry production potential and for it's smolt production potential. This tributary represents classic Coho production habitat and suffers only from low wood densities.
  3) Glines contributes directly to anchor site priority #3, ranked #3 because of it's reduced production potential due to diminished aquatic habitat surface area.

Lower Mainstem Area

- Winter habitat Potential
  The lower mainstem of the NF Yachats essentially stretches from the mouth at RM 0 to the confluence of Williamson at RM 2.4 The habitats in this reach exhibit many uniform characteristics, scoured to bedrock, terrace confined, extremely low wood densities, extremely low abundance of spawning substrate (38 sq.m total, 5 poor, 14 fair, 19 good), extremely low sinuosity. The reach has a very low rating for winter function.

- Summer habitat Potential
  The reach exhibits large surface areas of summer pool habitat, however, fish distribution data consistently reveals low summer densities of Coho. The one exception was the summer of 2001 following the low flow winter of 2000/2001 (see fish distribution graphic). During this winter adult access to higher reaches in the system may have been truncated forcing a higher level of mainstem spawning than normal. The progeny from these adults may have experienced lower winter survival rates than normal because of the distinct lack of quality winter habitat downstream.

Lowland Area

- Estuarine Marsh Habitat
  None within the designated 6th field
- Freshwater Marsh Habitat (Winter Potential)
  None within the designated 6th field
- Freshwater Marsh Habitat (Summer Potential)
  Non within the designated 6th field
- Lake Habitat (Winter Potential)
  None within the designated 6th field
- Lake Habitat (Summer Potential)
  Non within the designated 6th field

Location of other resources

- Spawning sites
  See Distribution of spawning gravel graphic
- Landmarks
  See General Location Map
- Road crossings
  See General Location Map
- High risk slopes
  See ODF Risk Assessment graphic
- Land use
  See Arial Photo sequence

Juvenile Coho

- Summer distribution profile
  Broad distribution and consistently fair densities indicate that significant escapement and seeding has been occurring in the NF Yachats and it's tributaries even during low abundance years. This condition exhibited a shift during the low flow winter of 2000 / 2001. Williamson Cr. stood out as exceptionally strong comparatively, with an increase in distribution from the 1.6 miles observed in 2000 to the 2.2 miles of Coho distribution observed in 2001. In addition, a comparison of expanded Coho production for Williamson Cr in the last three years was 1,500 (2000), 3,690 (2001) and 4,920 (2002). It is apparent that with adequate adult escapement Williamson alone could support 3 times the summer production exhibited in 2002.

- Goal: Determine correspondence with Anchor habitat location

  The overlay of multiple years of fish distribution data (figures 1&2) finds excellent agreement with the location of 5 of 7 designated anchor sites. These are the sites that not only exhibit a high potential for the provision of winter habitat through floodplain interaction, but they also appear to consistently retain the highest summer densities. The relationship may be a result of spring fry migrations where nomadic juveniles are congregating in edge oriented habitats that are functionally identical to the winter low velocity sites that anchor sites provide. 2 of the sites (upper Fish and Lower mainstem at the confluence of Williamson) have consistently exhibited only poor to fair abundances of summer rearing Coho parr, with the lower mainstem site the worst.

Field Assessment

Evaluate habitat quality and Coho production

- Riparian vegetation

  Lineal distance / location of deciduous

  The majority of the NF Yachats and it's tributaries riparian canopy is dominated by deciduous species (alder, maple). This adds up to 10.4 miles of riparian within the distribution of Coho. There is substantial nutrient potential in deciduous canopy litter recruited to the mainstem corridor that is lost annually because of the lack of roughness and complexity in the active channel for retention.

  Lineal distance / location of coniferous

  There are no reaches where the riparian is dominated by a conifer component. There are however zones in the upper end of the mainstem (above and below the confluence of Glines) where approximately 2,000 ft of mixed conifer in the riparian exhibit potential for future recruitment. In addition, upper Williamson (adjacent to the confluence of the West Fk) also exhibits approximately 650 ft of mixed conifer in the riparian.

  Lineal distance / location of open canopy

  The mainstem exhibits a total of 3,650 ft of riparian that is partially exposed to direct sunlight (13%). The majority of this exposed riparian exists on adjacent parcels slightly below the confluence of Fish Cr (see photos 6, 15) and on the Wynn property adjacent to historical pasture sites. The Wynn property is in an advanced stage of riparian recovery with several riparian planting efforts reintroducing conifers. The properties below the Fish Cr. junction are continuing to degrade with significant bank erosion and active vegetative degradation.

- Recruitment potential and time frame

  Because the majority of the 6th fields riparian is alder dominated (see photo 14), it's potential for future recruitment of coniferous large woody debris is extremely limited. This condition improves slightly near Glines and in upper Williamson. The system does however exhibit significant riparian shading. To return long term function to the simplified channel it will be important to consider varying methods of increasing the survival and stocking rate of conifers throughout the riparian. The current time frame for significant recruitment to the aquatic corridor is short for the substantial recruitment of stream adjacent alder because of their maturity and very long for conifers because of the low stocking rate.

- Potential for thermal problems

  Where

  The Yachats water Quality Monitoring Project has established monitoring sites in the NF just above it's confluence with the mainstem, just above it's confluence with Williamson and in Williamson, just above it's confluence with the NF. All of these sites have exhibited summer temperatures above the accepted threshold for salmonids (64 deg f) The number of days above this threshold ranged from 4-7 during the 2000 inventory and peak temperatures were 66, 64.9 and 66 deg in the three sites.

  Why

  It appears that there is a lower concern for thermal problems above the confluence of Williamson Cr. with 0 days above the threshold the following year in 2001. The primary concerns are for Williamson and the mainstem below. Both of these segments contain some open canopy with partial exposure to solar radiation. In addition, the mainstem exhibits exposed bedrock within these segments that may act as heat retention sinks.

  There is a historical lake bed in the lower end of Williamson Cr that was the result of a full spanning jam at the old quarry site (see photo 8). The jam (and associated beaver complex) was removed by the 96' flood event. The impounded lake bed remains in an early stage of vegetative succession and has not developed a riparian canopy for approximately 500 ft. This portion of the active channel is probably where most of the solar impacts in Williamson occur. The trajectory for Williamson's thermal profile is positive with limited upslope impacts planned for USFS ownerships and natural encroachment occurring in the historic homestead meadows.

  There continues to be some level of mainstem exposure to solar radiation through the Wynn property. Again the trajectory for this site is positive with well established riparian plantings providing additional shade in the future (10-15 years). The cumulative impacts of elevated temperatures upstream to those habitats existing below the confluence of Fish Cr. may be significant and suggest that every effort be expended to reduce aquatic exposure of the mainstem below the confluence of Williamson.

- Channel form and floodplain interaction
  Lineal distance / location of functional anchor habitat
  There were 7 distinct anchor sites identified within the NF Yachats 6th field. Combined they add up to 4.3 miles (41%) of the lineal distance available to Coho in the subbasin. This high abundance of available anchor habitat is weighted heavily by the 1.9 miles that exists in Williamson Cr (76% of it's total lineal distance). None of these sites has been classified as fully functional. Rated from best to worst function we have:
  1) Upper mainstem (surrounding confluence of Glines)
  2) Lower Williamson
  3) Middle mainstem
  4) Lower Fish
  5) Upper fish
  6) Upper Williamson
  7) Lower mainstem

- Quality, quantity and location of spawning gravel
  Collected as a function of probable redd sites
  791 sq.m. of spawning gravel was documented for the entire NF Yachats subbasin. 60 % of that gravel was observed in tributaries of the NF, of that, 66 % was contained in Williamson Cr. Williamson contains 310 sq.m. of spawning gravel or 39 % of the 6th field total. Only 534 sq.m. of gravel was classified as good quality subbasin wide. Williamson exhibited 55 % of the entire subbasins good quality gravel. The lowest quality spawning substrates were observed in the lower mainstem of the NF.

- Character and distribution of Summer Cover (lacks quantitative evaluation and relies on professional judgment)
  Large surface areas of potential summer habitat exist in the all of the mainstem NF Yachats and all of Williamson to it's confluence with the West Fk. None of these surface areas have even approached fully seeded densities in any of the last 5 years (highest avg. = 0.6 fish/sq.m). Pools in these areas are large but are devoid of complex cover components. Williamson's wood abundance is higher than the mainstem but far below optimum levels. Other tributaries exhibit lower abundances of summer pool surface area with the best in Fish, then Glines, then Depew.

- Character and distribution of Winter Cover (lacks quantitative evaluation and relies on professional judgment)
  The mainstem NF Yachats is a classic case of channel dysfunction. It would be difficult to find a better example of degraded winter function (see photo sequence for examples of entrenchment, scour and low sinuosity). It is clear that very limited habitat potential currently exists for juveniles in the mainstem except for the upper anchor site above and below Glines that has a good winter function rating. The mainstem is frequently scoured to bedrock and retains a very low abundance of migratory substrate. Almost no large wood is retained in the channel and deep terrace confinement truncates any potential for off channel or significant edge oriented winter habitat. The fundamental issue in this interrelated chain of events is the lack of wood complexity and channel roughness.
  The character and distribution of winter habitat in Williamson is radically different than observed in the mainstem. Sinuosity is moderate, wood complexity is poor increasing to moderate in the upper 1/3 of the anchor site, the retention of mobile substrates is good (primarily a function of low gradient and sinuosity). The current rating for winter function is fair to good (improving with distance upstream because of increasing wood densities above the historical homestead locations in the lower end).
  Winter habitats in Fish, Glines and Depew are poor because of increased gradients and diminished habitat surface areas. The provision of winter refuge in these tributaries is highly dependant on the presence or absence of beaver.

Locate migration barriers

- Location of barriers
  There are several minor potential barriers to migration in the system:
  1) The 4ft corrugated culvert on Trib A of Fish Cr. This pipe was installed on a 7% incline and had an 18" perch on the outlet side
  2) Two crossings on the abandoned road that parallels Williamson. These are no name, 2nd order tributaries that exhibit small numbers of juvenile Coho within the extent of the valley floor of mainstem Williamson. Actual pipes cannot be observed, but there is substantial fill at each site

- Species and age class affected
  1) The pipe on Trib A of Fish probably does not terminate adult Coho or Cutthroat destined for the upper basin. The pipe is a definitive barrier to upstream temperature dependant juvenile migrations. However, upstream juvenile migrations are probably not occurring at this site because temperatures in mainstem Fish near the confluence of Trib A are well below thresholds throughout the summer.
  2) The two crossings are more likely to impact adult Cutthroat migrations than they are to be significant issues for large salmonids.

Identify potential sites for restoration work

- **Location**
  1) Williamson lower anchor site
  2) Mainstem lower anchor site
  3) Mainstem middle anchor site
  4) Mainstem upper anchor site
  5) Williamson road crossings and associated decommissioning
  6) Williamson riparian treatment to increase conifer stocking
  7) Mainstem riparian treatment to increase conifer stocking
  8) Mainstem livestock exclusion
  9) Fish Cr. culvert replacement
  10) Glines and Depew road fill removal
  11) Direct delivery high risk landslide priority areas 1-3
  12) Mainstem section of extremely poor function and complexity just above second bridge crossing

- **Problem**
  1) Natural wood recruitment has been restricted to short lived deciduous components for decades due to historical homestead activities that removed most riparian conifers and retarded riparian development with grazing. The majority of the agricultural impacts were on the right bank and harvest reduced potential recruits from the left bank. Alder continues to be recruited in this segment and are retained at a higher rate than observed for the mainstem because of a narrow active winter channel width of 20 ft.
  2) Natural wood recruitment has been reduced to almost zero for decades due to historical agricultural pursuits that removed all riparian conifers and retarded riparian development with grazing except for a thin (15ft) inner riparian band containing only alder. Alder occasionally recruit in this segment but are rarely retained through the first winter because of a broad active winter channel width (40 ft).
  3) Natural wood recruitment has been reduced by a combination of grazing and upslope harvest activity. Alder occasionally recruit in this segment but are rarely retained through the first winter because of a broad active winter channel width (30 ft).
  4) Natural wood recruitment in this anchor site exhibits the highest level of function observed. This has maintained some sinuosity and good floodplain interaction. Wood sources are mixed conifer / deciduous. Wood densities are still below target levels.
  5) Two road crossings and their associated fills definitively retard the long term function of the critical contributing areas upslope to deliver wood and substrate resources to the mainstem of Williamson. In addition, some smaller first order crossings have plugged and are running parallel to the road bed and delivering sediment to the active channel.
  6) Low conifer densities result in very low potential for restoring optimum function to the aquatic corridor in the long term.
  7) Low conifer densities result in very low potential for restoring optimum function to the aquatic corridor in the long term.
  8) Significant erosion and a lack of riparian canopy has resulted from vegetative degradation associated with grazing on a single 800 ft stream adjacent parcel below the confluence of Fish Cr.
  9) The culvert, although not a barrier to adults and not in a location that is significant for the upstream movement of juveniles, exhibits some potential for retarding resource delivery to the mainstem.
  10) The road fills at both of these sites and the associated log stringer bridges do not currently impact the movements of adult or juveniles salmonids. They do however, present some potential to terminate resource delivery destined for the mainstem in a natural dam break flood event.
  11) 17 separate high risk sites have been identified as potential landslide zones. The top 3 priorities on this list would recruit to anchor habitat sites on Williamson and the mainstem just below the confluence of Williamson. Protection of these highest priority sites has been established as an important long term component of recovering ecosystem function.
  12) This site is an extended reach of low sinuosity, no wood retention, no pool development, deep entrenchment and the lowest site in the mainstem that could be treated to develop linkage

- **Method**
  1) resource movement
  2) Remove abandoned bridge stringers and road fill (excavator or dynamite)
  3) Protect high risk sites from future resource extraction
  4) Propose significant instream large wood placement, edge oriented, no full span (excavator or helicopter)
  5) Propose significant instream large wood placement (Helicopter)
  6) Propose significant instream large wood placement (Helicopter)
  7) Propose significant instream large wood placement (Helicopter, link this site to both upper and lower anchors with log structures to dissipate hydraulic potential)
  8) Propose significant instream large wood placement (Helicopter)
  9) Decommission road bed at 2nd order stream crossings (excavator or dynamite)
  10) Develop planting prescription that sites conifer clusters in regions of dry and high, maintain meadow environments for elk and maintain canopy exposure to sustain the high level of aquatic primary productivity.
  11) Develop planting prescriptions that blanket both banks, look for wide setbacks and complete canopy closure. Explore riparian conifer release and alder girdle and plant.
  12) Prescribe livestock exclusion fencing and planting on left bank owner below the confluence of Fish Cr.

  Replace Fish Cr. Culvert with appropriate size to increase potential for unimpeded fish and resource migration

- **Expected problems**
  1) Very low risk, no problems anticipated
  2) Large active channel widths at mean winter flow regimes. Wood placement becomes more critical and should target well anchored edge oriented complexes. Suggest placement consultations
  3) Low risk with large wood that meets guidelines
  4) Very low risk because of diminishing active channel widths and increased sinuosity and function in this upper anchor site.
  5) Excavator exhibits significant risk of recovery setback. To access these sites with machinery involves opening road beds that have recovered significantly with trees and shrubs. This type of entry would probably create more damage than it's proposed entry would restore. Dynamite would limit the impacts to two small sites and protect the remainder of the riparian from a vegetative setback caused by machinery.
  6) Plantings in this area could be significantly impacted by elk damage. Elk use is high. This supports the cluster prescription with protection (fencing)
  7) Very low risk, no problems anticipated
  8) Very low risk, no problems anticipated. Consider developing long term maintenance agreement
  9) Culvert replacement may exhibit low cost benefit ratio. Habitats are probably still accessible for salmonids adults.
  10) Accessing sites with excavator could result in setbacks to recovery that outweigh the benefits of fill removal. Dynamite would have short term site specific impacts (sediment, sound) but exhibits a much more positive cost / benefit ratio. Recommend electrofish juvenile removal and block netting prior to event.
  11) Protection is a low risk solution and all sites are contained on USFS ownership that simplify the identification, tracking and future planning.
  12) Deep entrenchment complicates wood placement. Stable anchors trees are hard to reach. Thick canopy reduces placement precision of helicopter which would be critical for this site. Canopy damage would be significant with helicopter, may be private owner concerns that don't exist on National Forest ownership. Excavator would limit the size of the woody material to potentially substandard lengths.

- **Expected results**
  1) Large increase in floodplain interaction resulting in increased winter habitats for juvenile salmonids and complex woody habitats for providing cover, low velocity, gravel retention and sorting.
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  3) Large increase in floodplain interaction resulting in increased winter habitats for juvenile salmonids and complex woody habitats for providing cover, low velocity, gravel retention and sorting.
  4) Large increase in floodplain interaction resulting in increased winter habitats for juvenile salmonids and complex woody habitats for providing cover, low velocity, gravel retention and sorting.
  5) 2nd order corridors are returned to the connected labyrinth of functioning tributaries in the system. Expect greater fish use and future unimpeded delivery of wood and gravel resources.
  6) Restore long term riparian function to the reach that provides for the natural recruitment of coniferous wood when the short term log placements have decayed.
  7) Restore long term riparian function to the reach that provides for the natural recruitment of coniferous wood when the short term log placements have decayed. In addition, the provision of shade for temperature mitigation becomes a significant desired result.
  8) Recover riparian vegetative stability that reduces erosion and provides long term shade and recruitment potential
  9) Removes impediments to the natural migration of wood and substrate resources in a storm driven debris torrent event
  10) Removes impediments to the natural migration of wood and substrate resources in a storm driven debris torrent event
  11) Retains wood resources on high risk slopes that have the potential to contribute these materials to the fish bearing Core area.
  12) Provides an increase in channel complexity, summer and winter habitat abundance, forms pool habitat and provides a low level of habitat linkage between the upper and lower NF basin that may be beneficial to both nomadic and density dependant migrations of juveniles.

Document potential restoration sites with photos

1) see photo #7 & #8
2) see photo #14
3) see photo #17
4) no photo
5) no photo
6) see photo #8
7) see photo #15
8) see photo #6
9) no photo
10) see photo #16
11) no photo
12) see photo #14

List and rank the factors currently limiting Coho production

- Include professional judgment of potential lowland habitats existing outside the boundaries of the 6th field analysis for the provision of winter habitat

A limiting factor analysis was completed utilizing Version 5.0 of the ODFW Carrying Capacity Model provided by Tom Nickelson of the ODFW Research Division. This analysis relies heavily on the summer data collected utilizing ODFW's Aquatic Habitat Inventory protocol and on inventories conducted by Bio-Surveys to assess the quantity and quality of available spawning gravel in the system. The spawning gravel surveys only measured gravels that were located in areas known to be utilized by Coho for redd development and gravels that were the appropriate size for adult Coho. Three categories of gravel quality were utilized that visually assessed the abundance of sediment and fines in the gravel. Gravel quantities in the Good category were multiplied by a coefficient of 1.0, for gravels in the Fair category we utilized a coefficient of 0.5 and for gravels in the Poor category we utilized a coefficient of 0.25. This step in the analysis adjusted the actual quantities of gravel utilized in the carrying capacity model. Consultation in the literature suggests that these coefficients are optimistic and may still tend to overestimate egg/fry survival rates in the degraded systems that dominate the Oregon Coast Range watersheds.

The results of this modeling effort are presented in the appendix. Note that two sets of life stage to smolt survival rates are presented in Table B1 and B2. These represent the vastly different ranges in life history budgeting that exist in the literature. One is the ODFW Research model which assumes a 70% egg/fry survival rate and the other is the Alsea Watershed Study model that utilizes a 42.5% grand mean for egg/fry survival.

The output tables from each of these models are presented in Tables F1 and F2. For the NF Yachats system you will note that potential smolt production estimates differ between each of the models, this is to be expected given the wide range of variation between life stage survival rates that exists between the two budgets. They also disagree in their conclusion of which life history stage is the dominant factor currently limiting Coho production. The ODFW model suggests that even with the inclusion of the lowland winter habitat that exists in the mainstem Yachats below the confluence of the North Fork and the winter habitat potential that could be utilized by Coho in the 1.9 miles of estuary, that the abundance of winter habitat is still the limiting habitat issue. The Alsea Watershed Study model only suggests that winter is a limiting habitat issue if these lowland habitats are not factored into the analysis of the 6th field (which does not encompass these lowlands).

The field assessments in this Limiting Factors analysis were designed to offer supplemental professional judgments to the mathematical representation portrayed in the modeling effort. In the case of the NF Yachats it is starkly evident that in its current condition, deep terrace confinement, substrates dominated by bedrock, wood densities consistently below 10 pieces/mile and no active or functional beaver communities, that the 6th field is indeed limited by the absence of high quality winter habitat.

This assessment suggests that given adequate adult escapement to utilize the spawning gravels currently available within the range of Coho distribution, that the quality of winter pool habitats and the abundance of off channel winter habitats would be the primary issues limiting Coho production.

Rank the list of restoration efforts

- From the methods listed above, list and rank the restoration work that most effectively stabilizes the population at a higher base level and prioritizes the recovery of ecosystem function.

- Short Term (prioritized)

Item #
1
2
3
4
12

- Long Term (prioritized)

Item #
7
6
8
10
5
11
9

- Combined prioritization

Item #
1
2
3
4
12
7
6
8
10
5
11
9

Explain how the modifications will interact and increase production

- Primarily relevant to modifications that effect passage. An estimate of increased production should be developed for all habitats where access to salmonids has been denied or compromised. This will facilitate an evaluation of cost /benefit and assist in the development of a prioritized culvert replacement program

  There are two restoration opportunities that deal with passage and watershed connectivity (#5, 9). Both of the identified sites are rated low in the prioritized list because of the lack of significant habitat potential that exist for salmonids above the passage impediment. The more significant issue at each of these sites is the translocation of wood and substrate resources from upslope areas to the fish bearing Core area of the watershed. Improving this connectivity has a direct long term positive influence on the systems ability to provide complex habitat that is known to increase productivity.

- Modifications to Critical contributing habitats, riparian corridors and instream reaches will be difficult to quantify and will rely on existing evaluations of restoration activities

Assessment questionnaire

Morphology

- Describe the valley form, constraint, and floodplain.

  Three primary reaches exist:
  1) The mainstem of NF Yachats from the mouth to a left tributary just below the confluence of Glines (Rm 0-4.0) Broad valley, limited hillslope confinement, almost continuous terrace confinement with limited floodplain interaction during winter flow regimes.
  2) The mainstem from this left tributary to the end of the Core area above the confluence of Early Cr. (Rm 4.0-5.5) Moderate valley widths, oscillating hillslope confinement, loses terrace confinement and exhibits much higher current and future potential for floodplain interaction.
  3) Williamson Cr. (Rm 0-2.5) Moderate valley widths, hillslope confinement very unusual, moderate terrace confinement but winter flows at the mean and above exhibit excellent current and future potential for connectivity and interaction. Natural channel sinuosity is indicator of retained channel function.

- Assess the potential for the development of meander, braiding, side channel, alcove, backwater channel forms.
  1) Extremely limited potential for the development of sinuosity, meander, braiding or side channels. Good potential for developing natural alcoves and backwater habitats.
  2) High potential for the development of complex channel forms that include side channels, braiding and increases in sinuosity. Extremely high potential for the development of complex backwater and alcove habitats.
  3) High potential for the development of complex channel forms that include side channels, braiding and increases in sinuosity. Extremely high potential for the development of complex backwater and alcove habitats.

- What is the current status of development of these channel forms? Include a description of entrenchment as the alternate state.
  1) No complex habitat will ever develop in this section without an injection of very large coniferous wood to provide the foundation for substrate retention. This section is currently as entrenched as it can get (scoured to bedrock). It currently represents the worst case scenario for function.
  2) Complex channel forms currently exist in this area as a result of stream adjacent recruitment and a lack of recent torrent history. The anchor habitat that exists in this zone is a very important component for salmonid stability. Entrenchment does not currently exist.

3) Complex channel forms are uncommon in this section. This is primarily a result of limited wood recruitment. The potential is extremely high for developing this channel complexity with a combination of short and long term prescriptions. Entrenchment is occurring and the trajectory is probably for a slow decrease in entrenchment as a result of the aging riparian alder canopy. Entrenchment probably peaked during the homestead era.

- What proportion of the system's Coho production appears to be provided by this zone? Describe in terms of spawning, incubation, summer rearing, and winter rearing ability.
  1) This zone currently provides the lowest incubation, summer and winter habitat in all of the NF Yachats. It is classified as exhibiting extremely poor function.
  2) This zone currently provides a disproportionately high abundance of spawning and incubation habitat as well as high quality summer and winter habitat. Because the habitats in this zone are diminishing in size and represent minor surface areas compared to the remainder of the basin, they cannot function without the assistance of habitats downstream for the provision of supplemental summer and winter refuge.
  3) Williamson functions as the primary anchor habitat for the entire NF Yachats. It has the highest abundance of high quality gravels and the highest abundance of potential winter habitat. It's potential for summer habitat is good but not adequate for rearing the full potential that exists in the abundant gravels.

- List and rank the factors currently limiting the development of channel complexity.
  1) Zone 1: Low densities of instream LWD, low densities of riparian conifers for providing long term recruitment potential
  2) Zone 2: Low densities of instream LWD
  3) Zone 3: Low densities of instream LWD, low densities of riparian conifers for providing long term recruitment potential

- Are these factors addressable through restoration work?
  1) Zone 1: Increased wood densities would begin to restore natural channel process, planting and conifer release would guarantee a future source for maintaining function
  2) Zone 2: Increased wood density would strengthen currently functional habitat and provide higher life stage survival rates for salmonids.
  3) Zone 3: Increased wood densities would begin to restore natural channel process, planting and conifer release would guarantee a future source for maintaining function

Riparian corridor

- Describe the riparian corridor and its potential to provide wood. How long before recruitment?
  1) Zone 1: The majority of the riparian contains a mature deciduous canopy that does not contribute significantly because of low sinuosity levels that do not encourage undercutting. The components most likely to contribute during storm driven events don't meet length guidelines and are subsequently washed away.
  2) Zone 2: The presence of a mixed deciduous / coniferous canopy has aided this reach in it's delivery to the aquatic corridor. Instream wood densities are higher, channel complexity is greater as a result. Future potential for contribution is fair.
  3) Zone 3: The majority of the riparian is dominated by either alder or other early success ional species. Channel sinuosities are higher and undercutting and channel meander are recruiting low levels of alder that have a good potential for being retained in the active winter channel. This rate of recruitment is probably fairly static and lacks the coniferous component that will be long lived in the channel. Recommend boosting abundance of riparian conifer through planting and release.

- To what degree would land use and ownership allow restoration work?
  1) This zone is primarily small private ownership and cooperation from individual landowners is a prerequisite for developing restoration alternatives
  2) This zone is almost exclusively within the Siuslaw National Forest. BPA owns a right of way that bisects the proposed restoration corridor
  3) This zone has multiple owners, Boise Cascade, USFS, Katrina Wynn, Lincoln Co. Public Works

- What is the potential to increase channel complexity in the long term through natural recruitment processes, with and without restoration?
  1) Without restoration, none. With restoration good.
  2) Without restoration, good. With restoration excellent.
  3) Without restoration, fair. With restoration excellent.

Core Area

Anchor sites

- Do anchor site(s) exist?
  Yes

- If so, describe the location, dimensions, gradients, and salient habitat features.
  1) Williamson Lower – 8,875 lineal ft, low terraces with greatest potential for improving connectivity, greatest potential for increasing sinuosity, highest quality and quantity gravels, Current function rated as good
  2) Mainstem Lower – 2,600 lineal ft, occasional low terrace, low in system (Williamson contributes to the center of this site), location is significant as potential winter refuge because most of subbasins spawning resources exist above this site. Current function rated as poor
  3) Mainstem Upper – 5,000 lineal ft, low terraces are common and currently interactive, site currently exhibits good sinuosity, close to gravel resource, lowest sediment content, immediate response expected in survival and retention with increase of wood complexity
  4) Mainstem Middle – 800 lineal ft, potentially interactive low terrace, some substrate accumulation, provides linkage between upper and lower
  5) Fish Upper – 3,600 lineal ft, moderate terrace height, historical beaver activity, excellent gravel resource, low potential for increase in sinuosity, relatively narrow valley width (VWI=3)
  6) Fish Lower – 800 lineal ft, broader valley width index (VWI=4), minor potential for increase in sinuosity
  7) Williamson Upper – 1,200 lineal ft, evidence of historical beaver activity, significantly narrower VWI than observed in lower anchor site, rearing potential reduced by dwindling pool habitat surface areas

- Describe how the site contributes to spawning, incubation, summer rearing and winter rearing.
  1) 280 sq.m. of spawning gravel, moderate sediment levels, avg. egg/fry survival rates expected, good summer habitats, the best winter habitat in subbasin and the best potential for improving winter habitat
  2) 87 sq.m. of spawning gravel, poorly sorted with high sediment contribution, below avg. egg/fry survival rates expected, good summer habitat potential, very low current potential for providing winter habitat (non existent).
  3) 115 sq.m. of spawning gravel, well sorted with low sediment levels, probably above avg. egg/fry survival rates, excellent summer and winter habitat potential.
  4) 68 sq.m. of spawning gravel, poorly sorted with high sediment loading, below avg. egg/fry survival rates, good summer habitat potential, very low potential for providing winter habitat.
  5) 80 sq.m. of spawning gravel, some sorting and avg. sediment loading, expect avg.egg/fry survival rates, fair summer habitat (though not abundant) and poor winter habitat potential.
  6) 7 sq.m. of spawning gravel, limited sorting with avg. sediment loading, expect avg.egg/fry survival rates, fair summer habitat and poor winter habitat potential.
  7) 24 sq.m. of spawning gravel, well sorted with avg. sediment loading, expect avg. egg/fry survival rates, good summer potential and good winter potential with the presence of beaver driving the abundance of impounded pool surface area.

- What proportion of the system's summer Coho production appears to be provided by this site?
  1) High
  2) Low
  3) High
  4) Moderate
  5) Moderate
  6) Low
  7) Moderate

- Rank the site in terms of each of these functions (abundance of pool surface area, spawning gravel, % of summer production).
  1
  3
  4
  5
  2
  7
  6
- Which function(s) limits the site's production potential, and what causes this limitation?
  1) Low winter habitat complexity, low LWD density
  2) Limited floodplain interaction, low LWD density
  3) Limited pool complexity (summer/winter), below objectives for LWD
  4) Limited pool complexity (summer/winter), limited floodplain interaction, low LWD density
  5) Limited floodplain interaction, low LWD density, reduction in beaver community
  6) Limited floodplain interaction, low LWD density, reduction in beaver community
  7) Limited floodplain interaction, basin wide reduction in beaver community

- List and rank the restoration work at this site that would most effectively increase survival within the Anchor site and stabilize the core population at a higher base level.
  1) Provide LWD, riparian conifer planting
  2) Provide LWD, riparian conifer planting
  3) Provide LWD

4) Provide LWD
5) Reintroduce beaver
6) Reintroduce beaver
7) Reintroduce beaver

Secondary Branch sites

- Do secondary branch site(s) exist?
  Yes
- If so, describe the location, dimensions, gradients, and salient habitat features.
  1) Depew contains 10 sq.m of spawning gravel, (4 poor, 3 fair, 3 good)
  2) Glines contains 29 sq.m of spawning gravel,(3 poor, 22 fair, 4 good)
  3) Early contains an unknown minor quantity, has not contained Coho in any of the last 5 years
  4) WF Williamson contains 13 sq.m of spawning gravel, (0 poor, 0 fair, 13 good)
  5) Trib A Fish contains 8 sq.m of spawning gravel, (8 poor, 0 fair, 0 good)

- Describe how the site contributes to spawning, incubation, summer and winter rearing
  1) Accessible to spawners, has not exhibited successful Coho spawning in any of the last 5 years, moderate abundance of summer habitat, can exhibit significant winter habitat in lower ¼ mile if beaver community is present.
  2) Accessible to spawners, always exhibits successful Coho spawning and produces approximately 600 summer parr annually. Summer habitat is limited, winter habitat is nearly non existent.
  3) Generally accessible to spawners (beaver impoundments have occasionally terminated access), Has not exhibited any Coho juvenile rearing in any of the last 5 years. Contains some summer habitat and no winter habitat.
  4) Very accessible to spawners, generally contains Coho juveniles in first ¼ mile, minor summer habitat, winter habitat non existent.
  5) Contains Coho juveniles and is accessible to adult spawners. Limited summer habitat and winter habitat non existent.

- What proportion of the system's summer Coho production appears to be provided by this site(s)?
  During the 2002 RBA inventories this group of secondary branch sites produced approximately 9% (1,595) of the total summer parr estimate for the NF Yachats. Greater than ½ this production was observed in Glines Cr.

- Rank the site in terms of each of these functions (abundance of pool surface area, spawning gravel, % of summer production).
  2
  4
  1
  5
  3
- Which function(s) limits the site's production potential, and what causes this limitation?
  1) Depew is limited by gravel abundance, high quality substrates are not recruited from the parent geology
  2) Glines is limited by a distinct lack of winter refuge, a result of natural morphological conditions that establish it's steeper gradients
  3) Early is probably limited by minor habitat surface areas, a result of natural morphological conditions
  4) WF Williamson is probably limited by a lack of winter refuge resulting from channel morphologies that establish steeper gradients.
  5) Trib A of Fish Cr. is probably limited by its diminished habitat size and a lack of high quality spawning substrate.

- List and rank the restoration work at this site that would most effectively increase survival and stabilize the Core population.
  1) Maintain water quality for mainstem (temperature) mitigation, remove road fill at mouth to insure storm driven torrent events in the tributary can reach the mainstem
  2) Maintain water quality for mainstem (temperature) mitigation, remove road fill at mouth to insure storm driven torrent events in the tributary can reach the mainstem
  3) Maintain water quality (temperature)
  4) Maintain water quality (temperature)
  5) Maintain water quality (temperature and herbicides), improve passage at road crossing for fisheries and resource migration

Critical contributing areas

- Do Critical contributing areas exist?
  Yes
- If so, describe the location, dimensions, gradients, and salient habitat feature
  1) Williamson – contains high risk landslide sites (2,4,5,6,9,11,16,17)
  2) Fish – contains high risk landslide sites (7,15)

3) The mainstem below the confluence of Williamson on the left bank contains high risk landslide site (3)
4) A left no name 2nd order tributary of the mainstem below the confluence of Williamson contains high risk landslide site

- How is each CCA related spatially to the Core and its Anchor sites?
  1) All the Williamson sites contribute to the highest priority Anchor site in the subbasin except for (16,17)
  2) The Fish Cr sites contribute to the 5th of 7 prioritized anchor sites in the subbasin and are less desirable for consideration
  3) The mainstem stream adjacent slopes ranked as #3 contribute just below the lowest mainstem anchor and therefore are highly desirable for providing future resources
  4) The highest priority slope for failure risk is the tributary headwalls in the no name trib just below the confluence of Williamson. This site delivers directly to the bottom end of the lowest mainstem anchor and would be highly beneficial for the provision of habitat complexity and spawning.

Lowlands outside the 6th field subbasin

- Do lowland habitats exist outside the 6th field that could function as potential winter habitat for Coho?
  There is the potential that juveniles dropping out of the identified anchor sites in the NF Yachats subbasin either as density dependant migrants or as a nomadic life history strategy might find winter refuge and adequate winter habitats in the low gradient brackish water estuary that exists from the confluence with the Pacific Ocean to RM 2.0. These habitats are approximately 8.6 miles from the bottom of the lowest mainstem anchor site in the NF and the distance represents significant risks to migratory juveniles from predation and loss of condition. We have chosen to run the limiting factors analysis with and without the potential habitats that exist in this zone to provide a range of possibilities and to test the strength of the limiting habitat. We have for these analyses made the assumption that the mainstem of the Yachats between the Head of Tide and the confluence of the NF Yachats provides an insignificant amount of utilizable winter habitat because of its homogeneous channel condition of terrace confinement.

- If so, describe the location, dimensions, gradients, and salient habitat features.
  The estuary habitat that exists above the Pacific is 1.9 miles in length and transitions completely to riverine habitats at the confluence of Wolf Cr. A conservative estimate of the abundance of winter habitat in this zone doubles the lineal distance of the estuary to account for the most likely edge oriented habitat on both sides and then multiplies that value by 0.5 meters wide. This results in a minimum winter surface area estimate of 3,058 sq.meters.

- What is the spatial relationship of the lowland habitat to spawning and incubation sites in the watershed?
  Most spawning and incubation occurs from 8.6 miles to 11.6 miles above this lowland habitat

- What are the problems associated with the abundance, location or condition of these lowlands?
  This 1.9 mile corridor is low gradient, contains significant levels of legacy wood buried and exposed in fine substrates, is partially riverine and partially salt water influenced. The zone of floodplain interaction has been significantly compromised by urban expansion and water quality may be influenced by the city water treatment facility that discharges directly into the estuary.

- What are the obvious lowland issues to consider for future planning activities within the watershed.
  Because the Yachats basin exhibits poor winter habitat profiles because of it's harvest and agricultural legacy, the lowland habitats that remain in the estuary are raised to a level of significance in the system that can not be overstated. These may be the most critical habitats for protection and enhancement within the basin because they form a fundamental life history foundation for multiple species. Degradation of these habitats could lead to devastating results to the native Chinook population and secondarily prevent a strong recovery in the native Coho population.