WATERSHED ANALYSIS RECOMMENDATIONS

Introduction

If a recommendation in this document conflicts with a decision document, or another current analysis document prepared by the BLM alone or in cooperation with the USFS, then the reader should give priority and use these documents in the following order:

- The Forest Plan ROD/ Standards and Guides
- The District ROD/RMP
- Other NEPA decision documents. These NEPA decisions must be consistent with the Forest Plan and the District RMP. However, site specific conditions may necessitate management actions other that those included among the watershed analysis recommendations.
- Recommendations in the South Coast - North Klamath LSR Assessment generally will take precedence over the recommendations in this Watershed Analysis on those LSR lands outside the Riparian Reserve. The LSR Assessment recommendations do not apply to lands outside the LSR.
- For lands that are both inside an LSR and a Riparian Reserve, the project ID teams should reconcile any conflicts that may arise between the Watershed Analysis recommendations and the LSR Assessment recommendations based on the site specific conditions in the proposed project area. The LSR Assessment and Watershed Analysis provide a landscape/ watershed scale context whereas the site specific analysis, completed as part of the NEPA process, takes into account the conditions on the project site. Since the LSR Assessment was reviewed and accepted by REO, recommendations in that document can be implemented without additional REO review. Proposed treatments on LSR land, not covered by the LSR Assessment or not previously exempted by REO, may require REO review.

The Records of Decision for the Forest Plan and the District RMP are decision documents. These documents define the decision space for management actions. The Watershed Analysis recommendations are advisory. These recommendations are based on a watershed perspective. Consequently, watershed analysis recommendations cannot address all the issues and problems that project ID teams find at the site scale. Based on a site specific analysis that considers the watershed context, a project ID team may find the best management action may be an activity other than those recommended in the Watershed Analysis.

Under the Aquatic Conservation Strategy, key watersheds, such as Cherry Creek and the Upper North Coquille Drainages, are the highest priority for watershed restoration. The watershed restoration component of the Aquatic Conservation Strategy identifies areas of focus for restoration activities (FEMAT 1993 pg II-38, II-40). They are:

- control and prevent road-related runoff and sediment production,
- improve the condition of riparian vegetation, and
- improve habitat structure in stream channels.

Site Identified Restoration Opportunities

Alder Creek: Give priority to completing density management and alder conversion treatments in areas accessed by 26-10-31.1; 26-10-31.3 and 26-10-30.4 roads and segment D of the 26-10-31.0 road. Following completion of silviculture treatments, storm-proof those roads by cutting water dips, and pull stream crossing culverts and associated fill with the objective of directing water intercepted by the road away from stream channels and onto the forest floor, reducing the risk of catastrophic failure, and reducing the risk of chronic sediment delivery to streams. Pull back unstable road sidecast on the upper

end of the 26-10-31.1 road[1]. Block the 26-10-31.1 road near junction with 27-10-6.2. Block 26-10-30.4 past access point to water hole. Design road stabilization and storm proofing so preserve option to do density management in 20 to 30 years. Design silvicultural treatments so that a reentry for density management will not be needed for 20 to 30 years.

On segments A, B, and C of the 26-10-31.0 road, replace the 2nd order stream crossing culverts with properly sized and positioned new culverts. Storm proof these crossings by installing water diversions (dips) across the road with armoring between the creek and the diversion crossing and on the fill slope side of the diversion crossing to dissipate energy and reduce erosion in a manner that directs water intercepted by the road away from stream channels and onto the forest floor. The objective is to reduce the risk of catastrophic failure, and reduces the risk of chronic sediment delivery to streams while maintaining administrative access to private land in W½ section 32, T.26S.,R10W. When the road is needed for hauling timber cut from private land, include storm proofing on completion of hauling in the conditions for use. Alternately, discuss options with the private company that desires keeping the segment open. Explore the option to "moth ball" the road until it is needed at a later date. Moth balling would involve installing water bars, remove stream crossing culverts and associated fill, and leaving cross drain culverts. When the road is needed again, install properly sized culverts at stream crossings and reshape the road. Storm proof the road when hauling is done and moth ball the road when regular administrative access is no longer needed.

Replace culvert on lower tributary to Alder Creek under the Alder Creek Road (27-10-6.2). This stream crossing is south of the 27-10-6.2 and 26-10-31.0 junction.

Restore Alder Creek flood plain by pulling fill on previously closed segment D of the 27-10-6.2 road.

Bay Creek: Control sediment eroding from the power line road that is entering Bay Creek in NW corner of sect. 29, T.27S., R.11W.

Cherry Creek: In order to meet objectives for Tier 1 watersheds and to protect the Cherry Creek Natural Area's function as a place for scientific research, give priority to completing density management and conversion treatments accessed by the D & E segments of Cherry Creek Mainline Rd (27-11-27.0) and N. Fk. Cherry Ck Rd (27-10-18.0) conversions to include restoration of mixed streamside stands along Cherry Creek that were converted to red alder by road sidecasting. Use intact streamside stands on the north side of Cherry Creek and on the North Fork Cherry Creek as reference stands. Based on the species composition in those reference stands the planting stock for the reaches to be restored should include bigleaf maple, myrtle and western redcedar. After silvicultural treatments are complete, pull culverts at stream crossings, and storm proof the Cherry Creek Mainline Rd east of Big Tree Park and the North Fork Cherry Creek Road. Construct trail segments where culverts are removed to allow these road segment to be used by foot and mountain bikes for management, monitoring, and recreational purposes.

Restore streamside stands on BLM land next to Cherry Ck Mainline Road west of the Big Tree Park that were converted to alder by logging and road sidecasting. The 1950 aerial photographs and intact stream side reference sites indicate the predisturbance stream side stands were dominated by myrtles and bigleaf maple. Use the 1950 aerial photographs and intact reference areas to indicate appropriate species mixes to plant in the alder conversion. Restore conifers to sites that supported conifer prior to logging and road construction that are now dominated by red alder.

[1] Putting the upper end of the 26-10-31.1 road back into driveable condition would require pulling back the failing sidecast material and realigning of the road grade.

Convert the alder dominated stand to the south of the Cherry Creek at Big Tree Rec Site to a conifer dominated stand. Retain the releaseable conifers, myrtles and bigleaf maples already present on that site.

Big Tree Park - Limit brush cutting to that necessary to control exotic plants (blackberry vines). Convert the red alder stand between the road and Cherry Creek from alder to mixed myrtle, bigleaf maple and western redcedar stand near the stream and a conifer dominated stand back away from the stream. Use the stream side stand next to North Fork Cherry Creek as a model. Provide at least one fire pit, otherwise, park users are likely to build their own fire rings. Continue to manage the site for light day use and educational purposes. Continue to discourage overnight use.

Uplands Sites on the North Side of Cherry Creek Ridge - Restore upland sites accessed by the Cherry Creek Ridge Road that formerly supported late-successional conifer stands that now support mixed conifer-alder or are now alder dominated using a combination of alder conversions, release treatments, and thinning with underplanting of shade tolerant trees. On appropriate sites and where stocking levels allow, add wood to steep 1st and 2nd order draws with the objective of trapping sediment and increasing spill resistance. Following treatments close existing and new spurs for wildlife habitat purposes.

Storm proof the 27-11-25.1 road in a manner that directs water intercepted by the road away from stream channels and onto the forest floor, reduces the risk of catastrophic failure, and reduces the risk of chronic sediment delivery to streams while maintaining administrative access to private land in NE¼, section 24, T.27S.,R11W.

Johns Creek: The 10-foot diameter culvert, in the location shown on figure 1, blocks fish passage. Remove, reposition or modify the culvert to allow passage of fish and other aquatic organisms. Continue monitoring and maintaining the alder conversion project sites upstream from the 10-foot culvert and below the 29-11-7.1 road.

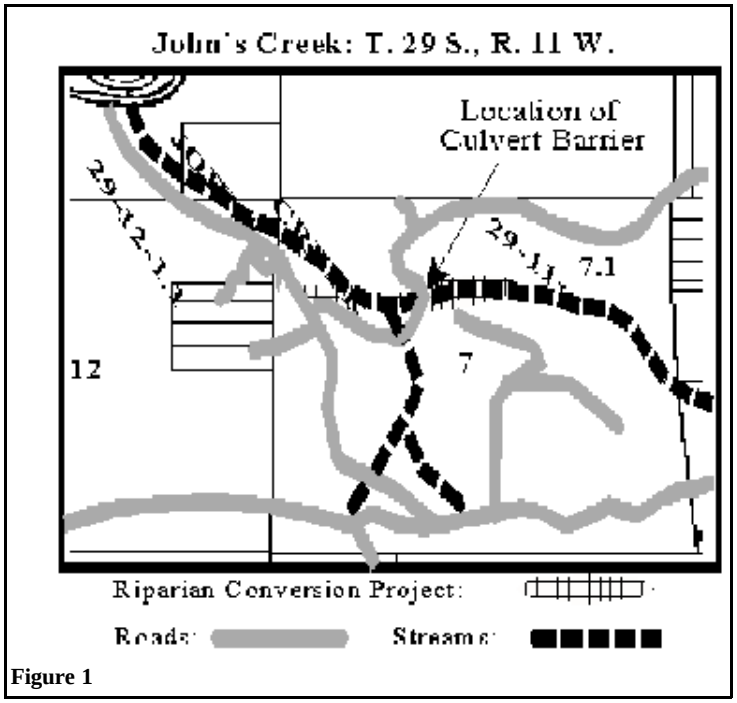

Figure 1

Little Cherry Creek: Little Cherry Creek is in the Cherry Creek Tier 1 watershed and therefore a high priority area for restoration work. Complete conversion and density management work accessible from Little Cherry Ck Spur (27-11-25.0) and storm proof the road by pulling stream crossing culverts and associated fill and adding water dips/ water bars to divert water off of the road surface with the objective of directing water intercepted by the road away from stream channels and onto the forest floor, reducing the risk of catastrophic failure, and reducing the risk of chronic sediment delivery to streams. Design silvicultural treatments and road storm proofing so that the road would not be needed again for 20 to 30 years.

Upland Sites on the South Side of Cherry Creek Ridge - Restore rockland associated dry prairie south of the Cherry Creek Ridge Road in order to protect plant species of concern found there and to maintain scarce special habitats. Restoration activities potentially could include cutting and removing trees from

areas marginally suited to tree growth, burning, seeding with locally collected/ locally adapted native species, and noxious weed monitoring and control. Historical records, fire history data and the presence of the dry prairie suggest the stands on this south slope experienced frequent fires that may have maintained open grown conditions. Therefore in addition to restoring the former extent and condition of the dry prairie, restore open stand conditions by thinning the adjacent south facing stands to wide spacings and instituting underburning when the trees are old enough to tolerate ground fires.

Middle Creek: Replace/ improve culverts under the Middle Creek to restore fish passage to Lost Creek, and to the unnamed tributary to Middle Creek above Honcho Creek.

The "culvert from hell" under the Middle Creek Road is failing and should be replaced. The failure is due to the deep fill causing the plastic culvert to collapse. The culvert is too small to pass the bed load. Replace with a larger metal culvert.

Assess need for additional cross culverts on the 27-11-21.1 road above the active slump in section 21, T27S.,R11W. The slump location is identified in the TPCC.

Mckinley Camp Rec Site - Upgrade the culvert under the 27-11-7.0 road to 18 inches. There are no other recommendations so long as Mckinley Camp remains a lightly used undeveloped group camp.

Moon Creek: Retrofit culvert on lower Moon Creek to improve passage for aquatic organisms.

North Fork Coquille - Tier 1 Watershed Reach: The Upper North Coquille Drainage is a Tier 1 watershed and therefore is a high priority for restoration. Reduce risk of road related debris torrents by stabilizing and storm proofing the 26-10-20.0 road. The high risk segment in near the beginning of the road where it crosses a headwall above Gatewood Creek. If road closure is necessary to protect Gatewood Creek from road related debris torrents then give priority to completing density management work accessed from that road. Design the density management treatments to minimize the frequency of reentry. Construct trail segments where culverts are removed to allow foot access on the road for management, and monitoring purposes.

Following completion of line pulling project close the 26-10-17.4 road. Storm-proof the 26-10-17.4 road and pull culverts at stream crossings with the objective of directing water intercepted by the road away from stream channels and onto the forest floor, and reducing the risk of chronic sediment delivery to streams.

Approach the owner of the 26-10-7.0 road segment that crosses BLM land in section 7, T.26S.,R.10W. to see if they are willing to relinquish control of that segment. If so, inspect and stormproof the road as needed and convert the road segment in to foot access trail for management, monitoring, and recreational purposes.

Should the opportunity occur to do mutually agreeable land exchanges, trade for the S½ section 21, T.26S.,R10W.

North Fork Coquille - Below Tier 1 Watershed Reach: Replace culvert on the North Fork Coquille River tributary inside Laverne Park that is approximately 0.5 mile up road 27-11-5.0. This would reopen fish passage to approximately 1/4 mile of good fish habitat on BLM land with an old growth streamside stand.

Pull remaining fill where stream crossing culvert on the 27-11-7.0 road failed in the SE¼SE¼ of section

7, T.27S.,R11W. Pull road fill in swale between failed culvert and gate.

Park Creek: At Park Creek Rec Site, 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 that are adjacent to the Park Creek when the improvements at those sites break or reach the end of their useful life.

Vaughns Creek: Complete density management and other projects accessed by the road 27-10-8.1 beyond where that road crosses the head of an active slump feature in section 8, T.27S.,R10W. Pull culverts at stream crossings and storm proof the road. The objective is to prevent road associated runoff from entering the slump feature. The objective to storm proofing and pull culverts beyond the slump feature is to direct water intercepted by the road away from stream channels and onto the forest floor, reduce the risk of catastrophic failure, and reducing the risk of chronic sediment delivery to streams.

Mid-slope Roads and Peak Flows: The road segments that will likely have the greatest impact on peak flows are midslope road segments whose road cuts intercept most of the soil profile, and whose running surface and ditch line flows are delivered to streams. These conditions suggest midslope road segments on the moderate to steep slopes with moderate to shallow depth soils are likely to have a greater potential for converting subsurface flows to surface flow and are therefore the higher priority sites for restoration work than are the midslope road segments on gentle to moderates slopes with deep soil profiles. In the North Fork Coquille Watershed, the combination of moderate to steep slopes with moderate to shallow soils will be most frequently encountered on the Tyee formation. Assess the need for restoration treatments on the following midslope roads on the Tyee formation:

- Cherry Creek Tier 1 Watershed: 27-10-25.0 (Little Cherry Creek Spur), 27-14-27.0 segment E (Cherry Creek Mainline)
- North Coquille Tier 1 Watershed: , 26-10-17.3, 26-10-16.0
- Middle Creek: upper half of segment F on 27-11-29.0 (Middle Creek Road switchbacks), 27-11-12.0 where road climbs from foot of slope to ridge (Burnt Mtn Road in section 13, T.27S.,R.11W.), 27-10-4.1 where that road climbs from creek bottom to ridge top (Honcho Ck Rd in section 33), 27-10-5.1 & -5.2 (Mungers Road area), 27-11-13.0 segment A (Old Man's Road),
- Little North Fork Coquille: 26-10-19.1, 26-11-33.0 where that road traverses section 19, T.26S.,R10W.
- Alder Creek: 26-10-30.4, 26-10-31.0, 26-10-31.1.

Restoration treatment may include:

- altering the subgrade of midslope roads, which are no longer needed, to improve permeability for subsurface water flow.
- reducing the delivery of water from road surfaces and ditch lines to streams by improving and maintaining cross drainages so that water is redirected away from channels and onto the forest floor. The number and positioning of the cross drains should allow surface water from the road right-of-way to infiltrate into the soil as opposed to cutting new surface channels that could connect with the stream system.

Candidate sites for alder and brushfield conversions identified in a previous analysis include

- Wimer Creek: Sect. 19, T.28S., R.11 W.
- Llewellyn Creek Tributary: Sect. 35, T.28S., R.12 W.
- John's Creek: Sect. 7, T.29S., R.11 W.

Maps of these sites are in the Appendix: In Stream Large Woody Debris Recruitment Potential.

Port-Orford-Cedar: Inventory the following areas for POC second growth trees.

- Vaughns Creek-Mungers Road Area: Sections 5, W ½ of 7, E ½ of 8, T.27S., R.10W., and SW ¼ of section 31, T.26S., R10W.
- Wimer Creek: Section 19, T.28S., R.11W., and section 25, T.28S., R.12W.
- Llewellyn Creek: Section 35, T.28S., R.12W.

If POC is found in sufficient numbers to merit active management for the species, apply POC root rot control measures. These may include eradication of road side POC, thinning, and gating access roads so that the POC sites can be closed to winter traffic.

Bat Habitat: Improve bat roosting opportunities by installing bat boxes or other structures on the following three BLM-controlled bridges:

Site name	Legal	Improve roost potential
Middle Creek - S Bridge	27S-11W-12 SE	X
Middle Creek Road at Alder Creek	27S-10W-6 SW	X
Moon Creek Road/N. Fork Coquille Road jct.	26S-10W-17 NW	X

Erosion Processes

Follow Best Management Practices (BMP). The BMPs are listed in the RMP/ROD Appendix D (USDI 1995) with additional erosion control practices listed in RMP/ROD Appendix E.

Where the Coos County Soil Survey (Haagen 1989) shows Whobrey and Etelka soils on BLM land, review the TPCC and add mass-movement restricted (FPR) to the fragility classification on appropriate sites. When proposing soil disturbing projects on Whobrey and Etelka soils, consider the range of problems associated with these soils (severe shrink-swell, low strength, shallow rooting depth, potential for chronic sediment delivery, and propensity to slump).

When proposing soil disturbing projects (particularly road construction) on gentle and moderate slopes, consult the Bealieu and Hughes (1975) geologic hazard maps. More recent geology maps, when available can show additional landslide debris features. Check the site for landslide debris and the potential for slumping and earth flows. Use appropriate engineering techniques where these features occur.

Vegetation

Note: See also the Density Management and Conversion Treatments and attaining Riparian Reserve Function recommendations.

Hardwood Management - species other than alder: On previously logged sites with stump sprouting myrtles and bigleaf maples, culture those species to encourage large single stem trees. Plant myrtles and bigleaf maple on stream side sites that formerly supported those species, but where stump removal or side casting, as part of road construction, eliminated those species from the site. Improve the potential for dispersal of ash, willows, myrtle and maples to suitable sites. Refer to *Hardwoods of the Pacific Northwest* by Niemiec *et al.* (1995), and to the plant section of the Fire Effects Information System < http://www.fs.fed.us/database/feis/plants/ > for additional information on site selection and stand management.

Alder Stand Conversion to Conifer or Mixed Stands: Units listed in the Forest Operations Inventory (FOI) with a recommended treatment to “convert”, and hardwood stands classified as “medium” and “high” on the CWD Recruitment Potential Map in this document indicate potential areas for alder conversion pending site specific examination. FOI recommendations to convert made before 1990 did

not distinguish between red alder that invaded following harvest and naturally occurring hardwood stands. The data used to create the CWD Recruitment Potential Map do not distinguish among the hardwood species or stand origins. Therefore, additional field work and aerial photo examination is needed before proposing alder conversions on these sites.

- On appropriate sites, manage for durable large woody material that can be recruited as instream structure for both hydrologic function purposes and to provide complex aquatic habitats. This includes both streamside sites suitable for growing trees that can fall directly into a stream, and headwall areas, which through headwall failure resulting in a debris avalanche/ debris torrent, could contribute CWD to low gradient streams.
- Use early aerial photos that show the premanagement condition, and intact riparian zones as reference stands when developing riparian regeneration and conifer release projects. Because more than one stand succession trajectory is possible on most sites, there is no one correct species mix. Manage for a species mix that is plausible, under wild conditions, as determined by species already on the site, observations on comparable sites, and site indicators. Retain all bigleaf maple, myrtle, Oregon ash, crab apple, willow, and existing vigorous conifers unless there is a compelling reason to do otherwise.
- Give priority to providing growing space for releasable existing conifers in mixed and hardwood dominated riparian stands.
- When evaluating a riparian hardwood stand for possible replacement with conifers, check for evidence of past debris avalanches, and consider the potential for future debris avalanches. For example, a third order or larger stream may have historically had an alder-dominated terrace because both the terrace and the alders are a direct result of past debris avalanches. When considering converting an alder stand to conifer on such a site, check aerial photos to see if alders were on the site before it was first logged. Also, consider the branching angles and gradients of the up stream tributaries. If the site was likely subject to frequent[2] debris avalanches, the best course of action may be to leave the alders on the terrace and reestablish conifers on the adjacent slopes.
- On unstable lower slope locations, release of bigleaf maples, and conifers, particularly western redcedars, is desirable. Small scale planting of western redcedar or bigleaf maple on unstable lower slope locations may be worthwhile where there are few other options for obtaining coarse woody debris over very long reaches. Planting should be considered experimental for now. The probability of converting these sites to conifer by planting is low on sites with active soil movement. Leaving these sites in native shrub, and/or alder will retain shrub and hardwood habitats on appropriate sites.

Data Management: Review and update the FOI data base using Landsat imagery and aerial photos so it more accurately reflects the number and distribution of hardwood stands.

Review FOI units, with a recommended treatment of "hardwood stands do not convert,"and correct polygon mapping, and timber typing as the needed. Make preliminary recommended treatment and schedule field review to verify and refine treatment recommendations and timber type.

Port-Orford-Cedar: Use an adaptive management approach to POC root disease control that incorporates the recommendations in the Port-Orford Cedar Management Guidelines (Betlejewski 1994), or subsequence BLM POC root disease management guides that are appropriate to each site.

Wolvery/Etelka Soils: There is a high probability of blowdown after disturbance on Wolvery/Etelka soils. This should be a consideration during the NEPA process when looking at green tree retention, thinning, and snags. These soils are mapped in the Soil Survey for Coos County (Haagen 1989). Site

[2] For planning purposes, "frequent" is a repeating return period shorter than 80 to 100 years. This is based on both the amount of time needed to grow 20-inch and larger conifer, and life expectancy of red alder.

level surveys may identify additional small pockets of these soils in the southwest part of the Watershed.

Fire and Vegetation Management: Blue blossom ceanothus commonly germinates on the ridgetops and south to west aspects following broadcast burning or wildfire on valley side locations in the Watershed occupied by grand fir, tanoak and poison oak. This should be a consideration when planning site preparation and reforestation activities.

Hydrology and Stream Channel

Continue collecting streamflow, water temperature and turbidity data at the stream gaging sites. We need this data to evaluate trends and affects of management activities in the future.

Establish permanent channel cross section monitoring sites to determine channel stability and evaluate changes in channel morphology.

Where practical, close the roads located on flood plains and streamside roads that confine stream channels. As part of closing these roads, remove culverts and re-contour slopes at the stream crossings.

Upgrade all culverts to accommodate a 100-year flood event, reduce flow velocities, allow free passage of sediments and debris, and allow for passage of vertebrate and invertebrate aquatic species.

Meet or exceed Oregon Department of Environmental Quality (DEQ) standards for non-point source (NPS) pollution and water temperature. The following are several strategies to consider for restoring degraded channel conditions, water quality, and riparian and flood plain habitat and function:

- Restore the structural integrity of historic riparian vegetation through the use of tree planting, thinning, and species conversion.
- Design and place log and rock in-stream structures at suitable sites on public and private lands, in conjunction with Watershed Associations, to restore and enhance habitats and the stable dimension, pattern and profile of stream types.
- Look for opportunities to restore incised stream channels by designing and/or creating new stream channels or reconnecting old oxbows on top of abandoned flood plains.
- Remove, resize or retrofit improperly sized culverts to reduce flow velocities, allow free passage of sediments and debris and allow for passage of vertebrate and invertebrate aquatic species.
- Look for opportunities to decommission, reroute or improve drainage on existing or abandoned roads. Highest priority should be given to streamside and midslope roads.

To help restore summer low flow patterns, convert red alder stands that came in following harvest of conifers. In appropriate stream reaches add structures to the channel that can trap substrate, and by that increase water storage in channel and raise the watertable on adjacent land.

Water Quality

Due to the land ownership pattern (17% BLM, 83% private/county) in this Watershed, the BLM should strongly support the Coquille Watershed Association in completing restoration activities on private land. This support is especially critical when the association is working on low gradient flood plain reaches. These are extremely sensitive systems that provide critical aquatic habitat.

Continue water temperature monitoring. Expand the scope of monitoring to the tributary streams so to determine the location of trouble spots.

Assess whether beneficial uses are impaired be sedimentation. This may be accomplished by collecting

and analyzing data on aquatic communities, primarily macroinvertebrates, using methods that will allow sharing results with ODEQ. Use multiple samplings across a range of stream habitats and through time to establish baseline conditions and trends.

Manage stands to develop muli-layer canopies above 4th, 5th, and north flowing 3rd order streams so to provide redundant shading.

Use aerial photos to determine prelogging distribution of hardwood, mixed and conifer stands and use that information to help set stream buffers next to alder conversions.

Reestablish streamside myrtles, bigleaf maples and western redcedars on those locations where those species were lost from the site due to past management activities (primarily in road sidecast areas).

As part of during density management treatments add wood to A & Aa streams that are deficient in wood to increase spill resistance and store sediment.

Include the District Haz Mat Coordinator on all ID teams for proposed projects in section 27, T.27S.,R12W. and on all proposed aquatic habitat projects in Steele Creek down stream from the landfill site.

Species and Habitats - Aquatic

Instream Habitat Restoration: Use instream habitat data (ODFW stream surveys where available) to locate potential restoration opportunities. Add wood and boulder clusters to streams where that would be benefit aquatic organisms.

Riparian Restoration: Use conifer release or alder conversion techniques to reestablish conifers within suitable riparian areas. Conifers have a difficult time establishing and surviving within the natural stream bank disturbance zone. Generally this disturbance zone is within 10-feet of the stream channel. Therefore, retaining a no-cut buffers that are at least 10-feet wide next to the stream channel and reestablishing conifers farther back from the stream planting outside that zone should help meet short term objectives using passive restoration and long term objectives using active restoration. The 10-foot wide no-cut buffers recommended here represent the minimum width[3]. Optimizing attainment of both short term and long term Riparian Reserve function may require wider no-treatment and/or special treatment buffers. For example, the 1950 aerial photos indicated myrtles and maples dominated stream side areas up to 50 feet either side of 4th and 5th order streams and wider where these streams have wide flood plains. Restoration in those reaches may depend on retaining or regenerating myrtles and bigleaf maples on suitable stream side areas. See the Density Management and Conversion Treatment and Attaining Riparian Reserve Function recommendations subsection.

Consistent with the Timber Management Guides TM-1a, b, and c (USDA; USDI 1994 pg 31-32), and Best Management Practices (USDI 1995 pg D-2) retain on the site, or relocate within the Riparian Reserve or place in stream, the woody material that blows down across the roads that are inside the Riparian Reserves.

Culverts: Complete culvert condition surveys on BLM controlled roads and at perennial stream crossings. Set priorities according to aquatic organism values and refuge habitat access:

[3] On most sites, the objective to protect root strength and associated protection against stream bank erosion, will result in no-treatment stream side buffers wider than 10-feet.

- Replace culverts found to be barriers to fish passage as funding becomes available. When funding is not adequate to fix or replace all fish barrier culverts, base culvert replacement priorities on the availability of habitat above the crossing, and on the relative constraint to passage caused by the existing culvert.
- Fish distribution should guide culvert repairs. Culverts crossing perennial streams above the known range of fish distribution should receive the next highest priority for inspection and repairs.
- Where the stream gradient at the crossing location will allow, design stream culverts so they will obtain and retain a natural surface substrate that will aid in dispersal of amphibians and aquatic species.

Consideration should also be given to sharing the cost of culvert replacements on private lands through cooperative projects with Coquille Watershed Association.

Transportation Management Objectives: From an aquatic protection perspective, streamside and midslope roads in the Tier 1 watersheds and the LSR are the highest priority for closing. Consider future access needs when selecting methods for closing roads. Where opportunities exist, pull all culverts crossing perennial streams and decompact the road surface by subsoiling or by other appropriate means suited to the site. Work with right-of-way agreement permittees to close as many roads as possible. Specific roads identified for closing, based on a combination of resource and access needs, are listed in the TMO data base.

Watershed Scale Cooperation: Work closely with the Coquille Watershed Association to develop restoration opportunities on private lands. Set priories for proposed projects, regardless of ownership, to achieve the greatest restoration benefits.

Aquatic Habitat Restoration

To achieve the ecosystem management goals and objectives of the Northwest Forest Plan and the District RMP, aquatic restoration projects should be designed to mimic the physical and biological characteristics of natural stream systems to the greatest extent possible. These projects should incorporate natural structural components, such as large down wood and boulders, and be designed to provide the complex habitats necessary to support full range of native species associated with these aquatic ecosystems. Additionally, instream projects should be patterned to mimic structural features of physically and hydrologically similar natural streams, and located based upon drainage level analyses of restoration needs rather than individual reaches.

Debris torrents are the primary material delivery mechanism to downslope fish bearing streams. The restoration of large conifer as a component to hillslope processes will provide large wood to the stream channels in the future. Streams, on steep slopes, that form confluences converging at angles of ?45° are important for delivering boulders, gravel, and large woody material to downstream fish bearing streams. Other important sources of large wood are the steep straight tributaries that feed directly into fish bearing streams. Many of these sites are now dominated by red alder trees that regenerated following a management disturbance. These sites are priority locations for reestablishing conifers. Treatments should be concentrated within one to one and a half site potential tree widths from the stream channel.

Select in-stream project sites with the assistance of a hydrologist. The Rosgen (1994, 1996) stream classification system and Rosgen and Fittante's (1986) suitability guidelines for selecting and evaluating in-stream fish habitat improvement projects are tools that can help match the appropriate types of projects to stream and valley form characteristics.

On sites where an abundance of large conifer trees exist, tree lining/cutting should be considered to provide long term structural complexity. The following items should be considered when tree lining is

proposed:

- At each site, select a large live tree that can serve as a "key", spanner conifer log, 2 to 3 times the width of the active channel, with root wad attached. This log should be placed perpendicular to, or angled downstream from, the stream channel.
- A minimum of 2 additional live conifer "brace" logs should be selected and placed on top of the key piece and at an angle to the key log. This will provide different obstruction angles for high stream flows to interact with streambanks and flood plain.
- Additional hardwood trees could be added to the accumulation to contribute twigs, branches, and additional edges.
- Consider other wildlife needs when designing this type of project.
- If line pulling/cutting creates individual gaps greater than a 10^{th} of an acre the ID team should evaluate the need for further treatments to facilitate tree regeneration.

Avoid placing cut logs of lengths less than 2 times the active channel width in the stream channel. Shorter logs potentially could be floated downstream. Anchoring shorter logs at a site using boulders is an option. Steel cable should be avoided.

Large whole conifer trees or large conifer logs should be incorporated into the design and configuration of existing or future boulder weirs, vortex weirs, boulder clusters, or boulder/log jams. Large boulders should be used as anchors/wedges to secure logs in place. Structures should resemble the remnants of a debris torrent or land slide which were the dominant natural in-channel habitat feature in steeper areas in the Watershed.

Log jams are important contributors to the biologic and hydrologic process of streams and rivers. They are especially important in maintaining watertables for low flow releases, and for causing interactions of the stream or river with the flood plain. Log jams should be retained unless there is compelling risk of damage to the environment or property (USDI 1995 pg D-2). An interdisciplinary team (ID) including a hydrologist should review all log/debris jam removal proposals to evaluate both ecological affects and risks to adjacent landowners. This ID team should consider ways to modify the log jam without total removal to meet desired habitat objectives, while assessing the risks to adjacent private property and fish passage. Access to important spawning or rearing habitat should be maintained.

Coordinate with ODFW to relocate problem beavers trapped on agricultural lands to streams on BLM lands.

Species and Habitats - Wildlife:

Threatened and Endangered Species: Implement BLM Policy 6840.06(A) for threatened and endangered species with emphasis on the following:

- Conserve T/E species and the ecosystems on which they depend.
- Ensure that all actions authorized, funded, or carried out by the BLM are in compliance with the ESA.
- Cooperate with the FWS/NMFS in planning and providing for the recovery of T/E species.
- Retain in Federal ownership habitats essential for the survival or recovery of any T/E species, including suitable habitat that was used historically by these species.

The recovery plans for marbled murrelet, northern spotted owl, peregrine falcon and bald eagle outline specific goals. Implement these Plans and follow their steps to provide secure habitats and increase populations to levels where it may be possible to delist the species. Follow project design criteria from current FWS Biological Opinions to reduce detrimental effects of projects which may affect these

species.

Bald Eagle (There are currently no known bald eagle nest sites within the watershed, but there have been several bald eagle sightings).

- On suitable sites, inside the Riparian Reserve and LSR, design density management treatments to obtain and retain habitat favorable for bald eagle. Suitable sites are ridges and windward slopes that are within approximately 1-mile of larger rivers and streams.
- Design density management treatments to obtain large dominant trees with an open branching pattern, and to obtain large snags.
- Design Matrix timber sales, on those sites where field examination finds a potential for bald eagle habitat, to include retaining and culturing large open branched trees, large snags, and protective screens.

Special Status Species (Not Federally Listed): Meet the general management objectives for species of consideration:

- Ensure that actions authorized on BLM-administered lands do not contribute to the need to list special status species under provisions of the Endangered Species Act (BLM Policy 6840).
- Maintain or restore a landscape conducive to movement of individuals among habitat patches.
- Retain red alder on locations where frequent natural disturbance maintained the presence of alder prior to logging and road construction. This is to protect habitat for the white-footed vole.

Survey and Manage/Protection Buffer Species: Maintain the viability, at both site-specific and range-wide scales of Survey and Manage/Protection Buffer Species. Apply the appropriate protocols during project planning so as not to impact species viability. In addition:

Red tree vole

- As required by current protocols, conduct pre-project surveys for red tree vole habitat disturbing projects if the proposed project would remove or modify conifer canopy structure or alter the microclimate within the stand.
- Protect known sites according to current management recommendations.

Mollusks

- As required by current protocols, manage known sites to maintain local and range wide viability of those species. This may include a variety of management options based on species, number of locations found, amount of adjacent areas surveys (particularly reserve areas).
- Survey reserve areas to determine abundance and distribution of these species across the landscape. If locations are found within reserve areas, these will provide flexibility in managing those sites located within project areas.
- Retain hardwoods, especially bigleaf maple, for those species that are dependent on their litter fall.
- Survey riparian reserves for the papillose tail-dropper, blue-gray tail-dropper, and Oregon megomphix when Riparian Reserve adjustments are proposed. Maintain existing riparian reserve widths in areas where these species are found.
- Maintain ample supplies of down wood as well as a distribution of all decay classes across the landscape to the extent possible.

Bats

Improve bat roosting opportunities by installing bat boxes or other structures on three BLM-controlled bridges listed in the site identified restoration opportunity section. Pursue a partnership with the Coquille Watershed Association to install bat roosting structures under suitable bridges in the analysis area. Select bridges that are warmed by the sun for improving bat habitat. However in the interest of

protecting cool stream temperatures, no treatments to intentionally increase the exposure of bridges to sun light are recommended. On an experimental basis, consider installing bat boxes or other bat habitat improvement structures in large culverts (>6' high) such as on John's Creek.

Snag Management on Matrix Land: Manage second growth stands to attain the snag sizes, numbers, and decay classes that will support 40% of potential population levels of those primary excavator species that can use 17-inch and smaller snags by age 50-years, and all primary excavators by time of regeneration harvest. Techniques could include but are not limited to using commercial thinning, individual tree culturing, snag creation as part of timber sale projects, or green tree retention with snag recruitment from those green trees in the future.

The following table shows the minimum sizes and numbers of snags that will meet the 40% population level objective:

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 40 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)			
Number of snags needed to support a 40% population	11+	3	3	6	2.4	0.1
	15+	95	0	95	38.0	1.0
	17+	40	10	50	20.0	0.5
	25+	2	0	2	0.8	0.0
	Totals:	**140**	**13**	**153**	**61.2**	**1.5**

If any hard snags smaller than 19 inches, or any decay class 3 snags larger than 19 inches are used to meet the 40% standard for snag habitat in the Matrix, then we will need to retain an equal number of green trees, in addition to the ROD/RMP required green tree retention, to provide for future snag recruitment. Alternately, we could create sufficient snags from 19-inch and larger trees, at the time of the regeneration harvest, to insure meeting the hard snag component of the 40% habitat requirement with 19-inch+ decay class 1 and 2 snags. These actions will make it possible to comply with the 40% snag habitat over the near term standard and guidelines in the District RMP.

The following table shows the number of snags/ acre we need to retain in a regeneration unit to meet the RMP/ROD requirement to provide a least 40% snag habitat levels on Matrix land, with the per-acre requirements met on average areas no larger than 40 acres, in those areas where there are no suitable snags outside the regeneration unit boundary:

Regeneration unit size	Area outside the regeneration unit but inside the 40-acre neighborhood	Total number of snags needed to meet the 40% snag level in the 40-acre neighborhood	Snags/ acre needed on the regeneration unit, following harvest, if there are no suitable snags in the 40-acre neighborhood outside the regeneration unit.
40-acres	0	61.2	1.53
30-acres	10-acres	61.2	2.04
20-acres	20-acres	61.2	3.06
16-acres	24-acres	61.2	3.8
<16-acres	>24-acres	Increasing snag densities to greater than 3.8 snags/ acre inside the regeneration unit boundary may not result in greater numbers of primary cavity excavator birds. This is because territory size or other factors may be more limiting than snag numbers. Therefore, when the regeneration unit is less than 16-acres, ID teams should establish snag retention levels based on an estimate of the number of primary excavator birds that can occupy the 40-acre neighborhood.	

Snag Management: In the Riparian Reserves and the LSR, manage snags to meet the 100% population potentials for cavity dependent species (3.8 snags per acre). Recruit snags in drainages that are below the 40% population level, and allow drainages above this percentage to naturally reach the 100% level. Inventories on densities and composition would be needed before this recommendation could be implemented. See Brown *et al.* (1985) for snag composition and distribution recommendations, and the LSR Assessment for additional recommendations concerning snags in the LSR.

Consider the risk of bark beetles when determining snag recruitment needs. If the combined recruitment needs for down wood and snags, with diameters greater than 10 inches, require killing four or more trees per acre, consider spreading the recruitment across two or more seasons. The need to limit killing trees for snag and down wood recruitment in any one year is greater on shady sites, such as thinnings, than on sites that are fully exposed to sunlight.

The Aquatic Conservation Strategy and the Density Management and Conversion Treatments recommendation sections contain snag recommendations for the Riparian Reserve.

Scheduling Projects and Road Closures: Avoid chronic ongoing disturbance by concentrating management activities spatially and temporally. To the extent practical, coordinate road closures with efforts to complete maintenance and restoration projects so when we finish the maintenance and restoration work we can close the road with the expectation that we will not need the road again in the foreseeable future.

Schedule regeneration cuts in the Matrix in a way that minimizes fragmentation:
- Harvest spatially disconnected late-successional patches before harvesting stands that are connected to large contiguous late-successional blocks.
- Select regeneration units from the edge of late-successional blocks instead of from the interior of large contiguous blocks

Density Management Inside the Riparian Reserves to Provide Wildlife Late-Successional and Connectivity Habitats:
- Meet ACS objectives by using an appropriate mix of passive and active management. The most sensitive parts of the Riparian Reserve, with respect to the near term benefits provided by the forest vegetation to the aquatic system, are those areas within a zone whose width is equal to one-half the average height of the overstory trees. Outside that zone, ID Teams will have greater flexibility in both meeting ACS objectives, and providing for connectivity and benefitting late-successional associated species.
- Maintain at least a 40% canopy closure overall. Otherwise, follow the density management recommendations in this document. Entries in the column titled “Density Management based on conventional commercial thinning spacings” on table DM-1 describe the limitations and benefits that come with managing for connectivity. The projected conditions given in that column were based on a 120 trees/ acre post-treatment stocking level. That stocking level was selected for analysis purposes only. Higher or lower stocking levels may be more appropriate depending on the conditions on a proposed project site. Managing for late-successional characteristics is addressed under the column titled “Density management with the objectives of rapid diameter growth for overstory trees and regenerating an understory”.
- To obtain the sizes and numbers of trees, down wood and snags recommended in this document, consistent with retaining at least a 40% canopy closure, consider creating small gaps and/or wide spacing around individual trees to obtain some coarse limbed trees for nesting habitat, for future large snag and large down wood recruitment, and to provide large wood to meet ACS objectives.

- ID teams may want to consider decreasing canopy closure to less than 40% in those areas where the following three conditions can be met:
  - Treatment is consistent with ACS.
  - Treatment will set the stand on a trajectory to develop late-successional characteristics.
  - Near by Matrix land can provide connectivity until the canopy closure in the treated area exceeds 40%.
- See the bald eagle subsection of the wildlife recommendations for additional bald eagle habitat management recommendations.

Riparian Reserves inside the LSR:
- Follow LSR Assessment recommendations.
- Integrate treatments inside and outside the Riparian Reserves so they fit the larger landscape.

Other:
In pile and burn units, recommend leaving 1 brush pile per acre for small mammal species to use as hiding and nesting cover.

Species and Habitats - Botanical Species
Additional inventories, including on the ground surveys, are needed to identify, classify and set restoration priorities for the entire Watershed. Act on restoration opportunities as they are identified through the ID team process.

Restoration and protection of fire dependent scarce habitats will require the use of fire or a management action designed to emulate the affects of fire. These restoration opportunities include restoring or expanding small prairies associated with rock outcrops, and reestablishing fire prairies. Candidate sites for restoration include south face of Cherry Creek Ridge above Little Cherry Creek. Aerial photos indicate the south face of Coos Mountain is also a candidate site for restoration. Examine old aerial photography and other records to identify other prairie sites.

Obtain and propagate seed from native plants for restoration purposes.

Species and Habitats - Noxious Weeds
The most effective noxious weed strategy is to prevent their introduction in the first place. The second most effective method is to not allow noxious weeds to become established by immediately treating newly infected sites before the weeds can spread. Treat new infection centers as soon as possible, consistent with applying treatment during appropriate biological windows.

To prevent the spread of broom, wash vehicles used in the broom infected areas in the northern part of the Umpqua Resource Area before deploying those vehicles to the infection free/ lightly infected areas in the southern part of the Resource Area.

To reduce risk of establishing new noxious weed centers or introduction of new noxious weeds, wash heavy equipment before bring that equipment into the Watershed and wash heavy equipment when moving that equipment from noxious weed infested to noxious weed free areas inside the Watershed. This recommendation includes heavy equipment used to control wild fire.

Use seed and straw that is certified weed free. To reduce the risk of introducing new noxious weed species, use the more encompassing "all state" noxious weed list instead of the Oregon noxious weed list when setting standards for procurement of weed free seed and straw mulch.

Seed bare ground to provide vegetative competition and monitor equipment roads, cat trails, mechanically site prepped units and fire trails for noxious weeds. Kill those noxious weeds found through monitoring. Identify monitoring and seeding needs on a case by case basis for units thinned using ground-based equipment. Risk of noxious weed establishment on yarding roads in thinnings are a lesser concern where a partial canopy closure is retained and equipment is run on top a bed of slash.

Eradicate broom and gorse from BLM administered lands within the analysis area before the infestation intensifies. Isolated patches of noxious weeds and noxious weeds along travel corridors should be treated first.

- Broom sites
  - Shuck Mountain
  - John's Creek
  - Junction of Vaughns Creek Road, North Fork Cherry Creek Road, and Burn Mountain Road
  - Section 27, T.26S.,R.10W. areas along and around 26-10-26.0, 26-10-26.1, 27-11-29.0, and 25-10-35.0 roads.
  - Junction of Garbage Dump and Cherry Creek Roads
  - Burnt Mountain Road right-of-way
- Gorse
  - Garbage Dump Road area (sections 22, 23, & 27, T28S.,R,10W.) including areas on road to the Middle Overlook sale, near the pond, and cat trails around the Cherry Dump timber sale units.
  - Mckinley Garage Road in section 33, T.28S.,R11W.
  - New road off of Moon Creek
  - Mast Creek area in section 16, T.27S.,R.11W.
  - Unconfirmed reports of gorse in Vaughns Creek and Old Man's Road.

Manage noxious weeds consistent with the current District noxious weed E.A., and with the "Prototype Weed Prevention Measures" in Appendix 4 of *Partners Against Weeds an Action Plan for the Bureau of Land Management* (USDI 1996b).

Human Use

If we develop recreation facilities in Riparian Reserves, design those facilities so as not to prevent meeting the ACS objectives, and document this through the NEPA process.

Consider converting long roads, identified through the TMO process for decommissioning, into trails. These trails will provide access for administrative, fire control, and recreational purposes. We can convert the decommissioned roads into trails by using those portions of the road bed left intact after decommissioning, and constructing short trail segments to provide access around where we pull culverts or where road fills have been pulled back. The most cost effective time to convert a closed road to a trail may be at the time the road is closed and culverts pulled.

Discourage the establishment of new dispersed camp sites next to streams by blocking all temporary streamside access spurs upon project completion.

If we find one or more dispersed camp sites preventing the attainment of the Aquatic Conservation Strategy Objectives, exhaust other options to remedy the problem(s) before closing the problem sites to camping.

Aquatic Conservation Strategy

Riparian Reserve Widths: When considering altering Riparian Reserve widths, follow procedures for site evaluation outlined in *The Riparian Reserve Techniques and Synthesis - Supplement to Section II of Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis Version 2.2* (RRTT 1997). The Ecological Protection Width Needs Diagram (FEMAT 1993 pg. V-38, and USDA; USDI 1994 pg. B-15) provides guidance as to needed reserve widths based on slope and rock type. The North Fork Coquille Watershed Analysis, combined with a site specific NEPA analysis, can support a "Level I Analysis" that can result in alterations to the outer half of the interim Riparian Reserve on up to 10% of the intermittent stream reserve acres. Additional analysis may be needed if a proposed change would affect more than 10% of the acres or if the proposed change would reduce the Riparian Reserve width to less than half the site potential tree height.

Reducing interim Riparian Reserve widths on intermittent streams to a half-site potential tree could reduce the likelihood below 80% of having a well-distributed stable population over the next 100 years for some J2 species found in the Watershed. Refer to FEMAT (1993) and Holthausen *et al.* (1994) for an explanation of the ratings and mitigation measures for the J2. No modification of Riparian Reserves can be made until field evaluations are completed. Those evaluations must include a site specific determination on the presence of those J2 species and their habitat. If any of those species (or suitable habitat for those species that is likely to be used) are found present inside the interim Riparian Reserve, then the Riparian Reserve width on intermittent streams in that area will remain at the 1-site potential tree width. Management activity inside that area of the Riparian Reserve should be in the long term either neutral or beneficial for those J2 species, and it should always be consistent with the Aquatic Conservation Strategy objectives. If the J2 species, and their habitats, that are considered dependent on the full interim Riparian Reserve width for intermittent streams are absent, then reducing the Riparian Reserves in intermittent streams to the width needed to provide protection to aquatic and hydrologic values can be implemented.

Post-Catastrophic Event Salvage: Allow salvage operations inside the Riparian Reserve when necessary to attain the ACS objectives and so long as present and future woody debris needs are met (USDI 1995). In the context of the ACS objectives, salvage activities inside the Riparian Reserve may be needed and therefore justifiable to obtain sufficient planting spaces for rapid reforestation, and to reduce hazards created by a catastrophic event that may further threaten the function of the Riparian Reserve. If a catastrophic disturbance occurs in the Watershed, apply the salvage and CWD retention guidelines in the South Coast- Northern Klamath Late-Successional Reserve Assessment (USDI; USDA 1998, pg. 72, 73) to the Riparian Reserve:

- The following recommendations for minimum down wood retention following partial salvage are based on Spies and Franklin (1991), Spies *et al.* (1988), and Ursitti (1990):
  - First site potential tree height – 3,600 - 9,400 cubic feet/ acre (includes all wood 4-inches in diameter and 1-meter long and larger).
  - Second site potential tree height– 1,600 - 2,300 cubic feet/ acre (includes all wood greater than 4-inches on the large end).
- Retain all green conifer trees likely to survive. On sites supporting hardwood stands that are not candidates for hardwood conversion, retain green hardwoods to the extent that doing so will allow attainment of the ACS objectives and will allow the replacement stand to be put on a trajectory to develop late-successional/ old-growth characteristics.
- Retain all soft snags to the extent practical. Following a salvage activity that is in response to large scale disturbances, retain at least 24 hard snags per acre of the largest diameter available on-site, and that are greater than 16-feet tall.

Retain, and save to the extent practical all decay class III, IV and V down wood. Retain sufficient decay class I and II down wood to insure an adequate future supply of decay class III, VI and V down wood.

Should blowdown occur next to a stream, retaining those trees that fall across or into the stream to the extent consistent with protecting habitat and down stream values. Retention of blowdown material in the streams will allow that material to provide dead shade and by that partially mitigate the loss of shade from standing trees.

Data Management: Correct the following in the GIS roads data base (GTRN):

- The 27-10-6.2D road is currently shown as open. That road segment was decommissioned in 1999.
- The GIS theme shows a NKN control road extending east from the end of the 27-10-6.2D segment. The NKN segment is part of the BLM controlled 27-10-6.2D segment and was also decommissioned in 1999.
- The 27-11-5.0 road, shown on the blueline road maps extending through sections 24, 30, 31 & 32, T26S,R11W., is recorded in GIS as a BLM controlled road. Correspondence records show BLM recently requesting conditions of use for that road, indicating that the road is not BLM controlled.
- GIS show the 27-12-35.0 road as BLM controlled. That road accesses private land, suggesting that at least the western end of that road may be private control.
-

Density Management and Conversion Treatments and Attaining Riparian Reserve Function
The following recommendations are for Riparian Reserve stands that are less than 80-years old:

Snags: Several of the following snag management recommendations are drawn from the LSR Assessment (USDI; USDA 1998). The intent is to provide consistency between the recommendations for the Riparian Reserve and the Late-Successional Reserve.

Manage stands to attain snag sizes, numbers, and decay classes that will support 100% of potential population levels of those primary excavator species using the Watershed by stand age 100-years.

Use stand growth models, or other techniques, to design density management treatments to put the stands on a trajectory to produce 17-inch dbh snags by age 60-years, and 20-inch dbh and larger snags by age 100-years.

If it is necessary to kill trees to provide snag and down wood habitat, select trees to kill from among the smaller two-thirds of the trees in the stand. Killing trees from among the larger third of the trees in the stand will delay attainment of other late-successional attributes and would select against the trees that are best adapted to the site.

The following table shows the minimum sizes and numbers that will meet the 100% population level objective:

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 40 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)			
Number of snags needed to support a 100% population	11+	8	8	16	6.4	0.2
	15+	237	0	237	94.8	2.4
	17+	100	24	124	49.6	1.2
	25+	6	0	6	2.4	0.1
	Totals:	**351**	**32**	**383**	**153.2**	**3.8**

The above table shows the minimum sized snags that the primary excavator species can use. The primary excavator species prefer to use larger snags when available (20-inch dbh minimum, at least 30-inch dbh

average). Therefore, manage Riparian Reserve stands to provide 3.8 snags per acre greater than 20-inches dbh by age 100-years, where it is practical to do so without delaying attainment of other late-successional habitat attributes or preventing attainment of ACS objectives in the long term.

On a site by site basis, ID teams may defer attaining snag levels supportive of 100% of potential population levels if the ID team finds that attaining the snag recommendations would delay attainment of scarce late-successional habitat attributes, or would prevent the attainment of ACS objectives in the long term.

Down Wood: Manage stands so that when the stands are 80-years old, they will have the potential to attain the following levels of down wood. These recommendations for down wood attainment are based on Spies and Franklin (1991), Spies *et al.* (1988), and Ursitti (1990):

- First site potential tree height – 3,600 - 9,400 cubic feet/ acre (includes all wood 4-inches in diameter and 1-meter long and larger).
- Second site potential tree height– 1,600 - 2,300 cubic feet/ acre (includes all wood greater than 4-inches on the large end).
- At least 255 cubic feet of decay class I or II[4]. Where possible and consistent with obtaining other late-successional stand characteristics, obtain decay class I and II amounts comparable with the upper end of the range observed in old-growth (385 cubic feet/ acre). These higher levels would enhance habitats for large woody debris associated species and would compensate for those areas where large woody debris amounts are near or below the natural variability.

Meeting these levels of down wood may be unobtainable, or in some cases, undesirable in younger stands. However, density management treatment designs should put stands on a trajectory to attain these levels by stand age 80-years, or provide for supplementing down wood levels through future projects.

Best Management Practices (USDI 1995, Appendix D) state that naturally occurring down logs will not be removed from Riparian Reserves except for the benefit of the stream or Riparian Reserve, or where there is a reasonable expectation of damage to down stream users' improvements resulting from floatable debris mobilized during infrequent foods. Circumstances where removing down wood may be benefit the Riparian Reserve include but not limited to obtaining suitable numbers of plantable spots when re-establishing conifers on a conifer site, or when reforesting following a catastrophic event. Removal of some wood debris and snags may be needed to create fuel breaks to reduce the risk of catastrophic fires or reburns. Removal of trap logs and excessive new mortality may be needed to protection of the green trees from insect caused mortality.

Stand Selection for Density Management:

- Focus efforts on stands that were regenerated following timber harvest and on previously thinned stands.
- The higher priority stands for density management are the younger stands because they will more readily respond to treatment. These stands are generally less that 45 years old.

Density Management and Landscape Patterns: Manage for landscape level diversity rather than attempting to maximize diversity within all stands. A practice of maximizing within stand diversity in all stands will result in decreased diversity between stands and by that lower landscape level diversity. Use fire patterns as a model for managing for landscape level diversity. Sources of information on fire patterns applicable to the North Fork Coquille Watershed are in:

[4] ROD/RMP CWD direction for the Matrix rule is retain at least 120 lineal feet of decay class I & II logs that are at least 16"X16'. A 16' long log, 14" small end & 16" large end, contains 19.7 cubic feet. If we obtain the minimum standard of 120 lineal feet of logs that are 16'X16" (7.5 16-ft logs/ acre), we will have 147.75 cubic feet/ acre. Spies & Franklin (1991) show the following levels of decay class II material 4" diameter & larger by age class: 13 to 64 cubic feet in 40 to 80-yr old stands; 56 to 255 cubic feet in 80 to 195-year old stands and 137 to 385 cubic feet in older stands.

- Appendix: Fire History and Fire Pattern Affects on Stand Development and Landscape Patterns on the Umpqua Resource Area With Emphasis on the North Coquille, Middle Creek and Tioga Creek Subwatersheds.
- Managing for Landscape Level Diversity Based on Observed Disturbance and Stand Development Patterns Appendix.
- South Coast - Northern Klamath Late-Successional Reserve Assessment (USDA; USDI 1998): Appendix B. - Fire History, Patterns, and Stand Level Effects in the Hemlock Zone.

These sources indicate forests that regenerated following a single stand replacement fire, which were not subsequently modified by a moderate severity disturbance, exhibit the following landscape patterns:

- Stands on the north aspects and riparian areas exhibit the greatest stand structural complexity
- Stands on south aspects tend to be more uniform, less structurally complex but do exhibit characteristics that are less common on the north aspect stands.
- Benches, riparian zones, moist stable headwalls, and areas subject to frequent low to moderate severity fires are the most likely areas for green tree patches to survive stand replacement events.

Density Management Design Features to Provide and/or Protect Habitats: Minimize soil and litter disturbance and the loss of down wood by using the least ground disturbing logging system practical for the site. This would benefit terrestrial amphibians (Density Management Appendix). On projects where we will need to do site preparation to obtain understory regeneration, provide refuge areas such as untreated patches, and clusters of large woody debris. The Density Management Appendix suggests other activities to consider in density management projects that will benefit wildlife and protect or provide wildlife habitats.

Retain existing late-successional associated elements found in the stand. For example retain wolf trees, remnant old trees, and large down wood. Retain hardwoods to the extent that their retention does not prevent or delay attainment of late-successional characteristics.

On appropriate locations on the landscape, increase stand level diversity by cutting gaps, leaving unthinned clumps, and creating snag patches. Intentionally increase the size of natural gaps by cutting and removing trees around rock outcrops, and thin soil-rockland areas.

No-treatment and Special-treatment Buffers next to Streams: Table DM-1 describes the opportunity costs and benefits associated with both passive and active restoration strategies with respect to attaining the intended functions of the Riparian Reserve. ID Teams can use the information in Table DM-1 to develop stand prescriptions that combine passive restoration and active treatments to optimize stream, riparian stand and upland forest restoration. The decision space described by Table DM-1 is as follows:

- The analysis in Table DM-1 shows the minimum no-treatment forested buffer needed along streams to have a width of 20-feet or a width equal to half the tree crown diameter of the streamside trees, whichever is wider. A 10 to 20-foot no-treatment stream side buffer is recommended next to brushfield conversion projects.
- Functionally, the widest forested buffer needed to protect aquatic values is a width equal to half the height of the overstory trees on the site at the time of treatment. These buffers are zones where passive and active restoration strategies are blended to optimize short term protection with long term restoration. ID teams may identify sites where it is appropriate to use no-treatment buffers that are wider than 20-feet or wider than half a tree crown width. However, relying solely on a passive restoration strategy can greatly delay attainment of some Riparian Reserve functions and perpetuate stand conditions associated with densely stocked plantations.
- Table DM-1 shows an array of treatments next to streams and buffer widths, which fall between the extremes described above, can benefit attainment of both aquatic protection and Riparian Reserve function. This is provided the buffers are designed to meet site specific needs and the prescriptions

take advantage of protection provided by aspect and topographic position.
- The no-treatment and special treatment buffers widths discussed above are based on slope distances.

Stand conversion projects:
Threshold for considering conversion treatment - Mixed stands with 40 or 50 well-spaced, established, free to grow conifer per acre may be on a trajectory to become old-growth without additional treatment.

Deciding between a conversion or a release treatment - Give higher priority to treating stands with releaseable conifer than to stands that have to be converted by cutting down the current stand and starting over. Stands with at least 40 well-spaced releaseable conifers per acre are candidates for a release treatment.

On sites where alder stands will be converted to a conifer or mixed stands:
- Retain all releaseable conifers.
- Retain existing conifer snags and conifer CWD.
- Retain myrtles, bigleaf maples, and other long lived hardwood trees to the extent that doing so is compatible with establishing a conifer component on the site.
- Where large live myrtles and bigleaf maples are present on conversion units, ID teams may want to experiment with providing cavity habitat by pruning up to 3 large limbs/ acre. This would encourage formation of rotten limb stumps that can eventually provide cavity habitat for excavator species.
- Where practical, retain at least two alder logs/ ac that are at least 12 inches in diameter on the large end and at least 16 feet long. When the alder trees in a stand are too small to generally supply 12 inch or larger diameter logs across the unit, then the ID team is encouraged to set CWD retention levels compatible with the piece sizes the alder stand can provide.

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