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## RECREATION SITES AND ACS

### Introduction

This analysis considers the existing BLM parks inside the South Fork Coos Watershed, Park Creek and Big Tree. The analysis will also address Mckinley Camp. Although Mckinley Camp is not an official park, it is used as a group camp site usually once a year and is a proposed park. An ACS assessment for the other proposed parks and trails will be completed when there is a proposed action. At that time, an ACS assessment can be done as part of the NEPA process.

### Management Direction Concerning Recreation and the Attainment of ACS Objectives:

*Design new recreational facilities within Riparian Reserves, including trails and dispersed sites, so as not to prevent meeting Aquatic Conservation Strategy objectives. Construction of these facilities should not prevent future attainment of these objectives. For existing recreation facilities within Riparian Reserves, evaluate and mitigate impacts to ensure that these do not prevent, and to the extent practicable contribute to, attainment of Aquatic Conservation Strategy objectives. (ROD/RMP pg. 14, 46)*

*Adjust dispersed and developed recreation practices that retard or prevent attainment of Aquatic Conservation Strategy objectives. Where adjustment measures—such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures—are not effective, eliminate the practice or occupancy. (ROD/RMP pg. 14, 46)*

### Related Management Direction:

*Additional land acquisitions to enhance recreation resource opportunities would be identified and evaluated on a case-by-case basis through watershed analysis and activity-level planning. (ROD/RMP, pg. 49)*

*Limit OHV use to designated roads throughout most of the District including the following sites/areas (approximately 326,600 acres):*

- *Developed and proposed recreation sites/areas.*
- *Late-Successional Reserves.*
- *Riparian Reserves.*
- *Proposed ACECs . . . (ROD/RMP, pg. 50)*

Key Watersheds: Big Tree Park is located in the Cherry Creek Key Watershed. Recreation sites are not specifically addressed in the management direction for key watersheds. Management direction does give highest priority for watershed restoration to key watersheds (USDA; USDI 1994 pg. B-19) Therefore, watershed restoration opportunities inside the Big Tree Park should receive high consideration when ranked against watershed restoration opportunities in parks outside of key watersheds.

The Format of the Analysis: FEMAT (1993) identified the functions provided by the Riparian Reserve. In addition, FEMAT summarized the research that explains, supports, and to the extent possible, quantifies those functions. This analysis examines the compatibility of the recreation facilities in the North Fork Coquille Watershed with ACS objective by primarily considering attainment of the measurable/ observable functions provided by the Riparian Reserve. The Table REC-1 shows how the Riparian Reserve functions tie to the ACS objectives:

Table REC-1: Attainment of ACS Objectives Provided for by the Riparian Reserve Functions

Riparian Reserve Functions	ASC Objectives To Maintain and Restore								
	1: diversity & complexity of watershed & landscape	2: spatial & temporal connectivity	3: physical integrity	4: water quality	5: sediment regime	6: instream flows	7: flood patterns & waterable levels	8: riparian & wetland plant species composition & structural diversity	9: habitat for riparian-dependent species
root strength provided streambank stability			X	X	X	X		X	
large wood delivery to the streams	X	X	X	X	X	X	X	X	
large wood delivery to the riparian area	X	X						X	X
leaf & particulate organic matter input to the stream		X							X
water quality: temperature as affected by shade	X			X					X
riparian microclimate	X							X	X
water quality: sediment			X	X	X	X		X	
wildlife habitat	X	X		X				X	X

### Riparian Reserve Function

The following table describes conditions needed to attain each Riparian Reserve function; assesses attainment of each of those functions in Park Creek, Big Tree and Mckinley Camp recreation sites; and presents recommendations.

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p>General affects and considerations: Unless otherwise indicated by the citation, the entries in this column are taken from FEMAT (1993, pages V-26 to 29). See FEMAT for the primary references. Critical distances noted in FEMAT are in <b>bold type</b>. Tables DM-4&amp; DM-5 show the heights of riparian trees and critical distances for a range of stand ages, and site indexes.</p>	<p>-Park withdraw: 60 acres          -Developed area: 4.75 acres          -100% of the park withdraw is forested (excluding R/W)          -100% of the developed area is forested          -1.13 miles of stream inside park reserve.          -0.51 miles of road inside the park reserve.          -An estimated 990-feet of streambank is next to the developed part of the park.</p>	<p>-Park withdraw: 20 acres          -Developed area is 1/4 acre plus a 1/4 mile of trail inside the withdraw and an additional 1/4 of trail out side the reserve.          -100% of the park withdraw is forested (excluding R/W)          -100% of the developed area is forested          -0.45 miles of stream inside the park reserve          -An estimated 300-feet of stream bank is next to the developed part of the park.</p>	<p>-Estimated park area: 12 acres          -Mowed area: 2.5 acres          -79% or 9.5 acres of the proposed park is forested (excluding R/W)          -0.9 miles of stream inside the proposed park          -0.31 miles of road inside park reserve, and 0.16 miles of road on the proposed park's boundary.          -Stream banks are at least 110-feet from the mowed area.</p>
<p><b>Root strength</b>          [Affected ACS objectives: 3, 4, 5, 6, 8]</p> <p>Half a tree crown diameter is an estimate of extent to which root systems of trees next to a slide scar margin affect soil stability. The contribution of root strength to maintaining streambank integrity also declines at a distance of <b>one-half crown diameter</b> (FEMAT 1993)</p> <p>Andrus and Froehlich (1992) in a study of blowdown in buffer strips, on Coast Range sites, found that even when catastrophic blowdown occurred, few trees became sources of sediment entering a stream. Only 7 sites out of 30 had sediment yield increases greater than 1%, and only 2 greater than 6% compared to rough estimates of pre-blowdown sediment yields. This increased sediment yield was almost always associated with upturned rootwads in or at the edge of a stream. The sediment was released when high flows scoured the exposed surface of the rootwad hole and washed soil out of the root mass. Andrus and Froehlich also observed that rootwads, even on very steep ground, rarely slid down hill more than 20 feet (McGreer; Andrus 1992). Ravel from upslope rootwad holes was rarely a source of sediment because the rootwad blocked downward movement of that material. Rootwad scars on steep ground did not appear to expand with time, and the disturbed slopes did not become sites for landslides. Where tree boles entered the stream, they found no cases where a net increase in sedimentation occurred. Releases of streambank sediments caused by flow diversions from the new trees in the stream were compensated for by the extra sediment storage capacity of the new large woody debris.</p>	<p>The stream banks inside the park reserve are forested to the edge. Therefore, trees roots are present to provide stream bank stability.</p> <p>The streambank is armored by exposed bedrock next to campsites B10, B11, and B12. That reach is on an outside curve and therefore is the erosional bank of the stream and the stream channel is cut down to bedrock. The soil between the bedrock and the campsites is well rooted by a dense shrub cover. The top of the stream bank at camp sites B10, B11, and B12 is about 12-15 feet above the streamhead</p> <p>A narrow strip of land between the streambank and campsites A3, A4, and A6 is only sparsely occupied with shrubs. This is due to three things:          - Vegetation removal associated with recent upgrades of these campsites to meet Americans With Disabilities Act access requirements          - past streambank trampling by people staying in the campsites.          - The Park Ck. Channel recently shifted in response to the formation of a log jam. The log jam redirected Park Ck. causing it to cut a new channel close to campsites A6 and A4, and consequently exposing a new stream bank. Tree roots do provide resistance to streambank erosion but shrubs and herbs have yet to establish on the banks of the new channel and augment the tree roots.</p> <p>Landslides up stream from the rec. site regularly add new gravel into Park Ck. Gravel delivered during intense storms in 1996 have worked their way down stream and have formed a gravel bar on the opposite side of the Park Ck. channel from campsites A3 and A1. This gravel bar is directing the water flow toward the campground. Tree roots appear to limit streambank erosion here. The gravel bar will eventually work its way down stream. Therefore, streambank erosion associated with the gravel bar influenced stream flow is both a temporary condition and within the normal range of variability for this channel type.</p>	<p>The stream banks inside the park reserve are forested to the edge. Therefore, trees roots are present to provide stream bank stability.</p> <p>In addition to the stream edge tree cover, the stream banks are also well vegetated with shrubs except for two locations. One is a 45-foot length of stream bank that is a depositional area during high flows. The openness of this area is due to normal deposition of sediment on the inside of a stream bend. The other is a 15-foot length of stream bank next to a large piece of woody debris that is providing in stream structure. This site is readily accessible making it an ideal spot for presentations on the functions of in stream wood for fish habitat and hydrological function. Consequently this part of the stream bank was denuded and kept open by frequent visits for interpretive and training purposes.</p> <p>In the past, open access and view points in this park were regularly maintained. However, that practice was stopped prior to this assessment.</p>	<p>The stream banks inside the proposed park reserve are forested. The forest cover extends back from the water's edge to the top of the gorge and well beyond. Total width is in excess of 110 to 220 feet.</p> <p>The actively used mowed area is well away from stream banks.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p>Assessment of, and recommendations for attainment of the root strength function:</p> <p><i>Assessment/ recommendations applicable to all sites:</i></p> <p>The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with and benefits attaining stream bank stability associated with tree roots.</p> <p>The streambanks in all three sites are forested. Therefore, streambanks are protected by tree root strength.</p>	<p>Approximately 250 feet of stream bank is sparsely vegetated by shrubs. This represents about 2% of the streambanks inside the park withdraw. Given the small area and the presence of tree roots, the sparseness of streambank shrubs presents only a very low but never the less preventable risk of sediment delivery via streambank erosion.</p> <p>This rec. site is on a dynamic reach of Park Ck. The large myrtles in the campground indicate that a large part of the rec. site has gone for many years without a major disturbance. However, the recent channel shift in response to a log jam also indicate that a windthrown tree entering the channel or a debris torrent (both are likely if not inevitable events) can greatly alter the site. Streambank stability, as imparted by root strength, can limit chronic sediment delivery but cannot prevent channel migration in response to an input of large wood or a slug of gravel.</p> <p>Recommendation: Monitor vegetation recovery on the stream side areas denuded during camp site improvement work. If natural recovery appears slow, consider transplanting native ferns and shrubs onto the sites and educate the park users to protect the recovering areas.</p> <p>Decommission the stream side campsites in Park Creek West (Section A) as those site improvements wear out,. The highest priority campsite to decommission is A6.</p>	<p>Approximately 60 feet of streambank is sparsely vegetated by shrubs. This represents about 1% of the streambanks inside the park withdraw, and most of that is attributable to naturally occurring deposition and not recreation management. Consequently, sediment delivery attributable to those areas is within the range of natural variability and not detectable at either the scale of the park withdrawal or the 5th field watershed scale. Continued recreational use at current levels will not affect attainment of stream bank stability or cause an observable increase in sediment delivery.</p>	<p>Recreational use at this site is concentrated in the mowed area. There are no developed recreational attractions next to the streams and consequently there is only incidental recreational activity on the stream banks. No known denuded stream side areas are associated with recreational use of the site. Continued recreational use at current levels will not affect attainment of stream bank stability or cause an observable increase in sediment delivery.</p> <p>Recommendation: If this site is developed in the future, confine major improvements and campsite development to the area immediately in and around the mowed area.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Large wood delivery to the stream</b> [Affected ACS objectives: 1, 2, 3, 4, 5, 6, 7, 8]</p> <p>The probability that a falling tree will enter the stream is a function of slope distance from the channel in relation to tree height. The effectiveness of stream side forests to deliver large wood to the channel is low at distances greater than approx. <b>one tree height away from the channel</b> (FEMAT 1993).</p> <p>McDade and coauthors (1990) found more than 70% of wood debris in streams originated at distances from the stream that were less than half the stand height. Eleven percent of debris pieces in the channel came from within 1-meter of the stream, and 90% originated from within 30-meters in 29 out of 39 streams. The distance of origin for in channel debris was significantly greater for streams in old-growth forests, for 3<sup>rd</sup> order streams, and for conifers as opposed to hardwood debris. There was no significant differences in distance from origin to channel for steep and gentle areas.</p> <p>Reiter and Beschta (1994) observed that landforms have an influence on large wood recruitment patterns in the Coast Range. Narrow channels have more large wood recruitment than flatter channels as a result of larger trees growing on hillslopes than on flood plains.</p> <p>The site potential tree height for the North Fork Coquille Watershed is 220-feet. This suggests that when the stream side stands are 240-year old, 70% of the CWD recruited to a stream will come from the adjacent 110-feet (slope distance) of land. Under some circumstances, up to 90% of the CWD that reaches the stream may originate from the adjacent 110-feet of land.</p> <p>Intact streamside stands along the larger streams in the North Fork Coquille Watershed (for example Middle Ck., Park Ck., Cherry Ck.) have a large myrtle and bigleaf maple component. Typical myrtles are 40 to 80-feet tall with mature trees on good bottomland sites exceeding 100-feet. Bigleaf maples range from 50 to 100-feet tall. Bigleaf maple height growth becomes negligible after 50 to 70-years (Niemiec <i>et al.</i> 1995). Reiter and Beschta (1994) observed approximately 80% or more of the instream hardwood debris originates within 10-meters of the stream, as compared to 50% or more of the conifer debris in western Oregon streams. The height growth potential for myrtle and bigleaf maple suggests a stream side zone of 100-feet would be the source for 90%+ of the myrtle and bigleaf maple CWD that enters the streams.</p>	<p>Inside the park reserve, mature and old-growth trees occupy the land within a 2-site-potential tree distance of 3th order and larger streams. However, road right-of-ways reduce the growing space inside the Riparian Reserve. The Park Ck. Rd. is more than 110-feet away from Park Ck. and thus has a comparatively low impact on CWD recruitment potential. Middle Ck. Rd. has a higher impact on CWD recruitment potential. Middle Ck. Rd. is approximately 110-feet away from Middle Ck. down stream from Park Ck. However much of the land between that road and the stream is occupied by red alder. Upstream from the Park Ck. junction, Middle Ck. Rd. is approximately 50 to 100-feet away from the stream.</p> <p>Timber harvest next to some of the 1<sup>st</sup> and 2<sup>nd</sup> order streams in the 1960's reduced CWD recruitment potential in those areas for the near term.</p> <p>The 4.75 acres of development is confined to floodplain/ terrace landform. Floodplains inherently offer a lower instream large wood recruitment potential than streamside hillslopes (Reiter; Beschta1994). However, major channel shifts can result in a pulse of CWD input by undercutting trees on the floodplains and exposing CWD that was buried during the period when the flood plain material was deposited.</p> <p>Tree cutting in the developed 4.75 acres and along the roads may at times be necessary for public safety. Bucking windthrow trees out of the road may be needed for maintaining access. Both are consistent with the ROD. The effect of these activities on attaining ACS objectives depends on what is done with the down wood and the relative abundance of CWD on the site.</p>	<p>Inside the park reserve, mature and old growth trees occupy the land within 2-site-potential tree distance of the North Fork Cherry Ck. and its tributary, and the north side of Cherry Ck. The Cherry Ck. Rd. is a little less than 110-feet away from the south side of Cherry Ck. Right-of-way clearing and side casting converted the stands between the road and Cherry Ck. from mixed myrtle-bigleaf maple-conifer to red alder.</p> <p>The 1/4 acre of development is confined to a small floodplain landform. Floodplains inherently offer a lower instream large wood recruitment potential than streamside hillslopes.</p> <p>Tree cutting in the developed 1/4 acre, and along the road and trail may at times be necessary for public safety. Bucking windthrow trees out of the road and the trail may be needed for maintaining access. These activities are consistent with the ROD. The affect of these activities on attaining ACS objectives depends on what is done with the down wood and the relative abundance of CWD on the site.</p>	<p>Inside the proposed park, all but 200 feet of Middle Ck. is adjacent to a mature streamside stand. That stand is at least 110-feet wide and in places approaches 220-feet wide. The north most 200 foot reach of Middle Ck. that is inside the proposed park is next to a half acre patch of younger hardwoods.</p> <p>A combination of ditch and intermittent stream channel connects a small wetland in the northwest corner of the proposed park to Middle Ck. The land inside the proposed park next to this channel is forested. That forested area extends more than 220-feet from the channel edge into the proposed park for most of the length of that channel. The exception is a small brush field near where the GP Reload Rd. crosses the channel.</p> <p>Tree cutting next to the 2.5 acre mowed area, and along the roads may at times be necessary for public safety. Bucking windthrow trees out of the roads may be needed for maintaining access. These activities are consistent with the ROD. The affect of these activities on attaining ACS objectives depends on what is done with the down wood and the relative abundance of CWD on the site.</p> <p>Activities on private land and the maintenance shop site reduce the large CWD recruitment potential on near by land outside of the proposed park. Actions on private land are subject to state regulation and are outside the BLM's jurisdiction.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p>Assessment of, and recommendations for attainment of large wood delivery to the stream function:</p> <p><i>Assessment/ recommendations applicable to all sites:</i> The rec. site is managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with growing large trees that could eventually contribute large wood to streams and floodplains. Hazard tree cutting, in and of itself, is consistent with the ROD. However, removal of the hazard trees from the Riparian Reserve can under certain circumstances conflict with ACS objectives and by extent with the ROD.</p> <p>Continued management of these sites for recreation is compatible with providing large wood to streams and flood plans provided cut hazard trees and windthrows are either left on site or used for habitat restoration inside the Riparian Reserve.</p> <p>Recommendation: Follow watershed recommendations concerning salvage inside the Riparian Reserve. On LSR land, follow the salvage recommendations in the LSR Assessment (USDI; USDA 1998)</p>	<p>The coarse wood recruitment potential on Park Ck. and unnamed the 3<sup>rd</sup> order tributary approaches 90% of maximum obtainable.</p> <p>Areas of currently low CWD recruitment potential are associated with the Middle Ck. Rd. right-of-way and past logging, and not with recreation management.</p> <p>Recommendations: A higher future CWD recruitment potential inside the park reserve may be attained by: -Conifer release and alder conversion along the Middle Ck. Rd. to replace alder dominated patches myrtle-bigleaf maple-conifer patches. -Thin the stands regenerated in the 1960s to put theme on a growth trajectory to develop late-successional characteristics.</p>	<p>The coarse wood recruitment potential on the North Fk. Cherry Ck. and its unnamed tributary, is fully intact.</p> <p>Areas of currently low CWD recruitment potential are associated with the Cherry Ck. Rd. right-of-way and past logging south of that road, and not with recreation management. Therefore, the continued management of this rec. site does not prevent attainment of large wood delivery to the stream provided cut hazard trees and bucked windthrows are either left on site or used for habitat restoration inside the Riparian Reserve.</p> <p>Recommendations: A higher future CWD recruitment potential inside the park reserve may be attained by: -Conifer release and alder conversion along the Cherry Ck. Rd. to replace alder dominated patches myrtle-bigleaf maple-conifer patches. -Convert the alder dominated portions of the plantation south of the Cherry Ck. Rd. Retain the releaseable conifers, myrtles and bigleaf maples. -Thin the conifer dominated areas in the plantation south of Cherry Ck. Rd. to favor diameter growth and to put that stand on a growth trajectory to develop late-successional characteristics.</p>	<p>The coarse wood recruitment potential to streams inside the proposed park is about 90% of the maximum obtainable from the lands inside the proposed park boundaries.</p> <p>Therefore, the continued management of this rec. site, at current levels, does not prevent attainment of large wood delivery to the stream provided cut hazard trees and bucked windthrows are either left on site or used for habitat restoration inside the Riparian Reserve. However, non-recreational land uses outside of the proposed park boundaries will prevent attainment of the maximum potential amount large CWD recruitment to the streams inside the proposed parks.</p> <p>Recommendations: Middle Creek, in the area of the proposed park, is deeply entrenched. In its present condition, Middle Creek is more likely to transport than to retain CWD that currently may enter the stream from this site.</p> <p>A higher future CWD recruitment potential inside the park reserve may be attained by: -Conifer release and alder conversion on the half acre patch next to Middle Ck in the northeast corner of the proposed park, and next to the GP Reload Road. However, treating these two areas is a low priority given their small size and low potential for retaining CWD in this reach of Middle Ck.</p>
<p><b>Large wood delivery to the riparian area</b> [Affected ACS objectives: 1, 2, 8, 9]</p> <p>Large down wood is recruited into the riparian areas from riparian forests and from upslope forests. The effectiveness of upland forest to deliver large wood to the riparian area is naturally expected to decline at distances greater than approximately <b>one tree height from the edge of the riparian area</b> (FEMAT 1993).</p> <p>Minimum standards for old-growth Douglas-fir on hemlock sites include CWM <math>\geq 15</math> tons/acre including 4 pieces <math>\geq 24</math> inch dbh and <math>&gt; 50</math> ft long (Old-growth Definition task Group 1986).</p> <p>Ursitti (1990) found 3,600 to 9,400 cubic feet of down wood (material at least 4-inches in diameter and at least 1-meter long) per acre on Coos Bay District stream side old-growth sites.</p> <p>Assessment of, and recommendations for attainment of large wood delivery to the riparian zone function:</p>	<p>See the “Large Wood Delivery to the Stream” discussion above</p> <p>See the “Large Wood Delivery to the Stream” assessment and recommendations above.</p>	<p>See the “Large Wood Delivery to the Stream” discussion above</p> <p>See the “Large Wood Delivery to the Stream” assessment and recommendations above.</p>	<p>See the “Large Wood Delivery to the Stream” discussion above</p> <p>See the “Large Wood Delivery to the Stream” assessment and recommendations above.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Leaf &amp; other particulate organic matter input to stream</b> [Affected ACS objectives: 2, 6, 9]</p> <p>The distance away from a stream from which leaf litter input originates depends on site-specific conditions. Thus, the effectiveness of floodplain riparian forests to deliver leaf and other particulate organic matter decreases at distances greater than approximately <b>half a tree height away from the channel</b>. The FEMAT scientists were unaware of studies examining litter fall from riparian zones as a function of distance of litter source to the channel. However, a study on the composition of benthos invertebrate communities in streams with riparian buffers greater than 100 feet wide found those communities indistinguishable from those in streams flowing through unlogged watersheds (FEMAT 1993).</p> <p>Conifer litter enters the stream through the year whereas litter from deciduous trees shrubs enter in a fall season pulse.</p> <p>Hardwood litter input is most likely along: - 3<sup>rd</sup> order and larger streams below 1,800-foot elevation, particularly those with a flood plain. - Steep unstable/ slide prone 1<sup>st</sup> &amp; 2<sup>nd</sup> order draws and headwalls.</p> <p>Hardwood litter input also comes from alders that occupy disturbed sites. These include road cuts and fills, compacted soils and sites where harvest activities unintentionally converted conifer stands to alder stands.</p> <p>For background information, see Bilby's (1997) article "Aquatic-Terrestrial interactions in Pacific Northwest" in the <u>Cope Report</u> 10(1&amp;2): 9-13, for a summary discussion on disturbance, diversity and productivity of aquatic communities.</p> <p>Road construction through a mature myrtle-bigleaf maple-conifer riparian stand can cause a more pronounced species composition shift than timber harvest. Myrtle and bigleaf maple normally vigorously regenerate by stump sprouting following timber harvest. However during road construction, most stumps in the R/W are either buried by sidecast or grubbed out of the ground. This reduces the regenerative potential of these stump sprouting species. Road construction associated disturbance favors red alder regeneration.</p>	<p>Except for the segment of the road next to Middle Ck., upstream from Park Ck., all lands within 100-feet of all streams are fully forested inside the park reserve.</p> <p>The younger stands that regenerated following timber harvest in the 1960's and along R/Ws following road construction are currently shorter than the stands they replaced. Potentially, the amount of leaf and other particulate organic matter that can reach a stream is less now than before road construction and timber harvest. However, it is unknown if there is a measurable difference.</p> <p>The replacement of the myrtle-bigleaf maple-conifer riparian stand next to Middle Ck by red alder following road construction changed composition of the litter reaching the stream. The litter delivered from this converted stand is probably less diverse but more nitrogen rich.</p>	<p>Except for the Cherry Ck. Rd., all lands within 100-feet of all streams are fully forested inside the park reserve.</p> <p>The younger stands that regenerated following timber harvest in the 1960's and along R/Ws following road construction are currently shorter than the stands they replaced. Potentially, the amount of leaf and other particulate organic matter that can reach a stream is less now than before road construction and timber harvest. However, it is unknown if there is a measurable difference.</p> <p>The replacement of the myrtle-bigleaf maple-conifer riparian stand next to Middle Ck by red alder following road construction changed composition of the litter reaching the stream. The litter delivered from this converted stand is probably less diverse but more nitrogen rich.</p>	<p>All lands within 110-feet of all streams are fully forested inside the park reserve. These stands are also diverse.</p>
<p>Assessment of, and recommendations for attainment of the leaf &amp; other particulate organic matter input to stream function:</p> <p><i>Assessment/ recommendations applicable to all sites:</i> The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with and benefits attainment of leaf and other particulate organic matter input to the stream. Continued management of this rec. site, at current levels will not prevent attainment of the leaf &amp; other particulate organic matter input to stream function.</p>	<p>Changes in quantity and quality of litter entering the streams inside the park withdraw are attributable to past timber harvest and road construction and not to recreation management.</p> <p>Recommendations: -Do conifer release and alder conversion along the Middle Ck. Rd. to replace alder dominated patches myrtle-bigleaf maple-conifer patches. -Discourage campers cutting of vegetation and firewood inside the park.</p>	<p>Changes in quantity and quality of litter entering the streams inside the park withdraw are attributable to past timber harvest and road construction and not to recreation management.</p> <p>Recommendations: -Do conifer release and alder conversion along the Cherry Ck. Rd. to replace alder dominated patches myrtle-bigleaf maple-conifer patches. -Convert the alder dominated portions of the plantation south of the Cherry Ck. Rd. Retain the releaseable conifers, myrtles and bigleaf maples.</p>	<p>(See assessment/ recommendations applicable to all sites)</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Water quality: temperature as affected by shade</b>  [Affected ACS objectives: 1, 4, 9]</p> <p>Effectiveness of streamside forest to provide shade varies with topography, channel orientation, extent of canopy opening above the channel, and forest structure, particularly extent of both under- and overstory. In the Oregon Coast Range, riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late-successional/ old growth forests (FEMAT 1993). A 100-foot distance is approximately equal to <b>half a tree height</b> for a late-successional/ old growth tree.</p> <p>Brazier and Brown (1973) found angular canopy density correlated well with stream temperature control. The angular canopy density is measured for the solar angle during the minimum flow period. For streams in their study, the maximum angular canopy density (maximum shading ability) was reached within an 80-foot width, with 90% of maximum reached in within 55-feet. Brazier and Brown observed the efficiency of heat blocking increased rapidly with increasing buffer strip width, up to 30-feet, before leveling off at a maximum, at around 40-feet.</p> <p>On Coast Range sites, where no buffers were left following logging, riparian vegetation regrowth along small streams (about 10 feet wide) will provide shade levels equivalent to mature stands in 10 years (Summers 1982 cited in Skaugset 1992). Another study showed 50% of a Coast Range stream shaded within 5 years of harvesting and burning (Beschta <i>et al.</i> 1987)</p> <p>Our knowledge on the effect of shade on water temperature is based on comparing stream temperatures under forested conditions to a denuded state. It is also based on research to establish how wide a buffer has to be to negate the effect an adjacent clearcut. We know of no peer reviewed publications on the effect of filtered light (as influenced by different levels of stand density/ crown closure) on stream temperature in the Douglas-fir region.</p>	<p>Except for the segment of the road next to Middle Ck., upstream from Park Ck., all lands within 110-feet of all streams are fully forested inside the park reserve. Aerial photos show several naturally occurring canopy gaps above streams where the streamside forest is either mature hardwood stand, or mature mixed stand. The largest gaps are associated with normal channel migration and debris torrents. Stream segments next to second growth stands are fully shaded with no gaps.</p>	<p>Except for the Cherry Ck. Rd., all lands within 110-feet of all streams are fully forested inside the park reserve. Aerial photos show naturally occurring canopy gaps above streams where the streamside forest is old-growth. Aerial photos show several naturally occurring canopy gaps above streams where the streamside forest is either mature mixed stand or old-growth. The largest gaps are associated with jam formation and past debris torrents. Heavy shrub cover is often present below the canopy gaps and that shrub layer contributes to shading the stream. Stream segments next to second growth stands are fully shaded with no gaps with the exception of one large gap associated with a log jam.</p> <p>The streamside red alder stands next to Cherry Creek are currently fully shading the stream. However these red alder stands are expected to break-up in another 40 to 60 years.</p>	<p>All lands within 110-feet of all streams are fully forested inside the park reserve. Aerial photos show no canopy gaps above streams.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p>Assessment of, and recommendations for attainment of the water quality: temperature as affected by shade Riparian Reserve function:</p> <p><i>Assessment/ recommendation applicable to all sites:</i> The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with maintaining a forest canopy that can shade streams.</p> <p>Red alders that established following road construction and logging provide a shade benefit to the streams. However, site occupancy by red alders can delay establishment of conifer and mixed stands that can provide larger structure and late-successional habitat benefits in addition to shade. Alders are a short-lived trees that live about 80 to 100 years. This is compared to a 300-year life expectancy for bigleaf maple, 200-year plus for myrtle, and 300 to 1,000 for native conifers. Shade tolerant trees, if already established on the site, can succeed alder. However until the shade tolerant trees are released, they exhibit reduced growth rates and are vulnerable to crown abrasion. Under other circumstances, red alder can be succeeded by salmonberry. Alders also prevent establishment of the tree species that are more representative of the predisturbance stand. Retaining red alder on these sites will maximize the near term shading benefit provided by those trees. However, this delays attainment of other benefits provided riparian stands composed of a range of large long-lived species.</p> <p>Recommendations: Create openings by cutting trees only when necessary for safety or when optimizing attainment of ACS objectives in the Riparian Reserve requires converting brush and alder stands or providing trees with additional growing space. See the "Density Management and Conversion Treatments and Attaining Riparian Reserve Function" for discussion and recommendations on stand treatment options and streamside leave strips.</p>	<p>The streamside lands inside the park withdraw are fully forested and thus shaded. Therefore, the continued management of this rec. site, at current levels will not prevent attainment of the shading benefit provided by the Riparian Reserve.</p> <p>The construction of the Middle Ck. Rd. has increase the streamside alder component at the expense of myrtles-bigleaf maples and conifers. These alders compete with other species for growing space, slow growth of established myrtles, maples and conifers.</p>	<p>The streamside lands inside the park withdraw are fully forested and thus shaded. Therefore, the continued management of this rec. site, at current levels will not prevent attainment of the shading benefit provided by the Riparian Reserve.</p> <p>Past timber harvest and road construction converted mature mixed and old-growth conifer stands south of Cherry Creek to red alder. This red alder is expected to provide shade for another 40 to 60-years.</p>	<p>The streamside lands inside the proposed park are fully forested and shaded for distances greater than 110-feet back from the streams. Therefore, the continued management of this rec. site, at current levels will not prevent attainment of the shading benefit provided by the Riparian Reserve.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Riparian microclimate</b> [Affected ACS objectives: 1, 8, 9]</p> <p>Microclimate is likely influenced by widths of both the riparian area and the stream channel. Riparian zones along larger streams consist of 2 distinct parallel bands of vegetation separated by the stream channel. By contrast, channels of lower order streams are so narrow that a functionally continuous canopy usually exists above the stream. The FEMAT authors are unaware of reported microclimate observations in riparian zones but Chen (1991) documented microclimate changes in old-growth stands as a function of distance from a clearcut edge. These patterns vary substantially with season, time of day, edge aspect, and extent of tree removal in harvested stand (FEMAT 1993). Chen used stands on uniform ground that did not exceed 10 degree slopes. The reader should exercise caution in extrapolating Chen's findings to lower slopes and riparian sites that are partially protected from winds and direct sun by deeply incised complex topography. Also, feathered edges, dense understory vegetation, topographic sheltering, and edge orientation can lessen the depth of the cut edge's effect on the interior microclimate and reduce the time until the interior microclimate conditions are fully recovered (Harris 1984; Chen <i>et al.</i> 1995; Oliver &amp; Larson 1990).</p> <p>A clearcut next to old-growth can result in a change in humidity and wind speed at distances into the forest interior equal up to 3 tree heights (Chen 1991). This represents the extreme. Edge orientation plays a critical role for all microclimate variables. Gradients generally are longest and steepest on partially clear warm dry days on southwest-facing edges. Wind penetration is highly related to stand density and understory structure. Wind may reach deep into a stand where tree branches are high and the understory sparse, and may penetrate only a short distance where the canopy is continuous and understory dense (Chen <i>et al.</i> 1995). Chen (1991) found edge influence into old-growth stands on biological variables varied dramatically from essentially none to up to 450 feet for small (0-10 cm) hemlock seedlings.</p>	<p>The park contains no stand openings large enough to have an affect on micro climate. The canopy gaps above the developed part of the park reserve are similar in size and distribution to the naturally occurring canopy gaps above Park Ck., Middle Ck., and adjacent riparian stands.</p>	<p>The park contains no stand openings large enough to have an affect on micro climate.</p>	<p>The proposed park contains mowed field which is a 2.5 acre opening. The edges of the mowed field are more than 110 feet .and in places, more than 220 feet from Middle Ck., and its tributary. Based on research by Chen (1991), which was later generalized for inclusion in FEMAT (1993 pg V-27), these widths should effectively buffer the effect of edge on soil moisture, radiation, and soil temperature by the streams. These widths are only partly effective for moderating the effects of edge on interior stand relative humidity, air temperature, and wind speed by the streams. However, the edges of the mowed field are neither the only edges nor the closest edges to the streams inside the proposed park. The edges associated with the maintenance shop yard and private pastures, which are both outside the proposed park, are closer to the steam s. Consequently edges outside the proposed rec site have greater influence on interior microclimate of the Riparian Reserves within the proposed park. The edge of the maintenance shop yard is within a few yards of the small wetland and its outlet channel. The private pastures, in places, are within 50 feet of Middle Creek.</p> <p>The mowed field has existed since at least 1942 when the McKinley Tree Nursery was started on the site. The pastures have existed since the late 19<sup>th</sup> century. This is enough time for trees regenerating along the edge of the mowed fields and pastures to fill the gaps between the ground and the base of the overstory trees next to the edges. This ingrowth has a moderating effect on edges and reduces the extent of edge influence on interior habitat (Oliver; Larson 1990; Harris 1984).</p>
<p>Assessment of, and recommendations for attainment of the Riparian microclimate function:</p>	<p>The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with maintaining a continuous forest canopy.</p> <p>Recommendations: Create openings by cutting trees only when necessary for safety or when converting brush or alder stands would optimize attainment of ACS objectives in the Riparian Reserve.</p>	<p>The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with maintaining a continuous forest canopy.</p> <p>Recommendations: Create openings by cutting trees only when necessary for safety or when converting brush or alder stands would optimize attainment of ACS objectives in the Riparian Reserve.</p>	<p>This site is in the forest-rural interface. The landscape is characterized by numerous boundaries between vegetation types and consequently has considerable habitat and microclimate edge effect. Therefore, neither continued mowing nor reforestation of the field will likely have a meaningful affect on the nearby riparian microclimate. The edges in this landscape have existed long enough for ingrowth to establish and moderate the effects of edges on interior microclimate. Therefore, cutting trees to expand the mowed area would create a more permeable edge that would increase the effect of edge on interior microclimate.</p> <p>Recommendations: Do not expand the mowed area. Cut trees on the edge of the mowed area only when necessary for safety or when converting brush or alder patches would optimize attainment of ACS objectives.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Water quality: sediment</b> [Affected ACS objectives: 3, 4, 5, 6, 8]</p> <p>The authors of a thorough literature review of widths of riparian areas required to protect water quality found the required width to protect water quality ranged from 12 to 869 feet. A western Washington study found that 200 foot buffers, about one site potential tree, would be effective to remove sediment in most situations if the buffer were measured from the edge of the flood plain (FEMAT 1993).</p> <p>The width of protection areas needed to provide for ecological protection needs on intermittent streams, which includes protection from surface erosion input, <b>varies with slope class and geologic parent material.</b> The width ranges from 200 feet slope distance where there are granitic soils on &gt; 70% slopes down to about 30 feet where there is resistant sedimentary parent material with &lt; 30% slopes (FEMAT 1993, pg. V-38). The FEMAT diagram that describes the ecological protection width needs was brought forward into the ROD for the Forest Plan (USDA; USDI 1994, pg B-15) and was intended to give guidance on establishing Riparian Reserve widths on intermittent streams at the project scale.</p>	<p>Parent material: unconsolidated material on the developed 4.75 acres. Most of the remaining park withdraw is underlain by resistant sandstone.</p> <p>The developed 4.75 acres are on flat ground and therefore has a low risk of slope failure. Elsewhere inside the park withdraw, the slopes are moderate to steep. There are no recreation improvements in the rest of the park withdraw.</p> <p>There are no gullies or rills. The sparsely vegetated areas are flat which reduces the risk that surface erosion can deliver sediment to the stream.</p>	<p>Parent material: unconsolidated material on the developed 1/4 acres. Most of the remaining park withdraw is underlain by resistant sandstone.</p> <p>Average slope in the developed 1/4 acre part of the park approaches 0% and therefore has a low risk of slope failure. Elsewhere inside the park withdraw, the slopes are moderate to steep. Trails and foot bridges are the only other recreation improvements in the rest of the park withdraw. The trail and bridge construction involved little surface disturbance. The trail surface is armored with duff and mosses, and is separated from the streams by a band of vegetation capable of filtering any sediment that may originate from the trail surface. The trail is not used by equestrians or mountain bikers because it is too short, too narrow and lacks challenge. The bridges effectively keep the foot traffic out of the creeks.</p> <p>There are no gullies or rills. The sparsely vegetated areas are flat which reduces the risk that surface erosion can deliver sediment to the stream.</p>	<p>Parent material: unconsolidated material in both the actively used part of the site and in the rest of the area with potential for including in a recreation site.</p> <p>All of the mowed area and most of the rest of the proposed park is nearly flat. Middle Ck is entrenched. Slopes in the entrenched area are estimated to be around 50% .</p> <p>There are no gullies or rills.</p> <p>Except for the intergorge next to Middle Ck., the land is flat which reduces the risk that surface erosion can deliver sediment to the stream. The soils in the forested parts of the proposed park are armored with duff and native vegetation. The soils in the mowed area are protected by a vigorous dense cover of grass. The Middle Ck. intergorge is well forested.</p>
<p>Assessment of, and recommendations for attainment of water quality: sediment function:</p> <p><i>Assessment/ recommendations applicable to all sites:</i> All three sites addressed in this assessment are located on flat ground which is not predisposed to slope failure.</p> <p>Rec. sites attract people and concentrate activity. This can result in loss of vegetation in the heavily used areas. From a recreation management standpoint, the denuded areas detract from the attractiveness of the site and predispose the site to being muddy during wet weather. Denuded or muddy areas are a risk to water quality only when they can actually deliver sediment to a stream.</p>	<p>The sparsely vegetated flat ground next to the stream presents a very low but never the less preventable risk of sediment delivery via surface erosion. The rec. site is in a drainage that has a history of large frequent landslides even in the absence of management activities. Therefore, any sediment delivery from the rec. site in its current condition would be undetectable when compared to the volume of sediment delivered to the stream through naturally occurring hillslope processes at both the drainage scale and the 60-acre scale of the park reserve.</p> <p>Recommendation: Monitor vegetation recovery on the stream side areas denuded during site improvement work. If natural recovery appears slow, consider transplanting native ferns and shrubs onto the site and educate the park users to protect the recovering areas.</p> <p>As site improvements wear out, decommission the stream side campsites in Park Creek West (Section A). The highest priority campsite to decommission is 6a.</p>	<p>The sparsely vegetated patches of flat ground next to the stream presents a very low risk of sediment delivery via surface erosion. Most of that sparsely vegetated area is attributable to naturally occurring deposition. Sediment delivery from surface erosion is within the range of natural variability and undetectable at either the scale of the park withdrawal or the 5th field watershed scale. Continued recreational use at current levels will not affect attainment of stream bank stability or cause an observable increase in sediment delivery.</p>	<p>There are no areas of exposed soil that are positioned to deliver sediment to a stream.</p> <p>Recommendation: If this site is developed in the future, confine major improvements and campsite development to the area immediately in and around the mowed area. Low impact improvements like foot trails will not present a sedimentation risk if properly designed.</p>

Riparian Reserve function	Park Creek	Big Tree	Mckinley Camp
<p><b>Wildlife habitat</b> [Affected ACS objectives: 1, 2, 4, 8, 9]</p> <p>The Riparian Reserves confer benefits to riparian-dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, and provide for greater connectivity of the watershed. The Riparian Reserves will also serve as connectivity corridors among the Late-Successional Reserves (USDA; USDI 1994, pg. B-13)</p>	<p>Stream side stands supply myrtle and bigleaf maple dominated riparian habitat. Upland areas provide Douglas-fir old-growth habitat.</p>	<p>Stream side stands supply myrtle and bigleaf maple dominated riparian habitat. Upland areas provide Douglas-fir old-growth habitat.</p>	<p>Intergorge area provides myrtle dominated riparian habitat. Flood plain area provides mixed hardwood conifer riparian habitat. Stand edges are against open farm land and second growth upland conifer stands.</p>
<p>Assessment of, and recommendations for attainment of wildlife habitat</p> <p><i>Assessment/ recommendations applicable to all sites:</i> Rec. sites attract people and concentrate activity. Concentrated human use can reduce habitat quality/ suitability for some wildlife species, have no affect on species, and in a few cases provide more favorable conditions for others. All three sites addressed in this assessment are located next to frequently traveled paved forest roads. Therefore, human use of the road would affect habitat suitability for some species independent of the rec. site.</p>	<p>The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with maintaining a late-successional habitat inside the Riparian Reserve.</p>	<p>The rec. sites are managed to provide the public with a recreation opportunity in a forested setting. This management is consistent with maintaining a late-successional habitat inside the Riparian Reserve.</p>	<p>This site is in the forest-rural interface. The landscape is characterized by numerous boundaries between vegetation type and consequently has considerable habitat and microclimate edge effect. Therefore neither continued mowing nor reforesting the field will likely have an meaningful affect habitat at the drainage, or 5<sup>th</sup> field scale.</p>

## **Attainment Assessment of the Aquatic Conservation Strategy Objectives**

*ACS-1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.*

Under the Forest Plan, coarse scale distribution, diversity, and complexity of watershed and landscape scale features are provided for through the use of an array of land use allocations. Watershed and landscape features associated with late-successional and old-growth forests are provided by the Late-Successional Reserves and Riparian Reserves. Watershed and landscape features associated with early and mid-successional forests are provided by Matrix lands. Management direction provides for retaining legacy structures/ attributes on the Matrix lands like coarse woody debris, snags and wildlife trees, and by that provide features found in unmanaged early and mid-successional landscapes. These legacy structures fulfill habitat requirements for some early and mid-successional associated wildlife species and make the early and mid-successional forest more hospitable and permeable for late-successional associated species.

Park Creek and Big Tree Recreation Sites are in the Late-Successional Reserve. Their landscape context is late-successional and old-growth forest. Both these sites have been managed in the past and will continued to be managed to provide a recreational experience in a mature/ old-growth forested setting. This is compatible with ACS-1. Mckinley Camp is in the Matrix part of the District. Mckinley Camp's landscape context is early to mid-seral with late-successional legacy elements providing refuge and connectivity. Mckinley Camp is a diverse setting providing wetland, bottomland forest, and early seral conditions in addition to late-successional forest. This is compatible with the ACS-1 objective to provide diversity and complexity on the landscape.

*Additional discussion on ACS-1:* The Riparian Reserve provides for site level elements that are building blocks of landscape and watershed scale diversity. Consequently, this objective is also attained by maintaining and restoring the following Riparian Reserve Functions: large wood delivery to the streams/ large wood delivery to the riparian area/ water quality: temperature as affected by shade/ riparian microclimate/ wildlife habitat. These Riparian Reserve Functions are provided by the streamside trees and understory vegetation at all three sites.

*ACS-2: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These lineages must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

Under the Forest Plan, this ACS Objective is met by the Riparian Reserve land use allocation, which provides lateral connection between streams and upland sites, and longitudinal and drainage network connectivity along the lengths of streams on Federal lands. The refugia component is provided for by key watersheds and by the standards and guidelines designed to protect existing refuge areas inside the Riparian Reserves and promote restoration inside Riparian Reserves, which in time will increase the area on Federal lands that provide quality refuge areas for species that use aquatic and riparian habitats.

At the site level, this Objective is attained by maintaining and restoring the following Riparian Reserve Functions: large wood delivery to the streams/ large wood delivery to the riparian area/ leaf & particulate organic matter input to the stream/ wildlife habitat. These Riparian Reserve Functions are provided by the streamside trees and understory vegetation at all three sites.

Attainment of this Objective is also influenced by road location and stream crossings. All three sites are on roads built as major log hauling routes accessing public and private lands. These roads would exist with or without the parks. No roads are built inside the Big Tree Park for recreation and service access purposes. Big Tree Park does contain short trails with foot bridges. These bridges are either built on existing stream spanning windthrows or of light construction that would not impede a debris torrent. In all cases, the foot bridges do not alter the stream beds. Road ways inside Park Creek and McKinley Camp that provide public and service access to the rec sites are built on flat ground and do not cross streams.

*Additional discussion on ACS-2:* The intermittent stream that connects the small wetland in the north end of McKinley Camp to Middle Creek passes through an undersized culvert under the 27-11-7.0 Road. Right-of-way clearing and sidecast construction on the 27-11-27.0 Road removed the streamside myrtles, bigleaf maples and scattered shade tolerant conifers and resulted in red alder regeneration along the south side of Cherry Creek inside Big Tree Park. Replacing the culvert by McKinley Camp and alder conversion by Big Tree Rec Site are potential projects that would help attain the restoration component of ACS Objective 2.

*ACS-3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

This Objective is attained by maintaining and restoring the following Riparian Reserve Functions: root strength provided streambank stability/ large wood delivery to the streams/ water quality: sediment. These Riparian Reserve Functions are provided by the streamside trees and understory vegetation at all three sites. See discussion for ACS-8

*ACS-4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

This Objective is attained by maintaining and restoring the following Riparian Reserve Functions: root strength provided streambank stability/ large wood delivery to the streams/ water quality: temperature as affected by shade/ water quality: sediment/ wildlife habitat. These Riparian Reserve Functions are provided by the streamside trees and understory vegetation at all three sites. Root strength provided stream bank stability aspect of this Objective is covered under ACS-8. Other aspects of the sediment regime are covered under ACS-5. Vault toilets are provided at Big Tree and Park Creek Rec Sites to control fecal coliform contamination. These toilets are pumped as needed. Large groups applying for permits to use the McKinley Camp site are required to provide self-contained toilets.

*ACS-5: Maintain and restore the sediment regime under which an aquatic ecosystem evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.*

This Objective is attained by maintaining and restoring the following Riparian Reserve Functions: root strength provided streambank stability, large wood delivery to the streams, and water quality with respect to sediment delivery. These Riparian Reserve Functions are provided by the streamside trees and understory vegetation at all three sites. All three sites are located on flats at the base of slopes. Barring actions that undermine the toe of the slope (none are planned), activities at the base of the slope would

not increase the risk of slope failure. This Objective is also attained by controlling sediment delivery from road surfaces. No roads are built inside the Big Tree Park for recreation and service access purposes. The Cherry Creek Road, built for timber and protection access, does pass through the park reserve. Big Tree Park does contain short trails with foot bridges. These bridges are either built on existing stream spanning windthrows or of light construction that would not impede a debris torrent. Roadways inside Park Creek and McKinley Camp that provide public and service access to the recreation sites are surfaced with gravel, built on flat ground and do not cross streams. The gravel surface resists sediment production and the flat ground impedes sediment transport. Camping pads in the Park Creek Recreation Site are armored with gravel. The camping area at McKinley camp is well-sodded. Camping is not allowed at Big Tree.

*ACS-6: Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing (i.e., movement of woody debris through the aquatic system). The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.*

All three sites are at the toe of the slope. Roads in the parks used for recreation and service access are on flat ground with deep soils and therefore do not intercept and divert groundwater to the surface. These recreation and service access roads do not intercept streams and so surface runoff from these roads enters the forest floor and does not flow directly into streams. Management activities are unlikely to affect the percent of the BLM land in the Watershed considered hydrologically mature. Park Creek and Big Tree Recreation sites are forested and will remain so. The 2.5 acre opening at McKinley Camp has declined slightly in size since the 1940s due to woody vegetation encroachment. The McKinley Camp 2.5 acre opening represents 0.0068% of the BLM land in the Watershed or 0.0025% of the total area of the Watershed. The relative effects of evapotranspiration by the grass in the 2.5 acre opening, as opposed to evapotranspiration by a mixed stand of hardwoods and conifers, on stream flows are not known but likely are undetectable at the 5th field scale. There are no BLM plans to create additional openings inside the Riparian Reserves for recreation purposes. From time to time, individual trees inside the parks will be cut because they have become danger trees due to decay or injury. Loss of individual trees is not likely to have an effect on the overall water relationships because the remaining healthy trees will take advantage of the newly freed growing space by consuming the water previously used by the danger trees. Assuming hydrologic maturity is reached by stand age 30-years, presently 75% of BLM lands in the North Fork Coquille Watershed support hydrologically mature stands. Under the Forest Plan, the percent of BLM land in the Watershed supporting hydrologically mature stands will continue to rise until the year 2020 when it will level off at 88%. Loss of wood through logging and stream cleaning have resulted in a loss of roughness and spill resistance, in headwater channels. This may have affected the timing of peak flows inside the parks. Restoration of the timing of peak flows inside the park areas will depend on active and passive restoration outside the park boundaries.

At the site scale, the following Riparian Reserve Functions: root strength provided streambank stability/ large wood delivery to the streams/ water quality: sediment contribute to meeting this Objective.

*ACS-7: Maintain and restore the timing, variability, and duration of floodplain inundation and the water table elevation in meadows and wetlands.*

Conditions that help meet ACS Objective 6 also contribute to meeting ACS Objective 7. Also this Objective is attained by site scale decisions and actions that maintain and restore the Riparian Reserve Function of large wood delivery to the streams. Streamside trees capable of contributing wood are

retained at all three BLM park sites in the Watershed. Little down cutting attributable to management is evident at Park Creek and Big Tree Rec Sites. Middle Creek has down cut by Mckinley Camp. Reconnecting Middle Creek to its flood plain would require restoration efforts outside Mckinley Camp on lands owned by several different people, and cannot be accomplished by BLM working unilaterally inside the proposed park boundary.

*ACS-8: Maintain and restore the species composition and structural diversity of plant communities in riparian zones and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.*

This Objective is attained by maintaining and restoring the following Riparian Reserve Functions: root strength provided streambank stability, large wood delivery to the streams, large wood delivery to the riparian area, riparian microclimate, water quality: sediment, and wildlife habitat.

Analysis in the Riparian Reserve Functions table (for root strength provided streambank stability and water quality: sediment) raises concern for the loss of stream side shrub cover in Park Creek West (Section A). To place this concern in context, the streambank is forested so tree roots do provide resistance to erosion, and the scale is small. The sparse shrub cover along a 250-foot length of stream bank will not have a measurable affect at the 98,247 acre 5<sup>th</sup> field watershed scale<sup>1</sup>. However, the resulting erosion at the site is an avoidable condition.

*Additional discussion on ACS-8:* The developed parts of Park Creek and Big Tree Parks and all of Mckinley Camp are on unconsolidated parent material. Root strength can protect the sites from chronic surface and streambank erosion. However, a strategically located windfall or deposition of slide material in or near the developed part of one of these rec sites could cause the stream channel to shift render the rec site unusable. The most vulnerable areas are Park Creek West (Section A) and the picnic area in Big Tree.

Restore conditions at the Park Creek Rec Site by monitor vegetation recovery in those areas disturbed by park improvement work. If vegetation recovery is slow in those areas, then consider transplanting native plants. Consider marking boundaries around vegetation recovery areas within the park and educating the park users as to the importance of staying out of those areas until the vegetation recovers. Decommission the camp sites in Park Creek West that are next to the Park Creek when the improvements at those sites break or reach the end of their useful life.

*ACS-9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

This ACS Objective to provide habitat is maintained and restored by the Riparian Reserve provided large wood delivery to the riparian area, leaf & particulate organic matter input to the stream, shading of the stream from solar heating, and sheltering the riparian microclimate from upland disturbance.

Park Creek and Big Tree Rec Sites are managed to maintain a late-successional forested condition. Forest conditions are maintained on most of the land in the Mckinley Camp site. This includes the

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<sup>1</sup> The North fork Coquille Watershed contains about 1,060 miles of stream based on GIS data. This translates to about 11,193,600 feet of stream banks. Middle Creek Subwatershed, which includes the Park Creek Drainage, contains about 347 miles of stream or 3,664,320 feet of stream bank.

intergore and all land within 110 feet of Middle Creek. The open area in Mckinley Camp has been open ground since at least 1942. This has allowed 60 years for trees and understory vegetation to establish and fill the gap between the base of the tree canopy and the ground and by that block the microclimate effects associated with freshly created edges (Harris 1984). So long as these edge trees and shrubs are remain intact, they will protect the microclimate under the streamside trees from edge effects.

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